Psychological Assessment

The Implications of Symptom Validity Test Failure for Ability-Based Test Performance in a Pediatric Sample

Michael W. Kirkwood, Keith Owen Yeates, Christopher Randolph, and John W. Kirk

Online First Publication, July 18, 2011. doi: 10.1037/a0024628

Psychological Assessment

1040-3590/11/$12.00 DOI: 10.1037/a0024628

The Implications of Symptom Validity Test Failure for Ability-Based Test Performance in a Pediatric Sample

Michael W. Kirkwood
University of Colorado Denver School of Medicine and Children's Hospital Colorado, Aurora, Colorado

Keith Owen Yeates
The Ohio State University and Nationwide Children's Hospital, Columbus, Ohio

Christopher Randolph
Loyola University Medical Center, Maywood, Illinois

John W. Kirk
University of Colorado Denver School of Medicine and Children's Hospital Colorado, Aurora, Colorado

If an examinee exerts inadequate effort to perform well during a psychological or neuropsychological exam, the resulting data will represent an inaccurate representation of the individual's true abilities and difficulties. In adult populations, methodologies to identify noncredible effort have grown exponentially in the last 2 decades. Though a comparatively modest amount of work has focused on tools to identify noncredible effort in pediatric populations, recent research has demonstrated that children can consistently pass several stand-alone symptom validity tests (SVTs) using cutoffs established with adults. However, no identified studies have examined the implications of pediatric SVT failure for ability-based test performance. The current sample consisted of 276 children aged 8–16 years referred consecutively for outpatient clinical neuropsychological consultation following mild traumatic brain injury (TBI). An earlier subgroup of this same case series that also included 17-year-olds was presented in Kirkwood and Kirk (2010). Nineteen percent of the current sample performed below the actuarial cutoff on the Medical Symptom Validity Test (MSVT). No background or injury-related variable differentiated those who passed from those who failed the MSVT. Performance on the MSVT was correlated significantly with performance on all ability-based tests and explained 38% of the total ability-based test variance. Participants failing the MSVT performed significantly worse on nearly all neuropsychological tests, with large effect sizes apparent across most tests. The results provide compelling evidence that practitioners should add objective SVTs to the evaluation of school-aged youth, even when secondary gain issues might not be readily apparent and particularly following mild TBI.

Keywords: symptom validity testing, response bias, mild traumatic brain injury, postconcussion syndrome, children

Psychological test interpretation rests upon the assumption that the examinee exerted adequate effort to perform well during the exam. If an individual provides suboptimal effort, the resulting data will represent an inaccurate representation of his or her true abilities and difficulties. Reliance on such data can lead to a host of problems for the psychologist or neuropsychologist including interpretive errors, inaccurate diagnostic and etiologic conclusions, mischaracterization of brain–behavior relationships, ineffective treatment recommendations, and inappropriate use of limited health care and educational resources. The frequency with which adults provide noncredible effort during neuropsychological evaluation is fairly well studied, with rates ranging from less than 10% in general medical cases to 40% in mild traumatic brain injury (TBI) litigants to even higher in some other secondary gain contexts (Chafetz, Abrahams, & Kohlmaier, 2007; Greve, Etherton, Ord, Bianchini, & Curtis, 2009; Larrabee, 2003; Mittenberg, Patton, Canyock, & Condit, 2002).

Relatively little attention has been paid to how often noncredible effort occurs during pediatric psychological or neuropsychological evaluation. In part this could be because children were assumed historically to be less capable of deception than adults. However, acts of deception in childhood are not uncommon, even in typically developing populations (Newton, Reddy, & Bull, 2000; Stouthamer-Loeber & Loeber, 1986; Wilson, Smith, & Ross, 2003). During neuropsychological examination in particular, a number of single-case reports have also clearly documented that children can feign cognitive impairment (Flaro & Boone, 2009; Henry, 2005; Kirkwood, Kirk, Blaha, & Wilson, 2010; Lu & Boone, 2002; McCaffrey & Lynch, 2009). Several recent clinical case series have also found that a small percentage of general pediatric patients consistently perform suboptimally because of

Michael W. Kirkwood and John W. Kirk, Department of Physical Medicine and Rehabilitation, University of Colorado Denver School of Medicine, and Children's Hospital Colorado, Aurora, Colorado; Keith Owen Yeates, Department of Pediatrics, The Ohio State University, and Center for Biobehavioral Health, The Research Institute at Nationwide Children's Hospital, Columbus, Ohio; Christopher Randolph, Department of Neurology, Loyola University Medical Center, Maywood, Illinois.

Correspondence concerning this article should be addressed to Michael W. Kirkwood, ABPP/CN, Children's Hospital Colorado, Concussion Program, B285, 13123 East 16th Avenue, Aurora, CO 80045. E-mail: michael.kirkwood@childrenscolorado.org

effort-related problems (Carone, 2008; Donders, 2005; MacAllister, Nakhutina, Bender, Karantzoulis, & Carlson, 2009). Two other recent studies suggest that under certain conditions, rates of noncredible effort in children are likely to be considerably higher. In a mild TBI case series consisting of 193 children and adolescents referred exclusively for clinical evaluation, 17% of the sample failed the Medical Symptom Validity Test (MSVT), which was the same percentage estimated to have put forth noncredible effort more broadly across the exam once possible false positives and false negatives were taken into account (Kirkwood & Kirk, 2010). During determination evaluations for Social Security Disability benefits, Chafetz et al. (2007) found an even higher percentage (28%–37%) of children who failed a symptom validity test (SVT).

In adult populations, research on methodologies to identify noncredible effort has grown exponentially in the last 2 decades. Adult-focused clinicians and researchers now have access to a multitude of well-validated measures to detect noncredible test performance and exaggerated self-report (Boone, 2007; Larrabee, 2007). Relying on objective tools to screen for inadequate effort in children is no less important, because subjective judgment alone is unlikely to be consistently accurate (Faust, Hart, & Guilmette, 1988; Faust, Hart, Guilmette, & Arkes, 1988). Of course, when using any test with a pediatric population, developmental competencies need to be considered. Some SVTs depend upon reading or facility with numbers, so will be inappropriate for young children. Even SVTs that rely exclusively on nonverbal stimuli may be affected by developmental factors, especially in more impaired populations (MacAllister et al., 2009). Above certain ages, however, children have been found capable of passing a number of stand-alone SVTs using cutoffs established with adults. For example, children down to age 5 or 6 years consistently pass the Test of Memory Malingering (TOMM; Constantinou & McCaffrey, 2003; Donders, 2005; Kirk et al., 2011); children who are at least age 11 years pass the Computerized Assessment of Response Bias (Courtney, Dinkins, Allen, & Kuroski, 2003); and children with at least a third-grade reading level pass the Word Memory Test (WMT; Green & Flaro, 2003).

