

# Sensation Seeking and Social Skills in Children with Autism Disorder and Down-Syndrome

Saeed Rezayi<sup>1</sup>

1. Department of Psychology and Education, Faculty of Psychology and Education, University of Tehran, Tehran, Iran.

## Article info:

Received: 7 Apr. 2013

Accepted: 25 Jul. 2013

## Key Words:

Sensation seeking,  
Social skills,  
Autism, Down-syndrome

## ABSTRACT

**Objective:** The present study was carried out to study the relationship between sensation seeking and social skills in two groups of school age patients; Down-Syndrome (DS) and Autism Disorder (DS).

**Methods:** This is a descriptive-analytic and correlation study in which all participants were of primary school age (10 to 13 years) with Down-Syndrome and Autism Disorder of autism spectrum disorder and down-syndrome rehabilitation centers and schools, in Tehran. Two groups, Down-Syndrome (N=35) and Autism Disorder (N=35), were randomly selected from a larger community, as sample group for the present study. Marvin Zuckerman (1994), 4-dimensions Sensation Seeking Scale (SSS), and Scott-Bellini Autism Social Skills Profiles (ASSP) 3 subscales were used as outcome measures.

**Results:** Gathered data were analyzed by using Pearson's correlation coefficients, multivariable regression and Z tests. The results showed that there are significant ( $\alpha=0.05$ ) relationships between susceptibility to boredom, seeking experience and sum scores of sensation seeking with social skills in Down-Syndrome group as well as there is significant relationship between susceptibility to boredom and sum scores of sensation seeking with social skills in Autism group.

**Conclusion:** Based on the results, it can be concluded that sensation seeking capability can improve social skills in children who are seriously impaired in social relationship and communication. In addition, this study suggests sensation seeking training program for promotions of social skills in children with social problems and who do not show normal social behavior specially children with autistic spectrum disorders.

## 1. Introduction

Sensation Seeking (SS) is a trait defined by the seeking of varied, novel, complex and intense sensations and experiences, and the willingness to take physical, social, legal and financial risks for the sake of such experiences" (Zuckerman, 1994). Zuckerman (1969) has proposed a theory of SS based on the construct "optimal level of stimulation". Like the other personality traits, individuals differ largely on SS. Research shows that SS needs heritage and biological readiness (Zuckerman, 1979), although some researchers emphasize on its cognitive and learning aspects (Moffitt et al,2006). In professional groups like

sport teams or artists, SS may be emerged in assertive or risky behavior forms (Zuckerman, 2007); however, these risky behaviors may set the stage for development of delinquency (Curcio et al,2013). Some researchers believe that SS is positively correlated with intelligence quotient (Ripa et al,2001), speed rate of information processing (Ball & Zuckerman, 1992), and creativity (deVries et al, 2009). According to these findings, it can be concluded that SS is expected to be high in intelligent people, and low in people with lower intelligence; however, Russo et al(2011) did not find significant differences in intelligence level of 176 boys with a range of diagnoses of psychiatric disorders for scores on the Sensation Seeking Scale for Children (SSSC).

### \* Corresponding Author:

Saeed Rezaee, PhD

Address: Department of Psychology and Education, University of Tehran, Tehran, Iran.

Tel: +98 (912) 4546499

E-mail: rezayi.saeed10@gmail.com

“Social skills” is a term that inclusively describes all abilities that enable a person to perform competently at particular social tasks. Social skills can be learnt through interpersonal relationship processes in socialization or through a structured training program.

Ladd and Mize (2007) defined the skills as “the ability to organize cognitions and behaviors into an integrated course of action directed towards some culturally acceptable social or interpersonal goals” (King & Kirschenbaum, 2002). A large body of researches has highlighted the importance of children’s early social skills for adjustment and school success (Dishion, 2009).

Many researches showed that there is sizable relationship between social skills and sensation seeking capability in children who are typically developed. Children who are in sensation seeking categories, experience many setting for adjustment that they need to have social behaviors (Curcio et al, 2013). Acting socially and making social relationship require more social skills (Steyaert et al, 2012).

Children who have sensation seeking and have poor social skills often have a number of problems, including peer rejection, behavior problems, and low levels of academic achievement (Mc Clelland et al, 2003). Down’s syndrome (DS), or trisomy 21, is a very frequent chromosomal abnormality that occurs due to an extra genetic load from the time of development within the uterus, marking the child for her/his entire life. Individuals with DS have been frequently described as subjects with charm personalities, often showing relative strengths in social activities.

