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Counselor Attitudes Toward the Use of Naltrexone in Substance Abuse Treatment: A Multi-level Modeling Approach

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Abstract

Although alcohol use disorders (AUDs) continue to be one of the most pervasive and costly of the substance use disorders (SUDs), evidence suggests that new medications provide effective treatment. However, adoption rates of these evidence-based practices (EBPs) remain low and have been explained by characteristics of treatment organizations and individual counselor's attitudes and behaviors. Few studies have simultaneously examined the impact of organizational-level and counselor-level characteristics on counselor perceptions of EBPs. To address this gap in the literature, we use data from a national sample of 1,178 counselors employed in 209 privately funded treatment organizations to examine the effects of organizational and individual counselor characteristics on counselor attitudes toward tablet and injectable naltrexone. Results of hierarchical linear modeling (HLM) show that organizational characteristics (use of tablet/injectable naltrexone in the program, 12-step orientation) were associated with counselor perceptions of naltrexone. Net of organizational characteristics, several counselor level characteristics were associated with attitudes toward tablet and injectable naltrexone including gender, tenure in the field, recovery status, percentage of AUD patients, and receipt of medication-specific training. These findings reveal that counselor receptiveness toward naltrexone is shaped in part by the organizational context in which counselors are embedded.

Keywords

TABLET NALTREXONE; INJECTABLE NALTREXONE; ALCOHOL USE DISORDERS; MULTILEVEL MODELING

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Conflict of Interest
All authors declare they have no conflicts of interest.

1. INTRODUCTION

Despite evidence of clinical effectiveness, a majority of treatment programs in the United States have not adopted medications for the treatment of substance use disorders (SUDs) (Ducharme et al., 2006; Knudsen, Abraham, and Roman, in press). In particular, treatment programs have been slow to implement medications for the treatment of alcohol use disorders (AUDs) (i.e., disulfiram, naltrexone, acamprosate). Although tablet naltrexone has been approved by the Food and Drug Administration (FDA) for the treatment of AUDs since 1994, less than 25% of treatment programs in the US use the medication. Even fewer (16%) report prescribing the injectable formulation of naltrexone which was FDA approved for AUDs in 2006 (Abraham and Roman, 2010; Knudsen et al., in press).

Naltrexone is a mu opioid antagonist that binds to opiate receptors in the brain and blocks the action of opioid medication and opiate neurotransmitters. It has been shown to reduce the rewarding effects of alcohol, reduce craving for alcohol, and decrease the likelihood of alcohol relapse (O'Malley et al., 1992; CSAT, 1998; CSAT, 2009). Naltrexone is available in two formulations. Tablet naltrexone is a self-administered daily tablet. It was found to be effective in clinical trials in the United States; however, the effect size was small-to-medium over placebo (Bouza et al., 2004; O'Malley et al., 1992; Srisurapanont and Jarusuraisin, 2005; Volpicelli et al., 1992; Volpicelli et al., 1995). Findings also indicate that patient compliance with the daily treatment regimen can be problematic (Baros et al., 2007; Volicelli et al., 1997). Injectable naltrexone is a monthly intramuscular gluteal injection that must be administered by a trained medical professional. The medication showed efficacy in decreasing drinking days and decreasing the event rate of heavy drinking days compared to placebo (Garbutt et al., 2005), as well as efficacy in prolonging abstinence and reducing the number of drinking days and heavy drinking days in patients that were abstinent for as few as four days before beginning treatment (O'Malley et al., 2007). While injectable naltrexone addresses the issue of daily patient compliance, the cost of the medication has been cited as a major barrier to adoption in community based substance abuse treatment programs (Abraham & Roman, 2010; Lee et al., 2010).

Another important factor in the successful implementation of AUD medications in substance abuse treatment programs is the support of counseling staff. A recent study showed that tablet naltrexone was not widely diffused among treatment counselors, and counselors viewed tablet naltrexone as only moderately effective or acceptable for use in treatment (Abraham et al., 2009). Since the majority of substance abuse treatment services in the United States are delivered by counselors in specialty treatment settings, counselors play a vital role in the recovery process. Although counselors do not prescribe medications to patients, they often introduce patients to medications as a treatment option, monitor patient compliance with medications, and link patients with appropriate medical personnel. Thus, counselor support for the use of AUD medications in substance abuse treatment is of paramount importance.

