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Who Leaves and Who Stays? A Review and Statistical Meta-Analysis of Hurricane Evacuation Studies

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Abstract

This statistical meta-analysis (SMA) examined 38 studies involving actual responses to hurricane warnings and 11 studies involving expected responses to hypothetical hurricane scenarios conducted since 1991. The results indicate official warnings, mobile home residence, risk area residence, observations of environmental (storm conditions) and social (other people's behavior) cues, and expectations of severe personal impacts, all have consistently significant effects on household evacuation. Other variables—especially demographic variables—have weaker effects on evacuation, perhaps via indirect effects. Finally, the SMA also indicates that the effect sizes from actual hurricane evacuation studies are similar to those from studies of hypothetical hurricane scenarios for 10 of 17 variables that were examined. These results can be used to guide the design of hurricane evacuation transportation analyses and emergency managers' warning programs. They also suggest that laboratory and Internet experiments could be used to examine people's cognitive processing of different types of hurricane warning messages.

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Introduction

The steady increase in coastal population, coupled with a lack of adequate land use and building construction practices, has made evacuation an increasingly important protective action for hurricanes. In the first review of research on this topic, Baker (1991) summarized the results of 15 empirical studies conducted from 1960 to 1990 that identified variables affecting household hurricane evacuation. Even though researchers have conducted many studies since then, this topic still lacks clarity regarding three major issues. First, recent summaries have only been narrative reviews rather than statistical meta-analyses (SMAs). Although narrative reviews are evidence based, they can produce incorrect conclusions if they are based on individual instances of significant effects rather than weighted average effect sizes (cf. Hunter & Schmidt, 2004). Second, few studies have tested multistage, multiequation models that not only identify the proximal antecedents of evacuation decisions but also the ways in which those proximal antecedents mediate the effects of more distal (remote) antecedents. Third, some studies have examined expected responses to hypothetical scenarios rather than actual decisions in poststorm surveys. Behavioral expectations studies could provide a valuable method of assessing people's responses to situations that have not been studied because they are so rare (e.g., a Category 5 hurricane with a late-changing track) or to new types of warning information that have not yet been implemented, such as track ensembles (Cox, House, & Lindell, 2013). Although there is some evidence that behavioral expectations provide accurate estimates of later behavior in actual evacuations (Kang, Lindell, & Prater, 2007), more evidence is needed about the validity of evacuation expectations. Hence, the objective of this SMA is to summarize the results from previous studies and systematically answer the question—"Who leaves and who stays?"

Research Background and Hypotheses

Predictors for Household Evacuation Decisions

Baker (1991) concluded that the risk level of a location (e.g., barrier islands and low-lying sites close to the shoreline), official notices, mobile home residence, personal risk perceptions, storm severity, and some social cues (such as business closing and peers evacuating) were generally good predictors of evacuation behavior. Other variables—especially demographic variables—were sometimes statistically significant, but varied from study to study. After Baker's (1991) summary, Sorensen (2000) reviewed progress in forecasting, warning integration, warning dissemination, and public responses in the years since Mileti, Drabek, and Haas (1975) reviewed hazard warning systems. Sorensen (see also Sorensen & Sorensen, 2007) summarized the evidence supporting the impact of 32 different factors affecting warning response, whereas the Huang, Lindell, Prater, Wu, and Siebeneck (2012) test of the abbreviated *Protective Action Decision Model* (PADM) organized variables into nine categories. Nonetheless, no matter how more recent studies have assessed the predictors of evacuation behavior, they have generally used Baker's conclusions as the foundation for their hypotheses (e.g., Huang et al., 2012; Lindell, Lu, & Prater, 2005; Stein, Dueñas-Osorio, & Subramanian, 2010; Wilmot & Mei, 2004). Hence, it is appropriate to test Baker's conclusions as the hypotheses of this SMA.

Specifically, this study hypothesizes that evacuations are consistently and significantly correlated with geographic and structural locations (i.e., risk area and mobile home residence; Hypothesis 1a [H1a]), official warning (H1b), environmental (i.e., observations of clouds, rain, and rising water levels) and social (i.e., observations of business closing and peers evacuating) cues (H1c), perceived storm characteristics (i.e., expected storm intensity, expected nearby landfall, and expected rapid onset; H1d), expected personal impacts (i.e., wind damage, surge damage, flood damage, casualties, job disruption, and service disruption; H1e), and female gender (H1f).

The available data on predictors of household hurricane evacuation can provide a partial test of the abbreviated PADM's proposition that expected personal impacts completely mediate the relationships of environmental/social cues and perceived storm characteristics with evacuation (see also Dash & Gladwin, 2007). Specifically, the PADM predicts that risk area residents form perceptions about storm characteristics (intensity, size, forward movement speed, and likely landfall location) based on messages transmitted from the National Weather Service through local authorities, the news media, and peers (Lindell, Prater, & Peacock, 2007). In turn, they use this information about expected storm characteristics to form expectations about the personal impacts they are likely to experience (Huang et al., 2012). To provide a rigorous test of this proposition, it would be necessary to conduct regression analyses on an aggregate correlation matrix that contains not only the effect sizes that are normally reported but also the intercorrelations among the predictor variables. This regression analysis is not possible because researchers rarely report the complete matrix of intercorrelations among all variables.

Although the lack of information on the intercorrelations among predictors of evacuation precludes a rigorous test of the PADM's hypothesized mediation effect, it is still possible to perform a weaker test that follows from the fact that a completely mediated causal chain $X \rightarrow Y \rightarrow Z$ (where Y is the mediator between X and Z) can only be true if $r_{XZ} < r_{YZ}$. This is because, in complete mediation, $r_{XZ} = r_{XY} r_{YZ}$ (see Lindell, 2008; MacKinnon, Fairchild, & Fritz, 2007). However, by definition, $r_{XY} \leq 1.0$ (and, in any meaningful empirical data, $r_{XY} < 1.0$), so complete mediation implies $r_{XZ} < r_{YZ}$. Unfortunately, this test is not definitive because it could also mean that X is simply another predictor variable that is independent of Y and has a lower correlation with Z. Hence, this study hypothesizes that expected personal impacts will mediate the relationships of environmental/social cues and perceived storm characteristics with evacuation (Hypothesis 2 [H2]).

In addition, Baker (1991) identified some variables as nonsignificant predictors of evacuation. However, hypothesizing a nonsignificant effect requires attempting to affirm the null hypothesis, as opposed to failing to reject it. This is considered inappropriate within the context of conventional null hypothesis test procedures, so the variables Baker (1991) reported as nonsignificant are addressed as three research questions:

Research Question 1 (RQ1): Do demographic variables other than gender have consistently significant effect sizes in predicting evacuation?

Research Question 2 (RQ2): Do hurricane experience, coastal tenure, and "unnecessary" evacuations/"false alarms" have consistently significant effect sizes in predicting evacuation?

Research Question 3 (RQ3): Do reliance on social sources of information and evacuation impediments have consistently significant effect sizes in predicting evacuation?

One significant limitation of postimpact surveys of actual hurricane evacuations—which rely on recollections that take place months after an evacuation— is that they cannot assess the moment-to-moment effects of individual warning messages. Moreover, they can only assess the effects of warning messages that were disseminated in the conditions that actually occurred; they cannot assess the effects of novel warning message formats (e.g., new verbal labels or graphical representations for probabilities) or rarely encountered situations (e.g., Category 5 storms with late-changing tracks) on evacuation decisions.

The obvious solution is to conduct experimental studies of new warning message formats in hypothetical hurricane scenarios, but some have expressed concern about hypothetical bias as a significant contributor to differences between judgments about hypothetical scenarios and actual events (e.g., List

& Gallet, 2001). Moreover, others contend that participants in hypothetical scenarios produce oversimplified responses because people have poor insight into the causes of their behavior (see Kühberger, Schulte-Mecklenbeck, & Perner, 2002; Nisbett & Wilson, 1977). This problem could be compounded when people are asked to judge situations they have not previously encountered. For example, people might base expectations about their evacuation decisions on "disaster myths" (Fischer, 2008) such as concerns about protecting their property from looting. However, social psychologists have found a significant degree of correspondence between behavioral intentions and actual behavior (Fishbein & Ajzen, 1975, 2010; Sheeran, 2002). More recently, Kang et al. (2007) found that the correspondence between evacuation expectations and later evacuation was strong for some variables but not others. Thus, the present SMA tests whether the effect sizes for variables in hypothetical evacuation studies are significantly different from those in actual evacuation studies (Research Question 4 [RQ4]: Are the effect sizes for variables in hypothetical evacuation studies significantly different from those in actual evacuation studies?).

Method

Selection of Variables and Articles for Household Evacuation Decisions

This study conducted an electronic search for English-language studies published between 1991 and 2014 using Google Scholar with keywords, including "hurricane," "evacuation," and "decision making." This search yielded 33 journal articles, master theses, and doctoral dissertations in which households' evacuation decisions were correlated with antecedent variables. These publications reported data from 49 separate studies—38 actual hurricane studies and 11 hypothetical evacuation studies. The actual hurricane studies are summarized in Online Appendix A, the hypothetical evacuation studies are summarized in Online Appendix B, and the citation data for all studies not listed in the *Reference* section are in Online Appendix C.