Many studies also reported that individuals with DS show low levels of psychopathology than individuals with other forms of mental retardation like autism. The key area that is developmentally affected in a child with DS is the cognitive area, the development of thinking, reasoning, and understanding. Delays are expected in this area. The other areas going to be delayed in development process are social and emotional areas.

Most babies with DS show the least delay in social and emotional development, smiling when talked to at 2 months (range 1.5-4 months), smiling spontaneously at 3 months (range 2-6 months), and recognizing parents at 3.5 months (range 3-6 months); each of these milestones show only a 1-month delay on average. Although some studies suggest that the intensity of affective responses such as smiling and laughing may be slightly less than that shown by typical babies, parents respond warmly

to the onset of smiling and eye contact. Studies in the second year of life show that the babies are skilled in social communication even using social skills to attempt to distract an adult from a task that the baby does not want to attempt. The babies are warm, cuddly, and normally responsive to physical contact, unlike babies with some other types of disabilities such as autism. Landry and Rehfeldt (2004) also found that children with Down’s syndrome showed fewer attempts to direct their mother’s attention to social interactions and had fewer incidences of turn taking. This finding was independent of expressive language difficulties possibly indicating that more structure and direction is needed to assist in social participation.

Thus, children who are typically developing may have internalized appropriate social behaviors that are not present in children with cognitive delays. The ability to generalize these abilities across social context is an area that the child with a cognitive delay will need additional support. The following section evaluates the effect of family variables in the development of social competence particularly in the effect of parent directive and social support.

Individuals with Autism Spectrum Disorders (ASD) suffer from direct and indirect consequences related to social interaction deficits. Children with ASD often report a desire for more peer social interaction and may also express poor social support and more loneliness than their typically developing peers (Bauminger & Kasari, 2000). Ironically when integrated with typically developing peers in mainstream classrooms, children and adolescents with ASD may be at increased risk for peer rejection and social isolation (Charan, 2012).

The social impairments in individuals with ASD are diverse and involve speech, linguistic conventions, and interpersonal interactions. Frequently identified problem areas include impairments in social pragmatics, poor speech prosody, a tendency to dwell on certain topics, difficulty understanding and expressing emotions, and difficulty interpreting nonliteral language such as sarcasm and metaphor (Ozonoff, 2005).

SS like sensation sensitivity was different in persons with ASD as compared to community controls. Harbour and Maulik (2013) suggest that children with ASD due to neurodevelopment impairments are disabled to have social behaviors as other peers. Review on literary show that SS is a significant feature of typical development and highly related to social skills and social data processing skills as well as social setting optima

experiences. Based on the research findings, it can be seen that children with intellectual disability like SD and ASD due to social impairments can not have SS capability as typically developed peers. There is evidence that SS differences may play a role in social behaviors (Kafry, 1992). As mentioned before, the purpose of this study was to investigate the condition of two groups of children (ASD and DS) in sensation seeking and social skills capability. Based on the literature, the research hypothesis was that the condition of DS and ASD in sensation seeking subscales and social skills capability are significantly different from each other.

## 2. Methods

### Participants

This is a descriptive-analytic and comparative study in which the statistical population was of primary school age (10 to 13 year-old boys and girls) with DS and ASD of autism spectrum disorder and down-syndrome rehabilitation centers and secondary schools in 2013, in Tehran. Two groups, DS (N=60) and ASD (N=60), were randomly selected from a larger community, as sample groups for the present study.

### Measures

Marvin Zuckerman (1994), reported that 4-dimensions Sensation Seeking Scale (SSS), displayed good reliability indexes, and Cronbach's alpha was 0.61 to 0.81, and validity and also Scott-Bellini (2007) Autism Social Skills Profiles (ASSP) 3 subscales with internal consistency was acquired by calculating Cronbach's alpha which was from 0.84 to 0.86, were used for assessment of social skills and sensation seeking correlation.

The gathered data were analyzed by using Pearson correlation coefficients, multivariable regression, and Z tests. The results showed that there is significant ( $\alpha=0.05$ ) relationship between susceptibility to boredom, seeking experience and sum scores of sensation seeking with social skills in DS group as well there is significant relationship between susceptibility to boredom and sum scores of sensation seeking with social skills in ASD group (Table 1). Based on the research findings, it can be seen that social skills are directly or indirectly rely on the intelligence and sensation seeking approaches. Based on the results, this study suggests sensation seeking training program for promotions of social skills capability in students' classroom schedules.

