Perceived Message Sensation Value (PMSV) and the Dimensions and Validation of a PMSV Scale

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Sensation seeking has been linked to drug abuse and risky behaviors, and is positively associated with preferences for messages high in sensation value (i.e., perceived to be highly novel, arousing, dramatic, or intense). This suggests the utility of valid and reliable measures of perceived message sensation value (PMSV) in research on information processing, persuasion, and reducing risk-related behaviors. Dimensions and construct validity of a 17-item PMSV scale were examined via 2 studies: 1 of 368 high school students' reactions to televised antimarijuana public service announcements (PSAs) and one of 444 college students' responses to televised anticocaine PSAs. Exploratory and confirmatory factor analyses indicated 3-dimensional solutions for the PMSV scale were nearly identical for high sensation seeking (HSS) and low sensation

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seeking (LSS) respondents in Study 1 and HSS respondents in Study 2. Total scale alphas were .87 for Study 1 and .93 for Study 2. The PMSV scale and its dimensions (Emotional Arousal, Dramatic Impact, Novelty) were positively correlated with affective response measures in both studies for HSS and LSS. Study 1 also examined cognitive, narrative, and sensory PSA processing, which were found to be positively associated with total PMSV and the Arousal and Dramatic Impact dimensions of PSMV for both HSS and LSS.

Recent research has found that the personality trait of sensation seeking, which has been closely linked to a variety of risk-related behaviors like drug abuse and unprotected sex, also is strongly associated with preferences for highly novel, arousing, dramatic, or unconventional messages (Donohew, 1990; Donohew, Lorch & Palmgreen, 1998; Palmgreen & Donohew, in press; Palmgreen et al., 1991). This research, encompassing formative, experimental, and field research, has shown that *message sensation value* ("the degree to which formal and content audio-visual features of a message elicit sensory, affective, and arousal responses;" Palmgreen et al., 1991, p. 219) plays a major role in high and low sensation seekers' preferences for and reactions to persuasive messages. High sensation seekers (HSS) display higher attention and recall, deeper processing, and greater attitude and behavior change in response to messages perceived to be high in sensation value (HSV) compared to messages perceived as low in sensation value (LSV; Donohew, Lorch, & Palmgreen, 1991; Everett & Palmgreen, 1995; Lorch et al., 1994; Palmgreen et al., 1991; Stephenson, 1999; Stephenson & Palmgreen, 2001). Low sensation seekers (LSS), on the other hand, generally display less favorable reactions to HSV messages and usually prefer messages notably lower in sensation value.

This research suggests the considerable utility of valid and reliable measures of perceived message sensation value in theoretical research on information processing and persuasion, and in formative research in developing messages for health interventions aimed at reducing risk-related behaviors of HSS. The purpose of this article is to present such a scale along with evidence for its dimensionality, reliability, and construct validity so that health communication practitioners and researchers can assess the sensation value of their messages in both formative and theoretical research.

The only scale measuring perceived message sensation value (PMSV) was developed by Everett and Palmgreen (1995) and used to classify televised anticocaine public service announcements (PSAs) as either higher or lower in PMSV. The 4 PSAs classified as HSV were considerably more effective with HSS in this experiment than 4 LSV PSAs in enhancing free and cued message recall, promoting more anticocaine attitudes, and reducing intentions to try cocaine. LSS displayed generally the opposite reactions. Stephenson and Palmgreen (2001) employed the same scale to investigate the relationship between the PMSV of antimarijuana PSAs and the amount and valence of processing of the PSAs by HSS or LSS adolescents. The

PSAs in that study were initially considered to be only moderate in sensation value, because of their focus on the less serious and dramatic consequences of marijuana as compared to harder drugs, an expectation confirmed by mean PMSV levels. Nonetheless, greater PMSV at the individual level was positively associated among both HSS and LSS with both amount and valence (positive) of the three types of processing evaluated: cognitive, narrative, and sensory. Among HSS, who were twice as likely to use marijuana in the past month than LSS, PMSV was a particularly important predictor of PSA narrative processing, and an important mediator of more positive cognitive message processing, more negative attitudes toward marijuana, and lower intentions to use marijuana (Stephenson, 1999). Greater PMSV also contributed to persuasive effects of the PSAs among LSS, but in a more direct fashion through cognitive processing.

At this point, then, the PMSV scale has demonstrated high reliability and excellent construct validity in the two studies that have employed it. However, because the above studies did not address these issues, we know little about the scale's dimensional structure and the relationship of those dimensions to message processing variables. Items tapping sensory, affective, emotional, and novelty responses to messages are included in the scale, but no factor analyses, either exploratory or confirmatory, have been performed. Further work also is needed to explore the relationships among PMSV (and its dimensions) and message processing variables among HSS and LSS, and to investigate ties with measures of affective responses to messages, through which PMSV is assumed to exercise much of its impact. The goal of this article, therefore, is to investigate these issues by drawing upon data from two studies. The first is the study discussed previously (Stephenson,1999; Stephenson & Palmgreen, 2001) of 368 adolescents who responded to televised antimarijuana PSAs. The second is a study of 444 college students who were exposed to televised anticocaine PSAs.

SENSATION SEEKING AND RISKY BEHAVIOR

Sensation seeking is a trait based on the concept that persons differ reliably in their need for novel, complex, arousing, and emotionally complex stimuli and experiences (Zuckerman, 1979, 1994). Research involving dozens of studies since the 1960s, employing several varieties of Zuckerman's Sensation Seeking Scale, has confirmed that HSS (usually defined as above the scale median) differ reliably from LSS in their preference for, and emotional and physiological reactions to, stimuli and experiences that are high in sensation and/or risk potential (Zuckerman, 1979, 1994). Like other personality traits, sensation seeking has been shown to have a high heritability factor (Fulker, Eysenck, & Zuckerman, 1980; Zuckerman, 1990, 1994). It also has a number of biochemical correlates, including testosterone, monoamines and their metabolites (particularly monoamine oxidase), and

endorphins (Netter, Hennig, & Roed, 1996; Zuckerman, 1979, 1986, 1994, 1996). Research by Bardo and others (Bardo, Donohew, & Harrington, 1996; Bardo & Mueller, 1991; Bardo, Neiswander, & Pierce, 1989) strongly suggests that novelty-seeking behavior and self-administration of drugs in animals may involve a common dopamine system in the brain. In fact, a moderate to strong association of sensation seeking with alcohol and illicit drug use has been demonstrated in a large number of studies in a variety of populations, cultures, and age groups (e.g., Barnea, Teichman, & Rahav, 1992; Clayton, Cattarello, & Walden, 1991; Donohew, 1988, 1990; Huba, Newcomb, & Bentler, 1981; Kilpatrick, Sutker, & Smith, 1976; Newcomb & McGee, 1989). It also has been related to unprotected sex (Donohew et al., 2000), deviance, violence, law abidance, and other risky activities (Palmgreen & Donohew, in press; Zuckerman, 1994).

