The Motive for Sensory Pleasure: Enjoyment of Nature and Its Representation in Painting, Music, and Literature

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ABSTRACT Eight studies assessed the motive for sensory pleasure (MSP) involving a general disposition to enjoy and pursue pleasant nature-related experiences and avoid unpleasant nature-related experiences. The stated enjoyment of pleasant sights, smells, sounds, and tactile sensations formed a unitary construct that was distinct from sensation seeking, novelty preference, and need for cognition. MSP was found to be related to (a) enjoyment of pleasant nature scenes and music of high but not low clarity; (b) enjoyment of writings that portrayed highly detailed nature scenes; (c) enjoyment of pleasantly themed paintings and dislike of unpleasant paintings, as distinct from findings with Openness to Experience; (d) choice of pleasant nature scenes over exciting or intellectually stimulating scenes; (e) view duration and memory of artistically rendered quilts; (f) interest in detailed information about nature scenes; and (g) frequency of sensory-type suggestions for improvement of a museum exhibit.

The pursuit and enjoyment of natural sensory experience are widespread. Humans across cultures show pleasure in the views of savannahs and forests (Herzog, Herbert, Kaplan, & Crooks, 2000;

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Ribe, 1989), the sights and smells of flowers (Buss, 2004), the sounds of songbirds and music, and the touch of fine fabrics. Studies of recreation document the enjoyment derived from camping, boating, and various other nature activities (Driver, Tinsley, & Manfredo, 1991). Portable devices present high fidelity music to many listeners engaged in daily activities, and much time and money is spent on art, décor, and fashions. But although some individuals are strongly attracted to nature and its cultural manifestations, others show less interest in such sensory experience. The present article explores a possible disposition to enjoy and pursue pleasant sensory experiences in nature and their representation in art and literature.

Surprisingly little systematic research has examined possible individual differences in the enjoyment of nature. This may be because positive psychology has only recently flowered and because contemporary leisure researchers have viewed exhibits in such venues as nature museums, art museums, aquariums, and displays more as opportunities for informal learning than for sensory pleasure. For example, the membership of the Visitor Studies Association, the professional organization devoted to study of visitor experiences in such settings, has contributed greatly to the understanding of lifelong learning but has given little attention to the enjoyment of sensory experiences.

The Motive for Sensory Pleasure

We suggest that there is a general disposition, differing in strength across individuals, to find pleasure in pleasant nature-related experiences and displeasure in unpleasant nature-related experiences (motive for sensory pleasure [MSP]). The underlying disposition that allows individuals to enjoy sweeping vistas, flowing water, and flowers and dislike darkness, strangers, and dense forests would influence hedonic reactivity to representations of nature—both realistic and impressionistic—in painting, music, and literature. The present series of studies developed a scale to measure MSP, examined MSP's relationship to other constructs, and evaluated its behavioral implications.

MSP may be influenced by socialization. Parents, peers, family, mass media, schools, and religious institutions convey values concerning the pleasure of natural experience (Kellert, 1993, 1996). Sensual enjoyment of nature is promoted by naturalistic romanticism, which can be traced to the early Renaissance in the Italian city states and was associated with such subsequent popularizers as Rousseau

(1782/1995) in France and the American transcendentalists Emerson and Thoreau (Thoreau & Harding, 1995). Additional contemporary encouragement of the sensual appreciation of nature ranges from ecologically minded religious groups proclaiming the joyful communion with nature to scientists and artists embracing their sensual connectedness to the natural world (Kellert, 1993, 1996).

Other contemporary influences counter or compete with MSP as sources of motivation. The Protestant work ethic and its Confucian counterpart, in contemporary form, emphasize the self-denial and hard work needed for achievement and the dangers of idle pleasure (Eisenberger, 1989). Such views often take sensual pleasures to be a harmful diversion from important work required for superior achievement at school and on the job, possibly diminishing MSP. Also, some religious groups convey a dismissive view of nature. For example, dominionistic Christians believe that earth was provided for humans' exploitation (Kellert, 1993) and belittle the pleasure taken in nature, perhaps reducing MSP. These favorable and unfavorable social influences may promote or inhibit the development of MSP.

Prior Research on Dispositional Differences in Enjoyment of Nature

Some personality theorists have examined dispositional differences in the enjoyment of sensory experiences that may be related to nature. Chapman and his colleagues (Chapman & Chapman, 1985; Chapman, Chapman, & Raulin, 1976) suggested that *psychosis proneness* may be associated with a lack of enjoyment of physical pleasures generally, including eating, sex, and the experience of nature. Chapman's *physical anhedonia scale*, including items regarding the enjoyment of nature, was found to be related to a decreased liking for various kinds of art (Rawlings, 2000). Used primarily, although not exclusively, in clinical contexts, Chapman's work is an important antecedent to our assessment of MSP.

Jackson (1984) included *sentience*, involving enjoyment of basic sensory pleasures, as one facet of his general personality inventory. According to Jackson (p. 7), the highly sentient person "notices smells, sounds, sights, tastes, and the way things feel; remembers these sensations and believes they are an important part of life; is sensitive to many forms of experience; may maintain an essentially

hedonistic or aesthetic view of life.'' Jackson reported that sentience scores were related positively to peer judgments of respondents. Jackson did not expand conceptually on this brief but tantalizing suggestion of a basic individual difference involving enjoyment of diverse sensory pleasures. Nor did he refine his scale, some items of which are dated, culturally narrow, or tangential (e.g., ''I have never seen a statue that reminded me of a real person'' and ''I would never spend money on a steam bath''). In the present research, we compared the dimensionality of Jackson's scale to the scale we developed to assess MSP.

Because MSP would be related to enjoyment of reproductions of nature in the arts, this disposition may seem to fall within the domain of the five-factor personality model's dimension of Openness to Experience. Studies examining the relationship of Openness with enjoyment of positively themed paintings of various types have reported mixed findings, suggesting the type of painting may be important (Furnham & Avison, 1997; Furnham & Chamorro-Premuzic, 2004; Furnham & Walker, 2001; Rawlings, 2003; Rawlings, Barrantes i Vidal, & Furnham, 2000).

Openness to Experience involves ''receptiveness to new ideas, approaches, and experiences'' (McCrae & Costa, 2003, p. 46) including active imagination, preference for variety, aesthetic sensitivity, depth of feeling, and intellectual curiosity (McCrae, 1996). Consistent with this characterization, Openness has been found to be strongly related to the need to be different (Joy, 2004) and to sensation seeking (Garcia, Aluja, Garcia, & Cuevas, 2005). In contrast to the strong relationship between Openness and desire for novelty, MSP concerns hedonic reactivity toward favorable and unfavorable nature-related experiences. Thus, MSP should be more closely related to enjoyment of favorable images of nature in art than should Openness and, unlike Openness, should be related to an aversion to unfavorable nature-related experiences.

The Present Studies

The disposition that allows individuals to find pleasure in sweeping vistas, flowing water, and flowers and displeasure in darkness, strangers, and inpenitrable forests should influence hedonic reactivity to both realistic and impressionistic representations of nature in painting, music, and literature. The present studies developed a scale

to measure MSP, examined MSP's relationship to other constructs, and evaluated its behavioral implications. MSP should be more strongly related to enjoyment of high-clarity, favorable sensory stimulation than less clear sensory stimulation. We examined the relationship of MSP to enjoyment of nature scenes and music presented in higher and lower fidelity forms.

In our view, MSP should lead to a *decreased enjoyment* of scenes that portray such unpleasant natural themes as death or grotesque figures that convey illness or injury. As we will discuss, this predicted relationship provides an important distinction between MSP and the five-factor personality model's dimension of Openness to Experience, which emphasizes a willingness to explore novelty, including negatively themed art (Rawlings, 2003). Accordingly, Rawlings reported that openness was associated with an *increased* liking for paintings depicting aggression, death, or despair. However, no research has analyzed the relationship between Openness to Experience and art related to nature. Therefore, we carried out a study comparing the relationships of MSP and Openness with enjoyment of paintings involving favorable and aversive nature scenes.

Humans' strong capacity for visual imagery allows them to evoke images of nature from linguistic descriptions. Descriptions of favorable nature scenes should be especially enjoyable for high MSP individuals. Further, just as the enjoyment of scenes or music should be enhanced for high MSP individuals by high clarity presentations, so more evocative linguistic representations of nature should be strongly enjoyed by high MSP individuals. We therefore examined the influence of MSP on enjoyment of writings describing favorable nature-related experiences and compared the strength of this relationship for more- and less-detailed descriptions.