A small body of literature has examined counselor attitudes toward the use of medications for the treatment of AUDs (Abraham et al., 2009; Forman et al., 2001; Thomas and Miller, 2007; Thomas et al., 2008; Thomas et al., 2003). However, this research has not addressed the potential influence of the treatment organization on counselor perceptions of AUD medications. This is an important theoretical and methodological consideration given that counselors are embedded within a larger organizational context that shapes their exposure to and receptiveness toward evidence-based practices (EBPs). In particular, the structure and culture of an organization in which a counselor is employed may play an important role in the formation of counselor perceptions of AUD medications. For example, counselors working in hospital-based programs are exposed to a medical treatment model and medical

staff and may therefore hold more favorable attitudes toward the use of medications for treatment of alcohol use disorders. In contrast, counselors working in treatment programs that place a strong emphasis on the 12-step model may hold more negative attitudes toward the use of medications.

To address this gap in the literature, this study uses hierarchical linear modeling (HLM) to simultaneously examine the effects of organizational and counselor-level characteristics on counselor perceptions of two formulations of naltrexone: tablet naltrexone (Revia®) and extended release injectable naltrexone (Vivitrol®).

1.1 Adoption of naltrexone in treatment organizations

A growing body of research examines organizational predictors of naltrexone adoption in substance abuse treatment programs (Abraham and Roman, 2010; Ducharme et al., 2006; Fuller et al., 2005; Heinrich and Hill, 2008; Knudsen et al., 2007; Oser and Roman, 2007, 2008; Roman and Johnson, 2002). This literature identifies several organizational characteristics that influence adoption of tablet and injectable naltrexone. Larger programs (those with greater slack or surplus resources) are more likely to adopt both tablet and injectable naltrexone, as are programs with a greater percentage of revenues from private insurance (Abraham and Roman, 2010; Ducharme et al., 2006; Fuller et al., 2005; Heinrich & Hill, 2008; Roman and Johnson, 2002). Treatment programs located in hospital settings are more likely to adopt tablet naltrexone (Knudsen et al., 2007), while programs based on a 12-step model are less likely to adopt the medication (Oser and Roman, 2007, 2008). Organizational barriers to the adoption of tablet and injectable naltrexone include program treatment ideology, availability of resources at the organizational and patient level, and access to medical staff (Abraham and Roman, 2010; Ducharme et al., 2006; Fuller et al., 2005; Thomas and Miller, 2007; Thomas et al., 2008).

1.2 Counselor-level research on perceptions of tablet naltrexone

To date, the literature lacks research on counselor perceptions of injectable naltrexone. However, a small body of research examines counselor perceptions toward tablet naltrexone (Abraham et al., 2009; Thomas and Miller, 2007; Thomas et al., 2003). A study that included both physicians and counselors showed that counselors were less familiar with tablet naltrexone than physicians and that the attitudes of both groups of clinicians were shaped by the prevailing philosophy of the organization in which they worked. Counselors who did not recommend tablet naltrexone most often cited lack of information about the medication, conflict with treatment philosophy, and concerns about its cost to patients as barriers to adoption (Thomas et al., 2003). Another study of counselor and treatment program administrator perceptions of tablet naltrexone showed that counselors had little knowledge of naltrexone, and they lacked confidence in the value of pharmacotherapies for AUD treatment (Thomas and Miller, 2007).

A recent study of counselor attitudes toward tablet naltrexone for AUD treatment showed that 58.1% of counselors were unable to rate the effectiveness of the medication, indicating a low-to-moderate level of diffusion. Diffusion of tablet naltrexone was associated with gender, tenure in the field, recovery status, receipt of specific training, and counselor-reported use of tablet naltrexone in the program. The study also found that perceived efficacy was positively associated with receipt of medication specific training and more positive attitudes toward medications in general; perceived acceptability was associated with receipt of specific training, use of tablet naltrexone in the program, and positive attitudes toward use of medications in general (Abraham et al., 2009). However, this previous study did not use multi-level modeling to simultaneously examine the impact of organizational

characteristics and individual counselor characteristics on counselor perceptions of tablet naltrexone.

