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Consumers regularly identify food safety as an issue of great concern. They also consistently rank mass media as a primary source of food safety information. The purpose of this study was to investigate Ohioans' levels of media system dependency and to assess the role of source trust and perceived food risk factors in influencing this dependency. Mail survey techniques were used to collect data from a sample of 7,976 Ohio residents. Data are reported for 4,014 respondents, for a 56 percent response rate. Traditional media, such as newspapers and television news, were perceived by respondents to be the most helpful among the media formats assessed. Moderate levels of perceived risk were found for the food safety items assessed. Pesticide residues in food and contamination of drinking water generated the highest levels of perceived risk. Relative to perceived source trust, physicians and scientists were evaluated most favorably, ahead of farmers and growers, the U.S. Department of Agriculture, and Extension. Regression findings indicate that perceived trust in government and expert sources were the two best predictors of media dependency, followed by perceived food safety risk. Findings have implications for food safety communicators and journalists communicating with at-risk audiences about the safety of their food supply.

Consumers regularly indicate that food safety is a serious concern. Faced with recent threats of food contamination, consumers in the United States and elsewhere have become more sensitive to the origin and content of their food (Ipsos-Reid, 2000; Butler, 2002). Among the food safety issues garnering increased media attention are genetically modified (GM) foods, bacterial and pesticide contamination, use of growth hormones in livestock, mad cow disease, and bio-terrorism.

Genetic engineering of food has become a highly public and controversial issue. Several major national studies assessing consumer attitudes

toward biotechnology and GM foods have concluded that much of the concern expressed by consumers is related to the perception that such foods pose health or environmental risks (Pew Initiative on Food and Biotechnology, 2002). A philosophical unease also exists about tinkering with nature. Meanwhile, the United States leads the world in the production of genetically engineered food with food industry experts estimating that 70% of the products found on U.S. grocery shelves contain genetically modified ingredients (Gillam, 2002).

Also of growing public concern are outbreaks of foodborne illness. Such events are typically followed by media accounts of the incident and decreased demand for the affected food product. Most foodborne illness results from microbial disease (bacteria and viruses) and occurs primarily because of mishandling of food by consumers or food service workers (Bryan, 1988; McIntosh, Acuff, Christensen, & Hale, 1994). Whaley and Doerfert (2003) found that foodborne illness topped the list of food safety-related issues covered by U.S. news magazines between 1990 and 2000.

Pesticide contamination of food and drinking water is another commonly identified consumer concern. Since Rachel Carson published her 1962 classic *Silent Spring*, consumer fears about pesticide use have escalated (Sachs, Blair, & Richter, 1987). Concerns reached an all-time high in 1989 and the early 1990s after massive national publicity about the use of the chemical Alar™ on apples and cyanide-laced grapes from Chile (Chipman, Kendall, Slater, & Auld, 1996). Consumers have consistently ranked pesticide residues first on a list of perceived serious health hazards in annual national food marketing surveys over the past 10 years (Opinion Research Corporation, 2002).

The healthfulness of dairy products has also been called into question following the industry's use of bovine somatotropin (bST), or growth hormone, to help boost milk production. Using the *New York Times* and *Associated Press* wire service as indicators, Powell and Leiss (1997) determined that American media coverage of bST peaked between November 1993 and February 1994. During this time, a number of environmental and consumer groups called for a boycott of products from cows treated with bST with Jeremy Rifkin's Foundation on Economic Trends issuing an alert calling bST "crack for cows" (Powell & Leiss, p. 132).

In the spring of 1996, media reports delivered the chilling news that a cattle disease, known as Bovine Spongiform Encephalopathy (BSE), or mad cow disease, could be transferred to humans. Mad cow disease had affected more than 100,000 cows in Europe during the past decade, and there appeared to be a link between mad cow disease and the similar

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Creutzfeldt-Jacob disease in humans. Both diseases attack brain cells, causing neurological problems and eventual death. Poulsen (1996) noted that the possible linkage between a deadly human disease and a food source seemed to make for an ideal media story. He argued that European mad cow coverage was based on emotions and sensationalism, while Ten Eyck (2000) concluded the same related to U.S. press coverage of the issue.

