



SENSATION SEEKING: A NEW CONCEPTUALIZATION AND A NEW SCALE

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(Received 6 January 1993)

Summary—A new conception of sensation seeking is presented, along with a new scale [the *Arnett Inventory of Sensation Seeking (AISS)*]. The new conception emphasizes novelty and intensity as the two components of sensation seeking. Two studies were conducted to validate the new scale. In the first study, the AISS was found to be more strongly related to risk behavior than Zuckerman's Sensation Seeking Scale (SSS) among 116 adolescents aged 16–18 years, although the new scale contains no items related to risk behavior (in contrast to the SSS). In the second study, involving 139 adolescents, similar relations were found between the AISS and risk behavior, and the new scale was also found to be significantly correlated with the Aggression subscale of the California Psychological Inventory (CPI). In addition, adults ($N = 38$) were found to be lower in sensation seeking than adolescents. In both studies, males were higher in sensation seeking than females.

The concept of sensation seeking developed by Zuckerman and others (Zuckerman, 1979, 1984a, 1990; Zuckerman, Eysenck & Eysenck, 1978) has attracted considerable research attention since its original development. Described as “the need for varied, novel, and complex sensations and experiences, and the willingness to take physical and social risks for the sake of such experiences” (Zuckerman, 1979, p. 10), sensation seeking has been applied especially in relation to risk behavior. It has been reported to be related to dangerous driving practices (Zuckerman & Neeb, 1980; Arnett, 1990), variety of sexual experiences (Zuckerman, Tushup & Finner, 1976), alcohol use (Schwarz, Burkhart & Green, 1978), drug use (Satinder & Black, 1984), and minor criminality (Perez & Torrubia, 1985). The biological basis of sensation seeking has been another area of considerable research (Zuckerman, 1984a). Sensation seeking has been found to be related to augmenting (as opposed to reducing) neurological responses (Lukas, 1987), lower platelet monamine oxidase (MAO) levels (Schooler, Zahn, Murphy & Buchsbaum, 1978), and higher testosterone levels (Daitzman, Zuckerman, Sammelwitz & Ganjam, 1978).

Virtually all of the recent research conducted in the area of sensation seeking has used the Sensation Seeking Scale, Form V (Zuckerman *et al.*, 1978). The widespread use of the scale indicates that many researchers have found the measure to be valid and useful. However, there are certain limitations of conception and form in this scale which limit the conclusions that can be drawn from studies in which it has been used. First, a ‘forced choice’ format is used in the scale, which may be frustrating and perplexing to respondents who feel that both (or neither) of the choices apply to them. Second, several items concern strenuous physical activities such as skiing or mountain climbing, which calls into question the assumption that age differences in responses actually indicate age differences in sensation seeking, rather than age differences in physical strength and endurance. Third, words used in some items are dated (‘hippies’, ‘jet set’, ‘queer’), reflecting the idioms of the late-1960s to early-1970s period when the scale was first developed.

Fourth, and perhaps most seriously, the scale contains numerous items on alcohol use, drug use, and sexual behavior—precisely the types of behavior studied in many of the studies which have employed the measure. This is a serious confounding factor, and casts doubt on the nature of the relationship between these types of behavior and sensation seeking. It suggests that a reported relation between sensation seeking and these types of behavior may be no more than a relation between questions about these types of behavior on the Sensation Seeking Scale, and other, similar questions about these types of behavior. In a more recent version of the scale (Form VI; Zuckerman, 1984b), the items were no longer in the forced-choice format, but the scale was constructed with even more potentially confounding items than Form V. In recent research,

Form V continues to be the version used in most studies, including by Zuckerman himself (e.g. Zuckerman, Ball & Black, 1990).

