MASS MEDIA AND MEMORY TRACES:
MULTILEVEL EXPLANATION OF ENCODED EXPOSURE TO TELEVISION CONTENT

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ABSTRACT

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Brian G. Southwell
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One construct that is useful when discussing media effects is the notion of encoded exposure, described here as a retrievable memory trace in an individual. Based on past research, encoded exposure to electronic media content should be associated with a variety of predictors on multiple levels of conceptualization, including variables related to the environmental prevalence of media content in question, individual media use, interest, processing ability and tendency, conversation with others, and formal content features. Past work also suggests that an explicitly multilevel model of encoded exposure including such predictors should be more useful than single-level prediction efforts alone.

This volume describes and validates a recognition-based measure of encoded exposure developed as part of an evaluation of a national health communication effort, namely an anti-drug mass media campaign sponsored by the U.S. Office of National Drug Control Policy. In order to test a multilevel model of encoded exposure, this study assesses three types of data. The National Survey of Parents and Youth, administered by Westat and the University of Pennsylvania’s Annenberg School for Communication to a nationally representative sample of U.S. adolescents, contributed both the encoded exposure measure and a variety of other individual measures. Television gross rating point estimates from the campaign provided environmental prevalence indicators. Lastly, electronic copies of campaign television advertisements also were a rich source of data concerning formal content features.
Not all hypothesized predictors garnered significant coefficients in the final analyses. As hypothesized, nonetheless, a multilevel model of encoded exposure (including significant individual-level predictors and significant content-level predictors) found strong support among a sample of U.S. adolescents with regards to television content from the campaign. In short, encoded exposure appears to be both related to individual-level variables, such as media use and conversation with others, and a function of content-level variables, such an environmental prevalence and formal features related to the depiction of time and space.
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Chapter One

Introduction

The idea that people can be exposed to information permeates contemporary discussion of mass communication. In much of that discussion, though, exposure is little more than a simple binary variable: either a person has been exposed or not. Such depictions often lack detailed clarification of what exposure means, what produces it, or what its consequences can be. Sometimes this simplification accompanies overestimation, as in a politician lamenting youth exposure to a controversial, but poorly selling, song. Sometimes this lack of consideration also permits underestimation. Two people casually talking about their favorite brand of jeans may not explicitly realize the extent of their own exposure to, and memory for, information about brands.

In contrast to the coincident prevalence and ambiguity of exposure as a concept, evidence suggests that exposure might involve more than an automatic process that accompanies simple information availability and that we might talk about exposure as a category of subtler constructs. Individuals who live in the same general media environment often vary in their knowledge, a pattern we might think about in terms of differences in remembered exposure to information (Tichenor, Donohue, & Olien, 1970). Moreover, not all information in an environment usually achieves equal presence, an idea that some scholars also discuss as an exposure phenomenon. Within the context of health promotion, for example, Hornik (1997) has noted that a major difference between communication interventions lies in their varying ability to achieve exposure.

Upon further consideration, then, initial banality gives way to more intricate terrain. Why are some people exposed to particular news items, advertisements, or programs, whereas others are not? Why do some strategic communication campaigns gain widespread exposure and others do not? What predicts individual memory for exposure to mass media content?
Answering these questions rigorously demands theoretical definition and clarification of exposure. We turn to that issue immediately below, defining exposure as a process with a distinct outcome construct, i.e., encoded exposure, worthy of investigation. Beyond that, I outline issues regarding the appropriate units of analysis for this investigation, in addition to fundamental considerations regarding what predictor variables to include.

**Encoded exposure as an outcome**

The first problem that any study of exposure needs to resolve is what aspect of the construct it will explore. Scientific investigation requires specific definition and operational choices. To understand why individuals vary in their reported exposure to mass media content, one must first assert what it is conceptually that exposure means.

Communication researchers largely have abandoned hypodermic metaphors depicting direct and unmitigated injection of information via mass media into a passive and unwitting populace (see Bineham, 1988, for a review). Rather than subscribing to a magic bullet understanding of exposure by which an external reality directly enters our minds, many scholars agree that complex information available via mass media rarely enters and resides unaltered in long-term memory (Grimes & Meadowcroft, 1995). A more useful understanding of what is often called exposure actually should consider a range of related elements, including environmental opportunity for encountering information, comprehension, and recall or recognition.

As Price and Zaller (1993) note, there has been a historic lack of analytic distinction and definition in discussion of various exposure process constructs in many literatures. Attention and recall, for example, are sometimes equated without sufficient consideration. The danger of treating these constructs synonymously, however, is highlighted by evidence that suggests the relationships between them are not always direct. Meadowcroft and Reeves (1989), for example, demonstrated that attention among children, inferred from performance on a
simultaneous secondary task, does not lead automatically to memory. Similarly, attention can be affected by external stimuli and the opportunity for engagement, but also appears to be a function of individual interest and goals (Anderson & Lorch, 1983; Neisser, 1976).

Upon consideration, then, we can quickly rule out a variety of constructs as being inadequate foci for the present investigation. Communication scholars, for example, have noted in various contexts that the simple physical proximity of a person to electronic media appliances (or time spent with appliances) does not guarantee any meaningful individual engagement with information presented in such media (Clarke & Kline, 1974; Kline, 1977; Salmon, 1986). A classic example occurs whenever a television blares away in a living room as various family members walk in and out, paying no substantive attention to the content and certainly not walking away with any meaningful sense of having been exposed.

Instead, what is often of more interest to campaign planners and evaluators is whether presentation of campaign content generates at least a minimal memory trace in individuals. Only at that point might we begin to suggest that a potential audience member has engaged the campaign's presentation in any meaningful sense. Here it is useful to draw on Lang's (1995) notion of encoding, which is a basic outcome that results in cognitive storage. To avoid confusion with other more general descriptions of exposure, in turn, I will refer to the outcome variable of central concern to the present investigation as encoded exposure. Encoded exposure is the outcome of a process that results in a minimal memory trace in an individual.

Encoded exposure represents a theoretically useful aspect of exposure that could be invoked as a mediating variable in predicting attitudinal, behavioral, or social change. It also represents a minimum threshold of exposure worth investigating as an effect in its own right. How can we argue that simple encoded exposure could be a useful variable in predicting social change? After all, some theories of behavior change, e.g., the Theory of Reasoned Action (Ajzen & Fishbein, 1980), involve systems of attitudinal beliefs that may seem vulnerable to change only through more comprehensive engagement with particular content than simple
encoding would seem to measure. Insofar as behavior change, however, arises through perceptions of social norms (Ajzen & Fishbein, 1980; Hornik, 1997) or consistent arousal (or priming) of pre-existing beliefs (Jo & Berkowitz, 1994), knowing a person has an image of particular content they can draw upon when asked should signal direct influence possibilities. (Certainly, other mediated effects, e.g., those that operate primarily through social networks and other mechanisms, are an additional, though not mutually exclusive, possibility.) If I can remember seeing an advertisement that depicts people drinking alcohol, then that suggests both my mental count of the number of people who drink alcohol and the system of beliefs I have surrounding alcohol could have been affected or aroused by that media content.

To describe such a basic threshold of information engagement and memory within an individual, a concept known as practical consciousness (Giddens, 1988; King, 2000) holds some utility. Giddens (1988) uses the notion to describe a level of consciousness located between discursive consciousness, of which an actor is fully aware, and the unconscious, which is theoretically irretrievable without psychoanalysis.³ King (2000) usefully clarifies the concept, arguing we can view practical consciousness as largely unacknowledged understanding shared between individuals. In other words, it is held information that is somehow taken for granted and not explicitly considered unless, perhaps, one is prompted for a response.

For our purposes, we might consider only information that gains at least such a minimal foothold among individuals to have achieved sufficient exposure encoding to be worth investigating within the larger context of potential media effects. In other words, whether or not a person can report having had previous minimal contact with a particular presentation of information when encountering that information a second time would seem to be a reasonable indicator of whether such information is available to the person in any pragmatic sense. Insofar as such retrieval is not possible, even with direct probing and repeated presentation of the original information or stimulus, then we might say that encoded exposure is functionally absent.
within the individual in question. This notion suggests distinct measurement possibilities that I outline below.

Before turning to measurement, though, the notion of practical consciousness also suggests that encoded exposure is worthy of investigation for another, perhaps more controversial, reason. Insofar as people have a limited capacity for processing and storing information (see Lang, 2000, for a discussion), encoded exposure signals the use of storage space. Encoded images of advertisements, for example, might be viewed as occupying space that might otherwise be used for other information. Encoded exposure itself, then, reflects an effect relevant to the current media-saturated era in which we live. As Cooley (1909) noted almost a century ago, we might see communication as having an impact on a society by “fixing certain thoughts at the expense of others to which no awakening suggestion comes” (p. 64).

**Measuring encoded exposure**

With these ideas in mind, how can we measure encoded exposure? While we will discuss specific operational choices later, initial consideration of measurement possibilities here will shed further light on the contours of the construct as we have defined it. Given the notion of a minimal memory trace, at least two individual memory performance task options are relevant: a recognition task or a recall task. The two types of memory measures are related; measures of each often covary (Singh, Rothschild, & Churchill, 1988; Zinkhan, Locander, & Leigh, 1986). Nevertheless, recognition can be differentiated from unaided recall of information. We can think about unaided recall as the ability to offer detail about a particular content when asked an open-ended question at some point after initial opportunity to engage the content. Recognition, in contrast, is a more basic ability to respond to a closed-ended question about past engagement with specific content when presented that content once again. Whereas recall suggests a relatively high degree of current information salience and accessibility, recognition involves a
somewhat lower standard of past cognitive engagement (Shoemaker, Schooler, & Danielson, 1989; Singh et al., 1988).

In light of this distinction, recognition-based tasks theoretically should offer appropriate indicators of encoded exposure. As Lang (1995) has argued, recognition measures likely indicate if the information in question ever has been encoded, suggesting that such encoding resides at a different conceptual level than the retrieval ability likely tapped by recall tasks. While unaided questions may provide a keener sense of what is most salient to a respondent at the time of interview, measuring recognition should more precisely and efficiently tap basic encoded exposure (du Plessis, 1994; Stapel, 1998).

As Singh and colleagues (1988) point out, some researchers typically criticize recognition measures as being inherently less able to discriminate between individuals in comparison to recall tests because of insensitivity and ceiling effects. On their surface, recognition measures might seem to assist respondents too much in a sense and to not distinguish between those who are able to remember particular stimuli on their own and those who cannot without aid. Another related problem potentially arising from the use of aided recognition questions is the "false positive" problem (Sudman & Bradburn, 1982) in which some respondents report having seen or heard an item when they, in fact, have not. Some reasons offered to explain this reporting inflation in reference to mass media content include social desirability concerns and a hesitation to appear ignorant (Clancy, Ostlund, & Wyner, 1979; Singh et al., 1988).

Evidence runs counter to criticism regarding the possible tendency of recognition measures to provide too much aid or to encourage false reporting. Recognition measures often appear to discriminate between valid and bogus reports and can produce variance comparable to recall measures (Singh & Rothschild, 1983; Singh et al., 1988; Zinkhan et al., 1986). In addition, insofar as a respondent's tendency to exaggerate is consistent, one can attempt to adjust for it by including stimulus items in the measurement instrument that have never been available
through mass media and then recording false affirmatives. Such a move not only would afford an aggregate sense of the prevalence of false reporting tendencies, but also would afford the creation of a dummy variable to control for desire to offer an affirmative response.

Moreover, recall measures have faults of their own. Unaided recall tasks, for example, tend to lead to substantial underreporting and place a heavy burden on the respondent (Sudman & Bradburn, 1982). When a participant is asked for a number of different responses throughout a survey, it might be too much to expect them to expend the necessary mental energy to recall every past engagement with media content that they conceivably can.

**Predicting encoded exposure: General considerations**

Available work in this arena suggests at least three types of explanations for encoded exposure, essentially involving the environmental prevalence of the content in question, the nature or structure of content, and individual differences in experience, capacity, and interest. Initial clues as to why these different domains each would offer explanations to this question are suggested by brief consideration of the various entities involved in the research question. If we view encoded exposure as involving human engagement with information available via mass communication systems, the construct theoretically should be vulnerable to multiple corresponding levels of influence.

On one level, Cappella (1996) has argued that investigation about possible media effects would be well served to begin with consideration of the mental processes and structures that constrain audience member responses. Studying exposure among humans, after all, means that biological and cognitive constraints bound what is possible. In this vein, Bransford and McCarrell’s (1974) early discussion of comprehension as a cognitive process offers a general starting point for understanding what might drive engagement with information. For them, comprehension requires that a person draw upon both contextual cues and existing knowledge in order to make sense of what otherwise would be ink marks on a page or flickering light pixels on
a television screen. In order to understand present engagement with information, then, it is also necessary to understand something about the structure and nature of past knowledge.

A network model of memory, as proposed by Anderson (1983; 1990), is useful in this regard. Network models essentially propose that information exists in the brain as a series of nodes connected via so-called associative pathways. Repeated access of particular nodes affects the salience or accessibility of both the information in question and also information located in adjacent nodes. Processing and storage of new information largely does not occur on a tabula rasa. In part, it appears to be facilitated by existing structures onto which new information can be attached; the nature of such structures might help determine whether or not information is attended or what aspects of that information are stored. Some (Fiske & Linville, 1980; Fiske & Taylor, 1984) have attempted to explain this idea in terms of cognitive structures called schemata, which operate to filter or help organize information as it is processed and stored.

Upon first glance, such a model of information storage and memory implies a situation in which, figuratively speaking, a bit of traction is necessary for engagement between two objects. Without some existing foundation for processing, certain types of unfamiliar stimuli might have little hope of achieving exposure encoding in any meaningful sense. Given this idea, individual variables describing past experience and existing knowledge become potentially important in understanding encoded exposure, as we will see in more detail below.

While such individual-level consideration is undoubtedly relevant and useful, nonetheless, all individual engagement with mass communication also occurs in a social, cultural, institutional, and organizational context (Pan & McLeod, 1991; Wright, 1986). It is unreasonable to expect individual-level encoded exposure to occur without some degree of macro-level information prevalence within a particular environment. To study such an individual-level outcome only as a function of individual-level factors likely would provide an incomplete picture of mass communication phenomena and limit the amount of variance we might hope to explain. Certainly, the environmental prevalence of particular media content
should affect individual exposure to it in some fashion. While not suggesting that the mere presence of content guarantees widespread encoded exposure, many commercial entities also discuss individual exposure to content from a similar perspective. Exposure, for example, is depicted as being a function of simple correspondence between the prevalence of content within an information environment and aggregate availability of individuals to engage that content (Webster, Phalen, & Lichty, 2000).

As might be apparent from this brief introduction, then, researchers interested in exposure have tended to focus on either individual-level or system-level approaches depending on the norms of the academic or professional field to which a particular researcher subscribes. Here it will be more useful to let the theoretical locus of variance in encoded exposure and the mechanisms hypothesized to account for that variance determine the appropriate level of analysis, following Pan & McLeod (1991), even if that move leads to simultaneous exploration of multiple levels of analysis. Many questions about encoded exposure (and about human communication in general) legitimately can invoke not only micro-level factors within individuals, but also (relatively speaking) macro-level constructs concerning information environments available to groups of people, as well as interaction between the two levels of variables. Price, Ritchie, and Eulau (1991), in fact, have argued that much communication research actually lies at an intersection of macro-level theorizing and available micro-level measurement and could be informed by cross-level or multi-level approaches. We will return to this idea throughout the present investigation, particularly in chapter 7.

**An opportunity to investigate encoded exposure: A national anti-drug campaign**

Now that we have both described in detail the central dependent variable for our discussion and suggested certain classes of explanations residing on various levels of conceptualization, we can address the question of what specific data will afford useful hypothesis testing. Recent national efforts on the part of the U.S. Office of National Drug
Control Policy (ONDCP) offer a prime research site. In order to discourage trial of marijuana and other drugs among adolescents, ONDCP began in September 1999 a phase of efforts in which campaign partners developed anti-drug advertisements for a variety of media and then purchased airtime and space for those advertisements (Hornik et al., 2000; Hornik et al., 2001). Throughout this volume, we will discuss encoded exposure as it relates to the intended U.S. adolescent audience for that campaign effort.

Various aspects of the ONDCP project make it appealing from the perspective of investigating encoded exposure. In cooperation with ONDCP, the National Institute on Drug Abuse funded an evaluation effort that generated nationally representative data about individual memory for, and response to, campaign advertisements through the National Survey of Parents and Youth (NSPY). (NSPY was developed and implemented by researchers from Westat and the University of Pennsylvania’s Annenberg School for Communication.) In addition, available data from the project include electronic copies of the television campaign advertisements aired, as well as estimates of the purchased environmental prevalence of those advertisements (in the form of gross ratings points, or GRPs). In all, these various sources of data offered an opportunity test a wide array of specific hypotheses, which I outline below.

Hypotheses

In this section, we will discuss previous work and highlight the relevance of such thinking to the ONDCP campaign research problem. These ideas can be organized into six groups of hypotheses. We will talk about potential main effects and also some interaction possibilities. Not only do both individual-level variables and news story measures predict memory for news items, for example, but such variables also have been found to interact in their effects (Berry, 1983; Neuman et al., 1992). We also briefly can discuss the probable nature or shape of each hypothesized relationship where relevant.5
This discussion only serves as an overview of where we are headed, however. More specific questions regarding construct operationalization and hypothesis testing, for example, are addressed in the forthcoming chapters. In addition to providing individual hypothesis tests, each chapter will build upon the work presented in previous chapters. Chapter 7 then discusses an attempt to fit a multilevel model based on the preceding chapters.

**Hypotheses involving individual opportunity and environmental prevalence**

Given the nature of encoded exposure, individual opportunity to engage television content and the extra-individual environmental prevalence of that content both should play central roles in predicting encoded exposure.

**Hypothesis A1:** As reported use of television increases, encoded exposure to specific television content will increase.

A measure of one’s media use should bear a positive bivariate relationship to a measure of encoded exposure. While that assertion may appear obvious, that simple idea underlies much contemporary media program planning. Commercial entities that purport to measure audiences, such as A.C. Neilsen, acknowledge that a primary determinant in the reported viewing of a particular show is often simply time available for watching television in general (Webster & Phalen, 1997; Webster et al., 2000). Those shows with the largest purported audiences often are those that are aired when most people are not working or otherwise occupied.

If no one is in front of a television at a particular point in time, then no one will encode in any sense the content aired at that time. In terms of measurement, then, the amount that individuals report using a particular medium should correspond positively to their likelihood of recognizing a particular advertisement and to the number of times they recognize having engaged that advertisement in the past. In the present case, that means that indicators of
television use should bear a positive relationship to measures of encoded exposure to ONDCP advertisements.

One other note is worthwhile here. Insofar as the availability of any unit of media content, such as an advertisement, is bounded physically by time and space constraints, hypothesizing a simple linear relationship between media use and recognition may not be adequate. Linear relationships technically do not mandate upper and lower bounds in the dependent variable; when extrapolated, a line extends indefinitely along the slope of the hypothesized relationship. The difference between one hour a week and two hours a week, however, is probably not the same as the difference between 40 and 41 hours. The relationship between media use and encoded exposure should be positive and monotonically increasing, but a logistic curve or other curvilinear function also may offer a more appropriate model. We will investigate that possibility in chapter 2.

Hypothesis A2: As the prevalence of television content increases within a particular information environment, encoded exposure to that content will increase, on average.

Various researchers have argued that simple community- or environmental-level information prevalence is a central force in producing exposure to mass-mediated ideas and even have speculated that, in many cases, informational prevalence will overwhelm the influence of other variables, such as message design characteristics, in producing widespread beliefs. Chaffee and Wilson (1977), and later Hornik (1997), have suggested that the sheer physical prevalence of information in an environment should be predictive of individual likelihood of exposure to that information, an argument we can extend to the more specific notion of encoded exposure. Even during the course of many ostensibly targeted campaigns, in fact, a proportion of the population for whom campaign efforts were not intended may harbor at least some degree
of campaign recognition by virtue of the sheer prevalence of those efforts in the public
information environment (Roser, 1990).

Much attention has been paid in advertising and consumer psychology literatures to the
impact of estimated prevalence on behavior, attitude change, or affective arousal. Work on
concepts such as the so-called wear-in or wear-out of an advertisement or the impact of
repetition on degree of liking illustrates this focus (Goldberg, Chattopadhyay, Gorn, &
Rosenblatt, 1993; Greenberg & Suttoni, 1973; Stewart, 1999). Less empirical work in this
arena, however, has documenting the more fundamental relationship between general
environmental prevalence and encoded exposure levels among a corresponding population,
perhaps reflecting the kinds of assumptions we discussed in the opening paragraphs of this
chapter.

Experimental work related to psychology and advertising often implicitly restricts the
range of content availability, in fact, so as to focus on other specific aspects of content. Zinkhan,
Locander, and Leigh (1986), for example, studied aided recall and recognition of various
different types of print advertisements by showing groups of individuals different advertisements
and then later measuring their ability to recognize them. What the study did not investigate,
however, was the impact of wide variation in opportunity for exposure as a source of possible
enhancement or attenuation of the relationships of interest. In a sense, they only explored
recognition within a limited range of such opportunity, namely that dictated experimentally in
order to focus on other content variables.

In contrast, Price and Czilli (1996) provide some useful empirical backing for the
importance of prevalence variables. As a part of a larger analysis of reported recognition and
recall of news stories, they report that higher intensity of story coverage significantly predicted
higher likelihood of recognition (and also higher reported recall) of the story, other factors being
equal. Similarly, we can expect that the higher the prevalence of media content availability, the
higher the likelihood of encoded exposure. We can expect to find a similar positive relationship
between the recent environmental prevalence of a campaign advertisement and the average encoded exposure to that advertisement.

**Hypotheses involving individual interest**

Past thinking about persuasion (Chaiken, Liberman, & Eagly, 1989; Eagly & Chaiken, 1993; Petty & Cacioppo, 1986a; Petty & Cacioppo, 1986b; Petty & Priester, 1994), selective exposure (see Zillmann & Bryant, 1985, for an introduction), and defensive message avoidance, e.g., Blumberg (2000), all focuses on the possible influence of individual interest in a message topic. In various contexts, for example, scholars have noted that interest and motivation variables can predict media use and exposure opportunities. A person can and does sometimes pick and choose the specific media content to which they are exposed (Donohew, Lorch, & Palmgreen, 1998; Donohew, Palmgreen, & Duncan, 1980; Hawkins et al., 2001).

As we will justify and discuss in great detail in chapter 3, however, we will focus our discussion of individual interest on variables that involve the point of individual contact with media content. This move leaves other antecedent constructs, such as media use, and subsequent constructs, such as counter-argumentation, either to other chapters in the volume or future study. As far as encoded exposure is concerned, interest variables likely play a direct role here at this point of engagement. It is reasonable to expect variation in processing patterns between different individuals in their engagement with the same stimulus. As noted earlier, Lang (2000) has argued that people encounter and process mediated information using a limited set of cognitive resources, and, thus, cannot infinitely attend to, or store, all available information. If we accept this idea, then dimensions of a person’s cognitive resources and representations should dictate, motivate, or facilitate his or her engagement of some information (and not other information) and should affect encoded exposure.

The important question, then, is how interest variables indicating differences across individuals could affect processing at this level. Two prominent and complementary social
psychological models of persuasion, namely the Elaboration Likelihood Model (Petty & Cacioppo, 1986a; Petty & Cacioppo, 1986b; Petty & Priester, 1994) and the Heuristic-Systematic Model (Chaiken et al., 1989; Eagly & Chaiken, 1993), offer some relevant insight in this regard. These theories are particularly noteworthy given the ostensibly persuasive intent of the ONDCP campaign. Both theories suggest that, when encountering a message, individuals vary in the degree to which they use effortful cognitive activity to process it.

According to the Elaboration Likelihood Model (ELM), people employ central processing, and demonstrate increased cognitive elaboration, in situations in which they are motivated and able to do so, and employ peripheral processing, and decreased elaboration, in situations of relatively less motivation or ability (Petty & Priester, 1994). Stored information resulting from central elaboration, in turn, appears to be more accessible and enduring than that associated with peripheral processes (Petty & Cacioppo, 1986a). Similarly, the Heuristic-Systematic Model (HSM) asserts that people use a central processing route, i.e., a “systematic” route, when they are motivated and able to do so and, when neither motivation or ability is high, people use heuristic processing, which is somewhat akin to the ELM’s peripheral route.

Though minor differences⁶ can be enumerated, the two models converge to suggest variables that should lead to encoded exposure (by virtue of affecting depth of processing and facilitating storage in memory). Both the HSM and the ELM suggest that personal relevance motivates effortful processing. Increased perception of the personal relevance of a message is associated with increased thinking about that message (Brickner, Harkins, & Ostrom, 1986; Leippe & Elkin, 1987; Petty, Cacioppo, & Haugtvedt, 1992). Increased elaboration, in turn, should be predictive of more enduring possibility for later retrieval or recognition of the various instances in which a message was encountered in one’s media environment.

Variables indicating ostensible personal relevance of particular media content, then, should positively affect an individual’s encoded exposure to that content. With regards to anti-
drug advertisements, there are at least four indicators of interest in or experience with drugs that should predict encoded exposure.

**Hypothesis B1:** The more extensive one’s past drug use, the greater encoded exposure to television content that individual will demonstrate, all else being equal.

**Hypothesis B2:** The more extensive one’s history of past drug offers, the greater encoded exposure to television content that individual will demonstrate, all else being equal.

**Hypothesis B3:** The more peers of an individual who have used illicit drugs, the greater encoded exposure to television content that individual will demonstrate, all else being equal.

The case for positive relationships between these drug experience indicators and encoded exposure draws directly on the aforementioned role of relevance in information processing. At the heart of each of these hypotheses is the notion that the richness of a person’s existing schematic frameworks with regards to drugs (or specifically marijuana in the case of the campaign) should indicate the likelihood that any one opportunity to engage anti-drug advertising will result in actual encoding.

Past drug use is one relatively uncontroversial reason that a person should perceive an anti-drug advertisement as being relevant, particularly use of the same drug depicted or mentioned. Having reportedly tried marijuana should sensitize an individual to advertisements mentioning marijuana, at least relative to those who have not tried it. Theoretically, however, past experience does not have to include only one’s own drug use. Simply having been offered marijuana, for example, also should play somewhat of a role in sensitizing individuals to the personal relevance of anti-drug messages. Directly knowing others who have used drugs also could create a sense of the personal relevance of the topic of drugs. As a result, reports of one’s
own past use, reports of past offers, and reports of knowledge of others that have used should be useful indicators of message relevance.

**Hypothesis B4:** The more extreme that one's attitude is toward drug use, the greater encoded exposure to television content that individual will demonstrate, all else being equal.

Another variable related to the general notion of perceived relevance that should play a role in our investigation is attitude. As we will discuss in chapter 3, an attitude can be depicted as an association in memory connecting representations of an object and an individual's evaluation of that object (see Roskos-Ewoldsen, 1996, for a review). Further, Anderson (1983; 1990) has theorized that each of two strongly related cognitive object representations will be relatively more accessible if either is activated. It follows, then, that an individual with a relatively developed attitude toward an object should be more able to access that attitude when presented with the object in question than others would be. In turn, an individual with a strong attitude toward drug use both should be more likely to process and engage an anti-drug advertisement directly given the opportunity and also should be more likely to access memory of that encounter when asked about their encoded exposure than others will be.

**Hypothesis B5:** Average encoded exposure for television content will be higher among respondents of the same sex as the majority of models depicted in that content, all else being equal.

**Hypothesis B6:** Average encoded exposure for television content will be higher among respondents of the same race as models most often depicted in that content, all else being equal.
A main effect of race, ethnicity, or sex on encoded exposure across all respondents and all types of media content is unlikely; speculation to the contrary enjoys little if any empirical support. It is conceivable that the race, ethnicity, or sex of respondents and of models depicted in media content might matter as an indicator of interest, however: perceived source similarity, e.g., Buller & Buller (1991), or correspondence between viewer and model could signal content relevance. We will explore this notion as well as the other aforementioned interest hypotheses in greater detail later in chapter 3.

Hypotheses involving processing ability and tendency

As noted above, another source of variation should be individual difference in general processing ability or tendency. Those who are more able to, or tend to, fully encode particular television content should be more likely later to report encoded exposure than their counterparts. Some variables theoretically indicative of such cognitive differences are age, school performance, and sensation seeking.

Hypothesis C1: Among children and adolescents, older youths will demonstrate greater encoded exposure to television content than younger individuals, all else being equal.

Age should bear a positive relationship to encoded exposure, all else being equal. Over the course of a lifetime, evidence suggests that age holds a curvilinear relationship with stimuli recognition ability, increasing during childhood and adolescence (Cycowicz, Friedman, Snodgrass, & Rothstein, 2000) and eventually decreasing toward the end of life (Golski, Zonderman, Malamut, & Resnick, 1998; Madden et al., 1999). Children in the present investigation should be less likely, then, to report encoded exposure to a particular advertisement than older adolescents after controlling for other factors.
At the same time, the story also might be more complicated. On one hand, some evidence highlights the possibility of a brief dip in recognition ability coincident with the onset of puberty and its developmental chaos (Flin, 1980; Soppe, 1986; Flin, 1985). On the other hand, the present investigation involves data regarding a strategic communication effort, which suggests the strong possibility that specific targeting efforts favoring one age group or another also might play a role in shaping the distribution of encoded exposure. Chapter 4 will investigate these possibilities.

**Hypothesis C2:** Those who demonstrate better performance in school also will report greater encoded exposure to television content, all else being equal.

Academic performance depends on a variety of factors, some appropriately measured at the individual level and some more appropriately assigned to a higher level of analysis (Bryk & Raudenbush, 1988). Certainly, the socioeconomic context of a school, for example, could have an effect on a child’s ability to perform well academically. At the same time, however, school performance also partially should be a function of individual information processing and retention ability. Over and above other factors, a youth who performs exceptionally well in school should be more likely to engage, retain, and recognize an encounter with a campaign advertisement than a less successful counterpart. Though this hypothesis has been relatively less investigated than the above speculation regarding age, the logic supporting it is similar.

**Hypothesis C3:** Those who are higher in sensation seeking tendency also will report greater encoded exposure to television content, all else being equal.

Donohew and colleagues’ individual-differences model of information exposure (Donohew et al., 1998; Donohew et al., 1980) and their focus on the concept of sensation
seeking (Zuckerman, 1979; Zuckerman, 1988; Zuckerman, 1994) offers another prime candidate for the prediction of encoded exposure. Sensation seeking essentially refers to the tendency to seek novel, complex, and intense sensation and to take risks for the sake of such experience. Donohew and colleagues assert that attention is a function of an individual’s level of stimulation need and the stimulation level provided by a source. Building on this work, scholars have speculated that sensation seeking tendency, or the closely related notions of novelty seeking or stimulation-seeking motivation, might be related to one’s general degree of stimulus engagement and encoding tendencies (Braverman & Farley, 1978; Fleming, Bigelow, Weinberger, & Goldberg, 1995; Smith, Davidson, Smith, Goldstein, & al., 1989). Such arguments suggest that those high in sensation seeking have a generally more excitable processing system relative to their counterparts. Given equal opportunity to engage a stimulus, then, we might expect basic memory encoding and later memory performance to be relatively enhanced for those with greater tendency toward sensation seeking given the more voracious processing tendency of that group.

Chapter 4 offers an overview of some specific evidence supportive of this hypothesis, including recent work from the realm of neuropsychology and neurobiology. That work points to evidence of a direct link between sensation seeking tendency and one’s general potential for encoding exposure to presented stimuli, such as an ONDCP campaign advertisement. Those higher in sensation seeking appear to demonstrate relatively greater intensity of neural structure activation related to memory updating when encountering presented stimuli. This could be the result of relatively greater motivation or tendency among individuals high in sensation seeking to process any and all presented stimuli as potential sources of arousal, given their theoretically higher threshold of stimulation necessary for optimal arousal. If so, we would expect to see higher levels of encoded exposure among those individuals after controlling for a host of other factors.
Hypotheses regarding conversation

Engagement with mass media does not occur in a vacuum. Social networks play a role in shaping a person’s initial engagement with such content, their retention of such engagement, and their action as a result of such engagement (Hagen & Wasko, 2000; Hornik, 1989; Katz & Lazarsfeld, 1955; Wright, 1986). Accordingly, another factor that could affect reported exposure to mass media content is the degree to which a person has conversations with others about that content or even about the general topic of the content in question.

**Hypothesis D1:** Those who report discussion with others about anti-drug advertisements in general will report greater encoded exposure to specific televised anti-drug campaign advertisements.

**Hypothesis D2:** Those who report conversation with others about drugs will report greater encoded exposure to specific televised anti-drug campaign advertisements.

How specifically could discussion with others strengthen one’s tendency to recognize media content when asked to do so? In reference to television news, Robinson and Davis (1990) have speculated that conversations with others about a story could increase the integration of story information into one’s long-term memory, for example, by increasing story information activation and establishing multiple connections between the story representation and other nodes. Such thinking is consistent with the aforementioned notion that continued and repetitious information retrieval strengthens memory for that information.

Further support for the relevance of conversations with others lies in work on so-called hypermnesia, a construct involving memory improvement through cognitive focus on memory of an object at some point after initial opportunity for contact with the object (Roediger &
Challis, 1989; Roediger, Payne, Gillespie, & Lean, 1982). As we will discuss in chapter 5, the convergence of such results with theoretical expectations about the impact of repeated accessing of memory objects suggests that conversation with others should predict encoded exposure.

In addition to speculating about the role of conversation about anti-drug advertisements, hypothesis D2 posits that general conversations about drugs also should be related to encoded campaign exposure. There are two ways in which conversations that do not necessarily explicitly refer to particular television content could nonetheless impact encoded exposure reporting about that content. First, a person who has engaged a particular unit of media content regarding drugs and who then discusses the general topic of drugs with another person might reinforce their cognitive imprint of the content in question through activation of related nodes during the course of conversation. Theoretical backing for this idea lies in earlier discussion of Anderson’s (1983; 1990) network model of memory and related ideas regarding the role of schemata. Insofar as information units related to “marijuana” are stored in connected memory nodes that are activated every time a person encounters the word, for example, conversation about drugs should arouse or activate not only nodes directly involved in that conversation, but also nodes where images of anti-drug advertisements are stored. In this manner, conversation about the topic should make any stored image of anti-drug advertising more salient and should increase the likelihood of that person recognizing the advertisement when it is presented in a survey.

A second possibility is that conversation about drugs provides cognitive fodder for later processing and recognition of related media content. A person who has a conversation with another person about drugs in general might bolster or enrich their schemata with reference to drugs such that they later engage a particular presentation of drug-related media content more thoroughly than they would have otherwise. In turn, they also should be more likely to report encoded exposure for unit of media content when presented with it in the future.
Chapter 5 will offer an opportunity to discuss a subtle, yet important, consideration about these ideas. The nature of available cross-sectional NSPY measures demands consideration of the casual order of any relationships that appear in our initial results. As we will discuss, the most appropriate stance, particularly with regard to individual-level analyses in chapter 5, will be to acknowledge that conversation and encoded exposure might hold a reciprocal relationship. Chapter 7 also will offer an additional opportunity to explore this notion.

**Hypotheses involving formal content features**

Wading into theoretical territory involving somewhat objective, or at least agreed upon, media content variables is likely to invite controversy and criticism, particularly from scholars more comfortable with the notion of an open text than with idea of media content having concrete features, e.g., Buckingham (1987) or Fiske (1987). Accordingly, it is worthwhile to offer a few comments here on this topic before delving into this last set of substantive hypotheses.

Livingstone's (1998) distinction between denotation and connotation actually suggests that content-level hypotheses of the variety that I outline below are not necessarily in diametric opposition to open-text camps but rather are focused on a different level of investigation. At the level of denotation, we can place consensual meanings of texts of the sort that serious students of human cognition agree are shared by most human observers. An advertised claim that 3,000 youths begin smoking each day denotes, at the very least, the number 3,000, and not 3,000,000. What connotative meaning one derives from, or assigns to, that statement involves, perhaps, a different sort of question. For analyses focused on such a denotative level, Livingstone admits that information processing approaches and measurement can be useful (whereas questions involving connotation might invite more reader-oriented, interpretative approaches).
For example, we should be able to measure the degree to which an advertisement includes particular simple editing or cutting techniques (though all observers may not agree about the appropriate metaphorical meaning to assign to that content structure). Certainly, a useful criterion to judge measures of content features, following Krippendorff (1980), will be agreement among multiple observers to differentiate useful general measures from the unique observations of one researcher (namely, the author). Nevertheless, insofar as encoded exposure involves one’s holding of denotative images of particular advertisements, it will be appropriate and useful to test whether measurable content features that affect basic human information processing also predict variation in a measure of average encoded exposure.

What media structure or content dimensions, then, might matter for predicting encoded exposure? Two different constructs find support in various literatures as good candidates to predict the amount of encoded exposure that a particular unit of media content is likely to generate: context instability and person focus. We will discuss both in detail in chapter 6. In the meantime, we can note that context instability involves the editing transitions used in constructing media content and person focus involves the (visual or audible) focus of that content on one person.

**Hypothesis E1:** The greater the context instability of television content, the lower encoded exposure for that content will be, all else being equal.

**Hypothesis E2:** The greater the person focus demonstrated by television content, the higher encoded exposure for that content will be, all else being equal.

With regard to context instability, it is useful to acknowledge the idea that electronic media presentations now allow the depiction of image sequences that would not have occurred in usual human surveillance of the external physical environment prior to the development of
mass media. Through available editing techniques and transitions, adjacent images in a sequence can depict, for example, visual perspectives that only could have come from two different cameras operating at the same time or a camera operating at substantially different points in time. The number of such transitions in any one unit of content, in turn, might be thought of as a formal feature of that content that might have an impact on processing and recognition, in part because of the departure of this type of image sequence from previous human experience. In other words, we can think about context instability as the density of unusual time or space transitions in a unit of media content.

Context instability, then, is a source of information-processing demand. Such instability should affect the encoded exposure potential for content insofar as it tends to overtax individual processing systems. This hypothesis draws support not only from Lang's limited capacity perspective but also from studies investigating the relationship of performance on recognition and recall tasks to various formal features, such as work by Reeves and colleagues (1985), Geiger and Reeves (1993), Lang and et al. (1993), Schmitt, Tavassoli, and Millard (1993), and Lang et al. (2000). We will review this literature in detail in chapter 6. While not all past studies in this arena discuss context instability explicitly, evidence suggests that the construct and its hypothesized relationship to encoded exposure represent a useful evolution of past thinking.

Why might the depicted prominence of a single person in media content, i.e., person focus⁷, positively affect average encoded exposure for that advertisement? One reason might be that content with such a focus works in concert with human tendency to engage mass media appliances as though such appliances were other human beings, as noted by Reeves and Nass (1996), and to process media content using the same faculties used for other physical stimuli. Insofar as humans attempt to interact with televised content as though it were somehow real, for example, content that focuses on another person's story is likely to encourage processing and

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storage relative to more abstract approaches. Humans ostensibly tend to pay more attention to other humans in non-mediated situations than to other objects.

