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## Predicting COVID-19 Risk Information-Seeking Behaviors in Relation to Food Purchasing Concerns

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# Predicting COVID-19 Risk Information-Seeking Behaviors in Relation to Food Purchasing Concerns

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*COVID-19 drastically altered the way consumers shopped for food as they had to adhere to recommendations for social distancing. However, the public has been divided across political parties in their assessment of the severity of COVID-19 and must filter through misinformation related to the pandemic to make informed choices for personal safety. Therefore, the purpose of this study was to explore the influences on Oklahoma consumers' risk information-seeking behaviors about COVID-19 within the context of risk perceptions while shopping for food. The Risk Information Seek and Processing (RISP) model and cultural cognition provided the framework for this study. An online instrument was distributed to Oklahoma consumers to collect quantitative data (n = 410). Respondents reported they were only slightly concerned while making food purchases and possessed moderately high knowledge about COVID-19. They also reported needing moderately high knowledge to make judgments about the issue. Additionally, the respondents engaged more often in systematic processing of COVID-19 information compared to heuristic processing, but neither agreed nor disagreed that they engaged in active information-seeking behaviors. The findings from this research provide Extension agents and agricultural communicators guidance for creating and researching risk communication during a pandemic in relation to food purchasing behaviors.*

*Keywords:* COVID-19, risk communication, information seeking and processing, food purchases, pandemic

“For the first time in a generation, Americans began spending more money at the supermarket than at places where someone else made the food” (Severson, 2020, para. 2). This change in food purchasing patterns was the direct result of the 2020 SARS-CoV-2 pandemic, otherwise known as COVID-19 or the novel coronavirus (Yuen et al., 2020). This pandemic caused widespread shutdowns across the United States as Americans were encouraged to practice social distancing to prevent the transmission of COVID-19 (Centers for Disease Control and Prevention [CDC],

2020). Specifically, people were encouraged to stay at least six feet apart while wearing face masks and to limit contact with people outside their houses to reduce the spread of the virus (CDC, 2020). Even with these recommendations in place, the COVID-19 virus infected at least seven million Americans and took the lives of more than 200,000 across the nation by October 2020 (World Health Organization [WHO], 2020). By spring 2021, COVID-19 vaccines were broadly distributed across the United States, and social distancing restrictions and mask mandates were lifted across the country (“See Reopening Plans,” 2021). However, only 50% of the United States population was fully vaccinated by August 2021 (CDC, 2021b), and the total number of COVID-19 infections had increased to 30 million cases with more than 600,000 deaths (CDC, 2021c). Because of the pandemic’s broad reach, Extension specialists and agricultural and science communicators need to understand Americans’ risk perceptions and risk information-seeking behaviors related to COVID-19. Exploring these risk perceptions within the context of food purchasing behaviors is particularly interesting because food purchasing behaviors were changing even before the pandemic (Holcomb et al., 2021), so the questions and concerns people have about where they purchase their food have likely evolved. Understanding risk-information-seeking behaviors related to food purchasing behaviors during the ongoing pandemic can lead to education campaigns and Extension programming in the future to help disseminate accurate information to the public during a public health crisis.

Because COVID-19 spread through respiratory water droplets and aerosol, the CDC (2021a) provided guidelines stating indoor activities were riskier than outdoor activities, and the likelihood of transmission increased the more time people spent around individuals who may have been infected. These guidelines for social distancing caused governors and mayors across the country to issue shelter-in-place orders that shut down businesses and encouraged people to stay home during March and April 2020 (Miller, 2020). However, essential businesses could stay open, which included healthcare, public utilities, food production and delivery services, and grocery stores (Chabon et al., 2020). The closure of indoor restaurants and bars, coupled with the threat of COVID-19, altered the way Americans shopped for food, even six months after the start of the pandemic (Severson, 2020). These food purchasing behavioral changes included fewer trips to the stores, more online grocery purchases, and increased interest in purchasing locally produced food (Severson, 2020). Even though online grocery shopping became more common during the pandemic, in-store shopping for food remained the mode of shopping for most Americans (Holcomb et al., 2021).

As government restrictions on businesses lifted and the country reopened after the onset of the pandemic, consumers needed to start making decisions for themselves about how they practiced personal protection against COVID-19. Despite scientific consensus on both the severity of COVID-19 and proper preventative measures (Mayo Clinic, 2020), there was a sharp divide between political groups regarding the severity of COVID-19 and steps individuals should take to control the spread of the virus (Pew Research Center, 2020a). While most Republicans and Democrats identified COVID-19 as a threat to the economy, Democrats viewed the virus as a

public health threat by more than 40 percentage points compared to Republicans as of May 2020 (Pew Research Center, 2020a). By June 2020, most Republicans believed the worst part of the pandemic was over, while 73% of Democrats believed the worst was still to come (Pew Research Center, 2020b).

Along with this vast disparity in COVID-19 concerns across political parties, there has been a barrage of misinformation and conflicting information related to the pandemic. Joszt (2020) described this occurrence as an infodemic or “an overabundance of information—some accurate and some not—that makes it hard for people to find trustworthy sources and reliable guidance when they need it” (para. 3). Researchers have identified more than 2,000 cases of misinformation related to COVID-19 across 87 countries (Joszt, 2020). One piece of misinformation led people to ingest highly concentrated alcohol, causing 800 deaths and nearly 6,000 hospitalizations across the globe (Joszt, 2020), thus demonstrating the severe implications of the spread of misinformation.

