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Sensation Seeking and Narrative Transportation: High Sensation Seeking Children's Interest in Reading Outside of School

Jakob Jensen, Kristen Imboden, and Rebecca Ivic
Purdue University

High sensation seekers (HSS) prefer messages that allow them to maintain an optimal level of arousal (i.e., highly arousing messages). Transportation theory suggests that narrative immersion in a story may moderate reader arousal, and thus HSS message selection. To test this idea, a survey was administered to 120 fourth and fifth graders. In addition to measuring sensation seeking and transportation, the survey assessed interest in reading outside of school (i.e., leisure reading). HSS were found to be less likely to engage in leisure reading. Consistent with the activation model of information exposure, a moderated mediation analysis revealed that whether HSS engaged in leisure reading hinged on their level of narrative transportation (moderator) and subsequent reader boredom (mediator). HSS who successfully transported while reading were no different than their low sensation seeking peers. From a genre standpoint, high sensation seeking children with high narrative transportation scores were found to be especially interested in science fiction/fantasy books. Strategies for increasing leisure reading as well as constructing narratives that are engaging to high sensation seeking children are discussed.

Research has demonstrated that people vary in terms of sensation seeking, or their basic need for cognitive arousal (Zuckerman, 1979). High sensation seekers (HSS) have a low baseline level of arousal and appear to be drawn to dramatic, novel, explicit, and emotionally complex stimuli and experiences (Donohew,

Lorch, & Palmgreen, 1991). Unfortunately, the pursuit of arousal frequently leads HSS toward deviant behaviors, including aggression, drug use, and criminality (Roberti, 2004; Romer, 2010).

Although often correlated with deviance, sensation seeking is not an inherently problematic trait. Directed toward healthy goals, pursuit of arousal could be a means of success. Consistent with this idea, studies have shown that HSS are more likely to play competitive chess (Joireman, Fick, & Anderson, 2002) and be interested in science (Hwang & Southwell, 2007). Moreover, research in developmental neuroscience has found that sensation seeking is positively correlated with both IQ and memory capacity (Shamosh et al., 2008). All of this suggests that it is possible to mediate negative outcomes typically associated with sensation seeking, perhaps by identifying and correcting developmental deficiencies (Romer, 2010).

The present study builds on the hypothesis that developmental deficiencies could explain negative outcomes by examining the relationship between sensation seeking and leisure reading. Leisure reading has proven to be a significant predictor of crucial educational and life skills. For example, leisure reading behavior has been linked to academic success; adult literacy; and vocabulary development, fluency, and comprehension (Guthrie & Wigfield, 2000; McKool, 2007; Taylor, Frye, & Maruyama, 1990). Hansen (1969) discovered that lifetime leisure reading habits stabilized around the fifth grade, a finding that has been replicated (Cline & Kretke, 1980; McKenna, Ellsworth, & Kear, 1995). As a result, children who are not engaged in leisure reading by the fifth grade are unlikely to pick up the behavior later on in life.

There is good reason to believe that HSS may struggle with leisure reading. Based on sensation-seeking research, Donohew, Palmgreen, and Duncan (1980) proposed an activation model of information exposure (AMIE). According to the AMIE, people seek out and ultimately prefer information (e.g., books, magazines, television programs, etc.) that facilitates an optimal state of arousal. For HSS, identifying reading material that provides sufficient stimulation may be a challenging ordeal. As a result, HSS may be drawn toward sexually explicit or violent content (Zuckerman, 2006) or perhaps away from leisure reading altogether.

Yet it seems plausible that at least some HSS are attracted to beneficial leisure reading (just like chess), likely because they have identified strategies to help them achieve their reading goals (i.e., arousal; see McKenna & Dougherty Stahl, 2008). Building on the work of Gerrig (1993), Green and Brock (2000) recently proposed transportation theory, which posits that many of the effects that narratives have on users hinge on a single variable: narrative transportation. Narrative transportation is “the process of becoming fully engaged in a story” (Green, Brock, & Kaufman, 2004, p. 312) and is referred to as involvement, engagement, absorption, or flow (Slater & Rouner, 2002). Transportation theory holds that increased transportation is related to, among other things, greater arousal (Green & Brock, 2000).