Another possibility, not mutually exclusive with the above notion, is that media content that focuses on one person also is likely to depict an optimal number of units of a particularly information-dense entity: a human face. Because of the central role that faces play in human interaction as a source of information (Cappella, 1993; Kappas, 1997; Wenger & Townsend, 2001), it is reasonable to suggest that faces deserve special notice as informational entities. The appearance of a face or two, relative to a completely abstract presentation, is likely to attract attention and processing. Depiction of a large number of people (and their faces), however, is likely to overwhelm the limited capacity processing system central to our discussion. Average encoded exposure, then, should be highest for content that focuses on one person and lower for both content that does not focus on any people and content that focuses on many people.

Such speculation is consistent with evidence suggesting that basic narrative focus on a person can enhance processing. Gunter (1987), for example, has argued that the use of relatively specific examples is more likely to contribute to information recall than more abstract approaches and there is little theoretical reason why a similar relationship should not hold for encoded exposure. Similarly, Graber (1990) has suggested that visual depictions of human figures to illustrate a story can encourage learning from television news. Additionally, empirical findings suggest that focusing on personalities or case history examples promotes memory for the content in question (Neuman, 1976; Nisbett & Ross, 1980; Price & Czilli, 1996; Robinson & Levy, 1986; Davis & Robinson, 1986). Price and Czilli (1996), for example, asked respondents to recognize one of 21 different news stories within seven days of its initial appearance in the news. Stories that focused on personalities were roughly twice as likely to be recognized as stories that did not, even after controlling for intensity of coverage and a variety of individual characteristics.
Hypothesized results from multilevel modeling

Many of the hypotheses outlined above will be tested initially in chapters 2 through 6 using ordinal or interval statistics and conventional ordinary least squares regression approaches. Ultimately, however, it will be important to fit a multilevel model of encoded exposure both to assess the main predictor variables mentioned up to this point and to illuminate cross-level relationships between those variables. The nature of encoded exposure, as discussed here, suggests that such an approach will yield a significant and useful model. While numerous methodological details concerning multilevel model estimation follow in chapter 7, a brief comment about this proposition is appropriate here as a way of describing nature of the research problem at hand.

Essentially, explaining encoded exposure as a function of independent variables that belong on different levels of measurement introduces what has been termed a “units of analysis” problem (Bryk & Raudenbush, 1988; Burstein, 1980; Haney, 1980). For example, the environmental prevalence garnered by a particular advertisement rightly characterizes the public communication environment available to a respondent rather than characterizing each individual respondent, thus calling for an aggregate measure. Past drug use of the respondent, in contrast, is an individual-level variable and should be measured and analyzed as such. Overlooking this difference would be inappropriate, and yet the proposed interrelationship among such variables calls for methods of looking simultaneously at relationships among these different levels rather than solely conducting separate aggregate or individual-level investigations.

Education researchers have faced similar problems in attempting to explain student achievement, as briefly noted in a different context earlier. Bryk and Raudenbush (1988), for example, point out that data are routinely analyzed at the student level. Such a move, however, assumes that educational interventions or organizational contexts, i.e., school-level variables, are constant across all students. Insofar as effects vary both among students and among contexts, conventional approaches may be misleading.
Rather than solely being a matter of choosing one or another unit of analysis, a number of scholars have suggested the need for statistical models that explicitly accommodate multiple organizational levels (Bryk & Raudenbush, 1988; Burstein, 1980). Models belonging to a general family typically called Hierarchical Linear Models (Bryk & Raudenbush, 1988; Bryk, Raudenbush, Congdon, & Seltzer, 1986) specifically address these concerns. Hierarchical Linear Models (HLMs) are potentially useful for a variety of endeavors, whether they involve student and school variables, e.g., Rowan, Raudenbush, & Kang, (1991), individual and neighborhood crime variables, e.g., Sampson, Raudenbush, & Earls (1997), or individual and communication environment variables as in the present case. HLMs or other multilevel models assess such various factors more appropriately than ordinary least squares regression methods because they take into account the error structure at each level, whereas ordinary least squares approaches do not automatically do so.

As Bryk and Raudenbush (1988) point out, HLM procedures involve specifying a set of within-group and between-group equations in which each between-group equation represents one of the individual-level regression parameters as a function of group-level variables and a unique residual effect for each group. Through the estimation of this overall set of equations, HLM allows for hypotheses about individual-level and group-level predictors and about the cross-level interaction of between-group and within-group variables. Chapter 7 highlights the potential of this approach, confirming not only the basic story told in chapters 2 through 6, but also presenting some intriguing cross-level interaction possibilities involving environmental prevalence and individual-level variables. Such results will underscore the benefits of approaching encoded exposure as a multilevel phenomenon.

Summary

Encoded exposure refers to a fundamental outcome of the exposure process, namely a memory trace held by an individual. Encoded exposure to mass media content should be
predictable as a function of a multilevel model including both individual-level variables, such as individual interest, and macro-level variables, such as the prevalence of a particular unit of content in an information environment shared by many. Available data from a national health communication campaign, e.g., survey measures of individual variables, gross ratings point estimates, and coder assessments of campaign advertisement content, should allow us to test these informed speculations. With that in mind, let us turn to those analyses.
Chapter Notes

1 As Livingstone (1998) has pointed out, depicting mass media content as "information" can suggest inadvertently that content has closed and unwavering meaning rather than allowing for individuals to play some interpretative role. Here I grant mass media content status as a measurable entity. Instead of asserting either extreme position in the open versus closed text debate, however, the present study instead draws hypotheses from different perspectives in this arena. Instead of disallowing either individuals or content to play a role in determining communication outcomes, I explore variables related to each, both separately and within the context of others.

2 Hornik (1997) also argues that many health intervention evaluations lack any explicit or rigorous consideration of exposure evidence, despite the idea that such evidence is crucial, not tangential, to understanding why change does or does not occur.

3 Giddens (1984; 1988) uses practical consciousness to explain how macro-level structures are replicated in actions of individuals. Questions have arisen, though, about structuration as an empirical model (Barley & Tolbert, 1997), and even Giddens claims his ideas suggest approaches rather than specific hypotheses.

4 Lippmann's (1922) early pessimism about exposing the populace to policy discussion with which they are not at all initially familiar might find some support in such a perspective. This idea also relates to work on the so-called "knowledge gap" hypothesis which asserts that those rich in knowledge get richer in the face of new information at a faster pace than the knowledge poor, e.g., Tichenor, Donohue, & Olien (1970).

5 Such consideration of mathematical models is not misguided empiricism. Model specification actually can inform theory by highlighting non-obvious implications of stated or implied relationships (Fink, 1993).

6 Eagly and Chaiken (1993) note, for example, that the HSM permits heuristic and systematic processing to occur simultaneously and that heuristic processing, and heuristic cues, can affect systematic processing. Moreover, the HSM holds that motivational variables can not only invite systematic processing but also can affect heuristic processing as well.

7 As we will discuss in chapter 6, person focus might be a specific (and more useful) aspect of a larger, more amorphous construct sometimes called vividness. There exists a large body of attempts to define vividness (Block & Keller, 1997; Denis, 1995; Frey & Eagly, 1993; McKelvie, 1995; Smith & Schaffer, 2000; Stapel & Velthuijsen, 1996). Given that much of the literature on vividness suffers from a distinct lack of conceptual clarity (Denis, 1995), however, it perhaps will be more productive to focus on a particular vividness aspects of stimuli that appear to be relatively easily coded and reliably identified, such as person focus. While some have attempted to code particular stimuli as being more or less vivid, e.g., Block & Keller (1997), many such instances actually focus on one particular attribute, e.g., the use of case examples versus more abstract information, rather than capturing a somewhat larger concept. Moreover, vividness measures apparently have been more often validated as indicators of individual mental imaging ability, e.g., McKelvie (1995), than as external stimulus descriptors.
Chapter Two

The role of opportunity and prevalence

The opening chapter of our discussion suggested that encoded exposure to mass media requires the convergence of least two different phenomena. One’s opportunity to encounter media content, in large part a product of media use habits, should offer a nontrivial explanation for one’s encoded exposure to that content. What media outlets provide also should matter: the availability, or what we can call the environmental prevalence, of content should account for variance in observed encoded exposure. In other words, the content prevalence and individual opportunity for engagement with that content likely are necessary (though not always sufficient) conditions for encoded exposure, conceived here as a generated memory trace, to occur.

Two separate hypotheses, A1 and A2, specify relationships between physical opportunity variables and subsequent exposure to media content. Neither hypothesis is particularly complicated. Yet both relationships should provide a solid foundation for later predictive models. Before presenting the strategy for, and results of, the present investigation, it will be useful to briefly review theoretical justification for these anticipated relationships. We turn to that next.

Hypothesis A1: As reported use of television increases, encoded exposure to specific television content will increase.

From the perspective of an individual youth in the U.S., we can start our exploration of encoded exposure quite literally at the power switch of his or her television set (or, increasingly, sets). Television use, however specifically conceived, should be the mechanism through which encoded exposure occurs. A measure of one’s media use should bear a positive bivariate relationship to a measure of encoded exposure.
While that assertion may appear obvious, that simple idea underlies a surprising amount of contemporary media program planning. Commercial entities that purport to measure audiences, such as A.C. Neilsen, acknowledge that a primary determinant in the reported viewing of a particular show is often simply time available for watching television in general (Webster & Phalen, 1997; Webster, Phalen, & Lichty, 2000). Those shows with the largest purported audiences often are also those that are aired when most people are not working or otherwise occupied. If no one is in front of a television at a particular point in time, then no one will encode in any sense the content aired at that time. In terms of measurement, then, the amount that individuals report using a particular medium should correspond positively to their likelihood of recognizing a particular advertisement and to the number of times they recognize having engaged that advertisement in the past. In the present case, that means that indicators of television use should bear a positive relationship to measures of encoded exposure to ONDCP advertisements.

Hypothesis A2: As the prevalence of television content increases within a particular information environment, encoded exposure to that content will increase, on average.

Various researchers have argued that simple community- or environmental-level information prevalence is a central force in producing exposure to mass-mediated ideas and even have speculated that, in many cases, informational prevalence will overwhelm the influence of other variables, such as message design characteristics, in producing widespread beliefs. Chaffee and Wilson (1977), and later Hornik (1997), have suggested that the sheer physical prevalence of information in an environment should be predictive of individual likelihood of exposure to that information, an argument we can extend to the more specific notion of encoded exposure. Even during the course of many ostensibly targeted campaigns, in fact, a proportion of the population for whom campaign efforts were not intended may harbor at least some degree

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of campaign recognition by virtue of the sheer prevalence of those efforts in the public
information environment (Roser, 1990).

Price and Czilli (1996) provide some empirical backing for the importance of prevalence
variables. As a part of a larger analysis of reported recognition and recall of news stories, they
report that higher intensity of story coverage significantly predicted higher likelihood of
recognition (and also higher reported recall) of the story, other factors being equal. Similarly,
we can expect that the higher the prevalence of media content availability, the higher the
likelihood of encoded exposure. We can expect to find a similar positive relationship between
the recent environmental prevalence of a campaign advertisement and the average reported
exposure to that advertisement. With these ideas in mind, we can turn next to empirical
investigation.

Methods

Procedure

From November 1999 through December 2000, a multistage cluster sample representing all U.S. youth ages 9- to 18-years-old and their parents or caregivers participated in
two waves of the National Survey of Parents and Youth (NSPY). In a first wave, from
November 1999 through May 2000, interviewers administered surveys with 3,312 youth aged 9
to 18 in 2,373 households and with 2,293 parents in 2,282 households. From July 2000 through
December 2000, interviews also were conducted with 2,362 youth aged 9 to 18 in 1,726
households and 1,632 parents in 1,623 households. Respondents used touch-screen laptop
computers and headphones brought into their homes by an interviewer to view each question (or
listen to a prerecorded reading of the question) and to respond. For a discussion of the first two
waves of the NSPY study, see Hornik et al. (2000) and Hornik et al. (2001).

Data regarding advertisement purchases also were obtained from the advertising
contractors for the campaign. During 1999 and 2000, campaign organizations placed anti-drug
advertisements in national network, cable, and in-school television programming, as well as in local television programming in over 100 U.S. metropolitan areas. Those organizations, in turn, reported purchase estimates, in the form of gross rating points (discussed below) for each advertisement and the specific weeks that each advertisement aired.

**Measures**

As noted in the introductory chapter, encoded exposure measurement in this study relied on a recognition-based task. Consistent with Lang’s (1995) speculations, if we understand encoding as a basic information engagement process that resides at a different, more fundamental conceptual level than the unaided retrieval ability likely tapped by other memory tasks, such as unaided recall, then recognition is precisely the type of rudimentary task necessary to tap evidence of encoded exposure. A recognition task administered to a representative sample of the intended population for a mass media campaign should provide a meaningful and useful measure of encoded exposure.

Accordingly, television advertisements that had aired in the two months prior to a particular NSPY interview were shown to respondents on the laptop computer used for the interview. Generally, the interview program played up to four advertisements for respondents, depending on the number of eligible advertisements. In addition to the actual campaign advertisements, each respondent also was shown a bogus anti-drug advertisement. Each bogus advertisement was one of a series of advertisements that had been produced professionally (for one of the partner organizations of the campaign) but had yet to air.

After seeing each advertisement, each respondent was asked, “Have you ever seen or heard this ad?” If they responded in the affirmative, they then were asked, “In recent months, how many times have you seen or heard this ad?” Response categories were “not at all,” “once,” “2 to 4 times,” “5 to 10 times,” and “more than 10 times.” In order to produce a reasonable interval measure, these categories were recoded into scores of 0, 1, 3, 7.5, and 12.5 for analysis.
“Don’t know” responses to the initial question were recoded as 0.5. Summed across the general market advertisements eligible for a respondent, this recoded question offered an indicator of individual exposure (EXPOSURE).

In order to assess hypothesis A2, construction of an average encoded exposure measure (ADEXPOSE) across all respondents for each general market advertisement was useful. To parallel the weekly environmental prevalence estimates available (see below), a weekly encoded exposure estimate was computed from the original NSPY measures. First, the average number of times an advertisement reportedly was seen in recent months was divided by the average number of days the advertisement was on the air in the 60 days prior to an interview. This step offered an estimate of average encoded exposures per day for that advertisement across respondents. Multiplying this number by seven then offered an estimate of average encoded exposures per week for each advertisement.

While on the surface these measures appear to afford reasonable indicators of encoded exposure, we should not proceed before first assessing two important aspects of measurement performance. First, because the degree to which individual respondents were able to report specifically about “recent months” is an open question, our discussion will not be complete without knowing whether youth appear to perform such mental calculus when responding. Later evidence regarding the relationship between environmental prevalence of advertisements reported by the ONDCP campaign and the NSPY encoded exposure measure will shed light on this issue.

Second, and more immediately urgent, is the possibility that some respondents falsely reported encoded exposure, an issue that warrants discussion here in the methods section. Aforementioned inclusion of bogus advertisements afforded an initial validity check for the exposure measures. The NSPY measure, after all, should discriminate between recognition of campaign media content that actually was available to a respondent in recent months and the tendency to falsely report recognition. In turn, average recognition levels for advertisements that
actually did air in the months prior to interview should be significantly higher than average recognition levels for bogus advertisements that were included in NSPY but did not actually air.

Results of this initial test were encouraging. The average actual campaign TV advertisement intended for youths was recognized by approximately 45 percent of 9- to 18-year-old youths. Over a third (9 of 23) of the youth advertisements were recognized by more than half of all youths. In contrast, the average bogus advertisement reportedly was recognized by less than 12 percent of youth. In other words, youth respondents were much more likely to report recognition when presented with an actual campaign advertisement than when presented with a bogus advertisement, $t = 50.05$, $p < .01$. Moreover, such difference between actual and bogus recognition persisted when looking at responses within different categories of sex, race, and ethnicity.

Several different NSPY questions offered resources to build independent measures for hypothesis A1, as NSPY measures indicated various dimensions of television use. For example, all youths were asked, “How much TV do you estimate watching on an average weekday?” and were offered response categories including “none,” “half-hour or less,” six separate options for one through six hours, and “7 or more hours.” Following that question, youths also were asked for an estimate of their TV watching during an “average weekend” and were offered categories including “none,” “less than one hour,” options for “1 to 2 hours” through “9 to 10 hours” and “11 or more hours.” I combined responses from these two questions into a weekly estimate of television watching (TVUSE) by assigning interval-level numbers to each of the categories, multiplying the weekday measure by five, and adding the weekday total to the weekend measure.

In addition, for 12- to 18-year-olds, NSPY also included up to 15 questions regarding whether the respondent had ever seen particular television shows. Shows included in each wave of surveys were selected from the list of primetime and daytime shows (including both general market and highly watched African-American shows) in which national anti-drug campaign staff
intended to purchase airtime, such as "ER," "Dawson's Creek," and "The Steve Harvey Show". Respondents who read (or listened to) and answered the survey exclusively in Spanish were presented with a list of Spanish-language shows targeted by the campaign. As a result, this measure also offered an indicator of a respondent's opportunity for engagement with campaign advertisements by virtue of their engagement with relevant television content. For analysis purposes, all of the items were dichotomized into two categories: having "never" seen a show or reporting at least some past watching. The items then were combined into an additive index (TVPROGS) that ranged from zero to 15.

Because the ONDCP campaign focused not only on network television, which is largely available to most American youths, but also on venues such as cable television and in-school programs such as Channel One, two additional measures of television use also are useful. In reference to cable programming, 12- to 18-year-old respondents were asked how often in the past 30 days had they watched different types of channels: channels focused on music television, all-sports programming channels, channels with programming intended primarily for African Americans, or Spanish-language channels (for those interviewed in Spanish). After converting original NSPY response categories into reasonable interval levels, these measures were added together to construct an index of relevant cable programming use for each individual (CABLE). In regards to in-school programming, a NSPY question asked of 12- to 18-year-olds regarding drug-related information available via Channel One includes the option to report that one's school does not have the channel. This measure afforded a dichotomous indicator of Channel One use (ONE).

Independent measures for hypothesis A2 largely drew from ONDCP reports regarding the obtained airtime for television advertisements. Specifically, reported gross rating points (GRPs) offered an indicator of the environmental prevalence of a particular campaign advertisement. A GRP is a conventional unit used by advertising researchers for measuring a population's opportunities for exposure to a particular unit of media content (Farris & Parry,
1991). GRPs are the product of underlying estimates of reach and frequency. In theory, for example, 100 GRPs could be the result of 100 percent of the population in question potentially seeing or hearing an advertisement one time, 1 percent of that population potentially seeing or hearing an advertisement 100 times, or some other combination of reach and frequency. Fortunately, GRP data was available for each advertisement in question from the NSPY study, both in terms of total prevalence for the time period in question and also on a weekly basis.

**Analysis for hypothesis A1**

Hypothesis A1 involves an individual as the unit of analysis. If the hypothesis is accurate, each of the available indicators of television use should bear a positive relationship to one's reported exposure to campaign advertisements. Increases in either the number of hours of television that a person tends to watch or the number of campaign-targeted shows that they have seen should both predict increases in a person's tendency to report encoded exposure for a campaign television advertisement. Similarly, reports of past watching of relevant cable programming or attendance at a school with Channel One also should accompany increased likelihood for encoded exposure across the campaign advertisements shown to a respondent.

Because a multistage cluster design was used to generate the original sample, it is most appropriate to use analysis software that affords the use of replicate weight factors to avoid underestimating standard errors. Accordingly, I used version 4.0.73 of WesVar Complex Samples Software, developed by Westat, both for hypothesis A1 analyses and for analyses throughout the forthcoming chapters involving probability levels of individual-level analyses. Additionally, analyses without replicate weights were conducted using versions 10.0 and 11.0 of SPSS.

Given the aforementioned evidence of validity for our exposure measure (and thus the lessened likelihood of responses being mere indicators of social desirability forces or other pressures), many conventional sources of spurious inference are not as large of a concern here as...
they might otherwise have been. For example, one might initially suggest that women might be more likely to watch certain types of television programming and also might be more likely to report that they had seen campaign advertisements, even if they had not, which could explain the appearance of a relationship between TVPROGS and EXPOSURE. Because women, like men, tended to report recognition for actual advertisements rather than bogus ones, however, such an argument is weakened. Nonetheless, we also will explore several demographic variables (SEX, RACE, and AGE) to broaden our understanding of these relationships and to further rule out the possibility of spuriousness as we attempt to support hypothesis A1.

In addition to assessing the main effects of each television use indicator on encoded exposure to campaign advertisements, the three specific programming measures, TVPROGS, CABLE, and ONE were assessed in terms of their interaction with TVUSE. Multiplicative interaction terms were computed and included in the final analyses to assess the joint effects of TVUSE and TVPROGS, CABLE, and ONE, respectively, on individual exposure to television advertisements from the campaign. This move allows us to assess whether a time dimension of television use, i.e., the sheer amount of time spent in front of a set, affects the impact of the other content-specific indicators. It could be that watching relevant shows or having Channel One in the classroom only matters, for example, for those who watch a lot of television in general.

Full assessment of hypothesis A1 using the present data also demands a few other analyses. First, insofar as the availability of an advertisement is bounded physically by time and space constraints, solely investigating the possibility of a linear relationship between media use and EXPOSURE may not adequately capture the essence of such relationships. Linear relationships technically do not mandate upper and lower bounds in the dependent variable; when extrapolated, a line extends indefinitely along the slope of the hypothesized relationship. The difference between one hour a week and two hours a week, however, is probably not the same as the difference between 40 and 41 hours. Accordingly, the results section outlines the
potential usefulness of several other types of mathematical relationships between television use and EXPOSURE in addition to a simple linear equation.

Second, it could be the case that the most revealing difference lies between those who simply recognize any campaign advertisements and those who do not. In other words, assuming individual ability to distinguish the number of times of past engagement may only muddy the waters: EXPOSURE may actually best capture a simple dichotomous sense of whether a person recognizes any previously televised campaign advertisements rather than offering a precise count of the frequency of exposure to the campaign. As a result, we also briefly can investigate whether the indicators of television use predict recognition of any of the relevant campaign advertisements shown to them (a dichotomous version of the full EXPOSURE variable) in a logistic regression to see whether a substantially different picture emerges.

A last consideration for multivariate analysis in support of hypothesis A1 lies in the fact that NSPY operated in the field over a substantial length of time (from November 1999 through December 2000 for the waves in question). As a result, NSPY responses also have a relevant location in time of which we should be wary, as that time location might signal substantially different campaign availability for different NSPY respondents. Such substantial differences in the degree of campaign advertisement prevalence either could cloud our ability to detect a relationship between individual television use measures and EXPOSURE or could explain that relationship, making it spurious.6

Ultimately, a multilevel model in chapter 7 will clarify these and other dynamics by allowing us to control for macro-level environmental prevalence while maintaining individual-level measurement of television use. Even within the context of this chapter, though, we can briefly engage in some less elegant assessment of this idea by controlling for the total television prevalence of the campaign during the time prior to an individual's period of interview. Essentially, to do this we can assign each individual case an estimate of the relevant campaign prevalence for the time period prior to their interview, as discussed below.

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Analysis for hypothesis A2

Hypothesis A2 squarely confronts us with the task of conceptualizing an appropriate unit of analysis. From a theoretical standpoint, hypothesis A2 suggests macro-level analysis (relative to the individual-level focus of hypothesis A1). Accordingly, a measure of the average exposure achieved by a particular campaign advertisement across a population (ADEXPOSE) should correlate with the sheer environmental prevalence of that advertisement (GRPS). Analysis of these macro-level measures will offer the most efficient and appropriate indicators for this chapter. Ultimately, we also will move to multilevel analysis in chapter 7 that allows us to test this hypothesis in a manner that respects the mixed-level nature of this research problem.

In the meantime, however, this chapter first offers an opportunity to present separate individual-level versions of this analysis as a way of illuminating and providing context for final results. Before moving to aggregate measures of encoded exposure, we will present several analyses relevant to both hypothesis A1 and hypothesis A2 in which individual-level EXPOSURE is predicted by GRPS assigned to each individual case. Beyond helping to clarify some of the initial hypothesis A1 results presented by offering a basic control for environmental prevalence, such individual-level analyses will provide initial assessment of the actual referent of the NSPY encoded exposure measure. The wording of the NSPY recognition question, with its direction to think about “recent months,” suggests that only recent GRPs for the advertisements in question should have any influence on a respondents’ report. We can test this assumption. Given that the timing of obtained GRPs was available on a weekly basis and the exact advertisements queried about in any given week of NSPY interviews are both known quantities, we can explore the impact of various individual-level scenarios.

In order to test whether respondents actually referred to some sense of “recent months” in their answers, four sets of GRP totals (from network, cable, local station, in-school and arcade television reports) were calculated for each week of NSPY interviews. First, a total was
computed for the four-week period prior to each week of NSPY interviews using all
advertisements that received responses during that week. Next, I computed a similar set of
moving eight- and twelve-week totals. Lastly, I constructed an option in which all GRPs for
relevant advertisements (beginning in August 1999 through the week prior to NSPY week of
interview) were included in the totals. If respondents called upon only recent experience in
responding, the first GRP time frame should bear a stronger relationship to exposure than the
last. I also tested a rudimentary decay function in which all GRPs are relevant but more recent
GRPs maintain full strength and more distant ones decay in their influence as time passes. In
this instance, relevant GRPs during the most recent month counted fully in the total and then
decayed by 25 percent a month as they receded in time from the point of interview.

Analyses with individually-assigned GRPs in this chapter then are followed by
theoretically more appropriate macro-level assessment for hypothesis A2 in which I look at the
correlation between GRPS and ADEXPOSE. Because of the conventional approach to the
macro-level analysis used in this chapter (as opposed to the multilevel modeling in chapter 7), it
also is worth noting one additional consideration here, however. The 23 available youth general
market campaign advertisements essentially are a census from the ONDCP campaign during the
time period in question. At the same time, we also can consider these advertisements at least to
be a reasonable convenience sample of youth anti-drug campaign advertisements from the
campaign overall (and perhaps of contemporary government-funded anti-drug advertisements in
general). The range and average levels of gross ratings points obtained for these advertisements
is not likely to differ dramatically from that obtained by the campaign during other periods. As
a result, for the present chapter we can note not only relationship coefficients for hypothesis A2
macro-level evidence but also the significance levels of statistics reported as an initial guide to
the plausibility of these results for those willing to consider this selection of advertisements as a
sample from the larger ONDCP campaign. When adopting that perspective for the moment, of
course, we should acknowledge the dual concerns of small sample size and somewhat limited
generalizability.

Results

One might notice the commingling of hypothesis A1 and hypothesis A2 variables
throughout our analysis plans for each separate hypothesis. The best available measure for
prevalence, i.e., GRPs, will be involved in analysis for hypothesis A1, for example. Because of
this intertwining, evidence for each hypothesis will be presented in several alternating stages
rather than exhaustively first for hypothesis A1 and then for hypothesis A2. Bivariate,
individual-level analysis for each hypothesis will be followed by multivariate analysis for
hypothesis A1 and then a macro-level analysis for hypothesis A2.

Univariate description for hypothesis A1

Exposure to campaign television advertisements intended for U.S. adolescents
(EXPOSURE) both was adequately ample for investigation among that group and also
demonstrated substantial variation. Mean encoded exposure across all television advertisements
shown to respondents suggests typical past engagement with about 7.8 advertisements in recent
months, or a rate of approximately one per week (.91), SD = 1.0, if one assumes “recent months”
to be equivalent to 60 days. Approximately 17 percent of adolescents reported no encoded
exposure, while about 3 percent reported recognizing past engagement with four or more
campaign television advertisements per week. Consequently, distribution for reported encoded
exposure did demonstrate slight positive skew (with a skewness statistic of 1.79, SD < .01).

Individual-level television use variables (TVUSE, TVPROGS, CABLE, and ONE)
unsurprisingly confirmed widespread engagement with the medium. The average U.S.
adolescent during the time period in question watched 19.46 hours of television per week, SD =
12.59. Only about 1 percent of adolescents report watching no television at all in an average
Many adolescents also reportedly watch at least some of the programming in which the campaign attempted to place its advertisements. On average, adolescents had watched just over 4 of the 15 shows listed for each respondent, $SD = 3.08$. Beyond network fare, U.S. adolescents also watched cable television channels targeted by the campaign. Across the four types of cable channels (music, sports, programming focused on African Americans, and Spanish-language programming), the average respondent reported 19.64 channel-days of watching out of a possible 120 (or 4 times 30) in the past month, $SD = 16.95$. Lastly, it appears that the Channel One service has infiltrated a large percentage of schools: only about 37 percent of adolescents distinctly report that their school does not offer Channel One programming.

**Univariate description for hypothesis A2**

Initial investigation of exposure at an individual level will draw upon the EXPOSURE variable whose distribution is outlined above. At a macro-level, relative to individual responses, we also can assess the distribution of average exposure for advertisements (ADEXPOSE) as well as the general pattern of gross ratings points obtained by the campaign for youth television advertisements during late 1999 and throughout 2000. For the 23 advertisements analyzed, ADEXPOSE ranged from less than one time in recent months to more than 9 times in that time period, with a mean of 3.76, $SD = 2.63$. This macro-level distribution of exposure across advertisements did not demonstrate significant skewness or kurtosis. For the entire time period in question, weekly GRPs (total GRPs obtained across various television outlets divided by the number of weeks on air) ranged from 3.65 to 77.97 with a mean of 28.80, $SD = 21.12$.

It is also worth noting the distribution of campaign television GRPs across time, as figure 2.1 illustrates. Within that figure, a variety of different GRP trends over time are depicted across the weeks relevant to NSPY. These trends correspond to various accumulations of campaign television GRPs suggested earlier as possible influences on individual exposure during a given week. Because our measure of exposure comes directly from the NSPY study, the
presentation of GRPs in figure 2.1 depicts the campaign as tracked by the NSPY questionnaire. In other words, the groupings of advertisement GRPs summarized for a given week correspond to the grouping of advertisements presented to NSPY respondents that week. For example, suppose that during a particular week, NSPY showed respondents the “Mary J. Blige”, “Michael Johnson”, and “Hockey” advertisements from the ONDCP campaign. For that week, the three trends depicted in figure 2.1 would be the total number of GRPs garnered by those three advertisements in the previous four, twelve, or all past weeks, respectively.

Figure 2.1
Gross rating points over time for campaign TV ads included in NSPY

These trend lines suggest proximal uniformity but relatively more variance at a more general level. In other words, when a particular broadcast of an advertisement is assumed to be
relevant only for a month or three months, then the recent environmental prevalence or context in which youth offered NSPY responses was relatively stable (though the specific advertisements obviously varied from time period to time period), though there is a slight dip in relevant past GRPs during the middle months of 2000 in each of these trends. When the experience of any one advertisement broadcast is expected to linger and operate on exposure reports indefinitely, however, the picture is somewhat different. From this perspective, early 2000 and late summer 2000 both experienced peaks in influential GRPs, due in part to NSPY’s periodic re-introduction of advertisements with relatively large accumulations of past GRPs from early 1999 up until that time. (If an advertisement was presented on national or local television in November and then again the following August, for example, it could appear in NSPY during two distinct time periods). These differences between a perspective that focuses only on proximal environmental prevalence and one that also encompasses more distal past prevalence should afford an interesting comparison. With these basic patterns in mind, we now can turn our attention to assessing hypotheses A1 and A2.

**Bivariate evidence for hypothesis A1**

If individual media habits explain exposure to the ONDCP campaign, as hypothesized, each of our four dimensions of television use should bear a positive relationship to EXPOSURE. An assessment of zero-order correlations provides some initially encouraging evidence in this regard. TVUSE, TVPROGS, CABLE, and ONE each demonstrate a significant positive relationship with EXPOSURE, $p < .01$ in each case. Table 2.1 offers an overview of the correlations amongst television use variables, EXPOSURE, and several demographic variables that could lead to spurious inference, each of which we will discuss in a moment.

It is reasonable to ask how well a correlation, with its assumptions of linearity, captures the actual relationship between EXPOSURE and television use indicators, particularly given that none of the relationships highlighted in table 2.1 is particularly strong. Further analyses,
however, suggested that correlation statistics are appropriate to depict these relationships. For the EXPOSURE and TVUSE relationship, $\eta^2 = .04$ and $R^2 = .03$. For EXPOSURE and TVPROGS, $\eta^2 = .06$ and $R^2 = .05$. For the EXPOSURE and CABLE relationship, $\eta^2 = .04$ and $R^2 = .02$. Lastly, for EXPOSURE and ONE, $\eta^2$ and $R^2$ were equal at .004. Because $\eta^2$ does not assume linearity whereas $R^2$ depends on that assumption, the relative similarity of $\eta^2$ and $R^2$ across the four relationships suggests that a linearity assumption is adequate in each case.

Table 2.1

Zero-order correlation between variables for hypothesis A1

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
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<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. EXPOSURE (avg. n = 5,145)</td>
<td></td>
<td>.17**</td>
<td>.21**</td>
<td>.16**</td>
<td>.06**</td>
<td>.02</td>
<td>.01</td>
<td>.11**</td>
<td>.03*</td>
<td>-.10**</td>
<td>-.01</td>
</tr>
<tr>
<td>2. TVUSE (avg. n = 5,187)</td>
<td></td>
<td></td>
<td>.29**</td>
<td>.25**</td>
<td>.01</td>
<td>-.04*</td>
<td>-.06**</td>
<td>.18**</td>
<td>.05*</td>
<td>-.17**</td>
<td>-.02</td>
</tr>
<tr>
<td>3. TVPROGS (avg. n = 3,575)</td>
<td></td>
<td></td>
<td></td>
<td>.24**</td>
<td>.03</td>
<td>-.11**</td>
<td>.15**</td>
<td>.37**</td>
<td>.03</td>
<td>-.32**</td>
<td>.03</td>
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<tr>
<td>4. CABLE (avg. n = 3,643)</td>
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<td></td>
<td></td>
<td></td>
<td>.03</td>
<td>.10**</td>
<td>-.17**</td>
<td>.20**</td>
<td>.08**</td>
<td>-.21**</td>
<td>.00</td>
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<td>5. ONE (avg. n = 4,732)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td>.07**</td>
<td>.03</td>
<td>.06**</td>
<td>.01</td>
<td>-.03</td>
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<tr>
<td>6. AGE (avg. n = 5,191)</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td>.01</td>
<td>-.02*</td>
<td>-.02**</td>
<td>.02</td>
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<tr>
<td>7. SEX (avg. n = 5,191)</td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>9. Hispanic</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>10. White</td>
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<tr>
<td>11. Other</td>
<td></td>
<td></td>
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</table>

Note. ONE is coded such that 0 equals not having Channel One in one’s school and 1 equals otherwise. SEX is coded such that 1 equals male and 2 equals female. The race and ethnicity categories listed represented dichotomous indicators of primary identification, with 1 equal to category listed and 0 representing otherwise. (Accordingly, table does not list correlation between race or ethnicity indicators.) Average n for variable refers to the average sample size across all 10 correlations involving that variable. * p < .05. ** $p < .01$.

A look at the bivariate relationships among other variables suggests few, if any, rival explanations for the predictive power of television use measures. Only one of the race indicators, namely being African-American, demonstrates the necessary relationships with any of the television use indicators and EXPOSURE so as to suggest possible spuriousness. Even in
that instance, however, we have begun to rule out the likelihood that such a set of relationships is the result of false reporting among African-American youth, given the lack of difference between racial groups in their tendency to report recognizing a bogus advertisement. As a result, it is more likely that campaign targeting efforts and television watching patterns in general are the mechanisms through which African-American youth witnessed relatively greater encoded exposure to televised advertisements than are other considerations about race or ethnicity. Nonetheless, we will investigate race as a unique predictor, as well as the ability of each television use indicator to predict EXPOSURE variance over and above other such variables, in a more extensive multivariate model presented in a later section.

Before doing so, however, let us first turn our attention to bivariate evidence in support of hypothesis A2. We first will discuss individual-level analyses in this vein and later will approach macro-level investigation. The initial individual-level hypothesis A2 analysis will introduce an important control for hypothesis A1, namely GRPs. Later macro-level hypothesis A2 analysis will provide a firmer footing for hypothesis testing.

**Individual-level evidence for hypothesis A2**

As we noted earlier, there are different ways that one might approach the question of environmental prevalence and its impact on exposure. At an individual-level, one could assess the impact of campaign advertisement prevalence measures (GRPS) on a person’s encoded exposure score across valid advertisements shown to that person (EXPOSURE). Table 2.2 summarizes the relationships demonstrated by various indicators of that recent media environment when assigned to individual NSPY cases. The first four columns outline an array of different retrospective time frames used for summing past relevant GRPs. The last column demonstrates relationships that result when a decay function is used in which GRPS decay at a rate of 25 percent per month, such that 100 GRPs during the most recent month is permitted to

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effectively act as 100 GRPs for one month, 75 GRPs for the following month, 56 GRPs the month after that, and so on.

Table 2.2
Zero-order correlation between TV GRPs and EXPOSURE (hypothesis A2)

<table>
<thead>
<tr>
<th></th>
<th>Previous 4-week GRP total</th>
<th>Previous 8-week GRP total</th>
<th>Previous 12-week GRP total</th>
<th>GRP total for all previous weeks</th>
<th>Total with decay function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation with EXPOSURE (n = 5,619)</td>
<td>.07**</td>
<td>.003</td>
<td>-.003</td>
<td>.17**</td>
<td>.09**</td>
</tr>
<tr>
<td>Partial correlation with EXPOSURE, controlling for bogus recognition (n = 5,416)</td>
<td>.06**</td>
<td>-.004</td>
<td>-.01</td>
<td>.17**</td>
<td>.09**</td>
</tr>
</tbody>
</table>

Note. A respondent indicated their “bogus recognition” tendency by reporting recognition of the bogus campaign advertisement shown to them. * p < .05. ** p < .01.

The first four columns of the table highlight two major ideas. First, the measurement impact of bogus recognition appears to be minimal in affecting our ability to see relationships at this level between GRPs and EXPOSURE; the relevant correlations are virtually identical whether or not one controls for a respondent’s tendency to recognize bogus advertisements. Second, clearly the strongest relationship among this group is that between individual exposure and the total number of GRPS for relevant advertisements regardless of when those GRPs were obtained. That relationship is positive, which initially supports hypothesis A2.

This finding suggests that the environmental prevalence obtained for campaign advertisements continues to impact encoded exposure long beyond the initial weeks following the original airing. Even when asked to focus on “recent months,” respondents appear to draw upon memory resources that are relatively impervious to time and decay (at least in the short run, as this data spans little more than a calendar year). As one moves from an assumption of relatively time-sensitive measures of relevant gross ratings points to a scenario in which
environmental prevalence accumulates, in a sense, over time, one witnesses a relatively stronger relationship at this individual level.