Analysis Methods

This study followed Field and Gillett's (2010) SMA procedure by converting the results from each study into a common index of effect size before computing the weighted average effect size across studies (see Online Appendix D). The variance of sample effect sizes, the sampling error variance, and the sampling error variance from the variance in sample correlations were computed before estimating the 95% confidence interval (CI) and 80% credibility interval of each effect size. Finally, a χ^2 statistic tested the homogeneity of effect sizes. As noted in Online Appendix D, no corrections were made for unreliability and variance restriction because these data are generally unavailable in hurricane evacuation studies. Second, some actual evacuation studies reported only correlation coefficients whereas others reported only regression coefficients or odds ratios. Because regression coefficients control for the effects of other whereas correlation coefficients do not, this SMA tested whether there is a significant difference between these two estimates of effect sizes. Third, this SMA followed the recommendation from Sánchez-Meca and Marín-Martínez's (1997) Monte Carlo simulation in drawing only tentative conclusions about variables for which the number of studies (K) is less than 6 and for differences between hypothetical and actual evacuation studies when $K < 6$ for either type of study. Fourth, this SMA used the 95% CI as the standard for determining whether the effect sizes are significantly different from zero or significantly different from one another. In addition, following Cohen (1992; see also Field & Gillett, 2010), the present SMA identified a variable as having a *small* effect size if the average $r \approx .1$, *medium* if $r \approx .3$, and *large* if $r \approx .5$.

Fifth, this review also assessed the consistency of results for each variable. In this SMA, consistency is described by the percentage of results that are consistent with the estimated overall effect (significantly positive, significantly negative, or nonsignificant) and is classified into three categories—*minimally* (0%-33%), *moderately* (34%-66%), and *highly* (67%-100%) *consistent*. Finally, this SMA compared the difference between effect sizes for actual and hypothetical evacuation studies by calculating the overlap of the 95% CIs. This CI overlap index is classified into four categories—*zero* (no overlap between CIs), *low* (1%-33%), *moderate* (34%-66%), and *high* (67%-100%).

The comparison of results from actual evacuations and hypothetical scenarios began by testing the significance of the difference in mean effect sizes for the two types of studies. However, it is possible that there might be a perfect linear relationship between the two sets of effect sizes even if there were significant differences in the mean effect sizes for all of the variables. Consequently, the analyses also included cross-plotting the effect sizes for the two types of studies (Gnanadesikan, 1977). If this cross-plot is approximately linear and has no obvious outliers, it indicates a similar overall pattern of effect sizes for both types of studies.

Results

Table 1 summarizes the relationships of potential evacuation predictors separately for actual evacuation studies (Row A for each variable) and hypothetical scenarios (Row H for each variable). It also provides separate summaries

Table 1. Relationship of Variables to Evacuation Decision by Actual and Hypothetical Studies.

	Study type	K_corr	N_corr	r_corr	K_corr +reg	N_corr + reg	r_corr + reg	% of PS	% of NS	SD	SE	95% CI⁻	95% CI⁺	80% CV⁻	80% CV⁺	χ^2
Authorities	A	2	1,784	.10	3	3,061	.05	67	0	0.08	0.03	−0.01	0.12	−0.04	0.14	18.11[a]
	H	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
News media	A	6	3,263	.10	15	8,222	.04	47	33	0.11	0.04	−0.04	0.13	−0.08	0.17	92.87[a]
	H	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Peers	A	4	4,210	.10	13	11,552	.09[b]	23	15	0.09	0.03	0.02	0.15	−0.02	0.20	103.68[a]
	H	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Age	A	10	7,687	−.07	27	24,004	−.02	0	41	0.05	0.03	−0.09	0.05	−0.06	0.02	54.43[a]
	H	na	na	na	2	710	.00	0	50	0.01	0.05	−0.11	0.10	na	na	0.09[a]
Female gender	A	9	9,022	.08	25	26,867	.08[b]	56	0	0.04	0.03	0.02	0.14	0.04	0.12	48.93[a]
	H	na	na	na	6	5,649	−.02	38	25	0.09	0.03	−0.09	0.04	−0.13	0.09	46.56[a]
White	A	7	3,549	−.02	15	8,924	.02	6	0	0.08	0.04	−0.06	0.10	−0.07	0.11	55.93[a]
	H	na	na	na	4	2,362	−.04	0	0	0.06	0.04	−0.12	0.04	−0.09	0.02	8.56[a]
Black	A	2	5,044	−.04	12	18,864	−.03	15	8	0.10	0.03	−0.08	0.02	−0.15	0.09	187.93[a]
	H	na	na	na	1	532	.20[b]	100	0	0.00	0.04	0.12	0.28	na	na	0.00
Hispanic	A	2	2,172	−.10[c]	12	13,032	.02	8	17	0.10	0.03	−0.04	0.07	−0.11	0.14	131.69[a]
	H	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Marital status	A	5	3,127	−.01	10	6,633	−.01	9	18	0.09	0.04	−0.09	0.07	−0.12	0.10	57.82[a]
	H	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
HH size	A	4	4,137	.00	20	19,933	−.02	0	24	0.04	0.03	−0.08	0.05	−0.05	0.01	31.08[a]
	H	na	na	na	2	710	.00	50	0	0.02	0.05	−0.10	0.10	na	na	0.21[a]
Children at home	A	10	10,806	.08	26	24,774	.06	33	4	0.11	0.03	0.00	0.12	−0.07	0.19	281.63[a]
	H	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na

(continued)

Table 1. (continued)

	Study type	K_ corr	N_corr	r_corr	K_corr +reg	N_corr + reg	r_corr + reg	% of PS	% of NS	SD	SE	95% CI−	95% CI+	80% CV−	80% CV+	χ^2
Education	A	7	9,509	.06	21	28,068	.03	18	5	0.06	0.03	−0.02	0.08	−0.04	0.10	96.44[a]
	H	na	na	na	7	6,181	.05	38	13	0.05	0.03	−0.01	0.12	0.00	0.11	17.64[a]
Income	A	8	9,656	.01	30	32,594	.02	15	18	0.04	0.03	−0.04	0.08	−0.03	0.06	65.59[a]
	H	na	na	na	6	3,204	.00	0	14	0.01	0.04	−0.09	0.08	na	na	0.16
Homeownership	A	8	10,071	−.05	27	30,598	−.08[b]	0	54	0.05	0.03	−0.14	−0.02	−0.14	−0.03	85.15[a]
	H	na	na	na	3	1,242	.06	33	0	0.02	0.05	−0.04	0.16	na	na	0.46[a]
Mobile home	A	7	9,274	.18[c]	28	32,076	.28[b]	82	0	0.18	0.03	0.23	0.33	0.05	0.51	1,250.0[a]
	H	na	na	na	5	2,894	.15[b]	20	0	0.16	0.04	0.07	0.23	−0.05	0.34	74.78[a]
Risk area	A	7	6,935	.25	23	21,415	.20[b]	83	0	0.11	0.03	0.14	0.26	0.06	0.34	293.07[a]
	H	na	na	na	3	4,116	.20[b]	75	0	0.09	0.03	0.15	0.25	0.09	0.30	32.96[a]
Hurricane experience	A	8	8,535	.01	21	20,412	.01	24	10	0.09	0.03	−0.05	0.07	−0.10	0.12	159.73[a]
	H	na	na	na	2	710	−.06	0	50	0.03	0.05	−0.17	0.04	na	na	0.79[a]
Coastal residence	A	3	2,758	−.04	12	13,309	−.02	0	33	0.04	0.03	−0.07	0.04	−0.04	0.01	17.18[a]
	H	na	na	na	2	932	−.01	0	50	0.01	0.05	−0.10	0.08	na	na	0.04[a]
"Unnecessary" evacuation	A	4	2,558	.02	7	4,609	.01	29	29	0.10	0.04	−0.07	0.09	−0.10	0.12	42.64[a]
	H	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Official warning	A	9	10,825	.30[c]	21	26,010	.35[b]	90	0	0.14	0.02	0.30	0.40	0.18	0.52	628.07[a]
	H	na	na	na	4	2,353	.15[b]	100	0	0.06	0.04	0.07	0.23	0.09	0.20	8.84[a]
Environmental cues	A	3	2,346	.19	3	2,346	.19[b]	100	0	0.04	0.03	0.12	0.26	0.17	0.20	3.33[a]
	H	na	na	na	4	2,278	.17[b]	75	0	0.09	0.04	0.09	0.25	0.06	0.27	20.69[a]
Peers evacuating	A	6	3,457	.30	9	5,006	.30[b]	100	0	0.07	0.04	0.22	0.37	0.23	0.37	28.15[a]
	H	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na

(continued)

Table 1. (continued)