Extension agents have indicated the spread of misinformation, complexity of scientific issues, and presence of political agendas were critical barriers to their ability to communicate about contentious topics to stakeholders (Leal et al., 2020), and COVID-19 is a perfect representation of all these issues (Joszt, 2020; Pew Research Center, 2020a). Therefore, understanding how consumers seek and process risk information related to the COVID-19 pandemic will be critical in aiding Extension specialists to develop public health campaigns and programming related to the pandemic or future public health crises in an effort to combat these communication barriers. For example, the importance of effective risk communication could be seen as vaccine hesitancy in the United States contributed to the spread of the delta variant of COVID-19 over the summer of 2021 (Mandavilli, 2021). The threat of COVID-19 will decrease eventually, but it will not be the last pandemic in an increasingly global society. Pandemic risk was documented before COVID-19, so there is a need to learn from the COVID-19 pandemic to avoid similar consequences in the future (National Academy of Sciences, 2016). Therefore, the purpose of this research was to explore the influences on consumers’ risk information-seeking behaviors related to COVID-19 transmission and food purchasing behaviors.

### **Theoretical Framework**

The Risk Information Seeking and Processing (RISP) model (Griffin et al., 1999) and cultural cognition (Douglas, 1970, 1982; Kahan, 2012) provided the theoretical framework for this study. The RISP model was initially developed to understand how people respond to information about risk because researchers understood that the daily processing of information can be biased, incomplete, and without effort (Griffin et al., 1999). The model builds on the heuristic-systematic model (HSM; Eagly & Chaiken, 1993) and Ajzen’s (1991) theory of planned behavior to account for social, psychological, and communication factors to predict risk information-seeking and information-processing behaviors.

The model proposes that an individual's characteristics, including demographics and political ideology, will influence their perceptions of risks (Griffin et al., 1999). The model assumed that perceived risks would trigger individuals to assess how much they knew about the topic being communicated and their current knowledge (in)sufficiency or how much they needed to know about the topic to make proper risk judgments. This gap between what people know and what they think they need to know is called information insufficiency, and it is a driving factor for an individual's desire to seek information about the topic (Griffin et al., 1999). In addition to seeking information related to the topic, the model examines the influence on how the information is processed. The two processing routes are systematic (e.g., active, engaged, and thoughtful) and heuristic (e.g., passive, superficial, and habitual). The model also accounts for past hazard experiences, informational subjective norms, relevant channel beliefs, and perceived information-gathering capacity to predict information-seeking and processing behaviors (Griffin et al., 1999).

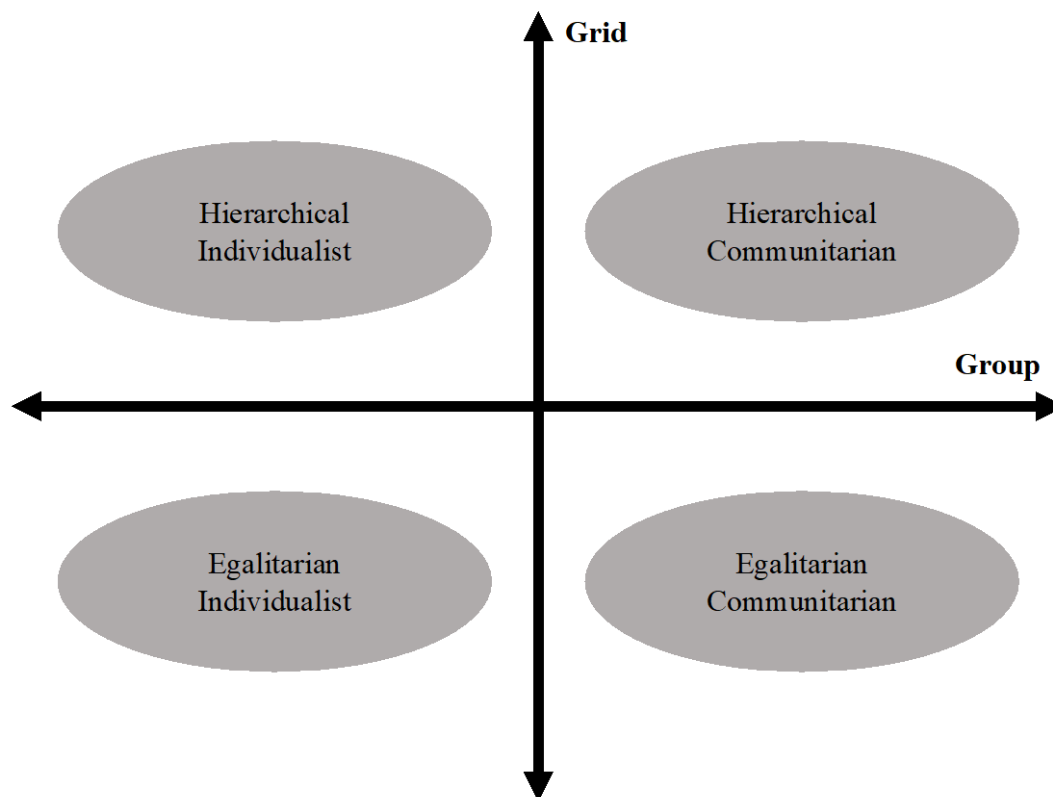
Due to the complex nature of the RISP model, researchers often choose to focus on specific variables of interest from the model (Cross et al., 2018; Hmielowski et al., 2018; Lu et al., 2020; Yang et al., 2019). This study identified individual characteristics, risk perceptions, knowledge (in)sufficiency, current knowledge, heuristic processing, systematic processing, and information-seeking behaviors as the variables of interest. Risk communication researchers have applied this model across multiple contexts and found it performed the best when research subjects identified the risk context to be both important and familiar (Yang et al., 2013). Within the context of smoke emission from prescribed wildfires, Rose et al. (2017) concluded that risk-seeking behaviors were influenced by information insufficiency, and information insufficiency was influenced by concern related to smoke emissions. Similarly, Lu et al. (2020) identified information insufficiency as a predictor of risk-seeking information related to vaccinations, along with emotional responses to vaccinations.

