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A Probabilistic and Individualized Approach for Predicting Treatment Gains: An Extension and Application to Anxiety Disordered Youth

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The objective of this study was to extend the probability of treatment benefit method by adding treatment condition as a stratifying variable, and illustrate this extension of the methodology using the Child and Adolescent Anxiety Multimodal Study data. The probability of treatment benefit method produces a simple and practical way to predict individualized treatment benefit based on pretreatment patient characteristics. Two pretreatment patient characteristics were selected in the production of the probability of treatment benefit charts: baseline anxiety severity, measured by the Pediatric Anxiety Rating Scale, and treatment condition (cognitive-behavioral therapy, sertraline, their combination, and placebo). We produced two charts as exemplars which provide individualized and probabilistic information for treatment response and outcome to treatments for child anxiety. We discuss the implications of the use of the probability of treatment benefit method, particularly with regard to patient-centered outcomes and individualized decision-making in psychology and psychiatry.

Keywords: child/adolescent anxiety; evidence-based treatment; individualized treatment benefit; patient-centered decision-making; treatment response and outcome

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EFFECT SIZES ARE USED as indicators of magnitude of treatment response and outcome in randomized controlled trials (Cohen, 1977). Although Cohen's *d* and other effect size indicators are useful in representing information about the *average* effects of treatments across youth, they do not illustrate the likelihood that a *particular* youth will benefit from a given treatment. (Westen, Novotny, & Thompson-Brenner, 2004). Moreover, individuals vary in the likelihood that they will respond to a given treatment (Lindhiem, Kolko, & Cheng, 2012; Westen et al., 2004). Various recommendations have been made when considering how to assess clinical impact of treatment on patients (Kraemer, Frank, & Kupfer, 2011; Lindhiem et al., 2012). The probability of treatment benefit (PTB) method is a new methodology that can provide further information on clinical impact of treatment in an individualized and patient-centered manner.

The PTB method (Lindhiem et al., 2012) was introduced as a strategy that supplements effect size indices by providing *individualized* information about the likelihood that a treatment will benefit a particular child, thus allowing patients and caregivers to make an informed decision based on their individual characteristics (PCORI, 2012). The PTB method summarizes the probability, in percentages, that an individual youth will have a favorable treatment benefit based on a set of baseline characteristics. One of the compelling reasons to use the PTB method to assess clinical impact of treatment on patients is that it is easy to understand and provides individualized information. There are two critical features of the PTB method. First, the PTB method is based on the premise that prediction must be probabilistic: for two variables that are not perfectly correlated, the value of one variable cannot predict the value of the second variable with certainty. Second, the PTB method underscores the differences between treatment response and treatment outcome, two terms often used interchangeably (Lindhiem et al., 2012). In the PTB method, "*response* is the magnitude of change from pre- to postassessment, and *outcome* is posttreatment status" (Lindhiem et al., 2012, p. 382). This distinction is important because a particular

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