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Assessing Causality in the Cognitive Mediation Model

A Panel Study of Motivations, Information Processing, and Learning During Campaign 2000

This two-wave national panel study was designed to test the causal claims of the "cognitive mediation model." The data indicate strong support for the following causal relationships predicted by the model: (a) surveillance motivations influence information processing, (b) information processing influences knowledge, and (c) motivations influence knowledge only indirectly through information processing. However, additional analyses demonstrated that these variables are not related in a simple unidirectional causal pattern. Instead, panel analyses found that most of these relationships are mutually causal. Future research should consider the reciprocal nature of relationships between information processing and knowledge, particularly as it relates to the study of the knowledge gap hypothesis.

Keywords: *uses and gratifications; elaboration; knowledge gap; political knowledge; news media*

In their classic article, "Some Reasons Why Information Campaigns Fail," Hyman and Sheatsley (1947; see also Bennett, 1988) point out that merely increasing the flow of communication via an information campaign will not necessarily help to increase the knowledge of the public on the campaign topic. They point to "psychological characteristics of human beings" (p. 413) as one explanation for the failure of information campaigns. Later research on learning from television news echoed this perspective. Neuman (1976) found that the average television news viewer could freely recall only about 1

COMMUNICATION RESEARCH, Vol. 30 No. 4, August 2003 359-386
DOI: 10.1177/0093650203253369

of 20 stories on the evening newscast within 3 hours of exposure and could only recognize having seen another 9 stories. Mere exposure to information, it seems, is insufficient to produce meaningful learning.

Over time, mass communication scholars began to call for greater attention to additional factors that might contribute to an understanding of this phenomenon. For instance, Tichenor, Donohue, and Olien (1970) proposed the knowledge gap hypothesis, suggesting that socioeconomic status plays a central role in the extent to which individuals obtain information from media campaigns. Uses and gratifications researchers (e.g., Blumler, 1979) argued for the importance of individual motivations as mediators of the effects process. These more advanced models of the effects of mass communication stressed the importance of moving "beyond simple exposure" (McLeod & McDonald, 1985) to consider individuals' orientations toward mass communication, including not only their motivations but also their cognitive activity (Levy & Windahl, 1985) or information processing behaviors (Kosicki & McLeod, 1990).

More recently, work has been done to connect these various streams of research to produce an integrated model of learning from media that includes both motivational variables and information processing. This "cognitive mediation model" (Eveland, 1997) incorporates the various predictors of learning identified over the past several decades and arranges them in a causal sequence derived from experimental research on learning. Although studies to date have supported the cognitive mediation model (e.g., Eveland, 2001, 2002), the data have suffered from limitations that have made strong inferences of causality tenuous.

This study is designed to advance work on the cognitive mediation model by addressing the methodological weaknesses of past research and replicating findings in the context of the 2000 U.S. presidential election campaign. To do so, we conducted a two-wave national panel study that permitted testing of the causal claims of the cognitive mediation model. Specifically, we examine whether (a) surveillance motivations influence information processing, (b) information processing influences knowledge, and (c) motivations influence knowledge only indirectly through information processing. Results support the cognitive mediation model, and, with some extensions based on the results of our panel study, can provide a compelling psychological explanation for knowledge gaps in response to media campaigns.

Foundations of the Cognitive Mediation Model

McLeod, Kosicki, and McLeod (1994) note that research on political communication has moved beyond the simple stimulus-response (S-R) perspectives

of direct and universal effects to an O-S-O-R perspective derived from advances in psychology (Markus & Zajonc, 1985). From this perspective, the first "O" includes "structural, cultural, cognitive, and motivational characteristics the audience brings to the reception situation that affect the impact of the message" (McLeod et al., 1994, p. 146). The second "O" represents "what is likely to happen between reception of the message and the response of the audience member" (McLeod et al., 1994, pp. 146-147). This general O-S-O-R perspective on mass media effects provides the broad foundations for the cognitive mediation model.

Various strands of research in mass communication fit into one or another aspect of the O-S-O-R model. Particularly relevant to our study is the uses and gratifications perspective, which has generally been concerned with issues surrounding the first O in the model with its focus on individual-level motivations for media use. Uses and gratifications scholars have developed numerous ways of thinking about the dimensions of gratifications sought from media use, ranging from broad distinctions between instrumental versus ritual functions (e.g., Rubin, 1984) to more specific multiple-factor solutions (Becker, 1979). We find greater utility in an approach that examines specific types of motivations such as surveillance to the dichotomous instrumental versus ritualized distinction.

Much of the work on audience activity and information processing during the 1980s and 1990s is relevant to the second O in the O-S-O-R framework because of its focus on what people do with media content. As with gratifications sought from media use, audience activity researchers have developed numerous ways of conceptualizing and operationalizing audience activity (e.g., Blumler, 1979; Levy & Windahl, 1985; Rubin & Perse, 1987). The cognitive mediation model focuses on cognitive activity that takes place during and after media use. The forms of audience activity examined by the cognitive mediation model mesh nicely with concepts in the audience activity literature such as cognitive involvement (and specifically elaboration and attention; see Perse, 1990c), as well as with concepts derived from work on media information processing strategies (Kosicki & McLeod, 1990).

In the past, communication scholars have attempted to link issues of motivations, audience activity, and media effects. Blumler (1979), for instance, argued that motivations for media use could be considered mediators of the communication effects process. Specifically, he argued that those who used news with cognitive motivations would learn more than those who had other motivations. Rubin and Perse (1987) proposed a model that linked motivations for media use and various forms of audience activity. They argued that motives and attitudes concerning media would influence intentions concerning media use, exposure, attention, and involvement, which would then in

turn influence future motives and attitudes. Later work by Perse (1990c) incorporated the next logical step in this model, proposing that media effects in the form of learning from the news were a product of both motivations and audience activity.

The cognitive mediation model (Eveland, 2001, 2002) draws heavily from these early uses and gratifications and audience activity approaches but has a somewhat different focus. First, the cognitive mediation model strives to provide an overarching theoretical structure—derived from experimental cognitive psychology and educational psychology—for how the concepts employed by uses and gratifications and audience activity researchers during the past two decades work within what we know about human cognition and memory. Eveland (2001) discusses this link to psychology in detail. Second, it works to consider these variables not merely as various predictors of outcomes that stand on equal causal footing as much of the past empirical work has treated them, but instead as part of an ordered and sequential process.