Food security has joined food safety as a hot topic among news media since the terrorist attacks of September 11, 2001. Klapthor (2001) noted that the autumn of 2001 was a busy time for food science communicators and food technologists called upon to provide insights on safety risks related to the food supply. The importance of governmental safeguards and the vulnerability of the food supply continue to receive media coverage.

Because mass media are consistently ranked by the public as a primary source of food safety information (Beck, 1992; Borra, Earl, & Hogan, 1998; Fisher & Chen, 1996; Kone & Mullet, 1994; McIntosh et al., 1994; Nelkin, 1987; Powell & Leiss, 1997; Pisano & Woods, 2002), it is important to gain a more complete understanding of how perceived food risks and trust of various sources affects an individual's media system dependency. The purpose of this study was to investigate levels of media system dependency and to assess the role of source trust and perceived food risks in influencing this dependency. Findings from this research provide a snapshot of consumer media preferences and can help professional communicators develop better strategies for targeting food safety messages to key audiences.

Theoretical Approach

A theoretical approach was formulated from selected components of media systems dependency theory and risk-analysis theory. Media system dependency theory asserts that individuals develop strong attachments to mass media to help satisfy various informational and entertainment needs (Ball-Rokeach, 1985, 1998; Ball-Rokeach & DeFleur, 1976; DeFleur & Ball-Rokeach, 1982, 1989). The theory posits that the more dependent an individual is on the media for having his or her needs fulfilled, the more important the media will be to that person (Merskin, 1998).

In media system dependency theory, individual-media relations are defined both in terms of overall intensity of the dependency relationship and the extent that individuals relate to a medium to meet specific goals (Patwardhan & Yang, 2003). Dependency theory suggests that individuals seek to meet the following goals through media resources: understanding the world and themselves, orientation (the need to behave effectively in interactions with others, as well as in personal behavioral decisions), and

play (entertainment or escapism) (Morton & Duck, 2000). The importance of media in these activities varies from person to person, across time, and from activity to activity. Folkerts and Lacy (2001) note that media's overall impact on a person will depend on the individual's background, his or her goals and interests, and the availability of nonmediated information.

The theory also asserts that the degree of change and conflict present in society is a determining factor in how dependent a person is on media (DeFleur & Ball-Rokeach, 1975). In the case of food safety, media coverage often focuses on possible problems with the food supply and coverage tends to cluster around crisis situations (Craven & Johnson, 1999; Ten Eyck, 2000; Whelan & Stare, 1992). Therefore, it would be expected that mass media dependency would be high when dealing with an extremely fluid topic, such as food safety, which affects all levels of society and often encompasses new technologies, scientific processes, and controversial elements.

Risk-analysis theory asserts that laypersons differ from experts in the manner by which they form risk judgments (Frewer, 1999; Slovic, 1987). Individuals who believe they are in control of a particular hazard are less likely to attribute risk to that situation. Individuals who believe they lack control over the safety of their food will be more likely to perceive higher levels of food safety risk.

A recurrent theme in the risk-analysis literature is that perceptions of risk are unevenly distributed across societies (Short, 1984; Dosman, Adamowicz, & Hrudey, 2001; McIntosh et al., 1994). Individuals with greater access to financial and education resources have been shown to express higher levels of tolerance for risk, while those with lower incomes and less education generally indicate higher levels of perceived risk for most hazard situations (Tomazic, Katz, & Harris, 2002). The uneven distribution of risks in society can also be seen in differential levels of perceived risks expressed by various racial groups. Research has shown that minority groups often perceive greater safety and health risks compared to others (Tomazic et al., 2002).

Risk-analysis literature also asserts that easily understood risk events are less likely to evoke fear or dread as opposed to events not easily understood (Frewer, 1999). Thorough understanding of a particular risk implies knowledge not only of the hazard itself, but also of techniques or technologies that offer avenues to minimize risk.