Consistent with this idea, research has found that more arousing narratives yield increased transportation (Chang, 2009) and that transportation interacts with need for affect to predict narrative processing (Appel & Richter, 2010).

Taken together, the AMIE and transportation theory suggest that HSS's leisure reading activity may hinge, in part, on narrative transportation. That is, HSS may seek out or come to prefer narrative experiences where transportation (and therefore increased arousal) is likely. Of course the reverse is also true: HSS may avoid narrative experiences where transportation is unlikely. The present study tests this combined model by examining the relationship between sensation seeking, narrative transportation, and children's reading behavior outside of school.

SENSATION SEEKING

Research on sensation seeking can be traced back to Zuckerman (1969). Zuckerman developed the initial scales to measure sensation seeking, and his subsequent research examined behavioral as well as physiological correlates (Zuckerman, 1979).

Based on the work of Zuckerman and others, we know that sensation seeking is a trait and that it appears to be somewhat hereditary (Fulker, Eysenck, & Zuckerman, 1980; Zuckerman, 1994). Sensation seeking is highly correlated with impulsivity (Zuckerman, Kuhlman, Joireman, Teta, & Kraft, 1993) but only moderately correlated ($r = .19-.25$) with need for cognition (Crowley & Hoyer, 1989; Olson, Camp, & Fuller, 1984). Personality researchers have identified five major personality traits (i.e., the Big Five), including Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism (McCrae & Costa, 1996). Zuckerman et al. (1993) found that a combination of impulsivity and sensation seeking (i.e., impulsive sensation seeking) was negatively correlated with conscientiousness from the Big Five as well as a unique factor in their alternative five-factor model. Sensation seeking has also been linked to biochemical processes within the body, including the release of dopamine and production of testosterone (Bardo, Donohew, & Harrington, 1995; Linnet, Moller, Kumakura, Cumming, & Gjedde, 2008). The former may explain the relationship between sensation seeking and drug addiction, whereas the latter is the basis for possible gender effects.

HSS prefer situations and experiences that are dramatic, intense, fast-paced, and arousing (Donohew et al., 1991); a personality trait that may lead them to pursue risky or dangerous behavior. Sensation seeking has been related to alcohol abuse (Brennan, Walfish, & AuBuchon, 1986; Dom, Hulstijn, & Sabbe, 2006), illicit drug use (Hawkins, Catalano, & Miller, 1992; Yanovitzky, 2005), risky driving (Dahlen, Martin, Ragan, & Kuhlman, 2005), high-risk sports (Malkin & Rabinowitz, 1998), sexual risk (Gullette & Lyons, 2005; McCoul & Haslem,

2001), consumption of violent material (Slater, 2003), gambling (McDaniel, 2002), and deviant and criminal behavior (Knust & Stewart, 2002; Newcomb & McGee, 1991; Vermeiren et al., 2003). Some of this behavior may be a by-product of HSS looking for stimulation (Roberti, 2004).

Donohew et al. (1980) argued that HSS behave in a similar manner when selecting messages. They proposed the AMIE, wherein HSS selected messages and/or came to prefer certain message types in accord with their need to maintain an optimal level of arousal. According to the model, HSS are drawn to messages with highly arousing traits, such as drama, intensity, and suspense. HSS also avoid messages that do not meet their arousal needs.

Donohew, Lorch, and Palmgreen (1998) further explicated the model by separating its propositions into five laws:

- L1: Individuals seek to achieve or maintain a level of activation at which they feel most comfortable.
- L2: Attention to a message is a function of (a) individual need for stimulation or cognition and (b) level of stimulation provided by the stimulus source.
- L3: Individuals will attend to messages that fulfill their needs for activation.
- L4: Individuals will turn away from messages that fail to generate enough arousal to meet their needs for activation to seek more exciting stimuli.
- L5: Individuals will turn away from messages that generate too much arousal to seek less exciting stimuli. (p. 459)

Conceptualizing the AMIE as a series of laws made relationships between variables more readily distinguishable. It also highlighted the importance of the stimulus, as information exposure was conceived to be a function of individual need and stimulus sensation value (i.e., L2).