By contrast, most prior uses and gratifications research has not empirically examined the connection between gratifications sought, audience activity, and media effects as a sequential process (for an exception, see Kim & Rubin, 1997). Finally, unlike most uses and gratifications theories, the cognitive mediation model suggests that motivations do not have any direct role in media effects. Instead, the cognitive mediation model predicts that the role of motivations is only to activate information processing behaviors that are the central determinants of cognitive media effects. Thus, instead of gratifications sought mediating the effects of media as proposed by Blumler (1979), the cognitive mediation model argues that information processing mediates the influence of gratifications sought on media effects.

The cognitive mediation model relies on prominent models of cognition and memory that assume a loosely unified mental system made up of a network of associated cognitive units (Collins & Loftus, 1975). Knowledge is represented in memory in terms of cross-links between cognitive units, complex hierarchical structures, and tangled multilevel interconnections. Scholars who examine human cognition are particularly interested in how these complex structures are formed, activated for use in information processing, and used to integrate new information into existing cognitive structures. Synthesizing these foundation literatures, the cognitive mediation model contains three key theoretical statements:

- Motivations for media use (representing one aspect of the first O in the O-S-O-R perspective) drive media information processing behaviors (the second O) during and after exposure to news media content (the S).

- Media information processing behaviors (representing one aspect of the second O) are the direct determinants of learning from media (the R).
- The effects of motivations for media use that have been described in past research are wholly mediated by media information processing behaviors (thus the term *mediation* in the cognitive mediation model).

From these basic theory statements, various concrete hypotheses may be derived to link specific motivations and information processing behaviors. To date, research has focused on one type of motivation—surveillance—and two types of information processing—news attention and elaboration—as central to the model.

Hypotheses Derived From the Cognitive Mediation Model

Surveillance was one of three functions of mass communication first identified by Lasswell (1948). Research from the uses and gratifications perspective has identified it as one of the most frequently cited reasons for the use of news media (Becker, 1979; McLeod & Becker, 1981). Surveillance motivations are represented in the information transmission function of the news; that is, they represent a desire to learn from the news as part of a more basic need to monitor the environment (Shoemaker, 1996). Surveillance is a key component of Blumler's (1979) "cognitive motivation" and is typically one of the motivations under Rubin's (1984) "instrumental orientation." In nonelection contexts, surveillance could mean keeping track of the activities of politicians, keeping an eye on the economic health of the country, and gathering information about the safety of various neighborhoods in one's metropolitan area. In an election context, other specific forms of learning, such as gathering information about candidates' issue stances and backgrounds, would also be relevant.

The cognitive mediation model predicts that a surveillance motive will lead to a number of information processing behaviors, including attention to and elaboration on news content. Both of these concepts may also be considered forms of audience activity (Levy & Windahl, 1985). News attention goes beyond news exposure (e.g., Chaffee & Schleuder, 1986; McLeod & McDonald, 1985) to indicate the amount of mental focus given to the news or even to particular types of stories (such as campaign stories) in the news. Elaboration (e.g., Perse, 1990a) moves one step beyond attention to represent the use of news information to make cognitive connections to past experience and prior knowledge and to derive new implications from news content. Other communication scholars have labeled similar concepts "reflective integration"

(Kosicki & McLeod, 1990), "active reflection" (Eveland, McLeod, & Horowitz, 1998), or the "amount of invested mental effort" ("AIME") (Salomon, 1981).

Research suggests that both news attention and elaboration are more likely among those who profess surveillance motivations for using news media (Kim & Rubin, 1997; Perse, 1990b; Rubin & Perse, 1987). That is, although aspects of information processing can be either consciously controlled or automatic (Geiger & Newhagen, 1993; Kellermann, 1985), we focus here on the controlled aspect of human cognition (Simon, 1967). Accordingly, news attention and elaboration are presumed to be at least partly under the motivational control of the individual. When motivated to gain information from media exposure, individuals will engage in effortful forms of processing to achieve their goals.

Hypothesis 1: Surveillance gratifications seeking will be positively related to news attention.
Hypothesis 2: Surveillance gratifications seeking will be positively related to news elaboration.

Attention is a necessary but not sufficient condition for elaborative processing (Rigney, 1978). That is, news content cannot be connected to one's prior knowledge or personal experience (a sort of "prior knowledge" itself) without being consciously attended to in the first place. Therefore, news attention is considered antecedent to elaboration in the cognitive mediation model. In essence, those who engage in elaborative processing must first pay attention to the content for it to activate related thoughts for conscious consideration. Elaboration is the additional process of connecting the information from news with these activated mental structures to draw new insights.

Hypothesis 3: News attention will be positively related to news elaboration.

According to the cognitive mediation model, greater attention to the news and elaboration should both lead to higher levels of learning from the news. News attention should influence learning by making news content available for information processing. In effect, content must be attended to in order for it to lead to learning because without attention the information is never brought to the conscious awareness of the individual. Elaborative processing should lead to higher levels of learning because of the connections made between news content, past experiences, and existing knowledge. By linking the new information with previously stored knowledge, the news content will be more easily accessible for recall. Similarly, inferences drawn while making

these connections between old and new information increase the total amount of related information in memory, thus increasing the likelihood of successful retrieval as well as the ability to infer information that may not be immediately accessible. Finally, the effort spent elaborating on the news should increase the strength of the memory trace for the new information. Indeed, attention and elaboration are positively related to knowledge of news content (Chaffee & Schleuder, 1986; Eveland, 2001, 2002; McLeod & McDonald, 1985; Perse, 1990c).

Hypothesis 4: News attention will be positively related to knowledge of news content.
Hypothesis 5: News elaboration will be positively related to knowledge of news content.

