touch—An expert system. *Perception & Psychophysics, 37*(4), 299–302. doi:10.3758/bf03211351

Klatzky, R. L., Loomis, J. M., Lederman, S. J., Wake, H., & Fujita, N. (1993). Haptic identification of objects and their depictions. *Perception & Psychophysics, 54*(2), 170–178. doi:10.3758/bf03211752

Lebaz, S., Jouffrais, C., & Picard, D. (2012). Haptic identification of raised-line drawings: High visuospatial imagers outperform low visuospatial imagers. *Psychological Research-Psychologische Forschung, 76*(5), 667–675. doi:10.1007/s00426-011-0351-6

Lederman, S. J., & Klatzky, R. L. (1987). Hand movements—A window into haptic object recognition. *Cognitive Psychology, 19*(3), 342–368. doi:10.1016/0010-0285(87)90008-9

Lederman, S. J., Klatzky, R. L., Chataway, C., & Summers, C. D. (1990). Visual mediation and the haptic recognition of two-dimensional pictures of common objects. *Perception & Psychophysics, 47*(1), 54–64. doi:10.3758/bf03208164

Miller, D. (1985). Reading comes naturally: A mother and her blind child's experiences. *Journal of Visual Impairment & Blindness, 79*(1), 1–4.

Morrongiello, B. A., Humphrey, G. K., Timney, B., Choi, J., & Rocca, P. T. (1994). Tactual object exploration and recognition in blind and sighted children. *Perception, 23*(7), 833–848. doi:10.1068/p230833

Picard, D., & Lebaz, S. (2012). Identifying raised-line drawings by touch: A hard but not impossible task. *Journal of Visual Impairment & Blindness, 106*(7), 427–431.

Stratton, J. M., & Wright, S. (1991). On the way to literacy: Early experiences for young visually impaired children. Louisville, KY: American Printing house for the Blind.

Theurel, A., Witt, A., Claudet, P., Hatwell, Y., & Gentaz, E. (2013). Tactile picture recognition by early blind children: The effect of illustration technique. *Journal of Experimental Psychology-Applied, 19*(3), 233–240. doi:10.1037/a0034255

Thompson, L. J., Chronicle, E. P., & Collins, A. F. (2003). The role of pictorial convention in haptic picture perception. *Perception, 32*(7), 887–893. doi:10.1068/p5020

Thompson, L. J., Chronicle, E. P., & Collins, A. F. (2006). Enhancing 2-D tactile picture design from knowledge of 3-D haptic object recognition. *European Psychologist, 11*(2), 110–118. doi:10.1027/1016-9040.11.2.110

Valente, D., & Darras, B. (2013). Communication graphique et cécité: Étude sémiotique pragmatique de la production et l'interprétation de signes figuratifs produits par des jeunes non-voyants [Drawing recognition and production by blind children]. *MEI Handicap et Communication, 36*, 77–91.

Florence Bara, CLLE-LTC, *lecturer of cognitive psychology, maison de la recherche, Université de Toulouse Jean-Jaurès, 5 allée Antonio-Machado, 3110 Toulouse, France; e-mail: florence.bara@univ-tlse2.fr.*

The Behavior Problems Inventory–Short Form: Utility for Children and Adolescents with Visual Impairments

Markus Lang and Klaus Sarimski

Several studies reported a higher prevalence of maladaptive behaviors in children and adolescents with visual impairments (that is, those who are blind or have low vision) compared with typically developing youths. Early studies reported that up to 57% of youths with visual impairments also have mental health problems (Jan, Freeman, & Scott, 1977; Tirosh, Shnitzer, Davidovitch, & Cohen, 1998). More recent studies found that approximately 25% of these children and adolescents have persistent problems with mental health (Maes & Grietens, 2004; Pinquart & Pfeiffer, 2014; Sharma, Sigafoos, & Carroll, 2002). These include problems with attention, anxiety, decreased initiative and communication, aggression, and low self-esteem. Some of the children and adolescents with visual impairments

develop serious manneristic or stereotypical behaviors (eye poking or rocking) or self-injurious behaviors like head hitting or self-biting (Fazzia et al., 1999; Gal & Dyck, 2009; Malloy & Rowe, 2011). Specifically, the risk of persistent problem behaviors is elevated in youths who present a combination of visual impairment and intellectual disabilities (Alimovic, 2013). This observation may be explained by a combination of neurological abnormalities that are associated with intellectual disabilities, impairments of social interaction and communication, and environmental reactions that maintain them.