A great deal of media coverage has surrounded biotechnology and its potential to dramatically enhance food quality and availability (Blaine, Kamaldeen, & Powell, 2002). Despite these promises, biotechnology does not enjoy universal public support partially because of concerns about unknown

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dangers from altering the genetic characteristics of plants and animals. Mazur (1981) found that a rise in the opposition to a specific technology coincides with a rise in the amount of media coverage on a specific technology, regardless of whether the coverage is positive or negative. Additionally, the more technical information presented by the media, the more concerned the audience becomes, even if the information is thought by scientists to be reassuring.

According to Nelkin (1987), mass media help define an individual's sense of reality, including perceptions of risks or benefits. Kone and Mullet (1994) concluded that the way in which media portray issues such as food safety can have a profound effect on consumer perception and behavior.

Based on the review of media system dependency theory and risk analysis theory, the following hypotheses were developed to help predict consumers' levels of dependency on various mass media channels.

H1: Individuals who perceive higher levels of food safety risk are more likely to express higher levels of media system dependency.

H2: Individuals who perceive high levels of trust in information sources are more likely to express higher levels of media system dependency.

H3: Individuals who perceive less control over the safety of their food are more likely to express higher levels of media system dependency.

H4: Individuals with lower household incomes are more likely to express higher levels of media system dependency.

H5: Individuals with less formal education are more likely to express higher levels of media system dependency.

H6: Individuals from minority racial groups are more likely to express higher levels of media system dependency.

H7: Females are more likely than males to express higher levels of media system dependency.

Methods

The sampling frame was provided by a private vendor for use in this study and consisted of 7,976 Ohio residents. The sample was stratified to ensure ample representation from (1) the state's 16 major metropolitan counties and (2) from each of five geographical districts as defined by Ohio State University Extension. This manner of sampling was undertaken to permit comparisons among respondents according to particular regions and

selected demographic characteristics that might otherwise be underrepresented if random sampling were used. For the current analysis, data were weighted to permit state-level reporting.

Mail survey techniques were used to collect data for this study.[1] Using elements of Dillman's (2000) tailored design method, the researchers made up to five contacts with respondents. A letter was mailed during the summer of 2002 explaining the purpose of the study and encouraging participation. A follow-up mailing was forwarded two weeks later and consisted of a cover letter, questionnaire, and a self-addressed business-reply envelope. Two $1 bills were included in this package as an incentive to increase response. This mailing was followed over several weeks with a reminder postcard, a second survey questionnaire package, and a second reminder postcard. The response rate was 56 percent.

The dependent variable in this study, level of media system dependency, was measured by asking respondents to indicate the perceived helpfulness of six media channels in providing news and information useful in running the household. The media channels included in the analysis were newspapers, television news, magazines, radio, World Wide Web, and television talk shows. Possible responses ranged from zero, indicating not helpful, to 5, indicating very helpful. Responses to the six items were summed to form a composite measure of media dependency. Item analysis was conducted to assess the reliability of the scale, resulting in an alpha coefficient of .80. A coefficient of this magnitude indicates a fairly high level of internal consistency among the items and justifies their use in a composite measure (Mueller, 1986; Cronbach, 1951).

Eight independent variables were identified from the theoretical perspective used to guide the study. The variables were operationalized as follows:

Perceived food safety risk was measured by asking respondents to indicate their level of perceived risk toward seven food safety issues: bacterial contamination, contamination of drinking water, genetically modified foods, mad cow disease, pesticide residues in food, growth hormones in meat or milk, and bio-terrorist attacks on the food supply. Possible responses ranged from 1 (no risk) to 7 (serious risk). Item analysis was conducted to assess the reliability of the seven items. The resulting alpha coefficient was .91, indicating a high degree of internal consistency among the items.

Perceived trust in information sources was measured by asking respondents to indicate how much they trusted nine commonly cited sources in providing reliable information about food safety and environmental issues.

The sources were as follows: university scientist, physician or other health professional, Extension educator/agent, friends or family, consumer advocacy group, farmer or grower, U.S. Department of Agriculture (USDA), U.S. Environmental Protection Agency (EPA), and U.S. Food and Drug Administration (FDA). Responses ranged from 1 (no trust) to 5 (a high level of trust).