Unlike past research that searched for a presumed direct effect of motivations on learning (Gantz, 1978; McLeod & McDonald, 1985; Neuman, 1976), the cognitive mediation model follows work in psychology to propose that any effects of motivations on learning are indirect through information processing behaviors. For instance, Anderson (1980) notes that "whether or not one intends to learn really does not matter. What matters is how one processes the material during its presentation" (p. 197). As this suggests, motivations may influence processing but not directly facilitate learning. Thus, although some past work in the area of uses and gratifications and news learning predicts a relationship between surveillance motivations and knowledge, the cognitive mediation model predicts that this simple bivariate relationship will be reduced to nonsignificance once news attention and elaboration are included as controls. Thus, in the language of statistical analysis, the effect of motivations on learning should be perfectly mediated (see Baron & Kenny, 1986, for a discussion of the distinction between mediation and moderation) by cognitive processing.

Hypothesis 6a: Surveillance gratifications seeking will be positively related to knowledge of news content before the introduction of news attention and news elaboration as controls.
Hypothesis 6b: Surveillance gratifications seeking will be unrelated to knowledge of news content after the introduction of news attention and news elaboration as controls.

Despite considerable evidence for the various links hypothesized in the cognitive mediation model in past research, few studies have evaluated the model holistically. However, those who have done so produced data consistent with the central predictions of the model (Eveland, 2001, 2002). Although the

current evidence for the cognitive mediation model is strong, this small base of research generally has three significant limitations that remain to be addressed. First, the findings are based on local samples that, although unlikely, may be subject to biases. Second, the measurement reliability of the key concept of elaboration in many of these studies was weak due to the use of secondary analysis of indicators not ideally suited to the purposes of testing the cognitive mediation model. Third, all previous studies testing the cognitive mediation model employed cross-sectional data, or data that were treated cross-sectionally, to test the relevant hypotheses. To improve on past research, this study employs a *national sample, improved measurement* of key independent and dependent variables, and a *panel design* amenable to causal analysis, including examination of alternate or complementary hypotheses concerning causal direction. These improvements on past research enable us to provide a more thorough and appropriate test of the cognitive mediation model and, ultimately, to contribute to our understanding of knowledge gaps as well.

Method

Sample

This study relies on national survey data collected in February 1999, June 2000, and November 2000 from a single panel of respondents. The February 1999 data were collected as part of an annual mail survey—the "Life Style Study"—conducted by Market Facts on behalf of DDB-Chicago, an international marketing communications company. The Life Style Study uses a complex stratified quota sampling technique to recruit respondents. Initially, Market Facts acquires the names and addresses of millions of Americans from commercial list brokers, who draw available information from drivers' license bureaus, telephone directories, and other centralized sources. Via mail, large subsets of these people are asked to indicate whether they would be willing to participate periodically in surveys for small incentives, which range from prepaid phone cards to "Post-It" notes, depending on the length of the survey.

Rates of agreement vary widely across demographic categories. For example, less than 1% of "racial minorities and inner city residents" typically consent, compared to 5% to 10% of "middle-aged, middle class, 'middle Americans'" (Putnam & Yonish, 1999). It is from this prerecruited "mail panel" of roughly 500,000 people that demographically balanced samples are drawn for inclusion in the annual Life Style Study. In an effort to achieve a study sample that is representative of the population, stratified quota sampling

procedures are then employed. That is, the sample is drawn to reflect the demographic distribution of the population within the nine Census divisions in terms of household income, population density, age, and household size. Further, the starting sample of mail panelists is adjusted within the subcategories of race, gender, and marital status to compensate for expected differences in return rates.

This stratified quota sampling method was used to select the initial sample of 5000 respondents for the 1999 Life Style Study. Consistent with past performance, 3,388 usable responses were received, which represents a response rate of 67.8% against the February 1999 mailout. This stratified quota sampling method differs markedly from more conventional probability sampling procedures yet produces highly comparable data. Putnam, who used 1975 to 1998 Life Style Studies as the primary data for his book *Bowling Alone*, took great care to validate these data against the General Social Survey and Roper Poll (Putnam, 2000; Putnam & Yonish, 1999). This validation involved longitudinal and cross-sectional comparisons of parallel questions found in the Life Style Studies and conventional samples. Putnam (2000) concludes that there are "surprisingly few differences between the two approaches" with the mail panel approach producing data that are "consistent with other modes of measurement" (pp. 422-424; see also Groeneman, 1994). For the June 2000 wave of the study (hereafter labeled "Wave I" even though it was technically the second survey in this panel series), we developed a custom questionnaire and then engaged Market Facts to recontact the individuals who completed the February 1999 Life Style Study. Due to some erosion in the panel, 2,737 questionnaires were mailed out. To ensure a high response rate—and a more representative sample—an incentive of a small tote bag was offered for completing the survey. The response rate for this survey against the mailout was 70.1%, with 1,902 respondents completing the questionnaire.

For the November 2000 wave of the study (hereafter labeled "Wave II" even though it was technically the third survey in this panel series), another custom questionnaire was developed. This survey reassessed many of the relevant variables from the June 2000 wave and added new sets of questions relevant to the 2000 presidential election. Once again, Market Facts recontacted individuals who completed the prior survey. Due to some erosion in the panel, 1,850 questionnaires were mailed to June 2000 respondents. The response rate against the mailout for this survey was 71.1%, with 1,315 respondents completing the questionnaire.

To address the demographic representativeness of our nonprobability sample, it is appropriate to compare it to concurrent probability sample data. The American National Election Study (ANES) was a comparable panel

study with first wave interviews conducted in the months prior to the 2000 election and the follow-up wave conducted immediately after the election. Comparing the second wave of the ANES to our June data collection (technically, the second wave of our study), we find few, if any, demographic differences. Our respondents were slightly more likely to be female (60.7% in our June wave compared to 56.7% in the second wave of the ANES). The average age of the two samples was comparable, with the median of our sample being 45 to 54 and the mean of the ANES being 47.89. The level of household income of the two samples was also similar, with our June wave having a median of $40,000 to $44,999 and the ANES having a median of $35,000 to $49,999. Finally, education was similar across the two studies, with our study obtaining a median of 1 to 3 years of college and the ANES "more than 12 years of education" (but less than a college degree). Thus, it appears that the second wave of our panel was comparable to the second wave of the ANES. Given the high response rate to the November 2000 wave of our panel study, there is no reason to believe that our data would be any different from a third wave of the ANES, had ANES conducted a third wave.