Griffin et al. (2004) concluded personal characteristics like age, race, income, and education could influence risk information-processing and seeking behaviors. Additionally, Yang et al. (2014) found political ideology an important variable in the model, with Republican participants less likely to process climate change systematically compared to Democrat participants. Researchers commonly used political ideology when testing the RISP model, which scholars have critiqued due to the unidimensional approach to ideology (Feldman & Johnston, 2014; Jost et al., 2009). However, cultural cognition outlines two underlying worldviews that influence ideology (Kahan, 2012), which Hmielowski et al. (2018) proposed was an appropriate alternative to a unidimensional political ideology measure.

The cultural worldviews described in cultural cognition included group (i.e., individualist to communitarian) and grid (i.e., egalitarian to hierarchy; Douglas, 1970, 1982; Kahan, 2012). People who score high on the grid scale believe there should be role differentiation in society (i.e., hierarchy), which implies duties, offices, and entitlements should be distributed based on

social classification (e.g., gender, age, race). Low-scoring individuals on the grid scale believe that social classification should be accessible by all (i.e., egalitarian; Kahan, 2012). For the group scale, high-scoring individuals have a communitarian worldview where they believe people depend on one another for success; therefore, the needs of the community should be met to help reach those goals. A low score on the group scale is indicative of an individualist worldview, where an individual meets their goals alone without assistance from the community (Kahan, 2012). These group and grid variables interact to form four categories of worldviews: hierarchical individualist, hierarchical communitarian, egalitarian individualist, and egalitarian communitarian (see Figure 1). These groups respond to risk information differently. For example, hierarchical individualists have been found to be dismissive of environmental and technology risks (Kahan, 2012).

**Figure 1. Cultural Cognition Categories**



*Note.* Figure adapted from “Cultural Cognition as a Conception of the Cultural Theory of Risk,” by D. M. Kahan, 2012. In *Handbook of Risk Theory: Epistemology, Decision Theory, Ethics, and Social Implications of Risk*. Springer.

Hmielowski et al. (2018) integrated these variables into the RISP model for a study related to water quality and determined that individuals with high group and low grid scores (i.e., egalitarian communitarians) perceived greater risk. Additionally, higher levels of risk perception lead to increased information-seeking behaviors and systematic processing but lower heuristic

processing (Hmielowski et al., 2018). Hmielowski et al. (2018) also found a positive relationship between systematic processing and risk information-seeking behaviors and a negative relationship between heuristic processing and risk information-seeking behaviors.

To understand the influences on consumers' risk information-seeking behaviors for COVID-19 transmission, concepts from the RISP model and cultural cognition theory were used to guide this research. Personal characteristics, including demographics and cultural cognition, along with risk perception, knowledge (in)sufficiency, current knowledge, heuristic processing, systematic processing, and information-seeking behaviors were explored in this study.

### **Purpose & Objectives**

The purpose of this research was to explore the influences on Oklahoma consumers' risk information-seeking behaviors related to COVID-19 transmission. This research explored risk perception within the context of food-purchasing behaviors during the COVID-19 pandemic to help agricultural communicators develop appropriate risk communication messaging and campaigns. The following objectives guided this study:

1. Describe Oklahoma consumers' cultural cognition.
2. Describe Oklahoma consumers' risk perceptions related to COVID-19 and food-purchasing behaviors.
3. Describe Oklahoma consumers' knowledge and knowledge (in)sufficiency related to COVID-19.
4. Describe Oklahoma consumers' information-seeking and processing behaviors related to COVID-19.
5. Identify the influence of demographics, cultural cognition, and RISP variables (i.e., knowledge, knowledge (in)sufficiency, risk perceptions, heuristic processing, systematic processing) on Oklahoma consumers' information-seeking behaviors related to COVID-19.