1.3 Multi-leveling modeling: Counselor attitudes toward medications

Extant research suggests that organizational factors shape counselors' attitudes toward medications (primarily through use in the program), however scant research uses multilevel modeling techniques to examine the impact of organizational characteristics and individual-level counselor characteristics on counselor perceptions of EBPs (Broome et al., 2007; Fitzgerald and McCarty, 2009; Fuller et al., 2007). A study of treatment staff (i.e., counselors, medical personnel, support staff, and managers/supervisors) participating in the NIDA Clinical Trials Network (CTN) examined attitudes toward a variety of EBPs, including a three-item measure of staff attitudes toward SUD medications (i.e., tablet naltrexone, buprenorphine, and methadone) (Fuller et al., 2007). Results of two-level HLM models showed that staff in programs offering residential services were less supportive of SUD medications and staff in programs offering methadone services were more supportive (Fuller et al., 2007). A similar CTN study used HLM to examine treatment staff perceptions of tablet naltrexone for alcohol treatment (Fitzgerald and McCarty, 2009). The researchers found that staff members in treatment programs that placed a greater emphasis on a social treatment model (versus a medical model) were less supportive of tablet naltrexone for alcohol treatment, while staff working in programs that used methadone were more supportive of tablet naltrexone. Staff level predictors included education level (master's degree or higher) and support for the use of psychiatric medications (e.g., SSRIs). Both of these studies examined the attitudes of combined treatment staff; therefore, the opinions of counselors cannot be disaggregated from medical personnel and managers.

Prior research has several limitations. First, little research has used multi-level modeling techniques to examine the impact of the organizational context specifically on counselor attitudes toward innovations. Instead, studies have appended counselor level datasets with organizational level measures of adoption. This approach does not account for the nested structure of the data and the resulting correlated errors among counselors within the same treatment programs (violating OLS regression assumptions). Second, studies that utilize multi-level modeling techniques have not directly examined counselor attitudes toward AUD medications. Since counselors play a major role in the treatment/recovery process, this is an important consideration. Third, studies of staff attitudes of medications within an HLM framework have been limited to the CTN, which is not nationally representative. Therefore, findings have limited generalizability. To address these limitations, we use two-level HLM models to examine counselor perceptions of tablet and injectable naltrexone as a product of organizational and counselor-level characteristics.

2. METHODS

2.1 Sample

Organizational-level data for this study were taken from a nationally representative study of privately funded substance abuse treatment programs. Data were collected through face-to-face interviews with administrators and/or clinical directors from 345 private sector treatment programs conducted between early 2007 and mid 2008. Participating organizations were selected via a two-stage random sampling approach. First, all U.S. counties were assigned to 1 of 10 strata based on population. Next, to ensure inclusion of a mixture of urban, suburban, and rural areas, random sampling was completed within each strata. In the second stage, using national and state directories, all substance abuse treatment facilities in the sampled counties were enumerated. Treatment programs were then proportionately sampled across strata, with telephone screening used to establish eligibility

for the study. Facilities screened as ineligible were replaced by random selection of alternative treatment programs from the same geographic stratum. Treatment programs were defined as "private sector" if at least 50% of their annual operating revenues came from commercial insurance, patient fees, and income sources other than "block" funding such as government grants or contracts. Medicaid and Medicare reimbursements received by programs for individual patient services were not regarded as "block" funding. As a further inclusion criterion, all participating programs offered alcohol and drug treatment at a level of intensity at least equivalent to the American Society of Addiction Medicine (ASAM) Level 1 outpatient services (Mee-Lee et al., 1996). Eligibility requirements excluded counselors in private practice, halfway houses and transitional living facilities, programs offering exclusively methadone maintenance, court-ordered driver education classes or detoxification services, and programs located in correctional and Veteran's Health Administration facilities. Programs received a $100 cash donation for participation in the study. The final organizational sample of 345 programs represented a 67% response rate.

Counselor-level data were collected via mail-based questionnaires. At the time of the onsite interview, administrators were asked to provide a list of counselors employed in the program. Counselors were subsequently mailed a packet that included a description of the study, a letter inviting them to participate, a consent form, a paper copy of the questionnaire, and a postage paid return envelope. A $40 incentive was paid to counselors who returned a completed questionnaire. The final counselor sample of 1,226 represented a response rate of 58%. All research procedures were approved by the Human Subjects Committee of the University of Georgia's Institutional Review Board.