Measurement

Demographics. Four demographic variables previously found to be related to political knowledge (e.g., Delli Carpini & Keeter, 1996) were employed as controls in this study: education, gender, age, and income. At Time 1, education was an ordinal variable with seven categories ranging from 1 to 7 years of schooling through postgraduate work (median = 5 [1-3 years of college]). Gender was coded with female (61% at Time 1) as the high value. Age at Time 1 was an ordinal variable with six categories ranging from 18 to 24 years of age through 65 years or older (median = 4 [45-54 years of age]). Finally, income (measured in February 1999 but including only Wave 1 respondents) was measured as an ordinal variable with 24 categories from less than $5,000 through $175,000 or more (median = 15 [$40,000 to $44,999]).

Theoretical variables. The current application of the cognitive mediation model includes four central theoretical variables: surveillance motivations, news attention, news elaboration, and knowledge. In this study, news attention, news elaboration, and knowledge were measured in both the first and second waves, whereas surveillance motivations were measured only in the first wave. Questions used to construct surveillance and news elaboration indices were spread among approximately 180 attitude and behavior questions in Wave I and more than 70 attitude and behavior questions in Wave II.[2] Questions tapping news attention were among about 10 indicators tapping

attention to various media and various types of content. This strategy of embedding and spreading out our questions among larger sets of questions helps reduce response set and other forms of methodological inflation of the internal consistency of our measures. Exact item wordings for these measures are included in the Measurement Appendix.

The surveillance motivations index (M = 3.99, SD = .97) was constructed as an average of five 6-point Likert-type questionnaire items (α = .81) that were derived from past research on the uses and gratifications of news media (e.g., Becker, 1979; Levy & Windahl, 1984; McDonald & Glynn, 1984). Research has suggested that surveillance motivations are stable individual differences (McDonald & Glynn, 1984) and thus no Time 2 measures of surveillance motivations were employed.

Our measurement of news attention was typical, employing two 10-point questions to represent attention to campaign news on television and in newspapers at Time 1 (α = .86, M = 3.76, SD = 2.38), with identical indicators at Time 2 (α = .85, M = 5.42, SD = 2.76).

The indicators of news elaboration were derived from a number of prior studies using this concept (Eveland, 2001; Eveland & Dunwoody, 2002; Kosicki & McLeod, 1990). In the first wave of the survey, elaboration was measured with eight 6-point Likert-type items. Four of the indicators referenced elaboration on television news and another four referenced elaboration on newspapers. These eight indicators were averaged to create the Time 1 measure of news elaboration (α = .90, M = 3.36, SD = .97). To save questionnaire space, only four of the eight original indicators (two each for television news and newspapers) were employed in the second wave. Decisions about which indicators to retain were based on item analyses of Wave I data. The best performing items were used to construct a measure of news elaboration for Time 2 (α = .81, M = 3.53, SD = .99).[3]

Candidate knowledge was also measured in both the first and second waves. To measure candidate knowledge, we developed questions to tap information recently covered in the news media with regard to the two major party presidential candidates, George W. Bush and Albert Gore. Respondents were asked to identify which candidate was described in each of several brief statements. Equal numbers of statements for each candidate were used to balance the scale. In the first wave, four questions (coded 0 for incorrect or "don't know" and 1 for a correct response) were averaged to measure candidate knowledge (KR-20 = .77, M = .41, SD = .38). In the second wave, eight new questions were developed to measure candidate knowledge (KR-20 = .77, M = .60, SD = .29).

Analysis Procedures

Traditionally, the cognitive mediation model has been tested using cross-sectional path modeling (Asher, 1983). This technique—as described by Asher (1983) and Cohen and Cohen (1983)—was also employed in this study, although panel data were employed.[4] Specifically, the theoretical variables were arranged into a path model that also included the four demographic control variables. Paths were estimated between the four exogenous demographic variables and all four theoretical variables. Paths were also estimated among the four theoretical variables. In these analyses, Time 1 measures were employed for surveillance motivations, news attention, and news elaboration. Knowledge at Time 2 was employed as the final endogenous variable, with knowledge at Time 1 included in this model as an additional, exogenous predictor of Time 2 knowledge. Thus, paths ending at Time 2 knowledge may be interpreted as the incremental influence of a predictor after controlling for prior knowledge.

This format of path analysis is ideal for testing hypotheses about relationships of various variables with knowledge (i.e., Hypothesis 4, Hypothesis 5, and Hypothesis 6b). However, it is not the ideal means of testing some of the other hypotheses (i.e., Hypothesis 1, Hypothesis 2, and Hypothesis 3) because the path model tests Hypothesis 1, Hypothesis 2, and Hypothesis 3 using only cross-sectional (Time 1) data. So, in addition to the path analyses, a series of regression models were estimated to provide stronger tests for Hypothesis 1, Hypothesis 2, and Hypothesis 3 as well as to consider reciprocal causal influence in the relationships among motivations, information processing, and knowledge. First, news attention at Time 2 was regressed on news attention at Time 1, knowledge and elaboration at Time 1, and all other Time 1 measures. Then, elaboration at Time 2 was regressed on elaboration at Time 1, knowledge and news attention at Time 1, and all other Time 1 measures. These additional analyses allowed us to evaluate the strength of some of the proposed causal paths of the cognitive mediation model (Hypothesis 1 through Hypothesis 3) as well as the possibility of mutual causation.

Results

The results of the path analysis are presented in Figure 1, with standardized path coefficients (i.e., betas) and fourth order partial correlations controlling only demographic variables in parentheses. The path coefficients control not only for the four exogenous demographic variables but also for theoretical variables as indicated by the various paths in Figure 1. The results of the regression models are reported in Table 1.