## 3. Results

As it can be seen, R ratio in 3 variables of sensation seeking (susceptibility to boredom, seeking experience and sum of sensation seeking subscales) are significant so it can be described that there are significant ( $\alpha=0.05$ ) relationship between sensation seeking and social skills.

Table 2 summarizes the results of statistical analyses (stepwise regression) to determine the relationships between social skills and sensation seeking. As can be seen in this table, all sensation seeking subscales entered in regression model according to high scores (significant levels). Table 2 demonstrated "susceptibility to boredom" one of them entered to the regression model as first variable after that other variables were entered by priority sequence. As can be seen, susceptibility to boredom in both groups, seeking experience just in DS group, disinhibition just in DS group, and sum of sensation seeking subscales in both groups was significant. But seeking thrill and adventure were not significant in both groups.

**Table 1.** Pearson correlation coefficients results of participants (DS and ASD).

| Predictive                      | Groups |    |         |       | Criterion     |
|---------------------------------|--------|----|---------|-------|---------------|
|                                 |        | N  | r       | P     |               |
| Sensation Seeking               |        |    |         |       |               |
|                                 |        |    |         |       |               |
| Seeking Thrill and Adventure    | DS     | 35 | 0.153   | 0.121 | Social Skills |
|                                 | ASD    | 35 | 0.131   | 0.160 |               |
| Seeking Experience              | DS     | 35 | 0.243*  | 0.031 | Social Skills |
|                                 | ASD    | 35 | 0.184   | 0.079 |               |
| Disinhibition                   | DS     | 35 | 0.286   | 0.021 | Social Skills |
|                                 | ASD    | 35 | 0.157   | 0.115 |               |
| Susceptibility to Boredom       | DS     | 35 | 0.308** | 0.008 | Social Skills |
|                                 | ASD    | 35 | 0.258*  | 0.023 |               |
| Sum Sensation Seeking Subscales | DS     | 35 | 0.259*  | 0.023 | Social Skills |
|                                 | autism | 35 | 0.229*  | 0.039 |               |

**Table 2.** Social skills with sensation seeking subscales analyzing by stepwise regression.

| Stage | Variables                          |  | Groups | R       | F    | P     | Beta    |       |
|-------|------------------------------------|--|--------|---------|------|-------|---------|-------|
|       | Prediction                         |  |        |         |      |       |         |       |
| 1     | Susceptibility to Boredom          |  | DS     | 0.308a  | .095 | 6.095 | 0.017a  | 0.308 |
|       |                                    |  | ASD    | 0.258a  | .067 | 4.125 | 0.025a  | 0.258 |
| 2     | Seeking Experience                 |  | DS     | 0.243a  | .059 | 3.339 | 0.031a  | 0.243 |
|       |                                    |  | ASD    | 0.184   | .042 | 3.031 | 0.089 a | 184   |
| 3     | Disinhibition                      |  | DS     | 0.286 a | .079 | 4.780 | 0.021 a | 0.286 |
|       |                                    |  | ASD    | 157     | .037 | 1.814 | 0.124   | 157   |
| 5     | Seeking Thrill and Adventure       |  | DS     | 153     | .028 | 1.080 | 0.127   | 153   |
|       |                                    |  | autism | 131     | .019 | 1.607 | 0.169   | 131   |
| 4     | Sum of Sensation Seeking Subscales |  | DS     | 0.259 a | .069 | 5.05  | 0.025 a | 0.259 |
|       |                                    |  | ASD    | 0.229 a | .051 | 3.001 | 0.043 a | 0.229 |

PRACTICE in  
CLINICAL PSYCHOLOGY

Table 3 demonstrate the correlation differentiation between all predictive variables (sensation seeking), one by one with criterion variable (social skills) in two groups. Not because of sizable difference between 2 groups (DS and ASD), but as  $Z_r \geq Z_b$ , the relationships were not significant.