Sensation Seeking: Its Origins and Relations to Stimulus and Message Preferences

Zuckerman based his original sensation seeking theory on an optimal level of arousal model (Zuckerman, 1969). The theory suggested that high and low sensation seekers differed in their optimal levels of stimulation and cortical arousal. Later research, however, seemed to indicate that the arousal of subcortical limbic systems (particularly involving the neurotransmitters dopamine and norepinephrine) was the source of reward for high levels of stimulation to HSS (Zuckerman, 1979, 1984, 1994).

Donohew, Palmgreen, and Duncan (1980) developed an activation model of information exposure based in part on both of these approaches to sensation seeking, which assumes that individuals "enter information exposure situations with the expectation of achieving or maintaining [an] optimal state [of arousal]" (p. 297). According to the model, HSS should demonstrate a need or preference for messages that are novel, emotional, arousing, and highly sensory, while LSS should be content with lower levels of these same message attributes (Donohew, Lorch, & Palmgreen, 1998). An extensive program of focus group research with HSS and LSS teens and young adults has added other message characteristics to the list of preferred HSV attributes, including dramatic, complex, intense, graphic or explicit, fast-paced, and suspenseful (Donohew et al., 1991). It is assumed that the greater the number of these characteristics that a message possesses, the greater will be its attraction to HSS.

BIS Versus BAS

A broader and widely recognized psychophysiological theory may also help explain the existence of these two distinct personality types (high and low sensation

seekers) who differ widely in their experiential, behavioral, and message prefer-ences. Accumulating evidence (Depue & Collins, 1999; Gray, 1982; Tomarken & Keener, 1998) indicates that positive and negative forms of activation and behav-ior in general "reflect the operation of two broad, evolutionary adaptive motiva-tional systems that mediate goal-directed approach and withdrawal behaviors" (Watson, Wiese, Vaidya, & Tellegen, 1999, pp. 829–830). The primary function of the Behavioral Inhibition System (BIS) appears to be to keep the organism out of trouble—it operates to help organisms avoid aversive stimuli. Gray (1987) has termed BIS a "stop, look, and listen system." According to Gray, BIS concen-trates on analyzing and avoiding certain environmental stimuli, especially novel stimuli that could indicate danger (or "risk"). BIS is highly anticipatory in that it "promotes a vigilant scanning of the environment for potential threats and moti-vates the organism to move cautiously" (Watson et al., 1999, p. 830). According to Watson et al. (1999), BIS is an affectively driven system associated with nega-tive feelings of activation. It is also connected closely to the neurotransmitters se-rotonin (related to aversive stimuli) and norepinephrine (involving alerting to im-portant stimuli; Buck, 1999; Gray 1982).

By comparison, the Behavioral Activation System (BAS) is an appetitive sys-tem of behavioral approach rather than avoidance or inhibition: It directs organ-isms toward situations and experiences that potentially yield pleasure and reward (Watson et al., 1999; p. 830). BAS is associated with novelty *seeking* rather than avoidance. It enhances approach to positive stimuli and promotes engagement with the environment through exploration of the unfamiliar. The neurochemicals associated with this system, dopamine and norepinephrine, are both associated with reward, and are part of the neurochemical system specified by Zuckerman (1979, 1984) to be involved in sensation seeking. Norepinephrine is also involved in BIS, but acts there in its role of increasing sensitivity to important stimuli (espe-cially negative ones). Dopamine cells in the midbrain appear to be involved in BAS, and respond particularly to novel stimuli and unexpected reward. After a re-ward has become routine, such cell activity is reduced substantially (Ashby, Isen, & Turken, 1999).

Individual differences in BIS–BAS.   Davidson (1992) and Tomarken and Keener (1998) have demonstrated the connection of BIS to right prefrontal brain activation, and BAS to activation of the left prefrontal area. These authors have ar-gued that there are individual differences in the resting levels of left and right prefrontal activation corresponding to differences in the relative dominance of BIS or BAS in a particular individual. Such differences in the seeking and avoidance of particular kinds of experiences, stimuli, and messages from the environment are at the core of the sensation seeking trait, and may go far toward explaining high and low sensation seekers' preferences for, and differential processing of, messages

which differ in their ability to elicit sensory, affective, or arousal responses. Certainly, given the considerable evidence of the powerful and often conflicting operations of these two basic biobehavioral systems, it is not surprising that individual differences in risk-related and reward-seeking behaviors should occur, or that these variations should be tied to individual differences in preference for and processing of messages of different types.

BIS–BAS, PSAs, AND AFFECT

Because current views posit that emotions are integrated into both lower and higher order brain functions (Buck, 1999), it is not surprising that emotions are intimately connected to the operations of the major behavioral activation and inhibiting systems. In fact, BIS has been associated with a variety of negative emotions, viewed collectively as negative activation, while BAS has been shown to be connected with a plethora of positive emotions, labeled together as positive activation (Buck, 1999; Watson et al., 1999). Individual differences in emotional experience in response to stimuli from the environment have also been tied to these systems (Watson et al., 1999).

Product ads and PSAs have been shown to induce a variety of positive and negative affective reactions (Dillard, Plotnick, Godbold, Freimuth, & Edgar, 1996; Gardner, 1994), and to influence processing of such ads (Englis, 1994; Gardner, 1994; Hitchon & Thorson, 1995; Thorson & Friestad, 1989). Nabi (1999) has recently proposed a persuasion model that specifically integrates rational and emotional appeals and suggests that message-induced emotions influence attitudes through a complex process of motivated attention and processing.

In addition, the message characteristics associated with high message sensation value (e.g., novel, dramatic, graphic or explicit, stimulating, suspenseful) would be expected to trigger a variety of emotional states in message recipients, which may differ according to the sensation-seeking levels of individuals. One of the major goals of this study, then, is to investigate the nature of any relationships between perceived message sensation value of antidrug PSAs and affective responses to these PSAs among high and low sensation seekers.

