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Utility of the Test of Memory Malingering (TOMM) in Children Ages 4–7 Years with and without ADHD

Heather Schneider¹, John Woodard Kirk², and E. Mark Mahone^{1,3}

¹Kennedy Krieger Institute

²Independent Practice, Louisville, Colorado

³Johns Hopkins University School of Medicine

Abstract

There is growing consensus that assessment for non-credible performance is a necessary component of pediatric neuropsychological examination. The current study examined the utility and validity of the Test of Memory Malingering (TOMM) in children ages 4–7 years with and without Attention-deficit/Hyperactivity Disorder (ADHD). Sixty-six children (30 controls, 36 ADHD) completed all three TOMM trials. There were no significant group differences in total score on any trial, or passing rate for Trial 2 or Retention. Four-year-olds with ADHD achieved “passing” score on Trial 1 less often than controls. Across groups, performance on Trial 2 and Retention improved with age, such that 85% of the sample achieved passing score. Four-year olds had greater difficulty and achieved passing score significantly less often than children 5–7 years. Moreover, half of the 4-year olds performed worse on Retention than Trial 2, calling into question the utility of the Retention trial at this age. Performance was associated with IQ only within the ADHD group on the Retention trial. Results suggest that the TOMM can be used with confidence in clinical groups as young as 5 years. Among 4-year olds, performance appears dependent on severity of ADHD or disruptive behaviors, and may be associated with factors other than effort.

Keywords

Symptom validity; childhood; development; assessment; neuropsychological

Introduction

Effort testing has become an important, if not standard, component of the neuropsychological assessment process, as failure on free-standing or embedded measures of effort has been shown to have a negative impact across the rest of the neuropsychological testing battery (Iverson & Binder, 2000; Lynch, 2004; Slick, Sherman, & Iverson, 1999; Kirkwood, Yeates, Randolph, & Kirk, 2012). During neuropsychological evaluation, symptom magnification and noncredible performance have been identified in pediatric populations, particularly in the context of overt secondary gain (Chafetz, Abrahams, &

Kohlmaier, 2007; Lu & Boone, 2002), as well as in pediatric clinical cases where there is no clear secondary gain (Kirkwood & Kirk, 2010). Consideration of the potential for noncredible or suboptimal effort becomes even more relevant following a review of the scientific literature, which has consistently indicated that using clinical judgment alone is an inaccurate and insufficient method for identifying suboptimal effort (Faust, Hart & Guilmette, 1988; Faust, Hart, Guilmette, & Arkes, 1988; Heubrock, 2001).

The Test of Memory Malingering (TOMM; Tombaugh, 1996) was initially designed to discriminate between those individuals with true memory impairments, and those whose memory performance was reduced as a function of reduced effort (Tombaugh, 1996). The TOMM is also used to assess an individual's general effort during an assessment in order to determine if he/she is providing a credible performance that can be assumed to produce valid test results. The TOMM was designed for adults, and has been documented as effective in assessing effort in many clinical populations, including those experiencing traumatic brain injury (Tombaugh, 1996; 1997), depression (Iverson, LePage, Koehler, Shojania, & Badii 2007; Rees, Tombaugh, & Boulay, 2001), anxiety (Ashendorf, Constantinou, & McCaffrey, 2004), psychosis (Duncan, 2005), and pain (Iverson, LePage, Koehler, Shojania, & Badii 2007).

More recently, researchers have examined the utility of the TOMM in assessing effort in pediatric populations. The practice of using the TOMM in pediatric samples has largely maintained the same adult published cut-off scores on Trial 2 or Retention in order to determine whether the results suggest non-credible performance (Tombaugh, 1996). As with adults, the Retention trial is used only if the child does not pass Trial 2, although in many studies, the Retention is administered regardless of Trial 2 performance to clarify performance patterns across the trials (Blaskewitz, Merten, & Kathmann, 2008; Kirk, et al., 2011; Loughan & Perna, 2014; Rienstra, Spaan, & Schmand, 2010).