The MSVT was designed explicitly to be used with children and adults (Green, 2004). Similar to the WMT, the MSVT involves the computerized presentation of word pairs over two trials and then examination of both word recognition and recall. The MSVT is easier than the WMT, as it consists of only 10 word pairs, not the 20 in the WMT, and because each word pair represents only one concept (e.g., school–book) rather than the two per pair in the WMT (e.g., playground–slide). Data from the MSVT publisher and several independent studies indicate that children with a second- to third-grade reading level providing adequate effort consistently score above the recommended pass or fail cutoff.

Normative child data provided by the publisher have been presented in several places including the test manual, the MSVT computer program and scoring software, and select scientific publications (Green, 2004; Green, Flaro, Brockhaus, & Montijo, in press; Green, Flaro, & Courtney, 2009). One of the data sets is based on administration of the MSVT to 55 healthy Canadian children without psychiatric or neurological illness aged 8–11 years (and one 7-year-old). Out of the 55 children, 53 passed the MSVT effort subtests, with no age or grade effect apparent. Another normative data set includes 82 healthy Brazilian children (age 6–17 years; mean age not reported) asked to do their best and 27 healthy Brazilian children (M = 12.2 years, SD = 2.4) asked to simulate memory impairment. In the children asked to try their best, 80 out of 82 cases passed the effort subtests. All 27 simulators failed the effort subtests. Green et al. (2009) also reported MSVT data from a subgroup of children (n = 27; mean age not reported) who had a Full Scale IQ of 70 or lower. The mean MSVT effort scores in this subgroup were said to be indistinguishable from those of other children.

In an independent study, Blaskewitz, Merten, and Kathmann (2008) administered a German version of the MSVT to 51 healthy German children (M = 8.9 years). All but one child performed at passing levels, with the only exception being a second grader who scored 1 raw score point below the cutoff on one of the effort subtests. Carone (2008) compared performance of 38 children (M = 11.8 years) who suffered an acquired moderate to severe TBI or displayed other significant neurological or developmental problems with 67 adults who had sustained a mild TBI. Whereas only 5% of the children failed the MSVT, 21% of the adults did. Even the two children in this sample who failed the MSVT were thought to have exerted suboptimal effort. Because the MSVT requires reading, Kirkwood and Kirk (2010) analyzed each case failing the MSVT in their pediatric mild TBI sample for evidence that reading difficulties accounted for the test failure. Of the 33 (out of 193) cases who failed the MSVT, only five (15%) had a history of early reading difficulty or diagnosed dyslexia. Four of these five cases also unequivocally failed the TOMM, which is a nonverbal SVT, so reading problems were not considered a plausible explanation for the vast majority of MSVT failures.

The MSVT and other SVTs mentioned above all use a forced-choice recognition memory paradigm based on the presumption that performance below a specified actuarial threshold (not simply below chance levels) indicates noncredible effort and should raise concerns about the validity of all collected test data. If these SVTs do indeed measure effort rather than ability for most children, two predictions should hold true. First, above a certain age, test performance should be affected minimally by demographic, developmental, or neurological differences (e.g., gender, learning difficulties, brain injury pathology). Second, SVT failure should have implications for performance on a wide range of neuropsychological tests, not simply other tests tapping memory or related skills that seem necessary on the surface to complete the SVT. No identified pediatric research has examined the relationship between performance on SVTs and performance on ability-based tests, though several relevant studies with adults have been conducted.

Constantinou, Bauer, Ashendorf, Fisher, and McCaffrey (2005) studied 69 mild TBI litigants and found that performance on the TOMM was correlated significantly with poorer performance on most subtests from the Wechsler Adult Intelligence Scale–Revised and two summary indices from the Halstead–Reitan Neuropsychological Battery for Adults. Performance on the TOMM accounted for about 25% of the variance in both Full Scale IQ and the Halstead Impairment Index and 50% of the variance on the Halstead General Neuropsychological Deficit Scale. Using a sample of 904 consecutively referred outpatients (most of whom had a financial claim at the time of evaluation), Green, Rohling, Lees-Haley, and Allen (2001) converted 43 neuropsychological test scores to z scores and found that WMT performance explained approximately 50% of the variance on ability tests, far more than that explained by brain injury severity, education, or age. In an updated version of the same case series, Green (2007) then delineated the significant effect that effort had on test scores across a wide variety of neuropsychological domains. Most recently, in a sample of 63 mild TBI patients receiving financial compensation, Lange, Iverson, Brooks, and Rennison (2010) documented that failure on the TOMM was associated with large effects on not only neurocognitive test performance (Neuropsychological Assessment Battery Screening Module Attention, $d = 1.26$; Memory, $d = 1.16$; Executive Functioning, $d = 0.70$) but also self-reported postconcussive symptoms (Post-Concussion Scale, $d = 0.79$) and general cognitive complaints (British Columbia Cognitive Complaints Inventory, $d = 0.98$).

The present study was designed to examine the effect of SVT failure on ability-based test performance in an exclusively pediatric population, consisting of 276 children and adolescents aged 8–16 years referred consecutively for outpatient clinical neuropsychological consultation following mild TBI. MSVT performance was anticipated to have broad-based implications for cognitive test performance, with significant differences predicted between those passing and those failing the MSVT across ability-based tests.

Method

Participants

The project was reviewed and approved by the university-affiliated institutional review board. Participants were drawn from a 4-year series of consecutive clinical cases referred to an outpatient concussion program at a children's hospital in the Rocky Mountain region of the United States. Patients were considered eligible for participation if they were aged 8–16 years at the time of evaluation. A subgroup of this same case series ($N = 193$) was presented in Kirkwood and Kirk (2010). All patients from the previous sample were included in the current sample, except twenty-two 17-year-olds. One hundred and five new patients were added to the current sample. All patients in both samples had sustained blunt head trauma within the previous 12 months and were referred because of concerns or questions about the effects of underlying brain injury. Other than a few select cases in which the head injury was unwitnessed and reliable acute injury data were unavailable, patients displayed evidence of mild TBI such as alteration in mental status, loss of consciousness, posttraumatic amnesia, or transient neurologic disturbance. The most common causes of injury in the current sample were recreation or sports (65%), falls (18%), motor-vehicle-related trauma (11%), and assaults (3%). Children who had intracranial pathology on neuroimaging were included if their Glasgow Coma Scale score was never less than 13. Exclusionary criteria were forensic referral, neurosurgical intervention, injury resulting from abuse, and nontraumatic brain injury such as hypoxia, stroke, or infectious illness. If a patient was evaluated more than once clinically, only data from the first evaluation were used. The final sample for the current project included 276 participants. Background and injury characteristics of the sample are provided in Table 1.