The timing strategy of the ONDCP campaign also partially helps to explain why the long-range “all previous weeks” GRP estimate works much better than the eight- and twelve-week estimates (see Hornik et al., 2000, and Hornik et al., 2001, for discussion). Particular ONDCP advertisements tended to air for a short period and then often did not air again for a number of months (sometimes more than 12 weeks later). Figure 2.1 underscores this point, highlighting the different patterns of relevant GRP variance that arise when one looks at all previous weeks as opposed to the more arbitrary 4-, 8-, or 12-week time frames. In order for an advertisement’s GRPs to demonstrate an impact on NSPY encoded exposure measure for that advertisement six months from the time it airs, for example, we need to use the GRPs estimate from the “all previous weeks” column to detect such lingering impact and to accommodate the long-range airing cycles of the campaign.

Table 2.2 also begins to address whether GRPs fade in their importance, even if they do not completely disappear, as the four-, eight-, and twelve-week measures assume. The final column in table 2.2 suggests that an assumption of such slow decay, e.g., a decay of 25 percent a month following a month of full strength impact, is less useful than simply accumulating all past GRPs for advertisements asked about during a particular week. While not the most elegant decay function imaginable or a definitive test of GRP decay over longer time periods, this assessment offers rough indication that further exploration of encoded exposure diminishment as a function of time is not likely to yield striking improvement over and above the total in the fourth column for the (relatively short) time period in question.

Now that we see this positive (albeit not very strong) relationship between campaign advertisement GRPs and individual exposure to the campaigns TV advertisements, we can return to hypothesis A1 regarding the influence of individual TV use on exposure with an important control variable in hand. Marked differences in the prevalence of campaign advertisements at

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different points during NSPY’s late 1999 and 2000 interviewing could cloud evidence for the influence of television use indicators (or, in a less likely scenario, even could explain the apparent relationship of those television use measures to individual exposure if total GRPs positively relate to both TV use and exposure). With that in mind, we can turn next to a multivariate analysis of the ability of each television use indicator to account for variance in TV campaign exposure over and above other factors.

Multivariate model for hypothesis A1

Table 2.3 describes a hierarchical regression analysis to predict EXPOSURE. Hypothesis A1 continues to receive support, even after controlling for demographic factors, total relevant TV GRPs, and one’s tendency to report recognizing a bogus advertisement. Television use measures are significant and positive predictors of EXPOSURE throughout the three steps presented in table 2.3, $p < .01$.

Sheer frequency of television use (TVUSE) positively predicts EXPOSURE, $p < .01$. The frequency and possibility of engagement with non-broadcast television outlets also demonstrates a positive relationship: degree of recent engagement with relevant cable programming and attending a school that ostensibly has access to Channel One programming are both indicators of a youth’s tendency to report a higher amount of exposure to televised campaign advertisements, $p < .01$ for both. Lastly, it is useful to know how many of the television shows targeted by the campaign for advertisement placement (or at least how many of the list of relevant shows investigated by NSPY) that a youth respondent has watched before. Those youth who have watched a greater number of relevant shows also report greater EXPOSURE, even after controlling for amount of general television watching, $p < .01$.  

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Table 2.3
Hierarchical regression results for prediction of TV campaign ad exposure among 12- to 18-year-olds (hypothesis A1)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1 (n= 3,508)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TVUSE</td>
<td>.07**</td>
<td>.01</td>
<td>.10**</td>
<td></td>
</tr>
<tr>
<td>TVPROGS</td>
<td>.44**</td>
<td>.06</td>
<td>.16**</td>
<td></td>
</tr>
<tr>
<td>CABLE</td>
<td>.05**</td>
<td>.01</td>
<td>.09**</td>
<td></td>
</tr>
<tr>
<td>ONE</td>
<td>1.39**</td>
<td>.34</td>
<td>.08**</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>3.39**</td>
<td>.34</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 2 (n = 3,420)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TVUSE</td>
<td>.05**</td>
<td>.01</td>
<td>.08**</td>
<td></td>
</tr>
<tr>
<td>TVPROGS</td>
<td>.40**</td>
<td>.08</td>
<td>.15**</td>
<td></td>
</tr>
<tr>
<td>CABLE</td>
<td>.05**</td>
<td>.01</td>
<td>.11**</td>
<td></td>
</tr>
<tr>
<td>ONE</td>
<td>1.40**</td>
<td>.35</td>
<td>.08**</td>
<td></td>
</tr>
<tr>
<td>AGE</td>
<td>-.29**</td>
<td>.09</td>
<td>-.06**</td>
<td></td>
</tr>
<tr>
<td>SEX</td>
<td>.27</td>
<td>.38</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>-0.09</td>
<td>.63</td>
<td>-.004</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>.70</td>
<td>.57</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>-.73</td>
<td>.72</td>
<td>-.02</td>
<td></td>
</tr>
<tr>
<td>Total TV GRPs</td>
<td>.002**</td>
<td>0.0003</td>
<td>.17**</td>
<td></td>
</tr>
<tr>
<td>Bogus recognition</td>
<td>2.13**</td>
<td>.67</td>
<td>.07**</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>2.74</td>
<td>1.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Step 3 (n = 3,420)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TVUSE</td>
<td>.05**</td>
<td>.01</td>
<td>.08**</td>
<td></td>
</tr>
<tr>
<td>TVPROGS</td>
<td>.41**</td>
<td>.07</td>
<td>.15**</td>
<td></td>
</tr>
<tr>
<td>CABLE</td>
<td>.05**</td>
<td>.01</td>
<td>.11**</td>
<td></td>
</tr>
<tr>
<td>ONE</td>
<td>1.40**</td>
<td>.35</td>
<td>.08**</td>
<td></td>
</tr>
<tr>
<td>AGE</td>
<td>-.28**</td>
<td>.09</td>
<td>-.06**</td>
<td></td>
</tr>
<tr>
<td>SEX</td>
<td>.27</td>
<td>.38</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>-.03</td>
<td>.62</td>
<td>-.001</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>.74</td>
<td>.57</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>-.77</td>
<td>.70</td>
<td>-.02</td>
<td></td>
</tr>
<tr>
<td>Total TV GRPs</td>
<td>.002**</td>
<td>0.0003</td>
<td>.17**</td>
<td></td>
</tr>
<tr>
<td>Bogus recognition</td>
<td>2.11**</td>
<td>.67</td>
<td>.07**</td>
<td></td>
</tr>
<tr>
<td>TVUSE x TVPROGS</td>
<td>-.003</td>
<td>.01</td>
<td>-.02</td>
<td></td>
</tr>
<tr>
<td>TVUSE x CABLE</td>
<td>-.0004</td>
<td>.001</td>
<td>-.01</td>
<td></td>
</tr>
<tr>
<td>TVUSE x ONE</td>
<td>-.003</td>
<td>.03</td>
<td>-.002</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>2.69</td>
<td>1.50</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. $R^2 = .07$ for the model presented in step 1, $R^2 = .11$ for step 2, and $R^2 = .11$ for step 3. ONE was coded as 0 if respondent reported that Channel One was not available in their school and 1 otherwise. SEX was coded so that female = 2 and male = 1. AGE refers to the age of the respondent in years; only 12- to 18-year-old respondents contributed to these models. "Bogus recognition" is a dummy indicator, with 1 indicating the respondent reported recognition to the bogus ad presented and 0 = not having done so. The GRP variable employed here is the assigned total for past relevant TV GRPs for ads asked about during respondent's week of interview. The interaction terms reported are the product of variables after they have been centered.

* p < .05. ** p < .01.
Table 2.4 presents the same set of independent variables from the main effects model presented in table 2.3, only this time as potential predictors of any exposure at all to campaign television advertisements in recent months in a logistic regression. The dependent variable in this instance was a dichotomous version of EXPOSURE, split between those reporting any exposure to any presented campaign advertisement and those reporting none. The basic story in the logistic regression analysis is the same as suggested by the ordinary least squares regression results above. Television use measures positively predict likelihood of encoded exposure to the ONDCP campaign among U.S. adolescents.

Table 2.4

Logistic regression results for prediction of any TV campaign ad exposure among 12- to 18-year-olds (hypothesis A1)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>Odds ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>TVUSE</td>
<td>.02**</td>
<td>0.01</td>
<td>1.02**</td>
</tr>
<tr>
<td>TVPROGS</td>
<td>.19**</td>
<td>0.03</td>
<td>1.21**</td>
</tr>
<tr>
<td>CABLE</td>
<td>.02**</td>
<td>0.01</td>
<td>1.02**</td>
</tr>
<tr>
<td>ONE</td>
<td>.37**</td>
<td>0.13</td>
<td>1.45**</td>
</tr>
<tr>
<td>AGE</td>
<td>-.06</td>
<td>0.03</td>
<td>.94</td>
</tr>
<tr>
<td>SEX</td>
<td>.14</td>
<td>0.13</td>
<td>1.15</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>-.10</td>
<td>0.19</td>
<td>.90</td>
</tr>
<tr>
<td>Hispanic</td>
<td>.53</td>
<td>0.29</td>
<td>1.70</td>
</tr>
<tr>
<td>Other</td>
<td>-.39</td>
<td>0.29</td>
<td>.67</td>
</tr>
<tr>
<td>Total TV GRPs</td>
<td>.0003**</td>
<td>0.0001</td>
<td>1.0003**</td>
</tr>
<tr>
<td>Bogus recognition</td>
<td>.53</td>
<td>0.35</td>
<td>1.69</td>
</tr>
<tr>
<td>Constant</td>
<td>.33</td>
<td>0.45</td>
<td></td>
</tr>
</tbody>
</table>

Note. Cox and Snell $R^2 = .08$ for the model. For this analysis, $n = 3,455$. Variable coding notes relevant to this table parallel the notes reported for table 2.3.

Various aspects of one's television use bear a significant relationship to their likelihood of any encoded exposure. Consideration of these odds ratio results only further confirms the positive impact of television use and access on encoded exposure to the ONDCP campaign. The impact of attending a Channel One school, for example, is quite clear here: as students who
report that their school does not receive Channel One programming are approximately 45 percent less likely to have been exposed to any campaign television advertisement.

Macro-level evidence for hypothesis A2

Despite the intriguing bivariate results presented earlier at the individual level for hypothesis A2, at best we are left with evidence of a relatively weak relationship between environmental prevalence and exposure; the strongest correlation between EXPOSURE and any combination of past GRPs for the advertisements shown was .17. What happens when we move to a theoretically more appropriate level and unit of analysis? Measurement noise associated with the mix of individual-level and advertisement-level measurement, after all, might cloud our ability to see relationships. A gross rating point describes an aspect of a population’s public information environment; assuming that any one individual represents a perfect microcosm of that population quite likely ignores a fair amount of uncertainty at that level. At the macro level, however, those campaign advertisements for which campaign staff obtained greater prevalence should tend to have substantially higher average exposure levels across all U.S. youth relative to those advertisements enjoying less availability.

Empirical investigation of this idea provides strong support for hypothesis A2 and reveals an even stronger relationship than that suggested by available individual-level evidence. For the 23 television advertisements from the campaign that were intended for general market youth audiences, the average exposure for an advertisement (ADEXPOSE) correlated strongly with the GRP density (ADGRPS) for that advertisement (obtained by dividing the total number of GRPs reported for an advertisement from September 1999 through December 2000 by the number weeks in which the advertisement was on the air at all). Figure 2.2 illustrates this striking relationship, which is characterized by a correlation coefficient of .82. If we assume this group of available advertisements to be representative of all campaign advertisements, such a relationship would be significant, p < .01.
Figure 2.2
Television advertisement GRP density and ADEXPOSE (hypothesis A2)

![Graph showing the relationship between weekly encoded exposure for ad and GRPs per week.]

Clearly, then, a demonstrable relationship exists between environmental prevalence and exposure from this macro-level perspective. A correlation of .82 suggests that as the prevalence of a campaign advertisement rises, the population-level exposure garnered by that advertisement also can be expected to increase. Are the linear assumptions of a correlation coefficient the best way to capture this relationship? The visual evidence presented in figure 2.2 is a reasonable indication that such linear statistics are appropriate in this instance, but it is worth further investigation.

Table 2.5 presents the results of three different curve estimations for the available 23 advertisements. In addition to the linear model described above, quadratic and logistic options were explored to investigate the possibility of curve inflections. As the table suggests, a linear model does appear to be as reasonable, if not moreso, than other considered options.
Table 2.5

Comparison of functions to describe environmental prevalence and average exposure for advertisement relationship (hypothesis A2)

<table>
<thead>
<tr>
<th></th>
<th>E</th>
<th>Degrees of freedom</th>
<th>Adjusted R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linear</td>
<td>43.49</td>
<td>1, 21</td>
<td>.66</td>
</tr>
<tr>
<td>Quadratic</td>
<td>21.91</td>
<td>2, 20</td>
<td>.66</td>
</tr>
<tr>
<td>Logistic</td>
<td>38.61</td>
<td>1, 21</td>
<td>.63</td>
</tr>
</tbody>
</table>

*Note.* The linear equation estimated assumed average exposure for a TV campaign advertisement to be the result of a constant plus \( \beta_1 \) (GRPs). The quadratic equation assumed average exposure to be the result of a constant plus \( \beta_1 \) (GRPs) plus \( \beta_2 \) (GRPs)². The logistic equation assumed an upper bound on average exposure of 1.2 (which is slightly greater than the highest observed data point) and then modeled such exposure as the result of the following: \( \frac{1}{1/(1/1.2)+\beta_0(\beta_1(\text{GRPs}))} \).

It appears, then, that sheer environmental prevalence accounts for a substantial portion of the average exposure garnered by a campaign advertisement in this case. Approximately two-thirds of the variance in ADEXPOSE, in fact, appears to be the product of total GRP density at this stage in our discussion. We must now progress to later investigation of other macro-level variables in future chapters with a striking .82 correlation already in hand.

Discussion

Both hypotheses relevant to this chapter find support in the array of evidence presented above. Four indicators of youth television use each demonstrate independent and positive relationships with EXPOSURE, even after controlling for demographic factors, false recognition tendency, and the best fitting individual-level assignment of GRPs from the previous analyses. A measure of the environmental prevalence of media content, namely the total GRP density for a given campaign advertisement during the time period in question, also demonstrates a positive relationship with the average exposure garnered by that content, ADEXPOSE.
Clearly, hypotheses A1 and A2 were supported. Knowing something about television use among youth in the U.S. is helpful in accounting for variance in their exposure to the anti-drug campaign’s television advertising efforts. Those who report more hours of television watching tend also to report more exposure to campaign television advertisements. Not having access to certain types of television outlets employed by the campaign also appears to be a protective factor of sorts: youth who report that their school does not currently use the Channel One service are 45 percent less likely to report any exposure to television advertisements sponsored by ONDCP. At the same time, the sheer amount of times that those advertisements appeared on television sets is quite indicative of the level of exposure we can expect such advertisements to have had.

A sense of general support for each hypothesis, however, also does not tell the entire story suggested by the aforementioned evidence for this chapter. The television use indicators, for example, together only account for about seven percent of the variance in EXPOSURE. In part, this positive, yet somewhat weak pattern may be indicative of the extremely high level of television use among most contemporary youth in the U.S.; the vast majority of youth report a substantial amount of television watching every week and so we may largely be seeing the impact of television watching over and above an assumption of at least some television watching.

Another more subtle aspect of the aforementioned evidence is the different degrees of predictive success achieved by our various indicators of environmental prevalence. First, we attempted to explain EXPOSURE by assigning different configurations of GRPs relevant to the advertisements shown in NSPY during the respondent’s week of interview. Among those assessed, the option achieving the strongest relationship between GRPs and EXPOSURE actually was that in which all GRPs from fall 1999 up until the week of interview were allowed to continue to influence EXPOSURE.
This option represents a sharp contrast to options that might have initially seemed more appropriate, namely summarizations of GRPs from the past four, eight, or 12 weeks only. Reasons for expecting the shorter time frames to be more appropriate are two-fold. First, as noted earlier, the NSPY question instructed respondents to think about “recent months”. Second, one might expect a memory decay that would render advertisement presentations from more than a few months ago relatively powerless with regards to current understanding of exposure. Such reasonable speculation appears to be misguided.

In terms of the apparent strength of relationships, macro-level analysis in this chapter presented a contrast to the individual-level work: the relationship between total GRP density for an advertisement and the average exposure achieved by that advertisement across NSPY youth respondents appears to be not only linear and positive, but quite striking in its strength, \( r = .82 \). Certainly, some of this difference in relationship strength can be attributed to the tendency of aggregation to dampen individual-level measurement noise. Also, as we will see in the chapter 7, the variance for which such macro-level variables account is essentially between-group variance rather than within-group variance. Nonetheless, this is a noteworthy result.

At the same time, it is also worth noting that the macro-level analysis presented here, like the strongest individual-level GRP indicator, allows GRPs to continue to act on encoded exposure for more than a few weeks. The total GRP density for an advertisement is this analysis draws upon GRPs from the entire time period covered by NSPY. Obviously, the entire time period for the two waves of NSPY relevant to our discussion, little more than one calendar year, is not particularly long relative to other perspectives. Nevertheless, these various pieces of evidence suggest that the environmental prevalence of an advertisement not only matters at the time of actual presentation or broadcast, but also for some time afterward. Encoded exposure, understood here as a minimal memory trace, may draw upon an expanse of the recent past as long as a year. Whether or not that content remains particularly salient in the minds of those exposed, of course, is an open question not directly addressed by this study. Nonetheless, it now
seems reasonable to suggest that what appears in the public information environment today will generate encoded exposure among a population that will linger much longer than one might expect when considering the apparently ephemeral nature of contemporary mass media presentations.

Conclusions

Hypothesis A1 and hypothesis A2 both receive support from the analyses presented in this chapter. Individual television use among youth bears a positive relationship to campaign exposure. The environmental prevalence of campaign advertisements also is predictive of exposure, particularly when assessed at the level of an advertisement. This support was not without complexities. The relationship between environmental prevalence and encoded exposure, for example, became more apparent as the analysis shed particular time constraints and moved toward aggregation with an advertisement as the unit of analysis. Nonetheless, it appears that the first two hypothesized predictors of media content exposure, individual media use and content prevalence in the public information environment, are in fact useful in this case of television campaign exposure among American youth.
Chapter Notes

1 The youth and their parents were found by door-to-door screening of a scientifically selected sample of about 34,700 dwelling units for Wave 1 and a sample of 23,000 dwelling units for Wave 2. These dwelling units were spread across about 1,300 neighborhoods in Wave 1 and 800 neighborhoods in Wave 2 in 90 primary sampling units. The sample provided an efficient and nearly unbiased cross-section of America's youth and their parents. Youth living in institutions, group homes, and dormitories were excluded. Parents were defined to include natural parents, adoptive parents, and foster parents who lived in the same household as the sample youth. Stepparents were also usually treated the same as parents unless they had lived with the child for less than 6 months. When there were no parents present, an adult caregiver was usually identified and interviewed in the same manner as actual parents. Among selected youth, the response rate was approximately 91 percent in Wave 1 and 92 percent in Wave 2, meaning that 91 or 92 percent of the youth received parental consent, signed to their own assent, and completed an extended interview. Among sample parents, 88 percent completed the extended interview in Waves 1 and 2.

2 If the number of eligible advertisements for an interview exceeded the maximum number of slots, a sample of the advertisements was shown and remaining eligible advertisements were assigned an imputed response using either so-called hotdeck methods or other procedures developed by Westat. Also, African-American and bilingual Spanish/English speakers were shown additional campaign advertisements specifically intended for those audiences. Results reported here focus on general population advertisements.

3 For both weekday and weekend watching, the “none” category was assigned “0”. For weekday watching, “half-hour or less” was assigned “.5” and, for weekend watching, “less than one hour” also was assigned “.5”. For weekday watching, the “about 1 hour” through “about 6 hours” categories were assigned “1” through “6”, respectively. The “7 hours or more” category was assigned “8” for weekday watching. For weekend watching, the “1 to 2 hours” through “9 to 10 hours” categories were assigned “1.5”, “3.5”, “5.5”, “7.5”, and “9.5”, respectively, and the “11 hours or more” category was assigned “12”.

4 The original NSPY questions asked how often the respondent had watched each of the following in the past 30 days: “a music television station, such as MTV, VH1, or TNN (The Nashville Network)”, “an all-sports channel, such as ESPN”, or “a channel focused on African Americans or Blacks such as BET.” Spanish-language interviews also asked how often one had watched “a channel especially for Latinos or Hispanics such as Telemundo, Univision, or Galavision” in the past 30 days. Original response categories included “never”, “1 to 4 days”, “5 to 14 days” and “15 to 30 days” and were assigned the interval levels of “0”, “2.5”, “9.5”, and “22.5”, respectively.

5 All analyses also were conducted using the version 10.0 of the SPSS package, which does not accommodate replicate weights, for comparison purposes. The same substantive story emerged in both WesVar and SPSS results.

6 If most of the individuals who watch little television are those answering in the summer, for example, their (expected) low exposure could be largely the result of lessened efforts by the campaign during the same period rather than solely the product of their own media habits.

7 WesVar does not compute $\eta^2$, and so SPSS was employed for these comparisons of $\eta^2$ and $R^2$. SPSS, as noted earlier, does not accommodate replicate weights.
Chapter Three

The role of individual interest

In the previous chapter, we reviewed evidence suggesting that both the environmental prevalence of specific content and a person’s use of a particular medium predict whether a person will have encoded exposure to content presented through that medium. Beyond such straightforward ideas, however, it also is reasonable to hypothesize that a person’s interests and past experience should bear a relationship with encoded exposure. After all, constructs related to interest or perceived relevance or past experience appear in a wide range of communication research literature and so it is appropriate that we investigate the relevance of such variables for the present study.

With that in mind, this chapter has at least two purposes. First, we can justify theoretical mechanisms through which interest variables conceivably could affect exposure encoding. That discussion will offer an opportunity to clarify, once again, important distinctions between encoded exposure and other constructs such as media use or evaluation of messages following exposure. Following that discussion, we will assess whether specific hypotheses derived from our theoretical exploration find support in the present data.

How could individual interest affect encoded exposure?

Past thinking about persuasion (Chaiken, Liberman, & Eagly, 1989; Eagly & Chaiken, 1993; Petty & Cacioppo, 1986a; Petty & Cacioppo, 1986b; Petty & Priester, 1994), selective exposure (see Zillmann & Bryant, 1985, for an introduction), and defensive message avoidance (e.g., Blumberg, 2000) has entertained the possible influence of a person’s interest in a message topic in various ways. In various contexts, for example, scholars have noted that interest and motivation variables bear a relationship to an individual’s media use behavior and exposure opportunities, as a person can and does sometimes pick and choose the specific media content to
which they are exposed (Donohew, Lorch, & Palmgreen, 1998; Donohew, Palmgreen, & Duncan, 1980; Hawkins et al., 2001).

In order to sort through the array of research in this arena to propose a coherent story as to how interest or perceived relevance specifically could affect encoded exposure, however, it will be useful to step back and recall the earlier suggestion that exposure is a process with various precursors, stages, and at least one outcome possibility (namely encoded exposure). Upon doing so, one can argue that past research in each of the above traditions has dealt with different parts of this sequence, either explicitly or implicitly, and that not all of the dynamics and relationships noted should have a direct bearing on encoded exposure. What one must decide in proposing hypotheses about the relationship of prior interest in a message topic to encoded exposure of a message about that topic, then, is where in this sequence interest plausibly can have a direct role. This move also will help to clarify some of the ambiguity that hampers these literatures.

A useful organizing device, at least as a starting place, is Greenwald and Leavitt’s (1984) delineation of four levels of information processing, which, in the abstract, offers four conceivable opportunities for interest variables to play a role. Specifically, those levels include what they call pre-attention, focal attention, comprehension, and elaboration and assessment. In essence, each level offers an opportunity for a person to engage a presented message in a particular manner. A person also might employ mechanisms to avoid a message at each level, as Blumberg (2000) notes. In fact, Blumberg proposes four mechanisms of avoidance, what he calls attention avoidance, blunting, suppression, and counter-argumentation, that correspond to each of Greenwald and Leavitt’s processing levels.

What is important for our investigation are differences in the likelihood of mechanisms at any one level to affect exposure encoding, differences that suggest only one part of the processing hierarchy is likely to offer a direct, non-mediated role for interest variables in shaping encoded exposure. To see this idea clearly, it will be useful to consider each level briefly and
assess whether interest could affect encoded exposure at that level. We can start by eliminating those levels of processing that seem least relevant to encoded exposure of ONDCP campaign advertisements, namely the first and the fourth.

The first level proposed by Greenwald and Leavitt, as noted earlier, is pre-attention. A message presentation residing at this level has yet to be granted any substantial attention by a person. In terms of possible avoidance, the first level in Blumberg’s corresponding model includes efforts to avoid paying attention to such stimuli. Many plausible mechanisms in this vein include active selection or avoidance of particular channels or media. A person might attempt to avoid paying any attention to particular television content, for example, by choosing not to watch a particular program because of the deemed offensiveness of anticipated content.¹

While conceptually important to delineate, however, this level is not likely to yield a direct role for interest on encoded exposure, particularly in the case of the ONDCP campaign. There are at least two reasons for this expectation. First, an effect of interest at this stage necessarily would be mediated by media use. Second, and perhaps theoretically more important, the nature of the ONDCP campaign advertisements as generally unanticipated content (from the perspective of most individual audience members) rules out many avoidance possibilities of this first-level type.

Media use itself is best understood as an array of sequential and related constructs rather than as a single construct, as Hawkins and colleagues (2001) have pointed out. We can understand any specific opportunity for engagement of television content as the result of a string of behaviors, including turning on the television and watching a particular type of program. While each of those behaviors plausibly is subject to influence from an individual’s prior interest in anticipated content, however, much of the activity leading up to this point of opportunity for actual content engagement is not crucial to our ability to predict encoded exposure. That activity and its precursors are largely summarized by the television use variables outlined in an earlier
chapter. We theoretically should be able to use such variables as summarizing indicators of
television use for prediction of specific encoded exposure.²

Even aside from this mediating role of media use, it also is not likely that interest
directly encourages first-level engagement or avoidance in the specific case of a health
communication campaign because a person has to be aware of what specific content will be
presented in a particular medium in order to engage or avoid it effectively. Anti-drug
advertisements and other similar media campaign content are not catalogued in readily available
viewing guides. In other words, a person quite likely could stumble accidentally upon ONDCP
advertisements despite intentions for avoidance or could fail to see such an advertisement
despite their desire to do so, thereby undermining the relevance of first-level selection for our
purposes in this chapter.

Similarly, the fourth level of avoidance or selection possibilities suggested by the
combination of Greenwald and Leavitt's work and Blumberg's observations, namely elaboration
or counter-argumentation, also should not yield a credible source of influence on encoded
exposure. This assertion does not mean that the possibility for counter-argumentation or even
biased evaluation of relevant messages is not noteworthy. In fact, insofar as the anti-drug
advertisements offer relevant, threatening messages to individuals, evidence suggests that the
advertisements actually are likely to be met with disparagement and relatively negative
evaluations (Kunda, 1987; Liberman & Chaiken, 1992; Southwell, 2001).

Counter-argumentation, negative evaluation, or defensive message disparagement,
however, occur only after a message presentation has been processed minimally in some
manner. This idea suggests that once elaboration or counter-argumentation occurs, a minimal
memory trace (and, thus, encoded exposure) already should have been generated. Despite initial
appearances, then, arguments about the impact of interest or relevance on message evaluation
need not be theoretically discordant with arguments about how such variables might specifically
affect exposure encoding. As a result, our primary focus need not be at this fourth level.
This reasoning leaves us at the levels of so-called focal attention and comprehension, which are roughly analogous to the processes outlined earlier in our introduction of the encoded exposure construct. Perhaps the most useful aspect of Blumberg’s perspective, in fact, lies in his distinction between either first-level avoidance of media content altogether or fourth-level counter-argument and such mid-level processing mechanisms related to engagement of content. As far as encoded exposure is concerned, interest variables likely play a direct role here at this point of engagement.

It is reasonable to expect variation in processing patterns between different individuals in their engagement with the same stimulus. As Lang (2000) has argued, people encounter and process mediated information using a limited set of cognitive resources, and, thus, cannot infinitely attend to, or store, all available information. Dimensions of a person’s cognitive resources and representations, in turn, should dictate, motivate, or facilitate his or her engagement of some information (and not other information) and should affect encoded exposure.

The important question, then, is how interest variables indicating differences across individuals could affect processing at this level. Two prominent and complementary social psychological models of persuasion, namely the Elaboration Likelihood Model (Petty & Cacioppo, 1986a; Petty & Cacioppo, 1986b; Petty & Priester, 1994) and the Heuristic-Systematic Model (Chaiken et al., 1989; Eagly & Chaiken, 1993), offer some relevant insight in this regard. These theories are particularly noteworthy given the ostensibly persuasive intent of the ONDCP campaign. Both theories suggest that, when encountering a message, individuals vary in the degree to which they use effortful cognitive activity to process it.

According to the Elaboration Likelihood Model (ELM), people employ central processing, and demonstrate increased cognitive elaboration, in situations in which they are motivated and able to do so, and employ peripheral processing, and decreased elaboration, in situations of relatively less motivation or ability (Petty & Priester, 1994). Stored information
resulting from central elaboration, in turn, appears to be more accessible and enduring than that associated with peripheral processes (Petty & Cacioppo, 1986a). Similarly, the Heuristic-Systematic Model (HSM) asserts that people use a central processing route, i.e., a "systematic" route, when they are motivated and able to do so and, when neither motivation or ability is high, people use heuristic processing, which is somewhat akin to the ELM's peripheral route.

Though minor differences can be enumerated, the two models converge to suggest variables that should lead to encoded exposure (by virtue of affecting depth of processing and facilitating storage in memory). Both the HSM and the ELM suggest that personal relevance motivates effortful processing. Increased perception of the personal relevance of a message is associated with increased thinking about that message (Brickner, Harkins, & Ostrom, 1986; Leippe & Elkin, 1987; Petty, Cacioppo, & Haugtvedt, 1992). Increased elaboration, in turn, should be predictive of more enduring possibility for later retrieval or recognition of the various instances in which a message was encountered in one's media environment. Variables indicating personal relevance of particular media content, then, should positively affect an individual's encoded exposure to that content.4,5

It is worth noting an alternative proposition, however, particular in the case of threatening messages that are perceived to be relevant. In noting possible defensive message responses that could occur at the level of attention or comprehension, Blumberg (2000) asserts the possibilities of what has been called "blunting" of comprehension and avoidance of inference (p. 784). The notion of blunting in particular has received attention as a coping mechanism from a number of psychology scholars interested in understanding how people respond to threats (e.g., Miller, Fang, Diefenbach, & Bales, 2001; Myers & Derakshan, 2000). In drawing from that literature, Blumberg proposes that people can disengage threatening information by avoiding comprehension of a message or avoiding drawing inferences based on the message, essentially suggesting such mechanisms can occur immediately after attention has been focused on the presented message.
That expectation, however, appears to run somewhat counter to other perspectives, such as that outlined by Bransford and McCarrell (1974) in their early discussion of comprehension. For Bransford and McCarrell, the process of comprehension involves a person drawing upon both contextual cues and existing knowledge in order to make sense of what otherwise would be ink marks on a page or flickering light pixels on a television screen. In light of this idea, the possibility that a person could somehow engage a message sufficiently to comprehend that it should be avoided and then somehow completely avoid comprehension or activation of related thoughts is questionable. The type of processing necessary for a person simply to assess the nature or topic of a message requires a degree of cognitive engagement that likely guarantees at least basic encoding of exposure (at least for the initially engaged portion of the message on which such an assessment is made). If any avoidance is possible at this stage, what seems more likely are scenarios in which a person might attempt to distract herself from attending to further messages or attempt to counter-argue the present message in order to defend existing beliefs.

Limited evidence further undermines the possibility that people tend to avoid basic processing of relevant threatening messages altogether once they have encountered them. Liberman and Chaiken (1992), for example, found that study participants for whom an article regarding the deleterious health effects of caffeine was relevant, i.e., caffeine consumers, reported using roughly the same level of cognitive energy in reading the article as did low-relevance individuals. Such results undermine the notion that relevant counter-attitudinal messages simply are not attended when encountered, even though a person might strive to avoid encountering such messages in general or might counter-argue such an article upon encountering it.

Given the short-term nature of the Liberman and Chaiken study, what the article does not provide is whether high and low relevance participants differed in later memory of the article, though we might suspect that the central processing likely employed by the high relevance participants at the time of engagement would have facilitated their later recognition
ability. Further, it is worth noting that high and low relevance participants also did differ in their evaluation of the article in the Liberman and Chaiken article. This finding is consistent, nonetheless, with our earlier discussion about biased evaluation of relevant messages.

Up to this point, then, I have located a possible direct role for interest variables in affecting encoded exposure at the point of an individual's cognitive engagement with media content. In doing so, I also have suggested that oft-cited and theoretically important insights about possible relationships between interest or relevance variables and either media use or message evaluation are less relevant to this specific discussion, particularly after we have controlled for media use. I also have noted, but attempted to rule out, the possibility that interest could lead individuals to blunt, rather than encode, exposure to threatening messages that they encounter, suggesting that future channel avoidance or biased message evaluation are more likely scenarios.

With these distinctions and clarification in mind, we next can outline and justify a specific set of hypotheses regarding relationships between interest variables and encoded exposure. With regards to anti-drug advertisements, there are at least four indicators of interest in or experience with drugs that should predict encoded exposure resulting from engagement with ONDCP anti-drug advertisements.

Hypothesis B1: The more extensive one's past drug use, the greater encoded exposure to television content that individual will demonstrate, all else being equal.

Hypothesis B2: The more extensive one's history of past drug offers, the greater encoded exposure to television content that individual will demonstrate, all else being equal.

Hypothesis B3: The more peers of an individual who have used illicit drugs, the greater encoded exposure to television content that individual will demonstrate, all else being equal.
The case for positive relationships between these drug experience indicators and encoded exposure draws directly on the aforementioned role of relevance in information processing. At the heart of each of these hypotheses is the simple notion that the richness of a person's existing schematic frameworks with regards to drugs (or specifically marijuana in the case of the campaign) should indicate the likelihood that any one opportunity to engage anti-drug advertising will result in actual encoding.

Past drug use is one relatively uncontroversial reason that a person should perceive an anti-drug advertisement as being relevant, particularly use of the same drug depicted or mentioned. Having reportedly tried marijuana should sensitize an individual to advertisements mentioning marijuana, at least relative to those who have not tried it. Theoretically, however, past experience does not have to include only one's own drug use. Simply having been offered marijuana, for example, also should play somewhat of a role in sensitizing individuals to the personal relevance of anti-drug messages. Directly knowing others who have used drugs also could create a sense of the personal relevance of the topic of drugs. As a result, reports of one's own past use, reports of past offers, and reports of knowledge of others that have used should be appropriate indicators of message relevance.

Another variable related to the general notion of perceived relevance that should play a role in our investigation is attitude. Generally speaking, we can expect that the more extreme a person's attitude toward the topic of television content is (relative to an attitude scale midpoint), the greater the likelihood they will encode any exposure opportunity, regardless of their specific reaction to the presented message. That leads to a fourth specific hypothesis.

**Hypothesis B4:** The more extreme that one's attitude is toward drug use, the greater encoded exposure to television content that individual will demonstrate, all else being equal.
An attitude can be depicted as an association in memory connecting representations of an object and an individual's evaluation of that object (see Roskos-Ewoldsen, 1996, for a review). Further, Anderson (1983; 1990) has theorized that each of two strongly related cognitive object representations will be relatively more accessible if either is activated. It follows, then, that an individual with a relatively developed attitude toward an object should be more able to access that attitude when presented with the object in question than others would be. In turn, an individual with a strong attitude toward drug use both should be more likely to process and engage an anti-drug advertisement directly given the opportunity and also should be more likely to access memory of that encounter when asked about their encoded exposure to the advertisement than others will be.

Admittedly, testing of this hypothesis as one that implies unidirectional causality is fraught with concerns about causal ambiguity. Moreover, the relationship between attitude and encoded exposure should be curvilinear (insofar as attitude exists on a bipolar dimension), reflecting higher encoded exposure with greater attitude extremity. We will touch upon these nuances further in the methodology section of this chapter.

It is worth noting once again that speculation about a positive relationship between past drug experience or attitude toward drug use and encoded exposure does not comment on the likely valence of advertisement evaluation. Those who staunchly refused past marijuana offers and are confident in their continued ability to do so, for example, are likely to react differently to anti-drug advertisements than are those with more welcoming attitudes.

**Hypothesis B5:** Average encoded exposure for television content will be higher among respondents of the same sex as the majority of models depicted in that content, all else being equal.
Hypothesis B6: Average encoded exposure for television content will be higher among respondents of the same race as models most often depicted in that content, all else being equal.

A main effect of race, ethnicity, or sex on encoded exposure across all respondents and all types of media content is unlikely; speculation to the contrary enjoys little if any empirical support. It is conceivable that the race, ethnicity, or sex of respondents and of models depicted in media content might matter as an indicator of interest, however: perceived source similarity (e.g., Buller & Buller, 1991) or correspondence between viewer and model could signal content relevance. As a result, we can at least briefly assess whether ONDCP advertisements enjoy different degrees of average encoded exposure among different demographic groups.

Methods

Procedure

As noted in earlier chapters, a multistage cluster sample \(^6\) representing all U.S. youth ages 9- to 18-years-old and their parents or caregivers participated in two waves of the National Survey of Parents and Youth (NSPY) from November 1999 through December 2000. Additional details regarding the sample are available either in preceding chapters or in various reports from the campaign evaluation (Hornik et al., 2000; Hornik et al., 2001).

Measures

Dependent variables for this chapter's analyses are identical to those described in the last chapter. EXPOSURE refers to encoded exposure to TV campaign advertisements at the individual level. ADEXPOSE refers to average encoded exposure among respondents shown a particular advertisement, adjusted for the average number of days that advertisement had been available in the general television environment.
Independent variables were constructed from a variety of measures for hypotheses B1 through B6. Following an instruction that marijuana and hashish should be treated synonymously, for example, all youth respondents were asked, "Have you ever, even once, used marijuana?" This measure offered a simple indicator (MJEVER) of past marijuana use. Respondents who had used marijuana before were asked about their age at first use, which also may prove useful for analyses insofar as it is worthwhile to attempt to untangle evidence about possible temporal precedence.

Adolescents (12- to 18-year-olds) who had ever used marijuana also were asked to report the number of times that they had used marijuana in the past 12 months. Those who had used less than 10 times in the past 12 months also were asked whether they had "ever used marijuana at least 10 times within any 12 month period" and, if so, how old they were when they "first used marijuana at least 10 times within any 12 month period" (MJREGAGE). These variables can be used in similar fashion as the ever use measures, offering an indicator of past regular use and also allowing us to determine whether such use had only occurred in recent months or if it had occurred prior to broadcast of ONDCP campaign advertisements.