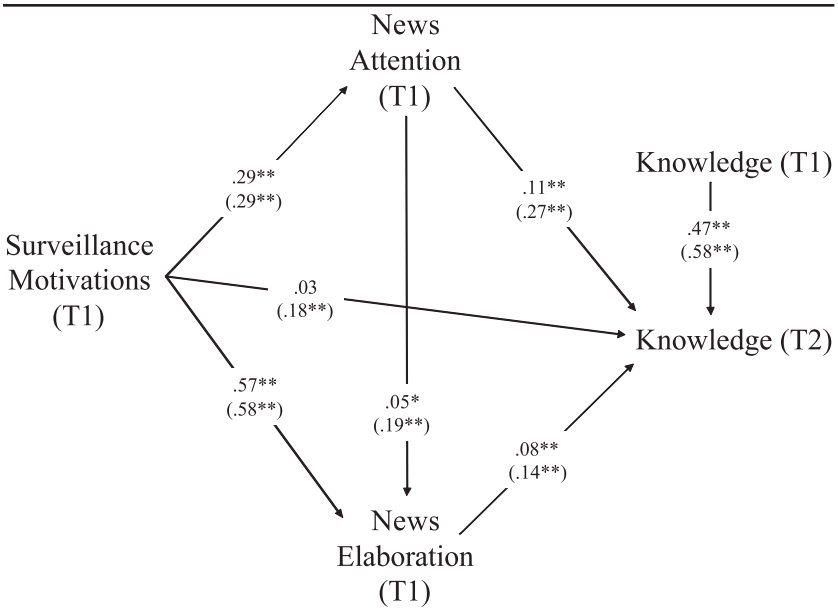

Figure 1. Path Analysis for Cognitive Mediation Model
Note. Four demographic variables (age, education, income, and gender) are controlled in the model but are not presented to increase readability. Coefficients are standardized regression coefficients with fourth order partial correlations controlling for demographics in parentheses. For paths to T2 knowledge, only panel respondents were included; other paths employed all T1 respondents (including T2 nonrespondents).
* $p < .05$. ** $p < .01$.

Hypothesis 1 predicted that surveillance motivations would be positively related to news attention. This hypothesis was supported not only by the relationship between these two variables at Time 1 as indicated by the significant beta in the path model ($\beta = .29, p < .01$) but also in the more stringent panel analysis presented in Table 1 where Time 1 surveillance motivations were significantly related to Time 2 news attention controlling for Time 1 news attention ($\beta = .12, p < .01$).

Hypothesis 2—that surveillance motivations would be positively related to news elaboration—was supported in the path coefficient between Time 1 surveillance and Time 1 elaboration ($\beta = .57, p < .01$) but not in the panel analysis in which Time 2 elaboration was the dependent variable and Time 1 elaboration was controlled ($\beta = -.04$, ns). This nonsupportive finding may be partially explained by the very strong stability between Time 1 and Time 2 elaboration ($\beta = .48, p < .01$) and the strong relationship between Time 1 elaboration and Time 1 surveillance as reported in the path model.

Table 1
Panel Analysis of Knowledge, News Attention, and News Elaboration

	News Attention (T2)	News Elaboration (T2)
Candidate Knowledge (T1)	.14**	.13**
News Attention (T1)	.36**	.08**
News Elaboration (T1)	.07*	.48**
Surveillance (T1)	.12**	–.04
Education	–.02	.04
Gender (F)	.04	.01
Age	–.03	–.03
Income	.09**	.05
Adjusted R^2	.262**	.269**

Note. Coefficients are standardized regression coefficients (beta) controlling for all variables in the model.
* $p < .05$. ** $p < .01$.

Hypothesis 3 stated that news attention would be positively related to news elaboration. This hypothesis was supported in the cross-sectional test in the path model ($\beta = .05, p < .05$) as well as the panel analysis in Table 1 ($\beta = .08, p < .01$). However, the coefficients are relatively weak in both models.

The remaining hypotheses were tested solely by their coefficients as reported in the path model. Hypothesis 4 predicted a significant positive relationship between news attention and knowledge. As indicated by the significant effect of Time 1 news attention on Time 2 knowledge while controlling for Time 1 knowledge ($\beta = .12, p < .01$), Hypothesis 4 was supported.

The expectation that news elaboration would be positively related to knowledge was formalized as Hypothesis 5. This hypothesis was also supported in the path model by the significant coefficient for the path between Time 1 news elaboration and Time 2 knowledge while controlling for Time 1 knowledge ($\beta = .08, p < .01$).

The final two hypotheses of this study were interrelated. Hypothesis 6a predicted that before the addition of controls for news attention and elaboration, Time 1 surveillance would be significantly related to Time 2 knowledge. This hypothesis was supported by significant fourth order (controlling demographics: $pr = .18, p < .01$) and fifth order (controlling demographics and Time 1 knowledge: $pr = .12, p < .01$) partial correlation coefficients. Hypothesis 6b predicted that this relationship would be reduced to nonsignificance with the introduction of controls for news attention and elaboration. The path coefficient between Time 1 surveillance and Time 2 knowledge represents the test of this hypothesis, which was supported by a nonsignificant relationship ($\beta = .03$, ns).

The hypothesis tests reported above assume a particular causal direction as specified by the cognitive mediation model. In most cases, these hypotheses were supported by panel analyses that are relatively strong tests (for survey data) of causal hypotheses. However, these findings do not deny the possibility of reverse causal influence. Indeed, we must acknowledge that the reverse causal flow—from knowledge to information processing—may also be possible. For instance, Kim and van Dusen (1998) recently argued that "the more relevant prior knowledge of the text readers have, the easier it is to elaborate" (p. 356) and, in fact, found that those with high prior knowledge were more likely to generate elaborations to a stimulus text than those with low prior knowledge. To test for the presence of reciprocal causality, we can examine additional coefficients in the regression models reported in Table 1 to determine whether or not (a) knowledge at Time 1 would increase news attention at Time 2, controlling Time 1 news attention; and (b) knowledge at Time 1 would enhance news elaboration at Time 2, controlling for news elaboration at Time 1.

News attention appears to be relatively stable over time, given the strong relationship between Time 1 and Time 2 measures of news attention ($\beta = .36$, $p < .01$). This is especially impressive given the change in external conditions and the increase in campaign communication between our early summer and immediate postelection data collection efforts. Whereas the mean level of attention did increase substantially, $t(1284) = 21.429$, $p < .001$, from Time 1 ($M = 3.81$, $SD = 2.346$) to Time 2 ($M = 5.41$, $SD = 2.752$) as we would expect, it still seems that differences across individuals were relatively stable over time. The analysis in Table 1 also indicates that Time 1 news elaboration ($\beta = .07$) and Time 1 knowledge ($\beta = .14$) also significantly contributed to Time 2 news attention after Time 1 news attention was controlled. This suggests that information processing begets information processing and that knowledge also begets information processing.