The AMIE has typically been utilized in health campaign research (e.g., Morgan, Palmgreen, Stephenson, Hoyle, & Lorch, 2003). For example, Stephenson and Palmgreen (2001) investigated how perceived message sensation value (i.e., how arousing people think a message is), sensation seeking, and personal involvement might influence processing of antimarijuana public service announcements. They found that perceived message sensation value was strongly related to narrative-processing style. Specifically, high sensation public service announcements encouraged increased narrative processing among HSS. This finding suggests that there may be a relationship between sensation seeking and narratives that needs to be explored.

On a related note, Harrington, Lane, Donohew, and Zimmerman (2006) argued that the AMIE might benefit from the addition of cognitive variables (e.g., need for cognition, need for affect, transportation). Adding cognitive states might reveal interesting interactions or help explain information exposure patterns unaccounted for by sensation seeking alone.

SENSATION SEEKING AND CHILDREN

Sensation seeking has rarely been studied in children, perhaps because the dependent variables of interest have been more typical of adolescence and adulthood (e.g., drug abuse, criminal behavior). That said, sensation seeking has been related to children's preference for puzzles, risky play activities, and deviant behavior (Kafry, 1982).

Few studies have focused on children, but there is reason to believe that studying this population may yield substantial benefits. First, existing research suggests that sensation seeking increases until adolescence—rising sharply from ages 10 to 14—and then begins to decline among older adults (Butkovic & Bratko, 2003; Kafry, 1982; Romer, 2010; Russo et al., 1993). Thus, studying children provides researchers with an opportunity to identify budding relationships between sensation seeking and behavior. For instance, sensation seeking is related to several deviant behaviors in adolescence and adulthood; perhaps these patterns manifest at a young age. Second, it is possible that tendencies of high sensation seeking children contribute to deviant behavior at later points in life. In other words, high sensation seeking children may engage in activities that indirectly contribute to problematic behavior in adolescence and adulthood. Both of these possibilities support the need for more research exploring sensation seeking within child populations. The present study looks to address this gap by examining the relationship between sensation seeking and children's leisure reading.

Leisure Reading

Whether children read outside of school—sometimes referred to as leisure, recreational, voluntary, or ludic (i.e., pleasure) reading—has been the topic of considerable study. Researchers have found that (a) few children engage in leisure reading and (b) leisure reading declines over time (Greaney, 1980; Logan & Johnston, 2009; McKenna et al., 1995; Sainsbury & Schagen, 2004).

Leisure reading is more than just a hobby. Children who read for fun have greater academic success (Anderson, Fielding, & Wilson, 1988; Stanovich, 1986; Taylor et al., 1990), increased vocabulary skills (Guthrie & Wigfield, 2000; McKool, 2007), and a more positive attitude toward reading (Walberg & Tsai, 1985).

Although leisure reading is an important activity for the development of life skills, there is good reason to believe that HSS will view it negatively. Leisure reading is a relatively passive activity that may be unappealing to HSS searching for high levels of arousal. According to the AMIE, leisure reading may be avoided by HSS because it does not help them reach their optimal level of arousal (Donohew et al., 1980). As a result, one would expect HSS to be less interested in leisure reading than low sensation seekers (LSS).

H1: Sensation seeking will be negatively related to leisure reading.

One factor that may moderate this relationship is narrative transportation. The central variable in transportation theory (Green & Brock, 2000), narrative transportation is the extent to which an individual is fully engaged or lost in a narrative. In other words, transportation describes the degree to which a person is in the experience. Green and Brock (2000) argued that narrative effect depends in large part on narrative transportation. They contended that increased transportation dictates identification with characters in the story, susceptibility to persuasion, ability to construct mental simulations, and reader/viewer enjoyment (Green & Brock, 2000; Green et al., 2004). Most important to the present study, transportation may be a significant predictor of arousal. Transportation may stimulate arousal, as the former is postulated to influence the realness of the story as well as reader response to characters, situations, and emotive experiences (Green & Brock, 2000). In narrative research, one indicator of arousal (or the lack thereof) is reader boredom. Children who find reading boring are those who fail to find it cognitively stimulating (or arousing). Moreover, boredom susceptibility is a dimension of sensation seeking (Zuckerman, 1979). Thus, consistent with narrative transportation and the AMIE of information exposure, transportation may moderate the relationship between sensation seeking and leisure reading by controlling reader arousal (see Figure 1). The proposed model is an example of a conditional indirect effect, or a mediation effect that varies in strength based on the level of at least one moderator (Preacher, Rucker, & Hayes, 2007). In this case, the relationship between sensation seeking and narrative preference is thought to be moderated by narrative transportation and mediated by individual arousal.