### **Methods**

Quantitative methods were used to fulfill the purpose of this study. An online questionnaire was distributed in July and August of 2020 via the survey company Qualtrics to collect the data. The questionnaire consisted of four sections of questions about local food perceptions and food-buying behaviors. One of the sections consisted of questions related to COVID-19, which are reported in this paper. Oklahoma consumers were the target population for this research, and all responses were kept anonymous to encourage honest responses. Data collection began the week after the state's governor contracted COVID-19, and the state experienced a recent influx in



COVID-19 cases (LaCroix, 2020; Wamsley, 2020). During 2020, people in Oklahoma shopped for groceries in person, mostly at Walmart Supercenters (Holcomb et al., 2021). It should also be noted that approximately 15% of the state's households live with food insecurity, which is higher than the national average (America's Health Rankings, 2022). Oklahoma was also of particular interest for this study because it had the sixth-highest death rate from COVID-19 in the country (Elflein, 2022), thus demonstrating the severe impact of COVID-19 across the state.

Quota sampling, a form of non-probability sampling, was used to help increase the generalizability of the findings to overcome the limitations of probability sampling's increasing coverage issues and poor response rates (Baker et al., 2013; Dillman et al., 2014). Filter questions were used at the beginning of the instrument to ensure respondents matched demographic quotas for gender, Hispanic/Latino status, and race based on 2019 U.S. Census estimates for Oklahoma (U.S. Census Bureau, 2019). The quotas had to be adjusted due to issues recruiting respondents who were American Indian or Alaska Native, so that group is underrepresented in the study, which is a sampling limitation. There were 410 complete and usable responses ( $n = 410$ ). A description of the respondents' demographics and associated Oklahoma quotas has been included in Table 1.

**Table 1. Quota Sample and Population Demographics**

	Sample ( $n = 410$ )	Oklahoma Population
	%	%
Gender		
Male	48.7	49.5
Female	51.1	50.5
Hispanic/Latino	10.7	11.1
Race/Ethnicity		
White alone	74.7	74.0
Black or African American alone	7.5	7.8
Asian alone	6.8	2.4
American Indian or Alaskan Native	1.9	9.4
Two or More Races	2.8	6.3
Other	6.1	Other

In addition to the quotas presented in Table 1, respondents were asked about their education, income, and if they lived with a child under the age of 18. Approximately 6.3% of the respondents had less than a high school degree/GED, 29.0% had a high school degree/GED, 26.3% had some college experience with no degree, 7.8% had a 2-year degree, 19.7% had a 4-year degree, and 10.9% had a graduate/professional degree. For total household income, 35.5% made less than \$25,000, 27.7% made \$25,000 to \$49,999, 24.6% made \$50,000 - \$99,999, and 12.2% made \$100,000 or more. Additionally, 43.6% of the respondents reported children under the age of 18 living in their homes. The average age of the respondents was 38.17 ( $SD = 12.74$ ),

ranging from 18 to 64. According to the 2019 Oklahoma Census, 25.5% of the population over the age of 25 had earned a bachelor's degree or higher, and the median household income was approximately \$53,000 (U.S. Census Bureau, 2020). Differences between sample demographics and population demographics should be considered when interpreting the findings of this study.

Eight questions from the COVID-19 section of the survey were analyzed in this research. These questions were adapted from a previous study that explored the role of the RISP model and cultural cognition on consumers' risk perceptions related to water quality (Hmielowski et al., 2018). Additionally, cultural worldviews were measured through two separate variables: grid (i.e., egalitarian to hierarchy) and group (i.e., individualist to communitarian; Kahan, 2012).

A four-item, five-point Likert-type scale was used to measure grid (i.e., egalitarian to hierarchy). The scale was adapted from prior research (Hmielowski et al., 2018; Kahan, 2012); the items remained the same, but the scale was changed from a six-point to a five-point scale. The scale had the following labels: 1 = *strongly disagree*, 2 = *disagree*, 3 = *neither agree nor disagree*, 4 = *agree*, and 5 = *strongly agree*. Respondents reported their level of agreement with the following items: "We have gone too far in pushing equal rights in our country," "Our society would be better off if the distribution of wealth was more equal," "We need to dramatically reduce inequalities between the rich and the poor," and "Discrimination against minorities is still a very serious problem in our society." Items were coded so a lower score indicated egalitarian worldviews and higher scores indicated hierarchical worldviews. The scale was found to be reliable, with a Cronbach's alpha of .78 (Field, 2013). The four items were averaged to create the grid worldview construct.

A four-item, five-point Likert-type scale was used to measure the group worldview (i.e., individualist to communitarian). This scale was also adapted from Hmielowski et al. (2018) and Kahan's (2012) research. The same labels as the grid measurement were used, and the items remained the same. Respondents were asked to report how much they agreed or disagreed with the items on the scale, including "Government interferes too much in our everyday lives," "Sometimes government needs to make laws that keep people from hurting themselves," "Government should put limits on the choices individuals make so they don't get in the way of what's good for society," and "It's not the government's business to try to protect people from themselves." Items were coded so that lower scores indicated an individualist worldview while higher scores indicated a more communitarian worldview. Even though this scale has been published in prior research (Hmielowski et al., 2018), Cronbach's alpha was .53, which is below the threshold of .70 to consider a scale reliable (Field, 2013). Removing an item did not increase the reliability of this scale; however, Nunnally (1978) reported reliability above .50 can be acceptable in social science research or during early stages of scale development. The four items were averaged to create the group construct. Additional discussion for the reliability of this scale has been included in the recommendations section of this paper.