To reduce the data for appropriate use in regression modeling, the nine source trust variables were factor-analyzed using principal components analysis with orthogonal rotation. Two factors emerged from the analysis, which dictated how the source trust variables were grouped for regression purposes. The first factor included three variables – physician/other health professional, university scientist, and Extension educator/agent – and was titled "expert sources." The second factor also included three variables – USDA, EPA, and FDA – and was termed "government sources." The two sets of variables were summed to form two composite measures of source trust, and item analysis was conducted to assess the reliability of the two scales. The resulting alpha coefficients were .70 for expert sources and .91 for government sources, indicating acceptable to high degrees of internal consistency among the items and justifying their use as composite measures.

Perceived control was measured by asking respondents to indicate their level of agreement with the statement, "I have little or no control over the safety of my food." Responses ranged from 1 (strongly disagree) to 5 (strongly agree). Midrange responses of 3 indicated the respondent was undecided.

Household income was measured by asking respondents to indicate their gross household income for 2001. Response categories ranged from 1 (less than $9,999 of gross household income) to 7 (more than $100,000).

Education was measured by asking respondents to indicate the number of years of education completed at the time of the study.

Race was measured by asking respondents to select one of six racial categories that best described them. A value of 1 was assigned to respondents describing themselves as African American, Asian, Hispanic/Latino, Native American/American Indian, or other. A value of zero was assigned to white respondents.

Gender was measured by asking respondents to indicate if they were male (1) or female (2).

Descriptive statistics, including frequencies, percentages and means, were used to summarize responses and provide a general summary of respondents' demographic characteristics. Multiple regression analysis was

used to test the theoretical model developed to guide the study (Pedhazur, 1982). Missing data were attributed the variable mean as recommended by Donner (1982).

Findings

Table 1 provides respondents' demographic information relative to the study. Respondents were relatively evenly distributed among males (47%) and females (53%). They were generally middle-aged and reported completing an average of two years of education beyond high school. Most of the respondents (89%) were white. Gross household income was widely distributed among respondents. The modal income category was $50,000 to $75,000.

Table 1. *Demographic and Other Selected Characteristics of Study Respondents (n = 4,014)*

Age	
Median	50 years
Mean	51.2
S.D.	16.4
Education	
Mean education completed	14.0 years
S.D.	2.7
Gender	
Female	52.6 percent
Male	47.4
Race/ethnicity	
White	89.4 percent
African American	6.3
Asian	1.3
Hispanic/Latino	1.0
Native American/American Indian	0.9
Other	1.1
Gross household income	
Less than $9,999	4.1 percent
$10,000 to 19,999	12.1
$20,000 to 34,999	19.3
$35,000 to 49,999	17.4
$50,000 to 74,999	23.5
$75,000 to 99,999	11.9
$100,000 or more	11.8

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Data on respondents' perceived helpfulness of various media in providing news and information is presented in Table 2. Respondents indicated slight to moderate levels of perceived helpfulness for the media assessed. Using a 6-point scale ranging from 0-5, mean responses ranged from 2.25 to 3.30. Traditional media, such as newspapers and television news, ranked most favorably for perceived helpfulness among the six media formats assessed.

Table 3 provides descriptive data on respondents' perceived risk posed by various food safety-related issues. For perceived food safety risks, mean responses ranged from 4.56 to 5.33 on a seven-point scale, indicating that respondents perceived average to moderate levels for all of the items assessed. Pesticide residues in food and contamination of drinking water generated the highest levels of perceived risk, while mad cow disease and genetically modified foods generated the lowest levels. More than 30 percent of the respondents perceived all of the risks except genetically modified foods as serious.

Table 4 provides data on respondents' perceived level of trust in various information sources. Mean responses ranged from 3.30 to 3.91 on a five-point scale, indicating nearly moderate levels of perceived trust for all of the information sources assessed. Expert sources such as physicians, health professionals, and university scientists were evaluated most favorably, while friends and family, the EPA, and consumer advocacy groups were evaluated least favorably.