Those who reported either using more than 10 times in the past 12 months or ever having done so were counted as having demonstrated regular past use (MJREGUSE). The depth of one's personal use also was measured in NSPY. For 12- to 18-year-olds, USEDEPTH was computed to indicate whether a respondent reported no past marijuana use whatsoever (USEDEPTH = "1"), previous trial but no regular use (USEDEPTH = "2"), or any previous instance of regular use (USEDEPTH = "3").

In addition to reports of personal use, respondents were asked, "Who, if anyone, has offered you marijuana?" Response categories included the possibility of no one ever having offered, as well as five other categories of adults or friends. This measure offered a simple indicator of whether a person had received any offers (ANYOFFER). Those who had ever been offered marijuana also were asked about the frequency of such offers in the past 30 days. This
measure (in combination with responses from first question in which a respondent reported never having been offered marijuana) provided an indicator of the density of recent offers (OFFDEPTH), albeit one that is not clearly temporally precedent to EXPOSURE.

Youths also were queried as to whether any of their friends have used marijuana or illicit drugs. Adolescents were asked, “Do you think any of your close friends sometimes use marijuana, inhalants, or other illicit drugs?” and offered a dichotomous response choice. This measure offered a simple indicator of friends’ use (FRIENDS). In addition, respondents were asked for an estimate of the number of their friends who had used marijuana (either “even once or twice” or “nearly every month,” depending on the aforementioned skip pattern) in the past 6 months. Five response categories ranged from “None” to “Some” to “All.” FRIDEPTH focuses on this measure with regard to regular marijuana use among 12- to 18-year-olds. (Nine- to 11-year-old respondents were asked about the number of their friends who have used marijuana even once or twice in that time period.)

Those who reported having used marijuana in the past 12 months also were queried about various expectations and attitudinal beliefs in reference to regular marijuana use, i.e., use nearly every month over a 12-month period. Among those who have not recently used marijuana, half were assigned randomly to answer questions about occasional use, i.e., even once or twice over a 12-month period, and half were assigned to answer questions about regular use. Children (9- to 11-years-old) answered questions only about occasional use.

While one might suggest that respondents answering about occasional and regular use as contributing separate sets of evidence for hypotheses B1 through B4, it will be efficient to study most closely the sub-sample that answered regular use measures. The group answering regular use questions will include both individuals who themselves have recently used and individuals who have not, obviously an attractive pair of groups for comparison. Further, the effects of drug experience as a factor in enhancing the personal relevance of an anti-drug advertisement should
be evident in the context of regular use; failure to find such effects, given sufficient sample size, would be damaging to the relevant hypotheses.

In order to explore hypothesis B4 specifically, we can turn to measures of attitude toward regular marijuana use. Among 12- to 18-year-olds, response to two seven-point semantic differential items regarding whether using marijuana would be "extremely good" or "extremely bad" and whether it would be "enjoyable" or "extremely unenjoyable" offer a plausible attitude indicator in combination. (This scale will only be available for adolescents, however, as youth in the 9- to 11-year-old survey only responded to the "good" or "bad" item for marijuana trial and did not respond to the regular use items at all.)

The pair of two items appears to form a cohesive scale for regular use: the correlation coefficient was .64 for the two items in reference to regular use (n = 1,814). (The two items also presented a somewhat useful scale for occasional use, r = .48, n = 1,586, though the weaker correlation is further reason to focus on regular use for the present investigation.) As a result, the mean across these two items (ATTREG) can serve as relevant indicator of attitude.

Basic demographic measures were included in the NSPY survey, such as sex (SEX) and race or ethnicity (RACE). Insofar as both copies of the actual advertisements and general descriptions were available from campaign staff, it also was possible to categorize advertisements in terms of the predominant sex and race or ethnicity of the models depicted. For that purpose, each advertisement was assessed in terms of the faces of models depicted. (Appendix A following Chapter 6 describes the definition employed for a face throughout this study.) If female faces constituted a simple majority of all faces in an advertisement, a variable called MODELSEX was coded as "1". For a majority of male faces, MODELSEX was coded as "2". For those rare instances in which both sexes were depicted equally or in which an advertisement did not depict humans, MODELSEX was coded as "0". Given the limited number of races and ethnicities depicted, categories for a MODELRAC variable included white (either non-Hispanic or Hispanic) most often ("1"), African-American most often ("2") and
other race or ethnic group or no faces ("0"). MODELSEX and MODELRAC were then used to create a series of variables for each advertisement corresponding to the matching audience. MATCHSEX is the average encoded exposure for an advertisement among NSPY respondents of the same sex as the models predominantly depicted (and UNMATCHS is the average encoded exposure for the opposite group). MATCHRAC and UNMATCHR correspond to comparisons of white and African-American NSPY respondents.

Analysis

As a first step, we can assess whether bivariate analysis yields any support for each hypothesis. For hypotheses B1 through B3, simple comparisons of youth who report particular relevant attributes can be compared with those without such attributes. By looking at MJEVER or MJREGUSE, those who have ever tried marijuana or have used marijuana regularly in the past can be compared with those who have not done so in terms of EXPOSURE. Similarly, those who have ever been offered marijuana (ANYOFFER) and those who believe they have close friends who use illicit drugs (FRIENDS) can be compared with those who have not been offered marijuana and those without such friends, respectively. The depth of experience indicators, USEDEPTH, OFFDEPTH, and FRIDEDTH, each can be assessed with regard to their linear relationship to EXPOSURE (unless evidence suggests otherwise). I employ these indicators as interval measures in this multivariate analysis, noting that the same substantive story emerged when using a series of dummy variables to represent these measures as when they were treated as interval indicators though also acknowledging the possible incomplete relationship measurement consequences of this move.

Hypothesis B4, which involves attitude extremity, can be tested initially by assessing the ability of a combination of two attitude terms to predict EXPOSURE. Specifically, assessment of a model including ATTREG and its square term should indicate a significant and positive
coefficient for the square term if the relationship between attitude and EXPOSURE is curvilinear and u-shaped, as hypothesized. A failure to find such a result will undermine hypothesis B4.

Hypotheses B5 and B6, which involve both content of the advertisements and demographic measures from NSPY respondents, can be assessed at the level of the advertisement. ADEXPOSE provides the average encoded exposure to an advertisement across respondents to that advertisement. The MODELRAc variable indicates the predominant (or apparent majority) race or ethnicity of models depicted in an advertisement, if there is one. The MODELSEX variable indicates whether the faces portrayed in an advertisement are predominantly female or male or equally female and male. We then can analyze whether MODELRAc and MODELSEX demonstrates different mean levels of ADEXPOSE depending on which demographic group is analyzed. African-Americans, for example, should report higher mean ADEXPOSE when MODELRAc equals African-American.

The problem of causal ambiguity will arise unavoidably in some cases. For any supportive evidence arising from this initial set of comparisons, however, we also can attempt to provide at least some evidence that experience prior to any physically possible campaign exposure is associated with EXPOSURE. (As noted earlier, NSPY provides not only a general indication of any past marijuana trial or past regular use, but also a reported age of such use.)

Perhaps more than for other chapters in the present investigation, however, simple bivariate assessment for each hypothesis also may not even be sufficient to provide initial supporting evidence. A suppressor effect is quite possible. Simple bivariate relationships between past drug experience or attitude toward drugs and encoded exposure are likely to be clouded by media use at first glance. Television use indicators, as we indicated earlier, are related to encoded exposure in relatively straightforward fashion and also are likely to be related to experience and interest variables. Television use variables, then, could suppress the effects of one or more of the interest variables.
How might this situation occur? Insofar as those more likely to have used drugs in the past are also less likely to use particular mass media, a suppressor effect could arise. If past drug use is indicative of time spent with alternative leisure activities other than television use, then those with past drug use would appear to be less likely to report encoded exposure than those without such experience. A prima facie negative relationship or no relationship between past drug use and advertisement recognition could appear, and yet it actually would be a pattern confounded by media use. As a result, it will be useful to assess the impact of past drug experience over and above television use variables.

For hypotheses B5 and B6, we can conduct advertisement-level analyses using the MATCHSEX, UNMATCHS, MATCHRAC, and UNMATCHR variables. Among TV youth advertisements depicting humans, average encoded exposure should be significantly higher among members of an audience comprised of members of a similar sex and similar race as the models predominantly depicted. For example, MATCHSEX should be higher than UNMATCHS, a comparison we can assess using a paired variable t-test for initial evidence.

Results

Univariate description for hypotheses B1 through B3

U.S. youth vary in their past drug and marijuana experience, with most reporting little such experience. Among 9- to 18-year-olds, 16 percent have ever tried marijuana (MJEVER), though trial increases markedly with age. Among 9- to 11-year-old youth, approximately one percent has ever tried marijuana, whereas among 16- to 18-year-old youth, approximately 40 percent has done so. Most adolescents have not used marijuana regularly (MJREGUSE), with approximately nine percent having used at least 10 times in a 12-month period before (9- to 11-year-olds were not asked about regular use). Approximately 37 percent of youth have ever received an offer to use marijuana (ANYOFFER) and approximately 37 percent of 12- to 18-year-olds report having close friends who have used illicit drugs (FRIENDS).

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As explained earlier, I treat USEDEPTH, OFFDEPTH, and FRIDEPTH as interval measures here. If we assume these measures to be interval indicators, then it is worthwhile to note that each showed a slightly skewed distribution. The mean of USEDEPTH was \( .31, SD = .63 \), skewness = 1.84. This reflects the fact that most youth report no past marijuana use, though a small number report past regular use. The mean of OFFDEPTH was \( .98, SD = 1.97 \), suggesting an average youth has received one offer in the past month, though this distribution also was positively skewed (with skewness = 2.2). That pattern suggests the extensive number of offers received by a few youth inflates the mean. Most of an average youth’s friends also do not use, at least according to 12- to 18-year-old reports: the mean of FRIDEPTH was 2.03 on the five-point scale measuring the proportion of one’s friends who use marijuana regularly, \( SD = 1.04 \), skewness = .86.

The positive skew in all three cases suggested the usefulness of a variable transformation. The natural log of each variable (which we can label LNUSEDEP, LNOFFDEP, and LNFRIDEP, respectively) demonstrated much less skew than the original variable and is useful for analysis. The skewness of the LNUSEDEP distribution was 1.37 (mean = -8.94, SD = 4.88), the skewness for LNOFFDEP was .92 (mean = -7.84, SD = 5.69), and the skewness for LNFRIDEP was .165 (mean = .58, SD = .51).

**Bivariate evidence for hypotheses B1 through B3**

Table 3.1 provides an overview of simple comparisons relevant to hypotheses B1 through B3 involving MJEVER, MJREGUSE, ANYOFFER, and FRIENDS. These initial results are not supportive of any of those hypotheses. Most of the simple dichotomous variables related to hypotheses B1, B2, or B3 failed to predict a significant mean EXPOSURE difference, \( p > .05 \). In fact, the only difference that is significant is that associated with MJEVER and that difference (among 12- to 18-year-olds) suggests the opposite of what hypothesis B1 expects.
Respondents who have tried marijuana before report less EXPOSURE to anti-drug TV advertisements than those who have not, \( p < .05 \).

Other non-significant mean differences are also negative, albeit miniscule. Neither having received an offer in the past or knowing friends who use illicit drugs predicts EXPOSURE. Are these patterns a result of suppression introduced by the television viewing habits of adolescents for whom drugs are ostensibly relevant? We turn to that question next.

Table 3.1

<table>
<thead>
<tr>
<th>Indicator of anti-drug message relevance</th>
<th>n of relevant respondents</th>
<th>EXPOSURE mean difference</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>MJEVER (9- to 18-year-olds)</td>
<td>5,145</td>
<td>-.90</td>
<td>-1.87</td>
</tr>
<tr>
<td>MJEVER (12- to 18-year-olds)</td>
<td>3,614</td>
<td>-1.23*</td>
<td>-2.41*</td>
</tr>
<tr>
<td>MJREGUSE</td>
<td>3,625</td>
<td>-.12</td>
<td>-.13</td>
</tr>
<tr>
<td>ANYOFFER (9- to 18-year-olds)</td>
<td>5,116</td>
<td>-.07</td>
<td>-.20</td>
</tr>
<tr>
<td>ANYOFFER (12- to 18-year-olds)</td>
<td>3,593</td>
<td>-.54</td>
<td>-1.29</td>
</tr>
<tr>
<td>FRIENDS</td>
<td>3,598</td>
<td>-.52</td>
<td>-1.18</td>
</tr>
</tbody>
</table>

Note. All variables are coded such that a report of the relevant experience is coded as "1" and otherwise as "0". Mean EXPOSURE difference refers to mean for yes group – mean for no group, such that a significant negative result suggests that those who report that relevance attribute are less likely to report EXPOSURE. Results produced using WesVarPC.

* \( p < .05 \). ** \( p < .01 \).

Multivariate evidence for hypotheses B1 through B3

One way to investigate whether these patterns merely reflect a suppression effect resulting from TV use variables is to introduce these dichotomous relevance indicators into the TV use model described in the previous chapter. We also can investigate whether relevance indicators that perhaps better capture the depth of relevance factors, e.g., number of offers received, rather than just simple presence or absence of factors fare any better. Tables 3.2 and 3.3 illustrate evidence from such efforts.

It is worthwhile to point out that past experience measures are presented as a set in those tables in order to facilitate presentation. When each measure was entered separately into the full model of other indicators listed in the last step of each table, the same substantive story emerged.
For example, both in table 3.2 and in the analyses entering each separately, MJREG, ANYOFFER, and FRIENDS all failed to garner significant coefficients, $p > .05$ for each.

Table 3.2

Hierarchical regression results for prediction of TV ad exposure among 12- to 18-year-olds

(hypotheses B1 through B3)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 ($n = 3,554$)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MJEVER</td>
<td>-1.78**</td>
<td>0.63</td>
<td>-.09**</td>
</tr>
<tr>
<td>MJREGUSE</td>
<td>1.23</td>
<td>1.02</td>
<td>.04</td>
</tr>
<tr>
<td>ANYOFFER</td>
<td>.11</td>
<td>0.44</td>
<td>.01</td>
</tr>
<tr>
<td>FRIENDS</td>
<td>-.10</td>
<td>0.47</td>
<td>-.01</td>
</tr>
<tr>
<td>Constant</td>
<td>8.43</td>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td>Step 2 ($n = 3,364$)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MJEVER</td>
<td>-1.45*</td>
<td>0.60</td>
<td>-.07*</td>
</tr>
<tr>
<td>MJREGUSE</td>
<td>1.28</td>
<td>0.90</td>
<td>.04</td>
</tr>
<tr>
<td>ANYOFFER</td>
<td>.01</td>
<td>0.47</td>
<td>.0007</td>
</tr>
<tr>
<td>FRIENDS</td>
<td>-.08</td>
<td>0.44</td>
<td>-.005</td>
</tr>
<tr>
<td>TVUSE</td>
<td>.05**</td>
<td>0.01</td>
<td>.08**</td>
</tr>
<tr>
<td>TVPROGS</td>
<td>.38**</td>
<td>0.08</td>
<td>.14**</td>
</tr>
<tr>
<td>CABLE</td>
<td>.06**</td>
<td>0.01</td>
<td>.11**</td>
</tr>
<tr>
<td>ONE</td>
<td>1.43**</td>
<td>0.35</td>
<td>.08**</td>
</tr>
<tr>
<td>AGE</td>
<td>-.22*</td>
<td>0.09</td>
<td>-.05*</td>
</tr>
<tr>
<td>SEX</td>
<td>.34</td>
<td>0.37</td>
<td>.02</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>-.06</td>
<td>0.62</td>
<td>-.003</td>
</tr>
<tr>
<td>Hispanic</td>
<td>.68</td>
<td>0.57</td>
<td>.03</td>
</tr>
<tr>
<td>Other</td>
<td>-.50</td>
<td>0.73</td>
<td>-.02</td>
</tr>
<tr>
<td>Total TV GRPs</td>
<td>.002**</td>
<td>0.0003</td>
<td>.17**</td>
</tr>
<tr>
<td>Bogus recognition</td>
<td>2.10**</td>
<td>0.67</td>
<td>.07**</td>
</tr>
<tr>
<td>Constant</td>
<td>1.82</td>
<td>1.36</td>
<td></td>
</tr>
</tbody>
</table>

Note. $R^2 = .005$ for the model presented in step 1 and $R^2 = .11$ for step 2. ONE was coded as 0 if respondent reported that Channel One was not available in their school and 1 otherwise. SEX was coded so that female = 2 and male = 1. AGE refers to the age of the respondent in years; only 12- to 18-year-old respondents contributed to these models. “Bogus recognition” is a dummy indicator, with 1 indicating the respondent reported recognition to the bogus ad presented and 0 = not having done so. The GRP variable employed here is the assigned total for past relevant TV GRPs for ads asked about during respondent’s week of interview. * $p < .05$. ** $p < .01$.

As table 3.3 highlights, the depth of marijuana experience indicators, i.e., USEDEPTH, OFFDEPTH, and FRIDEPTH, tell a similar story as depicted in table 3.2. Given the positive skew of the original variable distributions, it was useful to employ the natural log of each
variable. Each of those log variables appears as a predictor in table 3.3. Regardless of that move, no evidence emerges to support hypotheses B1 through B3 here either.

Table 3.3

Additional hierarchical regression results for prediction of TV ad exposure among 12- to 18-year-olds (hypotheses B1 through B3)

<table>
<thead>
<tr>
<th>Variable</th>
<th>β</th>
<th>SEβ</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 (n = 2,568)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LNUSEDEP</td>
<td>-.13**</td>
<td>0.05</td>
<td>-.07**</td>
</tr>
<tr>
<td>LNOFFDEP</td>
<td>.02</td>
<td>0.05</td>
<td>.01</td>
</tr>
<tr>
<td>LNFRIDEP</td>
<td>.16</td>
<td>0.57</td>
<td>.01</td>
</tr>
<tr>
<td>Constant</td>
<td>6.99</td>
<td>.80</td>
<td></td>
</tr>
<tr>
<td>Step 2 (n = 2,441)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LNUSEDEP</td>
<td>-.10*</td>
<td>0.05</td>
<td>-.06*</td>
</tr>
<tr>
<td>LNOFFDEP</td>
<td>.01</td>
<td>0.05</td>
<td>.004</td>
</tr>
<tr>
<td>LNFRIDEP</td>
<td>.16</td>
<td>0.57</td>
<td>.01</td>
</tr>
<tr>
<td>TVUSE</td>
<td>.07**</td>
<td>0.02</td>
<td>.12**</td>
</tr>
<tr>
<td>TVPROGS</td>
<td>.33**</td>
<td>0.08</td>
<td>.13**</td>
</tr>
<tr>
<td>CABLE</td>
<td>.05**</td>
<td>0.01</td>
<td>.10**</td>
</tr>
<tr>
<td>ONE</td>
<td>.84*</td>
<td>0.40</td>
<td>.05*</td>
</tr>
<tr>
<td>AGE</td>
<td>-.31**</td>
<td>0.11</td>
<td>-.07**</td>
</tr>
<tr>
<td>SEX</td>
<td>.16</td>
<td>0.39</td>
<td>.01</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>.13</td>
<td>0.63</td>
<td>.01</td>
</tr>
<tr>
<td>Hispanic</td>
<td>.68</td>
<td>0.66</td>
<td>.03</td>
</tr>
<tr>
<td>Other</td>
<td>-3.03**</td>
<td>0.72</td>
<td>-.07**</td>
</tr>
<tr>
<td>Total TV GRPs</td>
<td>0.002**</td>
<td>0.0003</td>
<td>.16**</td>
</tr>
<tr>
<td>Bogus recognition</td>
<td>1.18</td>
<td>0.80</td>
<td>.04</td>
</tr>
<tr>
<td>Constant</td>
<td>3.04</td>
<td>1.79</td>
<td></td>
</tr>
</tbody>
</table>

Note. R² = .004 for the model presented in step 1 and R² = .12 for step 2. ONE was coded as 0 if respondent reported that Channel One was not available in their school and 1 otherwise. SEX was coded so that female = 2 and male = 1. AGE refers to the age of the respondent in years; only 12- to 18-year-old respondents contributed to these models. “Bogus recognition” is a dummy indicator, with 1 indicating the respondent reported recognition to the bogus ad presented and 0 = not having done so. The GRP variable employed here is the assigned total for past relevant TV GRPs for ads asked about during respondent’s week of interview.

Univariate distributions for hypothesis B4

Most U.S. youth report a highly negative attitude toward regular drug use. Among 12- to 18-year-olds asked about regular use, the mean of ATTREG was 1.83 on a seven-point scale, SD = 1.36. The distribution was positively skewed, as the skewness statistic was equal to 1.72.
The negative reciprocal of ATTREG, or \(-1/\text{ATTREG}\), demonstrated much less skew and thus was useful: skewness of ATTRNR was .75. The mean of ATTRNR was -.76, SD = .32.

Multivariate evidence for hypothesis B4

Figure 3.1 offers an initial glance at the relationship between attitude and EXPOSURE. The picture is not particularly supportive of hypothesis B4. There is a vague dip in EXPOSURE around the midpoint of the attitude scale, but overall the pattern is not suggestive of the strong u-shaped relationship hypothesized. The fact that mean levels of EXPOSURE jump up and down at the higher end of attitude is probably reflective of the relatively small sample size available at that end of the attitude distribution. Regardless, this figure does not suggest that we are likely to see a striking relationship in the manner predicted.

Figure 3.1

Relationship of ATTREG to mean EXPOSURE

More formally, table 3.4 outlines how ATTRNR and its square term fare as predictors of EXPOSURE. As outlined in the analysis section, a significant and positive coefficient for the
square term would suggest that a u-shaped relationship exists between attitude toward regular marijuana use and EXPOSURE. That pattern did not emerge in this analysis. Though the coefficient for the squared attitude term is positive, suggesting the possibility of a u-shaped relationship as hypothesized, the ATTNRSQ was not significant either in a simple model or in the multivariate model, p > .10. Given these results, there does not appear to be sufficient evidence to support the attitude hypothesis.

Table 3.4
Hierarchical regression results for prediction of TV ad exposure among 12- to 18-year-olds (hypothesis B4)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 (n = 1,806)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATTRNR</td>
<td>-.47</td>
<td>0.74</td>
<td>-.02</td>
</tr>
<tr>
<td>Constant</td>
<td>7.79</td>
<td>0.68</td>
<td></td>
</tr>
<tr>
<td>Step 2 (n = 1,806)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATTRNR</td>
<td>2.73</td>
<td>6.34</td>
<td>.10</td>
</tr>
<tr>
<td>ATTNRSQ</td>
<td>2.49</td>
<td>4.95</td>
<td>.13</td>
</tr>
<tr>
<td>Constant</td>
<td>8.54</td>
<td>1.63</td>
<td></td>
</tr>
<tr>
<td>Step 3 (n = 1,702)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ATTRNR</td>
<td>6.47</td>
<td>6.06</td>
<td>.25</td>
</tr>
<tr>
<td>ATTNRSQ</td>
<td>4.62</td>
<td>4.74</td>
<td>.23</td>
</tr>
<tr>
<td>LNUSED</td>
<td>-.13**</td>
<td>0.07</td>
<td>-.07**</td>
</tr>
<tr>
<td>LNOFFDEP</td>
<td>.06</td>
<td>0.08</td>
<td>.04</td>
</tr>
<tr>
<td>LNFRIQ</td>
<td>-.29</td>
<td>0.67</td>
<td>-.02</td>
</tr>
<tr>
<td>TVUSE</td>
<td>.09**</td>
<td>0.02</td>
<td>.15**</td>
</tr>
<tr>
<td>TVPROG</td>
<td>.34**</td>
<td>0.10</td>
<td>.13**</td>
</tr>
<tr>
<td>CABLE</td>
<td>.04**</td>
<td>0.01</td>
<td>.08**</td>
</tr>
<tr>
<td>ONE</td>
<td>.45</td>
<td>0.51</td>
<td>.03</td>
</tr>
<tr>
<td>AGE</td>
<td>-.19</td>
<td>0.12</td>
<td>-.04</td>
</tr>
<tr>
<td>SEX</td>
<td>.22</td>
<td>0.51</td>
<td>.01</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>.02</td>
<td>0.78</td>
<td>.001</td>
</tr>
<tr>
<td>Hispanic</td>
<td>.14</td>
<td>0.82</td>
<td>.01</td>
</tr>
<tr>
<td>Other</td>
<td>-2.90**</td>
<td>0.80</td>
<td>-.06**</td>
</tr>
<tr>
<td>Total TV GRPs</td>
<td>.002**</td>
<td>0.0004</td>
<td>.17**</td>
</tr>
<tr>
<td>Bogus recognition</td>
<td>.57</td>
<td>0.81</td>
<td>.02</td>
</tr>
<tr>
<td>Constant</td>
<td>3.12</td>
<td>2.20</td>
<td></td>
</tr>
</tbody>
</table>

Note. Neither of the first two steps produced a model with a significant overall fit statistic, F = .41 and F = .30, respectively, and p > .10 for both. R² = .12 for step 3. ONE was coded as 0 if respondent reported that Channel One was not available in their school and 1 otherwise. SEX was coded so that female = 2 and male = 1. AGE refers to the age of the respondent in years; only 12- to 18-year-old respondents contributed to these models. "Bogus recognition" is a dummy indicator, with 1 indicating the respondent
reported recognition to the bogus ad presented and 0 = not having done so. GRP variable employed here is assigned total for past relevant TV GRPs for ads asked about during respondent's week of interview. p < .05. ** p < .01.

Univariate distributions for hypotheses B5 and B6

Of the 23 ONDCP TV advertisements intended for a general market youth audience, 16 advertisements depicted human models and offered the opportunity to assess the impact of model similarity on average encoded exposure among various demographic audiences. Using the coding techniques described above, nine youth TV ads were determined to depict a majority of male models, whereas seven depicted a majority of female models. In terms of racial comparisons, eight of the advertisements depicted white (non-Hispanic or Hispanic) models more often than any other apparent race and eight of the advertisements depicted African-American models more often than any other race.

Bivariate evidence for hypotheses B5 and B6

In order to assess whether a match between the demographic characteristics of an group and those of the models predominantly depicted in an advertisement predicted relatively greater average encoded exposure for that advertisement, a paired-variable t-test comparison between MATCHSEX and MATCHRAC provided relevant evidence for hypotheses B5 and B6. Table 3.5 highlights those results.
Table 3.5

T-tests comparing mean ADEXPOSE for those that match predominant ad models versus those that do not match

<table>
<thead>
<tr>
<th>Type of paired variables for comparison of means</th>
<th>n of ads for comparison</th>
<th>ADEXPOSE mean difference</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>16</td>
<td>.08</td>
<td>2.42*</td>
</tr>
<tr>
<td>Race (white vs. African-American)</td>
<td>16</td>
<td>.08</td>
<td>1.07</td>
</tr>
</tbody>
</table>

Note. Standard deviation for paired difference mean for sex match was 0.14, whereas standard deviation for paired difference mean for race match was 0.30, which likely contributed in part to the insignificant race result.

* p < .05. ** p < .01.

Both of the mean differences between MATCHSEX and MATCHRAC are positive, which is consistent with hypotheses B5 and B6. Only the sex match result is significant, p < .05. The small sample size available for study, n = 16, may have hindered ability to see a difference for the race match comparison, particularly given the larger spread of those differences between matched and unmatched audiences relative to the sex results. Nonetheless, this analysis only provides supportive evidence for hypothesis B5. That interaction between the sex of ad models and NSPY respondents is illustrated in figure 3.2.

Figure 3.2

ADEXPOSE mean for youth ads with majority male (n = 9) and majority female (n = 7) models

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Discussion

The evidence presented above provides little evidence to suggest that past experience with drugs predicts encoded exposure to campaign advertisements. In fact, the only glimmer of a stable, significant finding with regard to the first four hypotheses suggests that a higher degree of past marijuana use among adolescents actually predicts less encoded exposure to TV campaign advertisements, a result that we will discuss later. With regards to demographic characteristics in model depiction, results do provide some support for the hypothesis that ads will garner higher encoded exposure among similar sex respondents than among opposite sex respondents.

Clearly, the general lack of support for the first series of interest-related hypotheses outlined earlier demands some explanation. Fortunately, there are several good reasons why this evidence is, on first glance, discordant with our earlier discussion. Among possible explanations is the possibility that the indicators of message relevance that we investigated for the first four hypotheses, namely measures of marijuana use, drug use in one’s interpersonal environment, and attitude toward regular marijuana use, correspond to message attributes that actually are not particularly salient in the ONDCP advertisements. Upon further consideration, many of the anti-drug advertisements do not mention drugs until the last frame. For example, a series of the advertisements present an alternative source of enjoyment or stimulation, e.g., playing football, in the vast majority of the advertisement before concluding with a final question, “What’s your anti-drug?” In other advertisements, e.g., “Hockey”, marijuana is not depicted visually at all in the advertisement and only is mentioned in the voice-over narration. It could be the case that youth who encounter these advertisements are neither encouraged or discouraged to process and encode them by the fact that they are anti-drug advertisements and the fact that such youth may or may not have plausible cause to be interested in drugs as a message topic.
The results related to hypothesis B5 provide further support for this speculation: a relatively prominent aspect of ONDCP advertisements, the sex of the models predominately shown, did differentiate between average encoded exposure achieved among different sex groups of NSPY respondents. It is worth noting, however, that even this bivariate result is relatively weak and also might be the result of campaign staff targeting more than a processing enhancing effect of model-viewer sex similarity. Insofar as campaign staff felt that it was most appropriate to show same-sex role models to each group of adolescent viewers in the anti-drug advertisements intended for that group, then this small effect on EXPOSURE could reflect little more than macro-level content presentation patterns. Because these data do not allow us to sort out these various explanations and the size of the effect is rather small, it will be more appropriate to focus our attention on other results. Future work, however, should seek to investigate this intriguing possibility.

While these results do not completely eliminate the possibility that interest variables might play a role in predicting encoded exposure, then, they do suggest that interest variables related to the theme or message of an advertisement (rather than ones related to more immediately obvious features such as the sex of the models depicted) may be much less important than initially anticipated by the logic outlined earlier in this chapter. These data are consistent with an argument that interest variables simply are not as crucial in explaining encoded exposure as we might theoretically assume. In fact, our earlier speculation was built primarily on a series of theoretical extrapolations from evidence regarding processing and elaboration. Even some of that data suggests that basic processing efforts might be relatively unaffected by message topic interest: in the Liberman and Chaiken (1992) article, for example, high-relevance article readers reported using roughly the same level of cognitive energy as did low-relevance individuals.

Could other unmeasured interest variables affect exposure? It is possible, but difficult to imagine what such variables would involve. One of the few message attributes common to all of
the ONDCP advertisements is an explicit anti-drug theme. It is difficult to imagine another such common message dimension beyond the anti-drug theme that might offer the possibility for a specific type of individual interest variable to predict encoded exposure across all of the advertisements shown to a respondent. These results, then, are consistent with a model in which the sheer environmental prevalence of advertisements and individual patterns of media use are much more important in determining encoded exposure to a national campaign than are variables associated with individual interest in message topics.

We also should address one significant result from the first set of analyses briefly, namely the weak (but significant) negative relationship between individual marijuana use (LNUSEDEP) and EXPOSURE. This result could be read as support for Blumberg’s blunting hypothesis or could signal television use differences that are unmeasured by the four indicators employed here. It also could be indication of a different sort of blunting, however. Marijuana use has been demonstrated to produce memory impairment (Miller, 1999; Sullivan, 2000). As a result, it could be the case that marijuana use is actually an indicator of recognition (dis)ability rather than a measure of interest. Perhaps those who use marijuana extensively are simply less able to process and later recognize advertisements than their counterparts.

If that is the case, marijuana use actually is more relevant to the next chapter of our discussion, which grapples with the question of ability. Given the number of different analyses presented throughout this study, it is risky to place too much interpretive emphasis on a lone significant finding such as this one at this point. Instead it will be worthwhile to include LNUSEDEP as a predictor in later models and wait to assess the fate of this finding in subsequent chapters after the introduction of additional controls. (Nonetheless, the negative impact of past use on EXPOSURE here does suggest hypotheses for future study that were not emphasized in our earlier discussion.)
Conclusions

These results contrast with the results from the first chapter. Unlike individual media use and the environmental prevalence of media content, variables related to a person's ostensible interest in a message topic appear to be much less useful in explaining whether they are exposed to such content. Certainly, one could argue that complex patterns of interest in information drive one's general media use habits. Beyond television use, however, we have little evidence to suggest that interest affects one's encoding of exposure to encountered campaign media content. Despite the small number of advertisements assessed, this chapter did provide limited evidence that a match between the apparent sex of models depicted in an advertisement and the reported sex of a group of respondents might enhance that advertisement's ability to achieve encoded exposure. In general, however, it appears that encoded exposure is more a function of opportunity than a function of individual interest in processing campaign content.
Chapter Notes

1 Importantly, one reasonable interpretation of many selective exposure studies is that they essentially involve media use or avoidance choices that reside at this level.

2 Further, because the television advertisement portion of the ONDCP campaign does not appear exclusively in a particular genre of programming but rather as inserted content across a variety of television programming contexts, important suggestions about possible genre-specific relationships between viewer predispositions and attention to television (see Hawkins et al., 2001, for a discussion) are less relevant here.

3 Eagly and Chaiken (1993) note, for example, that the HSM permits heuristic and systematic processing to occur simultaneously and that heuristic processing, and heuristic cues, can affect systematic processing. Moreover, the HSM holds that motivational variables can not only invite systematic processing but also can affect heuristic processing as well.

4 The notion of personal relevance raises important questions about measurement. Ultimately, the personal relevance of a particular message for a person is a matter of subjective judgment by that person. At the same time, certain aspects of content, such as its message topic and the physically apparent characteristics of individuals it portrays, should predict perceptions of relevance among certain individuals.

5 Both of the models also highlight the importance of processing ability in accounting for the degree to which people process information. In that light, variables that indicate ability differences between individuals should play a role in predicting who reports past exposure to a particular advertisement, a possibility we consider in the next chapter.

6 The youth and their parents were found by door-to-door screening of a scientifically selected sample of about 34,700 dwelling units for Wave 1 and a sample of 23,000 dwelling units for Wave 2. These dwelling units were spread across about 1,300 neighborhoods in Wave 1 and 800 neighborhoods in Wave 2 in 90 primary sampling units. The sample provided an efficient and nearly unbiased cross-section of America's youth and their parents. Youth living in institutions, group homes, and dormitories were excluded. Parents were defined to include natural parents, adoptive parents, and foster parents who lived in the same household as the sample youth. Stepparents also were treated the same as parents unless they had lived with the child for less than 6 months. When there were no parents present, an adult caregiver was usually identified and interviewed in the same manner as actual parents. Among selected youth, the response rate was approximately 91 percent in Wave 1 and 92 percent in Wave 2, meaning that 91 or 92 percent of the youth received parental consent, signed to their own assent, and completed an extended interview. Among sample parents, 88 percent completed the extended interview in Waves 1 and 2.

7 All respondents who reported previous marijuana use answered these two questions with regards to regular use. Among non-users, half were randomly assigned to respond about regular use. Others were asked about occasional use.
Chapter Four
The role of processing ability and tendency

Throughout our discussion thus far, we have explored reasons why individuals might vary in their encoded exposure of information available in media outlets. In earlier chapters, we assessed whether hypotheses involving opportunity to engage information or individual interest were supported by the data presently in question. Results of those endeavors cast sharply different pictures, suggesting that opportunity (however produced) trumps interest in processing given such an opportunity. Beyond such considerations, however, another source of variation should be individual difference in general processing ability or tendency: those who are more able to, or tend to, fully encode particular television content should be more likely later to report encoded exposure than their counterparts.

Some variables theoretically indicative of such cognitive differences are age, school performance, and sensation seeking. The former two should indicate the development or possession of processing skills and capacities and the latter, as described below, appears to represent a personality trait ostensibly linked to memory encoding. Among youth, all should predict encoded exposure.

Hypothesis C1: Among children and adolescents, older youths will demonstrate greater encoded exposure to television content than younger individuals, all else being equal.

Age should bear a positive relationship to encoded exposure, all else being equal. Over the course of a lifetime, evidence suggests that age holds a curvilinear relationship with stimuli recognition ability, increasing during childhood and adolescence (Cycowicz, Friedman, Snodgrass, & Rothstein, 2000) and eventually decreasing toward the end of life (Golski, Zonderman, Malamut, & Resnick, 1998; Madden et al., 1999). Children in the present
investigation should be less likely, then, to report encoded exposure to a particular advertisement than older adolescents after controlling for other factors.

Hypothesis C2: Those who demonstrate better performance in school also will report greater encoded exposure to television content, all else being equal.

Following the same logic outlined above, it is also reasonable to expect that indicators of school performance are likely to be related to encoded exposure. Admittedly, school performance is a function of a wide variety of influences. Insofar as higher achievement in school signals greater processing and memory abilities, however, then measures related to academic achievement should predict encoded exposure. As we will outline later, two different measures of school performance will help to test this hypothesis.

Hypothesis C3: Those who are higher in sensation seeking tendency also will report greater encoded exposure to television content, all else being equal.

Donohew and colleagues' individual-differences model of information exposure (Donohew, Lorch, & Palmgreen, 1998; Donohew, Palmgreen, & Duncan, 1980) and their focus on the concept of sensation seeking (Zuckerman, 1979; Zuckerman, 1988; Zuckerman, 1994) offers another prime candidate for the prediction of encoded exposure. Sensation seeking essentially refers to the tendency to seek novel, complex, and intense sensation and to take risks for the sake of such experience. Donohew and colleagues assert that attention is a function of an individual's own level of stimulation need and the stimulation level provided by a source. Building on this work, scholars have speculated that sensation seeking tendency, or the closely related notions of novelty seeking or stimulation-seeking motivation, might be related to one's general degree of stimulus engagement and encoding tendencies (Braverman & Farley, 1978;
Fleming, Bigelow, Weinberger, & Goldberg, 1995; Smith, Davidson, Smith, Goldstein, & al., 1989). Such arguments suggest that those high in sensation seeking have a generally more excitable processing system relative to their counterparts. Given equal opportunity to engage a stimulus, then, we might expect basic memory encoding and later memory performance to be relatively enhanced for those with greater tendency toward sensation seeking given the more voracious processing tendency of that group.

Recent work from the realm of neuropsychology and neurobiology offers some evidence consistent with this possibility. This work points to evidence of a direct link between aspects of personality, i.e., sensation seeking tendency, and one's general potential for encoding exposure to presented stimuli, such as an ONDCP campaign advertisement. A brief walk through speculation and evidence in this domain will be useful to clarify this idea.