Perceived risk of food-purchasing behaviors during COVID-19 was measured through a five-item, five-point Likert-type scale with the following labels: 1 = *not at all concerned*, 2 = *slightly concerned*, 3 = *moderately concerned*, 4 = *very concerned*, and 5 = *extremely concerned*. Respondents were asked how concerned they were to engage in the following activities over the past seven days: shopping in grocery stores, shopping at farmers markets, eating at restaurants, ordering takeout from restaurants, and purchasing food directly from farmers and ranchers. These items were averaged to create the risk perception construct (Cronbach's  $\alpha = .90$ ). Real limits were created to aid in the interpretation of the findings (Sheskin, 2004). The real limits for this scale were as follows: 1.00–1.49 = not concerned, 1.50–2.49 = slightly concerned, 2.50–3.49 = somewhat concerned, 3.50–4.49 = concerned, and 4.50–5.00 = extremely concerned.

Knowledge and knowledge insufficiency were measured on 10-point Likert-type scales with varying question stems. The question stems for the knowledge variable stated, "Please indicate how much knowledge you have about the following topics." The stem for knowledge insufficiency stated, "Please indicate how much knowledge you think you need on these topics in order to make judgments on these issues." Both scales were adapted from Hmielowski et al. (2018), which used a scale that ranged from 0 = *nothing at all* to 100 = *everything*. The scale was changed to 10 points to make it more user-friendly for mobile devices and laptops with the same anchoring labels at 0 and 10. Both indexes included the following five items: COVID-19 transmission, COVID-19's impact on the food supply, the risk of contracting COVID-19 inside, and the risk of contracting COVID-19 outside. Both the knowledge (Cronbach's  $\alpha = .91$ ) and knowledge insufficiency (Cronbach's  $\alpha = .96$ ) indexes were reliable, and the items in each scale were average. The real limits created for knowledge and knowledge insufficiency were 1.00–2.49 = limited knowledge, 2.50–4.49 = slight knowledge, 4.50–6.49 = moderate knowledge, 6.50–8.49 = moderately high knowledge, and 8.50–10.00 = high knowledge.

Heuristic processing and systematic processing were measured using two different four-item, five-point Likert-type scales adapted from Hmielowski et al. (2018). The scales used the same labels as the cultural cognition indexes. Both indexes asked respondents to indicate their level of agreement with the presented items. Items used to measure heuristic processing included, "When I see information about COVID-19, I rarely spend much time thinking about it," "There is far more information on COVID-19 than I personally need," "When I encounter information about COVID-19, I focus on only a few key points," and "If I need to make a decision impacted by COVID-19, the advice of one expert is enough for me." These items were averaged to create the heuristic processing index (Cronbach's  $\alpha = .75$ ). The items measuring systematic processing included, "After I encounter information about COVID-19, I am likely to stop and think about it," "If I need to make a decision impacted by COVID-19, I want as many viewpoints as possible," "When I encounter information about COVID-19, I read or listen to most of it, even though I may not agree with the perspective," and "After taking the time to think about COVID-19, I have a broader understanding of the topic." These items were found to be reliable (Cronbach's  $\alpha = .81$ ), and the systematic processing index was created by averaging the items.

The following real limits were created to interpret these scales: 1.00–1.49 = strongly disagree, 1.50–2.49 = disagree, 2.50–3.49 = neither agree nor disagree, 3.50–4.49 = agree, and 4.50–5.00 = strongly agree.

Information seeking was measured with a five-item, five-point Likert-type scale that asked respondents how much they agreed or disagreed with the associated statements. This scale was also adapted from Hmielowski et al. (2018) and used the same labels as the information processing scales. Items included, “When COVID-19 information comes up, I am likely to tune it out,” “When COVID-19 information comes up, I go out of my way to avoid learning more about it,” “Gathering a lot of information about COVID-19 is a waste of time,” “When the topic of COVID-19 comes up, I try to learn more about it,” and “When it comes to COVID-19, I am likely to go out of my way to get information.” Items were recoded so a higher score indicated increased levels of active information seeking and averaged to create the index (Cronbach’s  $\alpha = .82$ ). The same real limits for the information processing scales were used to interpret information-seeking behaviors.

All data were imported and analyzed in Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics were used to report objectives one through four. Objective one also includes a scatterplot to visualize the cultural cognition of the respondents. Hierarchical linear regression was used to fulfill objective five. Similar to past research (Cross et al., 2018; Lu et al., 2020; Rose et al., 2017), the risk information-seeking behavior index served as the dependent variable for this model. A hierarchical regression was used for this study to understand the unique amount of variance the cultural cognition and RISP variables could account for in predicting risk information-seeking behaviors, which reflected past RISP research approaches (Cross et al., 2018). The first model included demographic variables of age, income, education, gender, and if respondents were parents/guardians of children younger than 18. Gender and children in the house were nominal variables and dummy coded for analyses. The group with the largest number of cases was treated as the control and coded as “0” (gender = *female*, children = *none*). Cultural cognition variables, including group (i.e., individualist to communitarian) and grid (i.e., egalitarian to hierarchy), were added to the second model because political ideology has been linked to COVID-19 concerns (Pew Research Center, 2020a, 2020b) and therefore was assumed to be of importance (Field, 2013). The third and final model added the RISP variables, including risk perception, knowledge, knowledge insufficiency, heuristic processing, and systematic processing.