	Study type	K_corr	N_corr	r_corr	K_corr +reg	N_corr + reg	r_corr + reg	% of PS	% of NS	SD	SE	95% CI^-	95% CI^+	80% CV^-	80% CV^+	χ^2
Businesses closing	A	3	2,346	.17	3	2,346	.17[b]	100	0	0.04	0.03	0.10	0.24	0.14	0.20	3.95[a]
	H	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Expected storm intensity	A	3	3,683	.11	9	12,213	.08[b]	100	0	0.04	0.03	0.03	0.14	0.05	0.11	16.32[a]
	H	na	na	na	2	1,064	.31[b]	67	0	0.09	0.04	0.24	0.39	0.21	0.41	9.76[a]
Expected nearby landfall	A	2	1,839	.13	2	1,839	.13[b]	50	0	0.06	0.03	0.07	0.19	0.07	0.19	6.71[a]
	H	na	na	na	1	532	.00	100	0	0.00	0.04	−0.08	0.09	na	na	0.00
Expected rapid onset	A	2	1,839	−.04	5	5,232	−.04	0	60	0.03	0.03	−0.10	0.02	−0.05	−0.02	5.72[a]
	H	na	na	na	2	1,064	−.03	0	100	0.03	0.04	−0.11	0.06	na	na	0.68[a]
Expected surge risk	A	4	2,380	.26	6	2,921	.22[b]	67	0	0.10	0.04	0.14	0.31	0.11	0.33	31.32[a]
	H	na	na	na	1	607	.06	100	0	0.00	0.04	−0.02	0.14	na	na	0.00
Expected flood risk	A	6	3,520	.16	12	7,125	.15[b]	67	0	0.08	0.04	0.07	0.23	0.06	0.23	45.36[a]
	H	na	na	na	3	1,962	.12[b]	25	0	0.07	0.04	0.04	0.19	0.04	0.20	10.95[a]
Expected wind risk	A	5	2,950	.24	9	5,394	.17[b]	78	0	0.09	0.04	0.10	0.25	0.07	0.28	49.27[a]
	H	na	na	na	4	2,272	−.01	20	20	0.10	0.04	−0.09	0.07	−0.13	0.11	22.95[a]
Expected casualties	A	4	2,263	.34	7	3,115	.29[b]	57	0	0.17	0.04	0.20	0.37	0.08	0.49	100.67[a]
	H	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Expected job disruption	A	4	7,034	.02[c]	6	12,229	−.03	17	33	0.08	0.02	−0.08	0.01	−0.13	0.06	69.03[a]
	H	na	na	na	1	532	−.10[b]	0	100	0.00	0.04	−0.18	−0.01	na	na	0.00
Expected service disruption	A	2	1,839	.07	2	1,839	.07[b]	100	0	0.00	0.03	0.00	0.13	na	na	0.00
	H	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Concern about looting	A	3	2,346	−.03	3	2,346	−.03	0	33	0.03	0.04	−0.10	0.04	na	na	1.88[a]
	H	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na

(continued)

Table 1. (continued)

	Study type	K_corr	N_corr	r_corr	K_corr +reg	N_corr + reg	r_corr + reg	% of PS	% of NS	SD	SE	95% CI⁻	95% CI⁺	80% CV⁻	80% CV⁺	χ^2
Concern about property	A	3	2,346	.00	4	2,774	−.03	0	25	0.08	0.04	−0.11	0.04	−0.13	0.06	19.43[a]
	H	na	na	na	1	400	−.16[b]	0	0	0.00	0.05	−0.26	−0.07	na	na	0.00
Expected evacuation expense	A	3	2,346	.07	3	2,346	.07	33	0	0.04	0.04	0.00	0.14	0.04	0.09	4.02[a]
	H	na	na	na	na	na	na	na	na	na	na	na	na	na	na	na
Expected traffic jams	A	4	2,558	.02	5	2,770	.03	0	0	0.05	0.04	−0.05	0.11	0.00	0.06	6.24[a]
	H	na	na	na	1	400	.10	0	0	0.00	0.05	0.00	0.20	na	na	0.00

Note. na = not available; *K_corr* = number of correlations from correlation analysis; *N_corr* = combined sample size among correlation analyses; *r_corr* = estimated mean correlation of correlation analysis; *K_corr* + *reg* = number of correlations from both correlation and regression analyses; *N_corr* + *reg* = combined sample size among both correlation and regression analyses; *r_corr* + *reg* = estimated mean correlation of both correlation and regression analyses; % *of PS* = percentage of positive significant case; % *of NS* = percentage of negative significant case; *SD* = standard deviation; *SE* = standard error; *95% CI* = 95% confidence interval; *80% CV* = 80% credibility interval; χ^2 = chi-square; A = actual evacuation study; H = hypothetical evacuation study; HH = household.

[a]Result of χ^2 test is significant at 5% level.

[b]95% CI of *r_corr* + *reg* is different from 0.

[c]*r_corr* is outside of 95% CI of *r_corr* + *reg*.

for the sample of studies only reporting correlations and the combined sample of studies reporting correlation analyses and those reporting regression analyses. The column heads in Table 1 are as follows (see Online Appendix D for a more complete description). *K_corr* is the number of studies reporting correlations, *N_corr* is the combined sample size for those studies, and *r_corr* is the average effect size from those studies. Similarly, *K_corr + reg* is the number of studies in the combined sample (those reporting correlations plus those reporting regressions), *N_corr + reg* is the combined sample size for the correlation and regression studies, and *r_corr + reg* is the average effect size from those studies. Moreover, *% of PS* is the percentage of significant positive results, *% of NS* is the percentage of significant negative results, *SD* is the standard deviation of sample effect sizes (see Online Appendix D, Equation 4), *SE* is the standard deviation of sampling error (see Online Appendix D, Equation 5), *95% CI*$^-$ is the lower bound of the 95% CI, *95% CI*$^+$ is the upper bound of the 95% CI, *80% CV*$^-$ is the lower bound of the 80% credibility interval, *80% CV*$^+$ is the upper bound of the 80% credibility interval, and χ^2 measures the homogeneity of effect sizes. The results reveal that the effect sizes from the correlation analyses are generally consistent with those from the regression analyses, so the following sections combined the two sets of coefficients.

Geographic/Structural Location (H1a)

Risk area has been studied in 24 actual evacuation studies[1] and 4 hypothetical evacuation studies.[2] Among the actual evacuation studies, 20 (83%) reported significant positive correlations and 4 (17%) reported nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from $r = -.02$ to .49 with a significant weighted average $\bar{r} = .20$ (95% CI [.14, .26]). This result is consistent with the results from the hypothetical evacuation studies, which reported 3 (75%) significant positive correlations and 1 (25%) nonsignificant correlation with a significant $\bar{r} = .20$ (95% CI [.15, .25]). In addition, a South Carolina hypothetical evacuation study found that 75% to 85% of risk area residents reported they would evacuate from a major hurricane, which is higher than the 69% of inland residents who would do so (Cutter, Emrich, Bowser, Angelo, & Mitchell, 2011). Over all studies, risk area had a highly consistent (82%) significant $\bar{r} = .20$ (95% CI [.14, .26]).

Mobile home residence has been studied in 28 actual evacuation studies and 3 hypothetical evacuation studies. Among the actual evacuation studies, 23 (82%) reported significant positive correlations and 5 (18%) reported nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from $r = .05$ to .56 with a significant $\bar{r} = .28$ (95% CI [.23,

.33]). This result conflicts slightly with the results from the hypothetical evacuation studies, which reported 1 (20%) significant positive correlations and 4 (80%) nonsignificant correlations with a significant $\bar{r}$ = .15 (95% CI [.07, .23]). Over all studies, mobile home residence had a highly consistent (73%) significant $\bar{r}$ = .27 (95% CI [.21, .32]).

Official Warning (H1b)

Research conducted after Baker (1991) examined the effect of official warning in 21 actual and 4 hypothetical evacuation studies. Among the actual evacuation studies, 19 (90%) reported significant positive correlations and 2 (10%) reported nonsignificant correlations. Overall, the correlations ranged from $r = -.04$ to .64 with a significant $\bar{r}$ = .35 (95% CI [.30, .40]). Although the correlations provided by hypothetical evacuation studies are generally lower than actual evacuation studies with a significant $\bar{r}$ = .15 (95% CI [.07, .23]), all four hypothetical evacuation studies reported significant positive effects that are consistent with actual evacuation studies. In addition, Dow and Cutter (1998, 2000) supported this result by reporting that about 20% of North and South Carolina coastal residents reported relying on official warnings in their evacuation decisions. Over all studies, official warning had a highly consistent (92%) significant $\bar{r}$ = .34 (95% CI [.28, .38]).

Environmental and Social Cues (H1c)

Environmental cues has been studied in 3 actual evacuation studies and 4 hypothetical evacuation studies. The actual evacuation studies reported significant positive correlations that ranged from r = .12 to .22 with a $\bar{r}$ = .19 (95% CI [.12, .26]). This result is consistent with the results from the hypothetical evacuation studies, which reported 3 (75%) significant positive correlations and 1 (25%) nonsignificant correlation with a $\bar{r}$ = .17 (95% CI [.09, .25]). Over all studies, environmental cues had a highly consistent (86%) significant $\bar{r}$ = .18 (95% CI [.10, .25]).

Peers evacuating has been studied in 9 actual evacuation studies, all of which reported significant positive correlations that ranged from r = .23 to .49 with a perfectly consistent (100%) significant $\bar{r}$ = .30 (95% CI [.22, .37]).

Businesses closing has been studied in 3 actual evacuation studies, all of which reported significant positive correlations that ranged from r = .14 to .24 with a perfectly consistent (100%) significant $\bar{r}$ = .17 (95% CI [.10, .24]).

Perceived Storm Characteristics (H1d)

Expected storm intensity has been studied in nine actual evacuation studies and six hypothetical evacuation studies.[3] Among the actual evacuation studies, all reported significant positive correlations that ranged from $r = .04$ to .18 with $\bar{r} = .08$ (95% CI [.03, .14]). However, the correlations in two hypothetical evacuation studies, which have $\bar{r} = .31$ (95% CI [.24, .39]), are much higher than those in actual evacuation studies. Moreover, Dow and her colleagues (Cutter et al., 2011; Dow & Cutter, 1998, 2000) reported that 24% to 32% of respondents reported their decisions were affected by hurricane intensity. Over all studies, expected storm intensity had a highly consistent (87%) significant $\bar{r} = .10$ (95% CI [.05, .16]).