High MSP individuals should have heightened hedonic responses to nature-related experiences and therefore pay more attention to them. Thus, we examined the association between MSP and memory for the sensory details of artistically rendered quilts that incorporated favorable nature-related scenes (flowers, birds, etc.) or the bright colors found attractive in nature. MSP may increase interest in information that adds meaning to, and prolongs positive memories of, favorable nature stimuli and their representation in art. As Tuan (1974, p. 95) suggested, "The appreciation of landscape is more personal and longer lasting when it is mixed with the memory of human incidents. It also endures beyond the fleeting when aesthetic

pleasure is combined with scientific curiosity." High MSP individuals should demonstrate increased interest in information that provides a greater understanding of favorable nature experiences. For example, high MSP persons enjoying the view of a lake might take additional interest in learning how the lake was formed or, upon viewing an impressionist painting of the lake, might show an enhanced interest in understanding what the artist was attempting to convey. We examined the possibility that high MSP individuals would take added interest in information about the nature and origin of the objects of favorable nature experiences.

High MSP individuals' enhanced motivation would produce greater pursuit of favorable nature experience. To examine this prediction, we gave participants a large number of choices among viewing favorable nature scenes, exciting scenes, and intellectually stimulating scenes. We examined choice behavior among these alternatives as a function of MSP, sensation seeking (Zuckerman, 1994), and need for cognition (NC; Cacioppo, Petty, Feinstein, & Jarvis, 1996). The relative selection of favorable nature scenes and exciting scenes is particularly instructive. MSP may be distinguished from the desire for arousal that has been proposed to underlie sensation seeking (Zuckerman, 1994). We predicted that MSP would be associated with increased choice of the favorable nature scenes whereas sensation seeking would be related to increased choice of exciting scenes.

Finally, to extend the generality of the findings beyond undergraduate students in an academic setting, we examined the type of suggestions that tourists made for improvements to an exhibit at a national park. MSP should be more strongly related to enhancements concerning sensory experience as opposed to other suggestions, such as a desire for more information.

General Method

The first seven studies involved college students at a mid-Atlantic U.S. university whose participation met a requirement of the introductory psychology course. During the period that the studies took place, the college students taking the introductory course comprised an average of 62.3% women. The women's age averaged 18 years and 3 months, whereas the men averaged 18 years and 7 months. In each study, a random sample of the students completing survey questions

in a group session was selected to take part in the subsequent behavioral session 1–2 months later. Participants in one additional study (Study 8) were entrants to a nature museum at Yellowstone National Park. These participants were 18 years and older, with an average age of 44.7 years ($SD = 12.8$). Except as noted, we used a 7-point Likert response format (1 = *strongly disagree*, 7 = *strongly agree*). Also, unless noted, we used principal axis factor analyses with oblimin rotation. Decisions concerning the number of factors were based on a break in the scree plot together with the requirement that eigenvalues be greater than 1.0. Gender effects are reported in those studies for which this information was kept.

STUDY 1: DEVELOPMENT OF THE MOTIVE FOR SENSORY PLEASURE SCALE

To assess MSP, we developed a series of statements concerning preference for a variety of favorable sensory experiences involving vision, hearing, touch, and smell, alone or in combination. In Study 1a, we compared the extent of agreement expressed to these statements with items assessing sensation seeking, involving the desire for exciting stimulation (Zuckerman, 1994), and NC (Cacioppo et al., 1996), involving an individual's disposition to engage in and enjoy effortful cognitive endeavors. We also administered the Social Desirability Scale (Marlowe & Crowne, 1961) to examine whether high scores on the MSP scale reflect simply a desire for social approval. In Study 1b we compared the MSP scale with Jackson's (1984) pioneering sentience subscale, and in Study 1c we compared the MSP scale with Costa and McCrae's (1992) actions facet of Openness to Experience, which primarily assesses the preference for novel behavior, as indicated by a tendency to visit new places, try out new foods, and so forth.

Zuckerman's (1994) construct of sensation seeking involves a need for arousal that can be satisfied by varied, novel, or intense stimulation. Because both sensation seeking and MSP might involve an increased tendency to become immersed in sensory stimulation, the two constructs could be positively related. However, the stimulus properties that provide the excitement craved by sensation seekers should be distinguished from the less exhilarating but favorable sensory inputs that should satisfy high MSP individuals.

High NC persons seek out and reflect on information because of their strong desire to understand events and relationships (Cacioppo et al., 1996). According to Cacioppo et al. (1996, p. 198), high NC individuals have an average interest in nonintellective activities. Nonetheless, NC and MSP might be related because both involve engagement and curiosity about the world.

We included items concerning enjoyment of physical exercise. Enjoyment of favorable sensory inputs from nature may be linked with physical pursuits. Accordingly, it might be argued that MSP involves both sensory pleasure and the enjoyment of physical exercise. However, the intensive interoceptive stimulation predominant in physical exercise seems distinct from the favorable nature-related experiences involved in MSP. Therefore, we examined the prediction that MSP would have little relationship to the need for exercise.

Study 1a: Initial Item Selection of the Motive for Sensory Pleasure Scale

Measures

Motive for sensory pleasure. Thirty-six items regarding interest in and enjoyment of experiencing pleasurable sights, sounds, smells, and tactile stimulation were administered to 324 students. Six items (Numbers 1, 2, 4, 8, 11, and 22) dealing with sensory pleasure were taken from Chapman et al.'s (1976) anhedonia scale assessing the inability of depressed patients to experience a variety of pleasures in everyday activities. To control for an agreement response bias, 18 of the 36 items were reverse worded. These items and those used to assess NC, sensation seeking, and need for exercise are given in Table 1.

Need for cognition. We used the short-form NC scale (Cacioppo, Petty, & Kao, 1984) consisting of 18 items measuring enjoyment of solving problems and engaging in effortful cognitive activity.

Sensation seeking. We selected five items from the Impulsive Unsocialized Sensation Seeking Subscale (Zuckerman, Kuhlman, & Camac, 1988) based on their diverse content and high loadings on the original scale. D. M. Kuhlman (personal communication) reported that these items had a coefficient alpha of .69 based on a sample of 2,111 college students.

Table 1
Exploratory Factor Analysis on the Motive for Sensory Pleasure and Related Constructs (Study 1, $N = 324$)

Item	MSP	NC	SS	NEX
1. Beautiful scenery has often been a great delight to me.	.794			
2. Flowers aren't as beautiful as many people claim. (R)	− .734			
3. I don't understand why people enjoy looking at the stars. (R)	− .675			
4. The beauty of sunsets is greatly overrated. (R)	− .672			
5. People always exaggerate the beauty and joys of nature. (R)	− .664			
6. Scenic views do not make an impression on me. (R)	− .658			
7. The smells of outdoors give me no pleasure. (R)	− .624			.242
8. When I pass by flowers, I have often stopped to smell them.	.615			
9. I enjoy long walks.	.606			
10. Pleasant smells have a strong positive effect on me.	.593			
11. A brisk walk has sometimes made me feel good all over.	.584			
12. I enjoy the sound of the rain falling on the roof.	.567			
13. The sound of rustling leaves has never much pleased me. (R)	− .561			
14. Experiencing nature has little importance in my life. (R)	− .508			
15. New sights and sounds are very enjoyable to me.	.495		.207	
16. I like the feel of a breeze on my face.	.492			
17. I think flying a kite is silly. (R)	− .487			
18. The color that things are painted has seldom mattered to me. (R)	− .483			
19. I very much like the feeling of the sun on my face.	.479			− .260

(Continued)

Table 1 (Cont.)

Item	MSP	NC	SS	NEX
20. I have been fascinated with the dancing of flames.	.457			
21. I enjoy walking barefoot outdoors.	.437			.214
22. The sounds of a parade have never excited me. (R)	− .429			
23. I spend a lot of time looking at things around me.	.424			.238
24. On seeing a soft thick carpet, I have wanted to take my shoes off and walk barefoot on it.	.417			
25. The bright lights of a city are exciting to look at.	.410		.223	
26. I prefer taking scenic routes even when they take extra time.	.400	.239		
27. I would rather do something that requires little thought than something that is sure to challenge my thinking abilities. (R)		− .770		
28. I would prefer complex to simple problems.	− .221	.745		
29. I like to have the responsibility of handling a situation that requires a lot of thinking.		.720		
30. I really enjoy a task that involves coming up with new solutions to problems.		.687		
31. The idea of relying on thought to make it to the top appeals to me.		.638		
32. Learning new ways to think doesn't excite me very much. (R)	.211	− .622		
33. Thinking is not my idea of fun. (R)		.619		
34. I prefer my life to be filled with puzzles I must solve.		.597		
35. I try to avoid situations where I have to think in depth. (R)		− .583		
36. I only think as hard as I have to. (R)		− .560		
37. I like tasks that require little thought once I've learned them. (R)		− .553		
38. I would prefer a task that's intellectual, difficult and important to one that is		.523		

(Continued)

Table 1 (Cont.)