All assumptions were met for the hierarchical regression. The skewness and kurtosis for the independent and dependent variables were between  $\pm 2$ , so assumptions for normality were met. Additionally, the variance inflation factors (VIF) and tolerance were within acceptable ranges (i.e., less than 10 and greater than .20, respectively), which decreased the threat of multicollinearity (Bowerman & O’Connell, 1990; Field, 2013; Menard, 1995).

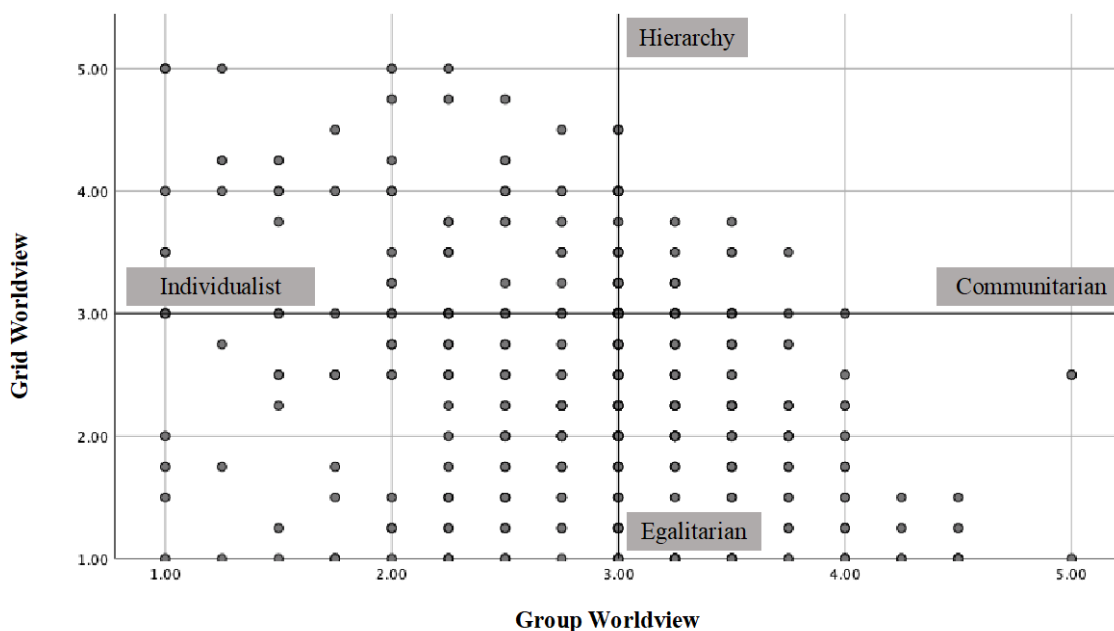
Cognitive interviews were conducted with two Oklahoma residents to help ensure face and content validity. After the cognitive interviews, items were adjusted for clarity and usability on different digital devices. The instrument was also reviewed by two individuals in Oklahoma with expertise in local food.

## Results

### Objective 1: Cultural Cognition

The group measurement (i.e., individualist to communitarian) had an average of 2.87 ( $SD = 0.74$ ), while the grid measurement (i.e., egalitarian to hierarchical) had an average of 2.46 ( $SD = 0.95$ ). A scatterplot of the group and grid variables has been presented in Figure 2 to visualize the distribution of cultural cognition within the sample. The respondents skewed toward individualist group views with both hierarchical individualist and egalitarian individualists.

*Figure 2. Respondents' Cultural Worldviews*



### Objective 2: COVID-19 Risk Perception

Respondents' reported risk perception related to purchasing food during COVID-19 was 2.43 ( $SD = 1.12$ ). This score indicated respondents were slightly concerned when engaging in food-purchasing behaviors.

### Objective 3: Knowledge Insufficiency

Respondents' reported knowledge related to COVID-19 transmission was 6.63 ( $SD = 2.01$ ), and their knowledge insufficiency related to COVID-19 transmission was 7.17 ( $SD = 2.44$ ). Both of these scores indicated respondents believed they possessed moderately high knowledge and needed to have moderately high knowledge when it came to COVID-19.

### Objective 4: Information Processing and Seeking Behaviors

Respondents neither agreed nor disagreed that they used heuristic processing ( $M = 2.81$ ,  $SD = 0.89$ ) when exposed to COVID-19 information. However, they did agree they used systematic information processing, with an average of 3.64 ( $SD = 0.78$ ). Respondents' neither agreed nor disagreed that they engaged in active information-seeking behaviors related to COVID-19 ( $M = 3.49$ ,  $SD = 0.85$ ).