Our story centers on a specific type of brain wave that has been discovered in neurological research employing electroencephalograph (EEG) measurement to monitor brain activity. Research suggests that the process of memory encoding or memory updating that occurs when an individual encounters a stimulus appears to have a specific wave associated with it: the so-called P300 component of the Event-Related Potential (Donchin & Coles, 1988; Hansenne, 1999; Kim, Kim, & Kwon, 2001). The amplitude of the P300 wave can be measured via EEG recordings from an individual who has the opportunity to engage a stimulus. That amplitude, in turn, appears to be related to the ease with which the detected stimulus is matched to existing memory templates and to motivation to engage the stimulus (Kim et al., 2001). Higher P300 amplitude, in other words, suggests more active and facilitated memory encoding and memory updating.

Further work has demonstrated a positive relationship between P300 amplitude and measures related to sensation seeking. Hansenne (1999), for example, found that P300 amplitude was correlated positively with individual score on a measure of novelty seeking (which was essentially a scale constructed from items such as “When nothing new is happening,
I usually start looking for something that is thrilling or exciting""). Further, Pierson and colleagues (1999), using Zuckerman's (1979) sensation seeking scale items, found a positive relationship between greater sensation seeking in an individual and P300 amplitude.

In other words, those higher in novelty seeking or sensation seeking appear to demonstrate a relatively greater intensity of neural structure activation related to memory updating when encountering a presented stimuli. This could be the result of relatively greater motivation or tendency among individuals high in sensation seeking to process any and all presented stimuli as potential sources of arousal, given their theoretically higher threshold of stimulation necessary for optimal arousal. If that is the case, we would expect to see higher levels of encoded exposure for television content after controlling for a host of other factors.

Methods

Procedure

As noted in earlier chapters, a multistage cluster sample representing all U.S. youth ages 9- to 18-years-old and their parents or caregivers participated in two waves of the National Survey of Parents and Youth (NSPY) from November 1999 through December 2000. See previous chapters for discussion and notes.

Measures

EXPOSURE once again served as the primary dependent variable for analysis. The measure, as we have discussed, indicates reported encoded exposure across the ONDCP TV campaign advertisements shown to a particular NSPY respondent. Previous chapters outline the distribution of the variable.

Age of the respondent in years (AGE) was calculated from a respondent's reported date of birth and date of interview. Two indicators of school performance were available through NSPY for 12- to 18-year-olds: one’s average grade in school (GRADES) and one’s tendency to
miss class (MISSCLS). NSPY measured respondents’ average grades in school by asking them which of nine different categories of grades best described their average grade. GRADE (reverse coded from the original NSPY question) ranged from 1, which corresponded to a “D (69 or below)” to 9, which corresponded to “A (93 – 100)” and should bear a positive relationship to EXPOSURE. Tendency to miss class was measured with a question asking how many days in the past 30 days one had skipped school. MISSCLS, accordingly, should bear a negative relationship to EXPOSURE.

Sensation seeking (SENSEEK) was assessed using mean reported agreement (on a five-point scale) across specific items regarding an individual’s tendency to seek novel and unpredictable experience. The four statements included were as follows: “I would like to explore strange places,” “I like to do frightening things,” “I like new and exciting experiences, even if I have to break the rules,” and “I prefer friends who are exciting and unpredictable.” This four-item scale, developed for NSPY (Hornik et al., 2000) and adapted from previous work (Palmgreen et al., 1991; Zuckerman, 1979; Zuckerman, 1994), demonstrated an alpha of .75 in the present sample of 9- to 18-year-old respondents and the item-total correlations ranged from .46 to .60.

Analysis

There are a variety of likely data patterns and constraints that should affect our interpretation of simple bivariate evidence for each these hypotheses. The correlation between EXPOSURE and each of the interval-level, independent measures employed to test hypotheses C1 through C3 will offer initial assessment of each hypothesis. Additionally, I also took the following steps to explore possible threats to inference.

With regards to hypothesis C1, I assessed the possibility of a curvilinear component of the relationship between AGE and EXPOSURE by including a squared version of age (AGESQ) along with AGE in multivariate analyses. The significance and direction of the AGESQ term
will be telling in this regard. Three specific ideas, however, offer various reasons to approach and interpret this curvilinear analysis with caution.

Theoretical and practical considerations actually predict opposite signs for the squared term initially. Some evidence highlights the possibility of a brief dip in recognition ability coincident with the onset of puberty and its developmental chaos, suggesting a u-shaped AGE and EXPOSURE relationship. Flin (1980), for example, assessed unfamiliar face recognition ability among 247 youths (reportedly first through 20th graders). Recognition improved from 6 to 10 years, but was worse among 11- and 12-year-olds, and then returned to the level of 10-year-olds among 13-year-olds. Soppe (1986) has demonstrated similar results for a face recognition task among a group of primary and secondary school children. The pattern also appears to be generalizable beyond the task of face recognition: Flin (1985) later was able to demonstrate a similar dip, this time among 12- and 13-year-olds, in an overall positive relationship between age and recognition of pictures of houses. At the same time, the ONDCP campaign focuses most intensively on the middle part of the 9- to 18-year-old age range. Campaign descriptions, for example, suggest an actual focus on 11- to 17-year-old youths and the general orientation of the campaign toward preventing initial trial of marijuana would suggest an emphasis on early adolescents (Hornik et al., 2001).

As a result, at the bivariate stage of assessment, we might see a slight inverted u-shape (and negative coefficient) such that predicted EXPOSURE actually peaks in earlier adolescence (rather than the type of u-shape implied by our above discussion of a dip in recognition ability in early adolescence). Should this pattern emerge, controlling for media use indicators, such as those described in detail in Chapter 2, should guard against the possibility that simple targeting strategies practiced by campaign staff (but not directly apparent in the GRP data available) produced higher encoded exposure among the middle age range of respondents. Existence and persistence of such an inverted u-shaped pattern (rather than a simple positive correlation or a dip in middle adolescence), nonetheless, will suggest that targeting efforts are more important in
explaining the AGE and EXPOSURE relationship than the cognitive development
considerations underlying hypothesis C1.

A third consideration is also noteworthy, albeit practically focused on the constraints of
the NSPY questionnaire and data set. As has been the case for earlier analyses, some relevant
NSPY measures were only offered to adolescents and not to 9- to 11-year-old children. This fact
suggests that the usefulness of curvilinear relationship indicators, such as a square term, will
wane when we move from simple bivariate analysis to multivariate analysis involving such teen-
only measures. Only the latter section of the curve, which by itself might be adequately
captured by a positive or negative slope or by including a series of dummy indicators for various
age groups, will be available in this analysis. We will review the results of this move below.

With regards to school performance, a bivariate relationship with EXPOSURE
demonstrated by one of the two measures used here might signal something other than a
processing ability or tendency main effect. Specifically, for any finding of a negative MISSCLS
and EXPOSURE relationship, it will be worthwhile to keep in mind that missing school not only
likely signals lower school abilities but also signals that a respondent has potentially missed
opportunities to see Channel One programming in school (an important outlet for the ONDCP
campaign). While consistent support for both school performance indicators will suggest that
the processing ability or tendency indicated by school performance in fact explains EXPOSURE,
support only for a negative coefficient for the MISSCLS measure will raise suspicion that such
missed Channel One opportunity (over and above one’s school simply having access to Channel
One) is actually responsible for the relationship. We will keep this idea in mind and elaborate as
necessary later.

Sensation seeking, as it is involved in hypothesis C3, also provides a few analysis
challenges, given its relationship to other relevant variables. Perhaps unsurprisingly, for
example, sensation seeking appears to be positively related to drug use (Ball, 1995; also see
Donohew, Palmgreen, & Lorch, 1994, for a discussion). Given the possible blunting effect of
marijuana use on exposure encoding noted in a previous chapter, it will be important to include past drug experience in the present models to prevent a suppressor effect from obscuring supportive evidence for hypothesis C3.

In addition, because sensation seeking is essentially defined, in part, as a tendency to seek new experience outside the routine, an individual high in sensation seeking might be led away from the classroom in search of more entertaining venues. Specifically, it is reasonable to expect that high sensation-seekers will be more likely to skip school (MISSCLS) than their counterparts. Given the aforementioned importance of the in-school Channel One service as a source of campaign TV advertisements, this idea suggests that inclusion of MISSCLS in SENSEEK analyses also may reduce possible suppression of a positive relationship between sensation seeking and EXPOSURE.

This tendency to seek sources of stimulation also might signal an additional potential mechanism for the possible relationship between SENSEEK and EXPOSURE other than the simple processing tendency explanation hypothesized here. Specifically, it could be those high in sensation-seeking tendency demonstrate a more active tendency to seek stimuli found both in television content and in interpersonal conversation. The present chapter includes various television use indicators as controls in a multivariate model. Not until the following chapter, however, will we turn to the issue of controlling for conversation measures, in part given the likely more complicated, reciprocal nature of conversation's relationship to EXPOSURE. Such a possibility is worth noting here, nonetheless, and also should temper mechanism-level interpretation of the present chapter's results.

Lastly, other investigations of the NSPY data have found that sensation seeking tendency appears to emerge in individuals somewhat as they mature into late adolescence (Hornik et al., 2000; Hornik et al., 2001). This pattern suggests the usefulness of including both age and sensation seeking in the same final model to begin to investigate whether any demonstrated positive effects of either sensation seeking or age on EXPOSURE can be separated
from the effects of the other independent variable. In general, then, many of the measures relevant to this chapter will be useful not only as potential predictors of EXPOSURE on their own, but also as important variables to include in multivariate analysis for other processing tendency and ability hypotheses.

Results

Univariate distribution of independent measures for hypotheses C1, C2, and C3

The mean for reverse-coded GRADES measure was a 6.1, SD = 2.20, which roughly corresponds to an average grade of B, and the measure demonstrated some negative skewness, skewness = -.52. Most youths did not miss many days of school recently, as the mean for MISSCLS was .22, SD = .80, and the distribution was positively skewed, skewness = 5.11. The mean of SENSEEK among 9- to 18-year-olds was 2.59, SD = 0.92, while the measure ranged from one to five, with five indicating the greatest sensation-seeking tendency across the four items included. SENSEEK demonstrated slight positive skew, skewness = .18. The age distribution of adolescents in the weighted NSPY data reflects the U.S. population.

Bivariate evidence for hypothesis C1

The simple expectation outlined in hypothesis C1 that older youths would report greater EXPOSURE than younger ones did not receive direct support from the present data. The correlation between AGE and EXPOSURE, while positive (r = .02), was not significant, p > .10, n = 5,619. Analysis of the relationship of AGE and EXPOSURE, however, revealed the possibility of a curvilinear component, as η² = .02 for the bivariate relationship whereas R² = .001. This pattern suggested the usefulness of also assessing the predictive power of AGE squared.

A more interesting picture emerged when that squared term was considered. A two-variable prediction of EXPOSURE including AGE and AGESQ yielded a significant coefficient
for each predictor and a significant model, $F = 22.82$, $p < .01$, $n = 5,619$. For AGE, $\beta = 1.17$, $p < .01$, and for AGESQ, $\beta = -1.16$, $p < .01$. The negative coefficient for AGESQ suggests an inverted u-shaped relationship, which is both somewhat consistent with a positive relationship between AGE and EXPOSURE for younger respondents and yet also is directly consistent with the targeted speculation mentioned earlier. Figure 4.1 depicts this relationship clearly.

Figure 4.1

Relationship of AGE of youth to mean EXPOSURE

In light of these results, a simple understanding of the relationship between AGE and EXPOSURE as being positive and linear is not warranted. Moreover, there seems to be a significant rise and then fall in EXPOSURE as AGE increases. The argument for hypothesis C2 appears to be on shaky ground. Mean EXPOSURE ranges from approximately 6.05 at age nine up to 9.25 at age 13 and back down to 6.76 at age 18. With this evidence in hand, we can move forward to multivariate assessment to attempt to understand the nature of this relationship.
Bivariate evidence for hypothesis C2

Both GRADES and MISSCLS demonstrated significant bivariate relationships with EXPOSURE, but only MISSCLS did so in the manner predicted. While MISSCLS demonstrated the hypothesized negative relationship with EXPOSURE, $r = -0.06, p < 0.01, n = 3,005$, GRADES also initially demonstrated a negative relationship with EXPOSURE, $r = -0.05, p < 0.05, n = 3,545$, which runs counter to hypothesis C2. Given the likelihood that those with lower grades watch more television than those with higher grades, this pattern is likely the result of opportunity differences, which we will test below. This pattern also suggests that the MISSCLS and EXPOSURE relationship is likely the result of the decreased opportunity to see Channel One programming among those who miss class.

Bivariate evidence for hypothesis C3

At the simple, bivariate level, there is only marginal support for a weak, positive relationship between sensation seeking tendency and EXPOSURE. The correlation coefficient between SENSEEK and EXPOSURE was $0.03, p = 0.09, n = 5,405$. Further, linear assessment of this relationship does not seem to be substantially less useful than assessment that allows for the possibility of curvilinearity. For the bivariate relationship, for example, $\eta^2 = 0.006$ and $R^2 = 0.001$. Because $\eta^2$ does not assume linearity whereas $R^2$ depends on that assumption, the relative similarity of these two indicators suggests that a linearity assumption is adequate.

As we noted earlier, however, there are possible suppressor effects lurking in the NSPY sample. Bivariate evidence further suggests this possibility. SENSEEK and MISSCLS, for example, are positively related among the 12- to 18-year-olds, $r = 0.08, p < 0.01, n = 2,969$, and we noted above that MISSCLS and EXPOSURE are negatively related, $r = -0.06$. Also, SENSEEK and AGE are related: the AGE and AGESQ terms employed earlier both predict SENSEEK, $\beta = 0.68, p < 0.01$, and $\beta = -0.40, p < 0.05$, respectively, with $n = 5,459$. While SENSEEK might
generally positively indicate processing tendency, the tendency of those high in SENSEEK to skip school might mask this relationship because of the missed opportunity to engage Channel One programming.

AGE also bears a generally negative relationship to EXPOSURE among older adolescents, as noted above. This pattern means that the emergence of high sensation seeking tendency among older adolescents comes at a time of generally less opportunity for exposure, suggesting that if SENSEEK does have a positive impact, our ability to see it will be dampened until we remove the impact of AGE. As a result of these patterns, it will be crucial to assess whether controlling for such measures allows a significant coefficient to emerge for SENSEEK.

**Multivariate evidence for hypothesis C1**

In order to address the fact that much of the multivariate analysis for this chapter necessitates removing 9- to 11-year-olds and thus potentially removing part of the curve noted above with regards to the AGE and EXPOSURE relationship, I included a series of dummy variables indicating the remaining age groups: a 12- to 13-year-old reference group and groups of 14- to 15-year-olds and 16- to 18-year-olds. Significant (and similarly signed) coefficients for all of the indicators would have suggested that a linear function might be appropriate. The results, however, presented a familiar story. As illustrated in table 4.1, a significant and negative coefficient for the older adolescents with regards to the reference group highlights two ideas. First, there is a relative lack of difference between 12- to 13-year-olds and 14- to 15-year-olds. Second, there is a significant difference in EXPOSURE between 16- to 18-year-olds and their 12- to 13-year-old counterparts for this analysis.

What happens when we control for television use and other relevant factors that might be producing this apparent AGE and EXPOSURE relationship? Table 4.1 offers an answer. Age continues to play a significant predictive role, though once again in a manner not anticipated by hypothesis C1. Instead, older adolescents report relatively less EXPOSURE
compared to their 12- to 13-year-old counterparts, even after controlling for a host of other variables, $p < .01$. This continues to reflect the downward trend in EXPOSURE among late adolescents, the second half of the inverted u-shape that we saw earlier in our discussion.

Table 4.1

Hierarchical regression results for prediction of TV ad exposure among 12- to 18-year-olds

(hypothesis C1)

<table>
<thead>
<tr>
<th>Variable</th>
<th>$B$</th>
<th>SE $B$</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 ($n = 3,625$)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14- to 15-years-old</td>
<td>-.46</td>
<td>0.47</td>
<td>-.03</td>
</tr>
<tr>
<td>16- to 18-years-old</td>
<td>-1.78**</td>
<td>0.43</td>
<td>-.10**</td>
</tr>
<tr>
<td>Constant</td>
<td>8.98</td>
<td>0.29</td>
<td></td>
</tr>
<tr>
<td>Step 2 ($n = 2,441$)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 to 15</td>
<td>.05</td>
<td>0.55</td>
<td>.003</td>
</tr>
<tr>
<td>16 to 18</td>
<td>-1.32**</td>
<td>1.06</td>
<td>-.08**</td>
</tr>
<tr>
<td>LNUSEDEP</td>
<td>-.09</td>
<td>0.05</td>
<td>-.05</td>
</tr>
<tr>
<td>LNFRIDEP</td>
<td>.11</td>
<td>0.57</td>
<td>.01</td>
</tr>
<tr>
<td>LNOFFDEP</td>
<td>.005</td>
<td>0.05</td>
<td>.003</td>
</tr>
<tr>
<td>TVUSE</td>
<td>.07**</td>
<td>0.02</td>
<td>.11**</td>
</tr>
<tr>
<td>TVPROGS</td>
<td>.33**</td>
<td>0.08</td>
<td>.13**</td>
</tr>
<tr>
<td>CABLE</td>
<td>.05**</td>
<td>0.01</td>
<td>.10**</td>
</tr>
<tr>
<td>ONE</td>
<td>.84*</td>
<td>0.40</td>
<td>.05*</td>
</tr>
<tr>
<td>SEX</td>
<td>.13</td>
<td>0.39</td>
<td>.01</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>.11</td>
<td>0.63</td>
<td>.01</td>
</tr>
<tr>
<td>Hispanic</td>
<td>.65</td>
<td>0.66</td>
<td>.03</td>
</tr>
<tr>
<td>Other</td>
<td>-3.11**</td>
<td>0.71</td>
<td>-.07**</td>
</tr>
<tr>
<td>Total TV GRPs</td>
<td>.002**</td>
<td>0.0003</td>
<td>.16**</td>
</tr>
<tr>
<td>Bogus recognition</td>
<td>1.19</td>
<td>0.81</td>
<td>.04</td>
</tr>
<tr>
<td>Constant</td>
<td>-.84</td>
<td>1.06</td>
<td></td>
</tr>
</tbody>
</table>

Note. $R^2 = .01$ for the model presented in step 1 and $R^2 = .12$ for step 2. ONE was coded as 0 if respondent reported that Channel One was not available in their school and 1 otherwise. SEX was coded so that female = 2 and male = 1. The reference category for age group is 12- to 13-year-olds; only 12- to 18-year-old respondents contributed to these models. The reference category for race/ethnicity is “white”. “Bogus recognition” is a dummy indicator, with 1 indicating the respondent reported recognition to the bogus ad presented and 0 = not having done so. The GRP variable employed here is the assigned total for past relevant TV GRPs for ads asked about during respondent’s week of interview. Other variables are described in chapter 3.

* $p < .05$. ** $p < .01$. 

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Multivariate evidence for hypothesis C2

What happens when we enter GRADES and MISSCLS into a multivariate model?

Table 4.2 illustrates these results. The initial GRADES relationship with EXPOSURE quickly falls out of the picture, whereas MISSCLS maintains its negative relationship. These results are consistent with our above speculation that hypothesis C2 is not supported by these data and that MISSCLS signals Channel One viewing opportunity and other dynamics.

Table 4.2

Hierarchical regression results for prediction of TV ad exposure among 12- to 18-year-olds (hypothesis C2)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1 (n = 2,991)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRADES</td>
<td>-.12</td>
<td>0.08</td>
<td>-.03</td>
</tr>
<tr>
<td>MISSCLS</td>
<td>-.62**</td>
<td>0.14</td>
<td>-.06**</td>
</tr>
<tr>
<td>Constant</td>
<td>8.56</td>
<td>0.52</td>
<td></td>
</tr>
<tr>
<td><strong>Step 2 (n = 2,032)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRADES</td>
<td>.02</td>
<td>0.09</td>
<td>.01</td>
</tr>
<tr>
<td>MISSCLS</td>
<td>-.63**</td>
<td>0.21</td>
<td>-.06**</td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14 to 15</td>
<td>.03</td>
<td>0.57</td>
<td>.001</td>
</tr>
<tr>
<td>16 to 18</td>
<td>-1.87**</td>
<td>0.46</td>
<td>-.11**</td>
</tr>
<tr>
<td>LNUSEDEP</td>
<td>-.07</td>
<td>0.05</td>
<td>-.04</td>
</tr>
<tr>
<td>LNFRIDEP</td>
<td>.50</td>
<td>0.66</td>
<td>.03</td>
</tr>
<tr>
<td>LNOFFDEP</td>
<td>.01</td>
<td>0.06</td>
<td>.004</td>
</tr>
<tr>
<td>TVUSE</td>
<td>.07**</td>
<td>0.02</td>
<td>.11**</td>
</tr>
<tr>
<td>TVPROGS</td>
<td>.37**</td>
<td>0.08</td>
<td>.15**</td>
</tr>
<tr>
<td>CABLE</td>
<td>.05**</td>
<td>0.01</td>
<td>.12**</td>
</tr>
<tr>
<td>ONE</td>
<td>1.05**</td>
<td>0.37</td>
<td>.07**</td>
</tr>
<tr>
<td>SEX</td>
<td>.54</td>
<td>0.41</td>
<td>.03</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>-.17</td>
<td>0.57</td>
<td>-.01</td>
</tr>
<tr>
<td>Hispanic</td>
<td>.46</td>
<td>0.73</td>
<td>.02</td>
</tr>
<tr>
<td>Other</td>
<td>-2.21**</td>
<td>0.76</td>
<td>-.05**</td>
</tr>
<tr>
<td>Total TV GRPs</td>
<td>.002**</td>
<td>0.0004</td>
<td>.13**</td>
</tr>
<tr>
<td>Bogus recognition</td>
<td>.55</td>
<td>0.85</td>
<td>.02</td>
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<tr>
<td>Constant</td>
<td>-.83</td>
<td>1.40</td>
<td></td>
</tr>
</tbody>
</table>

Note. R² = .004 for the model presented in step 1 and R² = .13 for step 2. Variable coding parallels that reported for table 4.1.

*p < .05. **p < .01.
Multivariate evidence for hypothesis C3

Table 4.3 highlights relevant supportive evidence for hypothesis C3. In a multivariate model, SENSEEK garners a significant and positive coefficient, $\beta = .06$, $p < .05$, consistent with hypothesis C3.

### Table 4.3

Hierarchical regression results for prediction of TV ad exposure among 12- to 18-year-olds (hypothesis C3)

<table>
<thead>
<tr>
<th>Step 1 (n = 5,405)</th>
<th>Variable</th>
<th>$B$</th>
<th>SE $B$</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>SENSEEK</td>
<td>.27</td>
<td>0.16</td>
<td>.03</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>7.09</td>
<td>0.42</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 2 (n = 2,926)</th>
<th>Variable</th>
<th>$B$</th>
<th>SE $B$</th>
<th>$\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>SENSEEK</td>
<td>.40*</td>
<td>0.19</td>
<td>.05*</td>
<td></td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14- to 15-years-old</td>
<td>-.60</td>
<td>0.50</td>
<td>-.04</td>
<td></td>
</tr>
<tr>
<td>16- to 18-years-old</td>
<td>-2.46**</td>
<td>0.44</td>
<td>-.15**</td>
<td></td>
</tr>
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<td>MISSCLS</td>
<td>-.43**</td>
<td>0.14</td>
<td>-.04**</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>7.74</td>
<td>0.52</td>
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</tbody>
</table>

<table>
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<th>$B$</th>
<th>SE $B$</th>
<th>$\beta$</th>
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<tr>
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<td>.06*</td>
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<td>Age group</td>
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<tr>
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<td>.0008</td>
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<tr>
<td>16- to 18-years-old</td>
<td>-1.82**</td>
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<td>-.11**</td>
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<tr>
<td>MISSCLS</td>
<td>-.64**</td>
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<td>-.06**</td>
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<tr>
<td>LNUSEDIP</td>
<td>-.08</td>
<td>0.05</td>
<td>-.05</td>
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<td>LNFREDIP</td>
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<td>0.06</td>
<td>-.0001</td>
<td></td>
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<tr>
<td>TVUSE</td>
<td>.07**</td>
<td>0.02</td>
<td>.12**</td>
<td></td>
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<tr>
<td>TVPROGS</td>
<td>.36**</td>
<td>0.08</td>
<td>.14**</td>
<td></td>
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<tr>
<td>CABLE</td>
<td>.05**</td>
<td>0.01</td>
<td>.11**</td>
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<td>ONE</td>
<td>1.07**</td>
<td>0.36</td>
<td>.07**</td>
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<td>.03</td>
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<tr>
<td>Race/ethnicity</td>
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<td>African-American</td>
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<td>0.60</td>
<td>.01</td>
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<td>Hispanic</td>
<td>.22</td>
<td>0.63</td>
<td>.01</td>
<td></td>
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<tr>
<td>Other</td>
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<td>0.75</td>
<td>-.05**</td>
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<td>Total TV GRPs</td>
<td>.002</td>
<td>0.0003</td>
<td>.12**</td>
<td></td>
</tr>
<tr>
<td>Bogus recognition</td>
<td>.62</td>
<td>0.86</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>-2.00</td>
<td>1.49</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Note:** The model presented in step 1 was not significant, $F = 2.91$, $p = .09$, $R^2 = .02$ for step 2, and $R^2 = .13$ for step 3. Variable coding parallels that reported for table 4.1. $p < .05$. ** $p < .01$. 

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Those youths who are higher in sensation-seeking tendency tend to report higher degrees of encoded exposure to the campaign's TV advertisements relative to their counterparts who are lower in sensation seeking, over and above the predictive power of other variables. In fact, the coefficient for SENSEEK is largest in the final step presented in table 4.3, which is consistent with the idea that the initial bivariate relationship was suppressed.

Discussion

Hypotheses C1, C2, and C3 received a mixed set of supportive and dissuasive evidence in the present analysis. Age, for example, does seem to bear a relationship to EXPOSURE and the positive relationship among younger respondents is consistent with hypothesis C1. What was most striking about the relationship between AGE and EXPOSURE, however, was its inverted u-shape. In fact, relative to 12- to 13-year-olds, 16- to 18-year-old youths report relatively less encoded exposure to the ONDCP campaign, p < .01. For an explanation of this finding, it seems most plausible to turn away from the cognitive development literature noted earlier and instead to highlight the possibility that (relatively unmeasured) campaign tendencies toward targeting younger adolescents may in fact have contributed to this phenomenon.

It is worth noting that both the quantity of television watching and the degree to which a respondent watches campaign-relevant programming were included in the final model assessed here, which should assuage some concern that AGE plays a role only through media use mechanisms. While the amount of television watching indicator (TVUSE) is likely a solid measure, however, it is possible that the specific programming measures, while clearly useful, are slightly leaky, such that they leave some variance in a youth's programming diet unmeasured. AGE might capture some of the remaining underlying variance in that diet. Aside from such considerations, nevertheless, what we do not have is evidence to suggest that age-related cognitive development (beyond that which occurs in very early adolescence) positively influences exposure encoding.
Similarly, variables related to hypothesis C2 did not receive support here as predictors of EXPOSURE in the manner hypothesized. Of the two school performance indicators, MISSCLS was the only one to maintain a significant predictive effect throughout this chapter’s analyses and the negative coefficient garnered by MISSCLS tended to be small. These results suggest that processing ability or tendency that is related to school performance is not related to EXPOSURE. Moreover, the possibility that those students who miss school also miss the opportunity to see ONDCP campaign advertisements via in-school Channel One programming is consistent with this pattern.

Hypothesis C3 received more consistent support, particularly in a full, multivariate model. SENSEEK positively predicts EXPOSURE, over and above other relevant independent variables. Hypothesized suppressor effects also appear to occur in the NSPY data with regard to sensation-seeking tendency. High sensation-seeking individuals are more likely to cut class, for example, p < .01. AGE and SENSEEK also appear to be related in curvilinear fashion, as noted above. Because missing school (a potential source of exposure opportunity for the ONDCP campaign) is negatively related to EXPOSURE and AGE bears a negative relationship to EXPOSURE among older adolescents, controlling for whether one tends to miss school and for age allowed a significant and positive SENSEEK and EXPOSURE relationship to become more apparent. While the bivariate relationship between SENSEEK and EXPOSURE is only marginally significant, p = .09, the relationship between SENSEEK and EXPOSURE is significant by conventional standards in a full model, p < .05.

While this pattern is consistent with hypothesis C3, it is also important to note that the direct role of stimuli processing might not be the only specific mechanism through which sensation seeking affects EXPOSURE. The results presented in the present chapter, in other words, do not provide a direct verdict regarding the nature of the weak, positive SENSEEK-EXPOSURE relationship in apparent evidence here. It is worth noting that a general tendency to engage the world's available stimuli might reasonably lead an adolescent to not only process...
anti-drug advertising but also might lead them to have conversations with others about drug-related topics that might serve to reinforce the availability of encoded exposure for later reporting. We turn to that possibility in the next chapter.

One other result that is worthwhile to note is that our measure of past marijuana use (LNUSEDEP) garnered only a marginally significant (albeit still negative) coefficient, \( p = .12 \), in the last full model presented here. The relationship of past use to both age and sensation seeking, however, suggests that multicollinearity might have reduced our ability to see the LNUSEDEP-EXPOSURE relationship in these analyses. It will be important to revisit this finding in the next chapter, which will introduce the last set of additional individual-level predictors.

In general, the final model presented here continues to emphasize the role of opportunity in predicting encoded exposure. For the most part, the processing tendency and ability indicators assessed here failed to provide EXPOSURE explanation that is comparable to the variables outlined in chapter 2 and the effects of one of the mildly successful predictors in this chapter, MISSCLS, could very well also be a simple opportunity-related phenomenon. The rudimentary nature of exposure encoding seems to leave the variable relatively vulnerable to the forces of environmental availability and individual opportunity and relatively impervious to variations in processing tendency and ability among a general population of U.S. adolescents.

At the same time, this chapter does suggest that individual age and sensation-seeking differences do matter in a significant, if not substantial, fashion. Over and above the impact of the sheer availability of ONDCP advertisements in the U.S. media environment and the simple luck of having one's television (and one's attention) turned on and tuned to the appropriate channel at the appropriate time, a person's basic arousal threshold seems also to play a role in predicting EXPOSURE. Moreover, AGE harbors predictive power that appears to exceed the impact of the simple television use indicators employed here, leaving its curvilinear relationship with EXPOSURE both counter to expectation and of note for future investigation.
Conclusions

Age, tendency to miss class, and sensation-seeking tendency were, in some sense, significant predictors in this chapter's analyses. At the same time, most of these variables failed to demonstrate substantial support for claims outlined in hypotheses C1, C2, and C3. The curvilinear relationship of AGE and EXPOSURE, for example, ran counter to expectation and undermined hypothesis C1. The most plausible explanation for that pattern involves the targeting efforts of the ONDCP campaign rather than age-related cognitive development considerations. The relationship posited in hypothesis C3 received some support. As hypothesized, SENSEEK positively predicted EXPOSURE after controlling for a series of relevant variables. While the magnitude of the apparent relationship is small, \( \beta = .06 \), these results suggest that youth with higher sensation-seeking tendencies also are more likely to encode exposure to campaign advertisements over and above the influence of other variables. It remains an open question as to whether this pattern actually results from processing tendency or from a different mechanism, as we will explore in chapter 5.

Chapter Notes

1 Unless otherwise noted, all analyses were conducted with weighted data, as described in chapter 2.

2 WesVar does not compute \( \eta^2 \), and so SPSS was employed for these comparisons of \( \eta^2 \) and \( R^2 \). SPSS, as noted earlier, does not accommodate replicate weights.
Chapter Five

The role of conversation

An individual’s exposure to media content is not likely to occur in a context devoid of other bodily present human beings. Interpersonal interaction is an important part of most serious understandings of human engagement with mass media. Social networks play a role in shaping a person’s initial engagement with media content, their retention of such engagement, and even later subsequent, or consequent, action (Hagen & Wasko, 2000; Hornik, 1989; Katz & Lazarsfeld, 1955; Wright, 1986).

While a teenager may sit sometimes alone in their room at night and encounter an anti-drug advertisement, their encoded exposure to that advertisement (understood here as an enduring memory trace) is subject to interpersonal influences not located in either the television set or the current cognitive stores of that teenager. It is possible that subsequent conversation with other people either about the television content in question or even just about the general topic of that television content can reinforce a person’s own encoded exposure to (or memory of) the original advertisement. Accordingly, discussion with others regarding both specific mass media content and the general topic of that content should be associated with encoded exposure, as stated below in hypotheses D1 and D2.

In contrast to the relationships hypothesized in previous chapters, however, conversation may enjoy a reciprocal relationship with encoded exposure in some instances. Initial presentation of an advertisement through a mass medium and a person’s physical engagement with that presentation will immediately precede that person’s encoded exposure and may also lead to later conversation about that advertisement topic. As a result, we should grant at least the possibility of temporal precedence (relative to conversation) to initial exposure encoding. Yet, at the same time, conversation, even when generated by initial exposure, also can influence later performance for the NSPY exposure measure, as we will discuss. Even aside from this possibility, though, some conversation about drugs most certainly is not spurred by any specific
media presentation and yet such conversation also may serve to reinforce and heighten one’s sense of encoded exposure. For a variety of reasons, conversation is likely to be telling with regards to EXPOSURE.

One can easily think of a scenario, for example, in which a youth is awash in relatively constant conversation with parents and their expectations about drug use. Memory of anti-drug advertisements encountered before such conversation is likely to be stirred by such conversation, as we will discuss, given the similar themes of drugs and expectations about use. (In reciprocal fashion, advertisements encountered after such conversations also might receive special attention given this parallel to prominent parental expectations.)

At the same time, however, the mere fact that a youth is engaged in such conversation might also signal the possibility of other factors that could explain the coincidence of reported conversation and exposure to anti-drug advertisements as a spurious finding. In light of that idea, initial bivariate evidence in the present chapter must also compete in the larger model of other individual-level influences built in previous chapters. Before we move to those analyses, though, it will be useful to specifically outline and justify hypotheses D1 and D2.

**Hypothesis D1**: Those who report discussion with others about anti-drug advertisements in general will report greater encoded exposure to specific televised anti-drug campaign advertisements.

How specifically could discussion with others strengthen one’s tendency to recognize media content when asked to do so? In reference to television news, Robinson and Davis (1990) have speculated that conversations with others about a story could increase the integration of story information into one’s long-term memory, for example, by increasing story information activation and establishing multiple connections between the story representation and other
nodes. Such thinking is consistent with the aforementioned notion that continued and repetitious information retrieval strengthens memory of that information.

Further support for the relevance of conversations with others lies in work on so-called hypermnesia, a construct involving memory improvement through cognitive focus on memory of an object at some point after initial opportunity for contact with the object (Roediger & Challis, 1989; Roediger, Payne, Gillespie, & Lean, 1982). Wicks (1992), for example, found that, when individuals were shown newspaper and television stories and then later told to think about those stories for two days, their recall two days following original exposure significantly, \( p < .05 \), improved relative to recall measured immediately following exposure.

One might question whether Wicks' experimental results are likely in more typical situations for engagement with mass media, particularly given the explicit and direct instructions given to participants. The convergence of such results with theoretical expectations about the impact of repeated accessing of memory objects, however, suggests that conversation with others should be an EXPOSURE predictor. Hypothesis D1, nonetheless, also raises an equally important question as to whether evidence of an association would indicate that discussion actually led to EXPOSURE. This issue is less soluble. Encoded exposure to an advertisement, after all, may precede a person’s engagement in a conversation about that advertisement. For this reason, it is most appropriate to suggest that the relationship between the two constructs, as Rosenberg (1968) might say, is likely reciprocal.

**Hypothesis D2:** Those who report conversation with others about drugs will report greater encoded exposure to specific televised anti-drug campaign advertisements.

General conversations about drugs also should be related to encoded campaign exposure. There are two ways in which conversations that do not necessarily explicitly refer to particular television content could nonetheless impact encoded exposure reporting about that

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content. First, a person who has engaged a particular unit of media content regarding drugs and who then discusses the general topic of drugs with another person might reinforce their cognitive imprint of the content in question through activation of related nodes during the course of conversation. Theoretical backing for this idea lies in earlier discussion of Anderson's (1983; 1990) network model of memory and related ideas regarding the role of schemata. Insofar as information units related to "marijuana" are stored in connected memory nodes that are activated every time a person encounters the word, for example, conversation about drugs should arouse or activate not only nodes directly involved in that conversation, but also nodes where images of anti-drug advertisements are stored. In this manner, conversation about the topic should make any stored image of anti-drug advertising more salient and should increase the likelihood of that person recognizing the advertisement when it is presented in a survey.

A second possibility is that conversation about drugs provides cognitive fodder for later processing and recognition of related media content. A person who has a conversation with another person about drugs in general might bolster or enrich their schemata with reference to drugs such that they later engage a particular presentation of drug-related media content more thoroughly than they would have otherwise. In turn, they also should be more likely to recognize that unit of media content when presented with it in the future.

The purest instance of the second scenario would suggest a causal relationship by which conversation lead to greater EXPOSURE likelihood, albeit through mediating variables related to engagement and processing. In the first scenario, however, the exact causal relationship between the two constructs is less clear, even in a relatively simple case. In some sense, some degree of encoded exposure likelihood would be temporally prior to the conversation about drugs. Salience of particular media content, in fact, could stimulate conversation about the general topic in question that then reinforces one's encoded exposure to related media content. As was the case for hypothesis D1, then, a reciprocal relationship and a basic association between general conversation and EXPOSURE is the most reasonable expectation for
hypothesis D2 at this stage. The reciprocal nature of the relationships outlined in both D1 and D2, however, does not obviate their relevance. Failure to find an association in either instance in this chapter would be a noteworthy lack of evidence for individual-level influences on encoded exposure.

Methods

Procedure

As noted in earlier chapters, a multistage cluster sample representing all U.S. youth ages 9- to 18-years-old and their parents or caregivers participated in two waves of the National Survey of Parents and Youth (NSPY) from November 1999 through December 2000. Additional details regarding the sample are available in previous chapters.

Measures

For assessment of hypothesis D1, NSPY provides a measure of anti-drug advertisement conversation, as youth were asked whether, in recent months, they had talked with anyone about anti-drugs advertisements in general. Admittedly, a more useful measure would refer to the specific ONDCP television advertisements in question. This measure also is limited in several other ways. First, only those respondents who reported any recall of anti-drug advertising available through television, radio, print, or outdoor media were queried as to their conversations. Second, 9- to 11-year-old respondents only were asked whether they had spoken with a parent or caregiver about such advertising. Third, the indicator does not assess the number of such conversations in recent months.