In this paper a new measure of sensation seeking is presented. One goal in the development of the measure was to avoid the limitations of the Sensation Seeking Scale and provide a new measure that could be used by investigators interested in exploring the relation between sensation seeking and various types of risk behavior, the kind of behavior that has frequently been the focus of research on sensation seeking. Beyond this, however, the conception of sensation seeking which guided the development of this measure was somewhat different than the conception used by Zuckerman (1979, 1984a), in two ways. In Zuckerman's scale and conception, sensation seeking is marked by a need for *novelty and complexity* of stimulation. In contrast, the development of the new scale was guided by a conception of sensation seeking as being characterized by the need for *novelty and intensity* of stimulation. The idea of complexity has not been clearly or adequately developed in theory and research on sensation seeking, and it has been suggested that the other defining quality of sensation seeking, in addition to novelty, is intensity rather than complexity (Wohlwill, 1984). Zuckerman has acknowledged that "the role of intensity [in sensation seeking] may be greater than was supposed", (Zuckerman, 1984a, p. 461), although it did not receive a prominent place in his original theorizing. (Recently, he has added intensity to his conception of sensation seeking; see Zuckerman, 1990, in preparation.) In the new scale, intensity is given equal prominence with novelty as a defining characteristic of sensation seeking.

A second difference in conception that guided the development of the new scale was a greater emphasis on the role of socialization in modifying any biological and/or genetic propensity for sensation seeking. In the theory and research provided by Zuckerman, the biological basis of sensation seeking predominates (Zuckerman, 1979, 1984a), with the role of socialization receiving little attention. In the development of the present scale, sensation seeking was conceived as being influenced by biological predispositions in interaction with the social environment. In this model, socialization is at least as important as biology; the form of expression of sensation seeking depends on the nature of the socialization environment (Farley, 1973), and the tendency may even be suppressed if the socialization environment is highly narrow and restrictive (Arnett, 1992a, b).

Thus sensation seeking is considered to be a predisposition, a potential, which may be expressed in a variety of ways depending on other aspects of the individual's personality and (especially) depending on how the socialization environment guides, shapes, or suppresses that predisposition. Sensation seeking is not only a potential for taking risks, but is more generally a quality of seeking intensity and novelty in sensory experience, which may be expressed in multiple areas of a person's life. In practical terms, this difference meant that in the construction of the new scale the attempt was made to avoid presupposing that the sensation seeking trait must be expressed in norm-breaking or antisocial ways. None of the items on the new scale include such behavior. Rather, it is suggested that the new scale could be used to examine the ways in which the degree of narrowness or restrictiveness in an individual's socialization environment (Arnett, 1992a, b) influences the forms of expression of the sensation seeking tendency.

Many of the items in the scale were constructed in relation to a specific sense—sight, hearing, touch, taste/smell, or the kinesthetic sense—although others concern an overall experience involving intensity or novelty. The intent was to provide a measure of sensation seeking that could be used to predict a wide variety of types of behavior in which the desire for novelty and intensity of sensory experience may be expressed.

To summarize, these were the guideposts for the development of the scale:

- A valid scale of sensation seeking should be composed of items that focus on *novelty* and *intensity* of stimulation of the senses, as well as general items concerning novelty or intensity of experience.
- The scale should be constructed with responses in a Likert-type format.
- The scale should not contain items that are intrinsically age-related, such as items that involve physical strength or stamina.
- Sensation seeking can be expressed in a variety of ways, some antisocial and some socially acceptable, depending on the extent to which the individual's socialization environment

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guides or suppresses the sensation seeking tendency. Because of this, the scale should not contain items that involve illegal or norm-breaking behavior. Whether sensation seeking is related to such behavior is an empirical question, but there is no reason to include such behavior as part of the definition and measurement of sensation seeking per se.

Two studies are presented in support of the reliability and validity of the new scale.

STUDY 1

Method

The sample consisted of 116 adolescents (54 boys, 62 girls) attending a public high school in suburban Atlanta, GA. The students, aged 16–18 years (mean age 17.4), completed the new scale, Zuckerman's Sensation Seeking Scale (Form V), and a questionnaire concerning their participation in various types of risk behavior during the past year. Students were assured of anonymity, and provided no name or other identifying information. All students present on the day of the study were invited to participate, and none refused.

The new scale [the *Arnett Inventory of Sensation Seeking (AISS)*] had 20 items, with two subscales of 10 items each, Intensity and Novelty. The two subscales, and the items comprising them, were developed on the basis of the theoretical perspective described above. For each item, the Ss indicated the extent to which the item described them (1 = describes me very well, 2 = describes me somewhat, 3 = does not describe me very well, 4 = does not describe me at all). Six of the items were worded negatively, in order to avoid an affirmation bias (DeVellis, 1991). The items are shown in the Appendix.

