

Highlights

Emerging analytic techniques point to provider-level characteristics that improve client outcomes.



The National Treatment Improvement Evaluation Study: Multi-level Re-analysis of Treatment Outcomes



NEDS Analytic Summary Series

The Center for Substance Abuse Treatment (CSAT) works to improve the lives of those affected by alcohol and other substance abuse, and, through treatment, to reduce the ill effects of substance abuse on individuals, families, communities, and society at large. Thus, one important CSAT mission is to expand the knowledge about effective substance abuse treatment and recovery services. In support of these efforts, CSAT established the National Evaluation Data Services (NEDS) contract to provide a wide array of secondary data analysis products to the substance abuse treatment field.

Specifically, the NEDS project is focused upon providing CSAT with an analytic capability to use existing data to address policy- and practice-relevant topics as well as future research and evaluation activities. NEDS has developed several product lines designed to provide analytic findings to substance abuse treatment policy makers, service providers, services researchers and evaluators in a format that is most useful to the end user.

The Analytic Summary is one of the NEDS product lines. The purpose of the Analytic Summary is to provide a brief summary of each technical report produced by NEDS written in non-technical language. Readers who find the Analytic Summary results of interest can contact the original NEDS technical report authors for more detailed information. Through this process, the NEDS Analytic Summaries provide information to the substance abuse treatment field and promote linkages among different areas in the field.

This Analytic Summary

This particular NEDS Analytic Summary is based on the NEDS Technical Report titled *The National Treatment Improvement Evaluation Study: Multi-level Re-analysis of Treatment Outcomes* (Orwin, R., & Ellis, B., March 2000). For a more thorough discussion of the analysis and findings, please obtain a copy of the complete Technical Report. Information for doing so is provided on the last page of this summary.

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The National Treatment Improvement Evaluation Study: Multi-level Re-analysis of Treatment Outcomes

Analytic Importance

One important function of CSAT is to expand the knowledge about and the availability of effective treatment and recovery services for those affected by alcohol and other substance abuse. In sponsoring these secondary analyses, CSAT is attempting to learn: *What actually constitutes effective (and cost-effective) treatment, and for what populations?*

This analytic summary demonstrates enhanced analytic methods to understand factors that influence treatment outcomes. In short, this analysis demonstrates that the application of more sophisticated analytic techniques, such as multi-level, random-effects modeling, provide more sensitive analyses of the relationships among provider and client characteristics.

Analytic Purpose

In the original National Treatment Improvement Evaluation Study (NTIES), client outcome data were analyzed by conducting multiple regressions on measures of client improvement (pre-post change). This approach showed little difference in client outcomes across providers and modalities. It is possible that the use of multiple regression analysis may not have been sufficiently sensitive to detect provider and modality-related differences.

Treatment outcome data from multiple site evaluations are inherently multi-level in that multiple providers, each with multiple clients who have different characteristics and treatment needs, are included in the evaluation data.

Therefore, multi-level, random-effects modeling may be more appropriate for analyzing these data than multiple regression analysis. In addition, multi-level models are designed to better address the direct effects of provider characteristics on individual behaviors than other analytic tools.

Multi-level, random-effects modeling, when applied to data that are appropriate for such analyses, may show differences across providers. Because of its greater sensitivity and sophistication, multi-level random-effects modeling is better able to examine the differences in service mix across substance abuse treatment providers and examine differences across clients within providers. In addition, because clients are not randomly distributed across providers with the same mix of services, multi-level modeling techniques may be more appropriate since multi-level modeling:

- Is able to include a broader range of provider-level variables within a “model” which enables simultaneous examination of all of these characteristics
- Correctly attributes similarities among clients within a provider to provider-level factors
- Is not dependent on how well client demographics and pre-treatment severity predict outcomes.

Finally, because the client-level and provider-level characteristics are analyzed together in a single model, combinations of client-level and provider-level factors can be examined.

Databases that include information about treatment providers as well as their clients are called “multi-level data.”

Multi-level, random-effects modeling can identify provider-level influences on client-level outcomes.



The National Treatment Improvement Evaluation Study: Multi-level Re-analysis of Treatment Outcomes (cont.)

Analytic Approach

This analysis performed a multi-level re-analysis of treatment outcomes from NTIES. The main intent of this analysis is to illustrate the application of multi-level modeling to the examination of treatment outcome data collected from clients in multiple substance abuse treatment providers.

Statistics. Aikake Information Criterion (AIC) statistics were used which take into account the number of variables used in the model as well as the degree of fit produced by the model.

Pseudo R^2 , which measures the difference in AIC between the reduced and full model, was calculated to describe the percentage of total variance that is explained by the model.

Findings

Two types of models were tested: provider and client variable models; and provider, client, and combined variable models. Findings associated with each type of model are summarized below.

Provider and client variable models: These models looked at provider-level effects on client outcomes. Provider variables had consistent effects within a modality. For example, case management improved several outcomes in outpatient programs. These provider effects often were, however, inconsistent in their influence across modalities. Missing data and too few providers limited the analyses of methadone and short-term residential treatment.

Provider, client, and combined variable models: These models exam-

ined how client-level and provider-level variables interact to affect treatment outcomes. The combination of provider characteristics with client characteristics generally had a substantial impact on outcomes and explained more of the differences in outcomes than was the case without these variables. For example, long-term residential clients with heroin addiction showed reduced drug use when client/treatment matching occurred. In another example, the use of case managers appeared to have a positive effect on treatment outcomes within the non-methadone, outpatient modalities.

