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Patterns and priorities of service need identified through the Child and Adolescent Needs and Strengths (CANS) assessment

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ABSTRACT

Using recursive partitioning on thousands of enrollment Child and Adolescent Needs and Strengths (CANS) assessments, we identified characteristics of the most troubled children/youth requiring comprehensive interventions reflected by a count of total actionable items (TAI) from 129 possible CANS actionable treatment planning items. Samples included 2557 and 6982 children/youth from two separate large, multi-program, California-based mental health treatment agencies administering CANS routinely upon enrollment. In two separate random forest analyses, 20 top predictors were identified which indicated very high levels of clinical severity needing comprehensive, urgent intervention at each agency, with 13 out of the 20 predictors common to both agencies' populations. Agency-specific decision trees were constructed with the top 20 predictors to examine relationships between predictors, which further identified four predictors of need highly prioritized at both agencies: child's frustration management problems, recreation and leisure time activity challenges, poor response to consequences for aggressive behavior, and lack of optimism. Within these service populations, children with actionable need for intervention in these four areas had four to five times more TAI as compared to children without these areas identified. A handful of the CANS items assessed can indicate very high severity ratings for a service population, and localized use of recursive partitioning analysis based on TAI can identify these core problems for specific programs or across agencies, helping clinicians to understand patterns and priorities within populations served.

1. Introduction

The Child and Adolescent Needs and Strengths (CANS) assessment is widely used for clinical mental health assessment of children, and many state health and human services authorities now employ it statewide to evaluate children's behavior and living conditions. CANS assessments evaluate strengths, concerns and service needs of children with mental health disorders, developmental disabilities, emotional and behavioral health care needs, and family issues, including children entering the child welfare system. Many agencies have adopted the CANS because it presents key behavioral dimensions for describing children's behavior, symptoms, and immediate living conditions in easy to comprehend terms accessible to families and clinicians, and because it can be adapted to particular circumstances of programming and characteristics of the population at hand. Published research provides evidence that the CANS is sound psychometrically (Hodges, Kline, Stern, Cytryn, & McKnew, 1982; Lyons, Rawal, Yeh, Leon, & Tracy, 2002), assists in treatment planning, and is sensitive to children's treatment-linked behavioral improvement (Dunleavy & Leon, 2011).

1.1. CANS assessments for treatment planning

CANS assessors are trained to implement the CANS in accordance with standard assessment procedures. Upon satisfactory assessment of a target case and after agreement with criterion ratings at acceptable levels, assessors are certified to use the CANS in routine practice. For rating needs for action CANS assessors rate each on a 0 to 3 scale: 0 = no need for remedial action; 1 = watchful waiting to see whether remedial action is necessary; 2 = indicates remedial action is necessary; 3 = remedial action immediately or intensive remedial action needed. For rating children's strengths the scoring is: 0 = centerpiece strength which can be used as the focus or foundation of a strength-based plan; 1 = useful strength which can be used in a strength based plan; 2 = strengths have been identified but they require significant strength building efforts before they can be effectively utilized as a focus of a strength-based plan; 3 = efforts are needed in order to identify potential strengths for strength building efforts.

Each item scored with 2 or 3 is an 'actionable item,' calling for targeted clinical intervention. For example, an actionable item for anxiety might be paired with a cognitive-behavioral treatment such as the Coping Cat intervention (Albano & Kendall, 2002). Total counts of actionable items assess intensity of treatment for areas of problematic

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functioning or for areas suitable for building or reinforcing strengths (Anderson, Lyons, Giles, Price, & Estle, 2003).

1.2. Recursive partitioning

Using recursive partitioning random forests and regression trees, the present study extracts key items from CANS assessments presenting potent markers of distress by identifying those items with the strongest associations with total CANS actionable items. In the present study, recursive partitioning resembles well-established psychometric approaches such as factor analysis and Item Response Analysis in that recursive partitioning uses item's correlations with assessments' total actionable items (TAI) as a benchmark of significance. Recursive partitioning differs from other approaches by not locating items (or, for item response theory, both respondents and items) on theory-based, underlying behavioral dimensions. Conversely, recursive partitioning's flexible, pragmatic analysis assumes nothing as it screens items for the most highly predictive item with which to form a cluster. These item clusters can be used to construct client profiles with meaningful results that are potentially valuable to clinical staff (James, White, & Kraemer, 2005). Recursive partitioning results have been found to be comparable to that of logistic regression for psychological screening (James et al., 2005), yet recursive partitioning enables the use of large numbers of predictor variables against small numbers of subjects, circumventing both collinearity and interaction concerns (Strobl, Malley, & Tutz, 2009). Thus, recursive partitioning is particularly appropriate for handling the large number of correlated CANS items assessed for children within specialized programs.