For clinical purposes, it is important to identify youths who show various symptoms with clinical significance in order to describe their form and to measure their frequency. Unfortunately, there is a lack of reporting on the utility of behavior-rating instruments that are well established for the assessment of such maladaptive behaviors for their use with children and adolescents with visual impairments. One of the well-established rating scales used in the assessment of youths with intellectual disabilities is the Behavior Problems Inventory (BPI; Rojahn, Mastson, Lott, Esbensen, & Smalls, 2001), which was developed to evaluate stereotypical, self-injurious, and aggressive or destructive behaviors in this population. The BPI is one of the rare behavior-rating instruments with proven reliability and validity that specialize in the assessment of these most common types of behavior problems in children and adolescents with intellectual disabilities (Rojahn et al., 2012a). Other instruments capture a wider spectrum of behavioral domains that may be more important for youths with typical development or that are single-domain instruments that involve assessing repetitive or aggressive behaviors separately.

A short form (Behavior Problems Inventory–Short Form, BPI-S; Rojahn et al., 2012a, 2012b) is available. As the BPI-S includes various items that describe behaviors exhibited by youths with visual impairments, it was used in the current study. The purpose of this project was to explore the utility of the BPI-S to describe various forms of maladaptive behaviors in children and adolescents with visual impairments, and to provide data to estimate if there are differences in specific forms of stereotypical, self-injurious, or aggressive or destructive behaviors in youths who are blind as compared to youths with low vision.

Measures

The BPI-S is a well-established, informant-based behavior-rating instrument that was designed to assess maladaptive behaviors in individuals with intellectual disabilities. Its items fall into one of three subscales: self-injurious behavior (8 items), stereotypical behavior (12 items), and aggressive or destructive behavior (10 items). Parents were asked to rate the frequency with which the behavior has occurred during the past two months: never = 0; monthly = 1; weekly = 2; daily = 3; hourly = 4.

The BPI-S has been empirically developed as a short form of the BPI (Rojahn et al., 2001) and uses the same rating system but has fewer items. Rojahn and colleagues (2012b) reported high correlations between the analogous BPI and BPI-S subscales, and provided data concerning reliability and validity for individuals with intellectual disabilities. As far as we know, the BPI-S has not been used to analyze the frequency of maladaptive behaviors in children and adolescents with visual impairments up to now.

Participants

Parents of several national German parent self-help groups in various parts of the country were contacted, informed about the intention to gather data on the frequency of behavioral problems in visually impaired youths and the form of the investigation, and asked if they were interested in contributing. After informed consent, the parents received the link to

the BPI-S, which was provided online. In addition to the items of the BPI-S, they were asked for information on their own educational level, their child's medical diagnosis, the degree of visual impairment, additional disabilities, and the type of kindergarten or school that their child attended currently.

Seventy-seven parents completed the questionnaire on their own. Data were collected anonymously; that is, there was no personal contact with the investigators. No demographic data from the parents were ascertained except educational level. Sixty-seven percent reported a high school or university graduation.

The mean age of the children was 7.2 years (SD = 3.10 years). Fifty-two percent were preschool age (2 to 6 years). Gender was nearly evenly distributed (37 boys, 40 girls). An estimation of the degree of their visual impairment was obtained from the parents. *Moderate low vision* was defined as visual acuity between 1/3 (20/60) and 1/20 (20/400). *Severe low vision* was defined as visual acuity between 1/20 and 1/50 (20/1000). *Blindness* was defined as visual acuity of more than 1/50. Twenty-two children had moderate or severe low vision; 55 children were blind.

Of those whose parents reported a medical diagnosis, 16 had Leber's amaurosis, 12 had retinopathy as a complication of premature birth, 11 were reported to have microphthalmia, and seven to have an optic dysplasia. An additional physical disability was reported for 10, an additional hearing impairment for 6. Eight parents reported that their child had an additional intellectual disability, but there was no information on the results of formal assessments like intelligence tests. Approximately 40% were enrolled in preschools; 6% were in a special "kindergarten." Twenty-six percent were mainstreamed in general education classes, and approximately 20% attended special schools.

Statistical analysis

After providing descriptive results on the number of parents who reported that each behavior occurred daily or hourly, differences among children who are blind and children with low vision were analyzed. On the item level, Chi^2-tests were used to assess the significance of differences. Then mean scores were computed for each of the three scales (self-injurious behavior, stereotypical behavior, and aggressive or destructive behavior). Differences between the groups were analyzed by t-tests.

Results

Table 1 shows the frequency ratings for each item in the group. It presents the number of parents who reported that the behavior described in the item occurred never, monthly, weekly, daily, or hourly. Among the self-injurious behaviors, only "head hitting" (item 2) was reported by more than 10% of the parents in the sample as occurring daily or hourly. Among the aggressive or destructive behaviors, "grabbing and pulling others" (item 13) was reported as a behavior that occurred daily or hourly, according to more than 10% of the parents who completed the questionnaire.