H1a: The negative relationship between sensation seeking and leisure reading will be moderated by narrative transportation and mediated by reader boredom.

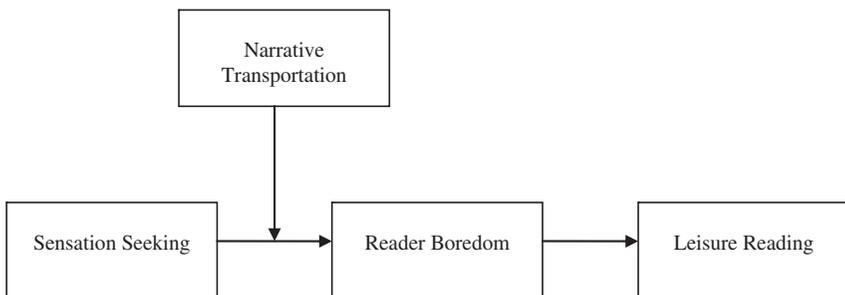


FIGURE 1 Hypothesized relationship between sensation seeking and leisure reading.

HSS will be less likely to read if they fail to transport and thus become bored with the activity.

METHOD

Sample/Participants

The survey was conducted in a midsize town located in the Midwest (pop. 100,000). Fourth and fifth graders ($N = 120$) were recruited from two local schools. One of the schools was a public elementary school (kindergarten through 5th grade) and the other was a private Christian school (kindergarten through 12th grade). Students were asked to complete a brief survey in exchange for a small reward (a \$3 yo-yo). The schools were also provided with compensation on a per-student basis (\$5 per student).

Participants ranged in age from 8 to 12 years old ($M = 10.27$, $SD = .87$) and were evenly split in terms of gender (59 girls, 59 boys, 2 missing data). Slightly more fourth graders ($n = 67$) participated than fifth graders ($n = 49$, $n = 4$ missing data). The sample was diverse compared to the U.S. population as a whole: 56.8% White, 9.3% Black, 17.8% Hispanic/Latino, 2.5% Asian/Pacific Islander, 0.8% Native American/American Indian, 5.9% described their race as other, and 6.8% checked multiple racial categories.

Procedure

Principals of elementary and middle schools in the area were contacted through mail. The mailings explained the purpose of the study, the benefits to the school, and the benefits to the students. Thirty-five letters were mailed out to local principals, and two schools responded.

Once a suitable time had been ascertained for both the researchers and the fourth- and fifth-grade teachers, researchers visited individual classrooms to recruit students. On the first visit, researchers provided all students with consent packets that needed to be taken home to their parents to be signed and then brought back to the school. A drop box was then left in the classroom for approximately one week to collect returned packets. If time permitted, the researchers stopped by the school a second time to check on the number of packets in the drop box. After sufficient time had passed, the researchers contacted the teachers again to set up a third visit.

During the third visit, students with complete consent packets were allowed to participate in the study. Before beginning, students were informed that the study concerned reading and writing for fun and that they should think about nonschool reading and writing when answering those questions. Surveys were then passed out to participating students. Researchers and homeroom teachers monitored participants and answered questions during the survey.

Independent Variables

Demographics. Gender, race/ethnicity, grade, and age were all assessed using close-ended questions.