Expected nearby landfall has only been studied in two actual evacuation studies and one hypothetical evacuation study. The actual evacuation studies reported one positive correlation and one nonsignificant correlation for a significant $r = .13$ (95% CI [.07, .19]). A hypothetical evacuation study by Bhattacharjee, Petrolia, Hanson, and Thomas (2009) reported a nonsignificant $r = .00$ (95% CI [−.08, .09]). In addition, some actual evacuation studies asked a different, but related, question. Cutter et al. (2011), Dow and Cutter (1998, 2000), Lindell et al. (2005), and Smith and McCarty (2009) found that evacuation rates were higher when residents believed their homes would receive a direct hit by a hurricane. Over all studies, expected nearby landfall had a highly consistent (67%) significant $\bar{r} = .10$ (95% CI [.03, .17]).

Expected rapid onset has been studied in five actual evacuation studies and two hypothetical evacuation studies. Among the actual evacuation studies, three (60%) reported significant negative correlations and two (40%) reported nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from $r = -.09$ to .00 with a nonsignificant $\bar{r} = -.04$ (95% CI [−.10, .02]). This result is consistent with the results from hypothetical evacuation studies, which reported two (100%) significant negative correlations with $\bar{r} = -.03$ (95% CI [−.11, .06]). Other studies (Riad, Norris, & Ruback, 1999; Smith & McCarty, 2009) reported that about 5% of respondents rated "not having enough time" as their reason for not evacuating. Over all studies, expected rapid onset had an inconsistent (29%) nonsignificant $\bar{r} = -.04$ (95% CI [−.10,.03]).

Expected Personal Impacts (H1e)

Expected surge damage has been studied in six actual evacuation studies and one hypothetical evacuation study. Among the actual evacuation studies, four (67%) reported significant positive correlations and two (33%) reported nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from $r = -.01$ to .35 with a significant $\bar{r} = .22$ (95% CI [.14, .31]). Fu's (2004) hypothetical evacuation study provided a correlation that was much lower than in the actual evacuation studies and nonsignificant—$r = .06$ (95% CI [−.02, .14]). Over all studies, expected surge damage had highly consistent (71%) significant $\bar{r} = .19$ (95% CI [.11, .28]).

Expected flood damage has been studied in 12 actual evacuation studies and 4 hypothetical evacuation studies.[1] Among the actual evacuation studies, 8 (67%) reported significant positive correlations and 4 (33%) reported nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from $r = -.05$ to .32 with a significant $\bar{r} = .15$ (95% CI [.07, .23]). This result is consistent with the results from the hypothetical evacuation studies, which reported one (33%) significant positive correlation and two (67%) nonsignificant correlations with a significant $\bar{r} = .12$ (95% CI [.04, .19]). Over all studies, expected flood damage had a moderately consistent (56%) significant $\bar{r} = .14$ (95% CI [.06, .22]).

Expected wind damage has been studied in nine actual evacuation studies and five hypothetical evacuation studies.[4] Among the actual evacuation studies, seven (78%) reported significant positive correlations and two (22%) reported nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from $r = .06$ to .30 with a significant $\bar{r} = .17$ (95% CI [.10, .25]). This result conflicts with the results from the hypothetical evacuation studies, which reported one (25%) significant positive correlation, one (25%) significant negative correlation, and two (50%) nonsignificant correlations with a nonsignificant $\bar{r} = -.01$ (95% CI [−.09, .07]). Over all studies, expected wind damage had a moderately consistent (57%) significant $\bar{r} = .12$ (95% CI [.04, .20]).

Expected personal casualties has been studied in seven actual evacuation studies that reported four (57%) significant positive correlations and three (43%) nonsignificant correlations. Over all studies, the correlations ranged from $r = -.06$ to .46 with a moderately consistent (57%) significant $\bar{r} = .29$ (95% CI [.20, .37]).

Expected job disruption has been studied in six actual evacuation studies and one hypothetical evacuation study. Among the actual evacuation studies, one (17%) reported a significant positive correlation, two (33%) reported significant negative correlations, and three (50%) reported nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from $r = -.15$ to .13 with a nonsignificant $\bar{r} = -.03$ (95% CI [−.08, −.01]). The Bhattacharjee et al. (2009) hypothetical evacuation study had a significant negative $r = -.10$ (95% CI [−.18, −.01]). In addition, Dow and Cutter (1998, 2000) and Smith and McCarty (2009) reported job disruption was the reason for about 7% to 10% of residents refusing to leave. Over all studies, job disruption had a moderately consistent (43%) nonsignificant $\bar{r}$ = −.04 (95% CI [−.08, .01]).

Expected service disruption has been studied in two actual evacuation studies that reported two (100%) significant positive correlations. Overall, the correlations for the actual evacuation studies produced a highly consistent (100%) significant $\bar{r}$ = .07 (95% CI [.00, .13]) in which the lower bound for the CI exceeded zero in the third decimal place.

Gender (H1f)

Female gender has been studied in 25 actual evacuation studies and 8 hypothetical evacuation studies.[2,5] Among the actual evacuation studies, 14 (56%) reported significant positive correlations and 11 (44%) reported nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from r = −.08 to .15 with a significant $\bar{r}$ = .08 (95% CI [.02, .14]). This result conflicts with the results from the hypothetical evacuation studies, which reported 3 (38%) significant positive correlations, 2 (25%) significant negative correlations, and 3 (38%) nonsignificant correlations. The correlations for the hypothetical evacuations ranged from r = −.10 to .14 with a nonsignificant $\bar{r}$ = −.02 (95% CI [−.09, .04]). Over all studies, female gender had a moderately consistent (42%) nonsignificant $\bar{r}$ = .06 (95% CI [.00, .12]).

Mediation Effects of Expected Personal Impacts (H2)

There was partial support for H2. As Table 1 indicates, expected storm characteristics do indeed have lower correlations than the expected personal impacts. However, environmental/social cues have correlations that are approximately the same size as those of the expected personal impact variables, which suggests that expected personal impact does not completely mediate the relationships between environmental/social cues and evacuation.

Other Demographic Characteristics (RQ1)

Age has been studied in 27 actual evacuation studies and 2 hypothetical evacuation studies. Among the actual evacuation studies, 11 (41%) reported significant negative correlations and 16 (59%) reported nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from r = −.15 to .04 with a nonsignificant $\bar{r}$ = −.02 (95% CI [−.09, .05]). This result is also supported by the results from hypothetical evacuation studies, which reported 1 (50%) significant negative correlation and 1 (50%) nonsignificant correlation, with a nonsignificant $\bar{r}$ = .00 (95% CI [−.11, .10]). Over all studies, age had a moderately consistent (59%) nonsignificant $\bar{r}$ = −.02 (95% CI [−.09, .05]).

White has been studied in 17 actual evacuation studies[6,7] and 4 hypothetical evacuation studies. Among the actual evacuation studies, 1 (6%) reported a significant positive correlation and 14 (94%) reported nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from r = −.10 to .23 with a nonsignificant $\bar{r}$ = .02 (95% CI [−.06, .10]). This result is consistent with the results from the hypothetical evacuation studies, which reported 4 (100%) nonsignificant correlations with a $\bar{r}$ = −.04 (95% CI [−.12, .04]). Over all studies, White ethnicity had a highly consistent (95%) nonsignificant $\bar{r}$ = .01 (95% CI [−.07, .09]).

Black has been studied in 13 actual evacuation studies[6] and 1 hypothetical evacuation study. Among the actual evacuation studies, two (15%) reported a significant positive correlation, one (8%) reported a significant negative correlation, and nine (77%) reported nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from r = −.22 to .18 with a nonsignificant $\bar{r}$ = −.03 (95% CI [−.08, .02]). The only hypothetical evacuation study of this variable reported a significant r = .20 (Bhattacharjee et al., 2009). Over all studies, Black had a highly consistent (72%) nonsignificant $\bar{r}$ = −.02 (95% CI [−.07, .03]).

Hispanic has been studied in 12 actual evacuation studies that reported one (8%) significant positive correlation, two (17%) significant negative correlations, and nine (75%) nonsignificant correlations. The correlations for the actual evacuation studies ranged from r = −.10 to .29 with a highly consistent (75%) nonsignificant $\bar{r}$ = .02 (95% CI [−.04, .07]).

Marital status has been studied in 11 actual evacuation studies[7] that reported one (9%) positive correlation, two (18%) negative correlations, and eight (73%) nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from r = −.16 to .30 with a highly consistent (73%) nonsignificant $\bar{r}$ = −.01 (95% CI [−.09, .07]).

Household size has been studied in 21 actual evacuation studies[7] and 2 hypothetical evacuation studies. Among the actual evacuation studies, 5 (24%) reported significant negative correlations and 16 (76%) reported nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from r = −.13 to .06 with a nonsignificant $\bar{r}$ = −.02 (95% CI [−.08, .05]). The hypothetical evacuation studies reported 1 (50%) significant positive correlation and 1 (50%) nonsignificant correlation with a nonsignificant $\bar{r}$ = .00 (95% CI [−.10, .10]). Over all studies, household size had a highly consistent (74%) nonsignificant $\bar{r}$ = −.01 (95% CI [−.08, .05]).

Children at home has been studied in 27 actual evacuation studies[6] that reported 9 (33%) significant positive correlations, 1 (4%) significant negative correlation, and 17 (63%) nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from $r = -.24$ to .45 with a moderately consistent (63%) nonsignificant $\bar{r} = .06$ (95% CI [.00, .12]).