2.2 Measures

2.2.1 Dependent variables—This study used six dichotomous dependent variables to measure counselor perceptions of tablet and injectable naltrexone (i.e., diffusion, perceived effectiveness, and perceived acceptability). Consistent with our prior research (Abraham et al., 2009; Knudsen et al., 2005, Rothrauff et al., in press), the diffusion of each medication was measured as the proportion of counselors who provided a "don't know" response to the following question: "Based on your knowledge and personal experience, to what extent do you consider [specific naltrexone formulation] to be effective?" Counselors were given the option of responding on the 1 to 7 effectiveness scale or selecting a "don't know" response. Counselors were instructed to choose the "don't know" option if they felt they were unable to rate the effectiveness of either medication. For each medication, a binary diffusion variable was constructed, in which 1 = a "don't know" response, and 0 = a response on the 1–7 scale. Our measure of perceived effectiveness of each medication included only responses on the 1 to 7 scale, where 1 = "not at all effective" and 7 = "very effective."

Perceived acceptability was measured by the following question: "Based on your knowledge and personal experience, to what extent do you consider [tablet naltrexone/injectable naltrexone] to be acceptable?" Responses ranged from 1 (completely unacceptable) to 7 (very acceptable). Histograms of both tablet and injectable naltrexone effectiveness and acceptability data revealed extensive skewness. Therefore, binary variables were created, where 1 = scale response of 5–7 (effective/acceptable) and 0 = scale response of 1–4 (not effective/unacceptable).

2.2.2 Independent variables

2.2.2.1 Level 1 Predictors: Consistent with our prior research, we included several counselor-level characteristics as Level-1 predictors in the HLM models. Counselor perceptions of tablet and injectable naltrexone were modeled as a function of socio-demographic characteristics, treatment orientation, alcohol-dependent patient caseload, and

receipt of medication-specific training at Level 1. Dichotomous measures of socio-demographic characteristics included female (1 = female, 0 = male), white (1 = white, 0 = non-white), and master's degree or higher (1 = master's degree or higher, 0 = less than master's degree). Age and tenure (i.e., number of years the counselor has been employed in the addiction treatment field) were continuous variables. As a measure of treatment orientation, we included recovery status as a dichotomous measure (1 = personally in recovery, 0 = not in recovery). Alcohol patient caseload was measured as each counselor's percentage of patients with alcohol-dependence diagnoses. This measures was measured on a 0 to 5 scale (0=0%, 1=1–10%, 2=11–25%, 3=26–49%, 4=50–75%, 5=>75%). Finally, we included an ordinal measure of counselor receipt of training on tablet naltrexone or injectable naltrexone. Counselors were asked: "To what extent has your center provided you with specific training about [specific naltrexone formulation]?" Responses ranged from 1 (no extent) to 7 (a very great extent).

2.2.2.2 Level 2 Predictors: Consistent with our prior research, we included four measures of organizational characteristics (Level 2 predictors). Hospital based (1 = hospital based, 0 = freestanding unit not on a hospital campus) was a dichotomous measure. Program size was measured by the number of full-time equivalent (FTE) employees; due to skew, this measure was log-transformed for analysis. To account for exposure to each medication in the program, we included a dichotomous measure that denoted whether the program currently used tablet or injectable naltrexone (1 = center currently uses naltrexone formulation, 0 = center does not use naltrexone formulation). Finally, treatment culture (i.e., adherence to a 12-step model) is a dichotomous variable that indicated whether the program required attendance at 12-stepmeetings during the course of treatment (1 = attendance required; 0 = attendance is not required).

2.3 Data analysis

To account for the nested structure of the data (counselors nested in treatment programs), data were analyzed using HLM 6.08 (Raudenbush and Bryk, 2002). Several steps were taken to prepare the data for analysis in HLM. To improve the reliability of the estimated between-program variance component, programs with less than 2 counselors were excluded from the analyses (n = 44). Counselors with missing data on the dependent variables were excluded from the analyses. This resulted in a final sample of 1,178 counselors nested in 209 treatment programs, with an average of 5.6counselors per program (range: 2 to 34). Continuous Level 1 and Level 2 variables were centered at the grand mean (age, tenure, medication-specific training, FTEs).