Measures

The MSVT (Green, 2004) is a computerized forced-choice verbal memory test designed to evaluate effort and memory. The primary effort indices are the Immediate Recognition (IR), Delayed Recognition (DR), and Consistency (CNS) scores. The test requires about 5 min of direct administration time (i.e., not including the delay time between IR and DR). Examinees are presented with 10 semantically related word pairs twice on a computer screen. They are then asked to choose the correct word from pairs consisting of the target and a foil, during IR and DR conditions. Examinees receive auditory and visual feedback about the correctness of each response. Examinees are then asked to recall the words during Paired Associate and Free Recall conditions. Participants in the current project were administered the MSVT in a standardized fashion, except that the examiner stayed in the room during the entire administration. The actuarial criteria proposed by Green (2004) were considered indicative of suboptimal effort.

Table 1
Background and Injury Characteristics of All Participants

Participants	$N = 276$
Age (years)	$M = 14.2$, $SD = 2.2$
Grade	$M = 8.3$, $SD = 2.2$
Male	$n = 172$ (62%)
Caucasian	$n = 232$ (84%)
Estimated Full Scale IQ[a]	$M = 103.5$, $SD = 12.6$
Maternal years of education	$M = 15.1$, $SD = 2.2$
Paternal years of education	$M = 15.2$, $SD = 2.6$
Premorbid history of attention-deficit/hyperactivity disorder	$n = 45$ (16%)
Premorbid history of diagnosed learning disability	$n = 29$ (11%)
Premorbid history of special education services	$n = 35$ (13%)
Weeks since injury	$M = 9.7$, $SD = 9.1$; $Mdn = 6.0$
Loss of consciousness	$n = 49$ (18%)
Neuroimaging conducted	$n = 200$ (73%)
Intracranial findings on computed tomography or magnetic resonance imaging for those who underwent neuroimaging	$n = 27$ (14%)
Families in or planning litigation	$n = 22$ (8%)
Families seeking disability compensation	$n = 0$
Participants charged with a crime	$n = 0$

[a] Based on performance of the 263 participants administered the Wechsler Abbreviated Scale of Intelligence.

Consistent with previous MSVT research (e.g., Carone, 2008; Green et al., 2009; Kirkwood & Kirk, 2010), the mean score of the three highly correlated validity indices (IR, DR, CNS) was considered a summary effort variable (MSVT Easy).

The Wechsler Abbreviated Scale of Intelligence (WASI; Wechsler, 1999) is a nationally standardized measure with satisfactory psychometric properties commonly used to estimate overall cognitive ability or IQ. The two-subtest version, comprising the Vocabulary and Matrix Reasoning subtests, was used for this project. The California Verbal Learning Test–Children's Version (CVLT–C; Delis, Kramer, Kaplan, Ober, & Fridlund, 1994) is a nationally standardized list-learning test with good psychometric properties that is frequently used by neuropsychologists to evaluate verbal learning and memory. The Wechsler Intelligence Scale for Children–Fourth Edition (WISC–IV; Wechsler, 2003) is one of the most commonly administered intelligence tests with children and has very strong psychometric properties. Only the Digit Span and Coding subtests from the WISC–IV were used for this project, which are designed to measure aspects of attention and processing speed, respectively. The Grooved Pegboard (Klove, 1963; Reitan, 1969) measures fine motor speed and dexterity by requiring the individual to place pegs within a pegboard as quickly as possible. The Woodcock–Johnson III Tests of Achievement (WJ–III; Woodcock, McGrew, & Mather, 2001) is a nationally standardized, commonly used measure of academic achievement. For this project, only the Letter–Word Identification subtest was used, which measures single-word reading. Participants also completed four automatized sequencing tasks, which required participants to recite the alphabet, say the days of the week, say the months of the year, and count to 20 as fast as they could.

Procedure

Patients underwent testing no earlier than 1 week postinjury and no later than 52 weeks postinjury. Median testing time was 6 weeks postinjury. Most children underwent an abbreviated battery of neuropsychological tests rather than a more comprehensive evaluation (as discussed in Kirkwood et al., 2008), though the actual tests administered varied depending on clinical need. The MSVT was administered to all participants. The majority of participants completed each of the following tasks: WASI (95.2%); CVLT–C (81.9%); WISC–IV Digit Span (99.6%) and Coding (91.3%); Grooved Pegboard (93.4%); WJ–III Letter–Word Identification (85.5%); and timed recitation of the alphabet (96.4%), counting to 20 (78.3%), saying the days of the week (92.8%), and saying the months of the year (94.6%).

Results

Of the 276 participants, 51 (18.5%) failed at least one of the three primary validity indices of the MSVT (i.e., IR, DR, or CNS). Performance profiles in those participants who passed the MSVT and those who failed are provided in Table 2. The two groups did not differ in age; grade; gender; ethnic–racial status (classified as Caucasian or other); parental educational level; mechanism of injury (classified as sport-related or other); history of premorbid learning disability, attention-deficit/hyperactivity disorder, or special education services; time since injury; or whether the injury was associated with loss of consciousness or neuroimaging pathology. At the time of evaluation, no cases in the sample reported seeking disability compensation or being faced with criminal charges. Twenty-two families reported that they were engaged in or planning litigation. Of these, only three cases failed the MSVT.

The MSVT pass group averaged near perfect scores on IR (99.4%), DR (99.2%), and CNS (98.9%), with little variability. The mean score of Paired Associates was also near perfect (98.4%), with slightly more variability. On Free Recall, the mean performance was 76.3%, comparable to normative data for early adolescents provided by the test publisher (Green, 2004). The mean performance of the MSVT fail group was well below cutoff scores for each of the primary effort indices.