MSV Versus PMSV

The definition of message sensation value advanced by Palmgreen and his colleagues allows one to think of the concept either as an *attribute of a message* related to its content and formal features, or as the sensory, affective, and arousal *responses* to such message features. We think it is useful to think of the former (message sensation value as message attribute) as message sensation value (MSV) per se, and of

the latter (MSV as receiver response) as *perceived* message sensation value (PMSV). Certain aspects of message sensation value as a message attribute have been investigated fruitfully through Berlyne's research on the *arousal potential* of a stimulus (Berlyne, 1971; Berlyne & Madsen, 1973), and by Lang and her colleagues' research on television message variables like arousing content, production pacing, edits, and related versus unrelated cuts (Lang, 2000; Lang, Bolls, Potter, & Kawahara, 1999; Lang, Dhillon, & Dong, 1995).[1] Researchers in the prevention research tradition discussed above have employed the more "objective" MSV characteristics in designing prevention messages, and PMSV in measuring subjective responses to these messages. The first and second authors currently are engaged in research that more directly examines the relationship between the two conceptualizations. This study, however, is focused on examining and validating a measuring instrument for PMSV employing data from different populations and antidrug PSAs for different substances. Such a measure not only has the potential to further the science and practice of persuasion directly, but also could be very useful in examining the relationship between message perceptions and more objective conceptualizations of message attributes.

RESEARCH QUESTIONS

The present research was guided by the following research questions (RQs):

RQ1: What are the dimensions of the PMSV scale?
RQ1a: Are these dimensions stable across sensation seeking levels?
RQ1b: Are these dimensions stable across antidrug PSAs for different substances/populations?

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[1] According to Everett and Palmgreen (1995), "In some respects, MSV is broader than Berlyne's concept of arousal potential, and in other ways, the reverse is true. For example, in an attempt to be more consonant with Zuckerman's broad concept of sensation seeking, MSV is more directly concerned with sensory and affective responses than is Berlyne's concept at both the theoretical and operational levels. Although the sensory responses sought by an organism seeking stimulation (as measured by evoked potentials at different levels of the afferent pathways and in the primary sensory neocortical areas) may be associated with arousal, they do not define arousal. Similarly, although affective responses are widely recognized to have an arousal component, the subjective experience of emotion as a psychophysiological sensation does not depend solely on arousal levels. The PSA sensation value scale used in this study thus attempts to capture message perceptions of a sensory, affective, and arousal nature. On the other hand, Berlyne's concept of arousal potential is broader in the sense that it incorporates ecological factors that promote or threaten biological adaptation and consequently appropriateness to the motivational conditions of the moment (Berlyne & Madsen, 1973, p. 14). In our view, this goes well beyond consideration of message variables per se to include an entire range of psychobiological constructs that are not easily measurable" (p. 229).

RQ2: What are the relationships between PMSV (and its dimensions), PSA
        processing measures, and measures of positive and negative affective
        reactions to the PSAs?

RQ2a: Do these relationships differ for HSS and LSS?

METHOD: STUDY 1

The larger purpose of Study 1 was to investigate HSS and LSS adolescents'
cognitive, narrative, sensory, and affective processing of antimarijuana PSAs
perceived to differ in message sensation value, and how such processing influ-
enced persuasive outcomes (Stephenson, 1999). The present article concen-
trates only on the dimensional structure of the PMSV scale employed, and the
cognitive, narrative, sensory, and affective processing correlates of the PMSV
dimensions identified. A fuller account of cognitive, narrative, and sensory
processing as a function of PSA PMSV, as well as their influence on persua-
sive outcomes, is contained in Stephenson (1999) and Stephenson and
Palmgreen (2001).

Participants

Because marijuana use among teens ranks third in use behind alcohol and to-
bacco (Johnston, O'Malley, & Bachman, 1998), adolescents represent an appro-
priate population for assessing how antimarijuana messages are processed. A
total of 368 south Texas high school adolescents in Grades 9 through 12 partici-
pated in this study (median age = 16 years). Fifty-one percent of the participants
were boys. Additionally, the ethnic composition of the group reflected the re-
gion in which this study was conducted (58% Hispanic, 33% White, 3% African
American, 6% Other).

PSAs

A total of six 30 sec antimarijuana PSAs were selected for the study from a large
pool of PSAs produced by the Partnership for a Drug-Free America and a related
National Institute on Drug Abuse-sponsored research project. All PSAs selected
targeted high school adolescents. Given the interest in narrative processing of the
larger investigation, only PSAs that clearly functioned as narratives (i.e., included
characters, goals, predicaments, and consequences) were used (most antidrug
PSAs employ a narrative structure). Finally, PSAs were selected to represent a
range of creative approaches.

Procedures

Students classified as either HSS or LSS (see "Measures") were randomly assigned to one of two school classrooms where they watched three of the six antimarijuana PSAs in one of 26 sessions (n = 10–15 per session). Three different PSAs were shown in each of the two classrooms on a 25-inch color monitor.[2] Although there is no formula for deciding how many messages should be used in studies of message effects, the consensus is generally "more than one." Reeves and Geiger (1994) suggest using multiple messages to attenuate systematic between-message differences and to decrease random error. Additionally, using multiple messages helps control for confounding and increases external validity. Most importantly, in advertising, "considerable cumulative exposure to messages is necessary to achieve desired effects" (Everett & Palmgreen, 1995, p. 235).

The study procedure consisted of three segments. In the first segment, students were told that they were participating in a study of the effectiveness of antimarijuana advertising for teenagers. After completing the consent forms, respondents completed the sensation seeking scale and demographic items.

In the second segment, respondents (Rs) viewed the tape containing three PSAs. The PSAs were viewed sequentially with approximately 3 sec between each PSA. All six possible orders of presentation were utilized across the sessions. Sound was set at the same level for all sessions. After viewing the three PSAs, Rs completed measures of cognitive, narrative, and sensory processing.

The third segment assessed Rs' PMSV and affective reactions to each PSA. Rs viewed the first PSA they had seen earlier and then completed the PMSV scale, followed by the measure of affect. This process was repeated for the second and third PSAs (in the order in which they were previously seen).

Measures

Sensation seeking.   Individuals were classified as either HSS or LSS based on a median split of scores on the 20-item Sensation Seeking Scale for Adolescents (SSS–A). This scale has demonstrated good construct validity. It correlates in ex-

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[2]While the primary focus of Study 1 was on different modes of message processing as a function of sensation seeking, PMSV, and involvement, a secondary objective was to replicate Everett and Palmgreen's (1995) finding that HSV messages would be more effective with HSS than LSV messages. This subsidiary objective influenced certain aspects of the study design. Respondents (Rs) were randomly assigned to view either 3 PSAs classified by pretest (using the PMSV scale described here) to be relatively higher in PMSV, or 3 lower in PMSV (from 15 PSAs pretested). However, these two PSA groups did not differ in mean PSA levels in the main study, possibly because the pretest sample was too small or because the repeated measures nature of the pretest magnified distinctions among the six PSAs. As expected, however, there was sufficient variation across Rs in PMSV for both the HSS and LSS groups to allow examination of the effects of this variable on message processing (see section on "Perceived Message Sensation Value").

pected ways with a variety of drug use measures and indexes of drug risk and pro-
tective factors (Hoyle & Stephenson, in press). Coefficient alpha in this study was
.82. Medians were calculated separately for each group by sex (male and female)
and ethnicity (White, Hispanic, Other).