Data regarding respondents' perceived level of control over food safety are presented in Table 5. Slightly more than 40 percent indicated they had little or no control over the safety of their food while an identical percentage reported that they did have control over the safety of their food. Eighteen percent of respondents were undecided about the issue.

Multiple regression analysis with forward entry was used to assess the performance of the predictive model developed in this study (Pedhazur, 1982). Variance in media dependency was regressed against the eight independent variables identified from theory. Findings are presented below in standardized regression form. All independent variables are significant at the .05 level.

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Table 2. *Perceived Helpfulness of Various Media in Providing News and Information, Presented in Percentages (n = 4,014)*

Information Medium	Not Helpful		Slightly Helpful	Moderately Helpful		Very Helpful	MD	Mean	SD
	0	1	2	3	4	5			
a. Newspapers	4.2	6.2	11.9	26.7	31.8	17.4	1.7	3.30	1.31
b. Television news	6.2	8.0	12.0	23.8	27.5	21.3	1.2	3.24	1.45
c. Magazines	8.6	10.1	16.8	29.1	23.8	9.9	1.7	2.80	1.41
d. Radio	10.4	10.7	17.1	24.6	23.4	11.6	2.2	2.76	1.49
e. World Wide Web	18.5	8.6	13.2	22.5	20.6	12.1	4.4	2.57	1.67
f. Television talk shows	22.0	13.7	16.8	19.5	16.8	9.7	1.6	2.25	1.66

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Table 3. *Perceived Risk to Food Safety Posed by Various Issues, Presented in Percentages (n = 4,014)*

Issue	Level of Risk							MD	Mean	SD
	None		Some		Moderate		Serious			
	1	2	3	4	5	6	7			
a. Pesticide residues in food	0.9	6.4	9.4	11.0	18.0	20.6	32.6	1.0	5.33	1.62
b. Contamination of drinking water	1.9	7.0	9.5	9.4	18.5	17.7	35.2	0.8	5.31	1.71
c. Growth hormones in meat or milk	2.0	6.4	8.7	12.7	16.9	18.5	33.3	1.4	5.28	1.69
d. Bacterial contamination	1.3	7.2	11.1	10.8	19.2	18.2	31.2	1.0	5.21	1.68
e. Bio-terrorist attacks on food supply	4.2	9.9	8.9	11.0	12.1	14.2	38.8	1.0	5.17	1.93
f. Mad cow disease	7.3	14.1	11.5	12.0	12.2	10.6	31.0	1.3	4.66	2.07
g. Genetically modified foods	4.7	10.0	11.9	21.3	17.3	14.7	18.2	2.0	4.56	1.76

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Table 4. *Perceived Trust in Various Sources of Information about Environmental and Food Safety Issues, Presented in Percentages (n = 4,014)*

Information Source	Level of Trust					MD	Mean	SD
	None	Low	Moderate		High			
	1	2	3	4	5			
a. Physician/other health professional	1.2	6.2	15.8	51.5	23.1	2.3	3.91	.87
b. University scientist	2.3	7.1	23.9	45.8	18.6	2.3	3.73	.93
c. Farmer or grower	1.4	5.5	27.5	47.4	15.6	2.5	3.72	.85
d. U.S. Dept. of Agriculture	2.7	9.6	25.2	43.7	16.6	2.2	3.63	.97
e. Extension educator/ agent	2.4	8.0	32.5	40.8	12.7	3.6	3.55	.91
f. U.S. Food and Drug Admin.	4.6	12.1	24.7	39.0	17.7	2.0	3.54	1.06
g. Friends or family	2.6	15.0	29.8	33.9	16.1	2.7	3.47	1.02
h. U.S. Environ. Protection Agency	5.7	13.3	25.4	37.5	16.0	2.1	3.46	1.09
i. Consumer advocacy group	5.2	15.6	31.4	34.8	10.0	2.9	3.30	1.03

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Table 5. *Attitudes Toward Perceived Control of Food Safety, Presented in Percentages (n = 4,014)*

Statement	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree	MD	Mean	SD
	1	2	3	4	5			
a. I have little or no control over the safety of my food	8.4	32.4	17.8	29.6	10.5	1.4	3.01	1.81