In most published studies, typically developing children tend to perform similarly to adults on the TOMM. In a community sample of German students (mean age 8.9 years) without history of LD, brain injury, or neurologic condition, no child scored below the established cut off on Trial 2 or Retention (Blaskewitz, Merten, & Kathmann, 2008). In a sample of Dutch elementary school children, all participants earned a score of 49 or 50 on Trial 2 and Retention (Rienstra, Spann, & Schmand, 2010). In community samples of typically developing children in the United States and Cyprus (mean ages 7.87 and 8.40 years respectively), in which fewer than 10% had a significant medical or psychiatric history, all participants achieved a passing score on either Trial 2 or Retention (Constantinou & McCaffrey, 2003). These results suggest that typically developing, and early elementary age children are capable of performing to the established adult standard on the TOMM.

Examination of performance among clinically referred children reveals that a majority are able to achieve passing scores on the TOMM, with rates of acceptable performance as high as 86% (Loughan, Perna, & Hertz, 2012) to 91% (Loughan & Perna, 2014). Within these clinical groups, those children who did not pass the TOMM were reported to demonstrate overt behavior problems (e.g., impulsivity, inattention, oppositional behavior) that contributed to the lower passing rates. For example, MacAllister, Nakhutina, Bender,

Karantzoulis, and Carlson, (2009) reported that although 90% of their clinical sample (ages 6–17 years) passed the TOMM, two of the children not achieving acceptable performance reportedly displayed impulsive, distractible, and/or overtly oppositional behavior—factors thought to contribute to suboptimal performance. Similarly, Donders (2005) reported that 97% of a mixed clinical sample (ages 6–16 years) were able to pass Trial 2 of the TOMM, but two of the failures were a clear result of behavioral problems.

Behaviors associated with Attention-deficit/Hyperactivity Disorder (ADHD), may also affect children's performance on the TOMM. In a mixed clinical sample of children ages 5–16 years (approximately half of whom were diagnosed with ADHD), Kirk et al. (2011) reported that 96% of the participants earned an acceptable score on TOMM Trial 2 and Retention, and none of those with ADHD were among the 4% with non-credible performance. Similarly, Loughran and Perna (2014) reported that 93% of the children with ADHD in their sample achieved an acceptable score. Of note, all these studies of performance validity assessment among clinical groups were completed with children of at least elementary school age. It remains less clear how younger clinical groups may perform on these measures.

The developmental course of recognition memory skills in children suggests that there may be a lower age limit at which use of the TOMM as an effort measure becomes less appropriate. In order for the TOMM (or any performance validity measure) to have utility, individuals taking the test must have previously mastered the skills being assessed. In other words, for young children who have not yet acquired the basic recognition memory skills required to actually perform the test, it becomes less a measure of validity (e.g., effort) and more a measure of memory acquisition (e.g., ability). There is some evidence to suggest that this transition may occur among children younger than age 5 years (Berk, 1997); although, there may also be other developmental factors aside from memory skills (e.g., attentional control, language comprehension, behavioral maturity, motor persistence) that set the lower age threshold for validity of performance validity tests such as the TOMM. Results of studies examining the association between age and TOMM performance have been mixed, with some showing no association with age (Constantinou & McCaffrey, 2003; MacAllister et al., 2009), and others identifying a positive relationship with age (Donders, 2005; Kirk et al., 2011). While younger school-aged children typically achieve lower overall mean scores in these studies, the proportion of children in the youngest age range (6–10 years) that achieved acceptable performance was still quite high: 87% (MacAllister et al., 2009), 91% (Donders, 2005), and 100% (Kirk et al., 2011).

The impact of intellectual skills on TOMM performance in children has also been the focus of investigation, with most studies showing a positive association between IQ and TOMM performance (Kirk et al., 2011; MacAllister et al., 2009; Welsh, Bender, Whitman, Vasserman, & MacAllister, 2012). Some of these studies also showed that children with low IQ are able to achieve acceptable performance on the TOMM. For example, in MacAllister et al. (2009), 7 of 11 participants with an IQ ≤ 70 achieved acceptable performance (including all four children with IQ < 50). Nevertheless, while the proportion of children who do not achieve acceptable performance on the TOMM is relatively low, those whose

performance is below threshold are likely to manifest lower IQ or intellectual disability (Kirk et al., 2011; Loughan & Perna, 2014; Welsh et al., 2012).