Perceived message sensation value.   PMSV for each PSA was assessed
with the 17-item scale from Everett and Palmgreen (1995). The scale (see Table 1) is
designed to tap affective, sensory, and arousal responses to messages via bipolar
pairs such as "novel–ordinary," "emotional–unemotional," "exciting–boring," and
"strong sound effects–weak sound effects." Each bipolar pair was assessed with a
7-point Likert-type scale. The scale was highly reliable across the six PSAs used in
this study (mean α = .87). A composite PMSV score was computed for use in the
analyses by averaging across scores for the three PSAs viewed by each R. In both
HSS and LSS samples, PMSV was approximately normally distributed with consid-
erable variation in responses (HSS: M = 3.50, SD = .89, 95% CI: 1.72–5.28; LSS: M =
3.76, SD = .75, 95% CI: 2.26–5.26). Probably due to the milder consequences of mar-
ijuana compared to harder drugs, the mean PMSV of the PSAs was moderate at best,
because the HSS and LSS means were below the midpoint of the 7-point scale.

Cognitive processing.   The amount of cognitive processing—similar to
Petty and Cacioppo's (1986a, 1986b) central processing—that occurred while view-
ing the PSAs was indexed by four items. On a scale of 1 (*not at all*) to 7 (*very much*),
participants were asked, "overall, how much did the PSAs make you" (a) think about
arguments for not using marijuana, (b) "think" rather than "feel," (c) think about the
consequences of using marijuana shown in the PSAs, and (d) think about how mari-
juana might affect my life. These items were selected from two previous studies
where they displayed good construct validity (e.g., Andrews, Durvasula, & Akhter,
1990; Chaudhuri & Buck, 1995). They were slightly modified here for use with ado-
lescents. The cognitive processing scale demonstrated good reliability (α = .84).
    A separate methodological study (Stephenson & Palmgreen, 2001) confirmed
that the summary measures of cognitive, narrative, and sensory processing used
here correlated strongly with a composite index derived from measures taken after
exposure to each individual PSA. The summary measures also correlated moder-
ately with those derived from a conventional measure of thought listing (Petty &
Cacioppo, 1986a, 1986b).

Narrative processing.   Participants responded to the question (again with a
7-point scale) "overall, how much did you pay attention to" (a) the characters in the
PSAs, (b) the storylines in the PSAs, and (c) the situations the characters were in
during the PSAs. The 3-item scale showed good reliability (α = .84).

TABLE 1
Perceived Message Sensation Value Scale (PMSV)

We would like you to rate the PSA (ad, message) you just saw on the following scales. For example, on the first pair of adjectives if you thought the ad was very *unique* give a "1." If you thought it was very *common*, give it a "7." If you thought it was somewhere in between, give it a 2, 3, 4, 5, or 6.

1.	Unique	1	2	3	4	5	6	7	Common
2.	Powerful impact	1	2	3	4	5	6	7	Weak impact
3.	Didn't give me goose bumps	1	2	3	4	5	6	7	Gave me goose bumps
4.	Novel	1	2	3	4	5	6	7	Ordinary
5.	Emotional	1	2	3	4	5	6	7	Unemotional
6.	Boring	1	2	3	4	5	6	7	Exciting
7.	Strong visuals	1	2	3	4	5	6	7	Weak visuals
8.	Not creative	1	2	3	4	5	6	7	Creative
9.	Not graphic	1	2	3	4	5	6	7	Graphic
10.	Arousing	1	2	3	4	5	6	7	Not arousing
11.	Unusual	1	2	3	4	5	6	7	Usual
12.	Involving	1	2	3	4	5	6	7	Uninvolving
13.	Not intense	1	2	3	4	5	6	7	Intense
14.	Weak sound track	1	2	3	4	5	6	7	Strong sound track
15.	Undramatic	1	2	3	4	5	6	7	Dramatic
16.	Stimulating	1	2	3	4	5	6	7	Not stimulating
17.	Strong sound effects	1	2	3	4	5	6	7	Weak sound effects

Note.   PSA = Public service announcement. Items 1, 2, 4, 5, 7, 10, 11, 12, 16, and 17 are reverse-coded so that an average score of "7" indicates very high PMSV and "1" indicates very low PMSV.

Sensory processing.   Participants responded to the question (7-point response scale) "overall, how much did you pay attention to" (a) the PSAs' sound tracks, (b) the PSAs' visual effects, and (c) the PSAs' sound effects ($\alpha = .84$).

Affective evaluation.   Items for affective evaluation of the PSAs were selected from two sources: Batra and Holbrook's (1990) affect response to advertising scale and Chaudhuri and Buck's (1995) affect checklist for advertising evaluation. Respondents scored ten items (selected to tap reactions to antidrug PSAs) on a 7-point Likert-type scale, 1 (*not at all*) to 7 (*extremely*). Rs were asked "did the PSA make you feel" (a) stimulated, (b) excited, (c) distressed, (d) anxious, (e) fearful, (f) afraid, (g) sad, (h) surprised, (i) sympathetic, (j) upset. As with PMSV, responses were summed across the PSAs and averaged.

METHOD: STUDY 2

The sole purpose of Study 2 was to explore the RQs posed earlier, with particular concern for RQ1b: Do the dimensions of the PMSV scale (established in explor-

atory factor analyses of the data in Study 1 for marijuana PSAs shown to adolescents) hold for cocaine PSAs shown to a college sample? Correlates of PMSV dimensions with affective reactions to the PSAs also were explored.

Participants

A total of 444 college students enrolled in the introductory communication course at a midwestern university participated in Study 2. Fifty-eight percent of the participants were women. Ethnically, the sample was 88% White, 6% African American, and 6% Other. The age range was 18 to 24 years (median = 19 years). National surveys indicate cocaine use peaks during these years.