Item	MSP	NC	SS	NEX
somewhat important but does not require much thought.				
39. It's enough for me that something gets the job done; I don't care how or why it works. (R)		−.508		
40. The notion of thinking abstractly is appealing to me.	.250	.487		
41. I feel relief rather than satisfaction after completing a task that requires a lot of mental effort. (R)		−.443		
42. I prefer to think about small, daily projects to long-term ones. (R)		−.428		
43. I find satisfaction in deliberating hard and long for hours.		.402		
44. I sometimes like to do things that are a little frightening.			.900	
45. I like doing things just for the thrill of it.			.850	
46. I sometimes do "crazy" things just for fun.			.807	
47. I enjoy getting into new situations where you can't predict how things will turn out.			.733	
48. I like to have new and exciting experiences even if they are a little frightening.			.666	
49. I like activities that require a lot of physical effort.				.728
50. I like to wear myself out with hard work or exercise.				.726
51. I have always hated the feeling of exhaustion that comes from vigorous activity. (R)				−.674
52. I have had very little fun from physical activities. (R)				−.604
53. I have sometimes enjoyed feeling the strength in my muscles.				.473

Note. MSP = motive for sensory pleasure, NC = need for cognition, SS = sensation seeking, NEX = need for exercise. Factor loadings between .2 and −.2 are not reported. (R) designates reverse wording.

Need for exercise. We used six items designed to assess individuals' pleasure obtained from physical exercise. Four items were designed specifically for this study, and two items (Numbers 51 and 53) were taken from the Chapman et al. (1976) anhedonia scale.

Social desirability. We used the 17 items of the Marlowe and Crowne (1961) Social Desirability Scale that were judged to be most relevant to college students. The scale assesses the extent to which individuals give answers that promote a socially acceptable impression but are highly unlikely to be truthful. Participants answered in standard true-false format.

Results and Discussion

Exploratory factor analysis suggested four factors.[1] Table 1 gives items loading .40 or greater on MSP and remaining items loading .20 or higher on other factors; cross-loadings below .20 are omitted. Diverse favorable sensory experiences loaded on one factor, suggesting that MSP forms a construct distinct from sensation seeking, NC, and need for exercise.

We used items loading above .40 to construct average scale scores for the respective constructs. This criterion was met by 26 of the 36 MSP items, 17 of the 18 NC items, all 5 sensation seeking items, and 5 of the 6 need for exercise items. The 18th NC item, loading .29, was retained, for completeness. Table 2 contains means, internal reliabilities, standard deviations, and correlations between factor scores and between scale scores. Despite its diverse content, the MSP measure had a high internal reliability (coefficient $\alpha = .90$), suggesting a unitary disposition. Women had higher MSP, on average, than men, means = 5.64 ($SD = 0.62$) and 5.14 ($SD = 0.83$), $F(1, 322) = 38.4$, $p < .001$. MSP had a zero correlation with the Marlowe–Crowne scale, indicating that responses were not due to socially desirable self-presentation. MSP had a small relationship with need for exercise and slightly higher relationships with sensation seeking and NC. Correlations between MSP and these scales were low relative to their

1. The first 10 eigenvalues were 14.1, 5.27, 3.67, 2.77, 1.94, 1.76, 1.64, 1.41, 1.35, and 1.28. Eigenvalues and factor loadings for subsequent exploratory factor analyses may be obtained from the first author.

Table 2
Factor and Scale Correlations Between Constructs (Study 1, $N = 324$)

Scales		*M*	*SD*	1	2	3	4	5
1.	Motive for sensory pleasure	4.42	0.76	.90	.41	.33	.23	.00
2.	Need for cognition	3.47	0.99	.33	.77	.22	.20	.08
3.	Sensation seeking	4.55	1.11	.27	.19	.90	.23	.11
4.	Need for exercise	4.46	1.06	.20	.12	.20	.80	.04
5.	Social desirability	2.10	0.23	—	—	—	—	.77

Note. All scale correlations above .10 are significant at $p < .05$. Factor correlations appear below the diagonal; scale correlations appear above the diagonal. Cronbach's αs are on the diagonal.

internal reliabilities, further supporting the distinctiveness of the constructs (Nunnally, 1967).

The findings from factor and correlational analyses suggest that MSP is a unitary factor distinct from sensation seeking, NC, need for exercise, and socially desirable responding. The distinctiveness of MSP from need for exercise suggests that the desire to hike and so forth for enjoyable exertion should be distinguished from MSP. The small positive relationship between MSP with NC suggests that both involve an increased interest and enjoyment in exploring the environment.

Study 1b: Comparison of the MSP and Sentience Scales

For 216 students we compared the 16 highest loading MSP items and 15 items from Jackson's (1984) sentience subscale. As in Study 1a, women averaged higher on MSP than men, means = 5.09 ($SD = 0.68$) and 4.48 ($SD = 0.65$), $F(1, 214) = 38.8$, $p < .001$. Because the sentience subscale has a true–false response format and the MSP scale has a 7-point Likert format, we carried out a factor analysis on the output correlation matrix from Prelis. In this procedure, the correlation matrix is constructed to correct for the shrinkage of correlations due to limited response options. The correction assumes that response options are collapsed categories of an underlying normal distribution and that the joint distribution of each pair of items is bivariate normal for construction of the correlation matrix. Because Prelis did not have a principal axis factoring option, we used a

principal components analysis. Ten factors were indicated owing to the poor fit of many of the sentience items. All 16 MSP items loaded on the first, presumptive MSP factor at .50 or higher, and only one showed a cross-loading of .40 or higher. Only 7 of the 15 sentience items loaded on the first factor at .50 or higher, and 8 items showed cross-loadings of .40 or higher. Thus, although the MSP and sentience scales address related constructs, the MSP scale has psychometric advantages.

Study 1c: Comparison of MSP With Preference for Novelty

With 474 students, we carried out an exploratory factor analysis on the eight highest loading MSP items with a scale whose items are related to preference for novelty: Costa & McCrae's (1992) eight–item actions facet of the NEO Openness to Experience domain. Three factors were indicated: MSP, preference for established routine, and a desire to try out new activities. All the MSP items loaded at least .36 on their own factor, and no other items loaded higher than .18 on the presumptive MSP factor. Again, women had higher MSP than men, means = 5.32 ($SD = 0.84$) and 4.52 ($SD = 0.93$), $F(1, 472) = 88.2$, $p < .001$. The first study provides evidence that MSP encompasses favorable sights, sounds, and tactile stimulation, differing in strength from one person to another. Factor analytic and internal reliability findings suggest that MSP represents a unitary construct distinct from sensation seeking, NC, desire for exercise, and a facet of Openness to Experience. The MSP scale was independent of socially desirable responses. In summary, the three samples that comprised Study 1 provide evidence that the MSP scale provides a scale useful for assessing the proposed disposition to pursue and enjoy favorable sensory experience.

STUDY 2: ENJOYMENT OF NATURE SCENES AND INTEREST IN CONTEXTUAL INFORMATION

We would expect high MSP individuals to find favorable visual scenes, especially high-clarity visual scenes, more enjoyable than would low MSP individuals. We tested this prediction by having college students rate their enjoyment of scenic park views that possessed high or low visual clarity. Further, high MSP individuals should show greater interest in explanatory information that might

increase appreciation or prolong memories. We therefore had participants rate their interest in either specific or generic park information. We assessed NC to distinguish its effects from those of MSP on enjoyment of park scenes and interest in natural history information.

Method

Procedure

Two hundred twenty-one students were asked to make a single rating of each of six high-clarity and six low-clarity park views, presented as slides. They were asked to rate the enjoyableness of scenes (1 = *very unenjoyable*, 7 = *very enjoyable*). Half of the scenes were accompanied by specific information (e.g., "Ice Age glaciers carved the mountains into jagged peaks"), and half were accompanied by generic statements (e.g., "This park is a great place to visit any time of year"). The students were asked to rate the interestingness of information accompanying each scene using a similar Likert scale. Each possible combination of scene clarity and information quality was presented three times to each participant, and these sequences were counterbalanced across sessions.

Measures

Motive for sensory pleasure. A short form of the MSP scale was created by using the 14 highest loading MSP items from Study 1 (see Table 1). The coefficient $\alpha = .90$.

Need for cognition. The 18-item NC questionnaire (Cacioppo et al., 1996) was used.

