Despite the importance of attention, executive functioning, and organizational skills for learning and behavior, very few behavior checklists measure these areas in depth. In this study, we developed a questionnaire measure of attention, executive, and organizational functions. The Learning, Executive, and Attention Functioning (LEAF) scale was administered to parents and teachers of 64 clinical children. LEAF subscales had internal consistent and test-retest reliability. LEAF Cognitive Subscales were significantly related to parent-rated measures of executive functioning and attention as well as to office-based neuropsychological measures of attention, concentration, fluency/spread, and memory. LEAF Academic Subscales correlated significantly with measures of Reading, Math, and Written Language. The LEAF is a reliable and valid tool for the assessment and monitoring of symptoms of attention, executive functioning, and organizational-in Integral skills in clinical and research settings.

Participants
Participants were 64 children between ages 6 and 17 years (mean=12.1, SD=3.0; 50 female, 44 male: 62 White, 1 African-American, 1 Hispanic) who were receiving clinical psychological testing in an outpatient clinic of a pediatric hospital. Parents identified attention problems (N=40) and/or learning problems (N=24) as the primary presenting concern for a majority of subjects, and the most common diagnoses were ADHD (any subtype; N=34) and/or specific learning disability (N=32).

Primary Measures: The LEAF Scale
Content areas for the Learning, Executive, and Attention Functioning (LEAF) Scale were selected based on a review of literature pertaining to disorders and interventions involving executive functioning and the impact of executive functioning and related processes on learning. In this content-development process, breadth of scale content was emphasized more than adherence to strict definitions of executive functioning. Therefore, content of the scale reflected not only traditional components of executive functioning, but also abilities that are related to or dependent on executive functioning, such as organizational and integrative functions. Based on this review, 8 cognitive content areas were identified: Comprehension and Conceptual Learning (CC), Factual Memory (FM), Attention (AT), Processing Speed (PS), Visual-Spatial Organization (VO), Working Memory (WM), Processing Complex Information (WM), and Novel Problem Solving and Learning (NP). An additional 3 academic content areas were added to reflect traditional areas of academic learning including mathematics skills (MT), reading skills (RD), and written expression skills (WE).

Procedure
Data for the present study were obtained from chart review. Parents and teachers completed parent and teacher version questionnaires including the LEAF (N=64; 7 father and 57 mothers), CHAOS (N=63; Kronenberger & Dunn, 2008), and Behavior Rating Inventory of Executive Function (BRIEF; N=60). Göia et al. (2000), Children completed the Stroop Color-Word Test (SCWT), the California Verbal Learning Test – Children’s Version (CVLTC – Children’s Version) (Delis et al., 1994) and the Wide Range Assessment of Memory and Learning – Second Edition (WRAML-2) Design Memory subtest Scaled Score. (N=60; Sheeke & Adams, 2003) as measures of verbal and visual memory, respectively, and the Woodcock-Johnson-III Tests of Achievement Fluency Subtests (WJ-III AT, p<0.10) reached a trend for significance (Figure 1). Validity: Relationships with CHAOS and BRIEF Questionnaires
The LEAF Subscales correlated moderately to strongly with CHAOS Attention Problems (AP), the BRIEF Behavioral Regulation Index, and the BRIEF Metacognition Index (Figure 2), with all correlations except one (LEAF PS-BRIEF R) reaching statistical significance and of greater than 0.50. Correlations of LEAF Cognitive Subscales with corresponding CHAOS or BRIEF subscales were similarly high (Table 1).

Validity: Relationships with Attention-Concentration Measures
Correlations between LEAF Cognitive Subscales and Attention-Concentration Measures (SCWT, CIT, and CCPT) are depicted in Figure 3. The Attention, Visual-Spatial Organization, Working Memory, and (to a lesser extent, the Working Memory and Processing Complex Information) LEAF subscales were significantly correlated with measures of attention and concentration. Relationships with Memory Tests
LEAF Comprehension and Conceptual Learning, Working Memory, and Novel Problem Solving subscales correlated significantly with both visual and verbal memory measures. The Visual-Spatial Organization, Working Memory, and (to a lesser extent, the Working Memory and Processing Complex Information) LEAF subscales were significantly correlated with measures of attention and concentration. Relationships with Academic Achievement Tests
The LEAF Academic Subscales correlated significantly with their respective WJ-III Broad Achievement area scores: Reading (r=0.43, p<0.001), Math (r=0.64, p<0.001), and Written Language (r=0.63, p<0.001). Significant correlations were also found between the LEAF Academic subscales and WJ-III Reading (r=0.41, p<0.01) and WJ-III Math (r=0.29, p=0.05).

The results of this study demonstrate that the LEAF is a reliable and valid questionnaire-based measure of attention, executive functioning and related processes in children and adolescents. LEAF subscales demonstrated excellent internal consistency and test-retest reliability, and parent-teacher agreement was in a typical range for behavior questionnaires of this type (e.g., Göia et al., 2000). LEAF subscales correlated significantly with corresponding subscales from other behavior questionnaires and also with performance-based neuropsychological measures of similar abilities. Based on these relationships, it appears that the 8 LEAF Cognitive Subscales are related to attention/executive functioning in general (the CHAOS Attention Problems subscale and the higher-order BRIEF Composite scores correlated with most of the LEAF Cognitive Subscales), and also that each Cognitive Subscale has a unique component as well. Specifically, the Attention, Visual-Spatial Organization, and Working Memory subscales showed strong relationships with attention/concentration and working memory measures, as did the Sustained Sequential Processing subscale to a lesser extent. The Processing Speed subscale related most strongly to measures of academic fluency and speed. The Factuality and Visual-Spatial Organization subscales also showed strong relationships with verbal and visual memory, respectively. Comprehension and Conceptual Learning was related to memory and learning. Similarly, each of the LEAF Academic Subscales correlated strongly with its respective achievement area.

Deficits in executive functioning and organization-integration abilities underlie several common psychiatric and learning disorders, including Attention-Deficit/Hyperactivity Disorder (American Psychiatric Association, 1997) and Nonverbal Learning Disorder (Rourke, 1995). As a validated questionnaire-based tool, the LEAF can aid in the assessment of executive, and related functions, the LEAF may be used to complement the results of cognitive ability testing in the office setting and to characterize or track changes in functioning in real-world learning and behavior.