PSAs

Three PSAs were selected from the four PSAs classified as HSV PSAs, and three from the four classified as LSV messages in the study of the effects of anticocaine PSAs on HSS and LSS by Everett and Palmgreen (1995). That study employed the same 17-item scale used in Study 1 to rate PMSV levels of 13 anticocaine PSAs. In that investigation, one-way ANOVA indicated that the 13 PSAs differed significantly on PMSV, $F(12, 37) = 8.54, p < .0001$. A Duncan test indicated that the PSAs in the HSV group differed significantly from those classified as LSV. As expected, the relatively graphic HSV anticocaine PSAs were considerably higher in PMSV than any of the marijuana PSAs employed in Study 1. The LSV PSAs were moderate in sensation value.

Procedure

Students participated in groups of approximately 100–125 individuals in a theater-type classroom during regular class periods. It was explained that the study's purpose was "to study your feelings and reactions to televised PSAs dealing with cocaine use." Respondents were shown all six PSAs arranged so that HSV and LSV spots were alternated. Two different orders of presentation (the second order was the reverse of the first) were shown to alternate class sections. A Proxima color projector was used to display the PSAs on a large pull-down screen, with sound provided by two large speakers flanking the screen. Sound was set at the same level for all sections. Students first completed a consent form. Rs then were shown the first PSA, and asked to complete a "Mood Scale" (i.e., the PANAS scale described in "Affect measure"). They were then shown the same PSA a second time, after which they completed the "PSA Rating Scale" (the measure of PMSV). This procedure

was repeated for the remaining five PSAs. After viewing the last PSA a second time, and completing the PSA Rating Scale, Rs completed a 35-item "Interest and Preference Questionnaire" (the Sensation Seeking Scale), followed by a number of demographic items (sex, ethnicity, and age).

Measures

Affect measure.   Watson, Clark, and Tellegen's (1988) Positive and Negative Affect Scale (PANAS) was employed because it is an extensively validated measure of positive and negative emotions (Crocker, 1997; Watson & Clark, 1991, 1992; Watson & Walker, 1996). This scale is a particularly appropriate index of positive and negative emotions discussed earlier in the BIS–BAS approach to individual differences in sensation seeking and reactions to stimuli. Research on emotions has identified the positive–negative dimension (also labeled "pleasant–unpleasant," or "valence") as one of two primary organizing dimensions of emotional response (arousal or activation being the other). The PANAS scale consists of two 10-item subscales. One measures positive affect (PA), reflecting the extent to which an individual feels a variety of positive affective states (e.g., enthusiastic, active, and alert). The second subscale measures negative affect (NA), which reflects how much an individual's mood is characterized by such states as anger, disgust, fear, and nervousness. In this study the 20 single-term descriptors were randomly ordered, and respondents were asked to indicate on a 7-point scale, 1 (*not at all*) to 7 (*extremely*), to what extent each word described the way they felt "*while watching* the PSA you just saw." Because the PANAS scale had not been used previously to measure reactions to PSAs, the 10-item positive and negative scale items were not summed, but instead all 20 items were subjected to exploratory factor analysis (see Results).

Perceived message sensation value.   PMSV of the PSAs was assessed with the same 17-item scale employed in Study 1 and in Everett and Palmgreen (1995). Mean reliability (coefficient alpha) across the six PSAs in this study was .93.

Sensation seeking.   This was measured using a modified version of Form V of Zuckerman's 40-item Sensation Seeking Scale (Zuckerman, 1979). The original forced-choice format was modified following Perse (1991) and Lawrence (1990) by having participants respond to each high sensation seeking foil using a 7-point scale, 1 (*strongly disagree*) to 7 (*strongly agree*). Five original items referring to alcohol and drug use were not employed to avoid any direct connection between the scale and the antidrug PSAs. Previous research has demonstrated that removing

such items does not reduce the sensation seeking scale's ability to predict drug use. The reliability of the 35-item scale was .90. Again, Rs were classified as either HSS or LSS based on a median split.

RESULTS

Data Analytic Strategy

To investigate RQ1 and establish a factor structure for the PMSV scale, exploratory factor analysis was employed, and subsequently followed by confirmatory factor analysis via structural equation modeling. To establish the construct validity of the scale, as proposed in RQ2, Pearson's *r* was used to assess the correlations between the PMSV factors and the affect dimensions and message processing measures.

Exploratory Factor Analysis

To determine the dimensionality of the 17-item PMSV scale, exploratory factor analysis (EFA) with oblique (promax) rotation was conducted utilizing principal components extraction. EFA was employed separately for each substance (marijuana, cocaine) on the total samples, HSS respondents, and LSS respondents of Studies 1 and 2.

Marijuana.   For the total sample of Study 1 ($N = 368$), three factors emerged which were moderately correlated (*r*s ranging from .03 to .48), and which explained 61% of the total variance. Factor criteria included a minimum eigenvalue of 1.0, minimum loading of .60 per item and no secondary loadings ≥.40, and a minimum of 3 items per factor. For HSS ($n = 186$), three factors emerged very similar to the full sample factors, after slightly adjusting the minimum eigenvalue upward from the standard 1.0 to 1.2 to eliminate a fourth factor with only one item. These three factors displayed generally similar correlations as the total sample (*r*s ranging from .07 to .40) and explained 63% of the total variance. For LSS ($n = 182$), a highly similar three-factor solution emerged indicating moderate correlation between two of the three factors (*r*s ranging from –.02 to .48) and explained 58% of the total variance.

Cocaine.   For the total sample of Study 2 ($N = 444$), three factors very similar to the marijuana study factors emerged, all of which were moderately correlated (*r*s ranging from .46 to .57), and which explained 68% of the total variance. For HSS ($n =$

224), three factors very similar to those in the total sample were found after slightly adjusting the minimum eigenvalue downward from the standard 1.0 to 0.9 (the eigenvalue for the third factor was .99). These three factors displayed correlations similar to the total sample (rs ranging from .53 to .60) and explained 73% of the total variance. For LSS ($n = 220$), a three-factor solution roughly similar to the previous solutions emerged after slightly adjusting the minimum eigenvalue upward from 1.0 to 1.1 (to prevent a fourth factor with one item). Similarly, the factors were moderately correlated (rs ranging from .45 to .58) and explained 65% of the total variance.

Evaluation of EFA Solutions

We selected the marijuana full sample factor structure from Study 1 to employ in subsequent analyses because it best met all factoring criteria and was very representative of the other solutions. Table 2 displays the pattern matrix indicating loadings of variables on the three factors of the full sample solution, as well as the percentage of total variance explained by each. Alpha for the entire scale was .89.

Factor 1 was labeled "emotional arousal" and included the items emotional, powerful, involving, exciting, arousing, stimulating, strong visuals, and strong sound effects. Factor 2 was labeled "dramatic impact" and included the items dramatic, graphic, creative, gives goose bumps, intense, and strong sound track. Factor 3 was labeled "novelty" and included the items novel, unique, and unusual.