In sum, the research literature investigating the validity of the TOMM in children has focused primarily on school-aged children, with samples including children as young as 5 years, and as old as 19 years. Additionally, most studies have examined typically developing controls, or mixed clinical samples, with few assessing performance in well-defined patient groups. Given these considerations, the present study sought to establish the utility and validity of the TOMM in younger children (ages 4–7 years) with and without ADHD. ADHD was chosen as a specific clinical group of interest because of its prevalence, and because the behaviors associated with ADHD are likely to contribute to reduced effort in situations requiring sustained performance. We hypothesized that there would be associations between age and TOMM performance, with younger children showing reduced passing rates. Further, we hypothesized that children with ADHD would manifest lower TOMM passing rates than typically developing controls, with reduced performance associated with severity of ADHD symptoms.

METHODS

Study Procedures

Approval was granted for this study from the Johns Hopkins Medicine Institution Review Board. Participants were recruited from advertisements in the community, pediatricians' offices, and local daycare centers, to participate in a longitudinal study of brain development. After description of the study, parents of participants signed written consent, and participants provided verbal assent. Participants were initially screened via telephone interview with a parent to determine eligibility. Once enrolled, participants completed a comprehensive neuropsychological assessment battery that included measures of attention, memory, language, visual, and motor skills, as well as the TOMM. Parents (and teachers, if available) also completed behavior rating scales at the time of neuropsychological testing. Performance parameters for the TOMM were analyzed for the present study.

Participants

Inclusion and Exclusion Procedures—Participants were part of a larger study examining the development of ADHD in young children. In an effort to study ADHD without the confounds of the cognitive difficulties manifest in comorbid disorders, participants were excluded if they had any of the following, established via review of medical/developmental history, and/or by study screening assessment: 1) diagnosis of Intellectual Disability or Autism Spectrum Disorder; 2) known visual impairment; 3) treatment of any psychiatric disorder (other than ADHD) with psychotropic medications [for those with diagnosis of ADHD, treatment with stimulants was allowed, whereas children treated with other psychotropic medications were excluded]; 4) any history of DSM-IV Axis I diagnosis other than Oppositional Defiant Disorder or Adjustment Disorder; 5) neurological disorder (e.g., epilepsy, cerebral palsy, traumatic brain injury, tic disorder); 6) documented hearing loss ≥ 25 dB loss in either ear; 7) evidence of physical, sexual, or emotional abuse; 8) Full Scale IQ scores (FSIQ; either by previous assessment or by study

screening assessment) less than 80. In addition, children were excluded if there was a history of a Developmental Language Disorder (DLD) either determined during the initial phone screen, based on prior assessment (completed within one year of the current assessment), or determined during screening visit.

Diagnostic methods for the ADHD and control groups were adapted from the NIH Preschoolers with Attention-deficit/Hyperactivity Disorder Treatment (PATS) Study (Kollins et al., 2006; Posner et al., 2007). For 4-year olds, diagnosis of ADHD was made using parent interview on the Diagnostic Interview Schedule for Children-Young Child (YC-DISC) (Lucas, Fisher, & Luby, 1998; Lucas, Fisher, & Luby, 2008). The YC-DISC is a highly structured diagnostic instrument that includes computer-assisted administration, and assesses common psychiatric disorders, as defined by DSM-IV, that present in young children. The following YC-DISC modules were administered: ADHD, Social Phobia, Generalized Anxiety Disorder, Separation Anxiety, Depression, Oppositional Defiant Disorder, and Conduct Disorder. For children who were 5 years of age or older, diagnosis was based on the (Diagnostic Interview for Children and Adolescents, Fourth Edition; DICA-IV) (Reich, Welner, & Herjanic, 1997). To be included in the ADHD group, symptoms must have been present for at least 6 months, and cross-situational impairment (defined as parent report of problems at home and with peers) was required. Additionally, children in the ADHD group were required to have T-scores ≥ 65 on one or both of the DSM-IV ADHD Scales (Scales L and M) of the Conners' Parent Scales-Revised (Conners, 1997).