Nonetheless, a brief look at the relevant NSPY questions themselves suggests a reasonable indicator for the purposes of assessing hypothesis D1. In practice, most youths were asked about such conversations: approximately 91 percent of all youths at least reported on their conversations with parents about general anti-drug advertising in recent months. Those 9- to 11-
year-old respondents who reported such general recall of anti-drug advertising were asked, "In recent months, have you talked with your {parents/caregivers} about any of these anti-drug ads?" Older youths reporting such recall were asked, "In recent months, who have you talked with, if anyone, about any of these anti-drug ads?" Then they were told to choose all options that apply from a list including no one, their parents or caregivers, adults other than parents or caregivers, siblings, friends, or other kids.

Hypothesis D2 enjoys a slightly greater array of NSPY measures. All youth NSPY respondents were asked, "In the last 6 months, how often have you and either of your {parents/caregivers} talked about drugs?" Available response categories included "Never," "Once," "2 to 3 times," "4 to 5 times," "6 to 10 times," and "More than 10 times." Similarly, youth respondents were asked, "In the last 6 months, how often have you and your friends talked about drugs?" Similar response categories were offered.

For both questions, a recoded measure offered an interval-level indicator of recent drug conversation frequency. For the purposes of discussion, the frequency of recent drug conversations was parents or caregivers will be labeled as DRUGCONP and frequency of such conversations with friends will be labeled as DRUGCONF. When convenient in the following analyses, I also employ a single summary measure of drug conversations (DRUGCONV) that is a simple additive index combining DRUGCONF and DRUGCONP.

Respondents also were asked about the nature of those conversations with parents, caregivers, or friends. Each youth who reported recent drug conversation was asked whether that conversation included one's mother, father, stepmother, stepfather, caregiver, or other guardian or adult in the household. Moreover, youth were asked whether drug conversation with parents or caregivers included discussion of family rules, recommended actions to avoid drugs, drug use in mass media programming, or specific people who "have gotten into trouble with drugs". In addition, 12- to 18-year-old respondents also were asked whether conversation with
friends included the notion that “marijuana use isn’t so bad,” “specific things I could do to stay away from drugs,” or “bad things that happen if you use drugs.”

While the justification for hypothesis D2 does not explicitly suggest that different types of conversation should have different effects on EXPOSURE, these additional variables can be used to assess whether the main relationships between DRUGCONP, DRUGCONF, and EXPOSURE vary as a function of conversation type. Centered, dummy indicators for whether or not a respondent reported a particular type of conversation with a parent (or whether a 12- to 18-year-old respondent reported a particular type of conversation with a friend) and a centered version of either DRUGCONP or DRUGCONF were multiplied to form an interaction term for this analysis.

**Analysis**

Comparisons of the mean EXPOSURE level among those who do report recent conversations with particular types of people about anti-drug advertising and those who do not report such conversation will offer initial evidence for hypothesis D1. Simple t-test comparisons will provide an initial look. The dummy indicators of advertising conversation (with parents, other adults, siblings, friends, other kids) also can be combined into a simple additive index to indicate the diversity of advertisement conversation (ADCONV) for 12- to 18-year-old respondents. We then can explore whether that conversation index adds to our ability to account for variance in EXPOSURE by adding ADCONV as an additional step to the individual-level models presented in earlier chapters.

Given the aforementioned interval-level measures available for general drug conversations with parents and friends, testing for hypothesis D2 can draw on the correlation between DRUGCONP and EXPOSURE and between DRUGCONF and EXPOSURE as initial bivariate evidence. Beyond such exploration, DRUGCONV also can be entered into the overall individual-level model noted above to see how it fares when controlling for other variables.
(Given the possible relationship between ADCONV and DRUGCONV, it likely will be useful to treat the two variables as a single predictive block when interpreting multivariate results. A model including not only the variables discussed in chapter 4 but also ADCONV and DRUGCONV should be more powerful in explaining EXPOSURE than the best-fitting model from that previous chapter.)

It also will be worthwhile to investigate briefly whether the nature of general drug conversations affects the relationship of such conversation to EXPOSURE. One way to investigate this possibility will be to assess how the aforementioned multiplicative interaction terms fare when entered as a second step over and above the simple, bivariate relationship of either DRUGCONP and EXPOSURE or DRUGCONF and EXPOSURE. Such analysis could suggest that differentiation of conversation partner type sheds substantial light on the nature of the general relationship between conversation and EXPOSURE.

Results

Univariate description for hypothesis D1

As hypothesis D1 draws upon the EXPOSURE measure reported in previous chapters as an indicator of encoded campaign exposure, the reader can refer to those chapters for a description of that variable. What is new in this chapter, however, is conversation measurement.

Conversation sources regarding anti-drug advertisements varied considerably for those respondents who reported at least some minimal recall of general anti-drug advertising. Among all U.S. youths reporting such recall, approximately 31 percent reported having conversed with parents or caregivers about anti-drug advertisements in recent months. Friends also appear to be a substantial source of conversation about advertisements: among 12- to 18-year-old youths, about 21 percent had such conversations in recent months with their friends. Other sources of conversation were less prevalent. Among 12- to 18-year-old adolescents, approximately 8 percent reportedly had such conversations with an adult other than a parent or caregiver,
approximately 9 percent had such conversations with a sibling, and about 6 percent had such conversations with “other kids”.

Univariate description for hypothesis D2

Testing for hypothesis D2 obviously also draws upon EXPOSURE as a variable. The main variable useful for the other half of the hypothesis, namely conversation about drugs, is captured by the DRUGCONP and DRUGCONF measures. On average, youth respondents report just over three conversations with parents, and about the same number with friends, about drugs in the recent past: mean of DRUGCONP equaled 3.11, SD = 3.55, and mean of DRUGCONF equaled 3.10, SD = 3.97. Both recoded variables also demonstrate slight positive skew, as a small number of respondents reported many more conversations than average. For DRUGCONP, skewness = 1.45 and for DRUGCONF, skewness = 1.32. (This distribution, nonetheless, likely does not depart from normality sufficiently as to drastically affect evidence for hypothesis D2.)

Bivariate evidence for hypothesis D1

Each of the five dummy variables indicating conversation about anti-drug advertising with a specific type of conversation partner offered two groups of respondents for mean EXPOSURE comparison. For four of the five conversation partners, those who report recent conversations about anti-drug advertising also report higher exposure to specific ONDCP television advertisements (among those who report at least some recall of anti-drug advertisements in general). Assessing conversations with siblings did not yield a statistically significant differentiation in terms of mean EXPOSURE, though mean difference among respondents (namely, .47 higher mean EXPOSURE among those reporting sibling conversation about advertisements) also suggested a pattern similar to the other conversation types. Table 5.1 provides greater detail.
Table 5.1

T-tests comparing mean EXPOSURE of those who have had recent anti-drug advertising conversations and those who have not

<table>
<thead>
<tr>
<th>Conversation partner type</th>
<th>n of relevant NSPY respondents</th>
<th>EXPOSURE mean difference</th>
<th>t</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parents or caregivers</td>
<td>5,112</td>
<td>1.05</td>
<td>3.66**</td>
</tr>
<tr>
<td>Other adults</td>
<td>3,462</td>
<td>1.80</td>
<td>3.66**</td>
</tr>
<tr>
<td>Siblings (or step-siblings)</td>
<td>3,462</td>
<td>.47</td>
<td>1.09</td>
</tr>
<tr>
<td>Friends</td>
<td>3,462</td>
<td>1.56</td>
<td>4.21**</td>
</tr>
<tr>
<td>Other kids</td>
<td>3,462</td>
<td>2.16</td>
<td>3.52**</td>
</tr>
</tbody>
</table>

Note. 9- to 11-year-old respondents only were asked about advertisement conversations with parents or caregivers. "EXPOSURE mean difference" refers to mean EXPOSURE among those reporting such conversation minus mean EXPOSURE among those not reporting such conversation. Number of relevant NSPY respondents shown to indicate differences in original sample size for each question. Final analyses, however, use WesVarPC, which employs full sample and replicate weights.

* p < .05. ** p < .01.

An additive advertisement conversation index (ADCONV) comprised of scores from each of the five individual conversation types to provide a sense of the overall amount of conversation about anti-drug advertisements reported by a 12- to 18-year-old respondent demonstrated similar support for hypothesis D1. Given the aforementioned nature of the NSPY measures, it is useful to consider ADCONV effects only among those reporting any recalled exposure to anti-drug messages from any source in any media (not just ONDCP efforts), just as done above. Nonetheless, at a bivariate level among this group, ADCONV and EXPOSURE demonstrated a significant, positive correlation of .09, p < .01. More recent conversation with others about anti-drug advertising in general predicts a slightly greater tendency to report EXPOSURE to ONDCP television advertisements specifically.
Bivariate evidence for hypothesis D2

The two available indicators of the sheer amount of general drug conversation (with parents or caregivers and with friends, respectively) both demonstrate positive bivariate relationships with EXPOSURE. DRUGCONP and EXPOSURE demonstrated a correlation of .13, $p < .01$, and DRUGCONF and EXPOSURE demonstrated a correlation of .11, $p < .01$. (DRUGCONV also bore a similar positive relationship with EXPOSURE, $r = .15, p < .01$).

These findings lend initial support for hypothesis D2. Those who report more recent conversations about drugs with parents or friends also report higher encoded exposure to ONDCP television advertisements.

Is all drug-related conversation equal in its relationship to EXPOSURE? Two simple models that investigate whether relevant interaction terms add to the predictive ability of either DRUGCONP or DRUGCONF suggests that most such conversation bears a similar positive relationship to EXPOSURE. There was one interesting exception to this pattern, however, as illustrated by tables 5.2 and 5.3.
Table 5.2

Hierarchical regression analysis to explain EXPOSURE as function of drug conversation with parent and interaction between amount and type

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1 (n = 5,552)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DRUGCONP</td>
<td>.31**</td>
<td>0.04</td>
<td>.13**</td>
</tr>
<tr>
<td>Constant</td>
<td>6.87**</td>
<td>0.18</td>
<td></td>
</tr>
<tr>
<td>Step 2 (n = 5,431)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DRUGCONP</td>
<td>.17**</td>
<td>0.05</td>
<td>.07**</td>
</tr>
<tr>
<td>Had conversation about family expectations</td>
<td>.70*</td>
<td>0.32</td>
<td>.04*</td>
</tr>
<tr>
<td>Had conversation about people who use drugs</td>
<td>.48</td>
<td>0.31</td>
<td>.03</td>
</tr>
<tr>
<td>Had conversation about how to avoid drugs</td>
<td>.26</td>
<td>0.34</td>
<td>.01</td>
</tr>
<tr>
<td>Had conversation about drugs in mass media</td>
<td>.65</td>
<td>0.34</td>
<td>.04</td>
</tr>
<tr>
<td>DRUGCONP x family expectation conversation</td>
<td>.19*</td>
<td>0.08</td>
<td>.06*</td>
</tr>
<tr>
<td>DRUGCONP x people who use conversation</td>
<td>-.06</td>
<td>0.06</td>
<td>-.02</td>
</tr>
<tr>
<td>DRUGCONP x how to avoid conversation</td>
<td>.01</td>
<td>0.08</td>
<td>.002</td>
</tr>
<tr>
<td>DRUGCONP x drugs in mass media conversation</td>
<td>-.05</td>
<td>0.07</td>
<td>-.02</td>
</tr>
<tr>
<td>Constant</td>
<td>6.22**</td>
<td>0.24</td>
<td></td>
</tr>
</tbody>
</table>

Note. $R^2 = .02$ for the model presented in step 1 and $R^2 = .02$ for step 2. The conversation types listed refer to types of drug conversations with a parent or caregiver. The interaction terms reported are the product of variables after being centered (by subtracting the mean).

* $p < .05$. ** $p < .01$.

While the sheer amount of drug conversations with parents persisted in explaining EXPOSURE in both steps of this analysis, drug conversations with parents regarding family rules and expectations appear to be somewhat more important in accounting for EXPOSURE than other types of conversations. The joint predictive power of reported parental drug conversation in general and conversation about expectations in specific was significant and positive, albeit not particularly strong, $\beta = .06$, $p < .05$. Overall, nonetheless, the set of interactions regarding topic of conversation with parents does not appear to improve the predictive power of a simple model that accounts solely for amount of such conversation with parents.
Table 5.3

Hierarchical regression analysis to explain EXPOSURE as function of drug conversation with friends and interaction between amount and type

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1 (n = 5,578)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DRUGCONF</td>
<td>.14**</td>
<td>0.05</td>
<td>.07**</td>
</tr>
<tr>
<td>Constant</td>
<td>7.59**</td>
<td>0.25</td>
<td></td>
</tr>
<tr>
<td><strong>Step 2 (n = 3,574)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DRUGCONF</td>
<td>.14**</td>
<td>0.06</td>
<td>.07**</td>
</tr>
<tr>
<td>Had conversation about</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>idea marijuana not so bad</td>
<td>-.34</td>
<td>0.48</td>
<td>-.02</td>
</tr>
<tr>
<td>Had conversation about</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>how to avoid drugs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Had conversation about</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>negative consequences</td>
<td>.13</td>
<td>0.41</td>
<td>.01</td>
</tr>
<tr>
<td>DRUGCONF x not so bad conversation</td>
<td>-.07</td>
<td>0.12</td>
<td>-.02</td>
</tr>
<tr>
<td>DRUGCONF x how to avoid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>conversation</td>
<td>-.13</td>
<td>0.11</td>
<td>-.03</td>
</tr>
<tr>
<td>DRUGCONF x negative consequences</td>
<td>.21</td>
<td>0.13</td>
<td>.05</td>
</tr>
<tr>
<td>Constant</td>
<td>7.34**</td>
<td>0.28</td>
<td></td>
</tr>
</tbody>
</table>

Note. \( R^2 = .01 \) for the model presented in step 1 and \( R^2 = .01 \) for step 2. Only 12- to 18-year-old respondents were asked about the types of drug conversations conducted with friends. As a result, 9- to 11-year-old respondents do not appear in steps 1 or 2 of this analysis (though their responses were used for the overall correlation between DRUGCONF and EXPOSURE reported earlier). The conversation types listed refer to types of drug conversations with a friend. The interaction terms reported are the product of variables after being centered (by subtracting the mean).

* * p < .05. ** p < .01.

Drug conversations with friends among teenagers appear to bear a positive relationship with EXPOSURE that does not seem to vary according to the nature of such conversation. None of the interaction terms assessed garnered significance, \( p > .10 \) for all such terms. Accordingly, it appears that most conversation between teenage friends for the present sample bore a positive relationship, if any, with EXPOSURE.

Multivariate evidence for hypotheses D1 and D2

The previous section provided initial evidence that conversation – both about drugs in general and about anti-drug advertising specifically – matters in explaining EXPOSURE. While the NSPY measures yielding such evidence are not helpful in sorting out the exact causal order
of the relationship, such evidence is consistent with the reciprocal relationship hypothesized earlier in our discussion. At the same time, these bivariate relationships might be symptoms of some other relationships, rather than being the result of the theoretical mechanisms outlined above. Adolescents who are more likely to report encoded exposure to ONDCP advertising because of their media use habits or other reasons might also be predisposed to having conversation with friends and parents. As a result, we can next investigate how each of the conversation indicators presented here fares when entered into a larger model that draws upon our analyses from previous chapters.

For the sake of efficiency and simplicity, we can assess the predictive power of ADCONV and DRUGCONV, respectively, as summary measures for each type of conversation. There is a positive relationship between ADCONV and DRUGCONV to note: the two measures demonstrate a positive, bivariate correlation among adolescents, $r = .30, p < .01, n = 3,461$. This pattern is consistent with the idea that DRUGCONV is likely somewhat inclusive of the type of conversational exchanges captured by ADCONV. (As a result, there is some small possibility of multicollinearity affecting the individual coefficients of either discussion variable when both are entered into a larger model.)

I treat the two variables as a single predictive block in table 5.4, in which it appears that a conversation step adds to the predictive power of a full multivariate model from chapter 4. Accounting for conversation is useful in predicting EXPOSURE, even over and above the prediction demonstrated by variables related to television use, interest, and processing tendency and ability. Specifically, DRUGCONV yields a significant and positive coefficient in the second step presented in that table, $\beta = .12, p < .01$. (The best estimate of a coefficient for ADCONV is also positive, $\beta = .03$, but that estimate is not statistically significant.) Moreover, the full model presented in step two accounts for approximately 14 percent of the variance in EXPOSURE.
Table 5.4

Hierarchical regression results for prediction of TV ad exposure among 12- to 18-year-olds (hypotheses D1 and D2)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Step 1 (n = 3,424)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADCONV</td>
<td>.39*</td>
<td>.15</td>
<td>.06*</td>
</tr>
<tr>
<td>DRUGCONV</td>
<td>.13**</td>
<td>.03</td>
<td>.09**</td>
</tr>
<tr>
<td>Constant</td>
<td>7.04**</td>
<td>.27</td>
<td></td>
</tr>
<tr>
<td><strong>Step 2 (n = 1,926)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ADCONV</td>
<td>.22</td>
<td>.18</td>
<td>.03</td>
</tr>
<tr>
<td>DRUGCONV</td>
<td>.17**</td>
<td>.04</td>
<td>.12**</td>
</tr>
<tr>
<td>SENSEEK</td>
<td>.39</td>
<td>.26</td>
<td>.04</td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14- to 15-years-old</td>
<td>-.18</td>
<td>.52</td>
<td>-.01</td>
</tr>
<tr>
<td>16- to 18-years-old</td>
<td>-1.69**</td>
<td>.46</td>
<td>-1.1**</td>
</tr>
<tr>
<td>MISSCLS</td>
<td>-.57**</td>
<td>.20</td>
<td>-.06**</td>
</tr>
<tr>
<td>LNUSEDEP</td>
<td>-.11*</td>
<td>.05</td>
<td>-.06*</td>
</tr>
<tr>
<td>LNFRIDEP</td>
<td>.26</td>
<td>.67</td>
<td>.02</td>
</tr>
<tr>
<td>LNOFFDEP</td>
<td>-.04</td>
<td>.05</td>
<td>-.03</td>
</tr>
<tr>
<td>TVUSE</td>
<td>.07**</td>
<td>.02</td>
<td>.11**</td>
</tr>
<tr>
<td>TVPROGS</td>
<td>.32**</td>
<td>.09</td>
<td>.13**</td>
</tr>
<tr>
<td>CABLE</td>
<td>.04**</td>
<td>.01</td>
<td>.08**</td>
</tr>
<tr>
<td>ONE</td>
<td>.99**</td>
<td>.37</td>
<td>.06**</td>
</tr>
<tr>
<td>SEX</td>
<td>.38</td>
<td>.41</td>
<td>.02</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>.47</td>
<td>.60</td>
<td>.02</td>
</tr>
<tr>
<td>Hispanic</td>
<td>.05</td>
<td>.63</td>
<td>.002</td>
</tr>
<tr>
<td>Other</td>
<td>-.181*</td>
<td>.78</td>
<td>-.04*</td>
</tr>
<tr>
<td>Total TV GRPs</td>
<td>.002**</td>
<td>.0003</td>
<td>.13**</td>
</tr>
<tr>
<td>Bogus recognition</td>
<td>.80</td>
<td>.83</td>
<td>.03</td>
</tr>
<tr>
<td>Constant</td>
<td>-3.02*</td>
<td>1.50</td>
<td></td>
</tr>
</tbody>
</table>

Note. $R^2 = .01$ for step 1, and $R^2 = .14$ for step 2. ONE was coded as 0 if respondent reported that Channel One was not available in their school and 1 otherwise. SEX was coded so that female = 2 and male = 1. The reference category for age group is 12- to 13-year-olds; only 12- to 18-year-old respondents contributed to these models. The reference category for race/ethnicity is “white”. “Bogus recognition” is a dummy indicator, with 1 indicating the respondent reported recognition to the bogus ad presented and 0 = not having done so. The GRP variable employed here is the assigned total for past relevant TV GRPs for ads asked about during respondent’s week of interview. Other variables are described in chapter 3.

* $p < .05$. ** $p < .01$.

Discussion

At the individual NSPY respondent level, the .14 $R^2$ value of the final model presented in table 5.4 indicates the most powerful prediction model of any presented in this study thus far (as we would expect). While this finding suggests that a substantial amount of EXPOSURE
variance continues to be unaccounted by present efforts, this model does offer a noteworthy prediction of EXPOSURE that not only includes the most powerful predictors from earlier results but also suggests that conversation holds the hypothesized relationship with encoded exposure outlined in the beginning of this chapter.

Both hypotheses D1 and D2 receive some support from the results presented above. Those adolescents who report having had conversations about anti-drug advertising with most types of partners tend to report a greater extent of encoded exposure to ONDCP television advertisements presented in NSPY. Moreover, those who report having had general conversations about drugs also appear to report a greater extent of encoded exposure than their counterparts. Hypothesis D2, however, receives stronger support at a multivariate level than does hypothesis D1, evidenced by table 5.4.

Simply stated, then, this chapter presents clear evidence that the amount of conversation that an adolescent reports having had regarding drugs bears a positive relationship to his or her extent of encoded exposure to ONDCP television advertising. If this result were merely an artifact of coincidence between interest in having drug conversations and interest in television programming specifically targeted by the campaign, then this result likely would have disappeared in the face of controls for various television use indicators. Conversation, at least conversation about drugs in general, maintains its predictive power over and above such other variables, however.

Within the domain of conversations with about drugs, there also appears to be a slightly greater tendency for conversations with parents regarding family expectations about drugs to be more noteworthy in their relationship to EXPOSURE. Table 5.2 suggests this possibility. One can imagine a scenario in which conversations about family expectations, perhaps often instigated by specific parental concerns about specific drug-related incidents involving a youth rather than being general and preventive, are characterized by a teenager as yet another authority figure telling him or her what to do with regards to drugs. If authority figure advice regarding
illicit substance use can fairly be characterized as a potential normative schema or cluster of thoughts about a topic, then it might not be surprising that parental scolding or discussion of familial expectation would prime one's cognitive imprint of anti-drug advertisements. As a result, the possibility of hypermnesia, noted by Wicks (1992) and others, seems to be plausible here. With only cross-sectional NSPY data available in the present analysis, nonetheless, further research is warranted.

Also noteworthy are the fates of two independent variables from past chapters, namely SENSEEK and LNUSEDEP. The extent of one's past marijuana use once again garnered a significant, negative (albeit weak) coefficient in the final model above, $\beta = -.06$, suggesting that earlier speculation regarding the possibility of literal processing and memory blunting caused by marijuana use may in fact be a phenomenon worth further study. At the same time, SENSEEK failed to garner a significant coefficient in the final model after conversation variables were introduced and the size of that coefficient is slightly less than was the case in chapter 4. That pattern suggests that increased tendency among high sensation seekers to seek out conversation for stimulation in fact might be a partial mechanism through which the positive SENSEEK and EXPOSURE relationship noted in chapter 4 operates.

What is clear, then, is that interpersonal communication dynamics bear a relationship to one's reported encoded exposure to content available primarily through a mass medium, namely television in this instance. Understanding the degree to which a person is involved in conversation networks in which the topic of drugs is discussed is useful in explaining whether that person will encode and maintain at least a basic imprint of campaign advertisements. The present study is limited in its ability to sort out the exact direction of this relationship. The fact that the dependent measure is a recognition task that, in some sense, must necessarily be performed after such conversation could have occurred, in combination with the fact that a conversation variable maintained its predictive power even in the face of controls related to past drug use, television use, sensation-seeking tendency, age and other variables, presents evidence.
that is consistent with the idea that interpersonal conversation can reinforce encoded exposure to media content. Even aside from the question of causality, nonetheless, this apparent relationship between conversation about a topic and encoded exposure to television content intended to present information about that topic provides further justification for the aforementioned body of thinking that reminds us to pay attention to interpersonal communication when assessing the possibility of media effects, e.g., Hagen & Wasko (2000), Hornik (1989), Katz and Lazarsfeld (1955), Wright (1986).

Conclusions

The present chapter explored the general hypothesis that conversation — about drugs and about anti-drug advertising — could play a role in explaining encoded exposure to campaign television content. Results supported that general hypothesis. A model including conversation variables produced a higher $R^2$ value than those presented in previous chapters and suggested a positive and significant coefficient for at least one summary conversation variable, namely an indicator of the amount of conversation an adolescent has had regarding drugs. While the cross-sectional nature of the NSPY data used for these analyses limits clarity regarding the causal direction of this relationship, the existence of a significant and positive relationship between encoded exposure to ONDCP advertising and general conversation about drugs is noteworthy from the perspective of past theorists who have urged scholars to assess the role of interpersonal communication in the domain of mass media effects. With this idea in mind, we will return to the role of conversation again in chapter 7.
Chapter Notes

1 The youth and their parents were found by door-to-door screening of a scientifically selected sample of about 34,700 dwelling units for Wave 1 and a sample of 23,000 dwelling units for Wave 2. These dwelling units were spread across about 1,300 neighborhoods in Wave 1 and 800 neighborhoods in Wave 2 in 90 primary sampling units. The sample provided an efficient and nearly unbiased cross-section of America's youth and their parents. Youth living in institutions, group homes, and dormitories were excluded. Parents were defined to include natural parents, adoptive parents, and foster parents who lived in the same household as the sample youth. Stepparents were also usually treated the same as parents unless they had lived with the child for less than 6 months. When there were no parents present, an adult caregiver was usually identified and interviewed in the same manner as actual parents. Among selected youth, the response rate was approximately 91 percent in Wave 1 and 92 percent in Wave 2, meaning that 91 or 92 percent of the youth received parental consent, signed to their own assent, and completed an extended interview. Among sample parents, 88 percent completed the extended interview in Waves 1 and 2.

2 “Never” was recoded into 0, “Once” was recoded into 1, “2 to 3 times” was recoded into 2.5, “4 to 5 times” was recoded into 4.5 times, “6 to 10 times” was recoded into 8, and “More than 10 times” was recoded into 12.
Chapter Six
The role of formal content features

The limited-capacity approach to understanding human engagement with mass media, posited most cogently by Lang (2000), suggests that individuals are limited in their ability to process media content by cognitive capacity constraints. The approach suggests that content sometimes can overload one’s processing system, resulting in presented information not being processed and stored. At the center of this potential for overload is the frequency of new information appearance and the processing it demands. While information-rich presentations can arouse attention under some circumstances, Lang and others (Lang, 1995; Lang, 2000; Lang, Geiger, Strickwerda, & Sumner, 1993) have suggested that formal features of a message that introduce substantial amounts of new information also can inhibit processing and later recognition ability.

Accordingly, the introductory chapter proposed two media content features that should bear a relationship to average encoded exposure when measured: context instability and person focus. Below, hypotheses E1 and E2 again specify the relationships with average encoded exposure that each feature should demonstrate among the present group of anti-drug advertisements. We will examine their hypothesized utility in accounting for exposure variance here shortly, following an explanation of each construct and a brief review of theoretical justification for suspecting that these variables should affect encoded exposure.

Unlike the measures presented in the previous chapter, however, measures assessing formal features of ONDCP television advertisements are not available through the NSPY study, a situation that calls for additional measure and data construction. Additional measure construction brings with it an additional burden of validation. Before presenting main effects analysis and results, then, it will be appropriate to pretest and validate the specific measures of context instability and person focus to be employed here. Following a validation effort, we then
can examine the ability of the feature measures to explain average youth encoded exposure achieved by television advertisements from the ONDCP campaign.

**Hypothesis E1:** The greater the context instability of television content, the lower encoded exposure for that content will be, all else being equal.¹

**Hypothesis E2:** The greater the person focus demonstrated by television content, the higher encoded exposure for that content will be, all else being equal.

Both context instability and person focus are sources of information-processing demand that theoretically exist as features of the media content in question (and not solely as a matter of individual subjective impression). Generally speaking, context instability involves the editing transitions used in constructing media content and person focus involves the (visual or audible) focus of that content on one person. The possibility of a relationship of each construct to encoded exposure draws support not only from the limited capacity perspective mentioned above but also from a variety of earlier studies investigating the relationship of performance on recognition and recall tasks to various formal features. While not all past studies in this arena discuss context instability, person focus, or the notion of encoded exposure explicitly, evidence suggests that such constructs (and their hypothesized relationship) represent a useful evolution of past thinking.

First, we can consider past work regarding the role that visual context (or, more specifically, transitions between contexts) might play in individual processing of media content. Electronic media presentations now allow the depiction of image sequences that would not have occurred in usual human surveillance of the external physical environment prior to the development of mass media. Through available editing techniques and transitions, adjacent images in a sequence can depict, for example, visual perspectives that only could have come
from two different cameras operating at the same time or a camera operating at substantially
different points in time. The number of such transitions in any one unit of content, in turn, might
be thought of as a formal feature of that content that might have an impact on processing and
recognition, in part because of the departure of this type of image sequence from previous
human experience.

Reeves and colleagues (1985) offer a place to begin to explore the impact of editing
transitions on encoded exposure. They offer evidence that clarifies one way in which the
amount of visual variation and transitions within media content can affect recognition or recall.
Reeves and colleagues document a negative correlation, $p < .05$, between covert visual attention$^2$
to televised stimuli, as measured by central and occipital electroencephalogram (COE) alpha
frequency, and both stimuli recognition and stimuli recall.$^3$ They also found the amount of
movement and scene changes in television advertisements to be related positively to alpha
variation. This finding suggests a tendency of editing transitions to demand processing
resources (or attention) and, in turn, to inhibit recognition under some circumstances, a notion
consistent with the limited capacity approach.

Not all editing appears to be equal in its effects, however. Geiger and Reeves (1993),
for example, found that the nature of an edited sequence can moderate the relationship between
editing transitions and visual attention. They focus on the notion of a cut, which they define as
"a discontinuous transition between successive visual frames" (p. 155). Two laboratory
experiments, in turn, suggested that local visual attention to television, as measured by response
time to a secondary task, was more affected by cuts in instances of low semantic relatedness
between elements before and after the cut than in situations of relatively more relatedness.

More local$^4$ attention, then, appears to be required to cope with unrelated transitions than
with related transitions. A study by Lang and colleagues (1993) offers further support for this
idea. They found that reported memory for transition sequences involving related elements was
greater among a sample of college students than memory for unrelated transitions. On a related
plane, Schmitt, Tavassoli, and Millard (1993) offer evidence that advertisement coherence, which they discuss in terms of the correspondence of visual, verbal, and brand name components, enhanced both unaided recall and recognition for print advertisement content.

Upon considering such evidence, one of the aspects of an editing transition that appears to matter most for encoding exposure is the degree to which a transition introduces a large amount of wholly new information to be processed. While several types of editing might introduce a high density of new information, one situation that should consistently do so is the introduction of a new visual environment. We might think of the degree to which a unit of media content introduces processing hurdles by transitioning between distinct visual contexts as the visual context instability of that media content. Such visual context instability should affect the exposure potential for that content insofar as it tends to overtax individual processing systems.

Lang and colleagues (2000) have made a useful distinction in this arena between what they call a cut and an edit, offering a slight clarification of past conceptions. For them, a cut is defined as a change from one visual scene to another within a coherent unit of content. An edit, on the other hand, is a change from one camera shot to another within the same visual scene. A cut theoretically takes a viewer to a new environment, which adds a considerable amount of new information to the advertisement to be processed and is more likely to contribute to system overload than an edit. As we will note later, this specific definition of a cut offers a route for operationalization of the context instability concept, i.e., the density of cuts in an advertisement, given the correspondence between Lang’s definition and our discussion.

In proposing a testable hypothesis about context instability within the anti-drug campaign data available, however, there also is one noteworthy limit: advertisements that display absolutely no context dynamism, i.e., no cuts, are likely to be somewhat rare, particularly among those currently developed for adolescent audiences. Even a transition to black screen with text at the end of an advertisement can be considered at least one cut. While
content with relatively few cuts might invite processing without overwhelming the system (and thus increase encoded exposure relative to completely context stable content), we will focus on the inhibiting effect of higher levels of instability relative to lower levels. As hypothesis E1 suggests, we will investigate the possibility of a negative relationship between cuts and ADEXPOSE, rather than exploring the full u-shaped relationship that might exist with the inclusion of rare advertisements with zero cuts.

Next, we can consider person focus. The case for person focus as a predictor of encoded exposure rests on both speculation and evidence suggesting that narrative focus on a person can enhance processing. Gunter (1987), for example, has argued that the use of relatively specific examples is more likely to contribute to information recall than more abstract approaches and there is little theoretical reason why a similar relationship should not hold for encoded exposure. Similarly, Graber (1990) has suggested that visual depictions of human figures to illustrate a story can encourage learning from television news. Additionally, empirical findings suggest that focusing on personalities or case history examples contributes to recall or recognition (Neuman, 1976; Nisbett & Ross, 1980; Price & Czilli, 1996; Robinson & Levy, 1986; Davis & Robinson, 1986). Price and Czilli (1996), for example, asked respondents to recognize one of 21 different news stories within seven days of its initial appearance in the news. Stories that focused on personalities were roughly twice as likely to be recognized as stories that did not, even after controlling for intensity of coverage and a variety of individual characteristics.

Person focus might be a specific (and more useful) aspect of a larger, more amorphous construct sometimes called vividness. Available evidence would support this speculation. For example, Davis and Robinson (1986) document a strong correlation between a measure akin to our discussion of person focus and a measure of visual vividness, $r = .68$, $p < .05$. Because both theoretical rationale and empirical support are somewhat clearer for person focus than is conventionally the case for vividness, nonetheless, it is most useful to look the role of person focus here.
From a theoretical perspective, why might the prominence of a single person in an advertisement positively affect average encoded exposure for that advertisement? One reason might be that content with such a focus works in concert with human tendency to engage mass media appliances as though such appliances were other human beings, as noted by Reeves and Nass (1996), and to process media content using the same faculties used for other physical stimuli. Insofar as humans attempt to interact with televised content as though it were somehow real, for example, media content that focuses on another person's story are likely to encourage processing and storage relative to more abstract approaches because humans ostensibly tend to pay more attention to other humans in non-mediated situations than to other objects.

Another possibility, not mutually exclusive with the above notion, is that media content that focuses on one person also is likely to depict an optimal number of units of a particularly information-dense entity: a human face. Because of the central role that faces play in human interaction as a source of information (Cappella, 1993; Kappas, 1997; Wenger & Townsend, 2001), it is reasonable to suggest that faces deserve special notice as informational entities. The appearance of a face or two, relative to a completely abstract presentation, is likely to attract attention and processing. Visual depiction of a large number of people (and their faces), however, is likely to overwhelm the limited capacity processing system central to our discussion. Average encoded exposure, then, should be highest for content that focuses on one person and lower for both content that does not focus on any people and content that focuses on many people.

With these two hypotheses stated, we are left with the tasks of measuring the relevant constructs and testing each speculation. What follows next is a description of my efforts to validate specific measures of context instability and person focus. Following that discussion, we can turn to tests of hypotheses E1 and E2 to assess the relationship of context instability and person focus in the available campaign advertisements on average encoded exposure among U.S. youth.
I. Formal feature measure pretest and validation with convenience sample

Theoretically, the present measurement challenge is a surmountable one for a lone communication researcher. Insofar as we accept the proposition that certain macro-level content features can have effects across all individuals, an individual, using a unit of media content as the unit of analysis and the appropriate host of surveillance resources, should be able to measure variation in such features. In practice, however, one might question the validity of new measures that any individual researcher, operating from a micro-level perspective of sorts that undoubtedly varies in some ways from other possible perspectives, might construct.

This reasonable concern calls for validation evidence. In the present case, the ultimate test of the validity of macro-level content measures, of course, will be their performance in predicting the level of national exposure for an advertisement (ADEXPOSE). An initial exercise, nonetheless, will afford additional clarity as to the construct validity of formal feature measures before we turn to hypothesis tests for hypotheses E1 and E2 later in the chapter.

Methods

Procedure

A convenience sample (n = 8) of anti-drug advertisements was assessed through both the formal feature count measurement ultimately employed for hypotheses E1 and E2 and by subjective rating from a group of independent judges. The advertisements used in the validation exercise were publicly available and produced by three different groups: the Partnership for a Drug-Free America, the Bluegrass Prevention Project, and the National Youth Anti-Drug Media Campaign that is the primary focus of our discussion. For the formal feature measurement task, I used the measures described later to assign each advertisement context instability and person focus scores. For the subjective rating task, a group of undergraduate students (n = 39) were
recruited from an Ivy League university to assess the advertisements using a series of semantic
differential scale items, as detailed below.

The convenience sample of undergraduate participants ranged in age from 18- to 22-
years-old, with a mean age of 19.7 years and a median average course grade of an “A-”.
Approximately 67 percent of the participants were female. Approximately 49 percent reported
themselves to be white and non-Hispanic, 21 percent were African-American, 23 percent were
Asian and the rest reported themselves to be Hispanic. About 64 percent reported ever having
tried marijuana or hashish.

Measures

The number of cuts per second in an advertisement constituted a measure (CUTS) of
visual context instability. The aforementioned definition of a cut developed by Lang and
colleagues (2000) offered a useful starting place for developing coding rules. In essence, a cut
within an advertisement was defined as a change from one visual scene to another. This
definition alone, however, did not eliminate all ambiguity in practice. Further consultation with
Lang (personal communication, 2001) suggested additional rules. Appendix B at the end of this
chapter provides details of these coding rules.

Insofar as person focus is the degree to which electronic media content focuses on a
single person, then a reasonable measure of that concept is the number of visible faces per
second that appear (FACES). The greater the number of faces, the more disperse the visual
focus will have to be. Operationally, FACES consisted of a count of the number of unique faces
that appeared in an advertisement. A face had to be unobstructed enough to see at least an eye,
nose, and some part of a mouth in focus for at least a half second. (With the playback rate of 11
frames per second available when viewing the advertisements through a desktop computer, this
rule dictated that a face had to be visible for six consecutive frames or more.) Also, only faces
that were at least one-fifth the size of the screen, when measured from the top of the head to the bottom of the chin, were counted. Appendix B at chapter’s end also summarizes these rules.

Five survey items offered relevant subjective measures. (Appendix A illustrates the full instrument used by judges, though only five of the items are relevant here.) The focus of an advertisement on one person was assessed using a seven-point scale item asking whether an advertisement “focuses on one person” or “focuses on more than one person”. Four seven-point scale items focused on the visual context instability of the advertisement. Two items asked the degree to which action in an advertisement occurred “at various points in time” or “at one point in time” and the degree to which action occurred “in one place or location” or “more than one place or location”. Another item asked whether an advertisement was “complex” or “simple”. A last item assessed the degree to which the advertisement “shifts from one image to another” or “does NOT often shift from one image to another.”

To investigate whether researcher-assigned macro-level measures of advertisement content bear a strong relationship to the average subjective judgments from members of an independent population of young adults, it was most useful ultimately to employ the mean score for each advertisement across the 39 participants for advertisement-level analysis. Before proceeding, however, it first was important to assess whether such aggregation would mask important sub-group differences on any of the individual survey items included. As a result, a variety of sub-groups were compared with regard to mean scores for individual subjective items.