Ss also completed Form V of the *Sensation Seeking Scale (SSS)*; Zuckerman *et al.*, 1978). The SSS has 40 items, with four subscales of 10 items each: Thrill and Adventure Seeking, Disinhibition, Experience Seeking, and Boredom Susceptibility. The format of the scale is forced-choice for each item. The items on the subscales were established through factor analysis. Internal reliabilities for the total scale have been found to range from 0.83, to 0.86. Reliabilities established for the subscales range from 0.56 to 0.82.

Adolescent risk behavior was measured using a 16-item questionnaire developed by the first author and used in previous studies (see Table 1 for the items). On this scale adolescents reported the number of times they had engaged in a variety of risk activities over the past year, in areas including automobile driving behavior, sexual behavior, marijuana use, theft, and vandalism. Responses were structured into ranges originally established on the basis of pilot testing on a suburban (American) high school population. Three month test-retest reliabilities have been found to average over 0.80 for the items on the scale.

Table 1. Correlations between sensation seeking and risk behavior, Study 1

Type of behavior	AISS			Zuckerman SSS
	Total	Intensity	Novelty	
Driving while intoxicated	0.39**	0.41**	0.23*	0.24*
Driving > 80 mph	0.50**	0.48**	0.35**	0.20
Driving > 20 mph over speed limit	0.37**	0.36**	0.25*	0.07
Raced another car while driving	0.47**	0.59**	0.17	0.15
Passed another car in no-passing zone	0.39**	0.48**	0.16	0.15
Sex without contraception	0.02	0.05	0.01	-0.11
Sex with someone not known well	0.28*	0.26*	0.21	0.01
Marijuana use	0.41**	0.36**	0.33**	0.24*
Vandalism	0.38**	0.49**	0.13	0.05
Theft worth < \$50.00	0.51**	0.57**	0.27*	0.09
Theft worth > \$50.00	0.31**	0.39**	0.11	0.01

* $P < 0.01$; ** $P < 0.001$.

For the risk behavior variables, Ss were asked to indicate how many times they had participated in each type of behavior over the past year, and responses were structured into ranges. For driving a car > 80 mph and driving a car > 20 mph over the speed limit, the responses categories were: 0, 1–5 times, 6–20 times, 21–50 times, and > 50 times. For all other items, the categories were 0, once, 2–5 times, 6–10 times, and > 10 times.

Table 2. Correlations between the AISS and the SSS

SSS	Total	AISS	
		Intensity	Novelty
Total	0.41**	0.35**	0.33**
Thrill and Adventure Seeking	0.46**	0.41**	0.36**
Disinhibition	0.35**	0.41**	0.15
Experience Seeking	0.32**	0.12	0.47**
Boredom Susceptibility	0.15	0.16	0.08

** $P < 0.001$.

Results

The new scale was significantly correlated (Table 1) with driving while intoxicated, driving at over 80 mph, driving greater than 20 mph over the speed limit, racing in a car, passing another car in a no-passing zone, sex with someone not known well, marijuana use, vandalism, theft of something worth <\$50, and theft of something worth >\$50. In every case, the AISS was correlated more strongly with risk behavior than was the SSS, which was significantly correlated only with driving while intoxicated and marijuana use. The correlation between the new scale and the SSS was 0.41 for the total scales, and ranged from 0.08 to 0.47 for the subscales (Table 2).

The correlation between the Novelty and Intensity subscales of the AISS was 0.41. In general, the Intensity subscale was more strongly correlated with risk behavior than was the Novelty subscale. Boys were higher in sensation seeking than girls, on the total scale [$F(1,109) = 11.33$, $P < 0.01$] and on the Intensity subscale [$F(1,112) = 13.89$, $P < 0.001$]. Internal reliability was found to be 0.70 for the total scale, and 0.64 and 0.50 for the Intensity and Novelty subscales, respectively.