Sensation seeking. A modified version of the Brief Sensation Seeking Scale was used to assess sensation seeking (Hoyle, Stephenson, Palmgreen, Lorch, & Donohew, 2002). The scale was modified to fit the target population (i.e., young children). Participants responded to eight statements using 5-point scales (*strongly disagree, disagree, neutral, agree, strongly agree*; scored 1–5). The eight statements were “I would like to explore strange places,” “I get restless when I spend too much time at home,” “I like to do things that scare me a little bit,” “I like new and exciting experiences, even if I have to break the rules,” “I prefer friends who are exciting and unpredictable,” “I would like to try bungee jumping,” “I get bored quickly,” and “I would like to try sky-diving.”¹ The eight statements were aggregated and averaged to form a scale ($M = 3.07$, $SD = .77$). The scale had moderate reliability ($\alpha = .65$).

Dependent/Moderator/Mediator Variables

Leisure reading. Participants responded to a question that asked, “How often do you do these things?” Several activities were located below the question. Participants indicated how often they did each of the activities using a 4-point scale (*never, a little, a lot, always*; scored 1–4). One of the activities listed was “read books for fun” ($M = 2.47$, $SD = 1.04$).

Favorite books. Participants were asked to list their favorite books. Five blank lines were provided and participants could write as many (or few) books as they wanted.

Narrative transportation. Participants used a 5-point scale (*strongly disagree, disagree, don't know, agree, strongly disagree*) to respond to the question, “When I read books, I feel like I am part of the action” ($M = 3.17$, $SD = 1.44$; scored 1–5).

¹The original Brief Sensation Seeking Scale was created for adolescents and adults. The eight items from that scale are “I would like to explore strange places,” “I get restless when I spend too much time at home,” “I like to do frightening things,” “I like new and exciting experiences, even if I have to break the rules,” “I prefer friends who are excitingly unpredictable,” “I would like to try parachute-jumping,” “I like wild parties,” and “I would like to take off on a trip with no pre-planned routes or timetables.” In the current study, several of the items were changed to remove words that might be difficult for fourth and fifth graders (e.g., *frightening, excitingly*) and others were replaced with items that might be more relevant to young audiences (e.g., “I like wild parties” and “I would like to take off on a trip . . .”).

Reader boredom. Participants responded to a question that asked, "Some kids don't like to read. Do any of these things make it hard for you to read?" Several obstacles were located below the question. Participants checked items that made it hard for them to read. One of the obstacles was "reading is boring" ($M = .18$, $SD = .38$; scored 0–1).

Power Analysis

G*Power was utilized to calculate the power of the design. Three power analyses were conducted ($\alpha = .05$, $k = 3$, $N = 120$) for three standard effect sizes, small ($r = .10$), medium ($r = .30$), and large ($r = .50$; Cohen, Cohen, West, & Aiken, 2003; Erdfelder, Faul, & Buchner, 1996). The design had excellent power to detect a large (.99) or medium effect (.95), but low power to detect a small effect (.21).

Moderated Mediation Analysis

Preacher et al. (2007) recently developed analytical techniques for carrying out moderated mediation analysis. Moderated mediation occurs when mediation varies in strength based on the level of at least one moderator. The utility of this analytical approach is that it can identify the specific level (of the moderator) at which mediation materializes. The analysis involves four steps: (a) the identification of a direct relationship between the independent variable and the dependent variable; (b) the identification of a direct relationship between the interaction term (i.e., the interaction between the independent variable and the moderator) and the mediator; (c) the direct relationship between the mediator and the dependent variable; and (d) a test, using Z scores, of the levels at which the indirect effect materializes. It should be noted that moderated mediation, like most indirect effects, can occur even if there is no significant relationship between the independent variable and the dependent variable.

RESULTS

A series of hierarchical multiple regressions were carried out to test the hypotheses. Three predictor variables were entered in the following order: gender, sensation seeking, and gender \times sensation seeking. Gender was investigated because sensation seeking is related to the production of testosterone in the body, a biochemical correlate that could yield meaningful differences between males and females. This was thought to be a conservative test of the hypotheses, because sensation seeking would have to predict variance above and beyond gender alone

to be significant. In the text, all regression equations are reported at the highest step (if no step was significant) or at the highest significant step.