For each of the five items noted above, an individual’s mean item score was computed across the advertisements (for all individuals who reported at least six advertisement scores per item). These scores then allowed five comparisons of sub-group item means. Results suggested that no significant difference existed in one’s tendency to use particular survey items as a function of demographic or other potentially relevant variables. (Admittedly, the relatively small sample may have hindered the ability to detect minor differences, but the lack of significance at least suggests that substantial differences do not exist).
Mean score for males and females did not differ for any of the five items, \( n = 39, p > .10 \) for all five comparisons. Similarly, participants who reported themselves to be white and non-Hispanic did not differ from members of other racial and ethnic groups in their mean assessment across advertisements, \( n = 39, p > .10 \) for all five comparisons. Having ever tried marijuana or having an average grade below the median did not predict a different reporting tendency for any of the five items compared to one’s counterparts in the other group, \( n = 39, p > .10 \) for all for comparisons.

An additional variable employed for comparison was one’s sensation-seeking tendency (Palmgreen et al., 1991; Zuckerman, 1979; Zuckerman, 1994), which ostensibly could have indicated differences in average subjective impression as a result of differences in arousal need. Using the median split on a four-item scale (Homik et al., 2000) of sensation-seeking (with \( \text{Alpha} = .72 \) and item-total correlations ranging from .39 to .58 for this sample), relatively high and low sensation-seekers were compared. Once again, no significant difference emerged for any of the five items, \( n = 39, p > .10 \).

The subjective survey items, then, offer the potential for two subjective impression measures, aggregated across individuals, that should be related to the formal feature measures noted above: a one-item subjective rating of person focus (SUBJPERS) and a four-item subjective visual context instability scale (SUBJINST). Additional analysis at the advertisement level suggested that the subjective instability scale was reasonable to employ. The means (\( n = 8 \)) of the four items across all respondents formed a cohesive subjective instability scale: \( \text{Alpha} = .87 \) and the item-total correlations ranged from .58 to .95. In addition, confirmatory factor analysis (Bollen, 1989) using the AMOS program suggested that reasonableness of a unidimensional or single-factor model in describing the four subjective instability measures. A model including the means (\( n = 8 \)) of the four items, a single latent instability variable, and measurement errors did not significantly differ from an unspecified saturated model that perfectly replicated the covariance structure of the data, \( p > .10 \).
Analysis for nomological validation

If the macro-level measures of the two advertisement features in question are valid indicators, they should bear a significant relationship to the aforementioned subjective measures (resulting from the mean judgment of any population of viewers) for a sample of anti-drug advertisements. The number of cuts per second should be related to the mean subjective assessment of an advertisement's visual context instability. The more often an advertisement includes transitions from one temporal or spatial environment to another one, the more often people should judge that advertisement to be unstable in its presentation of context. A count of the number of unique faces per second in an advertisement should be related positively to the mean assessment that an advertisement focuses on more than one person, assuming that human faces are a noteworthy information source for such judgments. The correlations between relevant macro-level and subjective measures offer tests of these speculations. If we find support for these speculations, we then can turn to the larger task of assessing hypotheses $E_1$ and $E_2$ with heightened confidence regarding what the number of cuts or faces per second measures.

Results

Both formal content measures find strong nomological validation support. The number of cuts and the subjective context instability measure correlate quite strongly ($r = .88$), a correlation that is statistically significant, $p < .01$, if we treat this group of advertisements as a simple random sample of anti-drug television advertisements. The count of unique faces and the mean assessment of the degree to which an advertisement focuses on more than one person also demonstrate a strong relationship ($r = .72$), which also represents a statistically significant result if the group is treated as a sample, $p < .05$. 

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Discussion

It appears that these count measures bear a relationship to more subjective assessments regarding the context instability and the one-person focus of advertisements made by an independent group of observers. These results lend further support to the idea that the number of cuts in an advertisement taps into the context dynamics, and likely processing demand, of an advertisement. They also lend support to the notion that the number of faces per second is a reasonable proxy for the degree to which the visual narrative of an advertisement focuses on one person or a limited number of people.

II. Main hypotheses tests with national sample

With the above evidence in hand, we can move forward with some confidence and next assess whether the two content measures are useful in predicting ADEXPOSE on a national level. What follows next are tests for hypotheses E1 and E2.

Methods

Procedure and measures

The NSPY national sample of youth described previously and the group of general market youth advertisements (n = 23) available from the campaign for the time period corresponding to that sample offered the relevant data for tests of hypotheses E1 and E2. The measure of average encoded exposure (ADEXPOSE) described in detail earlier in chapter 2 offered a dependent variable for both analyses and the researcher-assigned formal feature measures of visual person focus and visual context instability were used for independent measures.

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Analysis

Hypothesis E1 posits a negative relationship between context instability and average encoded exposure. Accordingly, we first can assess the correlation between CUTS and ADEXPOSE. If that assessment suggests that those campaign advertisements with relatively more cuts per second also earned relatively lower average encoded exposure in the U.S. youth population, then we will have prima facie evidence of the hypothesized relationship.

Hypothesis E2 posits a slightly more complicated relationship, in that it suggests an inverted curvilinear relationship between person focus and ADEXPOSE. Our first clue regarding whether such a relationship exists will be a chi-square test and an examination of categorical versions of the two variables. Following that assessment, a quadratic term in which FACES is squared should afford an assessment of whether an inverted u-shaped relationship exists when entered in a regression equation along with FACES. A significant and negative coefficient on the squared term would provide support for the hypothesized relationship.

The non-experimental nature of the research design employed to construct both NSPY and advertisement content data, however, also requires that we assess the potential impact of environmental prevalence, our successful predictor from chapter 2, in explaining any initial evidence of a relationship between content factors and ADEXPOSE. It could be the case that campaign staff obtained more GRPs for particular advertisements that display high person focus or relative context stability. Both of those factors, for example, would seem to facilitate narrative coherence, and so perhaps those advertisements judged by campaign staff to be the most coherent and most worthy of heavy promotion were precisely those advertisements that exemplify the extremes of these two variables. Given the relatively strong relationship already documented between GRPs and ADEXPOSE, it will be important to assess whether CUTS or FACES can explain variance over and above environmental prevalence when entered as a second step in a hierarchical ordinary least squares multiple regression following GRPs. The results of that procedure are presented below as a last step for each set of hypothesis results.
Beyond the main effects of context instability and person focus hypothesized, it also will enrich our understanding to know whether either of these constructs interacts with environmental prevalence such that the strength of its relationship with ADEXPOSE varies as a function of GRPs. One can imagine a scenario, for example, in which either of these formal features has an impact on encoded exposure at relatively low levels of environmental opportunity to encounter the advertisements. Beyond a certain threshold, however, whether an advertisement is relatively unstable in its context depiction or whether it focuses on the story of one person might matter quite a bit less in terms of individual processing and memory. Only having the chance to see a complex or abstract advertisement once or twice, in other words, is different than having a tremendous number of opportunities to process and remember it.

Accordingly, for each hypothesis, we also can discuss whether the inclusion of a multiplicative interaction term in analyses suggested such a situation. After centering each component variable and multiplying them together, we can assess whether the interaction adds to the ability to explain variance.

The role of statistical significance is again worth mentioning given the macro-level analysis planned. As noted before, the advertisements to be assessed are essentially a census of general market youth advertisements from the campaign during the time period in question. At the same time, these advertisements are a somewhat reasonable convenience sample of contemporary anti-drug campaign advertisements. The average number of cuts or faces for the group is not likely to be a function of time during which these advertisements first aired. As for environmental prevalence analyses from chapter 2, we will note significance levels of statistics reported for those willing to consider this selection as a campaign sample and yet also acknowledge the dual concerns of small sample size and somewhat limited generalizability.
Results

Univariate description of independent content variables

The ONDCP advertisements studied here ranged in length from 15 seconds to 60 seconds. As expected, none of the campaign advertisements was absolutely static in its depiction of visual contexts, i.e., none had CUTS score of zero. CUTS ranged from .03 per second, i.e., one cut in a thirty-second advertisement, to 3.73 per second, with a mean of .62, SD = .79. The distribution was rather positively skewed, with a skewness statistic of approximately 3.0, SD of skewness = .48, suggesting that a logarithmic transformation of the CUTS measure might be useful in later analysis to prevent heteroscedasticity.

The second measure included in analysis was the number of faces per second of an advertisement. FACES ranged from zero to .40 per second, with a mean of .12 and a standard deviation of .12. The distribution of FACES was approximately normal for the 23 campaign advertisements assessed.

Hypothesis tests for hypothesis E1

At the bivariate level, hypothesis E1 appears to have been a reasonable speculation. There is a negative correlation between the CUTS and ADEXPOSE measures in their original form, \( r = -.42 \). Despite the relatively small number of advertisements, this relationship also is strong enough to be considered statistically significant, \( p < .05 \), if we consider the advertisements to be representative of all advertisements from the campaign.

A closer look at the distribution of the data, however, also suggests that one extreme outlier might be affecting the strength of the negative relationship: one advertisement has a CUTS score of 3.73 and an ADEXPOSE score of approximately .20. (We discussed this possibility earlier with regards to the skewness displayed in the univariate distribution of CUTS.) In light of this pattern, the natural log of CUTS (LNCUTS) offered a way to reduce heteroscedasticity and to make the use of linear statistics more appropriate in this instance. The
relationship between LNCUTS and ADEXPOSE, depicted in figure 6.1, suggests this move is worthwhile, further clarifying the strong linear relationship between the two variables. In comparison to the relationship between CUTS and ADEXPOSE, the zero-order correlation between LNCUTS and ADEXPOSE is even stronger, $r = -.50, p < .05$.

Figure 6.1

**Scatter plot of ADEXPOSE by LNCUTS (hypothesis E1)**

Even this result, though, does not rule out the possibility that relatively context stable advertisements also were those with the most GRPs, which could make inference about the LNCUTS relationship to EXPOSURE spurious. In order to rule out this possibility, I conducted a hierarchical regression in which LNCUTS enters as a second step following GRPs. Results from that analysis continue to support hypothesis E1.

The relationship between visual context instability and ADEXPOSE does not appear to be solely a function of more context stable advertisements receiving more airtime. Despite the
substantial predictive power of total advertisement GRP density alone, $R^2 = .67$, LNCUTS contributes predictive power over and above GRPs, $\Delta R^2 = .16$, $df = 1, 20$, $p < .01$. LNCUTS and GRPs together explain approximately 83 percent of the variance in ADEXPOSE. The LNCUTS coefficient is not only significant, $p < .01$, but also is negative, $B = -.11$, $SE_B = .03$, $r = -.40$, as hypothesized. As the log of cuts per second for an advertisement increases by one, the average encoded exposure level for that advertisement decreases by over 10 percent, even after controlling for the environmental prevalence of the advertisement.

**Hypothesis tests for hypothesis E2**

If the relationship between FACES and ADEXPOSE is, in fact, an inverted u-shaped function, we should begin to see evidence of that notion in a simple cross-tabulation of the two variables. In order to assess this possibility, I recoded FACES into three levels corresponding to no FACES, .03 faces per second, e.g., one face per 30 seconds, to .20 faces per second, and more than .20 faces per second, and also recoded average weekly encoded exposure into a dichotomous variable split at its median. Table 6.1 illustrates the results of a comparison of these two recoded variables. These results do, in fact, constitute a significant departure from the null expectation, Chi-square = 6.54, $df = 2$, $p < .05$.

<table>
<thead>
<tr>
<th></th>
<th>No faces</th>
<th>.03 to .20 faces per second</th>
<th>More than .20 faces per second</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percent of ads with ADEXPOSE level above median</td>
<td>14.3</td>
<td>75.0</td>
<td>50.0</td>
</tr>
</tbody>
</table>

It appears that average encoded exposure is higher among those advertisements with relatively few faces per second compared with those with no faces per second and those with
more faces. Figure 6.2 also suggests the possibility of a weak inverted curvilinear relationship between the two measures, given the lower ADEXPOSE scores at the extremes of FACES and generally higher ADEXPOSE scores in the middle. Visual evidence in this instance, nonetheless, is not particularly compelling and simple cross-tabulations are no substitute for more thorough assessment. We turn next to such tests.

Figure 6.2

*Scatter plot of ADEXPOSE by faces per second (hypothesis E2)*

A regression analysis involving not only FACES but also FACES squared (FACESSQ) assessed whether an inverted u-shaped relationship between number of faces per second and ADEXPOSE exists. That combination of independent variables did not produce a significant model in predicting ADEXPOSE, $F = 2.36, p = .12$. (The coefficient of the FACESSQ terms was negative, $B = -8.28$, SE $B = 4.22$, $t = -1.99$, and approached significance, $p = .06$, however.)
Before abandoning hypothesis E2, I assessed one additional possibility in light of the nature of the FACES measure and consideration about the type of curvilinear relationship that the quadratic term approach actually assesses. If average encoded exposure is highest for those advertisements focusing on one person, then the relationship between faces per second in an advertisement and ADEXPOSE theoretically should rise sharply after zero and then peak around .03 faces per second, e.g., exactly one person in a 30-second advertisement, before again declining. The quadratic term, however, tests whether the curve rises, peaks, and the declines in a uniform, u-shaped manner across the full range of FACES. Because some positive values of FACES were much greater than .03, in other words, it may be useful to reign in those large values before testing the fit of an inverted u-shaped model. The natural log of FACES (LNFACES) afforded the chance to do that. The same analysis using LNFACES and its square (LNFACESQ) did suggest a more supportive picture with reference to hypothesis E2. Again, the square term garnered a negative coefficient, $b = -.02$, SE $b = .01$, $t = -4.72$. This time, however, the coefficient for LNFACESQ also was significant, $p < .05$ (as was the coefficient for LNFACES, $b = -.28$, SE $b = .13$, $t = -4.18$, $p < .05$).

As was the case for testing of hypothesis E1, nonetheless, it also was important to assess whether visual person focus contributed explanatory power over and above the environmental prevalence of an advertisement. In this instance, the strong relationship between GRPs and average encoded exposure appears to explain some of the relationship between FACES and ADEXPOSE. The quadratic term used above to assess the predictive ability of FACES did not fare as well as CUTS as an explanatory variable when added as a second step in a hierarchical regression including GRPs: the coefficient for LNFACESQ was not significant, $p > .10$.

Consistent with hypothesis E2, LNFACESQ did maintain a negative sign, $b = -1.06$, after controlling for GRPs. Given the small sample size available for this analysis, this pattern suggests that we cannot completely rule out the possibility of a weak curvilinear relationship.
existing between person focus and average encoded exposure over and above GRPs. Our stance could be one of agnosticism as to whether any relationship at all exists. Regardless of that debate, however, it also appears that the number of faces per second is not as useful in accounting for variance in the average encoded exposure of an advertisement as either GRPs or LNCUTS. As detailed in table 6.2, a final three-step regression including LNCUTS, the FACES terms, and GRPs as separate steps suggested that only LNCUTS and GRPs maintained significant coefficients, \( p < .01 \). (Analysis of tolerance statistics ruled out the possibility of multicollinearity between CUTS and the FACES terms, as they exceeded .75 for the relevant step).

Table 6.2

Hierarchical regression results for prediction of ADEXPOSE (n = 23)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE(B)</th>
<th>( \beta )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRPs</td>
<td>.01**</td>
<td>.002</td>
<td>.82**</td>
</tr>
<tr>
<td>constant</td>
<td>.10</td>
<td>.06</td>
<td></td>
</tr>
<tr>
<td>Step 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRPs</td>
<td>.01**</td>
<td>.001</td>
<td>.77**</td>
</tr>
<tr>
<td>LNCUTS</td>
<td>-.11**</td>
<td>.03</td>
<td>-.40**</td>
</tr>
<tr>
<td>constant</td>
<td>.01</td>
<td>.05</td>
<td></td>
</tr>
<tr>
<td>Step 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRPs</td>
<td>.01**</td>
<td>.002</td>
<td>.72**</td>
</tr>
<tr>
<td>LNCUTS</td>
<td>-.10**</td>
<td>.03</td>
<td>-.35**</td>
</tr>
<tr>
<td>LNFACES</td>
<td>.002</td>
<td>.08</td>
<td>.04</td>
</tr>
<tr>
<td>LNFACESQ</td>
<td>-.0006</td>
<td>.006</td>
<td>-.12</td>
</tr>
<tr>
<td>constant</td>
<td>.08</td>
<td>.12</td>
<td></td>
</tr>
</tbody>
</table>

Note. \( R^2 = .67 \) for step 1 and \( AR^2 = .16 \) for step 2, \( p < .01 \). \( AR^2 \) was not significant in step 3, \( p > .10 \).

Possible interaction effects related to hypotheses E1 and E2

An exploration of whether the relationship between context instability and ADEXPOSE varies as a function of environmental prevalence yielded no evidence of an interaction. A centered, multiplicative interaction term assessing the joint effect of GRPS and LNCUTS on ADEXPOSE did not add any significant predictive power as a last step in a hierarchical
regression, p > .10. It appears that the documented relationship between the number of cuts per second in an advertisement and ADEXPOSE for that advertisement is relatively constant across different observed levels of GRPs.

A somewhat similar story emerges for person focus upon consideration of an interaction term. A centered, multiplicative interaction term assessing the joint effects of GRPs and the LNFAcesSQ term noted above did not contribute substantial or significant predictive power over and above the main effects terms for prevalence and person focus, p > .10. Similarly, a prevalence and person focus interaction term failed to add explanatory power to the model outlined in step 3 of table 6.2, p > .10.

Discussion

It appears that at least one formal feature of television content, i.e., context instability, matters as a predictor of average encoded exposure. Hypothesis E1 receives rather strong support from the above results. The natural log of CUTS demonstrated a negative relationship with ADEXPOSE for an advertisement throughout the analyses discussed, even after controlling for GRPs.

Available evidence for hypothesis E2 was less supportive. At the bivariate level, an inverted u-shaped relationship found support as an approximation of the relationship between an advertisement’s person focus and its average encoded exposure only after a debatable transformation of the FACES measure. Further, the quadratic terms introduced to assess this curvilinear relationship do not add explanatory power to that enjoyed by either GRPs alone or by GRPs and LNCUTS. A quick look at specific advertisements suggests how sheer prevalence might have produced even the weak bivariate relationship between person focus and ADEXPOSE. The youth campaign advertisement called “Hockey”, for example, both tended to focus only one person and was relatively high in the number of GRPs it received (approximately 69 per week of airing). In contrast, advertisements such as “Swimming” (which depicted no
faces) and “Most Teens” (which depicted about a dozen faces) received relatively few GRPs per week of airing (about 8 and 4 respectively). It may well be the case that focusing on a limited number of people qualitatively enhanced particular campaign advertisements’ narrative coherence and, thus, their tendency to be promoted by campaign staff. Whatever the exact mechanism, this confounding of person focus and environmental prevalence at the very least disallows knowing whether person focus plays a predictive role.

Assessment of possible interactions also yielded little supportive evidence. There was no evidence for any interaction between the number of cuts per second in an advertisement and GRPs. An interaction term testing the joint effects of person focus and prevalence also did not maintain its coefficient when the main effects of GRPs and the natural log of CUTS were in the model. For the sake of parsimony, the best model to account for variance in ADEXPOSE requires only main effects for prevalence and context instability from this chapter.

The role of cuts in inhibiting encoded exposure for media content might seem, upon initial consideration, to be counterintuitive given contemporary practice among many media professionals who attempt to engage adolescents and youths with fast-paced content. Ostensibly, such practice is not intended to undermine exposure encoding, but rather follows conventional wisdom regarding the ability of such content to grab attention. At least three ideas help to reconcile present results with such popular practice. First, as we have noted earlier in the introductory chapter, attention is not the same as encoded exposure, though it is often discussed as such. Precisely because cuts actually should invite rapt attention (given their capacity to overwhelm a processing system en masse), erroneously equating attention with ultimate exposure encoding might lead one to introduce many cuts into media content. Second, a cut is not the only element of a fast-paced presentation; not all presentations labeled as fast-paced necessarily include a high density of cuts. It might be possible that such content includes many edits and other special effects that do not appear to have the same processing- or memory-inhibiting effect, as Lang and colleagues (2000) have noted. Lastly, while context instability has
an effect independent of environmental prevalence, that effect does not wash out the strong relationship between sheer environmental prevalence and encoded exposure.

This last point might help to counter a considerate reader’s skepticism arising from their own recall of prominent television advertisements that would qualify as quite context unstable. That reader might ask why resources were spent promoting such content if it is less likely to translate into encoded exposure. In response, it is worthwhile to note that these results are consistent with the idea that advertisements can gain relatively widespread encoded exposure through a large degree of environmental prevalence alone. A large number of GRPs, however, likely masks the relatively lower encoded exposure potential of content with high context instability. What these results also suggest, however, is that context unstable television content probably does not garner the level of encoded exposure that we might expect given its prevalence.

Conclusions

Despite the relatively small number of youth television advertisements available for analysis, the results presented in this chapter suggest that paying attention to formal features of an advertisement can explain the encoded exposure achieved by that advertisement. At the very least, the context instability of an advertisement appears to inhibit its level of encoded exposure among U.S. adolescents (at least among advertisements with at least minimal context instability like those assessed here). Among these advertisements, increasing the amount of new information to be processed logically should (and empirically does seem) to invite a lower likelihood that a sufficient amount of an advertisement will be remembered when a person is later asked to recognize it. In other words, these data are consistent with the notion that increasing the context instability of media content inhibits the exposure potential of that content. We return to these ideas in the next chapter with a more formal multilevel modeling approach.
In struggling with the dynamics of memory in 1934, Walter Benjamin wrote, "A memory that has to digest impressions imparted by unforeseeably changing living conditions will rarely be as reliable as one sustained by continuity" (1994, p. 444). We can extrapolate from that idea to the present case of encoded exposure to media content that varies in its continuity of presented time and place. At least as far as depicted context is concerned, constancy enhances exposure encoding and instability detracts.
### Chapter 6 Appendix A

Subjective instrument (includes items for present study plus other items)

<table>
<thead>
<tr>
<th>YOUR NAME ______________________ Form A (Form B reverse ordered)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD # 1 AD NAME: “adname.avi”</td>
</tr>
</tbody>
</table>

1. The pictures match the words or sounds in this ad.  
   - Strongly disagree: 1  2  3  4  5  
   - Strongly agree:  

2. This ad often shifts from one image to another.  
   - Strongly disagree: 1  2  3  4  5  
   - Strongly agree:  

3. This ad mostly focuses on one person.  
   - Strongly disagree: 1  2  3  4  5  
   - Strongly agree:  

4. This ad is unusual.  
   - Strongly disagree: 1  2  3  4  5  
   - Strongly agree:  

5. The action in this ad occurs in one place.  
   - Strongly disagree: 1  2  3  4  5  
   - Strongly agree:  

6. This ad is complex.  
   - Strongly disagree: 1  2  3  4  5  
   - Strongly agree:  

7. The sounds and words and pictures in this ad fit together.  
   - Strongly disagree: 1  2  3  4  5  
   - Strongly agree:  

8. This ad is bizarre.  
   - Strongly disagree: 1  2  3  4  5  
   - Strongly agree:  

9. All of the pieces of this ad are connected or related to each other.  
   - Strongly disagree: 1  2  3  4  5  
   - Strongly agree:  

10. This ad uses specific or concrete examples.  
    - Strongly disagree: 1  2  3  4  5  
    - Strongly agree:  

11. This ad is coherent.  
    - Strongly disagree: 1  2  3  4  5  
    - Strongly agree:  

12. The action in this ad occurs at one point in time.  
    - Strongly disagree: 1  2  3  4  5  
    - Strongly agree:  

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Chapter 6 Appendix B

Rules for CUTS and FACES

Rules for counting a cut

A cut is a transition to a different camera perspective that results in the depiction of a new visual environment or entirely new visual information. The following rules further clarify that notion.

- Any transition to a new physical environment (one that is not visible in, or contiguous with, the previous shot) counts as a cut.

- A transition to a close up of a face (at least \( \frac{1}{5} \) of the screen) also counts as a cut, even if the face was partially visible in the establishing shot and the same environment is depicted. This idea is based on Lang’s (personal communication, 2001) recommendation.

- If transition depicts the exact same room but results in the depiction of an entirely new face (see above for definition) in the same room, it will count as a cut the first time that the person (or people) in question appears. Each subsequent repetition of the person will not count as a cut (unless, of course, the environment has changed between shots of the face and the shot with a face now represents a cut from a different visual environment).

- If the same people are depicted in the exact same room in a sequence of shots that could not physically have occurred without editing, e.g., alternative versions of the same scenario, the first transition to a repeated scenario will count as a cut. Each subsequent repetition in the uninterrupted sequence will not count as a cut.

- Any transition from whole screen to split screen with different environments depicted is cut.

- Each new introduction of new scene in each separate screen (in case of split screen) is a cut.

- Transition to whole screen from split in which one of the scenes is enlarged to become the whole screen is an edit and not a cut.

- Transition to black (or other color) screen with text is a cut. Transition from one line of text to another, however, is an edit and not a cut.

- Special effects or graphics allow for some transitions in which only a part of a screen display changes, e.g., an abstract image changing one-fourth at a time. In these cases, at least half of the screen area needs to change to a new image in order to constitute a cut. At least 50 percent of the screen needs to change in order to count as a cut.

Rules for counting a face

- A face is comprised of at least one eye, a nose, and part of a mouth.

- A face must be at least one-fifth the total height of the screen when measured from the top of the head to the bottom of the chin, or in the case of a partially obstructed face from top to bottom of the visible portion of the head. Hats or other head coverings count as part of head.

- Because software used to view the advertisements allows a playback rate of approximately 11 frames per second, the face must be in focus for six consecutive frames to be counted.

- If the same person appears twice, but at different ages, only one face will be counted.
Chapter Notes

1 Because, as discussed, we can consider even a cut to a black screen with text as a shift in time or location, then completely context stable television content is likely rare. In light of that, our exploration of this hypothesis focuses on television content that is at least minimally context dynamic, while acknowledging that some minimal instability might actually invite processing and encoding relative to complete stability.

2 It should be noted that attention, in this case, essentially refers to the expenditure of cognitive energy for visual processing in response to stimuli (rather than to a more broad notion of attention as pondering or elaborately thinking about an object after immediate processing.)

3 They actually employ this finding as validation of their COE alpha measure in light of past work by others linking alpha frequency and cognitive activity, e.g., Gevins, Doyle, Schaffer, Callaway, & Yeager (1980).

4 It is worth noting that studies such as that by Reeves et al. (1985) essentially investigate what might be called immediate local processing (Thorson, Reeves, & Schleuder, 1986) involving the physical structure of stimuli. Such processing can be differentiated from global processing, which involves, at the risk of oversimplifying, comprehension of content as intelligible information with possible meaning. At the same time, the notion that context instability of media content can affect recognition also finds support from studies involving more global-level variables. So-called less complex (in terms of cuts and transitions) television messages, for example, appear to garner more focus and stable elaboration from participants regarding the messages than do more complex counterparts (Thorson, Reeves, & Schleuder, 1985). In explaining this notion, Thorson and colleagues claim that simpler material might be more engaging and more involving, thus affording more complete or uniform processing and storage. This finding is consistent with other work in which text materials judged to be “simple” produced longer reaction times for a secondary task than those judged “difficult” (Britton & Tesser, 1982).

5 Schmitt and colleagues also make a distinction between lexical relations among components versus conceptual relations among components, the former involving to linguistic derivations and phonemic similarity of two verbal items and the latter involving semantic relationships. They provide evidence suggesting that advertisements demonstrating lexical relations among components (namely, advertisement copy and brand name) enhanced memory more than advertisements with conceptual relations only.

6 There exists a large body of attempts to define vividness (Block & Keller, 1997; Denis, 1995; Frey & Eagly, 1993; McKelvie, 1995; Smith & Schaffer, 2000; Stapel & Velthuijsen, 1996). Much of the literature on vividness suffers from a distinct lack of conceptual clarity (Denis, 1995). While some have attempted to code particular stimuli as being more or less vivid, e.g., Block & Keller (1997), many such instances actually focus on one particular attribute, e.g., the use of case examples versus more abstract information, rather than capturing a somewhat larger concept. Moreover, vividness measures apparently have been more often validated as indicators of individual mental imaging ability, e.g., McKelvie (1995), than as external stimulus descriptors.

7 Because some cases had a value of zero for FACES and the natural log of zero is not computable, a very small constant of .00001 was added to FACES before taking the natural log.
Chapter Seven
Putting It All Together

The diversity of separate analyses presented in preceding chapters represents a concerted attempt to recognize and address a fundamental problem facing much communication research, namely the units of analysis dilemma. Whenever a study, such as the present one, engages a series of variables that by definition should be located at different levels of measurement, the risks of misdirected assignment of units of analysis and misleading results lurk (Bryk & Raudenbush, 1988; Burstein, 1980; Haney, 1980). Bryk and Raudenbush (1988), for example, point out that education data are routinely analyzed solely at the student level. Such a move assumes that educational interventions or organizational contexts, i.e., school-level variables, are constant across all students. Insofar as effects vary both among students and among contexts, conventional approaches may be misleading. Similarly, all media content is not equal, either in terms of general environmental prevalence or in terms of various content features. As a result, I have included content-level analyses throughout this investigation.

By separating analyses into individual-level and advertisement-level approaches, we have avoided some common pitfalls and have presented initial evidence that encoded exposure is rightly understood as a product of multiple levels of predictors. At the same time, research on multilevel modeling, e.g., Rowan, Raudenbush, & Kang (1991) and Sampson, Raudenbush, & Earls (1997), suggests that simultaneous estimation of all predictor levels is more appropriate. Also, there are additional worthwhile analysis avenues to explore. Formal fitting of a multilevel model will highlight answers to three important questions about the NSPY data: one regarding the multilevel distribution of encoded exposure, one regarding the plausibility of a predictive model implied by the preceding five chapters, and one regarding possible cross-level interactions.

Fundamentally, any theory positing that encoded exposure to media content warrants a multilevel understanding assumes that a content-level grouping of data generated to study the
phenomenon will account for a significant amount of the overall variance in the dependent variable. Previous chapters already have demonstrated a strong relationship between advertisement-level predictors and average encoded exposure, which implies that there is sufficient variation in mean encoded exposure between advertisements to warrant the inclusion of a macro-level perspective. Multilevel modeling procedures, nonetheless, can offer additional clarity and more formal evidence. As noted below, for example, assessment of the intraclass correlation as it relates to a specific advertisement grouping will offer a sense of the specific proportion of total variance in encoded exposure that lies between advertisements.

Beyond data structure questions, do the various significant predictors from preceding chapters tell a similar story when included in a single multilevel model? As we will outline, the HLM analysis package (Raudenbush, Bryk, & Congdon, 2001) allows explicit modeling at two levels of analysis so that the estimated effects of independent variables at one level of analysis are adjusted simultaneously for effects at the other level of analysis. Our discussion up to this point has highlighted the role of various predictors as being useful in accounting for variance in encoded exposure, but has not simultaneously assessed all predictors from different levels of analysis. This final multilevel analysis will serve to confirm or to undermine earlier results.

Lastly, advertisement-level predictors may curtail or attenuate the effects of independent-level variables on encoded exposure. Fitting an HLM model will shed light on whether that is the case. Specifically, we can assess whether a significant amount of random variation exists in any estimated individual-level predictor coefficient associated with initial model estimation. Such random variation in a coefficient is predictable (potentially) as a function of advertisement-level variables. In other words, an HLM approach not only estimates individual-level effects within each macro-level group but also assumes that such individual-level effects might vary between groups as a function of macro-level variables. For any such compelling possibilities, we can model the individual-level coefficient in question as a function of content-level predictors, i.e., environmental prevalence and context instability.
Methods

Procedure

The first challenge to be met in fitting an HLM model to the NPSY data was organizational in nature. More than 5,000 adolescents contributed responses for the two waves of NSPY analyzed. As noted earlier in chapter 2, each respondent contributed data in response to a series of interview presentations involving up to four advertisements from the 23 general market advertisements from the campaign. This situation resulted in a stacked dataset, whereby each respondent contributed more than one case of advertisement-specific measures.

In order to organize that data into usable form for a multilevel modeling endeavor, several steps proved useful. First, all cases corresponding to either non-eligible or non-general-market advertisements were removed from the dataset. For example, cases involving bogus advertisements that were shown to NSPY respondents but that did not actually air were removed. Second, one case was selected randomly from each respondent. This move resulted in an initial set of 5,521 cases. After sorting this data by the name of the advertisement for which a respondent contributed data, advertisement-level variables for the 23 advertisements then were merged and linked to the 5,521 cases.

From this original set of 5,521, 9- to 11-year-old respondents and others with missing values on the main independent variables (reiterated below) were dropped via listwise deletion from analyses for this chapter. The default dataset for all analyses in this present chapter has an n of 2,623. The resulting data set allowed analysis of both individuals and of 23 groups of individuals (grouped by advertisement).

Measures

Of the individual-level variables investigated and discussed previously, results most clearly documented the significant predictive power of four television use measures (TVUSE, TVPROGS, CABLE, and ONE), a past drug use indicator (LNUSEDEP), a measure of recent
school attendance (MISSCHL), and at least one conversation variable (DRUGCONV). In addition, dummy indicators of race and ethnic groups (AFAM, HISP, and OTHER, in comparison to WHITE as a reference group) and age (D14to18 and D16to18, in comparison to 12- to 13-year-olds as a reference group) found support. At the content level, environmental prevalence (GRPS) and context instability (LNCUTS) accounted for aggregate-level variance in encoded exposure. Consequently, all of these predictors are part of the multilevel model described below. (While each of these variables demonstrated predictive ability, of course, not all variables behaved in the manner predicted.) Description and distribution for these independent variable measures are reported in previous chapters.

Dependent variable measurement warrants somewhat more discussion. Because each respondent only contributed exposure information related to a single advertisement in the reorganized dataset mentioned above, the relevant measure of encoded exposure here contrasts slightly with previous individual-level analyses. Previously, at the individual level, we have assessed exposure across the series of advertisements shown to an individual. Now, with the reorganized data discussed above, we can look at the number of times a respondent reported being exposed to the one advertisement in question. This exposure measure offers both individual-level variation, i.e., person-to-person variance, and aggregate-level variation, i.e., differences in mean levels of the measure between different advertisements, that afford the very basis for multilevel analysis. In this manner, a single encoded exposure measure (EXPOSE1AD) stands to be analyzed at two different levels simultaneously in the same multilevel model.

Analysis

Among reasonable proposals to address the units of analysis problem for multilevel situations is the family of models known as hierarchical linear models (Bryk & Raudenbush, 1992). Estimation of hierarchical linear models or other similar multilevel models is often more
appropriate than ordinary least squares regression (OLS) methods because it acknowledges a unique error structure at each level, whereas OLS approaches do not automatically do so (Bryk & Raudenbush, 1988; Bryk, Raudenbush, Congdon, & Seltzer, 1986). Such models have been applied to a wide variety of research problems, including modeling academic achievement as a function of student and school variables, e.g., Rowan, Raudenbush, & Kang (1991), and understanding situations involving individual and neighborhood crime variables, e.g., Sampson, Raudenbush, & Earls (1997). We also should be able to apply them here. Accordingly, I used version 5.03 of the HLM program (Raudenbush, Bryk, & Congdon, 2001), which offers maximum likelihood estimation of hierarchical linear models, for this study.

The HLM framework directly accommodates the three major issues posed earlier. The question of whether a multilevel model is more appropriate than a single-level model, for example, can be addressed by looking at two types of statistics: intraclass correlation and reliability estimate of group means. Careful explication of the basic equations underlying these statistics will facilitate all later discussion and so is quite worthwhile.

HLM 5 allows assessment of the degree to which dependent variable variance can be decomposed into significant within-group, e.g., individual-level, and between-group, e.g., advertisement-level, components. Two equations, adapted from Rowan, Raudenbush, & Kang (1991), illustrate this decomposition.

1) Within-advertisement-group model

\[ Y_{ij} = \beta_{0j} + r_{ij} \]

\( Y_{ij} \) is the encoded exposure score for respondent \( i \) in advertisement group \( j \), \( \beta_{0j} \) is the mean score for the advertisement group, and \( r_{ij} \) is a random error for individual \( i \) in group \( j \) that is normally distributed with mean 0 and variance \( \sigma^2 \). The within-group variance \( (\sigma^2) \) will prove useful below.
2) Between-advertisement-group model

\[ \beta_{ij} = \nu_0 + U_{0j} \]

In this equation, \( \nu_0 \) is the grand mean of encoded exposure and \( U_{0j} \) is a random error term that is normally distributed with mean 0 and variance \( \tau \).

These two equations parallel a standard one-way random effects ANOVA model for this situation, in which advertisement group would be considered to be a random factor with varying numbers of respondents in each group. Following from these two equations, we can use the within- and between-group variance components to compute an intraclass correlation with the following equation, also adapted from Rowan, Raudenbush, & Kang (1991).

3) Intraclass correlation

\[ \rho = \frac{\tau}{\sigma^2 + \tau} \]

In this instance, the \( \rho \) parameter essentially is an estimate of the proportion of total variance in encoded exposure that lies between advertisement groups. A relatively high \( \rho \) value would suggest that a relatively large amount of the total variance in encoded exposure lies between advertisements. If a sizable amount of variance can be classified as lying between advertisements, then we will have further evidence of the necessity of approaching exposure as a function of multilevel influences.

Based on these components and the sample size of each group, HLM also offers easy calculation of a measure of the reliability of an estimated group mean. For each group, HLM computes a reliability estimate, \( \alpha_j \), with the equation, \( \alpha_j = \frac{\tau}{\tau + \sigma^2/n_j} \), where \( n_j \) is the sample size for group \( j \). We then can assess the average reliability of the advertisement group mean by
looking at the value of $\alpha_j / k$, where $k$ is the number of advertisement groups (23, in the present analysis). If the average reliability for all groups is relatively high, then we also can have further confidence that between-group analyses of encoded exposure can be presented with relatively less concern about potential dependent measure error (Rowan, Raudenbush, & Kang, 1991).

Answers to both the second and third research problems posed above also can draw upon HLM results as useful evidence. Before addressing complex questions of cross-level interactions, for example, it is crucial to know first whether a simultaneously estimated two-level model of encoded exposure composed of the significant predictors from previous chapters simply will tell a similar story as previous chapters. If it does, we can have further confidence in the particular hypotheses that receive support.

For this purpose, the HLM 5 program allows simultaneous estimation of the following two equations (using restricted maximum likelihood methods to generate parameter estimates and robust standard errors for those estimates). Each equation draws on variables achieving predictive success from chapters 2 through 6.

4) Level one model

$$\text{EXPOSE1AD} = \beta_0 + \beta_1 (TVUSE) + \beta_2 (TVPROGS) + \beta_3 (CABLE) + \beta_4 (ONE) + \beta_5 (AFAM) + \beta_6 (HISP) + \beta_7 (OTHER) + \beta_8 (LNUSEDEP) + \beta_9 (DRUGCONV) + \beta_{10} (D14to15) + \beta_{11} (D16to18) + \beta_{12} (MISSCHL) + r$$

5) Level two model

$$\beta_0 = \nu_{00} + \nu_{01} (GRPS) + \nu_{02} (LNCUTS) + u_0$$

Also, each predictor coefficient is considered to be a function of an intercept and error term. For example, $\beta_1 = \nu_{10} + u_1$.  