The results of the analyses, while thought-provoking, were not sufficiently clear-cut in terms of the nature of the effects of the provider characteristics on outcomes within treatment settings. Among the provider-level variables, case management, interacting with different individual-level variables, had a uniformly positive effect on several outcome variables. All of the other provider-level variables had positive effects in some cases and negative effects in others.

The following limitations must be considered in interpreting these results:

- The large amount of missing data had repercussions for the provider-level analyses, resulting in the discarding of entire treatment providers where values were missing for one or more of the analysis variables
- Some of the counter-intuitive findings on provider-level effects may represent unmeasured selection bias
- The analysis was based on six outcomes in four treatment modalities

Provider characteristics primarily interact with client characteristics to influence outcomes:

- Client/treatment matching improved outcomes among heroin users in long-term residential treatment
- Case management improved outcomes for clients in outpatient treatment
- Shorter, more frequent counseling sessions improved outcomes in outpatient treatment.



Successful use of new analytic techniques further support that the question “What works?” in treatment should read “What works for whom, and in what setting?”



The National Treatment Improvement Evaluation Study: Multi-level Re-analysis of Treatment Outcomes (cont.)

in which each of 42 interactions was tested for significance. It should be expected that a portion of the significant results could be due to chance alone.

Implications

These analyses were primarily designed as a methods demonstration. As such, the demonstration is deemed successful based on a limited number of new insights about the relationships among provider characteristics, client characteristics, and client outcomes. More importantly, the demonstration identified design and data limitations which impeded the full application of these more sophisticated analytic approaches. The results of the demonstration also support the identification of implications for further research, policy issues, and treatment providers.

Implications for Research/Analysis

This analysis represents a first attempt at applying multi-level random-effects models to the NTIES data, and one of few examples where this approach has been used with any large national substance abuse treatment data set. Additional analyses would help to clarify the results of this analysis.

- **Reduce amount of missing data.** Either by using a statistically valid alternative to adjust for missing data, or by collecting data that are more complete for all variables, an attempt to overcome this significant problem would be worthwhile. In this analysis, missing data reduced the samples of providers and clients to about 60 percent of the original NTIES samples.

- **Test alternative sets of modality- and client-level variables.** To the extent possible, add other potentially useful variables to the data collection design and test their effects in multi-level models.

- **Create a 3-level random effects model.** Modality could represent a third level of analysis, creating a more unified model. This would permit a direct test of the effect of modality on outcomes, controlling for differences in both client case mix and provider-level characteristics. A potential fourth level would incorporate data on clinicians, but only when clients were matched with a single clinician during their treatment.

Implications for Policy-Makers

Although this analysis was primarily a methods demonstration, it has substantive implications for policy.

- **Cost-effectiveness of programs.** Information that clarifies the relationships between treatment providers, client background, other characteristics and outcomes would produce better results for lower cost in the long run. People could participate in substance abuse treatment services that are most effective for their particular problems.
- **Waste avoidance.** Being able to focus attention on the components of treatment that research has shown to be effective would result in time and cost savings for both the individuals and the treatment providers.

The National Treatment Improvement Evaluation Study: Multi-level Re-analysis of Treatment Outcomes (cont.)

Implications for Practice

- **Non-methadone outpatient modality is a prime area for substantive improvements.** Positive effects of provider characteristics were primarily found in the non-methadone outpatient modality. This finding suggests that the likelihood of improving client outcomes by manipulating provider-level factors (e.g., having a designated case manager and tailoring the program to the population) may be greatest in non-methadone outpatient treatment.
- **Session length and frequency.** Frequent, short sessions may be more beneficial than longer, less frequent sessions in outpatient treatment. This has implications for structuring outpatient services.
- **Importance of client-level characteristics.** Interaction effects occurred more frequently than main effects, pointing to the importance of understanding client-level characteristics and modality. This confirms that in substance abuse treatment, the question of “What works?” is more accurately specified as “What works for whom, and in what setting?”

Future Steps

Much more needs to be learned about the effectiveness of treatment

options and different situational factors. The cost of substance abuse, whether measured financially or in human suffering, is great. The more we know about effective treatment, the more likely it is that we can finally understand what promotes and what prevents drug and alcohol abuse and other addictions. The optimal next step for researchers, policy-makers, and treatment providers would be to conduct new prospective studies that rigorously examine the relationships among providers, clients, and outcomes identified in this analysis; to reduce the amount of missing data; and to test additional variables.

Reference

National Opinion Research Center, *Final Report: National Treatment Improvement Evaluation Study*. March 1997. Prepared for the Center for Substance Abuse Treatment, U.S. Department of Health and Human Services, under contract 270-92-0002.

Orwin, R., Ellis, B. *The National Treatment Improvement Evaluation Study: Multi-level Re-analysis of Treatment Outcomes*. March 2000. Prepared under the NEDS contract by Battelle Centers for Public Health Research and Evaluation.

For more information, please contact the National Evaluation Data Services analysis team at (703) 385-3200, or visit the NEDS Web site.

Find more on the web
<http://neds.calib.com>

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National Treatment Improvement Evaluation Study (NTIES)

This analysis was performed on data derived from the National Treatment Improvement Evaluation Study (NTIES). The NTIES was a national evaluation of the effectiveness of substance abuse treatment services delivered in comprehensive treatment demonstration programs supported by the Center for Substance Abuse Treatment (CSAT). The NTIES project

collected longitudinal data between FY 1992 and FY 1995 on a purposive sample of clients in treatment programs receiving demonstration grant funding from CSAT. Data are derived from client interviews conducted at three points in time: treatment intake, treatment exit, and 12 months after treatment exit.



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