Education has been studied in 22 actual evacuation studies[7] and 8 hypothetical evacuation studies.[2] Among the actual evacuation studies, 4 (18%) reported significant positive correlations, 1 (5%) reported a significant negative correlation, and 17 (77%) reported nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from $r = -.10$ to .17 with a nonsignificant $\bar{r} = .03$ (95% CI [−.02, .08]). This result is consistent with the results from the hypothetical evacuation studies, which reported 3 (38%) significant positive correlations, 1 (13%) significant negative correlation, and 4 (50%) nonsignificant correlations. Overall, the correlations for the hypothetical evacuation studies ranged from $r = -.02$ to .11 with a nonsignificant $\bar{r} = .05$ (95% CI [−.01, .12]). Over all studies, education had a highly consistent (70%) nonsignificant $\bar{r} = .04$ (95% CI [−.02, .09]).

Income has been studied in 33 actual evacuation studies[6-8] and 7 hypothetical evacuation studies.[7] Among the actual evacuation studies, 5 (15%) reported significant positive correlations, 6 (18%) reported significant negative correlations, and 22 (67%) reported nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from $r = -.21$ to .09 with a nonsignificant $\bar{r} = .02$ (95% CI [−.04 , .08]). This result is consistent with the results from the hypothetical evacuation studies, which reported 1 (14%) significant negative correlation and 6 (86%) nonsignificant correlations. Overall, the correlations for the hypothetical evacuation studies ranged from $r = -.02$ to .01 with a nonsignificant $\bar{r} = .00$ (95% CI [−.09 , .08]). Over all studies, income had a highly consistent (69%) nonsignificant $\bar{r} = .01$ (95% CI [−.05, .08]).

Homeownership has been studied in 28 actual evacuation studies[3] and 3 hypothetical evacuation studies. Among the actual evacuation studies, 15 (54%) reported significant negative correlations and 13 (46%) reported nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from $r = -.28$ to .04 with a significant $\bar{r} = -.08$ (95% CI [−.14, −.02]). This result conflicts with the results from the hypothetical evacuation studies, which reported 1 (33%) significant positive correlation and 2 (67%) nonsignificant correlations with a nonsignificant $\bar{r} = .06$ (95% CI [−.04, .16]). Over all studies, homeownership had a moderately consistent (48%) significant $\bar{r} = -.08$ (95% CI [−.14, .02]).

Hurricane Experience, Coastal Tenure, and "Unnecessary" Evacuations (RQ2)

Previous hurricane experience has been studied in 21 actual evacuation studies and 2 hypothetical evacuation studies. Among the actual evacuation studies, 5 (24%) reported significant positive correlations, 2 (10%) reported significant negative correlations, and 14 (66%) reported nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from $r = -.12$ to .29 with a nonsignificant $\bar{r} = .01$ (95% CI [−.05, .07]). This result is consistent with the results from the hypothetical evacuation studies, which reported 1 (50%) significant negative correlation and 1 (50%) nonsignificant correlation with a nonsignificant $\bar{r} = -.06$ (95% CI [−.17, .04]). Moreover, Dow and Cutter (1998, 2000) reported that less than 15% of households reported depending on their previous experience as a reason for evacuating, whereas Brommer and Senkbeil (2010) found that 83% of households reported relying on previous experience. Over all studies, previous experience had a moderately consistent (65%) nonsignificant $\bar{r} = .01$ (95% CI [−.06, .07]).

Coastal tenure, which is sometimes viewed as a proxy for hurricane experience, has been studied in 12 actual evacuation studies and 2 hypothetical evacuation studies. Among the actual evacuation studies, four (33%) reported significant negative correlations and eight (67%) reported nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from $r = -.15$ to .00 with a nonsignificant $\bar{r} = -.02$ (95% CI [−.07, .04]). This result is consistent with the results from the hypothetical evacuation studies, which reported one (50%) significant negative correlation and one (50%) nonsignificant correlation with a nonsignificant $\bar{r} = -.01$ (95% CI [−.10, .08]). Over all studies, coastal tenure had a moderately consistent (64%) nonsignificant $\bar{r} = -.02$ (95% CI [−.08, .05]).

"Unnecessary" evacuation has been studied in seven actual evacuation studies that reported two (29%) positive correlations, two (29%) negative correlations, and three (42%) nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from $r = -.16$ to .15 with a moderately consistent (42%) nonsignificant $\bar{r} = .01$ (95% CI [−.07, .09]).

Information Sources and Perceived Evacuation Impediments (RQ3)

Reliance on authorities has been studied in three actual evacuation studies, which reported two (67%) positive correlations and one (33%) nonsignificant correlation ranging from $r = -.05$ to .21 with a minimally consistent (33%)

nonsignificant $\bar{r}$ = .05 (95% CI [−.01, .12]). Studies of North and South Carolina residents are consistent with this result, with only about 10% of respondents reporting they relied on the advice of authorities in their evacuation decisions (Cutter et al., 2011; Dow & Cutter, 1998, 2000).

Reliance on news media has been studied in 15 actual evacuation studies that reported 7 (47%) positive correlations, 5 negative correlations (33%), and 3 (20%) nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from r = −.23 to .28 with a minimally consistent (20%) nonsignificant $\bar{r}$ = .04 (95% CI [−.04, .13]). Dow and Cutter (1998, 2000) also reported that the percentage of residents relying on the news media varied from 13% to 27% across hurricanes.

Reliance on peers has been studied in 13 actual evacuation studies, which reported 3 (23%) positive correlations, 2 (15%) negative correlations, and 8 (62%) nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from r = −.10 to .25 with a minimally consistent (23%) significant $\bar{r}$ = .09 (95% CI [.02, .15]).

Concern about looting has been studied in three actual evacuation studies that reported one (33%) significant negative correlation and two (67%) nonsignificant correlations. Overall, the correlations for the actual evacuation studies ranged from r = −.08 to −.01 with a highly consistent (67%) nonsignificant $\bar{r}$ = −.03 (95% CI [−.10 , .04]).

Concern about property protection from the storm has been studied in four actual evacuation studies and one hypothetical evacuation study. Among the actual evacuation studies, one (25%) reported a significant negative correlation and three (75%) reported nonsignificant correlations. The correlations for the actual evacuation studies ranged from r = −.22 to .05 with a nonsignificant $\bar{r}$ = −.03 (95% CI [−.11, .04]). Consistent with this finding, the Lazo, Waldman, Morrow, and Thacher (2010) hypothetical evacuation study found a nonsignificant r = −.16 (95% CI [−.26, .07]). Over all studies, concern about property protection from the storm had a highly consistent (80%) nonsignificant $\bar{r}$ = −.05 (95% CI [−.13, .03]).

Concern about evacuation expense has been examined in three actual evacuation studies that reported one (33%) significant positive correlation and two (67%) nonsignificant correlations. Overall, the correlations for these actual evacuation studies ranged from r = .02 to .14 with a highly consistent (67%) nonsignificant $\bar{r}$ = .07 (95% CI [.00, .14]).

Concern about traffic jams has been studied in five actual evacuation studies and one hypothetical evacuation study. The actual evacuation studies reported correlations that ranged from r = .01 to .17 with a nonsignificant $\bar{r}$ = .03 (95% CI [−.05, .11]). This result is consistent with the Lazo et al.

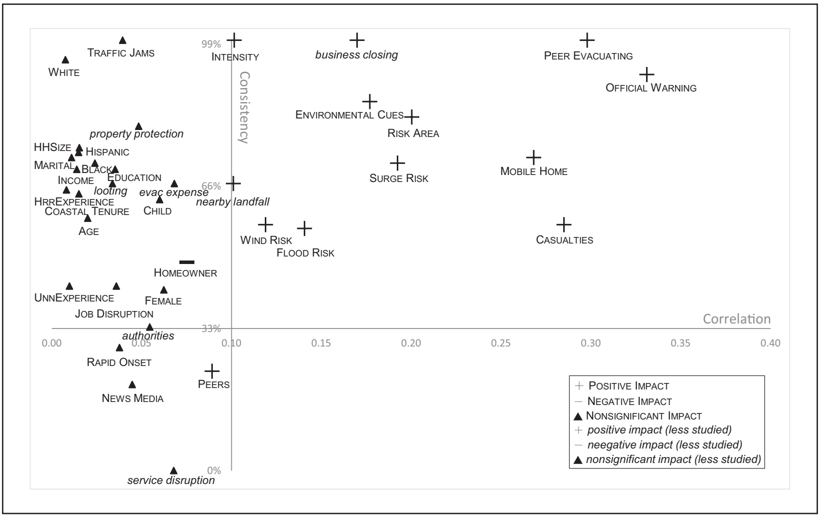

Figure 1. Cross-plot of effect size by consistency of results among all studies.

(2010) hypothetical evacuation study that reported a nonsignificant r = .10 (95% CI [.00, .20]). Over all studies, concern about traffic jams had a perfectly consistent (100%) nonsignificant $\overline{r}$ = .04 (95% CI [−.05, .12]).

Effect Size Versus Consistency

Figure 1 extends the data from Table 1 by cross-plotting effect size (dichotomized at .10, Cohen's standard for a small correlation) against consistency (dichotomized at 33%, our criterion for low consistency) and categorizing the variables into four groups based on the figure's four quadrants. The effects of these variables are coded according to the sign of the effect (+ indicating a positive effect, ▲ indicating a nonsignificant effect, and − indicating a negative effect) and the strength of evidence for the effect (variables with fewer than six studies are displayed in an italic lowercase font rather than a Roman uppercase font).

First, the results in the upper right quadrant indicate that official warnings, observations of peers evacuating, expected casualties, mobile home residence, surge damage risk, risk area, observation of environmental cues, wind damage risk, flood damage risk, and observation of businesses closing have moderately to highly consistent medium effects on household evacuation. Expected storm intensity and expected nearby landfall have consistent medium effects but only with a weak support because these variables are less studied.