#### 4. Discussion

As discussed before, social skills and sensation seeking scales were administered as research instruments for data gathering from two groups (DS and ASD students). The present study was aimed to investigate the relationship between the sensation seeking and social skills capability in two primary school age children. The first results of this study showed that based on R ratio, three subscales of sensation seeking, susceptibility to boredom, seeking experience, and sum of sensation seeking subscales were significant. So, there are positive and significant ( $\alpha=0.05$ ) relationship between sensation seeking and social skills (Table1). And the results of statistical analyses (stepwise regression) that susceptibility to boredom in both groups, seeking experience just in

DS group, disinhibition just in DS group, and sum of sensation seeking subscales in both groups were significant but seeking thrill and adventure were not significant in both groups. It means that some subscales of sensation seeking such as susceptibility to boredom, seeking experience, disinhibition, and sum of sensation seeking subscales can predict the social skills in this study. The results indicated that SS condition in ASD is lower than DS children.

These finding are compatible with the results of Ripa et al(2001) who found a positive relationship between SS and intelligence quotient. Also, Ball & Zuckerman (1992) found a mild positive association between intelligence and SS that supports our findings. Some researchers likes Sadock et al (2009) and Hallahan et al (2011) suggested that there is a positive correlation between IQ level and SS level, and social skills. Perhaps participants with different SS and social skills level were affected by their intelligence level. In this study, participants with ASD IQs were lower than DS participants. Some researchers have suggested that there is a relationship between the sensory processing problems in autism and

**Table 3.** two group’s participants (DS and ASD) correlation results of social skills and sensation seeking subscales.

| Sensation Seeking (ss)                          | Groups | N  | Rxy   | ZR    | Z      |
|---|--------|----|-------|-------|--------|
| Seeking Thrill and Adventure with Social Skills | DS     | 60 | 0.243 | 0.251 | 0.174  |
|   | ASD    | 60 | 0.184 | 0.186 |        |
| Seeking Experience with Social Skills           | DS     | 60 | 0.106 | 0.106 | 0.492  |
|   | ASD    | 60 | 0.157 | 0.158 |        |
| Disinhibition with Social Skills                | DS     | 60 | 0.308 | 0.319 | -0.393 |
|   | ASD    | 60 | 0.258 | 0.262 |        |
| Susceptibility to Boredom with Social Skills    | DS     | 60 | 0.259 | 0.265 | 0.431  |
|   | ASD    | 60 | 0.229 | 0.232 |        |
| Sensation Seeking and Social Skills             | DS     | 60 | 0.259 | 0.265 | 0.250  |
|   | ASD    | 60 | 0.229 | 0.232 |        |

PRACTICE in  
CLINICAL PSYCHOLOGY

the difficulties they experience in managing daily life (Cook & Dunn, 1998; Dunn, 1997, 1999, 2001; Kern et al., 2006). Baranek et al (2011), found that children with autism with higher levels of tactile defensiveness are also more likely to show rigid, inflexible behaviors, and repetitive verbalizations. There is a clear that more researches should be performed in the field of sensory processing and autism. Empirical researches are required to examine therapies used to help children with sensory differences. Little is known about what therapies are the most effective and why (Schaaf & Miller, 2005).

More studies are required to examine the relationship between sensory processing abnormalities and problems in autism, such as negative behaviors, difficulty with socialization, eating problems, and insistence on sameness. It is important to understand sensory differences in autism because it helps us to better understand the needs of persons with autism, and in turn, to understand the effective treatment protocols. As mentioned before, many researches showed that there is sizable relationship between social skills and sensation seeking capability in children who were typically developed. Children who are in sensation seeking categories, experience many setting for adjustment they need to have social behaviors (Curcio et al 2013). Acting socially and making social relationship require more social skills (Steyaert et al 2012).

Review of some previous researches (Gloude-mans et al (2012), Kevin and Gary (2009), Anderson et al (2004), Nasrabadi et al (2012), and Ahmadi (2011) has also demonstrated this relationship. It should be noted that students have different emotional reactions when they are faced with the superiority criteria, students with high achievement motivation, have generally tendency to hope, pride, anticipation and pleasure, but children with low sensation seeking have generally tendency to avoiding emotions. When students are faced with the excellence criteria, in their choices, efforts, stability and willingness to accept responsibility for the consequences of their success or failure will be different.