Just as we found considerable stability in knowledge in Figure 1 and Table 1, and considerable stability over time in news attention in Table 1, we also found strong stability in news elaboration over 6 months ($\beta = .48$), as already noted. In addition, the relationship between news attention and news elaboration appeared to be reciprocally causal, with Time 1 elaboration predicting Time 2 attention controlling for Time 1 attention ($\beta = .07$, $p < .05$). The only other significant predictor of Time 2 news elaboration was Time 1 knowledge ($\beta = .13$). This finding, in conjunction with the findings already reported, provides support for a claim of reciprocal causation between news elaboration and attention as well as between news elaboration and news knowledge.

Discussion

Various writers have stated that "knowledge is power" (e.g., Delli Carpini & Keeter, 1996). Normative democratic theory asserts that individuals must have a reasonable level of information to successfully participate in public life (Delli Carpini & Keeter, 1996). Recent research supports the claim that holding political information can be an important factor in assuring that an individual's opinions and voting behaviors are actually in his or her own best interests (Althaus, 1996). That is, voter preferences and collective opinion have been shown to shift when corrections are made to adjust for a lack of full information (e.g., Althaus, 1996, 1998; Bartels, 1996). Unfortunately, if the quality of decision making in a democracy is judged by the standard of how politically knowledgeable citizens are, democracy in the United States has been in trouble for at least the past 50 years (see Bennett, 1989, and Delli Carpini & Keeter, 1991, for over-time data on political knowledge). Several scholars have placed part of the blame for this low level of civic competence on the media, arguing that they do not provide sufficient and appropriate information to the American public (e.g., Graber, 1993). Although we believe that the news media are not above reproach—in fact, quite the contrary—the results of this study demonstrate that simple exposure to even the most thorough newspaper article or television newscast would not be sufficient to bring the American public to a high and uniform level of political knowledge. Instead, the cognitive mediation model suggests that individual motivations to learn must be present to encourage appropriate information processing behaviors. Not merely exposure to information but, instead, this process must be followed for individuals to learn.

The results of this panel study allow us to make two general conclusions. First, there is considerable support for the causal claims of the cognitive mediation model with regard to (a) the positive influence of both news attention and news elaboration on knowledge, (b) the lack of direct causal influence of surveillance motivations on knowledge despite a significant zero-order relationship, (c) the positive influence of news attention on news elaboration, and (d) the positive influence of surveillance motivations on news attention. However, there is only mixed support for the direct causal influence of surveillance motivations on news elaboration.

Second, despite the support for the causal claims of the cognitive mediation model, many of the proposed relationships are in fact reciprocally causal, including (a) the influence of knowledge on news attention, (b) the influence of knowledge on news elaboration, and (c) the influence of news elaboration on news attention. Although this does not cast doubt on the validity of the

model, it does suggest that there is more to the relationships than was initially predicted.

The Cognitive Mediation Model

We will address the above findings in order. First, this study provides considerable support for hypotheses of the cognitive mediation model. Unlike past research (e.g., Eveland, 2001, 2002), the data in this study allowed us to assess relationships among the relevant concepts in a way that accounted for time-order. Therefore, we were able to meet two of the three criteria for causality (Lazarsfeld, 1957): time order and correlation. However, despite statistical controls, we are still unable to meet the third criterion for causality—the absence of spuriousness—and without experimental data we would never be able to do so. Fortunately, this criterion has already been met in numerous other studies that have found effects for elaborative processing (e.g., Craik & Tulving, 1975) and attention (e.g., Cowan, 1993) on learning in laboratory experiments. Thus, past laboratory experimental data have shown that attention and elaboration can cause learning, whereas this study conducted in a field context demonstrates that elaboration and attention in fact do cause knowledge acquisition.

Given these supportive findings, research on the cognitive mediation model should move forward to extend the model into different contexts and expand the measures of motivation beyond surveillance, the measures of information processing beyond attention and elaboration, and measures of knowledge beyond simple recognition and recall. For example, extensions of the cognitive mediation model could examine perceptions of media sources (e.g., Kosicki & McLeod, 1990; Salomon & Leigh, 1984) as additional motivational variables that should affect information processing. Selective scanning—another form of information processing related to knowledge (e.g., Eveland & Dunwoody, 2002)—should be included in future tests of the model. Researchers should also endeavor to extend the measurement of knowledge beyond "knowing that" (declarative knowledge) or even "knowing how" (procedural knowledge) to "structural knowledge," which "provides the conceptual bases for why; it describes how the declarative knowledge is interconnected" (Jonassen, Beissner, & Yacci, 1993, p. 4). Measures of knowledge structure resemble mental networks conceptually and should be even more strongly related to elaboration than simple declarative knowledge because a defining characteristic of elaboration is making connections between various bits of information (Eveland, Seo, & Marton, 2002; Shah, Kwak, Schmierbach, & Zubric, in press). Another form of "knowledge in use" that might be employed in future research on the cognitive mediation model

would be measures of arguments stored in memory. Noelle-Neumann (1993) discusses the role of media—what she calls the "articulation function"—in teaching the public arguments that can be used in political conversations (see also Eveland & Scheufele, 2000). The cognitive mediation model could potentially be used to understand this specific articulation function of the media as well as learning from media more generally.

Reciprocal Nature of Effects

The second set of major findings of this study—the reciprocal causation between information processing and learning—has broader application to the study of learning from the news, as well as media effects more generally. These results suggest that learning from the news may take the function of an upward or downward spiral (see Figure 2) in much the same way that Elisabeth Noelle-Neumann (1993) describes the process of public opinion formation. That is, learning that takes place for an individual today increases the likelihood that he or she will appropriately process tomorrow's news, and that will increase the likelihood of learning tomorrow's news, and so forth. However, the reverse also holds true. By not processing today's news appropriately, the individual will be less likely to learn today's news, and without that information, the individual will be less likely to process and learn tomorrow's news.

If learning from the news does fit into this spiral format due to the reciprocal relationship between news knowledge and news information processing, this provides a viable psychological explanation for increases (or decreases) in knowledge gaps over time. Connecting these findings and the knowledge gap is also appropriate given calls for a greater focus on media attention and information processing in research on knowledge gaps (Viswanath & Finnegan, 1996).