STUDY 2

Method

The sample consisted of 139 adolescents (aged 16–18 years, 67 boys, 72 girls) attending a public high school in suburban Atlanta, GA, and 38 adults aged 41–59 years (30 of the adults were aged 41–50). The students were from the same high school as the students in Study 1, but Study 2 took place 1 year after Study 1, and none of the students in the first study participated in the second study. Parents of the adolescents who participated in the study were also invited to take part, and 38 agreed to do so (16 men, 22 women), comprising the adult sample. The students took part in the study during school, and all students who were present in class when data was collected participated voluntarily in the study. For the responses of the adults, the questionnaires were taken home to them by their children and then mailed to the author.

In addition to the AISS and questions about risk behavior (for the students), the Aggression subscale from the California Psychological Inventory (CPI; Gough, 1987) was included in Study 2 for the purpose of examining the construct validity of the new scale. The CPI is a well-validated measure used in many studies of personality on individuals from mid-adolescence to old age.

Results

As in Study 1, the AISS was correlated with a variety of types of risk behavior among adolescents, including driving while intoxicated, driving at high speeds, racing in a car, passing in a no-passing zone, having sex with someone not known well, illegal drug use, cigarette smoking, and vandalism (Table 3). Unlike Study 1, in Study 2 the AISS was not correlated significantly with marijuana use or with small or large theft.

Using one-way ANOVAs, it was found that adolescents reported significantly higher sensation seeking on the AISS than the adults did, on the total scale and on both the Intensity and Novelty subscales (Table 4). The age comparison was especially strong for the Intensity subscale. Because the adults were self-selected volunteers while the adolescents were a classroom sample, the age comparisons were also conducted comparing the adults to their own adolescent children rather than to the entire adolescent sample. The age differences were significant for the total scale [$F(1,56) = 15.93$, $P < 0.001$] and the Intensity subscale [$F(1,56) = 23.14$, $P < 0.001$], but not for the Novelty subscale. With regard to the relation between sensation seeking and aggressiveness,

Table 3. Correlations between sensation seeking and risk behavior, Study 2

Type of behavior	AISS		
	Total	Intensity	Novelty
Driving while intoxicated	0.24*	0.23*	0.16
Driving > 80 mph	0.35**	0.33**	0.22*
Driving > 20 mph over speed limit	0.30**	0.32**	0.15
Racing another car while driving	0.29**	0.33**	0.13
Passing another car in no-passing zone	0.35**	0.33**	0.23*
Sex without contraception	0.14	0.24*	-0.04
Sex with contraception	0.21*	0.23*	0.11
Sex with someone not known well	0.30**	0.28**	0.19
Cigarette use	0.25*	0.23*	0.17
Marijuana use	0.20	0.17	0.15
Other illegal drug use	0.23*	0.21*	0.16
Vandalism	0.33**	0.41**	0.09
Shoplifting	0.19	0.16	0.15
Theft worth > \$50.00	0.05	0.06	0.01

* $P < 0.01$; ** $P < 0.001$.

For the risk behavior variables, the response choices were the same as those described in the legend to Table 1, except for cigarette smoking, for which the question was "In the past month, how many days did you smoke at least one cigarette?" and the response choices were: 0, 1-5, 6-10, 11-20, and >20.

among the adolescents sensation seeking was significantly correlated with Aggression (0.32, $P < 0.001$) as measured with the CPI subscale, but for adults the correlation was not significant.

As in Study 1, males were higher in sensation seeking than females. This was true for both the adolescents and the adults. For the adolescents, boys were higher than girls on the total scale [$F(1,137) = 20.84$, $P < 0.001$] and on the Intensity subscale [$F(1,137) = 41.39$, $P < 0.001$]. For the adults, men reported higher sensation seeking than women on the total scale [$F(1,36) = 27.30$, $P < 0.001$], on the Intensity subscale [$F(1,36)$, $P < 0.001$] and on the Novelty subscale [$F(1,36) = 4.13$, $P < 0.05$].

DISCUSSION

The new scale provides an alternative measure to investigators interested in the personality trait of sensation seeking. In the studies presented here, sensation seeking as measured with the new scale was found to be related to a variety of types of risk behavior. Although the AISS contains no items on risk behavior, the new scale was associated more strongly with risk behavior than the SSS, which does contain such items. These findings re-affirm the usefulness of sensation seeking as an explanatory factor with regard to risk behavior, at least among adolescents. Specifically, the results suggest that the desire for intensity and novelty of experience are one motivation for norm-breaking and antisocial behavior. Even with a scale containing no items related to risk behavior, the personality characteristic of sensation seeking is strongly related to a wide variety of such behavior.