Results and Discussion

To test the effects of two continuous variables (MSP and NC) and two discrete variables (scene quality and information specificity), a two-level, two-way within-subjects analysis of covariance was performed on enjoyment of the scenes. Scene quality had a main effect on scene enjoyment, $F(1, 218) = 6.02$, $p < .05$, as participants enjoyed high-clarity scenes more than low-clarity scenes. This effect was qualified by a Scene Quality $\times$ MSP interaction, $F(1,218) = 5.37$, $p < .05$. As shown in Figure 1, simple effects tests indicated that MSP was positively related to scene enjoyment when the views were of high clarity, $t(218) = 4.56$, $p < .001$, and not related when the views

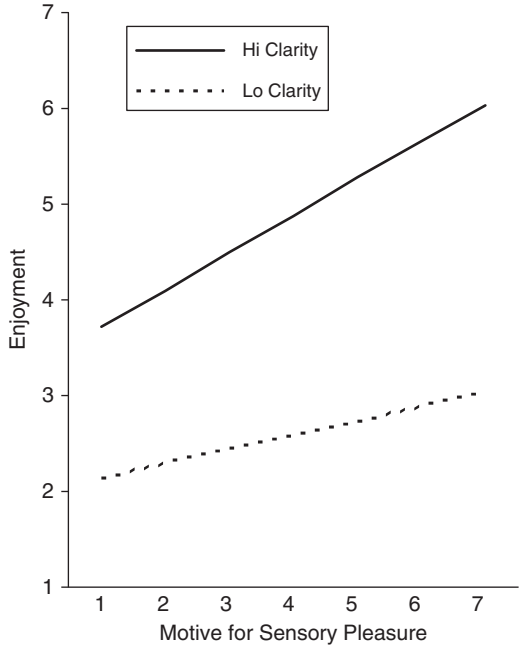

Figure 1
Enjoyment of low-clarity and high-clarity scenic views as a function of motive for sensory pleasure (Study 2, $N = 221$).

were of low clarity, $t(218) = 1.35$, $p = .82$. NC had no significant effects. A similar covariance analysis was carried out on interest in information. A main effect was found regarding scene quality, $F(1, 218) = 8.83$, $p < .01$, indicating that participants found information for a high-clarity picture more interesting. A main effect for information specificity was also found, $F(1, 218) = 3.88$, $p < .05$. This main effect was qualified by a Information Specificity $\times$ MSP interaction, $F(1, 218) = 14.3$, $p < .001$. Simple effects tests indicated that MSP was positively related to interest in high-specificity information, $t(218) = 4.62$, $p < .001$, but not low-specificity information, $t(218) = -.33$, $p > .05$. No significant effects for NC were found.

A positive relationship was found between MSP and enjoyment of high-clarity, but not low-clarity, nature scenes. Also, interest in high but not low specific information concerning the nature scenes increased with MSP, suggesting that high MSP individuals have an increased interest in both enjoyable nature scenes and contextual information that enhances their knowledge of their experience.

STUDY 3: ENJOYMENT OF MUSIC

MSP should be associated with increased enjoyment of various genres of pleasant music. As with nature scenes, we expected this relationship to be stronger with clearer presentation. We also assessed the association of NC and sensation seeking with music enjoyment.

Method

Procedure

Two hundred ninety-four students were asked to make a single rating of each of twelve 15-s segments of unfamiliar instrumental music obtained from a database promoting new artists. The students were asked to rate the enjoyableness of each music segment (1 = *very unenjoyable*, 9 = *very enjoyable*). Each participant received one high-clarity and one low-clarity piece of music from each of six genres: classical, bluegrass, calypso, surf, electronic, and blues. The piece selected for distortion within each genre was reversed for half the participants, and four different orders of presentations were used across sessions. The pieces were ordered such that no more than two high-clarity or two low-clarity pieces were played in succession. Reductions in audio clarity were made by lessening high frequencies and enhancing low frequencies, creating a sound akin to low-clarity radio reception. The overall decibel level was held constant across high- and low-clarity pieces.

Measures

Motive for sensory pleasure. MSP was measured using the same 14 items used in Study 2, with Items 1, 6, 13, and 14 stated in somewhat more extreme form to prevent ceiling effects. These items were altered based on a study at a U.S. national park in which we found that visitors showed high levels of agreement with these items.[2] For example, Item 1 was changed from "Beautiful scenery has often been a great delight to me" to "Beautiful scenery has always been a significant part of my life." The final short form of the MSP scale, incorporating these items, is given in the appendix with factor loadings based on a sample of 575 students (coefficient $\alpha = .88$).

2. Because the wording of 4 items was modified, an exploratory factor analysis was performed on the entire set of 14 MSP items. A single factor was indicated. All items loaded at .39 or higher on this factor (coefficient $\alpha = .87$).

Need for cognition. NC was measured using the same 18 items as in Study 2.

Sensation seeking. Sensation seeking was measured with the same five items used in Study 1.

Results and Discussion

To assess the relationship of MSP with enjoyment of high- versus low-clarity music, a two-level, one-way within-subjects analysis of covariance was performed. The discrete variable was the quality of the music (high or low clarity), and the continuous variables were MSP, NC, and sensation seeking. A main effect for music clarity was found, $F(1, 290) = 11.2$, $p < .01$, showing that high-clarity music was more enjoyed than low-clarity music. There was also a main effect, $F(1, 290) = 7.43$, $p < .01$, such that high MSP individuals enjoyed the music more. These effects were qualified by a Quality $\times$ MSP interaction, $F(1, 290) = 4.45$, $p < .05$. As shown in Figure 2, simple effects tests indicated that MSP was positively related to enjoyment of high-clarity music, $t(290) = 3.58$, $p < .001$, but not to low-clarity music, $t(290) = 0.93$, $p > .05$. There were no significant effects for NC or sensation seeking. Women showed higher MSP than men, means = 5.38 ($SD = 0.82$) and 4.75 ($SD = 0.84$), $F(1, 292) = 38.1$, $p < .001$, but the interactive effect of MSP and music clarity on enjoyment was not influenced by gender, $F(1, 286) = 2.13$, $p = .15$.

Enjoyment of high-quality transmission of music of various genres, and not low-quality music, increased with MSP. Further, the influences of MSP on enjoyment of music were distinct from potential influences of sensation seeking and NC. The findings suggest that MSP involves enjoyment of diversity of sensory experience and, as with national park scenes, the quality of sensory stimulation is very important to high MSP individuals.

STUDY 4: HEDONIC REACTIONS TO PAINTINGS WITH FAVORABLE AND UNFAVORABLE NATURE THEMES

MSP should increase hedonic reactivity to stimuli related to nature, including both enjoyment of favorable sensory experience and aversion to unfavorable sensory experience. In contrast, Openness to

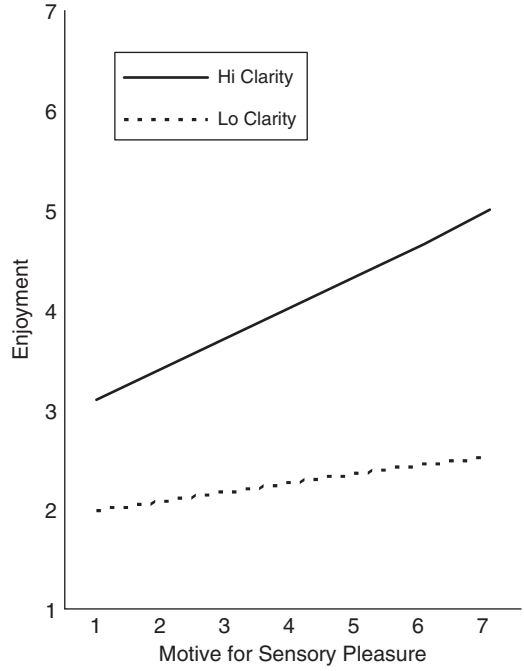

Figure 2
Enjoyment of low-clarity and high-clarity music as a function of the motive for sensory pleasure (Study 3, $N = 294$).

Experience involves heightened interest in novelty. Therefore, MSP should be more strongly associated with enjoyment of favorable nature scenes than should Openness. Further, Openness should increase enjoyment of negatively themed scenes (Rawlings, 2003), whereas MSP should decrease enjoyment of negatively themed scenes.

Costa and McCrae (1992, p. 17) proposed an aesthetic sensitivity facet of Openness to Experience involving a "deep appreciation for art and beauty." This facet emphasizes cultural involvements involving poetry, art, and music. Aesthetic sensitivity has received little study, but Rawlings (2003) provided some evidence that it was positively related to enjoyment of violent abstract art. Because aesthetic sensitivity is the facet of Openness conceptually most closely related to MSP, we compared the relationships of aesthetic sensitivity and MSP with enjoyment of positively and negatively themed paintings.