Why would the better educated—who, according to Tichenor et al. (1970), are likely to have more background knowledge—gain more from an information campaign than the less educated? Well, particularly in the case of elaboration, by having more stored background information on news issues, elaborative processing of the news is facilitated. That is, it is easier to make connections between the information on today's news and related events—elaboration—when those related events are well-stored in memory and easily accessible for use. So, those with more information are more capable of engaging in elaborative processing of new information when it is presented to them. As Kim and van Dusen (1998) conclude, "The beneficial effect of prior knowledge on memory is the result of self-generated elaborations" (pp. 373-374). Thus, in terms of knowledge, the rich get richer. Or alternatively, as

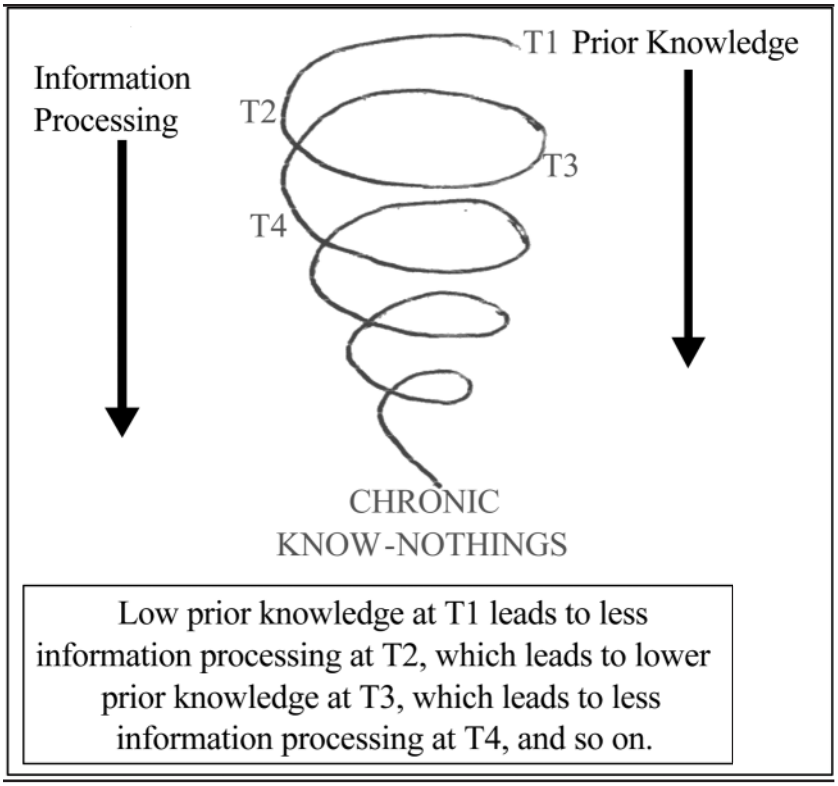

Figure 2. The Spiral Process in Learning From the News

Bennett (1989) argues, "since a certain amount of information is needed to make sense of news stories being transmitted by the media on any given day, ignorance begets ignorance" (p. 433).

Our findings also help to explain why, even in instances of intense publicity via news media, some individuals simply do not learn very much about current events. Without the appropriate background knowledge, they are less likely to engage—or even less capable of engaging—in information processing activities that will encourage learning. And, this situation can reinforce itself over time to produce what Hyman and Sheatsley (1947) called "chronic know-nothings." For instance, Hyman and Sheatsley noted, "There is something about the uninformed which makes them harder to reach, no matter what the level or nature of the information" (p. 413). To the factors identified by Hyman and Sheatsley, this study suggests we should add information processing. That is, those who "know nothing" tend not to deeply process information by paying attention and elaborating on that information.

This, in turn, keeps them from learning more information, even when it is heavily publicized.

More generally, these findings serve as a caution to researchers concerning the nature of media effects. Although many probably assume at least some degree of reciprocal causality in their cross-sectional models, this study stands with a relatively few others (most of which examine children or adolescents; e.g., Atkin, Galloway, & Nayman, 1976; Chaffee & Schleuder, 1986; Chaffee, Ward, & Tipton, 1970; Conway, Ahern, & Wyckoff, 1981) to demonstrate that the process of learning from the news builds on itself as part of a continuous system over time. Thus, simple snapshots—of learning or other media effects—are likely to reveal only part of the picture.

Study Limitations

Although this study had many strengths, we must also acknowledge its weaknesses. First, the data collected in this study were not drawn from a strict probability sample, and thus formal generalizations to the American population cannot be made. However, recent work done to validate data from this series of consumer mail panels, as well as similar data, has suggested that our results would have varied little in comparison to probability sample data (e.g., Groeneman, 1994; Putnam & Yonish, 1999).

Also, the use of a mail survey instead of one administered directly with an interviewer may have introduced some inaccuracy into our measures of political knowledge. That is, without the control of a trained interviewer, we cannot be certain that individuals answered the knowledge questions without the assistance of household members or by seeking information in the media after first reading the question. However, this source of error is likely counterbalanced by the fact that a lack of an interviewer should have reduced issues of social desirability surrounding responses to knowledge questions. In addition, to reduce the tendency for individuals to feel that they *should* know the answers to our knowledge questions, we prefaced them with the following sentences: "Of course, there is so much going on these days that it's impossible to keep track of all of it. In any case, do you happen to know which presidential candidate . . . ?"

The inclusion of only surveillance motivations among our measures of gratifications sought from news was also a limitation. Work on the cognitive mediation model should expand to include other motivations for news use—most prominent among them the communicatory utility motivation (see Eveland, 2003)—as well as other forms of information processing. Moreover,

factors currently exogenous to the model such as need for cognition (Cacioppo & Petty, 1982), media images (Becker & Kosicki, 1995; Kosicki & McLeod, 1990), personality strength (Scheufele & Shah, 2000), and various precursors to media motivations (see Conway & Rubin, 1991) ought to be included in future iterations of the model.

Furthermore, our measures of knowledge differed between Wave I and Wave II. Although this was intentional—we felt that asking the same questions repeatedly would sensitize our respondents—a direct comparison of learning through a subtractive method (Time 2 knowledge minus Time 1 knowledge equals learning) is not possible. However, our regression-based technique for controlling the Time 1 measure before examining the effect of other Time 1 predictors on Time 2 knowledge is an accepted method of panel data analysis. In addition, as Viswanath and Finnegan (1996) have noted, "knowledge is not static" (p. 200) and so it is appropriate that our measures of knowledge not remain static after a delay of many months.