Associations between the MSVT Easy score (mean of IR, DR, and CNS) and age or grade and ability-based tasks are provided in Table 3. A Bonferroni correction was used to conservatively control the familywise error rate and reduce the chances of a Type I error. The resultant $p < .003$ was used to indicate significance. Performance on the MSVT effort indices was not significantly correlated with age or grade. In contrast, MSVT performance was significantly associated with all ability-based tasks. MSVT performance accounted for less than 10% of the variance on WASI Vocabulary (4%), WJ–III Letter–Word Identification (6%), and WISC–IV Coding (8%). MSVT performance accounted for more than 10% of the variance on all other tasks, with approximately 25% or more of the variance explained on WASI Matrix Reasoning (26%), CVLT–C Recognition Discriminability (34%), WISC–IV Digit Span (24%), and time to say the days of the week (25%) and months of the year (23%). To calculate a single summary ability score, we converted all ability-based test scores to *z*

Table 2
Medical Symptom Validity Test Performance in Those Passing and Failing the Primary Effort Indices

Variable	Pass (n = 225)				Fail (n = 51)			
	M	*SD*	*Mdn*	Range	*M*	*SD*	*Mdn*	Range
Age (years)	14.3	2.2	14.9	8.0–16.9	13.8	2.3	14.2	8.4–16.6
Grade	8.3	2.2	9.0	2–12	8.0	2.3	8.0	3–11
Immediate Recognition	99.4	1.8	100	90–100	75.8	19.4	80	25–100
Delayed Recognition	99.2	2.2	100	90–100	66.8	18.4	70	20–100
Consistency	98.9	2.5	100	90–100	69.3	15.0	75	35–95
Paired Associates	98.4	4.4	100	80–100	62.5	26.3	70	0–100
Free Recall	76.3	12.3	80	40–100	47.7	18.2	50	10–90

Table 3
Correlations Between the Medical Symptom Validity Test Easy Score and Age–Grade and Ability-Based Tests

Test	*n*	*r*	r^2
Demographic			
Age	276	.12	.01
Grade	276	.09	.01
WASI			
Estimated IQ	263	.38**	.14
Vocabulary T score	263	.21**	.04
Matrix Reasoning T score	265	.51**	.26
CVLT–C			
Total Learning Trials 1–5 T score	226	.35**	.12
Long Delay Free Recall *z* score	226	.41**	.17
Recognition Discriminability *z* score	226	.58**	.34
WISC–IV			
Digit Span scaled score	275	.49**	.24
Coding scaled score	252	.29**	.08
Grooved Pegboard			
Dominant hand *z* score	258	.38**	.14
Nondominant hand *z* score	260	.33**	.11
Woodcock–Johnson III			
Letter–Word Identification standard score	236	.24**	.06
Automatized Sequencing (time in seconds)			
Alphabet	266	−.42**	.18
Counting 1 to 20	216	−.43**	.18
Days of week	256	−.50**	.25
Months of year	261	−.48**	.23
Summary test mean[a]	276	.61**	.38

Note. The Medical Symptom Validity Test Easy score is based on the mean of Immediate Recognition, Delayed Recognition, and Consistency scores. WASI = Wechsler Abbreviated Scale of Intelligence; CVLT–C = California Verbal Learning Test–Children's Version; WISC–IV = Wechsler Intelligence Scale for Children–Fourth Edition.
[a] Based on the mean of all independent norm-referenced tests (excludes automatized sequencing tasks).
** $p < .003$ (Bonferroni corrected value).

scores, with the exception of the automatized sequencing tasks that do not have independent normative data and WASI Full Scale IQ because of its redundancy with WASI Vocabulary and Matrix Reasoning. A total test mean *z* score was then calculated, which accounted for the number of tests that an individual participant was administered. On this summary ability index, MSVT performance accounted for 38% of the variance.

To explore the independent effect of MSVT performance on ability-based test performance, we conducted hierarchical regression analyses (see Table 4). In the first step, age; history of attention-deficit/hyperactivity disorder, learning disability, or special education (coded as present or absent); and time since injury were entered as predictors, yielding a very modest R^2 of .02. The second step added MSVT performance to the equation, resulting in a significant change in the model's predictive ability ($\Delta R^2 = .39$, $p < .001$). The third step added an Age × MSVT interaction term to determine whether the relationship between MSVT and ability varied by age at testing. The interaction term did not contribute significantly to the model. Examination of the final beta weights indicated that MSVT performance continued to be a robust unique predictor of ability-based scores even after controlling for age, premorbid learning history, time since injury, and the Age × MSVT interaction term ($\beta = .64$, $p < .001$).

Comparisons were also made between the MSVT pass and fail groups on the ability-based tests. Descriptive statistics, independent sample *t*-test results, and effects sizes are presented in Table 5. The mean scores for the MSVT pass group were within normal limits in all cases. The Grooved Pegboard performance was modestly lower than the other scores, which was thought most likely to reflect a limitation of the pediatric normative data for this test (Baron, 2004; Strauss, Sherman, & Spreen, 2006). In certain cases, the mean scores for the MSVT fail group were also solidly average (e.g., WASI Vocabulary, WJ–III Letter–Word Identification); however, on more than half the tests, performance for the MSVT fail group fell approximately 1 standard deviation or greater below the normative mean.

In examining comparisons between the MSVT pass and fail groups, the Bonferroni-corrected $p < .003$ was again used to indicate significance. The MSVT fail group performed more poorly than the MSVT pass group on every task, with significant differences apparent on 12 of the 15 tests. The only tasks for which there were not significant differences were WASI Vocabulary ($p = .05$), WJ–III Letter–Word Identification ($p = .35$), and the time to count to 20 ($p = .01$). Effect sizes (Cohen, 1988) were small ($d = 0.3$) for both WASI Vocabulary and WJ–III Letter–

Table 4
Summary of Hierarchical Regression Analyses Predicting Ability-Based Test Performance

	Model 1			Model 2			Model 3		
Predictor	*b*	*SE b*	β	*b*	*SE b*	β	*b*	*SE b*	β
Age at testing	.00	.02	.00	−.03	.02	−.08	−.03	.02	−.07
History of ADHD, learning disability, special education	−.24	.11	−.13*	−.29	.09	−.16***	−.29	.09	−.15***
Time since injury	.00	.01	−.01	.00	.00	−.05	.00	.00	−.05
MSVT Easy score[a]				.04	.00	.63***	.04	.00	.64***
Age × MSVT							.00	.00	.04
R^2		.02			.41			.41	
R^2 change		.02			.39***			.00	

Note. Test performance is based on the mean of all independent norm-referenced tests (excludes automatized sequencing tasks). ADHD = attention-deficit/hyperactivity disorder; MSVT = Medical Symptom Validity Test.
[a] Based on the mean of MSVT Immediate Recognition, Delayed Recognition, and Consistency scores.
* $p < .05$. *** $p < .001$.