Once children met general entry/exclusion criteria above, they were included in the control group only if they did not meet categorical diagnostic criteria for ADHD on the YC-DISC or DICA-IV. Additionally, children in the control group were required to have T-scores ≥ 60 on the DSM-IV ADHD Scales (Scales L and M) of the Conners' Parent Scales-Revised.

Demographic information about the study sample is included in Table 1. The study sample included 66 children ages 4–7 years ($M = 5.57$, $SD = .93$), which included 30 typically developing children (17 boys, 13 girls) and 36 children with ADHD (25 boys, 11 girls). Socioeconomic status (SES) for the study participants was determined using the Hollingshead Index four-factor index (Hollingshead, 1975).

Study Measures

Test of Memory Malinger (TOMM) (Tombaugh, 1996)—The TOMM is a 50-item forced choice visual recognition test comprised of two learning trials (T1 and T2) and a retention trial (T3). Examinees are then asked to choose the correct drawing from a pair consisting of the target and a foil during two recognition trials. The published cut-off scores on Trial 2 and the Retention Trial proposed by Tombaugh (1996) were considered indicative of suboptimal effort and therefore warranting further investigation. Although T3 is not required if the participant achieves a passing score on T2, all three trials of the TOMM were administered, regardless of individual performance. It should be noted that although T1 is not utilized in comparing to the published cut-off scores for determination of suboptimal effort, previous adult and pediatric studies have analyzed T1 performance in order to provide additional performance characteristics for those who eventually pass/fail T2 and/or

T3 (O'Bryant, Engel, Kleiner, Vasterling, & Black, 2007; O'Bryant et al., 2008; Brooks, Sherman, & Krol, 2012). Consistent with the terminology used in these previous studies and in order maintain test security, the term “passing” T1 is used in order to directly compare T1 performance to those of T2 and T3.

Clinical Evaluation of Language Functions-Preschool-2 (CELF-P-2) (Wiig, Secord, & Semel, 2004)—The CELF-P-2 is an individually administered, norm-referenced test developed to identify and diagnose language and communication disorders in preschool children. Participants scoring < -1.5 SD on either the Receptive Language or Expressive Language Index of the CELF-P-2, or < -1.0 SD on *both* indices, were excluded.

Wechsler Preschool and Primary Scale of Intelligence-Third Edition (WPPSI-III) (Wechsler, 2002)—The WPPSI-III was used to assess IQ in our sample for each participant. Children with WPPSI-III FSIQ < 80 were excluded. The WPPSI-III Verbal IQ (VIQ) was also used to examine associations with TOMM performance. In an effort to limit the impact of group differences in processing speed from the examination of potential associations with IQ, the Full Scale IQ (FSIQ) was not used for these comparisons.

Conners' Parent Rating Scales-Revised-Long Form (CPRS-R) (Conners, 1997)—Dimensional ratings of ADHD symptom severity were obtained using the DSM-IV oriented scales from the CPRS-R, including Scale L (DSM-IV Inattentive) and Scale M (DSM-IV Hyperactive/Impulsive).

Data Analyses

Because data were collected as part of a longitudinal study, some of the children completed the TOMM more than once; however, only the initial administration of the TOMM was included in these analyses. Additionally, since the TOMM is a measure intended to be “passed” relatively easily, mean scores were relatively high for all participants, resulting in a highly skewed distribution of scores. As a result, Spearman's Rho was used to assess performance on the TOMM, and its relationship with other variables.

RESULTS

Sample Demographics

Sample demographics are listed in Table 1. There were no significant differences in age or SES between the ADHD and control groups. The control group was found to have significantly higher Verbal IQ scores (VIQ) than the ADHD group.

Group Differences on TOMM Performance

Group performance on all three trials of the TOMM is listed in Table 2. Despite control participants earning a slightly higher mean score on all three trials, the difference in mean scores between groups was not statistically significant on any of the three trials.