Because unpleasant sensory stimulation can increase arousal, we also considered the relationship between sensation seeking and aversion to negatively themed paintings. Finally, we examined the association between NC and the unpleasantness of paintings. Although artistic endeavors may be of less interest than intellectual pursuits to high NC individuals (Olson, Camp, & Fuller, 1984), symbolically rich art may increase high NC individuals' cognitive involvement and, in the case of negatively themed paintings, lessen emotional reactivity.

Method

Participants and Procedure

The short form of the MSP scale (coefficient $\alpha = .88$), the sensation seeking, and NC scales, and the eight-item aesthetic sensitivity subscale of Costa and McCrae's (1992) NEO measure of Openness to Experience were completed. Aesthetic sensitivity items focus primarily on poetry, art, and music. Students ($n = 273$) in groups of 10–20 were presented with 64 images of paintings, one at a time, projected onto a screen for 20 s each. Half the images incorporated paintings of positive nature themes, including flowers, gardens, fields, lakes, beaches, shrubs, and so forth, and half included negative themes involving death, violence, disfigurement, monsters, and so forth. Each successive block of four paintings contained two positive and two negative paintings, arranged according to randomly selected Latin Squares. The students rated each painting on a 9-point scale (1 = *highly unenjoyable*, 9 = *highly enjoyable*).

Results and Discussion[3]

To assess the associations of MSP, aesthetic sensitivity, NC, and sensation seeking with enjoyment of the paintings, we carried out a two-level, one-way within-subjects analysis of covariance, with painting valence (positively or negatively themed) as the discrete variable and with MSP, Openness to Experience, NC, and sensation seeking as the continuous variables. Main effects of valence and NC were found, $F(1, 268) = 8.51$, $p < .01$ and $F(1,268) = 9.90$, $p < .01$,

3. Because MSP and the aesthetic sensitivity facet of Openness to Experience were the main focus of this study, we carried out an exploratory factor analysis on the MSP items and the aesthetic sensitivity items (Costa & McCrae, 1992). The MSP and Openness items loaded predominately on their predicted dimensions, with only one cross-loading exceeding .20.

indicating that positively themed paintings were experienced as more enjoyable than negatively themed paintings and that high NC individuals enjoyed the paintings more than low NC individuals. The valence effect was qualified by the predicted Valence × MSP interaction, $F(1, 268) = 15.4$, $p < .001$. As shown in Figure 3, the enjoyment of positively themed paintings increased with MSP, $t(268) = 4.32$, $p < .001$, and, of more direct interest, the enjoyment of negatively themed paintings *decreased* with MSP, $t(268) = -2.32$, $p < .05$. Although women showed higher MSP than men, means = 5.26 ($SD = 0.79$) and 4.71 ($SD = 0.82$), $F(1, 271) = 27.5$, $p < .001$, the interactive effect of MSP and painting valence on enjoyment was not influenced by gender, $F(1, 263) = 1.58$, $p = .21$.

The predicted main effect of aesthetic sensitivity on enjoyment of paintings did not approach statistical significance, $F(1, 268) = 0.65$, $p = .42$. Simple effects tests indicated that neither the relationship

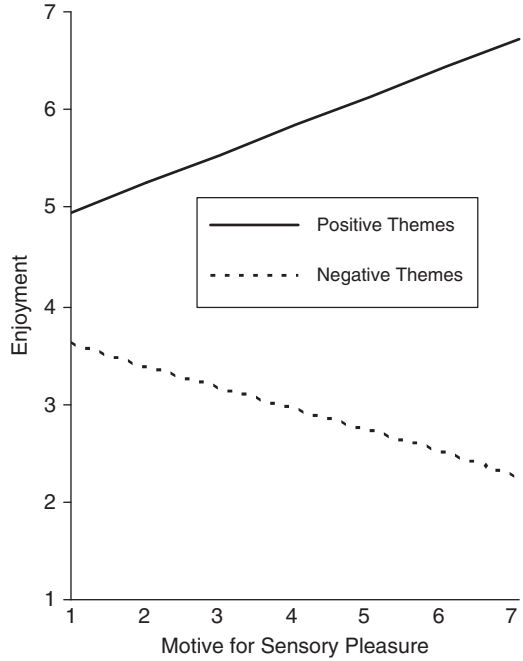

Figure 3
Enjoyment of paintings with positive themes and negative themes as a function of the motive for sensory pleasure (Study 4, $N = 273$).

between aesthetic sensitivity and enjoyment of positively themed paintings nor the relationship between aesthetic sensitivity and enjoyment of negatively themed paintings approached statistical significance, respectively, $ts(268) = -.52$, $p = .60$, and 1.22, $p = .22$. No other findings were significant. The same pattern of statistically significant findings obtained when MSP and Openness to Experience were entered into separate analyses rather than into the same analysis.

The results were consistent with our view that MSP is distinct from the aesthetic sensitivity component of Openness to Experience: (a) the items constituting the scales assessing MSP and aesthetic sensitivity fell on different factors, (b) MSP and not aesthetic sensitivity was positively related to enjoyment of paintings of favorable nature scenes, and (c) MSP was negatively related to enjoyment of negatively themed paintings whereas aesthetic sensitivity was not related to enjoyment of negatively themed paintings. The findings are consistent with the view that MSP increases the distaste for unfavorable nature experience as well as increasing the enjoyment of favorable nature experience. The findings distinguish MSP from Openness, which showed no relationship with favorable or unfavorable nature scenes. NC was positively related to enjoyment of both favorable and unfavorable scenes, suggesting that intellectual curiosity can overcome some of the unpleasantness associated with unpleasant natural stimuli.

STUDY 5: CHOICE AMONG NATURAL, EXCITING, AND INTELLECTUALLY STIMULATING SCENES

MSP should enhance pursuit of and prolong contact with favorable nature scenes. The present study examines (a) the choice to view favorable nature scenes over scenes relevant to sensation seeking (exciting scenes) or NC (intellectually stimulating scenes) and (b) the duration of time spent viewing the nature scenes. MSP should be positively related to the frequency of choice of nature scenes over exciting or intellectually stimulating scenes and positively associated with time spent viewing the nature scenes. The choice between nature scenes and exciting scenes is of particular interest. MSP and sensation seeking should increase instrumental behavior targeted toward

sensory stimulation of differing types: nature in the case of MSP and arousing sensory stimulation in the case of sensation seeking.

Method

Students ($n = 153$) completed the short form of the MSP scale (coefficient $\alpha = .87$), the 17 highest loading items of the 18-item NC short-form (Item 8 from the short form loaded below .40 and was dropped from this and the remaining studies), and the previously used 5 sensation-seeking items. Except where otherwise noted, these scales were also used in the subsequent studies. Five weeks later, participants made 100 choices to view 4- $\times$ 4-in. images from three picture classes (nature scenes, exciting, or intellectually stimulating) presented in three stacks across a flat-panel computer screen. No labels or categories were provided for the picture stacks. Nature pictures included, for example, sunsets, mountains, and water scenes. Exciting pictures were designed to be arousal inducing, such as a person on fire, white water rafting, or a shark. The intellectually stimulating pictures were sequences of three increasingly discernable images of an object (e.g., watch, book), from highly unrecognizable to clearly recognizable, whose uncertainty was designed to interest high NC individuals.

The study started with three pictures, one from each stimulus class, spread horizontally across the computer screen. Clicking a button below any one picture advanced the display to another picture from the same class. Participants viewed each selection for as long as they wished before making the next selection. Choices and viewing times were electronically recorded. The position of the three classes on the screen was counterbalanced across participants. Participant groups ranged from 15 to 25, with partitions blocking the screens of the others. Participants were instructed: "The screen in front of you has three different pictures on it. By clicking on the button below a picture, you will have the opportunity to view another picture of the same type. You can move between types of pictures at any time. When I say begin, please start viewing the pictures."

Results and Discussion

Scene Category Preferences

Our analysis took into account the statistical dependence often found in sequential choice behavior. Multinomial regression was performed using the three categories of scenes to define the outcomes. Using the statistical package STATA, we stacked each participant's 100 choices in a working file. The cluster option of mlogit

was used to adjust for statistical dependence among individual participants' choices. This procedure involves selecting categorical referent variables. To assess the effects of the three dispositional variables (MSP, sensation seeking, and NC) on the probability of choosing the nature scene over the exciting scene, we used the exciting scene as the referent variable. This selection of the first comparison made the second comparison involve the influence of three dispositional variables on the probability of selecting an exciting scene over the intellectually stimulating scene.