Table 5
Descriptive Statistics and Comparisons Between Medical Symptom Validity Test Pass and Fail Groups on Ability-Based Tests

Test	Pass			Fail				
	n	*M*	*SD*	*n*	*M*	*SD*	*p*	*d*
WASI								
Estimated IQ	215	105.5	11.6	48	94.5	13.4	<.001**	0.9
Vocabulary T score	215	53.6	8.6	48	50.7	10.9	.045	0.3
Matrix Reasoning T score	215	52.4	7.2	50	41.0	10.6	<.001**	1.4
CVLT–C								
Total Learning Trials 1–5 T score	186	53.0	8.4	40	46.6	11.4	.002**	0.7
Long Delay Free Recall *z* score	186	0.34	0.8	40	−0.48	1.3	<.001**	0.9
Recognition Discriminability *z* score	186	0.18	0.6	40	−1.29	1.8	<.001**	1.6
WISC–IV								
Digit Span scaled score	224	9.9	2.9	51	6.4	3.2	<.001**	1.2
Coding scaled score	207	9.7	5.3	45	6.4	3.1	<.001**	0.6
Grooved Pegboard								
Dominant hand *z* score	213	−0.25	1.4	45	−1.7	2.5	.001**	0.9
Nondominant hand *z* score	215	−0.41	1.5	45	−1.6	2.2	.001**	0.7
Woodcock–Johnson III								
Letter–Word Identification standard score	191	100.2	9.7	45	97.0	22.0	.347	0.3
Automatized Sequencing (time in seconds)								
Alphabet	216	5.6	6.1	50	11.4	10.9	.001**	0.8
Counting 1 to 20	172	4.7	1.4	44	9.6	12.5	.013	0.9
Days of week	209	2.5	1.2	47	5.4	5.1	<.001**	1.2
Months of year	214	6.1	4.4	47	12.0	6.8	<.001**	1.2

Note. WASI = Wechsler Abbreviated Scale of Intelligence; CVLT–C = California Verbal Learning Test–Children's Version; WISC–IV = Wechsler Intelligence Scale for Children–Fourth Edition.
** Significant at $p < .003$ (Bonferroni corrected value).

Word Identification. A medium effect size ($d = 0.6$) was apparent on the WISC–IV Coding subtest. Large effect sizes were apparent for all other tests. The largest effect sizes ($d > 1.0$) were seen on WASI Matrix Reasoning, CVLT–C Recognition Discriminability, WISC–IV Digit Span, and time to say the days of the week and months of the year.

To provide further information about the meaning of MSVT failure, we calculated the percentage of group participants scoring more than 1 standard deviation below the mean on the standardized ability-based tests, along with the odds ratios for poor performance (see Table 6). For all tests, poor performance was more common in the group that failed the MSVT. In the MSVT pass group, scoring poorly on any of the tests was relatively uncommon, with only about 5% or fewer participants scoring below 1 standard deviation on the WASI, CVLT–C, or WJ–III Letter–Word Identification. A moderately higher percentage of the MSVT pass group performed poorly on the WISC–IV Digit Span (11%) and Coding subtests (16%) and Grooved Pegboard (16% preferred hand, 25% nonpreferred hand). Rates of poor performance on the ability tests were at least twice as high in the MSVT fail group across all tests. The odds ratio was significantly greater than 0 for all tests, and 5 or higher on eight of the 11 ability-based tests. Forty percent or more of the MSVT fail group scored worse than 1 standard deviation below the mean on WASI Matrix Reasoning (44%), CVLT–C Recognition Discriminability (40%), WISC–IV Digit Span (59%) and Coding (49%), and Grooved Pegboard preferred hand (58%).

Discussion

Though given scant attention historically, the current study supports the idea that some meaningful percentage of adolescents and children, down to at least age 8 years, demonstrate evidence of noncredible performance during neuropsychological evaluation. In this relatively large clinical case series, 19% of the children performed below the actuarial cutoff on the MSVT validity indices. This percentage is consistent with the number of patients who were judged to have provided noncredible effort in an earlier subgroup of the same case series, after possible false positives and false negatives on the MSVT were taken into account (Kirkwood & Kirk, 2010).

The primary purpose of the present study was to explore whether performance on an SVT has implications for ability-based test performance in an exclusively pediatric sample. If, as is intended, the MSVT's validity indices primarily measure effort rather than ability, then pass or fail performance for children above a certain age should not be affected by demographic, developmental, or neurological factors. Support for this idea was found in this sample of pediatric mild TBI patients, as no background or injury-related variable differentiated those who passed from those who failed the MSVT. Even in the face of much more significant neurologic, psychiatric, and developmental problems, data from the publisher (Green, 2004; Green et al., in press) and independent research (Carone, 2008) suggest that the vast majority of children with at least a second- or third-grade reading level can pass the MSVT at rates approximating the adult population.

If the MSVT measures effort rather than ability, then MSVT performance should impact a range of neuropsychological test scores, not just those tapping skills such as reading or verbal memory that seem necessary on the surface for successful MSVT completion. The current project found unambiguous support for this second proposition as well. MSVT performance was correlated significantly with performance on all ability-based tests and

Table 6
Percentage of Participants in Medical Symptom Validity Test Pass and Fail Groups Performing One Standard Deviation Below the Normative Mean on Ability-Based Tests and Associated Odds Ratios

	MSVT			95% CI	
Test	Pass	Fail	OR	*LL*	*UL*
WASI					
Estimated IQ	5	23	5.5	2.2	13.6
Vocabulary T score	5	10	2.4	0.8	7.3
Matrix Reasoning T score	6	44	13.3	5.9	29.8
CVLT–C					
Total Learning Trials 1–5 T score	5	25	6.6	2.5	17.5
Long Delay Free Recall *z* score	3	28	11.4	3.9	33.2
Recognition Discriminability *z* score	2	40	40.7	11.0	149.9
WISC–IV					
Digit Span scaled score	11	59	11.9	5.9	24.0
Coding scaled score	16	49	5.2	2.6	10.5
Grooved Pegboard					
Preferred hand	16	58	7.5	3.7	15.0
Nonpreferred hand	25	44	2.4	1.2	4.6
Woodcock–Johnson III					
Letter–Word Identification standard score	4	9	2.2	0.6	7.8

Note. MSVT = Medical Symptom Validity Test; OR = odds ratio; CI = confidence interval; *LL* = lower limit; *UL* = upper limit; WASI = Wechsler Abbreviated Scale of Intelligence; CVLT–C = California Verbal Learning Test–Children's Version; WISC–IV = Wechsler Intelligence Scale for Children–Fourth Edition.

explained more than a third (38%) of the variance on a summary index representing performance across the entire range of ability tests. Even after controlling for age; history of attention-deficit/hyperactivity disorder, learning disability, or special education; and time since injury, MSVT performance remained a robust unique predictor of ability-based test performance.