H1 predicted that sensation seeking would be negatively related to leisure reading. The results support this hypothesis (see Table 1), as HSS were less likely to enjoy leisure reading ($R = .20$, $R^2 = .04$), $F(2, 103) = 2.23$, $p = .03$.

H1a predicted that the relationship between sensation seeking and leisure reading would be moderated by narrative transportation and mediated by reader boredom. It was hypothesized that HSS would be less likely to read if they failed to transport and thus became bored with the activity. Using statistical methods outlined in Preacher et al. (2007), two regression analyses were conducted to test whether mediation was conditional on the value of a moderator (in this case, narrative transportation). Table 2 shows the results of this analysis. The results are consistent with H1a as the effect of sensation seeking on reader boredom depends, in part, on narrative transportation (interaction coefficient = $-.06$, $p = .01$) and reader boredom significantly predicts leisure reading (coefficient = $-.98$, $p < .001$). In other words, HSS were less likely to engage in leisure reading if they failed to transport and thus became bored with the activity.

An examination of the conditional indirect effect at specific values of the moderator revealed that increased narrative transportation decreased the relationship between sensation seeking and leisure reading by decreasing reader boredom (see Table 2). For the conditional indirect effect, the negative relationship between sensation seeking and leisure reading ceased to exist around 4 on the 5-point narrative transportation scale (coefficient = $-.02$, $Z = -.40$, $p = .31$). In other words, HSS no longer exhibited decreased desire to leisure read if they experienced high

TABLE 1
Gender, Sensation Seeking, and Children's
Preference to Read Outside of School

	<i>Leisure Reading</i>
R^2 Step 1	.00
Gender	.02 (.20)
R^2 Step 2	.04*
SS	-.26 (.12)*
R^2 Step 3	.05
SS \times Gender	-.25 (.25)

Note. The table reports the results of a hierarchical regression predicting leisure reading with gender (Step 1), sensation seeking (SS; Step 2), and SS \times Gender (Step 3). R^2 is reported at each step as well as the corresponding coefficient (B) and standard error (SE).

* $p < .05$.

TABLE 2
Moderated Mediation Analysis

	<i>B (SE)</i>	<i>T</i>
Mediation variable model		
Constant	-.65 (.33)	-1.96
SS	.33 (.09)	3.46***
Transportation	.13 (.08)	1.50
SS × Transportation	-.06 (.02)	-2.48*
Dependent variable model		
Constant	.93 (.87)	1.07
Reader boredom	-.98 (.25)	-3.90***
SS	.26 (.26)	1.01
Transportation	.49 (.23)	2.13*
SS × Transportation	-.07 (.07)	-1.04
<i>N</i>	105	
Conditional Indirect Effect at Specific Values of the Moderator ^a		
Transportation	<i>B (SE)</i>	<i>Z</i>
1.74	-.21 (.08)	-2.65**
3.20	-.12 (.05)	-2.24*
4.65	-.02 (.05)	-0.40

Note. The table reports the results of a moderated mediation analysis.

^aModerator values listed are the sample mean and ± 1 *SD*.

* $p < .05$. ** $p < .01$. *** $p < .001$.

transportation (i.e., transportation greater than 4). HSS who experienced narrative transportation appeared to be indistinguishable, in terms of leisure reading, from their LSS counterparts.

Follow-up Analysis

A logical follow-up analysis is to investigate whether HSS with a narrative transportation score of 4 or higher consumed different genres of texts compared to their less transported peers. Such an analysis could reveal if there are particular types of books that are more likely to be associated with transportation (and therefore leisure reading) in HSS.

All participants were asked to list their favorite books. Participant responses were then sorted according to sensation-seeking behavior (LSS vs. HSS) and narrative transportation score (3 or less vs. 4+).

Three trends were visible in the data. HSS with low narrative transportation scores were more likely to state that they didn't have a favorite book, which is consistent with the idea that they enjoyed leisure reading less. Moreover, when

HSS with low transportation scores did list favorite books, they were more likely to be introductory texts or those below the expected reading level of the participants. For example, HSS with low narrative transportation scores frequently listed Dr. Seuss books among their favorites, including *The Cat in the Hat*; *How the Grinch Stole Christmas!*; and *One Fish, Two Fish, Red Fish, Blue Fish*. By comparison, no HSS with a high transportation score listed a single Dr. Seuss book among their favorites. Thus, not only are low transportation HSS students less likely to have a favorite book, but they also appear to be less likely to advance beyond early reading texts.