Second, the upper left quadrant shows that homeownership has a consistent but small ($r \approx .10$) effect size. Consistent with Baker's (1991) conclusions, the demographic variables, coastal tenure, hurricane experience, unnecessary evacuation experience, and concerns about traffic jams and job disruption have consistently nonsignificant impacts on hurricane evacuation. It is premature to draw any conclusions about reliance on authorities or expected evacuation impediments such as concern about property protection from the storm, looting, and evacuation expense because too few studies have examined those variables.

Third, there are no variables located in the lower right quadrant—high effect size with low consistency—because this is a mathematical impossibility. Fourth, the lower left quadrant shows that evidence regarding reliance on peers and news media as information sources, expected rapid onset, and service disruption is ambiguous because, although the average effect sizes are small, the results are inconsistent. Finally, the generalizability of the results in Figure 1 was tested by deleting the results of the 11 hypothetical evacuation studies and redrawing the figure using only the results of the 38 actual evacuation studies. This figure, which is presented in Online Appendix E, shows that the deletion of the hypothetical evacuation studies produced no meaningful differences in the conclusions to be drawn.

Actual Evacuation Studies Versus Hypothetical Evacuation Scenarios (RQ4)

Due to the limited number of variables studied in hypothetical evacuation studies, it was only possible to compare results from 17 of the 36 variables that were addressed in the overall SMA. Table 2, which displays the results of the comparison of actual and hypothetical evacuation studies (RQ4), indicates nonsignificant differences in effect sizes on 10 of the 17 variables. Moreover, the 95% CIs had high overlap for six variables (age, income, risk area, coastal tenure, environmental cues, and expected rapid onset), medium overlap for five (White, household size, education, hurricane experience, and expected flood risk), low overlap for two (female gender and homeownership), and zero overlap for four (mobile home residence, official warning, expected storm intensity, and expected wind risk). The hypothetical evacuation studies had significantly smaller (or more negative) effect sizes than the actual evacuation studies on female gender, official warning, mobile home residence, and expected wind risk but a larger (or more positive) effect sizes

Table 2. Comparison Between Actual and Hypothetical Studies.

	Study type	*K*	*n*	Range	*r*	95% CI	Consistency (sign)	Overlap
Age	A	27	24,004	−.15 to .04	−.02	[−.09, .05]	M (×)	H
	H	2	710	−.01 to .01	.00	[−.11, .10]	M (×)	
Female gender	A	25	26,867	−.08 to .15	.08[a]	[.02, .14]	M (+)	L
	H	6	5,649	−.10 to .14	−.02	[−.09, .04]	M (×)	
White	A	15	8,924	−.10 to .23	.02	[−.06, .10]	H (×)	M
	H	4	2,362	−.09 to .08	−.04	[−.12, .04]	H (×)	
Household size	A	20	19,933	−.13 to .06	−.02	[−.08, .05]	H (×)	M
	H	2	710	−.01 to .02	.00	[−.10, .10]	M (×)	
Education	A	21	28,068	−.10 to .17	.03	[−.02, .08]	H (×)	M
	H	7	6,181	−.02 to .11	.05	[−.01, .12]	M (×)	
Income	A	30	32,594	−.21 to .09	.02	[−.04, .08]	H (×)	H
	H	6	3,204	−.02 to .01	.00	[−.09, .08]	H (×)	
Homeownership	A	27	30,598	−.28 to .04	−.08[a]	[−.14, −.02]	M (−)	L
	H	3	1,242	.03 to .08	.06	[−.04, .16]	H (×)	
Risk area	A	23	21,415	−.02 to .49	.20[a]	[.14, .26]	H (+)	H
	H	3	4,116	.05 to .25	.20[a]	[.15, .25]	H (+)	
Mobile home residence	A	28	32,076	.05 to .56	.28[a]	[.23, .33]	H (+)	∅
	H	5	2,894	.02 to .38	.15[a]	[.07, .23]	L (+)	
Hurricane experience	A	21	20,412	−.12 to .29	.01	[−.05, .07]	M (×)	M
	H	2	710	−.09 to −.02	−.06	[−.17, .04]	M (×)	
Coastal tenure	A	12	13,309	−.15 to .00	−.02	[−.10, .08]	H (×)	H
	H	2	932	−.01 to .00	−.01	[−.07, .09]	M (×)	

(continued)

Table 2. (continued)

	Study type	K	n	Range	r	95% CI	Consistency (sign)	Overlap
Official warning	A	21	26,010	−.04 to .64	.35[a]	[.30, .40]	H (+)	∅
	H	4	2,353	.06 to .23	.15[a]	[.07, .23]	H (+)	
Environmental cues	A	3	2,346	.12 to .22	.19[a]	[.12, .26]	H (+)	H
	H	4	2,278	.09 to .31	.17[a]	[.09, .25]	H (+)	
Expected storm intensity	A	9	12,213	.04 to .18	.08[a]	[.03, .14]	H (+)	∅
	H	2	1,064	.23 to .40	.31[a]	[.24, .39]	H (+)	
Expected rapid onset	A	5	5,232	−.09 to .00	−.04	[−.08, .05]	M (×)	H
	H	2	1,064	−.05 to .00	−.03	[−.11, .06]	L (×)	
Expected flood risk	A	12	7,125	−.05 to .32	.15[a]	[.07, .23]	H (+)	M
	H	3	1,962	.04 to .20	.12[a]	[.04, .19]	L (+)	
Expected wind risk	A	9	5,394	.06 to .30	.17[a]	[.10, .25]	H (+)	∅
	H	4	2,272	−.16 to .09	−.01	[−.09, .07]	M (×)	

Note. A = actual evacuation study; H = hypothetical evacuation study; K = number of correlations; n = combined sample size; r = estimated mean correlation; 95% CI = 95% confidence interval; Overlap = level of overlap between the 95% CIs of the actual and hypothetical studies; H = high consistency/overlap; M = moderate consistency/overlap; L = low consistency/overlap; ∅ = zero overlap; × = nonsignificant effect; + = positive effect; − = negative effect.

[a]95% CI of r does not include zero.

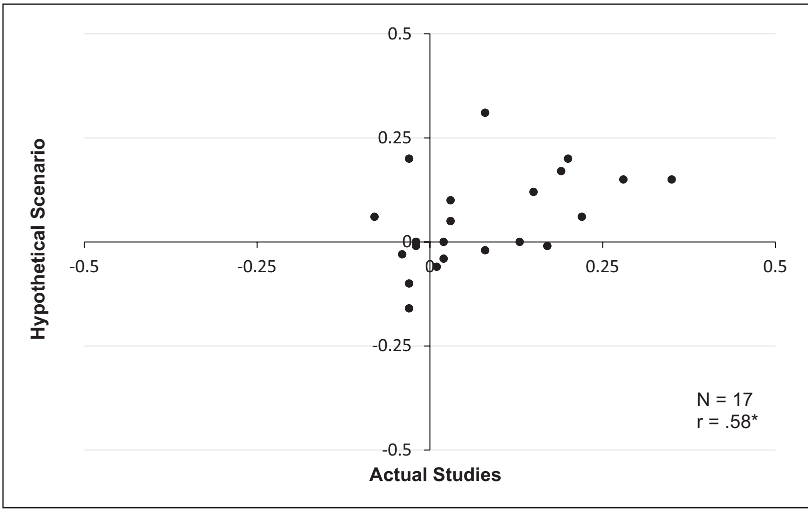

Figure 2. Cross-plot of effect sizes for actual evacuation studies and hypothetical scenarios.

for homeownership and expected storm intensity. However, there were fewer than six hypothetical studies ($K < 6$) for all of these variables except gender, which itself had only six studies. Consequently, only tentative conclusions can be drawn about significant differences between hypothetical and actual studies in these variables' effect sizes.

Figure 2 presents the cross-plot of effect sizes ($r = .58$, $p < .05$) between actual evacuation studies and hypothetical evacuation studies. The cross-plot of the effect sizes has two slightly discrepant points—expected storm intensity and expected wind risk but, overall, these results indicate a significant degree of similarity between the effect sizes for the actual evacuation studies and hypothetical scenarios.

Discussion

The strong support for the hypothesis that geographical/structural locations have consistently significant effect sizes in predicting evacuation (H1a) confirms Baker's (1991) conclusions. Hurricane risk area is a significant predictor of evacuation because people are broadly aware of their proximity to the coast, although many are confused about which specific hurricane risk area they are in (Arlikatti, Lindell, Prater, & Zhang, 2006; Zhang, Prater, & Lindell, 2004). Similarly, the vulnerability of mobile homes is well known, so people who live in those structures would also be more likely to perceive risk from a hurricane and leave when a storm approaches. It is somewhat surprising that these variables are as highly correlated with evacuation as direct measures of perceived threat—expected personal impacts—but this might be due to the fact that self-reports of risk area and mobile home residence are probably measured with very high reliability whereas the reliability of expected personal impacts is probably lower. One theoretical explanation for the high correlations for these variables is that their effects on evacuation decisions are only partially rather than completely mediated by expected personal impacts, as proposed in the PADM (Lindell & Perry, 1992, 2004, 2012). To test this hypothesis, future studies will need to report the correlations among the predictors of evacuation as well as the correlations of the predictors with evacuation.