A two-level hierarchical logistic (Bernoulli) model is used to predict counselor attitudes toward tablet naltrexone and injectable naltrexone. We estimate random intercept models where random variation in the level-1 intercept is modeled as a function of treatment program characteristics. All level-1 predictors are specified as fixed at level-2, meaning that the effect of each predictor is assumed to be common across programs (Raudenbush and Bryk, 2002).

We estimated the proportion of the total unexplained variance at Level 1 from the unconditional model as $\tau_{00}/(\tau_{00} + \pi^2/3)$, where τ_{00} is the Level 2 intercept variance (unexplained random variance at level 2) and $\pi^2/3$ is the Level 1 variance, which is fixed to $\pi^2/3 = 3.29$ in all logistic regression models (Snijders & Bosker, 1999, pp. 224). This proportion is numerically equal to the intra-class correlation coefficient (ICC) and can be viewed as the proportion of variance in the dependent variable attributable to differences between treatment programs.

3. RESULTS

Table 1 displays descriptive statistics for the full sample. Diffusion of each medication (counselors who provided a "don't know" response to the effectiveness question) was estimated to be 40% for tablet naltrexone and 55% for injectable naltrexone. A majority of counselors perceived tablet naltrexone to be effective (53%) and acceptable (70%) for use in treatment. Similarly, a majority of counselors perceived injectable naltrexone to be effective (56%) and acceptable (67%).

A majority of counselors were female (63%), white (82%), and had a master's degree or higher (53%). The average age of counselors was 46 years and the average number of years employed in the substance abuse treatment field was 11 years. Less than half (46%) of counselors reported personally being in recovery. On average, counselors carried a caseload comprised of 50 to 75% alcohol-dependent patients. Counselors reported an average training score of 2.95 for tablet naltrexone and 2.49 for injectable naltrexone (0 to 5 scale). Turning to organizational characteristics, 29% of programs were based in a hospital setting. A majority of programs required patients to attend 12-step meetings as part of their treatment regimen (66%). Approximately 34% of programs reported prescribing tablet naltrexone and 16% of programs reported prescribing injectable naltrexone.

3.1 Hierarchical Linear Models (HLM)

Table 2 shows the final HLM models of naltrexone diffusion, perceived effectiveness, and perceived acceptability. Intra-class correlation coefficients (ICC) for the unconditional models are listed in Table 2. Estimates for tablet naltrexone models suggest that differences in programs account for approximately 19% of the total variation in diffusion, 11% of the total variation in effectiveness, and 16% of the total variation in acceptability. For injectable naltrexone models, ICC estimates suggest that differences in programs account for approximately 16% of the total variation in diffusion, 22% of the total variation in perceived effectiveness, and 26% of the total variation in perceived acceptability. Overall, ICC estimates suggest that counselors within programs are not independent, and hierarchical analysis is appropriate.

3.2 Diffusion

The tablet and injectable naltrexone diffusion models included n = 1178 counselors in n = 209 programs. These results model the odds that a counselor responded "don't know" regarding the effectiveness of naltrexone. Two counselor-level characteristics were predictive of diffusion for both tablet and injectable naltrexone. Counselors with longer tenure in the substance abuse field were significantly less likely to provide a "don't know" response. Each unit increase in counselor tenure decreased the odds of a "don't know" response by almost 3% for both medications (tablet naltrexone: $p = 0.02$; injectable naltrexone: $p = 0.03$). Counselors that received medication-specific training were significantly less likely to provide a "don't know" response when asked about the effectiveness of naltrexone. For each unit increase in the level of training, the odds of a "don't know" response decreased by 54% ($p < 0.01$) for tablet naltrexone, and by 33% ($p < 0.01$) for injectable naltrexone. Age was positively associated with injectable naltrexone diffusion; the odds of providing a "don't know" response were greater for older counselors. At the organizational-level, current use of the medication significantly decreased the likelihood of a counselor providing a "don't know" response by 39% ($p = 0.03$) for tablet naltrexone and 64% ($p < 0.01$) for injectable naltrexone. No other counselor- or organizational-level factors were significantly associated with diffusion. The final estimation of variance components indicates that, after controlling for counselor and

organizational-level predictors, there is still significant unexplained between-program variation in diffusion (variance component p-values < .05).