Numerous investigators and theorists have noted that sensation seeking or a related quality ('stimulus-seeking', 'fearlessness', 'the search for excitement and tension') are the basis for many types of antisocial behavior (Frankl, 1969; Lykken, 1982) even to the extreme of psychopathy (Cleckley, 1976). It may be that these types of behavior result when a person with a high tendency for sensation seeking develops in a socialization environment that fails to inculcate the self-control that would enable (or require) the person to direct the energy of sensation seeking toward constructive ends.

However, in the theoretical thinking that guided the development of the new scale, sensation seeking is a predisposition, a global trait, and may be directed toward a variety of specific behavioral ends, not just risk behavior. Which ends an individual chooses is likely to depend on

Table 4. Comparison of adolescents and adults on sensation seeking

	Adolescents	Adults	F
AISS total	54.52	45.89	49.72***
Intensity subscale	26.86	19.82	70.21***
Novelty subscale	27.66	26.08	5.15*

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

the nature of the socialization environment, over the course of the person's development as well as in the present. While the focus of much research on sensation seeking has been its relation to risk behavior, other manifestations of the sensation seeking trait should also be explored. For example, sensation seeking as measured by the new scale could be expected to be related to attaining positions of leadership (Arnett, 1991; Lykken, 1982), as such positions often involve high intensity of experience. Also, sensation seeking is likely to be related to the kind of occupation a person chooses, as occupations differ greatly in the degree of intensity and novelty they entail (Farley, 1973). Sensation seeking may also be one of the factors involved in high achievement in some fields, because the enjoyment of intensity can be reflected in the ability to remain poised in high-stress situations, and the desire for novelty can be expressed as creative, divergent thinking (Domangue, 1984). These expressions of sensation seeking may result if a person has been socialized in such a way that the sensation seeking trait has been disciplined and directed by conscience and impulse control.

Males were found to be higher in sensation seeking than females, among both adolescents and adults. This is consistent with gender differences in sensation seeking found using the SSS (Zuckerman *et al.*, 1978). It may be tempting to suggest a biological basis for this difference, as testosterone has been found to be positively related to sensation seeking (see Zuckerman, 1983), and testosterone is higher among males. However, from infancy onward, biological differences between males and females are inextricable from socialization. One area for future research on sensation seeking is the examination of the ways in which boys and girls may have their sensation seeking tendencies socialized into different avenues, resulting in the expression of sensation seeking in gender-related types of behavior.

Age differences were also found in the AISS, with adolescents reporting higher levels of sensation seeking than adults, in general. This, too, is consistent with results from the SSS (Zuckerman *et al.*, 1978). However, the SSS contained numerous items which may have been considered to contain an age bias unrelated to sensation seeking. There were items involving physical strength and stamina, and an item that assumed the respondent was unmarried (concerning dating preferences). That the new scale did not contain such items, and yet resulted in similar finding on age differences, confirms the theoretical notion that sensation seeking is highest in adolescence and declines with age. However, additional age comparisons should be conducted with the new scale, on younger as well as older samples. The sample of adults in the present study was rather small, and it will be necessary to replicate and extend the findings on age differences.

Another area for future research is to compare self-ratings of sensation seeking with peer ratings. While self-judgments of personality have generally been found to agree with peer judgments (Funder & Colvin, 1991), peer judgments are an important confirmation of the validity of self-judgments on any particular trait (Allport & Allport, 1921; Funder, 1991). This kind of research has yet to be conducted for the sensation seeking trait.

Sensation seeking was found in Study 2 to be related to aggressiveness, at least among adolescents, and it is likely that it is related to other personality traits as well. In particular, it is likely to be related to characteristics such as extraversion, psychoticism (Eysenck & Eysenck, 1975), and impulsivity. Relations of this kind have been found for the SSS (Zuckerman, 1983), and they are likely to be found for the new scale as well. Research and theory on personality traits has moved toward a general consensus that there are five main personality traits: Surgency, Neuroticism, Openness, Agreeableness, and Conscientiousness (Digman, 1990). Sensation seeking could probably be considered to be part of the Surgency trait, but sensation seeking is distinctive in that it refers specifically to the intensity and novelty of sensory experience, at least in the theory and scale presented in the present paper. Also, while sensation seeking may be part of the Surgency trait, sensation seeking remains a *global* trait in the sense that it is conceived as comprising a variety of behavioral outcomes (Funder, 1991).