Compared to children with low level of emotion and motivation who choose easy assignments rather than difficult task, Children who have high level of emotion and motivation compared to those with low level of emotion and motivation, more try in relatively difficult task and show better performance because pride and hope makes them stronger (Reeve, 2010). This study as other study had some limitations related to test completion by patient's parents or teachers because of patient disability in reading test items, it likely has bias ideas

and also these finding are clearly preliminary, therefore, should be interpreted with caution. Finally, this study suggest that AD and DS students due to social impairments are required sensation seeking and social skills training program more than other peers.

## Acknowledgements

I would like to thank all participants and their teachers who cooperated with us to perform this study.

## References

- Ahmadi, Shiva. (2011). Critical thinking and self-efficacy with academic performance of students. *Journal of Shaheed University*. 3, 3, 122-132
- Anderson, T, How C & Rebecca S. (2004). Peer interaction and the learning of critical thinking skills in further education students. *Journal of Instruction Science*. 29 1-32.
- Ball, S. A., Zuckerman, M. (1992). Sensation seeking and selective attention: Focused and divided attention on a dichotic listening task. *Journal of Personality and Social Psychology* 63 (5) 825-831.
- Balzac, Fred. (2006). "Exploring the Brain's Role in Social Skills ". *Neuropsychiatry Reviews*. 7 (5): 1, 19-20.
- Baranek, G. T., Foster, L. G., & Berkson, G. (2011). Sensory defensiveness in persons with developmental disorders. *Occupational Therapy Journal of Research*, 17, 173-185.
- Bauminger, N., & Kasari, (2000). Loneliness and friendship in high-functioning children with autism. *Journal of Child Development*: 71, 447-456.
- Capps L, Yirmiya N, Sigman M. (2010). Understanding of simple and complex emotions in non-retarded children with autism. *Journal of Child Psychol Psychiatry*; 39(7): 1169-1182.
- Charan, SH. (2012). Childhood disintegrative disorder. *Journal of Pediatric Neurosci*; 7:55-7
- Coleman, M.(1992). "Down's Syndrome children with autistic features", *Down's Syndrome: Papers and Abstracts for Professionals*, 9,1-22-33.
- Cook, D. G., & Dunn, W. (1998). Sensory integration for students with autism. In R. L. Simpson, & B. S. Myles (Eds.), *Educating children and youth with autism: Strategies for effective practice* (pp. 191-229). Austin, TX: PRO.
- Curcio, A.L., Mak, A.S., George, A.M., (2013) .Do adolescent delinquency and problem drinking share psychosocial risk factors? A literature review. *Addictive Behaviors* 38 (4) 2003-2013.
- De Vries, R.E., de Vries (2009). Sensation seeking, risk-taking, and model of personality. *Personality and Individual Differences* 47 (6) 536-540.