CFA

To investigate RQ1a and RQ1b, confirmatory factor analysis (CFA) was employed specifying the three full sample marijuana EFA factors and their respective scale items a priori in order to assess the empirical replicability of this factor solution. We utilized structural equation modeling (SEM) to conduct the CFA because it tests the hypothesis that the relationships among the observed variables (i.e., scale items) are explained by specified latent factors (Bollen, 1989; Hoyle, 1995). Additionally, SEM provided a means of testing our hypothesized three-factor solution (shown in Figure 1) simultaneously while containing measurement error. To evaluate the three-factor solution, four CFA were conducted separately (HSS marijuana, LSS marijuana, HSS cocaine, LSS cocaine).

Following the recommendations of Bentler (Bentler, 1990; Bentler & Bonnett, 1980) and Hoyle (1995), assessment of model fit was determined by three fit indices: chi-square, the Comparative Fit Index (CFI; Bentler, 1989), and the Root Mean Square Error of Approximation (RMSEA; Browne & Cudeck, 1993, Steiger & Lind, 1980). Each has a generally accepted "critical value" that indicates acceptable fit. The χ^2 goodness-of-fit test should be nonsignificant ($p > .05$), CFI values

TABLE 2
Exploratory Factor Analysis Pattern Matrix for Marijuana Public Service Announcement
Perceived Message Sensation Value (PMSV): Total Sample

	Factor		
PMSV Item	Emotional Arousal	Dramatic Impact	Novelty
Unique	−.012	.121	.829[a]
Novel	.074	−.002	.820[a]
Creative	.098	.696[a]	−.070
Unusual	.016	−.099	.786[a]
Powerful	.632[a]	.138	.134
Emotional	.755[a]	−.015	.047
Graphic	−.021	.815[a]	−.012
Involving	.760[a]	−.078	.016
Dramatic	.041	.826[a]	.017
Goose bumps	−.144	.635[a]	.119
Exciting	.789[a]	.037	.059
Arousing	.752[a]	−.067	.092
Intense	.008	.824[a]	.039
Stimulating	.758[a]	−.004	−.039
Strong visuals	.777[a]	.088	−.135
Strong sound track	.123	.702[a]	−.092
Strong sound effects	.734[a]	.038	−.017
Percent of total variance	38.4%	14.9%	7.30%

[a]Factor loadings above .60.

should be above .90 (on a 0 to 1 scale), and RMSEA values ≤.08 indicate "reason-able" fit and values ≤.05 a "close" fit.

Marijuana HSS.   Estimation of the three-factor solution generated promising but not entirely acceptable values for the indices of fit, $\chi^2(116, N = 186) = 259.68, p < .001$; CFI = .91; RMSEA = .082. Modifications specified by the Lagrange Multiplier (LM) test, which suggests relaxing constraints on specific parameters that contribute to model misspecification, significantly improved model fit (see Bentler, 1990; or Byrne, 1994 for a description of modification indices like the LM test). The LM test indicated four pairs of error terms ("strong soundtrack" and "strong sound effects;" "arousing" and "strong visuals;" "strong visuals" and "dramatic;" "involved" and "graphic") were significantly correlated, indicating some commonality not captured by the scale items comprising the latent variables. Releasing these constraints did *not* change the factor structure or the items loading on the factors, but produced significant improvements in fit indices. Although still statistically significant, the chi-square was considerably smaller, $\chi^2(112, N = 186) = 198.91, p < .001$. The CFI (.95) indicated a good model and the RMSEA (.065) indicated a reasonable fit.
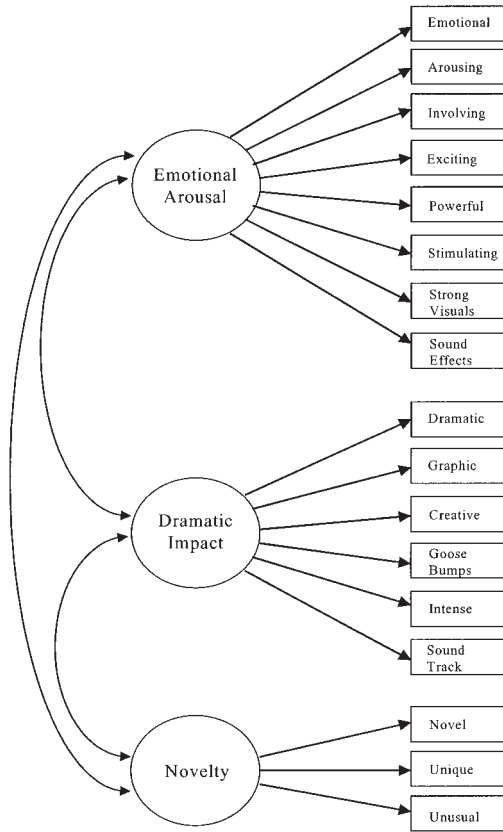
FIGURE 1   Hypothesized three-factor solution for confirmatory factor analyses.

Marijuana LSS.   The three fit indices for the initial estimation of the three-factor solution produced results generally beyond accepted critical values for good model fit, $\chi^2(116, N = 182) = 240.56, p < .001$; CFI = .90; RMSEA = .077. To improve model fit, the LM test suggested freeing constraints for three pairs of correlated error terms ("strong soundtrack" and "strong sound effects;" "strong visuals" and "unusual;" "creative" and "goose bumps"). These changes produced significant improvements in the fit indices. The chi-square was considerably smaller: $\chi^2(113, N = 182) = 194.49, p < .001$. Again, the CFI (.94) indicated a good fit and the RMSEA (.063) a reasonable fit.

Cocaine HSS.   Two of three fit indices for the initial estimation of the three-factor solution were beyond acceptable critical values, $\chi^2(116, N = 224) = 312.50, p < .001$; CFI = .94; RMSEA = .087. The LM test indicated an improved

model fit by freeing constraints for three pairs of correlated error terms ("strong soundtrack" and "strong sound effects;" "arousing" and "stimulating;" "involved" and "exciting"). These changes again produced significant improvements in fit indices. The chi-square was smaller: $\chi^2(113, N = 224) = 227.48, p < .001$. The CFI (.96) indicated a good fit and RMSEA (.068) a reasonable fit.