### Objective 5: Predicting Information Seeking Behaviors

Hierarchical regression was used to fulfill objective five, and information-seeking behavior was treated as the dependent variable (Table 2). Model 1 included demographic information and could account for 2% of the variance in risk-seeking behaviors related to COVID-19 ( $R^2 = .02$ ,  $F(5, 404) = 3.17$ ,  $p = .01$ ). Education was the only statistically significant predictor in the model ( $b = 0.07$ ,  $p = .03$ ). Cultural cognition variables were included in Model 2 and could uniquely account for 23% of the variance in the model ( $\Delta R^2 = .23$ ,  $F(2, 403) = 61.58$ ,  $p < .01$ ). The second model remained statistically significant ( $R^2 = .26$ ,  $F(7, 402) = 20.54$ ,  $p < .01$ ), and both the grid and group variables were predictors of information-seeking behaviors. Respondents with more hierarchical grid worldviews were less likely to actively seek COVID-19 information ( $b = -0.34$ ,  $p < .01$ ), and respondents with more communitarian group worldviews were more likely to actively seek information ( $b = 0.23$ ,  $p < .01$ ). Education was no longer a predictor of information seeking behaviors in the presence of cultural cognition variables ( $b = 0.04$ ,  $p = .10$ ).

The final model added RISP variables to account for knowledge insufficiency, risk perception, and information processing behaviors. This model could account for 59% of the total variance in predicting risk-seeking behaviors ( $R^2 = .59$ ,  $F(12, 397) = 46.79$ ,  $p < .01$ ). The RISP variables could uniquely account for 32% of the total variance ( $\Delta R^2 = .32$ ,  $F(5, 397) = 61.80$ ,  $p < .01$ ). In the presence of the RISP variables, the group worldview was no longer a predictor ( $b = 0.06$ ,  $p = .13$ ), but grid worldview remained a predictor ( $b = -0.15$ ,  $p < .01$ ). Heuristic processing was a predictor. The more respondents relied on heuristic processing, the less they actively sought risk information related to COVID-19 transmission ( $b = -0.44$ ,  $p < .01$ ). Conversely, the more respondents systematically considered COVID-19 information, the more they actively sought COVID-19 transmission information.

**Table 2. Predicting Information Seeking Behaviors**

	Model 1		Model 2		Model 3	
	<i>b</i>	<i>p</i>	<i>b</i>	<i>p</i>	<i>b</i>	<i>p</i>
Constant	3.14	.00**	3.11	.00**	3.16	.00**
Age	0.00	.06	0.01	.00**	0.01	.01*
Gender (Male)	-0.10	.24	-0.01	.87	0.02	.76
Children (Yes)	-0.15	.08	-0.09	.25	-0.10	.08
Education	0.07	.03*	0.04	.10	0.03	.10
Income	0.00	.96	0.00	.87	0.01	.82
Grid (egalitarian – hierarchical)			-0.34	.00**	-0.15	.00**
Group (individualist – communitarian)			0.23	.00**	0.06	.13
Knowledge					0.02	.16
Knowledge Insufficiency					0.01	.64
Risk Perception					0.04	.22
Heuristic Processing					-0.44	.00**
Systematic Processing					0.32	.00**
R <sup>2</sup>	.04		.25		.59	.00**
F	3.17	.01*	20.54	.00**	46.79	.00**
Δ R <sup>2</sup>			.23		.32	
Δ F			61.58	.00**	61.80	.00**

\*  $p < .05$ , \*\*  $p < .01$

## Discussion

While COVID-19 may be one of the most pressing health crises in modern times, there is always a threat of future pandemics (National Academy of Sciences, 2016), and Extension educators and agricultural communicators need to be prepared to deliver effective risk information during these times of crises. However, consumers will also need to sift through communication to find trustworthy and reliable information to help them make judgments. Therefore, the purpose of this research was to explore the influences on consumers' risk information-seeking behaviors. This study was conducted prior to the COVID-19 vaccine and the widespread emergence of COVID-19 variants. However, this research still provides valuable context for how people might respond to risk information at the beginning of an outbreak. This research drew upon concepts related to cultural cognition theory (Kahan, 2012) and the RISP model (Griffin et al., 1999) to better understand what influences people to actively seek information related to COVID-19.

Respondents in the sample reported only a slight concern about engaging in food purchasing behaviors in the week prior to the study, despite rising levels of COVID-19 in Oklahoma and the governor testing positive for the virus (LaCroix, 2020; Wamsley, 2020). This lack of concern may stem from the respondents' group worldview, which is skewed toward individualistic.

Respondents may believe they are able to meet their own goals, like purchasing food and staying

safe, without the collective public health strategy of the community (Kahan, 2012), which would ease their concerns when it comes to purchasing food.

Respondents believed they possessed moderately high knowledge about COVID-19 transmission and needed moderately high knowledge about the topic to make judgments around the issue. While knowledge insufficiency was greater than knowledge, there were no practical differences between the scores due to the large standard deviations. According to the RISP model, respondents' slight concern related to COVID-19 would likely not spark a need for respondents to obtain more information than they already had to make proper judgments (Griffin et al., 1999), which would explain why these scores are so close. While perceived knowledge is important within the RISP model to understand one's desire to seek information, it should be noted this knowledge scale does not reflect actual knowledge related to COVID-19.