The strong support for the hypothesis about the effect of official warning on evacuation (H1b) also confirms Baker's (1991) conclusion. An official warning—whether it is a National Hurricane Center hurricane watch or warning, a local official's recommendation, a voluntary or a mandatory evacuation order—probably is a strong predictor of household evacuation because people believe these authorities have a high level of hazard knowledge, will transmit information accurately, and have responsibility to warn households at risk (Arlikatti, Lindell, & Prater, 2007; Lindell & Whitney, 2000). Here, too, there is a question about why a variable that would be expected to have its effect on evacuation completely mediated by expected personal impacts has such a strong correlation. One possibility is that some people comply with authorities regardless of their personal risk assessments (C. H. Gladwin, Gladwin, & Peacock, 2001).

The consistently large effect sizes for environmental and social cues, which support H1c, are somewhat puzzling because most people evacuate before the arrival of intense wind and rain. Indeed, state and local emergency managers attempt to have everyone evacuated before the arrival of Tropical Storm wind. Thus, environmental cues of hurricane onset are more likely to serve as confirmation of social warnings than as an independent source of threat information—as in many flash floods (Gruntfest, Downing, & White, 1978) and tornadoes (Lindell, Sutter, & Trainor, 2013). The effect of social cues such as observations of businesses closing and other people evacuating is easier to explain because they not only provide indications that danger exists but that other people are taking the threat seriously enough to take protective action. This can result in a bandwagon effect (Asch, 1951) in which households that are uncertain about how to respond to an approaching hurricane assume their neighbors are responding appropriately to the threat and therefore conform to the strong visual cues they see on the streets.

The partial support for the hypothesis that perceived storm characteristics have consistently significant effect sizes in predicting evacuation (H1d) also lends support to Baker (1991) by yielding statistically significant—although weak—effect sizes for expected nearby landfall and expected hurricane intensity. Both of these variables provide coastal residents with information from which to infer two critical aspects of the PADM's definition of a threat—certainty and severity (Lindell & Perry, 1992, 2004, 2012). It is this threat perception, combined with people's beliefs about their hazard exposure (location in a hurricane risk area) and structural vulnerability (e.g., residence in a mobile home) that presumably produces expected personal impacts. What is surprising is the nonsignificant effect of expected rapid onset because this condition should provide a sense of immediacy that prevents procrastination in seeking and implementing protective action. One possible explanation for this nonsignificant result is that hurricanes generally have so many days of forewarning that some people do not experience a sense of urgency to act until the storm is very close. By that time, however, evacuation routes are so crowded that the procrastinators believe they have little chance of reaching safety before the onset of storm conditions and therefore choose to shelter at home rather than risk being caught on the road. This negative relation could offset the positive correlation that would be expected for early decision makers. The opposing positive and negative correlations in the two groups could produce the observed nonsignificant correlation.

The support for the hypothesis that expected personal impacts have consistently significant effect sizes in predicting evacuation (H1e) is also consistent with Baker's (1991) conclusions as well as findings from other hazards (Mileti & Peek, 2000; Mileti & Sorensen, 1990; Sorensen, 2000; Sorensen & Sorensen, 2007). Specifically, expected personal impacts provide the most direct measure of people's beliefs about the threat to themselves, their loved ones, their property, and their daily routines. Thus, expected personal impacts provide motivation to confirm a threat and take protective action (Lindell & Perry, 1992, 2004, 2012). What is new in these results is that expectation of family casualties is a notably stronger predictor than damage from surge, flood, or wind. In turn, expected damage is a stronger predictor than expectations of job or service disruption. Moreover, as noted earlier, expected personal impact does not appear to completely mediate the effects of geographical exposure, structural location, official warning, and observation of peers evacuating. Thus, future studies need to examine the possibility that these variables have direct effects or identify additional mediators of these variables' effects.

The lack of support for the hypothesis that female gender has a consistently significant effect size in predicting evacuation (H1f) is contrary to the proposition that females usually have social vulnerabilities and caregiving roles in the household. These conditions are thought to produce greater risk perceptions about a variety of social and environmental hazards that directly affect evacuation decisions (Bateman & Edwards, 2002; Davidson & Freudenberg, 1996). One explanation for this apparent conflict is that most previous research has examined the effect of female gender on risk perceptions rather than protective action. Consequently, the constraints imposed by evacuating as a family unit (Drabek, 1986) might attenuate the effects of gender differences in risk perception. Specifically, evacuation questionnaires are—at least nominally—filled out by one member on behalf of the entire household, so some respondents might be reporting (their own) risk perceptions that are inconsistent with (the entire household's) protective action. To address this ambiguity, future research should examine the dynamics of household decision making about hurricane evacuation.

There was some support for H2, but these results only *suggest* that expected personal impact mediates the relationship between expected storm characteristics and evacuation but not the relationship between environmental/social cues and evacuation. More definitive conclusions about these hypothesized mediation effects will be possible when researchers provide data about the correlations of environmental/social cues and expected storm characteristics with expected personal impacts.

The evidence relevant to the research question about consistently significant effect sizes of demographic variables in predicting evacuation (RQ1) shows that homeownership was the only demographic variable that had a consistently significant effect size. The significant negative effect of homeownership on evacuation is difficult to explain but might be due to its correlations with one or more other variables. One possibility is that homeownership is negatively correlated with risk perception, which is usually positively correlated with evacuation. Specifically, homeowners might have lower risk perceptions if they live in houses with stronger structures—or *think* they live in houses with stronger structures—and are more likely to have home insurance (H. Gladwin & Peacock, 1997). Another interesting finding regarding demographic variables is that six of the seven studies reporting significant positive correlations between education and evacuation were published after 2009, which suggests the impact of education might be increasing over time.

Regarding the research question about the effect sizes of hurricane experience, coastal tenure, and "unnecessary" evacuations ("false alarms") on evacuation (RQ2), the lack of a significant effect for hurricane experience also is consistent with Baker's (1991) conclusions and the reasons for this result are likely to be the same ones he identified. First, researchers vary in the ways they use to measure hurricane experience, such as whether the respondents think they have "experienced" a hurricane; the recency, frequency, and severity number of hurricanes experienced; whether the experience was personal or vicarious (and whether the experience was by others who were known personally or by strangers seen on the news media); and the nature of the personal impacts experienced—family casualties, personal property damage, and social disruption. Second, respondents differ in the ways they interpret the word "experience," with many people on the periphery of a hurricane thinking they have experienced the full force of that storm—what Baker (1991) called "false experience" (see also Bourque, Reeder, Cherlin, Raven, & Walton, 1973). Thus, future studies should measure experience in multiple ways.

The SMA data also indicate previous "unnecessary" evacuations ("false alarms") have no effect on hurricane evacuation decisions. This is important because it is widely believed that "unnecessary" evacuations significantly decrease evacuation rates in later hurricanes. One possible reason for the lack of a relationship between "unnecessary" evacuation experience and evacuation decisions is that, like other aspects of hurricane experience, people vary in the lessons they draw from an evacuation warning that is not followed by a hurricane strike on their homes. Another possibility is that hurricanes do not threaten people frequently enough to decrease evacuation rates for later hurricanes. For example, the 2004 season was remarkable because Florida experienced four hurricanes in the same year. By contrast, most coastal jurisdictions go years or decades between hurricane evacuations so any regret about evacuating "unnecessarily" might dissipate between storms. Although researchers should continue to study false alarm effects—see, for example, the research of Dillon and her colleagues (Dillon & Tinsley, 2008; Dillon, Tinsley, & Cronin, 2011; Tinsley, Dillon, & Cronin, 2012)—it might be that research on tornado warnings will provide clearer understanding of this issue because some regions of the country *average* 5 tornado days per year (www.spc.noaa.gov/wcm/2013/TORN.png). Comparison of areas that vary in their incidence of false alarms for tornado strikes might provide a better understanding of "false alarm" effects.

Regarding RQ3, reliance on all of the three information sources (authorities, news media, and peers) had small effect sizes and low consistency. Indeed, the reported correlations varied substantially from negative to positive signs, especially reliance on the news media. One possible reason is that people might rely more on information channels transmitting National Weather Service information about a hurricane with a stable track but rely more on peers for information about a hurricane with a late-changing track. This might occur if a late-changing track stimulates more discussion with peers about whether to evacuate or to "ride out" the storm.

The results regarding expected evacuation impediments are important because Baker (1991) noted that it is just as important to identify coastal residents' reasons for staying as to understand their reasons for leaving (also see Dow & Cutter, 2000; Riad et al., 1999). The available studies provide some evidence of the nonsignificant effects of perceived evacuation impediments, but the number of studies ($K = 5$) is too small to draw any firm conclusions.

Evidence regarding the similarity of effect sizes in hypothetical evacuation studies and actual evacuation studies (RQ4) is very important. Overall, 10 of 17 variables have nonsignificant differences in effect sizes and the cross-plots of standard deviations and effect sizes are generally linear. These results are more consistent with the conclusions of Kühberger et al. (2002) than those of Nisbett and Wilson (1977). Instead, the SMA results are broadly compatible with the Kang et al. (2007) finding that the correspondence between people's expectations and their actual responses to hurricanes differs from one variable to another. For example, people's expectations about their preparations for a hurricane evacuation are likely to be based on their previous experiences in preparing for previous evacuations as well as other long distance trips.

Moreover, any differences between the results of hypothetical and actual evacuations might be due to differences in the salience of specific cues or the socially desirability of admitting to their use. For example, perceived storm conditions, coastal location, and mobile home residence are highly salient and are likely to be more socially acceptable justifications for evacuation because they presumably rely on risk area residents' independent assessments of a hurricane threat. By contrast, observations of peers evacuating and concerns about evacuation impediments might be more subtle decision cues that are less socially acceptable justifications for evacuation because they imply uncritical conformity with the decisions of others. In turn, admissions of such conformity would threaten respondents' self-esteem to the extent that they view themselves as independent actors who make rational decisions based on the available information. Similarly, official warnings might also be less socially acceptable because they imply passive compliance and, thus, might also threaten respondents' self-esteem. To evaluate these hypotheses, further experimental studies of hypothetical scenarios need to be conducted.