Cocaine LSS.   All three fit indices for the initial estimation of this model produced unacceptable critical values, $\chi^2(116, N = 220) = 491.84, p < .001$; CFI = .83; RMSEA = .122. Fit statistics still were generally unacceptable after releasing constraints on certain error terms, $\chi^2(111, N = 224) = 359.97, p < .001$; CFI = .89; RMSEA = .101. However, the EFA solution produced a 3-item Novelty factor identical to the other 5 EFA solutions, a Dramatic Impact factor similar to the others but with somewhat weaker loadings for a few items, and a clear 4-item Arousal factor. Also, applying the hypothesized CFA factor structure to this group resulted in highly reliable subscales (Emotional Arousal, $\alpha = .89$; Dramatic Impact, $\alpha = .86$; Novelty, $\alpha = .85$). The alpha for the entire 17-item scale for this group was .92, and all corrected item-total correlations were moderate to strong (.53–.71 for total scale; .56–.72 for Emotional Arousal; .59–.77 for Dramatic Impact; .66–.76 for Novelty). The preponderance of evidence, therefore, indicates the hypothesized CFA dimensional structure was stable across different samples and PSA types. Also, as will be seen later, the correlations between the cocaine study affect measures and the PMSV scale and its subscales were nearly equivalent for the HSS and LSS subgroups (Table 3), providing evidence of the construct validity of the hypothesized 3-factor solution for the LSS group.

Establishing Construct Validity

We next correlated the three-factor solution dimensions with various affect and message processing measures. While both Studies 1 and 2 employed the 17-item PMSV scale, the affective response measures were different. Additionally, the cocaine study did not measure message processing. We first present the factor analyses of the affect measures from the marijuana and cocaine studies, then assess the correlations between the three PMSV dimensions and the affect and message processing measures.

Marijuana affect measures.   To determine the dimensionality of the composite affect measures in Study 1, exploratory factor analysis with oblique (promax) rotation was conducted utilizing principal components extraction. Factor

criteria were the same as for the PMSV EFA (factor loadings not shown for space reasons). Two factors emerged which were moderately correlated ($r = .49$) and which explained 69% of the total variance. One factor was labeled "empathic distress" and included the items fearful, sad, afraid, sympathy, and upset ($\alpha = .89$). The factor is similar to Zillmann and Bryant's (1994) labeling of feelings generated by drama in which a liked central character experiences adversity. The second factor was named "anxious excitement" and contains the items stimulated, excited, anxious, and surprised ($\alpha = .89$). This factor reflects a state of elevated arousal, but tinged with anxiety, perhaps felt for characters in the PSAs who experienced negative consequences. The loading of "surprised" on this factor indicates that novelty plays a role in the aroused state. One item, distressed, was dropped from the final solution because of a double loading.

Cocaine affect measures.   Study 2 participants rated 6 cocaine PSAs on the 20-item PANAS scale (Watson, Clark, & Tellegen, 1988). In previous studies, PANAS has typically displayed two 10-item subdimensions, positive affect and negative affect. To determine if PANAS retained its bi-dimensionality for this study of PSAs, factor analysis with oblique (promax) rotation was conducted using principal components extraction. Factor criteria were the same as for previous EFAs. Three factors emerged which were moderately correlated (rs ranging from .30 to .59) and explained 71% of the total variance.

Reflecting one of the two original PANAS subdimensions, factor one was labeled "negative affect," and included eight of the ten original negative affect items: scared, afraid, upset, distressed, jittery, nervous, irritable, and hostile ($\alpha = .94$). Two items in the original negative affect scale, ashamed and guilty, were eliminated because of substantial double loadings.

The items from the positive affect subscale of PANAS, however, emerged on two separate factors in this analysis. Factor two, labeled "enthusiasm," was comprised of the items enthusiastic, determined, excited, inspired, active, strong, and proud ($\alpha = .92$). Factor three, labeled "attentiveness," included the items interested, alert, and attentive ($\alpha = .89$). The latter factor may have emerged because PSAs are generally embedded in a clutter of TV ads and programming, and viewers have become acclimated to be sensitive to the attention-getting qualities of such brief messages.

Marijuana: PMSV and Affect Dimensions

The correlations from Study 1 between empathic distress, anxious excitement, and the total PMSV scale and subscales are presented for HSS and LSS in Table 3. For HSS, there were significant moderate positive correlations between the total

TABLE 3
Correlations of Perceived Message Sensation Value (PMSV) Subscales and Affect from
Marijuana PSA Study 1 for High Sensation Seekers (HSS; *n* = 186)
and Low Sensation Seekers (LSS; *n* = 182)

		PMSV Scale (α = .89)	Emotional Arousal (α = .90)	Dramatic Impact (α = .85)	Novelty (α = .77)
Empathic distress	HSS	.41***	.29***	.57***	−.02
(α = .89)	LSS	.33***	.18*	.50***	−.08
Anxious excitement	HSS	.33***	.22**	.47***	−.02
(α = .84)	LSS	.25***	.10	.44***	−.05

*p ≤ .05, two-tailed. **p < .01, two-tailed. ***p < .001, two-tailed.

PMSV scale and the two affective factors, Empathic Distress and Anxious Excite-
ment. The Emotional Arousal factor of the PMSV scale demonstrated lower but
significant positive relationships with the two affective factors. Dramatic Impact,
however, showed moderately strong associations with feelings of Empathic Dis-
tress and Anxious Excitement. Somewhat surprisingly for HSS, Novelty was not
related to either affective component.

The relationships between the factors were similar for LSS, although not as
strong. For LSS, the total PMSV scale was positively correlated with both affective
factors. Emotional Arousal was only slightly associated with Empathic Distress but
not at all with Anxious Excitement. As with HSS, the strongest correlations with af-
fect occurred for Dramatic Impact, while Novelty demonstrated no association.

Cocaine: PMSV and Affect Dimensions

The Study 2 correlations between the three affective factors derived from
PANAS and the PMSV scale and its subscales are presented for HSS and LSS in
Table 4. For HSS, the most prominent result was the moderate to strong correla-
tions displayed between Attentiveness and the total PMSV scale and its three
subdimensions. Consistent with theory, individuals rating PSAs greater in
PMSV (or Emotional Arousal, Dramatic Impact, or Novelty) were much more
likely to display affect associated with attention to the anticocaine messages (r^2
ranged from .26 for Attentiveness with Novelty to .50 for Attentiveness with the
total scale). The PMSV scale and its factors were positively related to the other
two PANAS factors as well for HSS. Greater PMSV and the subdimension
Emotional Arousal were positively and moderately associated with both in-
creased Enthusiasm and stronger Negative Affect. Dramatic Impact displayed
even stronger positive correlations with both of these measures. Finally, the
weakest relationships were produced by the Novelty factor, although it was posi-
tively and significantly correlated with Negative Affect.