Age Effects on TOMM Performance

Performance on the TOMM was also examined (combining ADHD and control groups) between three age groups (i.e., 4, 5, and 6–7 year olds). After determining that there were no significant differences in the performance on any of the measures being compared between children aged 6 and 7, these age groups were combined, due to the small number of 7-year-olds ($n = 5$). For the entire sample, performance on the TOMM was significantly correlated with age for T2 and T3, with children ages 5 and 6–7 performing better than children at age 4 years (T2: $\rho = .245$, $p = 0.048$; T3: $\rho = .287$, $p = 0.022$). No significant correlations were observed between age and performance on T1 of the TOMM ($\rho = .212$, $p = 0.088$). The mediating effect of age on group performance was also examined. For T1, 4-year-old children with ADHD performed significantly lower than controls ($p = 0.031$); however, there were no significant group differences on T1 at older age groups, or for any age group on T2 and T3.

Age Effects on Pass Rates

For the entire sample, there were no significant overall differences between groups in the rate of achieving a passing score on Trials 1, 2, or 3 (Table 3); however, when analyzing data separately by age groups, there was a significant group difference in pass rates for 4-year olds on T1 ($\chi^2_{(1)} = 3.86$, $p = 0.049$), such that controls achieved a passing score significantly more often than children with ADHD. There were no other significant diagnostic group differences in pass rates at other age groups for T1, or for any age group on T2 or T3.

Because few differences were observed between ADHD and control groups, the groups were combined for subsequent analysis of age effects. With groups combined (Table 3), the overall proportion of children in this age range who passed by Trial 2 or 3 was 85%, suggesting that most 4–7 year olds in our sample were able to complete this task. Nevertheless, the proportion of 4-year-olds passing at T2 or T3 was significantly less than the other age groups ($\chi^2_{(2)} = 7.97$, $p = 0.019$), such that only 67% of 4-year-olds were able to pass the TOMM, while approximately 93% of the older children were able to do so. There were no significant differences in pass rates between the two older groups on T3, nor between any of the age groups at T1 or T2.

Those participants who did not earn a passing score often displayed obviously limited effort to perform well, engaging in behaviors such as stating their decision to make incorrect choices, waving a finger above the correct choice before laughing and touching the incorrect picture, or making a selection with eyes closed. Moreover, more than half of the children who did not achieve a passing score on T2 actually performed *worse* on T2 than on T1. When examining performance of the total sample, 14% performed worse on T2 than on T1 (29% of 4 year olds, 3% of 5 year olds, and 10% of 6–7 year olds). Further, 34% of the total sample performed worse on T3 than on T2, including 50% of 4-year-olds, 28% of 5-year-olds, and 26% of 6–7-year-olds. There were no significant overall differences between ADHD and control groups in the rate of performance decline from T1–T2 or from T2–T3, nor were there significant differences in performance decline between ADHD and control groups at any age level, as reflected by chi-square values.

TOMM Performance and Association with IQ and ADHD Symptom Severity

Due to differences in VIQ and ADHD symptom severity between the ADHD and control groups, potential associations between these variables and TOMM performance were examined within groups. Within the control group, there were no significant associations between VIQ, ADHD symptom severity, and TOMM performance on T1, T2 or T3. Similarly, within the ADHD group, there were no significant associations between VIQ on T1 or T2; however, there was a significant positive association between VIQ and performance on T3 ($p = .504$, $p = 0.002$), such that lower VIQ was associated with poorer T3 performance. As was the case in the control group, symptom severity in the ADHD group was not generally associated with performance on the TOMM trials. Only among 6–7 year olds with ADHD, was there a significant association between performance on T2 and symptom severity ($p = -.512$, $p = 0.05$), such that those with higher symptom severity displayed a lower performance on the TOMM. This association was not observed in the ADHD group at T1 or T3.