HSS with high transportation scores, on the other hand, frequently listed one book genre: science fiction/fantasy. HSS are attracted to stimuli that are dramatic, novel, explicit, arousing, and emotionally complex. The genre of science fiction/fantasy contains frequent action, novelty, and other features that would seem to be of a highly arousing nature. Not surprisingly, high transportation HSS listed numerous science fiction/fantasy books among their favorites, including *Harry Potter and the Goblet of Fire*, *The Hobbit*, *The Titan's Curse*, *Bridge to Terabithia*, *Boba Fett: Hunted*, *Dragonology* series, *The Spiderwick Chronicles* series, *Winter of the Ice Wizard*, *The Magician's Nephew*, *Eldest*, and *Gregor the Overlander*.

DISCUSSION

Consistent with the AMIE, HSS engaged in leisure reading if they routinely experienced arousal from the activity (Donohew et al., 1980). In addition, whether HSS experienced arousal during leisure reading was a by-product of narrative transportation, a finding that is consistent with basic postulates of transportation theory (Green & Brock, 2000).

The results of the present study are consistent with the cognitive model of reading as well (McKenna & Dougherty Stahl, 2008). The cognitive model postulates that reading behavior depends on automatic word recognition, language comprehension, and mastery of strategies "needed to achieve one's purpose in reading" (p. 8). Concerning the latter, successful readers identify strategies that facilitate their reading (e.g., finding a quiet place to read in the library) as well as goals that mirror the content and direction of selected texts (e.g., reading for enjoyment, comprehension, or study). From this perspective, high-transport HSS in the present study can be viewed as individuals who have mastered successful reading strategies and goals.

Educators will be interested in how the results of the present study inform educational methods or approaches for working with HSS. The results suggest that educators should identify HSS in their classroom, perhaps using the measure utilized here. Once identified, HSS may need help viewing leisure reading

as a means for achieving their arousal goals. Sensation seeking is not associated with a lack of ability (i.e., IQ, memory capacity), but HSS may struggle (more than other students) to see reading as a source of arousal or enjoyment. Moreover, educators might consider the development of classroom modules that focus on the idea of narrative transportation, and perhaps even teaching students how to cultivate reading environments that facilitate getting lost in a book (i.e., successful reading strategies). Science fiction and fantasy books were popular among high-transport HSS; therefore, it might be valuable to expose HSS to this genre of book as early as possible. In addition, providing highly stimulating activities that are related to science fiction/fantasy texts (e.g., quidditch games, dragon dancing) could cultivate positive associations between reading and arousal. Research on the efficacy of such strategies would be valuable for curriculum development and could suggest alternative avenues for reaching sensation seekers.

Reading aside, the present study has implications for future research in the domain of sensation seeking. One of the goals of sensation-seeking research is to identify messages that might be appealing to HSS and therefore effective as a means for behavior change (Palmgreen, Stephenson, Everett, Baseheart, & Francies, 2002). Narrative approaches are increasingly common in behavior change research (Green, 2006; Kreuter et al., 2007), and the present study suggests that narrative transportation may be a key variable in successfully implementing a narrative-based campaign or intervention directed at high sensation seeking children. In fact, a priority for such efforts might be the identification of message features that increase the likelihood of narrative transportation for HSS children. The present study suggests that high-transportation HSS children are attracted to science fiction/fantasy books, but clarifying exactly why this is the case as well identifying other attractive message types would be a good next step. Researchers may discover, for example, that variables already known to be attractive to HSS (e.g., dramatic, complex, fast-paced, suspenseful; see Donohew et al., 1980; Palmgreen et al., 2002) will also be related to transportation. Regardless, attention to narrative transportation may help to explain patterns and explicate relationships between sensation seeking and message selection.

