Using the *General Behavior Inventory* with Children and Adolescents

- **The GBI, P-GBI, or P-YMRS cannot be used in isolation to determine a psychiatric diagnosis.**
- **The GBI, P-GBI, or P-YMRS currently are considered research instruments.**
- **The performance of the GBI, P-GBI, or P-YMRS will vary in new samples, and no guarantee can be made or implied about performance in any setting.**

Richard Depue authored the General Behavior Inventory (Depue, 1987). He would like to be notified of any use made of the instrument. His contact information currently is:

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The GBI is currently in the public domain. There is no fee associated with its use.

The "Self-report version" of the GBI used in research at Case Western Reserve University is the same version developed by Depue. The length of the questionnaire (73 items), and the items themselves may make the GBI difficult for children to read on their own. We have used the measure with youths as young as 11 years old, but need to read the instrument to due to limited language/reading skills for some patients.

The "Parent GBI" is a modification of the original GBI. The changes mostly involve substituting "your child" for "you" throughout the questionnaire. The P-GBI also is in the public domain. Please inform Eric Youngstrom or Robert Findling of how you are using the instrument. We would like to hear how useful people find it, and work to incorporate improvements. We are planning to develop an abbreviated form in the near future.

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The Parent YMRS (P-YMRS)

The Parent YMRS (Gracious, Youngstrom, Findling, & Calabrese, 2002) is an adaptation of the widely used clinician rating scale (Young, Biggs, Ziegler, & Meyer, 1978), modified so that parents can complete it as a multiple-choice questionnaire describing the behavior of their child. Initial findings suggest that it looks quite promising as a brief screener for bipolar disorder (Gracious et al., 2002; Youngstrom et al., under review; Youngstrom, Gracious, Danielson, Findling, & Calabrese, 2003). If interested in using the P-YMRS, please contact Barbara Gracious, M.D., (**Barbara_Gracious@URMC.Rochester.edu**).

Notes on the GBI and P-GBI:

The Self-Report GBI has been used with youths as young as age eleven, though many may require assistance completing the inventory, depending on reading level (Danielson, Youngstrom, Findling, & Calabrese, 2003; Robert L. Findling et al., 2002).

The Parent-GBI has been used to describe youths aged 5 to 17 years. Parents usually can complete the measure on their own, although again reading level may be an issue in some settings (R. L. Findling et al., 2001; Youngstrom, Findling, Danielson, & Calabrese, 2001).

The published version of the GBI uses a four point Likert scale for the 73 items, with responses ranging from 1 to 4. This is the format used to validate the instrument. However, the two published scoring systems for the GBI require a conversion of the item scores. Depue recommends a "case scoring" approach, where responses of "Never or Hardly ever" or "Sometimes" are recoded to 0, and "Often" or "Very Often/Almost Constantly" are scored 1.

Youngstrom et al. followed Depue's suggestion to use a range of **0 to 3 for the items** in a research context. This could be done by subtracting 1 point from each item, or by subtracting 46 from the Depression scale raw score (which has 46 items) and 28 from the Hypomanic/Biphasic scale (with 28 items).

To avoid confusion, we have created a "distribution" version where the items are scaled from 0 to 3. Using this format, the GBI is scored by simply adding the items on each scale (if using the approach published in Youngstrom et al., 2001). Alternately, scores of 0 or 1 could be treated as a 0, and 2 or 3 treated as a 1, to yield Depue's case-scoring. It is unlikely that the change in item anchors from 1-4 to 0-3 would substantially influence people's responses to the questions, but strictly speaking, this is not the response format that has been validated.

The Depression Scale consists of the sum of items:
01, 03, 05, 06, 09, 10, 12,
13, 14, 16, 18, 20, 21, 23, 25,
26, 28, 29, 32, 33, 34, 36, 37,
39, 41, 44, 45, 47, 49, 50, 52,
55, 56, 58, 59, 60, 62, 63, 65,
67, 68, 69, 70, 71, 72, 73.

The Hypomanic/Biphasic Scale consists of the sum of items:
02, 04, 07, 08, 11, 15, 17, 19, 22, 24, 27, 30,
31, 35, 38, 40, 42, 43, 44, 46, 48, 51, 53, 54, 57, 61, 64, 66.

To compare scores to data offered by Youngstrom et al. (any publication), just add the items (if scored 0 to 3), or add the items and subtract the number of items on the scale (if scored 1 to 4). To compare scores to college student and adult data (published by Depue, Klein, and others), use the 0/1 case scoring method as appropriate.

Please note that the accuracy of the test depends on the base rate of disorders for your sample. The positive and negative predictive value are directly influenced by base rate. However, the sensitivity and specificity of a test also will vary from sample to sample (Kraemer, 1992). For this reason, the cut scores published in any article cannot be assumed to be equally valid in new contexts. Please refer to the GBI Manual (available from Depue) and the monograph published in the *Journal of Abnormal Psychology* (Depue, Krauss, Spoont, & Arbisi, 1989; Depue et al., 1981) for additional information about the measure.

The GBI or P-GBI in Screening and Differential Diagnosis

Pediatric bipolar disorder is likely to be a rare condition in most clinical settings (e.g., prevalence of less than 10% in most settings). Because of the low "base rate" of the condition, the majority of youths scoring high on any screening test are likely to still not have the condition. Put another way, the "false positives" will outnumber the "true positives" in most situations unless bipolar disorder is fairly common where one is using the test.