Multinominal regression uses an odds ratio to express the magnitude of the effects. As predicted, there was a significant effect of MSP on the odds of choosing a nature scene over an exciting scene, such that, for each point increase in MSP, the odds of choosing a nature scene increased by a factor of 1.31, $\beta = .266$, $SE = .117$, $Z = 2.28$, $p < .05$. Additionally, there was an effect of sensation seeking on the odds of choosing an exciting scene over an intellectually stimulating scene such that, for each point increase in sensation seeking, the odds of choosing the exciting scene increased by a factor of 1.2, $\beta = .196$, $SE = .098$, $Z = 2.00$, $p < .05$. Thus, MSP and sensation seeking both increased choice of the expected scene type.

Looking Time

High MSP individuals should prolong their contact with nature scenes. We used multiple regression to test the effect of the dispositional variables on the mean amount of time (total time divided by number of choices) spent looking at each scene. The first analysis tested the influence of MSP, sensation seeking, and NC on looking time for nature scenes, the second analysis tested the influence of the three dispositional variables on looking time of exciting scenes, and the third analysis assessed the influence of the dispositional variables on looking time for the intellectually stimulating scenes. Because we were interested in the influence of each dispositional variable on time spent with relevant scenes, we controlled in each analysis for the time spent looking at the other stimulus scenes. The only significant effect was the predicted incremental relationship between MSP and time spent per nature scene ($\beta = .131$, $p = .05$).

These results suggest that MSP enhances pursuit of nature scenes and extends contact with such stimulation. Additionally, sensation seeking was related to an increased selection of exciting scenes over

the intellectually stimulating scenes. Contrary to prediction, NC was not reliably related to choice of the difficult-to-discern objects. Perhaps object recognition, a perceptual task, was not intellectually stimulating for high NC individuals. Overall, the data provide evidence of distinctive goal-oriented behavior by high MSP and high sensation-seeking individuals and prolonged contact with favorable nature experience by high MSP persons.

STUDY 6: MUSEUM VISIT DURATION AND MEMORY

MSP should enhance the duration of contact with realistic and impressionistic renderings of flowers, flowing water, colorful birds, savannas, and so forth. The infusion of elements of these favorable nature stimuli, especially bright colors, would also enhance the enjoyment by high MSP individuals of artworks. Study 6 examined the relationship between MSP and the duration of contact with artistically rendered quilts in an applied setting. Because high MSP individuals should pay added attention to artistic representations of nature, we also assessed postvisit memory for the quilts. Finally, participants also rated their enjoyment of the exhibit and likelihood of recommending it to a friend.

Method

Participants ($n = 270$) observed a university art museum exhibit of 25 quilts of various sizes, colors, and design. Most of the quilts pictured flowers, birds, leaves, or patterned designs incorporating the bright colors of nature. This national traveling exhibit of captivating works was designed to highlight quilting as an art form. On arrival, participants received written and verbal instructions stating that the researchers were interested in opinions about the experience of viewing quilts and that they should "spend as much or as little time" as they wanted in the exhibit. To reduce conformity, participants began their trip individually on arrival and were alternately directed to begin viewing the quilts on the left and right sides of the exhibit.

The amount of time each participant chose to spend in the exhibit was unobtrusively recorded. Participants were then directed to a room on another floor and given a questionnaire asking them to write down all they could remember about seven quilts identified by brief descriptive titles. Additional, Likert-type items addressed how enjoyable the participants found the exhibit and participants' likelihood of recommending the exhibit to a friend.

Results and Discussion

We used simultaneous regression with MSP, sensation seeking, and NC as predictors. The time spent in the exhibit was positively related to MSP ($B = .16$, $p < .01$) and NC ($B < .12$, $p = .01$) but not sensation seeking ($B = -.08$). Figure 4 shows strong incremental independent effects of MSP and NC on the time spent in the museum. Three judges evaluated participants' memory for sensory details of seven quilts on a 4-point scale (1 = *no memory*, 4 = *high degree of memory*). Each participant's average memory score for the seven quilts was averaged across raters to obtain a total memory score. Because of clear differences between participants' remembered details, the effective interrater reliability (Rosenthal & Rosnow, 1985) was unusually high at .99. As shown in Figure 5, memory for sensory details of the quilts increased substantially with MSP ($B = .27$, $p < .01$), was unrelated to NC ($B = .08$), and decreased with sensation seeking

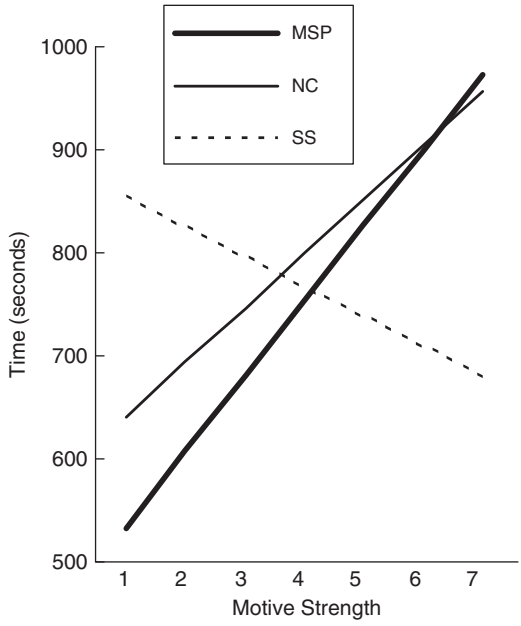

Figure 4
Time spent in a quilt museum exhibit as a function of motive for sensory pleasure, need for cognition, and sensation seeking (Study 6, $N = 270$). MSP = motive for sensory pleasure, NC = need for cognition, SS = sensation seeking.

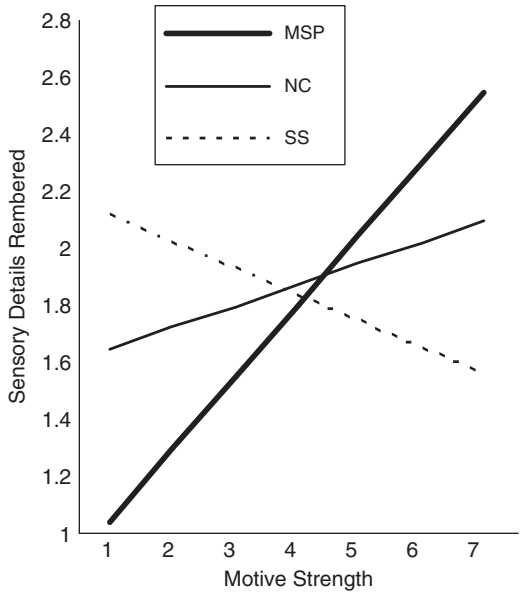

Figure 5
Memory of sensory details of a quilt museum exhibit as a function of motive for sensory pleasure (MSP), need for cognition (NC), and sensation seeking (SS) (Study 6, $N = 270$).

($B = -12$, $p < .05$). Because MSP increased looking time, we examined whether the effect of MSP on memory was entirely due to viewing time. We regressed memory for detail on the three dispositional variables and added looking time as a control variable. Viewing time was a positive predictor of memory ($B = .42$, $p < .01$), and MSP was the only additional significant variable ($B = .16$, $p < .01$), indicating that high MSP participants focused more attention per unit of time than low MSP individuals.

Quilt enjoyment increased with MSP ($B = .33$, $p < .01$), although not with NC ($B = .02$) or sensation seeking ($B = .00$). Finally, MSP was positively related to participants' reported likelihood of recommending the exhibit ($B = .35$, $p < .01$), whereas NC ($B = .02$) and sensation seeking ($B = .00$) were unrelated to willingness to recommend. These data support the view that high MSP individuals engage in increased contact with artistic representations of favorable sensory experience and remember more of the details of the stimulation.

STUDY 7: ENJOYMENT OF TEXTUAL DESCRIPTIONS

Humans' strong capacity for visual imagery evokes a strong sense of place when novels and travelogues are read. High MSP individuals should have an enhanced enjoyment of verbally described favorable nature scenes. Descriptive detail should enhance this effect by creating more evocative visual images. To examine the influence of MSP and NC on enjoyment of verbal descriptions of nature scenes, college students were given the MSP short form and NC scale and later two versions of eight nature-related descriptive paragraphs. One version used highly vivid and detailed descriptions, whereas the second version used the same subject matter and less descriptive language. We anticipated that MSP would be positively related to enjoyment both of more and less descriptive paragraphs, more so with the highly descriptive paragraphs.