- Dishion, T. J. (2009). The family ecology of boys' peer relations in middle childhood. *Journal of Child Development, 61*, 874-892.
- Dunn, W. (2001). The sensations of everyday life: Empirical and pragmatic considerations. *Journal of Occupational Therapy, 55*(6), 608-620.
- Gloude-mans, H.K. Schalk, R.M.J.D. & Reynaert W. (2012). The relationship between critical thinking skills and self-efficacy beliefs in mental health nurses. *Journal of Education Science*. 5.6.117-125
- Gralewski, J., & Karwowski, M. (2012). Social Skills and school grades: A case from Poland. *Journal of Thinking and Social Skills, 7* 198- 208.
- Harbour, C. & Maulik, P. (2013). History of intellectual disability. Retrieved from: <http://cirrie.buffalo.edu/encyclopedia/en/article/143/>
- Hallahan, D.P., Kauffman, J.M., Pullen, P.C., (2011). *Exceptional Children: introduction to special education*. 11th Ed. Virginia: Allyn and Bacon.
- Hops, H. (1983). Children's social competence and skills: Current research practices and future directions. *Journal of Behavior Therapy, 14*, 3-18.
- Howlin, P., Goode, S., Hutton, J., & Rutter, M. (2004). Adult Outcome for Children with Autism. *Journal of Child Psychology and Psychiatry, 45*, 212-229.
- Kafry, D. (1992). Sensation seeking of young adults. *Personality and Individual Differences, 3*, 161-166.
- Kern, J. K., Trivedi, M. H., Garver, C. R., Grannemann, B. D., Andrews, A. A., Savla, J. S., et al. (2006). The pattern of sensory processing abnormalities in autism. *Journal of Autism, 10*, 480-494.
- King, C. A. & Kirschenbaum, D. S. (2002). Helping young children develop social skills: The social growth program. CA: Wadsworth.
- Kozbelt, A., Beghetto, Ronald A. & Runco. (2010) "Theories of Social Skills. *The Cambridge Handbook of Social Skills* Cambridge University Press.
- Khadivi A and Mafakheri A (2011). The relationship between achievement motivation, locus of control, self-concept and academic achievement in high school, *Journal of Educational Sciences, 4*, (13), 66-75.
- Ladd, G. W., & Mize, J. (2007). A cognitive-social learning model of social-skill training. *Journal of Psychological Review, 90*(2), 127-157.
- Landry, B.M. & Rehfeldt, R. A. (2004). Evaluating stress Levels of parents of children with Disabilities. *Council for Exceptional children, 70* (2), 231- 240.
- McClelland, M. M., & Morrison, F. J. (2003). Learning-related social skills in preschool children. *Early Childhood Research Quarterly, 18*, 206-224.
- Nasrabadi BH, Mousavi K & Farsan Zabihullah S (2012). Attitude of critical thinking and cognitive learning styles in predicting academic achievement of students. *Iranian Journal of Medical Education, 13*.4.332-341
- Njardvik, U., Matson, J. L., & Cheery, K. E. (1999). A comparison of social skills in adults with autistic disorder, pervasive developmental disorder not otherwise specified, and mental retardation. *Journal of Autism and Developmental Disorders, 29*, 287-295.
- Ozonoff, S., Goodlin-Jones, B.L., & Solomon, M. (2005). Evidence-based assessment of autism spectrum disorders in children and adolescents. *Journal of Clinical Child and Adolescent Psychology, 34*, 523-540.
- Reeve, John Marshall & Yahya SM. (2010). *Motivation and Emotion*. Thirteenth printing, New York: veraeash publishing.
- Russo, A. Reynolds, T., Zupanick, C., & Dombeck, M. (2011) *Intellectual functioning*. Retrieved: [http://www.mentalhelp.net/poc/view\\_doc.php?type=doc&id=10326&cn=208](http://www.mentalhelp.net/poc/view_doc.php?type=doc&id=10326&cn=208)
- Ripa, C.P.L., Hansen, H.S., Mortensen, E.L., Sanders, S.A., Reinisch, J.M. (2001). A Danish version of the Sensation Seeking Scale and its relation to a broad spectrum of behavioral and psychological characteristics. *Personality and Individual Differences, 30*, 1371-1386.
- Rogers, P. T. & Coleman, M. (1992). "Medical Care in Down syndrome: Preventive Medicine Approach, New York: Marcel Dekker, Inc., pp 208-211.
- Sadock, B.J., Sadock, V.A., Ruiz, P. (2009). *Comprehensive Textbook of Psychiatry*. 9th Ed., Lippincott Williams & Wilkins.
- Schaaf, R. C., & Miller, L. J. (2005). Occupational therapy using a sensory integrative approach for children with developmental disabilities. *Mental Retardation and Developmental Disabilities Research Reviews, 11*, 143-148.
- Seyf A. A. (2011). *Modern Educational Psychology: Psychology of teaching and learning*. Tehran: nashre doran Publication.
- Simpson, M. (2012). The Importance of Social Skills on Our Global Society and in Today's Educational System, *Journal of International and Cross-cultural Studies; 2*, 1.123-132.
- Steyaert, J., de la Marche, W., Noens, I. (2012). Atypical sensory processing in adolescents with an autism spectrum disorder and their non-affected siblings. *Research in Autism Spectrum Disorders, 6* (2), 639-645.
- Yanovitzky, I., (2006). Sensation seeking and alcohol use by college students: *Journal of Health Communication, 11*, 269-280.
- Yanovitzky, I., (2005). Sensation seeking and adolescent drug use: The mediating role of association with deviant peers and pro-drug discussions. *Journal of Health Communication 17* (1) 67-89.
- Zuckerman, M. (2007). *Sensation Seeking and Risky Behavior*. American Psychological Association, Washington DC.
- Zuckerman, M. (1994). *Behavioral expressions and biosocial bases of sensation seeking*. New York: Cambridge University Press.
- Zuckerman, M. (1979). *Sensation seeking: Beyond the optimal level of arousal*. Hillsdale, N. J.: Lawrence Erlbaum Associates.