Participants failing the MSVT also performed significantly worse on nearly all neuropsychological tests including those measuring nonverbal reasoning, memory, attention, processing speed, and fine motor functioning. Effect sizes were large across most standardized tests, comparable to those seen in similar studies of adults, including samples with financial incentive to perform poorly (Constantinou et al., 2005; Lange et al., 2010). The largest effects in this clinical sample were apparent on the WASI Matrix Reasoning subtest, CVLT–C, WISC–IV Digit Span subtest, and Grooved Pegboard. Even performance on very simple tasks such as the time it takes to recite the alphabet, days of the week, or months of the year differed significantly between the groups, with participants failing the MSVT taking roughly twice as long as those passing the MSVT. Group differences for the current sample were actually least apparent on tests of vocabulary and single-word reading, two skills that might have been predicted to be most related to performance on the verbally based MSVT, if the MSVT primarily measured ability rather than effort.

Performance on the neuropsychological tests in the MSVT pass group was solidly within normal limits, consistent with most methodologically rigorous pediatric studies indicating that persistent deficits after mild TBI are difficult to detect with performance-based tests (Babikian & Asarnow, 2009; Carroll et al., 2004; Maillard-Wermelinger et al., 2009; Satz et al., 1997). In contrast, performance on the ability-based tests in the MSVT fail group was much more variable, with significant portions of these participants scoring worse than 1 standard deviation below the normative mean across many tests. In comparison to children who passed the MSVT, those who failed were at least twice as likely to perform poorly across all ability-based tests. On eight of the 11 ability-based tests, the odds of performing poorly were at least 5 times as great in those failing the MSVT.

The current article did not focus on the MSVT's classification accuracy or attempt to estimate the base rate of noncredible effort by determining the rate of false positives. Those concerns go beyond the scope of the current article, and were addressed in the earlier article based on a subgroup of the same case series (Kirkwood & Kirk, 2010). The question of why children exert noncredible effort during a neuropsychological evaluation also was not the focus of the current study. Suffice to say, however, the clinicians evaluating the study participants judged the reasons to be quite varied and to include both conscious and unconscious processes and attempts to both obtain external gains (e.g., additional support at school) and to fulfill internal psychological needs (e.g., somatoform disorder). Certain children were also judged simply to be noncompliant. These and many other possible explanatory factors for noncredible effort have been discussed elsewhere in a separate case-based analysis (Kirkwood et al., 2010). Of note, although children are capable of feigning cognitive symptoms in pursuit of financial gain (Lu & Boone, 2002; McCaffrey & Lynch, 2009), compensation-seeking behavior did not drive the vast majority of MSVT failures in this clinical sample, in contrast to what is commonly seen in adults after mild TBI. At the time of the neuropsychological evaluation, no participants reported seeking disability compensation, and only three of the 51 participants (6%) who failed the MSVT reported attorney involvement or planned litigation (vs. 8% of the cases who passed the MSVT).

The implications of the current findings are clear and significant. The MSVT takes only 5 min to administer. Yet, with few exceptions, failure on this test dramatically impacted ability-based test performance and therefore provided valuable information to the clinician about the validity of the performance-based data. We are unaware of any studies that have examined the number of pediatric psychologists or neuropsychologists who use stand-alone SVTs; however, our sense is that they are still not incorporated routinely into pediatric test batteries, perhaps excepting when evaluations are conducted for independent educational or forensic purposes. We believe the current data should give pause to any pediatric clinician who considers SVTs the exclusive purview of adult neuropsychology or only necessary in pediatric cases when secondary gain issues are obvious. If an objective SVT had not been included in the current entirely clinical evaluations, gross interpretive errors and less than optimal treatment recommendations would have almost certainly been made.

The current findings have potential implications for research as well. The relatively high failure rate on the MSVT raises questions about data collected from previous studies of pediatric mild TBI. To date, no published study of pediatric TBI has incorporated an objective means to evaluate test effort or symptom exaggeration. Multiple studies with adults have documented the powerful effect that effort-related variables can have on both performance-based test results and symptom report following mild TBI (Constantinou et al., 2005; Green, 2007; Green et al., 2001; Lange et al., 2010). As such, and given the current findings, previous pediatric studies that have reported persistent postconcussive cognitive deficits or documented cases of "postconcussion syndrome" need to be interpreted cautiously. To better control for noninjury-related effects in future mild TBI studies and to increase confidence in any future findings, pediatric investigators should seriously consider adding SVTs to their outcome batteries.

The study results need to be interpreted in the context of several limitations. The data were collected for clinical purposes and thus were constrained by specific patient need and the protocol being followed at the time of evaluation. Although all patients were administered the MSVT, the number of ability-based tests shared across participants was somewhat limited. Thus, unlike analyses conducted with adult populations that have examined the impact of SVTs across a comprehensive set of neuropsychological tests (Green, 2007), the influence of MSVT performance could be measured only for a relatively small number of ability tests. Another limitation was that the MSVT was the only SVT administered to all patients. Like any classification decision that relies on a single test, decisions about noncredible effort based solely on the MSVT will almost certainly include some false positive and false negative errors (Kirkwood & Kirk, 2010). Thus, select cases in the MSVT pass group likely provided noncredible effort during other aspects of the test battery, and select cases in the MSVT fail group likely provided credible effort. The participants in this study were also drawn from a sample of convenience comprising children and adolescents for whom persistent questions or concerns were apparent following a mild TBI. Because most youth can be expected to recover relatively quickly after such injury, the participants are unlikely to be representative of the majority of patients with mild TBI. An additional limitation is that the sample consisted only of mild TBI patients and was skewed toward high-functioning adolescent Caucasians who were from well-educated families. Further research will be required to examine whether the results generalize to youth with more severe neurological dysfunction and who are from more varied backgrounds.