Method

Procedure

Students ($n = 298$) in groups of approximately 30 students were shown a series of nine paragraphs, projected on a screen, depicting two levels of nature-related imagery. A practice slide was used to help the students understand the instructions. The eight remaining slides contained four high- and four low-imagery paragraphs, with the identity of the high-imagery paragraphs counterbalanced across trials. The average length of both kinds of paragraphs was 69 words. Participants were given 45 s to read each paragraph and rate how enjoyable and how interesting they found it on 9-point Likert scales (1 = *not at all*, 9 = *very much*).

Results and Discussion

A two-way within-subjects analysis of covariance was performed on enjoyment of the paragraphs to assess the effects of high versus low imagery and MSP. There was no main effect of paragraph imagery on enjoyment, $F(1, 296) = 2.41$, $p = .12$, but there was a main effect of MSP, $F(1, 296) = 38.9$, $p < .001$, and an MSP $\times$ Imagery interaction, $F(1, 296) = 8.30$, $p < .001$, such that MSP had a greater effect on paragraph enjoyment when imagery was high. As shown in Figure 6, simple effects tests revealed that MSP was positively related to paragraph enjoyment both with high-imagery paragraphs, $t(296) = 6.81$, $p < .001$, and low-imagery paragraphs, $t(296) = 4.65$, $p < .001$. Thus, enjoyment of both low- and high-imagery paragraphs

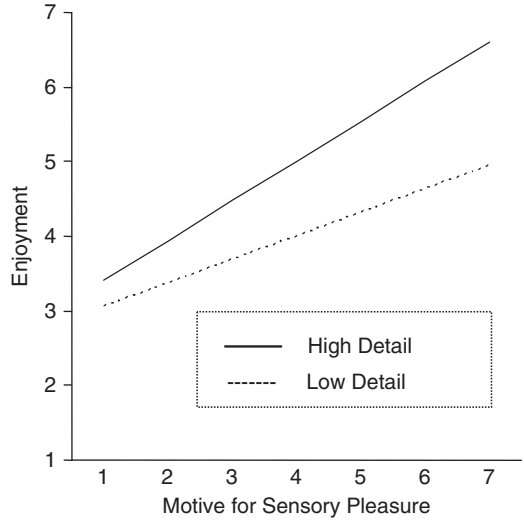

Figure 6
Enjoyment of textual descriptions of pleasant scenes as a function of motive for sensory pleasure and description detail (Study 7, $N = 298$).

increased with MSP, but the increase was greater with high imagery paragraphs. A corresponding analysis of covariance was carried out on paragraph interest, with similar results. There was not a main imagery-level effect on interest in the paragraph, $F(1, 296) = 1.21$, $p = .27$, but a main effect of MSP, $F(1, 296) = 27.1$, $p < .001$, and an MSP $\times$ Imagery interaction, $F(1, 296) = 6.04$, $p < .05$, were present such that MSP had a greater effect on paragraph interest when imagery was high. MSP was positively associated with rated interest for high-imagery paragraphs, $t(296) = 5.69$, $p < .001$, and low-imagery paragraphs, $t(296) = 3.62$, $p < .01$. As with enjoyment, interest in both high- and low-imagery paragraphs increased with MSP, but the increase was greater with high-imagery paragraphs. Women showed higher MSP than men, means = 5.15 ($SD = 0.86$) and 4.54 ($SD = 0.95$), $F(1, 296) = 29.4$, $p < .001$, but the interactive effects of MSP and imagery on enjoyment and interest were not influenced by gender, $F(1, 292) = 0.66$, $p = .42$, and $F(1, 292) = 0.53$, $p = .47$, respectively.

The results indicate that high MSP individuals show enhanced interest in and enjoyment of verbal depictions of favorable scenes related to nature. This association between MSP and enjoyment of scene descriptions was greater with highly descriptive language.

Thus, enhanced enjoyment of favorable nature-related experiences among high MSP individuals applies to linguistic representations of favorable natural stimuli, as well as direct sensory stimulation.

STUDY 8: TOURISTS' SUGGESTIONS FOR IMPROVEMENT OF A NATURE EXHIBIT

We examined MSP for a more general population than college students and in a nonacademic setting. We assessed the MSP and NC of entrants to a nature museum and then asked them to suggest improvements for an exhibit. MSP should be more closely related to suggestions involving pleasant sensory experience than to other types of suggestions.

Method

Participants and Procedure

Rangers at a Yellowstone National Park visitor center and nature museum approached entering adults and asked if they would take a survey on their impressions as they progressed through the museum. Eighty-three percent of the visitors agreed to take the survey. Participants ($n = 264$) were directed to investigators who administered the initial part of the survey, assessing MSP and NC, and who provided a second questionnaire that the participants were to use to evaluate the museum. An open-ended question asked for opinions on how to improve a wallowing buffalo display. This exhibit consisted of the body of a buffalo laid on its back in a shallow dust hole against a backdrop of a life-sized photo of a buffalo herd. After completing their trip through the museum, participants returned the questionnaire to the investigators.

Measures

Because the National Park Service restricted the time we could take with visitors, we selected a reduced number of MSP and NC items having diverse content.

Motive for sensory pleasure. Seven MSP items (Items 6, 9, 13, 14, 15, 23, and 26) from Study 3 were used.

Need for cognition. Six items from the short form of the Need for Cognition Scale were used (Items 37, 39, 40, 42, 43, and 48 from Study 1).

Display improvement. Suggestions for exhibit improvement were solicited with direction: "Please give us your opinion concerning how the Wallowing Buffalo Display might be improved."

Results and Discussion

Each participant's response to the open-ended question on improving the display was categorized by three judges as primarily involving a sensory experience or some other experience. Examples of participants' sensory suggestions include "provide a recording of buffalo sounds," "make the background image a video of buffalo wallowing," and "have a hands-on feel." In the less than 10% of the cases in which all three judges failed to assign a suggestion to the same category, the disagreement was resolved by discussion. Logistic regression was used to determine the extent to which MSP and NC predicted sensory versus other suggestions for display improvement. A test of the full model compared with an intercept-only model was statistically significant, $\chi^2(2, N = 264) = 12.4$, $p < .01$, indicating that MSP, NC, or both explained the incidence of sensory suggestions for display improvement. As shown in Table 3, there was a statistically significant effect for MSP and not for NC. The odds ratio shows that for each one unit increase in MSP, a person was 1.7 times more likely to give a sensory suggestion to improve the display. MSP was positively related to the sensory suggestions for exhibit improvement.

In all of the prior samples for which data were available, we found that women college students had higher MSP than men. In contrast, MSP did not differ for the female and male National Park visitors, means = 5.84 ($SD = 0.67$) and 5.77 ($SD = 0.67$), $F(1, 262) = 0.604$, $p = .44$. Study 3 included the same MSP items as the present study, allowing a direct comparison of the samples. Male park visitors

Table 3
Logistic Regression of Motive for Sensory Pleasure and Need for Cognition as Predictors of Type of Park Visitors' Suggestions for Exhibit Improvement (Sensory vs. Other; Study 8, $N = 264$)

Predictor	β	Wald χ^2	p	Odds Ratio
MSP	.507	4.58	.032	1.66
NC	.244	2.51	.113	1.28

Note. MSP = motive for sensory pleasure, NC = need for cognition.

showed greater MSP than the male college students, means = 5.77 ($SD = 0.67$) and 4.51 ($SD = 0.84$), $F(1, 229) = 161.5$, $p < .001$. Similarly, female visitors showed greater MSP than their college student counterparts, means = 5.84 ($SD = 0.67$) and 4.75 ($SD = 0.89$), $F(1, 325) = 145.1$, $p < .001$. These results provide preliminary evidence that men and women who visit national parks tend to be highly motivated by MSP. Consistent with the prior studies, the positive relationship between MSP and sensory suggestions for display improvement did not interact with gender, $\beta = .69$, Wald $\chi^2(1) = 2.34$. In sum, the relationship between MSP and preference for pleasant sensory stimulation applied to park visitors as well as college students, involving the practical issue of what tourists would like to see in an exhibit.

GENERAL DISCUSSION

Our findings indicate that people have a basic disposition, differing in strength across individuals, to find pleasure in pleasant nature-related experiences and displeasure in unpleasant nature-related experiences. The stated enjoyment of pleasant sights, smells, sounds, and tactile sensations formed a unitary construct that was distinct from sensation seeking, novelty preference, and need for cognition. MSP was found to be related to (a) enjoyment of pleasant nature scenes and music of high but not low clarity; (b) enjoyment of writings that portrayed highly detailed nature scenes; (c) enjoyment of favorably themed nature paintings and dislike of unpleasant paintings, as distinct from findings with Openness to Experience; (d) choice of pleasant nature scenes over exciting or intellectually stimulating scenes; (e) view duration and memory of artistically rendered quilts; (f) interest in information about nature scenes; and (g) frequency of sensory-type suggestions for improvement of a tourist exhibit.