DISCUSSION

Among preschool and early elementary school children (ages 4–7 years), age appears to be a more salient factor in determining performance on the TOMM than the presence of ADHD. In our sample, most children ages 5–7 years completed the TOMM with relative ease, such that 93% reached “adult” level of performance by either Trial 2 or Retention. Conversely, 4-year-olds (in general) had more difficulty completing the task, with 4-year olds with ADHD showing the least consistent success. Across groups, TOMM performance on Trials 1 and 2 was not associated with IQ; however, among children with ADHD, lower IQ was correlated with poorer Recognition Trial performance, perhaps as a function of lower frustration tolerance. Nevertheless, the absence of an overall association with IQ may be a function of the IQ range of our sample (average to superior), and different patterns may be observed in younger children with lower IQ.

The present findings extend previous research demonstrating the validity of the TOMM in assessing effort in young children. The TOMM can be useful at a very young age in assessing effort because many children as young as 4 years can successfully complete the task. One goal of the present study was to more carefully examine the lower age limits for which clinicians can confidently use the TOMM as a measure of effort or performance validity. It is no longer a measure of performance validity if the child has yet to develop the basic recognition memory skills required to actually perform the test (e.g., measuring ability rather than effort). The majority of typically developing 4-year-olds have sufficient development of recognition memory skills to complete the TOMM at a level necessary to use the test as a valid measure of effort. By the age of 5 years, typically developing children have developed recognition memory for this task that is similar to that of adults. Among clinical groups, however, the presence of developmental problems in attentional control, language comprehension, behavioral maturity, or motor persistence can delay maturation of recognition memory skills, and as such, limit the utility of the TOMM as a measure of performance validity. There may also exist an interaction between the behaviors associated with the developmental manifestation of ADHD (e.g., high levels of inattention,

hyperactivity, and/or oppositional behavior) and the specific performance demands of the TOMM that make interpretation of findings in young clinical groups more challenging.

One finding from the present study that has not been observed in older groups is a decline in performance across trials. The percentage of 4-year-olds in this sample obtaining a passing score on the Retention trial was less than in the older age groups, and actually less than the same group of 4-year-olds obtaining a passing score on Trial 2. This finding may be due to the relative intolerance for boredom and/or frustration in the younger age groups, which results in withdrawal of effort on this necessarily repetitive task. In all three age groups a small proportion of the sample performed worse on Trial 2 than Trial 1, while an even greater proportion of children in all three age groups were observed to withdraw their effort when moving from Trial 2 to Trial 3 (Retention). While the youngest children in our sample (4-year olds) showed the poorest performance on Trial 3, the 5-year-olds had the largest increase in the proportion of participants performing more poorly across trials. In these instances, withdrawal of effort was often accompanied by overt behaviors such as complaints about the repeated trials, choosing responses with closed eyes, and intentionally selecting incorrect answers, suggesting that the assessment situation in which the TOMM was administered was successful in identifying those children who were not putting forth credible effort. Of course, when such obvious signs of limited effort are present, the need for performance validity or effort testing is less likely to be necessary.

These results also call into question the use of the Retention trial in the youngest age groups. Although overall performance continued to improve over each trial for the children ages 6–7 years, there was very little difference among the 4 and 5-year old participants in the rate of achieving a passing score on Trial 2 and those who achieved a passing score on either Trial 2 or Retention. The limited improvement of overall pass rates when using the Retention trial, combined with the more frequent decline in performance between Trial 2 and Retention in these younger groups, suggests that the Retention trial may have limited utility in younger children. Conclusions regarding the child's effort may be better made by focusing on performance on Trial 2, without the use of the Retention trial.

Assessing effort in younger children continues to be important a critical component of the overall neuropsychological assessment protocol. While younger children may not attempt to overtly malingering for secondary gain in the more traditional sense, their motivation and effort may be reduced or inconsistent for a variety of other reasons. For example, children in this age range may not fully understand the importance of the assessment, may have less tolerance for the length of the assessment, and may not understand the impact the results will have on their education, therapy, home life, etc. Complicating these issues is the fact with preschool age children clinicians may not have as many outside sources of information (e.g., school performance records) with which to compare any questionable neuropsychological performance results. These and many other possible explanatory factors for noncredible effort in children have been discussed elsewhere in a separate case-based analysis (Kirkwood, Kirk, Blaha, & Wilson, 2010).