Despite these limitations, the current project is the first published pediatric study to demonstrate that SVT performance can have a substantial impact on ability-based test scores. Although further work is needed to examine the classification statistics of the MSVT in more impaired pediatric populations, the test's validity indices in the current sample appeared to measure a meaningful and pervasive effort-related process, rather than a distinct ability-based skill. Consistent with trends in adult neuropsychology (Sharland & Gfeller, 2007; Sweet, King, Malina, Bergman, & Simmons, 2002) and general adult-based recommendations from national neuropsychological organizations (Bush et al., 2005; Heilbronner, Sweet, Morgan, Larrabee, & Millis, 2009), the results provide compelling evidence that objective SVTs should be added to the evaluation of school-aged youth as well, even when secondary gain issues might not be readily apparent and particularly following mild TBI. Of course, performance on any SVT depends in part on the particular demands of the task and can vary for a multitude of reasons, including true cognitive impairment and temporary fluctuations in arousal, attention, emotional state, and effort. Determining whether a child is responding in a consistently biased fashion or providing noncredible effort in general requires not only careful examination of performance on SVTs but also a solid understanding of the natural history of the presenting condition; scrutiny of the child's developmental, medical, educational, and environmental background; and thorough consideration of the consistency and plausibility of the behavioral, self-report, and test data.

References

Babikian, T., & Asarnow, R. (2009). Neurocognitive outcomes and recovery after pediatric TBI: Meta-analytic review of the literature. *Neuropsychology, 23,* 283–296. doi:10.1037/a0015268

Baron, I. S. (2004). *Neuropsychological evaluation of the child.* New York, NY: Oxford University Press.

Blaskewitz, N., Merten, T., & Kathmann, N. (2008). Performance of children on symptom validity tests: TOMM, MSVT, and FIT. *Archives of Clinical Neuropsychology, 23,* 379–391. doi:10.1016/j.acn.2008.01.008

Boone, K. B. (Ed.). (2007). *Assessment of feigned cognitive impairment: A neuropsychological perspective.* New York, NY: Guilford Press.

Bush, S. S., Ruff, R. M., Tröster, A. I., Barth, J. T., Koffler, S. P., Pliskin, N. H., . . . Silver, C. H. (2005). Symptom validity assessment: Practice issues and medical necessity NAN Policy & Planning Committee. *Archives of Clinical Neuropsychology, 20,* 419–426. doi:10.1016/j.acn.2005.02.002

Carone, D. A. (2008). Children with moderate/severe brain damage/dysfunction outperform adults with mild-to-no brain damage on the Medical Symptom Validity Test. *Brain Injury, 22,* 960–971. doi:10.1080/02699050802491297

Carroll, L. J., Cassidy, J. D., Peloso, P. M., Borg, J., von Holst, H., Holm, L., . . . Pépin, M. (2004). Prognosis for mild traumatic brain injury: Results of the WHO Collaborating Centre Task Force on Mild Traumatic Brain Injury. *Journal of Rehabilitation Medicine, 36,* 84–105. doi:10.1080/16501960410023859

Chafetz, M. D., Abrahams, J. P., & Kohlmaier, J. (2007). Malingering on the Social Security disability consultative exam: A new rating scale. *Archives of Clinical Neuropsychology, 22,* 1–14. doi:10.1016/j.acn.2006.10.003

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Hillsdale, NJ: Erlbaum.

Constantinou, M., Bauer, L., Ashendorf, L., Fisher, J. M., & McCaffrey, R. J. (2005). Is poor performance on recognition memory effort measures indicative of generalized poor performance on neuropsychological tests? *Archives of Clinical Neuropsychology, 20,* 191–198. doi:10.1016/j.acn.2004.06.002

Constantinou, M., & McCaffrey, R. J. (2003). Using the TOMM for evaluating children's effort to perform optimally on neuropsychological measures. *Child Neuropsychology, 9,* 81–90. doi:10.1076/chin.9.2.81.14505

Courtney, J. C., Dinkins, J. P., Allen, L. M., III, & Kuroski, K. (2003). Age related effects in children taking the Computerized Assessment of Response Bias and Word Memory Test. *Child Neuropsychology, 9,* 109–116. doi:10.1076/chin.9.2.109.14507

Delis, D. C., Kramer, J. H., Kaplan, E., Ober, B. A., & Fridlund, L. J. (1994). *California Verbal Learning Test–Children's Version.* San Antonio, TX: Psychological Corporation.

Donders, J. (2005). Performance on the Test of Memory Malingering in a mixed pediatric sample. *Child Neuropsychology, 11,* 221–227. doi:10.1080/09297040490917298

Faust, D., Hart, K. J., & Guilmette, T. J. (1988). Pediatric malingering: The capacity of children to fake believable deficits on neuropsychological testing. *Journal of Consulting and Clinical Psychology, 56,* 578–582. doi:10.1037/0022-006X.56.4.578

Faust, D., Hart, K. J., Guilmette, T. J., & Arkes, H. R. (1988). Neuropsychologists' capacity to detect adolescent malingerers. *Professional Psychology: Research and Practice, 19,* 508–515. doi:10.1037/0735-7028.19.5.508

Flaro, L., & Boone, K. (2009). Using objective effort measures to detect noncredible cognitive test performance in children and adolescents. In J. E. Morgan & J. J. Sweet (Eds.), *Neuropsychology of malingering casebook* (pp. 369–376). New York, NY: Psychology Press.

Green, P. (2004). *Manual for the Medical Symptom Validity Test.* Edmonton, Canada: Green's.

Green, P. (2007). The pervasive influence of effort on neuropsychological tests. *Physical Medicine and Rehabilitation Clinics of North America, 18,* 43–68. doi:10.1016/j.pmr.2006.11.002

Green, P., & Flaro, L. (2003). Word Memory Test performance in children. *Child Neuropsychology, 9,* 189–207. doi:10.1076/chin.9.3.189.16460

Green, P., Flaro, L., Brockhaus, R., & Montijo, J. (in press). Performance on the WMT, MSVT, & NV-MSVT in children with developmental disabilities and in adults with mild traumatic brain injury. In C. R. Reynolds & A. Horton (Eds.), *Detection of malingering during head injury litigation* (2nd ed.). New York, NY: Plenum Press.