Recursive partitioning maximizes predictive accuracy: it moves through a decision-tree choosing, at each choice point, an item which can add most to predictive accuracy at that point (Strobl et al., 2009). In effect, recursive partitioning sorts items, unconstrained by prior assumptions, maximizing use of information for predictive purposes. The result boils down the CANS, after sorting through sometimes more than a trillion possibilities, to a handful of items with great utility for identifying and understanding clients most in need of intensive programming.

This study isolated CANS items with the strongest association to TAI. By characterizing children with the greatest intervention need in example datasets, the study seeks to provide theoretical and clinical insight into problematic functioning to support development of hypotheses for future research. A second purpose for conducting the study was heuristic: to demonstrate, at two different agencies, recursive partitioning's usefulness for isolating the most salient actionable items from the pool of all candidate CANS items and to provide meaningful descriptions of children in greatest need.

2. Method

2.1. Study setting

Data represent assessments collected from two multiservice children's agencies each operating many child/youth-serving programs. Each offers comprehensive care to thousands of families and children/youth with mental illness, social, behavioral and familial problems across overlapping population bases of California counties. Through partnerships with county's mental health, public health, social services and other community-based providers, the agencies offer: mobile crisis response, crisis stabilization, therapeutic foster family care, wraparound, community mental health, therapeutic behavior services, multisystemic therapy, and intensive case management. Service modalities include community-based services, school-based services, foster/adoption services, clinic-based, outpatient mental health treatment services, day treatment, residential programs, and 24-h response teams. Most programs are contracted partnerships with schools, local government and other community-based providers to support children/youth and families at home, at school and in the community; only a small proportion of children/youth are served through residential treatment.

2.2. Study participants

All children/youth ages 5–20 enrolled in any of the agencies' programs between 2009 to 2013 for one agency and 2010 to 2015 for the other, who received a CANS assessment upon enrollment were considered for the study. A small proportion (~1%) of enrollment CANS assessments had no actionable items, and these children/youth were excluded from the study as these assessments provided no clinical relevance and were likely for children/youth not requiring direct service. The final sample represented 2557 and 6982 children/youth from each agency, respectively. University of California Berkeley Committee for the Protection of Human Subjects provided approval for this study.

2.3. CANS assessment

The CANS was administered to incoming children/youth within the first two months of program entry. All members of agency's staff performing assessments were trained and certified for CANS administration. The assessment included a series of basic questions given to all children/youth along with additional supplemental items utilized to explore additional areas of need when answers on base questions were indicative of potential problems in an area. Based on the use of all items, one agency included a total of 199 possible items on the CANS while the other agency had 315 total possible items. For this analysis, only the common items used by both agencies were evaluated, which included 129 possible CANS questions for identifying strengths or needs. A complete list of CANS items used in the analysis is available upon request. However, the descriptions and rating scales for the top predictors identified in our analysis are displayed in Appendix A.

2.4. Analysis

CANS items were coded as “A” for actionable (2 or 3), “N” not actionable (0, 1) or “U” for null (not answered or answered as unknown), and the total count of actionable items “A” per child/youth was identified as the TAI. To reduce over-fitting in the final regression tree, recursive partitioning random forests were utilized to identify the top 20 from the 129 possible CANS items which were most strongly predictive of TAI for each agency. Random forest analysis creates a set of regression trees based on a random sample from the entire dataset, which are used to identify the importance of each potential predictor (Breiman, 2001). Results of random forest analysis generate a prioritized list of variable importance based on individual measures of increased node purity and differences in models' mean squared error when individual predictors are selected for the model. For each agency's dataset, random forest recursive partitioning was used to create 151 regression trees by identifying at each step of a tree, an item which maximized difference in TAI between groups of children/youth who were actionable, not actionable or null for each item. This nonparametric approach assumed that selection for each sampled tree was random and representative of the underlying population. The random forest identified, from all CANS items, top items which best predicted the highest TAI for presenting children/youth. The top 20 items were then used to formulate a final regression-based decision tree for each agency, which demonstrates the nonparametric and complex relationship between predictive items, identifying ‘profiles’ of high-need children/youth within the population served. Common predictors within decision tree profiles from both agencies were used to generate a final set of population profiles, comparing frequency and severity of each profile at both agencies. Analysis was performed utilizing randomForest and Rpart packages within R version 3.0.2.