Various stereotypical behaviors were reported, especially "rocking, repetitive body movements," "waving or shaking arms," "repetitive hand or finger movements," "yelling and screaming," "pacing, jumping, bouncing, running," and "clapping hands." According to parental reporting, all these behaviors were shown by 15% of the children at minimum, with a frequency of daily or hourly occurrence.

The frequencies of each behavior were compared between the 22 children and adolescents with moderate or severe low vision and the 55 children and adolescents with blindness. The groups did not differ significantly regarding additional intellectual disabilities. In the subgroup with moderate or

Table 1
Number of parents who reported that the maladaptive behaviors occur ($N = 77$).

Type of behavior	Never	Monthly	Weekly	Daily	Hourly
Self-injurious					
1 Self-biting	64	7	3	3	-
2 Head hitting	58	6	5	6	2
3 Body hitting	64	4	6	2	1
4 Self-scratching	73	2	1	1	-
5 Pica	66	3	2	3	3
6 Inserting objects in nose, etc.	74	1	1	1	1
7 Hair pulling	71	4	1	1	-
8 Teeth grinding	56	15	5	-	1
Aggressive or destructive					
9 Hitting others	53	13	7	2	2
10 Kicking others	61	12	3	-	1
11 Pushing others	61	7	4	3	2
12 Biting others	62	7	5	1	2
13 Grabbing and pulling others	53	11	5	6	2
14 Scratching others	66	7	-	3	1
15 Pinching others	55	10	7	3	2
16 Verbally abusive with others	53	8	10	4	2
17 Destroying things	63	8	4	1	1
18 Bullying—being mean and cruel	72	3	1	1	-
Stereotypical					
19 Rocking, repetitive body movements	40	9	8	7	13
20 Sniffing objects, self	69	5	1	-	2
21 Waving or shaking arms	43	3	8	16	7
22 Manipulating objects	51	11	7	4	4
23 Repetitive hand or finger movements	43	9	6	15	4
24 Yelling and screaming	43	10	12	10	2
25 Pacing, jumping, bouncing, running	50	11	4	10	2
26 Rubbing self	72	3	-	2	-
27 Gazing at hands or objects	75	-	-	1	1
28 Bizarre body postures	69	3	2	2	1
29 Clapping hands	47	9	9	6	6
30 Grimacing	55	9	6	4	3

severe low vision, two youths had an additional intellectual disability, according to parental reporting. In the subgroup of those who were blind, six parents reported an additional intellectual disability.

The comparison revealed several differences. "Head hitting," "Pica," "teeth grinding," "scratching others," "pinching others," "verbally abusive with others," "waving or shaking arms," "manipulating objects," "repetitive hand or finger movements," "pacing, jumping, bouncing, running," and "rubbing self" were seen significantly more often in children and adolescents who were blind.

Table 2 shows the means and standard deviations for both groups. Again, for children and adolescents with blindness the frequencies of stereotypical behaviors and self-injurious behaviors were significantly higher. The difference of mean scores for aggressive or destructive behaviors approached significance.

Finally, the mean scores for each type of maladaptive behavior were analyzed for

Table 2
Means and standard deviations for self-injurious, aggressive or destructive, and stereotypical behaviors ($N = 77$).

	Low vision ($n = 22$)		Blind ($n = 55$)			
Type of behavior	*M*	*SD*	*M*	*SD*	*T*	*P*
Self-injurious	1.04	1.86	2.69	3.67	−1.99	.05
Aggressive or destructive	2.00	3.17	4.83	6.99	−1.82	.07
Stereotypical	4.59	6.02	9.41	7.64	−2.64	.01

associations with an additional intellectual disability (see Table 3). They were significantly higher for the eight children whose parents reported an additional intellectual disability. There was no significant correlation with age.

Discussion

The Behavior Problems Inventory–Short Form (BPI-S) seems useful in identifying aggressive or destructive, self-injurious, and stereotypical behaviors in children and adolescents with visual impairments. Seventy-seven parents rated the frequency of maladaptive behaviors that occurred regularly. Various forms of maladaptive behaviors could be differentiated by the BPI-S. Some behaviors were rarely seen in this group (such as teeth grinding, hair pulling, kicking others, or destroying things) and seem more suitable to describe the spectrum of behaviors seen in children with intellectual disabilities for which the BPI-S was developed originally. Each of the behaviors described in the 30 items may occur in visually impaired youths.

Limitations

We cannot be sure that parents understood the wording of the items in the sense that was intended. Another limitation is that parents might have judged the frequency of problem behaviors as higher or lower compared to direct observers, common issues when questionnaires and rating scales are used in the assessment of problem behaviors that are not specific to the BPI-S. Another study limitation is the lack of demographic information on the parents.