Respondents tended to agree they engaged in more systematic processing behaviors than heuristic processing behaviors, indicating they were more often thoughtfully considering COVID-19 information. However, they neither agreed nor disagreed that they were actively seeking information related to the pandemic. Because the data for this study were collected in the summer of 2020, respondents likely were concerned about the effects of COVID-19 but may have been fatigued from the amount of information they were exposed to related to the topic, which could explain high levels of systematic processing coupled with only moderate levels of active information seeking. The final regression model, which included demographics, cultural cognition, and RISP variables, could account for 59% of the variance in risk information-seeking behaviors. This large effect size (Cohen, 1988) demonstrates that the application of the RISP model and cultural cognition framework was appropriate for this research. The overall importance and familiarity of COVID-19 were likely driving factors for why this framework performed so well (Yang et al., 2013).

The cultural cognition variables could account for 23% of the unique variance in the dependent variable, which supported the importance of treating ideology as a complex set of views opposed to a unidimensional characteristic (Feldman & Johnston, 2014; Jost et al., 2009). The RISP variables could account for the greatest amount of unique variance in risk information-seeking behaviors at 32%. In the final model, the group variable was a statistically significant predictor of information-seeking behaviors, with more communitarian respondents being more likely to actively seek information related to COVID-19 compared to those with individualistic worldviews. This finding may be due to recommendations that citizens follow social distancing and mask-wearing guidelines to control the transmission of COVID-19 (CDC, 2020), which would align with a communitarian worldview (Kahan, 2012). However, this variable had a low reliability score despite being published in prior literature (Hmielowski et al., 2018). The question stem and items were not changed from the original article, so this issue of reliability may have reflected the volatile nature of public opinion during a year of a global pandemic, civil unrest, and an upcoming presidential election (Schmich, 2020).



Similar to the Hmielowski et al. (2018) research, increased levels of heuristic processing predicted decreased levels of risk-information-seeking behaviors, while increased levels of systematic processing predicted increased levels of risk-information-seeking behaviors. Contradictory to prior research (Lu et al., 2020; Rose et al., 2017), knowledge and knowledge insufficiency were not predictors in the model. This finding may be due to the similarity in the two variable scores, which would cause respondents to believe they did not need to seek additional information (Griffin et al., 1999). Additionally, regardless of the accuracy of the information, respondents would have been exposed to a barrage of media coverage related to COVID-19 (Joszt, 2020), which could have decreased their motivation to seek new information actively.

An interesting finding in this study was that risk perception related to purchasing food during COVID-19 was not a predictor in the model. Risk perceptions were measured within the context of food purchases, which may explain this lack of statistical significance. Extension educators should be aware that concerns related to food-purchasing decisions did not appear to influence risk information-seeking behaviors for COVID-19. Americans have vastly changed the way they shopped for food in 2020 and possibly for good, which may explain their low levels of concern now that the behaviors have become a habit (Severson, 2020).

### **Recommendations**

While the research in this paper is not generalizable outside Oklahoma, it still provides critical insight for practitioners and researchers alike. When identifying audiences for education and communication campaigns, practitioners should consider using group and grid variables instead of political ideology to develop audience profiles. Targeting consumers with communitarian worldviews with messages that promote the success of the community would help to drive active, risk-information-seeking behaviors. Additionally, Extension programs should provide multiple sources of information and opportunities for two-way engagement with community stakeholders to encourage the systematic processing of risk information. Although concerns related to purchasing food during COVID-19 were limited, practitioners could focus communication on the risk of transmitting COVID-19 in different food-purchasing settings. While the goal of this communication would not be to induce panic, increasing the perceived risk of contracting COVID-19 while making food purchases would likely increase the need to obtain more knowledge, thus triggering active information-seeking behaviors (Griffin et al., 1999).

This study should be replicated in other states and countries to generalize these findings to populations outside of Oklahoma. COVID-19 has impacted the globe (WHO, 2020), and understanding how local culture and government influenced risk information-seeking behaviors would help improve risk communication in the future. If this research is to be replicated, the group variable would need to be edited to account for the low reliability in this study. Adding additional items to the scale and testing the variable across multiple populations would help to

strengthen this measurement for future studies. Although the group variable did not perform as expected, researchers should consider measuring ideology using cultural cognition theory as opposed to asking a unidimensional political affiliation question. Asking additional demographic questions related to household size or rural/urban residency could also provide valuable insight into risk information-seeking behaviors. It would also be helpful to understand how food access and food purchasing behaviors inform how people seek risk information related to COVID-19 and food purchases.

Future studies should utilize structural equation modeling (SEM) or path analysis to understand how the variables interact and influence one another within the context of COVID-19. Additional risk perception questions should be asked about COVID-19, in general, to help Extension educators and agricultural communicators better understand if concerns related to purchasing food differ from other activities that may expose consumers to COVID-19. Additionally, this research should be replicated to understand how current vaccine adoption rates and COVID-19 variants (like Omicron and Delta variants) would influence how consumers seek and process risk information related to COVID-19. Because this study only focused on parts of the RISP model, additional questions could be added in future studies. Asking about past hazard experiences (i.e., testing positive for COVID-19) and where consumers receive information about the pandemic would provide more robust recommendations for future risk communication and Extension programming.

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