Finally, we have eschewed a focus on macro-level concepts like community conflict and community pluralism that have been shown to predict learning and knowledge gaps (Viswanath & Finnegan, 1996). Future work on political learning and knowledge gaps should integrate macro and micro explanations for the social distribution of knowledge.

In summary, this panel study of the 2000 U.S. presidential election campaign was designed to test the causal claims of the cognitive mediation model. Nearly all of the hypotheses derived from this model were supported, including the effect of motivations on at least one form of information processing, the mediation of motivational effects on learning through information processing, and the direct effects of news attention and elaboration on learning. However, additional analyses demonstrated that our theoretical variables are not related in a simple unidirectional causal pattern and that future research should pay close attention to the reciprocal nature of the relationships between information processing and knowledge.

Measurement Appendix

Surveillance Motivations (T1) (1-6 scale, *definitely disagree* to *definitely agree*):

I use the news to give me more facts to back up my opinions.
I use the news to see how politicians stand on issues.
I use the news to stay informed about my surroundings.
I use the news because it helps me understand the main events of the day.
I use the news because it helps me make up my mind about things.

News Attention (T1 & T2) (1-10 scale, *very little attention* to *very close attention*)
"When you come across the following kinds of coverage in the news, how much *attention* do you pay to them? Here, 1 means very little attention, and 10 means very close attention. How much attention do you pay to . . . ?"
stories about the presidential campaign on television?
articles about the presidential campaign in newspapers?

News Elaboration (T1) (1-6 scale, *definitely disagree* to *definitely agree*)
I often find myself thinking about what I've seen on TV news.
I often tie what I see on TV news to ideas I've had before.
I often try to relate what I see on TV news to my own personal experiences.
I often think about how what I see on TV news relates to other things I know.
I often tie what I read in the newspaper to ideas I've had before.
I often find myself thinking about what I've read in the newspaper.
I often try to relate what I read in the newspaper to my own personal experiences.
I often think about how what I read in the newspaper relates to other things I know.

News Elaboration (T2) (1-6 scale, *definitely disagree* to *definitely agree*)
I often try to relate what I see on TV news to my own personal experiences.
I often think about how what I see on TV news relates to other things I know.
I often try to relate what I read in the newspaper to my own personal experiences.
I often think about how what I read in the newspaper relates to other things I know.

Candidate Knowledge (T1) (response options of Bush, Gore, and don't know)
"I have listed a few questions about the major political parties, presidential candidates, and other political figures. Of course, there is so much going on these days that it's impossible to keep track of all of it. In any case, do you happen to know which presidential candidate . . . ?"
favors a system of school vouchers?
was once a U.S. senator?
wrote a book called *Earth in the Balance*?
supports the larger tax cut?

Candidate Knowledge (T2) (response options of Bush, Gore, and don't know)
"I have listed a few questions about the major political parties' presidential candidates and their policy positions. Of course, there is so much going on these days that it's impossible to keep track of all of it. In any case, do you happen to know which presidential candidate . . . ?"
has a brother who is currently a state governor?
favors allowing young people to devote up to 1/6th of their Social Security taxes to individually controlled investment accounts?
favors providing "targeted tax cuts" to particular groups?
gave a dramatic kiss to his wife at the national nominating convention?
favors drilling in Alaska's Arctic National Wildlife Refuge for oil?
used to be partial owner of a major league baseball team?
served as a journalist in Vietnam?
favors a 72-hour waiting period for gun purchases at gun shows?

Notes

1. Support for the research reported in this article was provided through a major grant from the Ford Foundation through the Digital Media Forum to D. Shah. Additional support of various sizes was provided by the following sources (organized alphabetically): Department of Communication, UC-Santa Barbara to W. Eveland; Howard R. Marsh Center for the Study of Journalistic Performance, Department of Communication Studies, University of Michigan to N. Kwak; Journal Communications/Warren J. Heyse Faculty Excellence Award, UW-Madison to D. Shah; School of Journalism & Communication, OSU, to W. Eveland; School of Journalism & Mass Communication, UW-Madison, Cramer-Krassalt Fund to D. Shah; Special Grants Program, College of Social & Behavioral Sciences, OSU, to W. Eveland; Social Science Research Grant, Institute for Social, Behavioral and Economic Research, UC-Santa Barbara, to W. Eveland. In addition, the authors would like to thank DDB-Chicago for access to the Life Style Study, and Marty Horn and Chris Callahan, in particular, for making these data available and sharing methodological details. Opinions, findings, and conclusions in this article are those of the authors and do not necessarily reflect the views of the supporting sources or DDB-Chicago.

2. The other questions in these rather large surveys essentially served as distractor items, and so it is unlikely that respondents would have felt that our surveys were focused primarily on mass media and politics. This decreases the likelihood that respondents would have reacted to this survey by increasing traditional political media use or seeking to gain additional political knowledge. Other questions on the survey included attitudes toward the Internet and other media regulations, social trust, social and political attitudes, group memberships, and technology purchasing behaviors and intents. Moreover, these respondents receive numerous surveys from various groups as members of the mail panel, so any one survey is unlikely to change their behaviors substantially.

3. The noncomparability of the Time 1 and Time 2 measures of elaboration could potentially have an influence on our results. Therefore, we also constructed a Time 1 measure of elaboration that was equivalent to the Time 2 measure (i.e., only the four items included on the Wave II questionnaire). We replaced the 8-item Time 1 measure of elaboration reported here with the 4-item Time 1 measure in all analyses to check for such an influence. However, the results were essentially the same, with only a slight decrement in predictive ability using the 4-item as opposed to the 8-item measure (e.g., the stability coefficient for elaboration from T1 to T2 declined from .48 to .45 when using the 8-item versus 4-item measure).

4. No weights were used to adjust the sample more precisely to match population figures because (a) this is not common practice in our field and (b) the use of weights in multivariate regression analysis leads to miscalculation of the standard errors (and thus significance tests) in almost all statistical packages, including SPSS, which was used for the analyses reported here.

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