The frequency of all three types of maladaptive behaviors appeared to be associated with the degree of visual impairment. Youths who are blind showed more problem behaviors than did those with moderate or severe low vision. The highest frequency was reported for various forms of stereotypical behaviors. Our results confirmed stereotypical and self-injurious behaviors as problems with clinical significance in visually impaired youths (Fazzia et al., 1999; Gal & Dyck,

Table 3
Means and standard deviations for self-injurious, aggressive or destructive, and stereotypical behaviors ($N = 77$).

	Intellectual disability ($n = 8$)		No intellectual disability ($n = 69$)			
Type of behavior	*M*	*SD*	*M*	*SD*	*T*	*P*
Self-injurious	6.75	3.77	1.70	2.88	−4.55	<.001
Aggressive or destructive	9.62	8.43	3.38	5.70	−2.78	.007
Stereotypical	15.37	4.60	7.19	7.33	−3.08	.003

2009). However, the majority of participants in this sample did not present maladaptive behaviors on a regular (daily or hourly) basis (see Table 1).

As an implication for clinical practice, we recommend the use of the BPI-S as an instrument to identify youths with visual impairments who are in need of positive behavior support. Practitioners can use the BPI-S to describe the specific form of aggressive, stereotypical, or self-injurious behavior as a target for intervention, and to evaluate the effects of behavioral interventions. However, more research is needed to provide data on the reliability of BPI-S-ratings with children and adolescents with visual impairments and the correspondence with direct observational methods. Furthermore, it is important to stress that the effectiveness of positive behavior support depends on a careful analysis of antecedents and maintaining variables for problem behavior. A behavior rating form like the BPI-S can be seen as a first step for assessment that must be followed by a systematic functional analysis.

References

Alimovic, S. (2013). Emotional and behavioral problems in children with visual impairment, intellectual and multiple disabilities. *Journal of Intellectual Disability Research, 57*, 153–160.

Fazzia, E., Lannersby, J., Danovaa, S., Ferrarri-Ginevraa, O., Ghezaa, C., Lupariaa, A., . . . Lanzia, G. (1999) Stereotyped behaviours in blind children. *Brain & Development, 21,* 522–528.

Gal, E., & Dyck, M. (2009). Stereotyped movements among children who are visually impaired. *Journal of Visual Impairment & Blindness, 103,* 754–765.

Jan, J., Freeman, R., & Scott, E. (1977). *Visual impairment in children and adolescents*. New York, NY: Grune & Stratton.

Maes, B., & Grietens, H. (2004). Parent-reported problem behavior among children with sensory disabilities attending elementary regular schools. *Journal of Developmental and Physical Disabilities, 16*, 361–375.

Malloy, A., & Rowe, F. (2011). Manneristic behaviors of visually impaired children. *Strabismus, 19,* 77–84.

Pinquart, M., & Pfeiffer, J. (2014). Change in psychological problems of adolescents with and without visual impairment. *European Child and Adolescent Psychiatry, 23,* 571–578.

Rojahn, J., Mastson, J., Lott, D., Esbensen, A. & Smalls, Y. (2001). The Behavior Problems Inventory: An instrument for the assessment of self-injury, stereotyped behavior and aggression/destruction in individuals with developmental disabilities. *Journal of Autism and Developmental Disorders, 31,* 577–588.

Rojahn, J., Rowe, E. W., Sharber, A. C., Hastings, R., Matson, J. L., Didden, R., Kroes, D. B., & Dumont, E. L. (2012a). The Behavior Problems Inventory–Short Form for individuals with intellectual disabilities: Part I: Development and provisional clinical reference data. *Journal of Intellectual Disability Research, 56*, 527–545.

Rojahn, J., Rowe, E. W., Sharber, A. C., Hastings, R., Matson, J. L., Didden, R., Kroes, D. B., & Dumont, E. L. (2012b). The Behavior Problems Inventory–Short Form for individuals with intellectual disabilities: Part II: Reliability and validity. *Journal of Intellectual Disability Research, 56,* 546–565.

Sharma, S., Sigafoos, J., & Carroll, A. (2002). Challenging behavior among Indian children with visual impairment. *British Journal of Visual Impairment, 20,* 4–6.

Tirosh, E., Shnitzer, M., Davidovitch, M., & Cohen, A. (1998). Behavioral problems among visually impaired children between 6 months and 5 years. *International Journal of Rehabilitation Research, 21*, 63–70.

Markus Lang, Ph.D., *professor, Department of Special Education, University of Education, Keplerstrasse 87, D-69120 Heidelberg, Germany; e-mail: lang@ph-heidelberg.de.* ***Klaus Sarimski, Ph.D.,*** *professor, Department of Special Education, University of Education, Heidelberg, Germany; e-mail: sarimski@ph-heidelberg.de.*