3.3 Effectiveness

The second columns in Table 2 present logistic HLM models estimating the odds that counselors perceived naltrexone to be effective. These models include only counselors who expressed an opinion about naltrexone effectiveness, reducing the tablet naltrexone sample to n = 671 counselors in n = 193 programs, and the injectable naltrexone sample to n = 477 counselors in n = 172 programs. Counselors with greater percentages of patients with alcohol-dependent diagnoses are significantly more likely to perceive naltrexone as effective. Each unit increase in the percentage of alcohol-dependent patients increased the odds of perceived effectiveness by 24% ($p = 0.01$) for tablet naltrexone and 31% ($p = 0.01$) for injectable naltrexone. Recovery status had an inverse relationship with effectiveness. Counselors in recovery were 49% less likely ($p < 0.01$) to rate tablet naltrexone effective, and 45% less likely ($p = 0.01$) to rate injectable naltrexone effective. Thus, counselors who reported being in recovery were significantly less likely to rate naltrexone effective, as compared to counselors who did not identify as being in recovery. Finally, at the counselor-level, for each unit increase in the level of training, the odds of perceived effectiveness increased by 27% for both tablet naltrexone ($p < 0.01$) and injectable naltrexone ($p < 0.01$).

At the organizational-level, current use of the medication significantly increased counselors' perceptions of effectiveness. After adjusting for counselor characteristics, counselors in programs currently using naltrexone were more than twice as likely ($p < 0.01$) to rate tablet naltrexone effective, and more than three times as likely ($p < 0.01$) to rate injectable naltrexone effective. Required attendance at 12-step meetings had an inverse relationship with effectiveness. Counselors in programs that require 12-step attendance were 37% less likely ($p = 0.03$) to rate tablet naltrexone effective, and 48% less likely ($p = 0.01$) to rate injectable naltrexone effective. No other counselor- or organizational-level factors were significant. The estimation of variance components reveals that after controlling for counselor and organizational-level predictors there is still significant unexplained between-program variation in perceived effectiveness of tablet ($p = .079$) and especially injectable naltrexone ($p = .002$).

3.4 Acceptability

The third columns in Table 2 present logistic HLM models estimating the odds that a counselor perceived naltrexone to be acceptable. This model includes only counselors who expressed an opinion about naltrexone acceptability, reducing the tablet naltrexone sample to n = 727 counselors in n = 198 programs, and the injectable naltrexone sample to n = 586 counselors in n = 184 programs. Although gender was not significant in the other models, female counselors were significantly less likely to rate naltrexone as acceptable. The odds of perceived acceptability among female counselors were 48% lower ($p < 0.01$) for tablet naltrexone and 45% lower ($p = 0.01$) for injectable naltrexone, as compared to male counselors. Although education level was not significant in the other models, counselors with a master's degree or higher were 62% more likely ($p = 0.02$) to perceive tablet naltrexone as acceptable for use in treatment. Education level was not significant for injectable naltrexone.

As in the effectiveness models, alcohol-dependent caseload and recovery status were associated with perceived acceptability. Counselors with greater percentages of patients with alcohol-dependent diagnoses were significantly more likely to perceive tablet naltrexone as acceptable; each unit increase elevated the odds of perceived acceptability by 17% ($p = 0.03$) for tablet naltrexone (the effect was not significant for injectable naltrexone).

Counselors who reported being in recovery were significantly less likely to rate injectable naltrexone as acceptable, as compared to other counselors who did not identify as being in recovery. Counselors in recovery were 36% less likely ($p = 0.02$) to rate tablet naltrexone as acceptable, and 59% less likely ($p < 0.01$) to rate injectable naltrexone as acceptable. Consistent with the diffusion and effectiveness models, medication-specific training was a significant predictor of naltrexone acceptability. For each one-unit increase in the level of counselor training, the odds of perceived acceptability increased 24% ($p < 0.01$) for tablet naltrexone and 25% ($p < 0.01$) for injectable naltrexone.