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Beyond these parameter estimations, we also will want to talk about the degree to which any estimated overall model explains variance in encoded exposure. A useful and computable statistic for this purpose is the proportion reduction arising from the introduction of an explanatory model (relative to the simple two-level model without predictor variables outlined in equations 1 and 2). This proportion reduction can be interpreted as an indicator of the strength of the explanatory model and can be calculated separately for each level of a proposed two-level model (Bryk and Raudenbush, 1988). Individual-level and advertisement-level explanatory power, in this framework, can be assessed with the following equations.

6) Proportion variance reduction for level one
\[
\frac{(\sigma^2 \text{ of model 1}) - (\sigma^2 \text{ of model 2})}{(\sigma^2 \text{ of model 1})}
\]

7) Proportion variance reduction for level two
\[
\frac{(\tau \text{ of model 1}) - (\tau \text{ of model 2})}{(\tau \text{ of model 1})}
\]

In addition to producing fixed effects estimates to confirm or overturn earlier findings, the HLM program also estimates residual variance components for all of the individual-level predictor slopes estimated. This information will shed light on the third issue raised earlier, namely the possibility of cross-level interactions. Indications of a significant amount of residual variance remaining in the estimated slope for a first-level predictor will suggest the potential usefulness of a more extensive model that includes slopes as outcomes.

In such a more elaborate model, second-level predictors would not only account for differences in group means but also can account for differences in first-level predictor slopes. Not only \( \beta_0 \) but also \( \beta_1 \), for example, might be a function of content prevalence or content.
features. In that instance, HLM can produce estimates for the following model: \( \beta_1 = \nu_{10} + \nu_{11} \) (GRPS) + \( \nu_{12} \) (LNCUTS) + \( u_1 \). When appropriate, I test such additional models below.

Results

Within-advertisement-group versus between-advertisement-group variance

Decomposition of the variance in EXPOSE1AD suggests that a significant and sizable proportion of the variance lies between advertisements, \( t = 5.14, df = 22, p < .01 \). Drawing upon equation 3 from earlier in our discussion and the estimated values of \( \sigma^2 = 11.07 \) and \( \tau = 1.75 \), we can see that \( \rho = .14 \). This intraclass correlation suggests that approximately 14 percent of the total variance in encoded exposure lies between advertisement groups. In addition, the average reliability estimate for advertisement-group exposure means was 0.91, which justifies dependent variable measurement at the group level. Both of these findings suggest macro-level influence.

Multilevel model of encoded exposure: Main effects

Table 7.1 summarizes the results of an estimated multilevel model that includes notable predictors from previous results. As outlined, both individual- and advertisement-level explanatory variables continue to be successful in explaining variance in this context. The extent to which an adolescent had seen television programming targeted by the campaign, attendance at a Channel One school, and reported conversations about drugs all bear positive relationships to encoded exposure, \( p < .01 \) for each. In addition, past drug use continues to bear a negative relationship to encoded exposure, \( p < .01 \). In comparison to 12- to 13-year-olds, 16- to 18-year-old respondents report less encoded exposure and white respondents report more encoded exposure than respondents who are not African-American, Hispanic, or white. Moreover, GRPs continues to predict encoded exposure in a positive fashion and context.
instability maintains its negative relationship to the dependent variable, \( p < .01 \). The basic story stands.

Table 7.1

Multilevel model of encoded exposure (equations 4 and 5)

<table>
<thead>
<tr>
<th>Variable</th>
<th>( B ) (predicting group mean)</th>
<th>( B ) (mean fixed effect)</th>
<th>SE ( B )</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level one (n = 2,623)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TVUSE</td>
<td>( .01 )</td>
<td>( .01 )</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>TVPROGS</td>
<td>( .10^{**} )</td>
<td>( .02 )</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>CABLE</td>
<td>( .01 )</td>
<td>( .003 )</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>ONE</td>
<td>( .31^{**} )</td>
<td>( .11 )</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td><strong>Race/ethnicity</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>( .30 )</td>
<td>( .30 )</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Hispanic</td>
<td>( -.11 )</td>
<td>( .20 )</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>( -.77^{*} )</td>
<td>( .28 )</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>LNUSEDSEP</td>
<td>( -.04^{**} )</td>
<td>( .01 )</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>DRUGCONV</td>
<td>( .07^{**} )</td>
<td>( .02 )</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td><strong>Age comparisons</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14- to 15-years-old</td>
<td>( -.15 )</td>
<td>( .21 )</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>16- to 18-years-old</td>
<td>( -.49^{**} )</td>
<td>( .16 )</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>MISSCHL</td>
<td>( -.11 )</td>
<td>( .08 )</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td><strong>Level two (23 groups)</strong></td>
<td>( .04^{**} )</td>
<td>( .003 )</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>LNCUTS</td>
<td>( -.35^{**} )</td>
<td>( .07 )</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>( -1.35^{**} )</td>
<td>( .35 )</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

Note. Via level two, this model accounts for 26 percent of encoded exposure variance between groups and, via level one, 13 percent of the variance within groups. The reference groups for racial and ethnic and age comparisons are whites and 12- to 13-year-old respondents, respectively. * \( p < .05 \). ** \( p < .01 \). Robust standard errors are reported, as recommended by Raudenbush, Bryk, and Congdon (2001), though estimation of fixed effects without robust standard errors told a similar story. (No probability of \( p < .01 \) reported above exceeded .05 in the non-robust analysis.)

Relatively speaking, this model appears to account for a greater percentage of the explainable between-group variance in encoded exposure than of the within-group variance (though it is worthwhile to recall that the majority of overall exposure variance lies at the individual level in this sample). At the individual level, \( \sigma^2 \) initially was 11.07 and is 9.61 after estimation of this explanatory model, resulting in a 13 percent reduction of variance. At the advertisement level, \( \tau \) initially was 1.75 and is 1.29 after estimation of this explanatory model, resulting in a 26 percent reduction of variance.
Beyond such results, however, the non-significant coefficient for TVUSE warrants attention. Could it be that the relationship of TVUSE to EXPOSE1AD is a function of content-level influences? For some advertisements, the relationship between TVUSE and EXPOSE1AD might be weak enough to dilute the average reported relationship. For example, a cross-level interaction between GRPs and TVUSE could have produced the above pattern; without any prevalence, no amount of TVUSE will produce exposure. We turn to that possibility next.

**Multilevel model of encoded exposure: Cross-level interactions**

We can assess the cross-level influence possibility further by looking at whether there is significant random variation in the TVUSE slope that is potentially attributable to an advertisement-level variable. For example, if we assume that the TVUSE slope itself is a function of $v_{10} + u_1$, then we can assess whether $u_1$ significantly differs from zero. Table 7.2 highlights the final estimation of such error terms associated with the results in table 7.1.

### Table 7.2

<table>
<thead>
<tr>
<th>Random effects for individual-level predictors from table 7.1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variable</strong></td>
</tr>
<tr>
<td>TVUSE</td>
</tr>
<tr>
<td>TVPROGS</td>
</tr>
<tr>
<td>CABLE</td>
</tr>
<tr>
<td>ONE</td>
</tr>
<tr>
<td>Race/ethnicity</td>
</tr>
<tr>
<td>African-American</td>
</tr>
<tr>
<td>Hispanic</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>LNUSED10</td>
</tr>
<tr>
<td>DRUGCONV</td>
</tr>
<tr>
<td>Age comparisons</td>
</tr>
<tr>
<td>14- to 15-years-old</td>
</tr>
<tr>
<td>16- to 18-years-old</td>
</tr>
<tr>
<td>MISSCHL</td>
</tr>
<tr>
<td>Constant</td>
</tr>
</tbody>
</table>

*Note.* *p < .05. **p < .01.
Among other results, analysis of variance components does point to the existence of a significant random effect for the TVUSE slope, \( \chi^2 = 31.44, df = 18, p < .05 \). This suggests that there remains between-group variance in the relationship of TVUSE and EXPOSE1AD that we can attempt to model as a function of level-two predictors. Additionally, table 7.2 also suggests that significant (and potentially explainable) between-group variance exists in the relationship of DRUGCONV to EXPOSE1AD.

The possibility that both of these individual-level patterns are a function of macro-level influences is theoretically interesting. Such evidence could highlight the primacy of campaign information prevalence in determining the relationship of individual-level variables to reported campaign exposure. Such evidence also could demonstrate the amplification or dampening effect of individual variables for content-level influences.

I tested these possibilities by estimating a model that is identical to the model outlined above except that it also assumes the coefficients for TVNEWS and DRUGCONV to not only be a function of a constant and an error, but also a function of GRPs and LNCUTS. In other words, we can assess the usefulness of including \( \beta_1 = \nu_{10} + \nu_{11} (\text{GRPS}) + \nu_{12} (\text{LNCUTS}) + u_1 \) and \( \beta_2 = \nu_{20} + \nu_{21} (\text{GRPS}) + \nu_{22} (\text{LNCUTS}) + u_2 \) among the elements to be estimated, where \( \beta_1 \) is associated with the main effect of TVUSE and \( \beta_2 \) is associated with the main effect of DRUGCONV.

If either content-level variable, i.e., GRPs or LNCUTS, is useful in accounting for variance in the TVUSE slope, for example, then we would expect the successful level-two predictor to garner a significant coefficient, e.g., \( \nu_{11} \) or \( \nu_{12} \) from the equation above. We would expect a similar pattern if either GRPs or LNCUTS can account for variance in the DRUGCONV slope. In addition, the new model including these new terms should account for even more advertisement-level variance than the model outlined in table 7.1.
Table 7.3 outlines the results from estimation of this alternative explanatory model.

Results again highlight the predictive power of TVPROGS, ONE, LNUSEDEP, and age and racial and ethnic comparisons, p < .01 for each. Cross-level dynamics are also now apparent.

Table 7.3

Multilevel model of encoded exposure (with cross-level interactions)

<table>
<thead>
<tr>
<th>Variable</th>
<th>B</th>
<th>SE B</th>
<th>df</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level one</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TVUSE</td>
<td>-.02</td>
<td>0.01</td>
<td>20</td>
</tr>
<tr>
<td>TVPROGS</td>
<td>.10**</td>
<td>0.02</td>
<td>22</td>
</tr>
<tr>
<td>CABLE</td>
<td>.005</td>
<td>0.003</td>
<td>22</td>
</tr>
<tr>
<td>ONE</td>
<td>.33**</td>
<td>0.11</td>
<td>22</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African-American</td>
<td>.32</td>
<td>0.30</td>
<td>22</td>
</tr>
<tr>
<td>Hispanic</td>
<td>-.10</td>
<td>0.20</td>
<td>22</td>
</tr>
<tr>
<td>Other</td>
<td>-.86**</td>
<td>0.27</td>
<td>22</td>
</tr>
<tr>
<td>LNUSEDEP</td>
<td>-.04**</td>
<td>0.01</td>
<td>22</td>
</tr>
<tr>
<td>DRUGCONV</td>
<td>-.01</td>
<td>0.02</td>
<td>20</td>
</tr>
<tr>
<td><strong>Age comparisons</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14- to 15-years-old</td>
<td>-.13</td>
<td>0.22</td>
<td>22</td>
</tr>
<tr>
<td>16- to 18-years-old</td>
<td>-.50**</td>
<td>0.16</td>
<td>22</td>
</tr>
<tr>
<td>MISSCHL</td>
<td>-.12</td>
<td>0.08</td>
<td>22</td>
</tr>
<tr>
<td><strong>Level two</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prediction of level-one intercept</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRPS</td>
<td>.02**</td>
<td>0.005</td>
<td>20</td>
</tr>
<tr>
<td>LNCUTS</td>
<td>-.24**</td>
<td>0.07</td>
<td>20</td>
</tr>
<tr>
<td>Constant</td>
<td>-.56</td>
<td>.34</td>
<td>20</td>
</tr>
<tr>
<td>Prediction of TVUSE B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GRPS</td>
<td>.001**</td>
<td>0.0001</td>
<td>20</td>
</tr>
<tr>
<td>LNCUTS</td>
<td>-.002</td>
<td>0.002</td>
<td>20</td>
</tr>
<tr>
<td>Constant</td>
<td>-.02</td>
<td>0.01</td>
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<tr>
<td>Prediction of DRUGCONV B</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>GRPS</td>
<td>.002**</td>
<td>0.0002</td>
<td>20</td>
</tr>
<tr>
<td>LNCUTS</td>
<td>-.02</td>
<td>0.01</td>
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</tr>
<tr>
<td>Constant</td>
<td>-.01</td>
<td>0.02</td>
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</tr>
</tbody>
</table>

Note. Via level two, this model accounts for 49 percent of the encoded exposure variance between groups and, via level one, 13 percent of the variance within groups. The reference groups for racial and ethnic and age comparisons are whites and 12- to 13-year-old respondents, respectively.

* p < .05. ** p < .01. Robust standard errors are reported, as recommended by Raudenbush, Bryk, and Congdon (2001), though estimation of fixed effects without robust standard errors told a similar story. (No probability of p < .01 reported above exceeded .05 in the non-robust analysis.)
The relationship between TVUSE and EXPOSE1AD and the relationship between DRUGCONV and EXPOSE1AD are associated with the environmental prevalence (GRPS) achieved by a particular advertisement. (LNCUTS is not a significant predictor in this capacity by conventional standards, though was marginally significant with regards to the DRUGCONV slope, \( p = .05 \).) In other words, the environmental prevalence of advertisements either moderates the relationship of particular individual-level variables or itself is moderated by such individual-level variables in its influence on encoded exposure. Television use, for example, appears to have a markedly different relationship with exposure depending on the degree to which the advertisement in question was prevalent on U.S. airwaves. Figure 7.1 illustrates this relationship.

Figure 7.1

Cross-level interaction (GRPs and TVUSE) to predict exposure

![Graph illustrating the relationship between estimated encoded exposure and hours of weekly television at different GRPS levels (GRPS = 70.00, 50.00, 30.00, and 10.00).]
For campaign television advertisements that received prominent airplay, individual television use plays a significant role in positively explaining encoded exposure. For those advertisements receiving little such airplay, however, individual television use does not appear to be an important predictor. We see an upward slope between TVUSE and EXPOSE1AD at high levels of GRPs, whereas the relationship between TVUSE and EXPOSE1AD is essentially flat at the lowest levels of GRPs.

A similar pattern exists with regard to the predictive ability of past conversation about drugs. As table 7.3 suggests, the positive relationship between DRUGCONV and EXPOSE1AD is strongest for those advertisements for which campaign staff purchased or obtained a relatively high degree of environmental prevalence. This evidence further elaborates our understanding of the results presented in earlier chapters.

Importantly, inclusion of GRPs as a predictor of the relationship of TVUSE and DRUGCONV appears to have eliminated any significant random effects remaining for the coefficients of those two individual-level variables. While table 7.2 indicated significant variance in the coefficients initially estimated for each individual-level variable, the model fit and outlined in table 7.3 resulted in insignificant residual variance component estimates for TVUSE and DRUGCONV, p > .10 for each. This evidence again highlights the importance of paying attention to content-level prevalence differences.

Beyond these findings, however, we also can begin to parse out the directional nature of the conversation-exposure relationship. Given that the variable of focus here involves general conversation about drugs, at least two possibilities are plausible. First, it might be the case that encoded exposure to anti-drug campaign advertisements (which itself is a function of environmental prevalence) simply tends to generate discussion, which explains the positive association between the two measures. Our earlier discussion noted theoretical reasons to suspect a second possibility, however, in exploring how conversation about drugs might either sensitize a person's drug-related media content encoding tendencies or, through hypermnesia,
might arouse memory of past anti-drug advertisements and facilitate later recognition ability whenever drugs are discussed.

Results presented up to this point, either in previous chapters or in the above table, essentially go no further than expecting an association between conversation and encoded exposure and allowing for the reciprocal relationship possibilities. Because of the simultaneous estimation of both individual- and content-level effects presented in this chapter, however, we now also should be able to generate an additional piece of evidence regarding the nature of that conversation-exposure relationship by looking at the role of environmental prevalence. Specifically, we can ask whether widespread availability of media content leads to increased discussion or whether there is no relationship between macro-level anti-drug advertisement availability and micro-level discussion. In the first instance, we could view the individual-level conversation-exposure relationship as essentially a symptom of (or mechanism for) a general prevalence-conversation relationship. If there is no relationship between advertisement GRPs and the amount of drug conversation reported by respondents associated with that advertisement, however, then it will be reasonable to understand table 7.3 as suggesting that drug conversation moderates the impact of advertisement GRPs on encoded exposure. We might think of this phenomenon as an memory trace amplification effect.

Using DRUGCONV as a dependent variable, I predicted the mean level of drug conversation in advertisement respondent group simply as a function of GRPS and an error term. (This HLM analysis directly parallels the main analysis above in which GRPS predicted EXPOSE1AD group mean). Results of this analysis undermine the possibility that reported general drug conversation is a function of the environmental prevalence of recent anti-drug advertisements. First, a decomposition of variance suggests that almost all of the variance in DRUGCONV lies within advertisement groups, not between them. Only roughly 1 percent (0.48 / 34.98) of the variance in DRUGCONV lies between advertisement groups. Second, GRPs do not bear a significant predictive relationship to the intercept of DRUGCONV, $B =$
.007, $SE_B = 0.008, df = 21, p > .10$. These results suggest that conversations about drugs between adolescents and their friends and parents do not appear to be a function of the prevalence of specific ONDCP campaign advertisements available during recent months.

In light of this pattern, it seems reasonable to suggest that the amount of general drug-related conversation that occurs in an adolescent’s immediate social network (at least that network comprised of friends and parents or caregivers) moderates the degree to which an anti-drug advertisement’s prevalence translates into later memory trace retrieval for that advertisement. From this perspective, figure 7.2 depicts the cross-level interaction between GRPs and DRUGCONV in an appropriate manner, not only reiterating the general positive relationship between GRPs and encoded exposure but also suggesting that that positive relationship increases in strength when the amount of drug conversations reported by adolescents increases.

Figure 7.2

Cross-level interaction (GRPs and DRUGCONV) to predict exposure

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Discussion

The mere fact that the general pattern of main effects, as described by table 7.1, is essentially consistent (in terms of relationship direction and statistical significance) with the story told in previous chapters is noteworthy. On an individual-level, encoded campaign exposure among 12- to 18-year-olds in the U.S. appears largely to be a function of their media habits, general conversation about drugs with friends and parents, and the extent of their own past drug use. Age and race differences also exist, which in part can be explained by targeting efforts on the part of ONDCP campaign staff. The consistency of these results with our earlier discussion suggests not only that the random subset of responses drawn for this chapter is representative of the full NSPY data discussed in earlier chapters, but also suggests that the HLM procedures introduced here are not radical or unreasonable departures from the ordinary least squares regression efforts outlined earlier.

The present results also offer some important contextual constraints for our discussion, however. For example, throughout this investigation, environmental prevalence and content features have strongly predicted encoded exposure levels; this chapter is no exception, as level two of the final model presented here accounts for about half of the group-level variance in encoded exposure. Nonetheless, it is also worth noting that total between-group variance represents a minority (about 14 percent) of the overall variance in encoded exposure among 12- to 18-year-old adolescents in the U.S., albeit a sizable minority. In other words, while we would be remiss to overlook macro-level effects when discussing encoded exposure (and in fact have avoided such an oversight here by documenting some striking macro-level effects), there is a considerable amount of individual-level variance that remains both outside the domain of macro-level main effects and unaccounted for by the individual variables highlighted here.

At the same time, the HLM efforts of the present chapter also offer more than confirmation or context. By allowing content-level variables not only to predict mean level of encoded exposure but also either to attenuate the relationships between individual-level variables
and encoded exposure or to have their own relationships with exposure moderated by individual-level variables, I markedly improved the predictive power of the multilevel model in question. At the advertisement level, initial efforts accounted for approximately 26 percent of between-group variance in exposure, whereas an alternative model in which GRPs were allowed to predict the slopes of TVUSE and DRUGCONV in their relationships with exposure accounted for approximately one-half of all between-group variance in exposure. In other words, heeding the possibility for cross-level interaction resulted in a doubling of second-level predictive power.

In earlier chapters, the cross-sectional nature of the individual-level measures employed in this study limited discussion about the relationship between conversation and encoded exposure. In this chapter, allowing a macro-level measure that theoretically precedes exposure encoding, i.e., environmental prevalence, to operate in a multilevel analysis afforded some further clarification of the likely nature of the relationship between individual-level conversation and encoded exposure. Given the lack of a group-level relationship between GRPs and general drug conversation reported, past increases or decreases in ONDCP advertisement prevalence do not appear to have preceded or (linearly) motivated recent general drug conversation involving 12- to 18-year-olds. Instead of solely being a product of encoded exposure, then, conversation, however it arises, appears to enhance memory retrieval ability for advertisements and also likely facilitates or moderates the tendency of an advertisement’s environmental prevalence to be translated into encoded exposure reports. Without multilevel modeling results such as those highlighted here, such speculation would enjoy less empirical evidence.

Conclusions

By employing formal multilevel modeling techniques, I have produced three types of useful evidence regarding encoded campaign exposure among U.S. adolescents. First, basic variance decomposition confirmed that the distribution of encoded exposure itself invites a multilevel understanding. A significant and sizable proportion of exposure variance can be
attributed to between-group differences when respondents are grouped according to the advertisement about which they were queried in the selected dataset. Second, an overall predictive model involving the most successful individual-level and content-level predictors from preceding chapters paints a familiar picture, confirming in most instances both the significance and the nature of the predictive power of each included variable. Beyond such results, the multilevel models fit presently also support the hypothesis that advertisement-level variables can interact with individual-level variables in having a joint effect on encoded exposure.

In general, the results highlighted here confirm that encoded exposure is rightly understood as a multilevel phenomenon. Importantly, however, this chapter also highlights ways in which multilevel modeling techniques, such as maximum likelihood estimation of hierarchical linear models, can be useful for approaching communication research questions involving both individual variables and variables that describe mass media content. Not only do various successful predictors of encoded exposure theoretically reside at different levels of measurement, but it also appears that some of these variables moderate the influence of variables located at a different level. Individual adolescents in the U.S. exert some limited influence over their own exposure to strategic media campaigns, but they also appear to be living in a web of influences, ranging from conversations with others to particular features of media content, that affect their memory for campaign material in a variety of ways.
Chapter Notes

1 In addition to the discussion offered later in this chapter, see Rowan, Raudenbush, & Kang (1991) for a useful and thorough overview of intraclass correlation and its relevance to multilevel modeling.

2 This random selection was accomplished by first using both dwelling unit identification number and roster identification number as grouping variables (making each respondent into a single group, in other words) and then randomly selecting one case from each created group. SPSS syntax for this operation was adapted from the follow SPSS advice web site on February 4, 2002: "http://pages.infinit.net/rlevesqu/Syntax/RandomSampling/Select2CasesFromEachGroup.txt".

3 The present analyses, as in previous chapters, employ NSPY weights that reflect sample selection probabilities and compensate for non-response (Hornik et al, 2001). As present analyses utilize HLM 5, however, replicate weights adjustment available through WesVarPC was not employed. Accordingly, I emphasize those results with p < .01, as opposed to results at the conventional .05 level.

4 Robust standard errors are consistent even ordinary least squares assumptions about constant variance of outcomes across groups are incorrect.

5 The degrees of freedom are equal to 18 in this instance because only 19 of the original 23 groups had sufficient data for HLM computation of $\chi^2$ to test random effects. Reported fixed effects and variance components, nonetheless, are based on all data.

6 One age and one race comparison also suggests significant random effects in table 7.2. None of the content-level variables used for this study, however, produced an alternative model that reduced this additional random coefficient variance for age or race significantly. Future investigation of different content-level variables might account for this coefficient variation.
Chapter Eight

Conclusions

Exposure to mass media content is a process that can result in a retrievable, theoretically noteworthy memory trace, i.e., encoded exposure. This volume has described and validated a recognition-based measure of this construct. Past work suggests that an explicitly multilevel model of encoded exposure should be more useful than single-level prediction efforts and such a multilevel model (including significant individual-level predictors and significant content-level predictors) found strong support among a sample of U.S. adolescents with regards to an anti-drug media campaign.

At the same time, the work here also highlights the need for some theoretical revisions. Proponents of an active and intentionally processing audience, for example, may have found some hypotheses of interest in earlier pages but likely will find little empirical evidence to bolster their case here. Because of the extensive terrain that we have covered both to confirm and falsify hypotheses, some extended final remarks will help to summarize where we have been and to comment on where research in this arena might go.

Confirmations

Perhaps unsurprisingly, chapters 2 and 7 both support the hypotheses that individual television use and the environmental prevalence of specific television content will positively predict encoded exposure to that content. Various dimensions of individual television use appear to matter, including not only the sheer volume of one's television diet but also the nature of the programming in that diet. Moreover, the amount of television GRPs garnered by a particular advertisement found clear empirical support as a predictor of the level of encoded exposure enjoyed by that advertisement.

Noteworthy with regards to environmental prevalence were chapter 2 results suggesting that people continue to recognize advertisements for a period longer than a few weeks. This
evidence suggests that encoded exposure to media content, once achieved, might offer a
cognitive resource for individuals for a longer period than the physically ephemeral nature of
electronic communication might seem to imply. While such longevity is striking, though, the
nature of the encoded exposure construct itself helps to explain this endurance. The theoretical
definition of encoded exposure, after all, involves a rudimentary memory trace that is retrievable
upon prompting, a phenomenon that we might see as both more decay-resistant and less complex
than salient counter-argumentation in response to a persuasion attempt, for example. Encoded
exposure is not the same as achieved salience and may hold less value because of that for some
theorists. Nonetheless, as discussed in the introduction, encoded exposure offers an important
building block for various conceptualizations of media effects and such exposure appears to
endure for longer than we might have expected.

Beyond main effects on encoded exposure, chapter 7 also outlines examples of how a
macro-level variable can curtail or attenuate the impact of an individual-level variable. GRPs
positively enhanced the relationship of individual television use to reported encoded exposure
such that relatively few GRPs resulted in roughly a flat-line relationship between individual use
and encoded exposure. While certainly a logical outcome, the result usefully highlights the
primacy of sheer content prevalence in the exposure process. Such results suggest that strategic
communication campaign developers should spend less time worrying about simple trends in
individual media habits, e.g., creating web sites in response to the large number of people now
reporting Internet usage, and spend more time figuring out how to generate prevalence within
various media environments.

Another content-level hypothesis that received support in this study involved the notion
of context instability. As noted earlier, electronic media technology now allows communication
professionals to present image sequences that would not have occurred in usual human
surveillance of the external physical environment prior to this technological innovation, such as
context instable sequences that are discontinuous in their depiction of time or space locations.
In light of the possible disjuncture between the gradual pace of human evolution and this relatively recent technological development, I hypothesized that advertisements with relatively higher context instability should garner lower encoded exposure. Chapter 6 and 7 both support this hypothesis.

The context instability of an advertisement appears to inhibit its achievement of exposure among U.S. adolescents, at least for those campaign advertisements that demonstrate at least minimal context instability. This finding is consistent with past work on the effects of cuts and editing, such as studies by Lang and colleagues (1993) and Geiger and Reeves (1993). A cut, i.e., a shift in depicted time or space, introduces a substantial amount of new information for a person to process and store. Increasing the amount of new scene or context information in an advertisement to be processed logically should (and empirically does seem) to invite a lower likelihood that a sufficient amount of that advertisement will be remembered when a person is later asked to recognize it.

Other hypotheses also received support. Among hypothesized predictors, reported conversation with others about drugs demonstrated positive ability to predict encoded anti-drug campaign exposure that was stronger, i.e., $\beta = .12$ in chapter 5, than that of many other predictors in this study. Both chapter 5 and chapter 7 present clear evidence that the amount of conversation that an adolescent reports having had regarding drugs bears a positive relationship to his or her extent of encoded exposure to ONDCP television advertising. If that pattern of results was merely an artifact of coincidence between interest in having drug conversations and interest in television programming specifically targeted by the campaign, then the pattern likely would have disappeared in the face of controls for various television use indicators. That did not happen. Moreover, because anti-drug advertisement prevalence does not predict the extent of general conversation about drugs (as discussed in chapter 7), results suggest that such conversation likely reinforces memory for campaign advertisements.
Cross-level interaction results from chapter 7 further elaborate this story. If an individual adolescent lives in a conversational web imbued with talk about drugs, that situation actually appears to amplify the exposure impact of anti-drug campaign advertising’s environmental prevalence. The degree to which GRPs are translated into encoded exposure appears to be at least partially a function of the amount of general drug conversation available to an adolescent. This evidence underscores recommendations to include interpersonal communication dimensions in studies of mass media effects, e.g., Hagen & Wasko (2000), Hornik (1989), Katz and Lazarsfeld (1955), and Wright (1986).

Among some groups of adolescents, there is a steady drumbeat of conversation with parents and friends about drugs. Such adolescents likely harbor well-used mental storage facilities with regards to all kinds of drug information that are strengthened, supported, and perhaps even upheld by the conversational demands and opportunities of their daily lives. Those facilities are likely places where anti-drug advertisement memory traces, the stuff of encoded exposure, reside.

What this study does not clarify are reasons why such interpersonal conversation occurs. Media campaigns may generate some conversation in some instances. At the same time, there appears to be a large amount of conversation regarding drugs that arises from dynamics not directly linked to any specific strategic communication campaign effort. Such conversation forms a noteworthy, yet often overlooked, context in which the ONDCP campaign likely operated and in which other campaign efforts undoubtedly toil.

**Surprises**

The opening chapter of this volume emphasizes both individual and extra-individual predictors of encoded exposure in largely balanced fashion. The results of this study do not support that balance. The types of variables receiving the strongest support almost all involve content-level constructs, interpersonal (not exclusively intrapersonal) conversation patterns, or
media use behavior that affects one's opportunity to encounter campaign advertisements. Almost none of those successful predictors directly involve individual tendency to fend off or invite exposure once a person is sitting in front of a television. In contrast, hypotheses that do emphasize individual variation in the processing of anti-drug advertisements at the point of contact, e.g., extremity of attitude toward drugs, did not fare particularly well.

In contrast to individual media use, conversation, or advertisement features, for example, variables related to a person’s ostensible interest in drugs were not useful in positively predicting encoded exposure to related content. The only glimmer of a stable, significant finding with regard to chapter 3 hypotheses involving past drug experience and attitudes toward drugs, for example, actually suggested that a higher degree of past marijuana use among adolescents predicts slightly less encoded exposure to campaign advertisements. That result runs counter to the stated hypothesis and reflects either unmeasured media use differences between marijuana users and non-users or possible memory impairment among marijuana users. Regardless, interest variables were not major predictors in this study.

Certainly, one could argue that interest still has a role to play in this story. Complex patterns of interest in information likely drive one's general media use habits, for example. From that standpoint, people can avoid most exposure to television content by simply turning off the set (and, in the U.S., by attempting to avoid the ubiquitous televisions strewn all over contemporary commercial centers). Aside from questions of media use, nevertheless, we have little evidence to suggest that interest variables directly affect one's encoding and memory of exposure to encountered campaign media content in any substantial manner.

This study also investigated the possible role of processing tendency and ability in explaining individual differences in encoded exposure. Results do not suggest that such tendency is particularly crucial in understanding encoded exposure among U.S. adolescents. Chapter 4 results do not support the theoretical proposition that adolescents become more thorough encoders of anti-drug advertisements as they age, for example. Age actually was a
significant predictor of encoded exposure and is represented in the final model presented in chapter 7. Exposure does not increase among older adolescents, though. Instead, it decreases among older adolescents relative to their 12- to 13-year-old counterparts. This pattern seems likely to result from targeting efforts on the part of campaign staff focused on preventing marijuana trial among early adolescents rather than signaling any fundamental pattern related to cognitive development. Results also provide only limited initial support to suggest that sensation-seeking tendency is positively associated with EXPOSURE. (SENSEEK later failed to garner significance in the full model including conversation variables presented in chapter 5).

Some of these failed hypothesis tests might result from irrelevant operationalization and measurement rather than fundamental undermining of the idea that individual interest and processing tendency matters with regard to exposure encoding. Perhaps the present indicators of ostensible interest in anti-drug advertisements, for example, were not the best ones to use. After all, chapter 3 did outline some limited evidence to support the idea that similarity between depicted models and audience members in terms of demographic variables might enhance exposure prospects. In general, however, it seems more likely that the process of exposure simply occurs at a basic level that is less affected by complex attitudinal considerations than are subsequent processes, such as counter-argumentation.¹

Despite the failure of chapter 3 and 4 hypotheses, it is crucial to point out that these results do not suggest that the nature of human cognition does not matter for explanations for encoded exposure. To the contrary, results such as the apparent impact of context instability in chapters 6 and 7 suggest that the limits and constraints of human processing systems matter quite a bit. What is interesting, though, is that, with regards to basic encoded exposure, what is largely common to all humans, e.g., difficulty coping with rapid scene changes that differ from the types of physical environments processed by our ancestors, matters as much or more than differences among us.
Future directions

This study employed nationally representative data from U.S. adolescents in response to a national anti-drug mass media campaign, specifically focusing on encoded exposure to television advertisements from that campaign. Any careful reader of that sentence might question the degree to which these results can be said to represent a wider universe of human populations beyond the intended audience of the ONDCP campaign. One might recommend replicating these findings with different age groups, for example.

The specific results presented here, however, actually suggest that striking differences are not particularly likely to arise if we were to investigate different demographic groups. Various results failed to signal any differences in exposure encoding related to sex, age, or topic-interest, for example, that could not be explained by campaign targeting efforts. Moreover, the success of many predictors in this study, e.g., formal content features or television use variables, likely was not dependent on the fact that this study involved adolescents in the U.S.

That said, this study does focus specifically on television advertisements and so an interesting dimension for future study could involve explorations of exposure via different media or different formats. Present discussion of context instability, for example, draws on visual communication research. Whether similar results are likely for radio content, for example, is an open question. Also, the units of media content in question are relatively short in length. Investigation of encoded exposure to content of a greater length or different format would be useful.

In addition, future research should address a more general model that links encoded exposure to a variety of attitudinal and behavioral consequences. Not all instances of exposure lead to attitude or behavior change, of course, but certainly encoded exposure to information is one part of a complex web of variables relevant for that arena of understanding. Whereas encoded exposure is at least partially the product of campaign staff efforts and a variety of
environmental dynamics, work that attempts to link encoded exposure to attitude and behavior change might assign greater importance to individual-level constructs.

While outside the immediate domain of this study, understanding when, why, and among whom conversations about a particular campaign topic often occur also would seem to be an important dimension of understanding for future strategic communication campaign evaluations, as noted earlier. Beyond the effect of introducing new ideas or of communicating social norms to an individual, conversations about a particular topic might also amplify or reinforce the exposure impact of mass media messages involving that same topic and so be an overlooked reason why some campaigns achieve exposure more than others. Extra-individual conversational prompting, neither exclusively an attitudinal or belief variable or a phenomenon residing at the level of mass media content, might play a role in mass media exposure that has been overlooked. Certainly, this area is one that warrants further research, not only among different populations and for different media but also with different types of research designs that can better capture the interrelationship of the interpersonal and the mass mediated.

Implications

In what ways do any of the results presented here matter? Ultimately, that is a question the reader is invited to answer. This volume, nonetheless, offers at least four different reasons that we should either have more confidence in past thinking or should consider overturning past arguments.

First, the predictive success of a multilevel model of encoded exposure here supports past recommendations to treat mass communication research as a multilevel phenomenon (Pan & McLeod, 1991; Price, Ritchie, & Eulau, 1991). Price and colleagues (1991), as noted earlier, have argued that much communication research lies at an intersection of macro-level theorizing and available micro-level measurement and could be informed by cross-level or multilevel
approaches. This study underscores the importance of future efforts both to think clearly about units of analysis and to develop multilevel communication theory.

Second, we should heed the potential role of interpersonal conversation (or electronically mediated conversation involving a relatively small number of people) in amplifying mass media exposure. As noted earlier, communication research in the past century has considered interpersonal communication in a variety of ways. One role suggested by this study involves the potential for conversation on a topic to act as an environmental backdrop that prompts individuals to maintain memory traces related to media content involving that topic.

Third, the relative success of variables related to macro-level media content presentation (and the relative lack of success of variables related to individual interest or tendency in processing that content) supports policy considerations that acknowledge that individuals operate in mass communication environments over which they exert little or incomplete control. Scholars who suggest that individuals essentially can fend off the effects of ubiquitous media content through creative interpretation of, or responses to, that content theoretically overlook the degree to which simple encoding of exposure to such content is itself an effect of sorts. Cooley's aforementioned notion that communication can affect a society by "fixing certain thoughts at the expense of others to which no awakening suggestion comes" (1909, p. 64) presages the idea that encoded exposure driven by macro-level forces matters, if only through the impact of crowding other ideas off public stages. In the present case, the ONDCP campaign decided to invest resources in ensuring the environmental prevalence of its anti-drug advertisements in a variety of U.S. information environments. Those advertisements may or may not directly dissuade an adolescent from trying marijuana, but the prevalence of those advertisements did provide a source of cultural currency shared among the exposed audience (either intended or unintended) of the campaign.²

Fourth, we should continue to pay attention to the biological, psychological, and perceptual constraints common to all humans when pursuing human communication research
questions. Strategic communication professionals interested in imprinting information, for example, would be well advised to restrain themselves from indulging in rapid-fire editing techniques that favors context instability to the detriment of exposure encoding. Communication scholars would be well advised to focus on the rift between information technologies that humans create and the information processing capacities that we inherit.

Final thoughts

Our discussion of the communication exposure process as it relates to large-scale mass mediated campaigns has traversed more pages and analyses than a casual observer initially might have thought were warranted. The diversity of ideas and results presented, however, hopefully justifies the effort. This volume devotes a large amount of space to theoretical discussion of exposure and one of its outcomes, encoded exposure in individuals. Such discussion is surprisingly lacking in campaign evaluation and communication research literatures. The analyses in preceding pages also outline various ways in which careful consideration of the seemingly simple construct of encoded exposure can highlight important power dynamics within the information environments in which many individuals currently operate. From that standpoint, this study of exposure is noteworthy. That said, like most social science research, the clarification and empirical confirmation offered here raises as many questions as it answers, inviting future investigation that begins by acknowledging encoded exposure as a distinct construct borne of influences at varying levels of abstraction relative to human perspectives.

Chapter Notes

1 We also might return to the chapter 1 distinction between denotation and connotation as a source of explanation for these results.

2 Recently, I overheard two women discussing ONDCP campaign advertisements that aired during the Super Bowl. That cognitive energy could have been spent on something else.
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Chapter Two References


Chapter Three References


Chapter Four References


Chapter Five References


Chapter Six References


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Chapter Seven References


Chapter Eight References