Y = .232x1 + .192x2 + .177x3 + .097x4 - .047x5 + .039x6

Adjusted R-Square = .180

Where:

Y = Media Dependency (scale)

x1 = Trust in government sources (scale)

x2 = Trust in expert sources (scale)

x3 = Perceived food safety risk (scale)

x4 = Minority status

x5 = Education

x6 = Gross income

Multivariate findings indicate that perceived trust in government sources and in expert sources were the two best predictors of media dependency, followed by perceived food safety risk, minority status, education, and gross income. The adjusted R-square of .180 means that the six variables explained 18 percent of the variance in respondents' media system dependency.

Respondents expressing higher levels of trust in government sources and in expert sources were more likely to express higher levels of media dependency, as were those who indicated higher levels of perceived food safety risk. Minority respondents, respondents with less education, and those with higher gross incomes also tended to express higher levels of media dependency.

Discussion

The descriptive findings show that respondents viewed mass media as slightly to moderately helpful in providing information useful in running their households. Newspapers and television news were viewed as most helpful among the items assessed, which is a common finding in the literature. Although the World Wide Web ranked rather low in perceived helpfulness, this may change over time.

An overall lack of discrimination was found among perceived food safety risks. Respondents expressed relatively similar perceptions of risk for each of the items assessed. This finding is somewhat unexpected given the fact that the items vary greatly in their likelihood of occurrence and in the steps that can be taken by consumers to mitigate risk.

Relative to perceived trust in information sources, respondents tended to rate expert sources such as physicians and scientists most favorably. The finding that farmers and growers were among the top three trusted sources supports the notion that farmers are held in generally high regard by the public. The findings also support continued use of farmers and growers in news stories and releases on food safety and related topics.

Regression findings indicate that the theoretical model developed in the study was somewhat useful for our purposes. The major goal in this study was to investigate the unique contribution of source trust and perceived food risks to media system dependency rather than maximizing explained variance in the dependent variable. Six of the eight hypothesized variables accounted for approximately 18 percent of the variance in media system dependency.

Trust in sources was the best predictor of media system dependency. Those with higher levels of trust in government and expert sources were more likely to express higher levels of media dependency. This finding is supported in the literature and reiterates the importance of sources building and maintaining credibility with audiences. All of the remaining variables in the model, with the exception of gross income, entered the model in the expected direction. The finding that respondents with higher gross incomes were more likely to express higher levels of media dependency was contrary to the theory. While this finding is deserving of more attention in future research, it should also be noted that the beta coefficient for this variable was relatively small and that gross income accounted for a very small portion of variance in the dependent variable.

Collective findings from this research have implications for communication practitioners and researchers. One implication is that individuals' media preferences are influenced by their perceptions of scientists and other sources. Unfortunately, working relationships between journalists and scientists are often hampered by cultural differences within the two professions. For example, journalists depend on information from a variety of sources to provide balanced coverage. Production deadlines can largely dictate the type of sources and information that ultimately appears in media stories. Meanwhile, many scientists are not comfortable phrasing abstract or technical terms into sound bites or other simple language, which is a hallmark of both broadcast and print media. It is also important to acknowledge that the academic reward structure generally does not encourage scientists to devote large amounts of time or energy to publishing in the popular press as opposed to academic journals. Land-grant communicators can play a crucial role in bridging differences between the two worlds of journalism and

academia. Cultivating stronger relationships between journalists and scientists would likely result in the development of more accurate and socially responsible editorial products that will attract the attention of media gatekeepers and audiences without creating undue public fears or concerns.

A second implication of this research is that additional studies are needed to identify and test other variables that might account for additional unexplained variance in consumer media dependency. The current model might be more successful if it focused on more specific media usage, rather than the general measure of perceived helpfulness used here. It is also possible that the model might offer more predictive value if the research was conducted specifically for consumers actively pursuing information on a particular food safety issue. Future research will help answer these questions and provide additional insights of value to both researchers and communication practitioners.

Endnote

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Keywords

media dependency, perceived risk, food safety, source trust

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