TABLE 4
Correlations of Perceived Message Sensation Value (PMSV) Subscales and Affect from
Cocaine Public Service Announcement Study 2 for High Sensation Seekers (HSS; *n* = 224)
and Low Sensation Seekers (LSS; *n* = 220)

		PMSV Scale ($\alpha = .94$)	Emotional Arousal ($\alpha = .92$)	Dramatic Impact ($\alpha = .88$)	Novelty ($\alpha = .87$)
Enthusiasm	HSS	.36**	.29**	.47**	.13
($\alpha = .92$)	LSS	.40**	.34**	.46**	.12
Attentiveness	HSS	.71**	.66**	.67**	.51**
($\alpha = .89$)	LSS	.64**	.55**	.68**	.31**
Negative affect	HSS	.42**	.33**	.51**	.20*
($\alpha = .94$)	LSS	.37**	.34**	.40**	.10

*$p < .01$, two-tailed. **$p < .001$, two-tailed.

Mostly similar relationships were reported for LSS. Although a few of the correlations are not quite as strong as for HSS, the PMSV scale and its subdimensions are still most related to Attentiveness, indicating that LSS also paid more attention to anticocaine messages greater in PMSV. The weakest association here is with Novelty ($r = .31$; $r^2 = .096$). Again consistent with theory, Novelty was a much stronger predictor of Attentiveness for HSS ($r = .51$; $r^2 = .26$). The correlations between PMSV and its subscales and Enthusiasm and Negative Affect were comparable in magnitude to those observed for HSS.

Marijuana: PMSV and Message Processing Measures

Table 5 presents the Study 1 correlations between the PMSV scale and subscales and the three message processing measures. For HSS, the total scale and two of three subdimensions exhibited low to moderate positive correlations with message processing measures. Specifically, the total PMSV scale was most positively associated with narrative processing, followed by sensory processing, and least associated with cognitive processing. Emotional Arousal was also most positively associated with narrative processing, with lower and similar correlations with both cognitive and sensory processing. Dramatic Impact was equally associated with narrative and sensory processing, while less so with cognitive processing. Novelty exhibited no significant correlations with any processing measures, despite its effect on attentiveness in Study 2. Overall, for HSS, greater total PMSV, Emotional Arousal, and Dramatic Impact were most likely to generate greater narrative processing, with somewhat weaker effects on sensory and cognitive processing.

By contrast, for LSS total PMSV and its subdimensions (except Novelty) were most strongly correlated with cognitive processing, followed by narrative processing, and then sensory processing. Dramatic Impact facilitated similar levels of all

Table 5

Correlations of Perceived Message Sensation Value (PMSV) Subscales and Message Processing Measures From Marijuana Public Service Announcement Study 1 for High Sensation Seekers (HSS; *n* = 186) and Low Sensation Seekers (LSS; *n* = 182)

Processing		PMSV Scale (α = .89)	Emotional Arousal (α = .90)	Dramatic Impact (α = .85)	Novelty (α = .77)
Cognitive	HSS	.25***	.23**	.24***	.08
(α = .84)	LSS	.38***	.34***	.34***	.08
Narrative	HSS	.36***	.35***	.37***	.00
(α = .84)	LSS	.30***	.24***	.34***	−.01
Sensory	HSS	.28***	.23**	.37***	−.07
(α = .84)	LSS	.29***	.20**	.33***	.09

**p < .01, two-tailed. ***p < .001, two-tailed.

processing types, while Novelty, as with HSS, was not associated with message processing. For LSS, then, greater overall PMSV, Emotional Arousal, and Dramatic Impact were most associated with cognitive processing measures and least with sensory processing.

DISCUSSION

The results of the two studies reported here offer strong support for the construct validity and reliability of the PMSV scale. That the dimensions of PSA PMSV were nearly identical across three of four subgroups differing in sensation seeking, age, ethnicity, and featured drug indicates that the scale may be validly employed with a variety of audience subgroups and PSAs. The somewhat weaker (though still good, considering all evidence) fit of this dimensional structure to the solution for LSS exposed to cocaine PSAs indicates that interactions among message variables and sample characteristics may sometimes affect dimensional solutions.

It would appear that the scale could easily be applied to televised product ads and perhaps even longer audiovisual messages (e.g., TV programs), although PMSV could be expected to vary across different portions of such longer messages. It should also be possible to apply the scale to print content (including that involving still photos such as magazine ads), although this would necessitate dropping items referring to sound tracks and sound and visual effects.

It is also clear from these findings that PMSV as measured here is related to a variety of affective reactions to messages, particularly among HSS. This, of course, was to be expected on the basis of our previous theoretical discussion and because, by definition, message sensation value involves affective reactions (in addition to sensory and arousal responses) to messages. However, only one of the subdimensions of PMSV—Emotional Arousal—has clear emotional overtones, and it was not as strong a predictor of affective reactions (especially in the marijuana study) as Dra-

matic Impact, whose scale items are rarely, if ever, employed as affective descriptors in studies of emotion. In addition, in the cocaine study the Novelty subscale predicted Attentiveness for both HSS and LSS, and Negative Affect among HSS, despite its lack of affect-laden items. It is, then, the ability of a message to produce a variety of perceived *sensations* that appears to be a major source of the intensity of both positive and negative affective reactions to messages.

According to the results of Study 1, higher PMSV also seems to induce higher levels of cognitive, narrative, and sensory processing of PSAs among both HSS and LSS. This may be due principally to PMSV's strong positive influence on Attentiveness observed in the cocaine study for the total scale and all three subdimensions. It is unfortunate that the Attentiveness items were not included in the marijuana study to permit an empirical test of that variable as a mediator of PMSV's effects on message processing. Future studies might include all three kinds of measures.

It is not our purpose here, however, to explore all of the ramifications for theory of the correlations observed in these two studies between PMSV and televised PSA processing, as well as affective reactions to the PSAs. A much more extended treatment of these relationships and their implications for persuasion in the marijuana study, employing structural equation modeling, may be found in Stephenson (1999) and Stephenson and Palmgreen (2001). Rather, our primary goal has been to present data from two very different sources relevant to the validation of a scale which, based on this and previous studies, appears to adequately measure the construct of perceived message sensation value. As such, the scale can be an important tool in research efforts aimed at developing messages which are more effective in a variety of persuasive contexts, especially those in which reaching high sensation seekers about risk-related behaviors is the goal. It also shows much promise for more basic research exploring the complexities of message processing by individuals differing in their needs for sensation and stimulation.

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