For this reason, we have been reluctant to publish cut scores on these tests, or have offered a range of scores rather than a single place to cut the test into "positives" and "negatives" (Robert L. Findling et al., 2002; Youngstrom et al., under review).

The preferred method for using these instruments would be to focus on the change in likelihood of a bipolar diagnosis based on high and low scores. Low scores on a good test decrease the odds that a given youth has a bipolar disorder, just as high scores should increase the odds. It is possible to formally combine (1) the change in odds associated with a test score and (2) the prior probability that the youth had a bipolar diagnosis to obtain a new estimate of the probability that the child has bipolar disorder. This can be done visually (using a "nomogram"), mathematically, or by use of a table containing the posterior probabilities for a fixed prevalence. There are several excellent sources for clinicians who are interested in learning more about using changes in odds as a way of refining diagnosis (Jaeschke, Guyatt, & Sackett, 1994a, 1994b; Sackett, Straus, Richardson, Rosenberg, & Haynes, 2000).

We are publishing the changes in odds (or diagnostic likelihood ratios) associated with scores on six different tests (the P-GBI, the P-YMRS, the Achenbach CBCL, TRF, and YSR, and the self-report GBI) based on a large sample of outpatients (Youngstrom et al., under review). We also are including a table here that is based on these likelihood ratios, estimating the probability that a child has bipolar disorder assuming a base rate of 5% in combination with a test score in the particular range. We chose the 5% base rate estimate for three reasons: (1) because other colleagues are estimating that 5% of the youths evaluated at outpatient academic research centers meet criteria for a bipolar spectrum disorder (e.g., 6-7% of outpatient cases evaluated in the TEAM multi-site NIMH grant; Geller et al., 2002); (2) because 5% is low enough to serve as a reminder that bipolar disorder is likely to be rare in community mental health, outpatient, and private practice settings, yet high enough to act as a reminder that the disorder can occur and should be assessed; (3) because a 5% base rate will be reduced to negligible probabilities by low or moderate scores on good tests, and raised to intermediate probabilities (30% to 50% range) by high scores on the same tests.

If bipolar disorder is substantially more rare or more common at your site than 5%, we strongly recommend obtaining the table of likelihoods from (Youngstrom et al., under review) and refiguring the probabilities to be appropriate to your site.

Table 1

Estimated probability of a case having a bipolar spectrum diagnosis (bipolar I, bipolar II, cyclothymia, or bipolar NOS due to insufficient duration) associated with scores on tests

Clinical Nonspecialty Outpatient						Prevalence	0.05
Age 5-10 Years							
Summary	Range:	Low	Mod. Low	Neutral	Mod. High	High	Very High
P-YMRS	Raw Score	<7	7 to 13	14 to 21	22 to 29	30 to 34	35+
	Posterior Probability	0.4%	2.5%	4.4%	12.8%	26.8%	31.9%
P-GBI	Likert Score	<11	11 to 20	21 to 30	31 to 42	43 to 50	51+
	Posterior Probability	0.5%	2.5%	6.6%	10.8%	20.5%	24.9%
CBCL	T-Score	<58	58 to 67	68 to 72	73 to 77	78 to 81	82+
	Posterior Probability	0.4%	2.4%	7.3%	17.1%	17.1%	17.1%
TRF	T-Score	<49	49 to 56	57 to 62	63 to 70	71 to 77	78+
	Posterior Probability	3.8%	4.0%	4.4%	6.0%	7.4%	7.4%
Age 11-17 Years							
Measure	Range:	Low	Mod. Low	Neutral	Mod. High	High	Very High
P-YMRS	Raw Score	<6	6 to 11	12 to 17	18 to 23	24 to 27	28+
	Posterior Probability	1.0%	1.7%	5.0%	9.5%	17.6%	28.1%
P-GBI	Likert Score	<9	9 to 15	16 to 24	25 to 39	40 to 48	49+
	Posterior Probability	0.3%	1.3%	5.6%	10.5%	20.2%	32.6%
A-GBI	Likert Score	<10	10 to 17	18 to 26	27 to 37	38 to 45	46+
	Posterior Probability	1.7%	5.0%	5.0%	5.0%	9.6%	17.1%
CBCL	T-Score	<54	54 to 64	65 to 69	70 to 75	76 to 80	81+
	Posterior Probability	0.2%	2.7%	6.2%	10.1%	12.2%	18.4%
YSR	T-Score	<49	49 to 55	56 to 62	63 to 69	70 to 76	77+
	Posterior Probability	1.6%	2.7%	5.7%	7.7%	10.9%	13.8%
TRF	T-Score	<46	46 to 53	54 to 60	61 to 68	69 to 76	77+
	Posterior Probability	1.3%	3.3%	4.9%	8.6%	8.6%	16.5%

Adapted from likelihood ratios presented in Youngstrom et al. (Youngstrom et al., under review).

Using Rating Scales as Measures of Outcome

We also are actively examining how these measures perform as measures of response to treatment (Youngstrom, Cooperberg, Findling, & Calabrese, 2003; Youngstrom, Findling, & Feeny, 2003). Currently, no manuscripts concentrating on outcome measure performance have completed the peer review process. We will add information as this happens.

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