At the organizational-level, current use of the medication significantly increased counselors' perceptions of acceptability. After adjusting for counselor characteristics, counselors in programs currently using naltrexone were almost twice as likely ($p = 0.01$) to rate tablet naltrexone acceptable, and more than three times as likely ($p < 0.01$) to rate injectable naltrexone acceptable. Required attendance at 12-step meetings had an inverse relationship with counselor perceptions of acceptability. Counselors in programs that require 12-step attendance were 61% less likely ($p < 0.01$) to rate tablet naltrexone as acceptable for use in treatment, and 60% less likely ($p < 0.01$) to rate injectable naltrexone as acceptable. No other counselor or organizational-level factors were significantly associated with counselor perceptions of acceptability. The estimation of variance components shows that there remains significant unexplained between-program variation in perceived acceptability of tablet ($p = .064$) and especially injectable naltrexone ($p = .001$).

4. Discussion

This paper examined the effects of organizational-level and counselor-level characteristics on counselor perceptions of tablet and injectable naltrexone. While we found evidence of greater diffusion of tablet naltrexone among substance abuse counselors when compared with earlier studies (Abraham et al., 2009), a substantial percentage of counselors (40%) still felt they were unable to rate the effectiveness of tablet naltrexone. Further, our results showed that injectable naltrexone had a lower rate of diffusion among our sample of counselors than tablet naltrexone. This is not surprising given that tablet naltrexone has been FDA approved since 1994 and injectable naltrexone is relatively new to the field (FDA Approved in 2006). These findings suggest that greater dissemination efforts aimed specifically at counselors in substance abuse treatment programs are warranted.

This study made a significant contribution to the literature by examining the effects of organizational characteristics on counselor perceptions of naltrexone. In each of the multivariate models, use of naltrexone in the program was a significant predictor of counselor knowledge and perceptions of naltrexone, indicating that exposure to medications (via use in the program) is associated with increased counselor support for use of AUD medications. While counselors working in programs that use naltrexone may not be responsible for prescribing or dispensing AUD medications to patients, they likely observe improved patient outcomes and may therefore be more supportive of the use of medications in AUD treatment. This finding is consistent with Rogers' (2003) concept of observability (i.e., innovations that have readily observable results are more likely to be adopted and implemented). With so few programs using either medication, however, counselors may have to be exposed to medications via other methods including dissemination of written materials, formal training, and internet or webinar resources. In fact, Herbeck and colleagues (2008) found that knowledge gathered from sources external to the treatment program such as journals, other treatment agencies, and county, state, and research organizations played a key role in the extent of use of a variety of EBPs including tablet naltrexone.

Another possible mechanism to increase counselor knowledge of available pharmacological treatments is to integrate medication-specific training into the licensing and certification process for substance abuse treatment counselors. Relatedly, training in the use of medications and practice guidelines that assist with implementation in treatment planning for substance use disorders (SUDs) could be included in the required academic coursework for students seeking bachelor's and advanced degrees in counseling, social work, and related fields. Finally, given the high rates of turnover among substance abuse treatment counselors (Rothrauff et al., in press), the substance abuse treatment field must find mechanisms to attract and retain counselors and other treatment staff with medication-specific training.

While prior research has suggested that the treatment orientation of the organization influences adoption of EBPs, no prior studies have directly tested this hypothesis using hierarchical modeling. Consistent with expectations, we found that program treatment ideology (i.e., emphasis on the 12-step model) had a significant negative impact on counselor perceptions of naltrexone effectiveness and acceptability. This finding shows that that treatment culture is, in fact, a significant barrier to adoption and implementation of medications which must be addressed. The important role of treatment culture was demonstrated by a recent study of mental health agencies (Glisson et al., 2008) which showed that agencies with a proficient organizational culture were more likely to sustain new programs, services, and treatment models over a five year period. Further, according to Mendel and colleagues (2008), an environment that is closed to new beliefs will have difficulty implementing an innovation. Thus, when working to increase the use of medications such as naltrexone, programs (including those emphasizing a 12-step model), must employ process improvement and organizational change strategies that emphasize an open culture that supports innovation.