One question that will need to be addressed is whether the finding observed in the present study holds for adolescents and adults. Research on this front will need to be cautious as there are several possible patterns that could be difficult to distinguish from one another. High sensation seeking children, adolescents, and adults may prove to be equally uninterested in leisure reading, but the behavior of the latter two groups could be a by-product of (a) insufficient transportation or (b) habit. That is, behaviors forged at childhood could continue into later stages of life by habit alone. Researchers should be especially cautious in this situation, as there appears to be a curvilinear relationship between sensation seeking and

age, with sensation seeking peaking in adolescence or young adulthood (Butkovic & Bratko; 2003, Kafry, 1982; Russo et al., 1993). As a result, the HSS's need for arousal or optimal level of arousal eventually declines, and this creates the possibility that the same behavior (i.e., limited interest in leisure reading) will be explained by different factors over time. Habit aside, researchers should also investigate the relationship between sensation seeking and IQ, as the latter could be another confound or at the very least a correlate of the relationships identified here.

On a related note, one advantage of studying children is that relationships among variables can be identified early and then compared to patterns later on in life. If HSS are less likely to engage in leisure reading, then that has long-term implications on their development (Romer, 2010). We would expect HSS to suffer academically (Anderson et al., 1988; Stanovich, 1986; Taylor et al., 1990), have lower vocabulary skills (Guthrie & Wigfield, 2000; McKool, 2007), and struggle with literacy issues into adulthood (Cline & Kretke, 1980; Hansen, 1969; McKenna et al., 1995). This, in turn, could help to explain previously observed associations between HSS and risky or dangerous behaviors. Additional research on high sensation seeking children may help to clarify the matter and provide concrete connections between child and adult behaviors. Longitudinal research, in particular, could allow researchers to track development over time.

In a larger sense, the results suggest that empathy may be an important part of future research in this area. Past work has found that impulsive sensation seeking is negatively correlated with conscientiousness from the Big Five personality model (Zuckerman et al., 1993), and the present study revealed that narrative transportation significantly moderated the relationship between sensation seeking and leisure reading activity. Empathy could play a role in both relationships. HSS may struggle to empathize with others and hence be less conscientious. The inability to empathize could also dissuade HSS from activities (e.g., leisure reading) that only bring arousal to those capable of identification and/or transportation (Green & Brock, 2000), which is not to say that impulsive sensation seeking is akin to empathy (it is not; see, e.g., Eysenck, Pearson, Easting, & Allsopp, 1985); rather, the two constructs may be related in meaningful ways.

Limitations

There are a number of limitations that need to be acknowledged. The sample was drawn from two elementary schools located in the midwestern United States. Even though the sample was racially diverse, it is possible that students at these two schools are not representative of children in general. The present study also utilized survey methodology to identify relationships. A drawback of this approach is that causality is unclear. As a result, the model depicted in this study represents only one possible sequence of the variables. Experimental or

longitudinal work may demonstrate the actual ordering and help researchers to better understand the complex relationship among sensation seeking, narrative transportation, and leisure reading. Similarly, variables were assessed using self-reports. Self-report data from children could over- or underestimate actual leisure reading and writing. Moreover, as many popular children's books are available in other formats (e.g., movies, video games), the self-report data could be a reflection of priming (i.e., what is on the child's mind) more than personal preference (i.e., what they actually like to read). More objective measures of leisure reading should be explored in future research.

Conclusion

Very few children engage in leisure reading, and the number that do tends to decline over time. By the fifth grade, lifetime leisure reading may be set. The present study identified one cognitive factor—sensation seeking—that seems to explain some variation in leisure reading at this crucial age juncture. But even among HSS there were those who engaged in reading outside of school. For high sensation seeking children, narrative transportation appears to be a key predictor of leisure reading. Because of the importance of leisure reading to child development as well as the implications for behavioral change efforts, it is important that researchers continue to investigate the relationship among these variables. Parents, teachers, researchers, and behavioral change practitioners will be interested in the identification of factors that may help to increase transportation in high sensation seeking children. Increasing narrative transportation among high sensation seeking children may improve their short-term achievements as well as their long-term development.

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