Green, P., Flaro, L., & Courtney, J. (2009). Examining false positives on the Word Memory Test in adults with mild traumatic brain injury. *Brain Injury, 23,* 741–750. doi:10.1080/02699050903133962

Green, P., Rohling, M. L., Lees-Haley, P. R., & Allen, L. M., III (2001). Effort has a greater effect on test scores than severe brain injury in compensation claimants. *Brain Injury, 15,* 1045–1060. doi:10.1080/02699050110088254

Greve, K. W., Etherton, J. L., Ord, J., Bianchini, K. J., & Curtis, K. L. (2009). Detecting malingered pain-related disability: Classification accuracy of the Test of Memory Malingering. *Clinical Neuropsychologist, 237,* 1250–1271. doi:10.1080/13854040902828272

Heilbronner, R. L., Sweet, J. J., Morgan, J. E., Larrabee, G. J., & Millis, S. R. (2009). American Academy of Clinical Neuropsychology consensus conference statement on the neuropsychological assessment of effort, response bias, and malingering. *Clinical Neuropsychologist, 23,* 1093–1129. doi:10.1080/13854040903155063

Henry, G. K. (2005). Childhood malingering: Faking neuropsychological impairment in an 8-year-old. In R. L. Heilbronner (Ed.), *Forensic neuropsychology casebook* (pp. 205–217). New York, NY: Guilford Press.

Kirk, J. W., Harris, B., Hutaff-Lee, C. F., Koelemay, S. W., Dinkins, J. P., & Kirkwood, M. W. (2011). Performance on the Test of Memory Malingering (TOMM) among a large clinic-referred pediatric sample. *Child Neuropsychology.* Advance online publication. doi:10.1080/09297049.2010.533166

Kirkwood, M. W., & Kirk, J. W. (2010). The base rate of suboptimal effort in a pediatric mild TBI sample: Performance on the Medical Symptom Validity Test. *Clinical Neuropsychologist, 24,* 860–872. doi:10.1080/13854040903527287

Kirkwood, M. W., Kirk, J. W., Blaha, R. Z., & Wilson, P. (2010). Noncredible effort during pediatric neuropsychological exam: A case series and literature review. *Child Neuropsychology, 16,* 604–618. doi:10.1080/09297049.2010.495059

Kirkwood, M. W., Yeates, K. O., Taylor, H. G., Randolph, C., McCrea, M., & Anderson, V. A. (2008). Management of pediatric mild traumatic brain injury: A neuropsychological review from injury through recovery. *Clinical Neuropsychologist, 22,* 769–800. doi:10.1080/13854040701543700

Klove, H. (1963). Clinical neuropsychology. In F. M. Forester (Ed.), *The medical clinics of North America* (pp. 1647–1658). Philadelphia, PA: Saunders.

Lange, R. T., Iverson, G. L., Brooks, B. L., & Rennison, V. L. A. (2010). Influence of poor effort on self-reported symptoms and neurocognitive test performance following mild traumatic brain injury. *Journal of Clinical and Experimental Neuropsychology, 32,* 961–972. doi:10.1080/13803391003645657

Larrabee, G. J. (2003). Detection of malingering using atypical performance patterns on standard neuropsychological tests. *Clinical Neuropsychologist, 17,* 410–425. doi:10.1076/clin.17.3.410.18089

Larrabee, G. J. (Ed.). (2007). *Assessment of malingered neuropsychological deficits.* New York, NY: Oxford University Press.

Lu, P. H., & Boone, K. B. (2002). Suspect cognitive symptoms in a 9-year-old child: Malingering by proxy? *Clinical Neuropsychology, 16,* 90–96. doi:10.1076/clin.16.1.90.8328

MacAllister, W. S., Nakhutina, L., Bender, H. A., Karantzoulis, S., & Carlson, C. (2009). Assessing effort during neuropsychological evaluation with the TOMM in children and adolescents with epilepsy. *Child Neuropsychology, 15,* 521–531. doi:10.1080/09297040902748226

Maillard-Wermelinger, A., Yeates, K. O., Taylor, H. G., Rusin, J., Bangert, B., Dietrich, A., . . . Wright, M. (2009). Mild traumatic brain injury and executive functions in school-aged children. *Developmental Neurorehabilitation, 12,* 330–341. doi:10.3109/17518420903087251

McCaffrey, R. J., & Lynch, J. K. (2009). Malingering following documented brain injury: Neuropsychological evaluation of children in a forensic setting. In J. E. Morgan & J. J. Sweet (Eds.), *Neuropsychology of malingering casebook* (pp. 377–385). New York, NY: Psychology Press.

Mittenberg, W., Patton, C., Canyock, E. M., & Condit, D. (2002). Base rates of malingering and symptom exaggeration. *Journal of Clinical and Experiential Neuropsychology, 24,* 1094–1102. doi:10.1076/jcen.24.8.1094.8379

Newton, P., Reddy, V., & Bull, R. (2000). Children's everyday deception and performance on false-belief tasks. *British Journal of Developmental Psychology, 18,* 297–317. doi:10.1348/026151000165706

Reitan, R. M. (1969). *Manual for administration of neuropsychological test batteries for adults and children.* Unpublished manuscript, Indianapolis University Medical Center, Indianapolis, IN.

Satz, P., Zaucha, K., McCleary, C., Light, R., Asarnow, R., & Becker, D. (1997). Mild head injury in children and adolescents: A review of studies (1970–1995). *Psychological Bulletin, 122,* 107–131. doi:10.1037/0033-2909.122.2.107

Sharland, M. J., & Gfeller, J. D. (2007). A survey of neuropsychologists' beliefs and practices with respect to the assessment of effort. *Archives of Clinical Neuropsychology, 22,* 213–223. doi:10.1016/j.acn.2006.12.004

Stouthamer-Loeber, M., & Loeber, R. (1986). Boys who lie. *Journal of Abnormal Child Psychology, 14,* 551–564. doi:10.1007/BF01260523

Strauss, E., Sherman, E. M. S., & Spreen, O. (2006). *A compendium of neuropsychological tests: Administration, norms, and commentary* (3rd ed.). New York, NY: Oxford University Press.

Sweet, J. J., King, J. H., Malina, A. C., Bergman, M. A., & Simmons, A. (2002). Documenting the prominence of forensic neuropsychology at national meetings and in relevant professional journals from 1990 to 2000. *Clinical Neuropsychologist, 16,* 481–494. doi:10.1076/clin.16.4.481.13914

Wechsler, D. (1999). *Wechsler Abbreviated Scale of Intelligence.* San Antonio, TX: Psychological Corporation.

Wechsler, D. (2003). *Wechsler Intelligence Scale for Children–Fourth Edition.* San Antonio, TX: Psychological Corporation.

Wilson, A. E., Smith, M. D., & Ross, H. S. (2003). The nature and effects of young children's lies. *Social Development, 12,* 21–45. doi:10.1111/1467-9507.00220

Woodcock, R. W., McGrew, K. S., & Mather, N. (2001). *Woodcock–Johnson III Tests of Achievement.* Itasca, IL: Riverside.

Received January 5, 2011
Revision received June 2, 2011
Accepted June 6, 2011 ■