Surprisingly, expected storm intensity had a much stronger effect in a hypothetical scenario than in an actual evacuation whereas the effect of expected wind damage was the reverse. This stronger effect of expected storm intensity might reflect sampling fluctuations that occurred because there are so few hypothetical studies examining these variables. Alternatively, people who are responding to a hypothetical scenario might be influenced more by variables that are highly salient and easily imagined (Alpízar, Carlsson, & Johansson-Stenman, 2008). Nevertheless, storm intensity (i.e., Saffir–Simpson category) is defined by wind speed and, thus, might seem to have the same effect as expected wind damage, not the opposite effect. In fact, wind damage is determined by structural vulnerability as well as wind speed, which reinforces the need for future research to assess people's perceptions of the structural vulnerability of their homes to hurricane conditions.

Finally, it is not clear about why the effect size for homeownership is nonsignificant in hypothetical evacuation scenarios but significant for actual evacuations. Here, too, sampling fluctuations due to the small number of studies (K = 3) might explain the differences. Alternatively, this difference might be due to framing effects (Kühberger, Schulte-Mecklenbeck, & Perner, 1999; Nisbett & Wilson, 1977) that influence the accessibility of different evacuation cues when an evacuation decision (either actual or hypothetical) is being made.

Conclusion

This SMA examined 49 studies published since Baker's (1991) review that assessed variables affecting households' hurricane evacuation decisions. First, the results are consistent with Baker's (1991) findings that official warnings, mobile home residence, risk area residence, expectations of severe personal impacts, and observations of social/environmental cues are consistently significant predictors of evacuation decisions whereas expected hurricane intensity, expected nearby landfall, homeownership, and reliance on information from peers are weaker predictors. However, the mechanisms by which some of these variables (e.g., homeownership) affect evacuation remain unclear.

Second, the results are consistent with Baker's (1991) conclusion that other demographic characteristics and previous hurricane experience have either minor or inconsistent effects on household evacuation. The nonsignificant effects of some of these variables—especially hurricane experience and "unnecessary" evacuation experience—might be due to methodological flaws in the ways they have been measured. Alternatively, these variables might have indirect effects on evacuation via their effects on other variables that do directly affect evacuation. Consequently, future research should examine alternative ways of operationalizing these variables as well as reporting intercorrelations among predictor variables.

Third, there are significant limitations to the conclusions that can be drawn for some of the variables because so few studies have examined their effects. These variables—authorities, business closing, nearby landfall, service disruption, looting concerns, property concerns, and evacuation expense (see Table 1)—should be included in more hurricane evacuation surveys.

Fourth, this study provides evidence that responses to hypothetical scenarios are generally similar to those of actual hurricanes, but there are significant differences in the effect sizes for seven variables. These differences might be due to the sampling fluctuations arising from the small number of experimental studies of hypothetical evacuations. Alternatively, the conflicting results might be an outcome of participants' differential framing of hypothetical and actual evacuation decisions. Thus, evacuation researchers should conduct more experimental studies that examine the effects of such decision frames by manipulating the salience of different variables that seem to influence evacuation decisions. Such studies should recognize that actual and hypothetical evacuation decisions are both vulnerable to framing effects, so the challenge will be to determine whether there are conditions in which actual and hypothetical decisions differ in their degree of susceptibility to framing effects (Alpízar et al., 2008). From this perspective, experimental studies of hypothetical scenarios can provide a valuable complement to studies of actual evacuations—via laboratory and Internet experiments (e.g., Meyer, Broad, Orlove, & Petrovic, 2013; Wu, Lindell, Prater, & Samuelson, 2014)—rather than a questionable substitute for them. This use of experimental methods in judgment and decision research has a long and productive history that evacuation researchers should continue to pursue (see Lindell, 2014).

Fifth, this SMA also tentatively identified mediation effects for some evacuation predictors. Specifically, as Huang et al. (2012) concluded, the effects of official warnings, mobile home residence, wind risk, and some environmental cues appear to be direct whereas those of hurricane intensity, expected service disruption, female gender, homeownership, and peers' advice appear to be mediated. Of course, reporting only the correlation or regression coefficients for evacuation predictor variables is not enough to demonstrate mediation effects; researchers must test multistage, multiequation models (Lindell, 2012).

Unfortunately, this SMA is necessarily limited in its conclusions because few studies reported the entire matrix of correlations among independent and dependent variables. There are two reasons why future empirical studies should do so. First, reporting only the regression coefficients makes it impossible to determine if other—quite different—models might fit the data almost as well as the estimated model (which does, of course, provide the optimal fit to the data in that sample). As Gordon (1968) noted, the problem is that a model that fits slightly less well in a given sample might fit much better in the population and, thus, in other samples. To illustrate this problem, consider the

Table 3. Hypothetical Correlation Matrix.

Case	r_{12}	r_1	r_2	β_1	β_2
1	.00	.20	.17	0.20	0.17
2	.20	.20	.17	0.26	0.20
3	.40	.20	.17	0.37	0.25
4	.60	.20	.17	0.61	0.31
5	.80	.20	.17	1.60	0.25

data in Table 3. All cases have the same zero-order correlations between two independent variables and a dependent variable. X_1 has a correlation of $r_1 =$ .20 and X_2 has a correlation of $r_2 = .17$. These two correlations are not identical but do not differ from each other in any practically meaningful way. Nonetheless, the corresponding regression coefficients become increasingly different from each other in magnitude as the intercorrelation increases from Case 1 ($r_{12} = .00$) to Case 5 ($r_{12} = .80$). In fact, it only takes a modest intercorrelation of $r_{12} = .40$—such as one might find between education and income, for example—to produce quite noticeable differences in the regression coefficients. If a researcher reports the regression coefficients without the matrix of intercorrelations, a reader has no way to determine after the fact that X_1 and X_2 should probably be considered to be equally important.

The second reason for reporting the intercorrelations among all of the variables is that this information is critical for conducting SMAs on relationships among the independent variables affecting evacuation. For example, researchers need to be able to determine whether "coastal tenure is consistently associated with risk perception" as well as "coastal tenure is consistently associated with evacuation" and "risk perception is consistently associated with evacuation." Only if researchers report the entire correlation matrix is it possible to properly assess the causal paths among demographic, psychological, and behavioral variables.

Despite its limitations, the results of this SMA can be used to guide the design of hurricane evacuation transportation analyses and emergency managers' warning policies. In particular, the consistency between actual evacuation studies and hypothetical scenario studies—although tentative because of the small number of hypothetical studies—provides some support for the types of hypothetical evacuation studies that are commonly used as the basis for local evacuation transportation plans (see Lindell, Ge, et al., 2013, for an example study; Lindell & Prater, 2007, for a critique of evacuation analysis studies; and Baker, 2000; Lindell, 2013; Murray-Tuite & Wolshon, 2013, for general evacuation planning recommendations).

Moreover, the results confirm that local officials are extremely important information sources, presumably because of their perceived expertise, trustworthiness, and protection responsibility (Arlikatti et al., 2007). The results also indicate that the audiences for hurricane warnings are generally aware of the differential vulnerability of certain structures (mobile homes) and locations (coastal risk areas). Although people can presumably differentiate mobile homes from other types of housing, hurricane education materials and warning messages need to define evacuation zones in terms of readily identifiable characteristics such as geographical or administrative boundaries (e.g., ZIP codes—see www.hcoem.org/HCMap.aspx?P=Evacuation). To increase the protection motivation (and thus warning compliance) of those who are at risk and decrease the protection motivation (and thus evacuation shadow) of those who are not at risk, authorities should identify the scientifically estimated likelihood of personal impacts (e.g., casualties and damage) that can be expected in different areas of their jurisdictions so people are not left to infer them from their beliefs about storm wind and surge at their locations. Of course, these projections of casualties and damage must be credible to those at risk, which seems to have been the reason for the absence of a detectable effect of the "certain death" warning issued as Hurricane Ike approached Galveston in 2008 (Wei, Lindell, & Prater, 2014).

Finally, authorities need not be overly concerned about looting concerns suppressing evacuation compliance in risk areas, especially if they explain that they will maintain security in the evacuation zones. Similarly, authorities need not be concerned that "false alarms" will decrease future hurricane evacuations, especially if they explain that prediction errors are due to the inherent uncertainty in storm behavior rather than authorities' incompetence, unwillingness to provide accurate information, or refusal to assume responsibility for protecting those at risk.

Authors' Note

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Notes

1. Lazo, Waldman, Morrow, and Thacher (2010) only reported the results of the significance tests instead of providing correlations.
2. Wilmot and Mei (2004) only reported the results of the significance tests instead of providing correlations.
3. Lindell et al. (2001) only reported the results of the significance tests instead of providing correlations.
4. Van Willigen, Edwards, Edwards, and Hessee (2002) only reported the results of the significance tests instead of providing correlations.
5. Lindell, Lu, and Prater (2005) only reported the results of the significance tests instead of providing correlations.
6. Carrasco (2009) only reported the results of the significance tests instead of providing correlations.
7. Whitehead et al. (2000) only reported the results of the significance tests instead of providing correlations.
8. Vu, Van Landingham, Do, and Bankston (2009) only reported the results of the significance tests instead of providing correlations.

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