MSP was positively related to enjoyment of scenes and music of high but not low quality. High MSP individuals are thus attuned to refined pleasant sensory experiences. Future research might examine various implications of this finding, such as the possibility that outdoor walks and nature watching by high MSP individuals are more strongly dependent than for other individuals on the daily weather and the season of the year.

Humans' considerable facility to derive images from descriptive language allows literature to mimic aspects of direct natural experience. We found that MSP was positively related to enjoyment of linguistic descriptions of pleasant visual scenes and that this relationship increased with more detailed descriptions. The greater detail presumably increased the enjoyment of high MSP individuals through enhanced imagery. This suggests that high MSP individuals might be especially attracted to novels and travel books that use evocative language to provide a strong sense of place. Because MSP persons take pleasure in the sensory imagery created by others' writings, they might also enjoy the sensory images related to nature that they conjure up from their own memories. We suggest that future research investigate the possibility that high MSP persons, more than low MSP individuals, use their sensory memory and imagination to incorporate pleasant nature scenes into their wakeful imaginings and daydreams.

MSP involves a heightened preference for pleasant natural stimuli. In contrast, Openness to Experience is closely related to the need to be different (Joy, 2004) and sensation seeking (Garcia et al., 2005). We found that MSP was distinct from novelty preference (Study 1). We also found that MSP was positively related to enjoyment of paintings of pleasant nature scenes, whereas Openness to Experience showed no relationship to enjoyment of such scenes (Study 4). Further, MSP was associated with a *decreased* enjoyment of negatively themed paintings, whereas Openness showed no relationship. These findings suggest that MSP and Openness to Experience are distinct motives, fulfilled in different ways. Also, unlike MSP, need for cognition showed a positive relationship with negatively themed paintings, suggesting that intellectual interest can overcome some of the aversion associated with fear-arousing stimuli.

MSP was positively related to goal-oriented behavior that produced favorable sensory experience. High MSP individuals showed an increased choice of pleasant nature scenes over exciting or intellectually interesting scenes. Thus, MSP does not simply involve passive aesthetic judgments but motivated behavior as well. MSP may be distinguished from sensation seeking motivation: Each motive increased choice of its own type of scenes. High MSP persons also spent increased time viewing favorable nature scenes following their choices and spent more time viewing artfully constructed quilts in a museum. The findings indicate that individuals with high MSP

engage in increased goal-directed behavior aimed at favorable nature experience.

We have suggested that socialization may influence MSP. Evolution may also play a role. Evolutionary theorists maintain that the promotion of sustenance and safety by natural sensory experiences contributed to their pleasurableness (Ulrich, 1993). For example, the sight and smell of flowers may be enjoyable because their blooming was associated with green vegetation and fruit (Buss, 2004), and seascapes may be pleasing because they indicated the presence of fish, a rich source of protein (Orians, 1980). Predators and environmental dangers, such as heights, darkness, and strangers, produced fear as a protective mechanism (Buss, 2004; Nesse, 1990). Our forebears were attracted to environments that promoted both sustenance and safety. For example, the grassy planes of savannahs allowed grazing of domesticated animals, and its scattered trees provided escape from predators (Orians, 1980). This accords with modern humans preference for scenes of savannahs as opposed to tropical rainforests or deserts (Herzog et al., 2000) and a preference for penetrable views of forests in comparison to thick forests (Ribe, 1989).

Pleasant nature scenes have been found to be more enjoyable across cultures than urban scenes (Ulrich, 1993). Moreover, pleasant natural views have been found to reduce stress (Ulrich et al., 1991; Ulrich, Simons, & Miles, 2003) and contribute to recovery from mental fatigue (e.g., Berto, 2005). Ulrich and colleagues (Ulrich & Gilpen, 2003; Ulrich et al., 1991) proposed that evolution favored the survival of individuals for whom safe environments produced a large reduction in anxiety. Additionally, Kaplan (1995) maintained that nature scenes are especially effective in providing *mild fascination* that aids recovery from the fatigue associated with tasks that demand attention.

The evolutionary value of natural environmental stimuli that signaled sustenance and safety (Ulrich, 1993), as well as danger, may similarly have contributed to MSP. Behaviorial genetic studies of personality find that both heritable and nonheritable sources make important contributions to many dispositional differences (Buss, 2004, p. 395) such as sensation seeking (e.g., Stoel, De Geus, & Boomsma, 2006). Various mechanisms have been suggested for ways in which the selection pressure for reduction in variation in an adaptive trait is countered by other mechanisms that foster this variability. Tooby and Cosmides (1990, pp. 54, 57–58), for example,

argued that variation in the genetic code has the benefit of making it more difficult for pathogens to gain a foothold. Tooby and Cosmides also pointed to conditions occurring during child development favoring the long-term elicitation of a trait. Future research might examine behavioral genetic evidence regarding MSP.

The present studies' limitations include, first, the use of college students from the same university for the first seven studies, which the final study with national park visitors partially ameliorated. Second, reliability and validity information was lacking for the experimental tasks. Third, somewhat different versions of the MSP scale were used across studies. Fourth, an abbreviated version of the social desirability scale was used. Fifth, we examined only the most relevant facet rather than all six facets of the NEO Openness construct. Sixth, the sensation seeking scale we used emphasized adventure seeking and gave less attention to experience seeking. Seventh, the item pool used to develop the MSP scale was unduly weighted toward the visual domain and failed to consider the possible relevance of taste.

MSP has basic implications for leisure and visitor studies, especially the motivation of individuals who visit scenic parks, nature and art museums, aquariums, zoos, and other locales providing nature experiences. Exhibits in these locales often emphasize learning to the detriment of pleasant sensory experience. Indeed, our interest in possible dispositional differences in enjoyment of nature was instigated by National Park Service nature museum evaluators who believed that their museums did not sufficiently fulfill visitor motives, including enjoyment of nature. Informal learning centers with little sensory appeal may limit interest and learning, especially among high MSP individuals.

Well-designed exhibits that integrate pleasant sensory experience with related information might provide an enhanced learning experience in informal learning centers. Because of their enhanced affective responses to nature-related experiences, high MSP individuals would be expected to have a stronger memory for nature-related experiences and to take advantage of contextual information that aids storage of such experiences. We found that following a trip to an art museum, high MSP individuals had an enhanced memory of details of quilts that featured pleasant nature-related experiences. We also found that high MSP individuals showed increased interest in high- but not low-detail contextual information about attractive

park views. Because written information often accompanies audio-visual presentations in informal learning centers, future research might investigate ways in which the strong nature interest by high MSP individuals can be used to promote informal learning.

MSP also has implications for marketing. We found that MSP was positively related to the choice of pleasant nature scenes and time spent looking at these scenes and the time spent visiting an exhibit of beautiful quilts in an art museum. Further, visitors to a national park had higher average MSP than did a general college student sample. Using the Internet, which is strongly user-directed relative to other media, high MSP individuals may be identifiable by their interest in nature topics and stimuli. Future research might examine whether MSP is positively related to the effectiveness of nature-related themes in advertising.

The present studies provide evidence of dispositional differences in pursuit of, and hedonic reactions to, nature experiences and their expression in painting, music, and literature. We hope that these initial findings will encourage further exploration of this pervasive but little studied aspect of human behavior.

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APPENDIX 1: SHORT FORM OF THE MOTIVE FOR SENSORY PLEASURE SCALE

Item	Factor Loadings
1. Beautiful scenery has always been a significant part of my life.	.72
2. People always exaggerate the beauty and joys of nature. (R)	– .65
3. The smells of outdoors give me no pleasure. (R)	– .60
4. Flowers aren't as beautiful as most people claim. (R)	– .59
5. A brisk walk has sometimes made me feel good.	.57
6. Experiencing nature is central to my life.	.57
7. I have found the sound of rustling leaves to be pleasant.	.55
8. I enjoy long walks.	.55
9. The beauty of sunsets is greatly overrated. (R)	– .55
10. When I pass by flowers, I have often stopped to smell them.	.52
11. I think flying a kite is silly. (R)	– .51
12. I don't understand why people enjoy looking at the stars at night. (R)	– .49
13. Pleasant smells have a strong, positive effect on me.	.49
14. On seeing a soft, thick carpet, I have sometimes wanted to take off my shoes and walk barefoot on it.	.48
15. I enjoy walking barefoot outdoors.	.48

Note. (R) designates reverse wording.