In sum, sensation seeking was conceived here as the extent of a person's desire for novelty and intensity of experience, and a new scale was presented in accord with that conception. The new scale confirmed the relation between sensation seeking and risk behavior, and gender and age differences in sensation seeking were found. Possibilities for future research include the relation between sensation seeking and types of behavior other than risk behavior, and the relationship between sensation seeking and socialization.

Acknowledgements—
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Acknowledgements—This research was funded partly by an institutional training grant from the National Institute of Mental Health 5T32 MH14668-14, for the Clinical Research Training Program in Adolescence, jointly sponsored by the Department of Psychiatry at Northwestern University and the Committee on Human Development at the University of Chicago.

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APPENDIX

The AISS (Arnett Inventory of Sensation Seeking)

For each item, indicate which response best applies to you:

- (A) describes me very well
- (B) describes me somewhat
- (C) does not describe me very well
- (D) does not describe me at all

1. I can see how it would be interesting to marry someone from a foreign country.
2. When the water is very cold, I prefer not to swim even if it is a hot day. (—)
3. If I have to wait in a long line, I'm usually patient about it. (—)
4. When I listen to music, I like it to be loud.
5. When taking a trip, I think it is best to make as few plans as possible and just take it as it comes.
6. I stay away from movies that are said to be frightening or highly suspenseful. (—)
7. I think it's fun and exciting to perform or speak before a group.
8. If I were to go to an amusement park, I would prefer to ride the rollercoaster or other fast rides.
9. I would like to travel to places that are strange and far away.
10. I would never like to gamble with money, even if I could afford it. (—)
11. I would have enjoyed being one of the first explorers of an unknown land.
12. I like a movie where there are a lot of explosions and car chases.
13. I don't like extremely hot and spicy foods. (—)
14. In general, I work better when I'm under pressure.
15. I often like to have the radio or TV on while I'm doing something else, such as reading or cleaning up.
16. It would be interesting to see a car accident happen.
17. I think it's best to order something familiar when eating in a restaurant. (—)
18. I like the feeling of standing next to the edge on a high place and looking down.
19. If it were possible to visit another planet or the moon for free, I would be among the first in line to sign up.
20. I can see how it must be exciting to be in a battle during a war.

Novelty subscale

1. I can see how it would be interesting to marry someone from a foreign country.
3. If I have to wait in a long line, I'm usually patient about it. (—)
5. When taking a trip, I think it is best to make as few plans as possible and just take it as it comes.
7. I think it's fun and exciting to perform or speak before a group.
9. I would like to travel to places that are strange and far away.
11. I would have enjoyed being one of the first explorers of an unknown land.
13. I don't like extremely hot and spicy foods. (—)
15. I often like to have the radio or TV on while I'm doing something else, such as reading or cleaning up.
17. I think it's best to order something familiar when eating in a restaurant. (—)
19. If it were possible to visit another planet or the moon for free, I would be among the first in line to sign up.

Intensity subscale

2. When the water is very cold, I prefer not to swim even if it is a hot day. (—)
4. When I listen to music, I like it to be loud.
6. I stay away from movies that are said to be frightening or highly suspenseful. (—)
8. If I were to go to an amusement park, I would prefer to ride the rollercoaster or other fast rides.
10. I would never like to gamble with money, even if I could afford it. (—)
12. I like a movie where there are a lot of explosions and car chases.
14. In general, I work better when I'm under pressure.
16. It would be interesting to see a car accident happen.
18. I like the feeling of standing next to the edge on a high place and looking down.
20. I can see how it must be exciting to be in a battle during a war.

Scoring: Combine responses to items, with A = 4, B = 3, C = 2, D = 1, so that higher score = higher sensation seeking. items followed by (—), scoring should be *reversed*.