Based upon the results of this study, the TOMM can be used with confidence to establish credibility of performance for children age 5 years and older. This finding is similar to

previous results that suggest children age 5 and older can perform similarly to adults. As the first study to examine the utility of the TOMM in 4-year-old children, the results suggest that while a majority (67%) of these children are able to obtain a passing score on Trial 2 or Retention, the confidence in using the TOMM as a primary assessment of credible performance is not as strong as it is for older children, and may vary as a function of IQ and/or symptom severity. Although important in all clinical assessments, in cases with younger children, examiner observations and assessment of the child's overall performance may be even more important in determining the validity of their performance.

The use of the TOMM as the only formal assessment of performance validity is a noted limitation of this study, i.e., there were no other similar tasks administered to which TOMM performance could be compared. Given the length of the total evaluation and the age of the participants, adding additional performance validity measures may have only added to the frustration experienced by some of the youngest children. Nevertheless, performance on the TOMM has been shown to be associated with performance on other symptom validity tests (Blaskewitz et al., 2008); thus one might expect a similar pattern of findings. Future research assessing the construct validity of the TOMM should directly assess these associations in younger samples such as this one.

An additional limitation in the present study is the relatively high level and homogeneity of IQs among the participants. None of the participants achieved a VIQ below 95, and 65% of the sample achieved a VIQ in the high average range or above. In a more diverse sample with a wider range of IQ, stronger overall associations with IQ may have been identified. If such correlations were to be identified in a more diverse sample, the rates of achieving passing scores may also be different than those observed in this sample. The association between intellectual development and the use of the TOMM as an assessment of performance validity is particularly important in younger children. While the current results suggest that the TOMM can be used with relative confidence in children age 5 years and older, its utility in children in this age range with more significant cognitive deficits is less clear. Given the mixed results regarding the performance of adults with intellectual disabilities on the TOMM, and the early research on older children with intellectual disabilities, it remains particularly important to consider intellectual development (or disability) when using the TOMM with young children. Further investigation of the use of the TOMM with children diagnosed with intellectual disability or other developmental delays is thus essential.

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Table 1

Participant Demographics

	Control (<i>n</i> = 30)		ADHD (<i>n</i> = 36)	
	Mean	SD	Mean	SD
Age	5.61	0.83	5.53	1.02
SES	59.45	8.62	56.10	13.94
CPRS-R DSM-IV Total T	49.68	9.87	74.61	9.45
VIQ	119.30	9.31	110.50	9.90

Note: ADHD = Attention-deficit/Hyperactivity Disorder; SES = Socioeconomic status, measured via Hollingshead Index; CPRS-R = Conners' Parent Rating Scale-Revised; VIQ = Verbal IQ from Wechsler Preschool and Primary Scale of Intelligence, Third Edition

Table 2

Performance on Test of Memory Malinger Trials

	Control (<i>n</i> = 30)			ADHD (<i>n</i> = 36)			<i>p</i>
	M (SD)	Median	Range	M (SD)	Median	Range	
Trial 1	43.27 (4.24)	43.50	34–49	41.14 (6.34)	41.50	23–50	0.183
Trial 2	47.07 (4.73)	49.50	33–50	44.39 (9.15)	48.50	16–50	0.217
Retention (T3)	45.62 (8.65)	49.00	15–50	44.51 (9.37)	49.00	4–50	0.197

Table 3

Participants Achieving “Passing” Scores for the Entire Sample

	Age 4 (n=21)	Age 5 (n=26)	Ages 6–7 (n=19)	Total (n=66)
Trial 1	4 (19%)	12 (46%)	10 (53%)	26 (39%)
Trial 2	13 (62%)	23(89%)	14 (74%)	50 (76%)
Retention (T3)	10 (50%) ^a	22 (88%) ^a	18 (95%)	50 (78%)
Trial 2 or Retention (T3)	14 (67%)	24 (92%)	18 (95%)	56 (85%)

^aMissing one group member's Retention score