Several counselor-level characteristics were also associated with perceptions of naltrexone. Consistent with prior research (Abraham et al., 2009), gender, tenure in the field, and the percentage of alcohol patients in the counselors' caseload were associated with counselor attitudes toward naltrexone. Counselors in recovery were less likely to rate tablet and injectable naltrexone as effective and acceptable for use in treatment. Because we also found that the organization's treatment ideology had a negative impact on counselor support for naltrexone, overcoming these ideological barriers may be especially challenging. Research suggests that counselor attitudes toward naltrexone may be impacted by educational interventions that include printed information, didactic instruction, and academic detailing (Miller et al., 2007). Therefore, greater efforts should be made on the part of local and federal agencies to fund interventions and other education resources targeting counselor knowledge of AUD medications.

Consistent with prior research (Abraham et al., 2009; Ducharme et al., 2010; Knudsen et al., 2005; Herbeck et al., 2008), counselors that received greater medication-specific training were significantly more likely to view each medication as effective and acceptable for use in treatment. This finding demonstrates the continued importance of training as a mechanism to positively impact counselor attitudes and subsequent use of medications. Further, existing research shows that staff adoption rates as well as a desire to learn are increased when relevant and feasible counseling innovations are combined with effective training (Bartholomew et al., 2007). Similarly, with new treatments such as the use of medications to treat AUDs, training and the availability of expert consultants have been found to be critical elements in acceptance and use (Nelson et al., 2006; Herbeck et al., 2008). However, research suggests that one-time trainings or workshops are fairly ineffective in helping clinicians to adopt new practices and gain proficiency in treatment approaches (Miller et al., 2006). Further, Bartholomew et al. (2007) found that counselors that attended a short

training workshop (1 to 3 days) later reported “not enough training” as a barrier to using the training materials.

Consistent with expectations, we found that counselors employed in treatment programs that used naltrexone reported receiving more naltrexone-specific training on average than counselors working in programs that had not implemented naltrexone. However, approximately 33% of counselors in naltrexone using programs reported receiving no medication-specific training, suggesting that these counselors would also benefit from training. While medication-specific training appears to be an obvious method for improving counselors’ knowledge and attitudes toward medications, training will require additional organizational and/or personal resources. Given that many treatment programs do not have slack or surplus resources available to cover the costs of training and the average annual counselor salary is roughly $32,000 increased funding from local and federal sources will be necessary to facilitate training (Olmstead et al., 2007).

Several limitations of the current study should be noted. First, the data are cross-sectional which limits our ability to draw causal inferences. Second, the response rate for the study is not optimal and may have introduced response bias into the study. Third, all data are self-report and therefore subject to the memory of the respondents. Finally, significant between-program variation remains unexplained (as indicated by the variance component p-values), especially for tablet and injectable naltrexone diffusion and beliefs regarding injectable naltrexone acceptability and effectiveness. These findings suggest there are unmeasured factors at play and that future research should consider additional individual- and organizational-level predictors of counselor attitudes toward the use of naltrexone in AUD treatment.

In sum, this study represents a first examination of counselor attitudes toward AUD medications within a multi-level modeling approach. Our results show that organizational context and individual counselor characteristics had a significant impact on perceptions of the two naltrexone formulations. Key barriers included lack of knowledge of naltrexone, lack of exposure to naltrexone via use in the program, the treatment ideology of the program, counselors’ personal recovery status, and low levels of naltrexone-specific training. Overall, our findings suggest that greater efforts are needed to disseminate information about naltrexone to counselors. Improving the knowledge base of the counseling workforce and addressing unsupportive treatment cultures would likely have a positive overall impact on the quality of AUD treatment.

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Table 1

Descriptive statistics: Full sample

Variable	% (N) or *M* (SD)
Dependent Variables	
Tablet naltrexone	
Diffusion (“don’t know” about effectiveness)	40.07% (472)
Perceived effectiveness (n=671)	53.02% (356)
Perceived acceptability (n=727)	69.82% (508)
Injectable naltrexone	
Diffusion (“don’t know” about effectiveness)	55.18% (650)
Perceived effectiveness (n=477)	56.05% (267)
Perceived acceptability (n=586)	66.88% (392)
Counselor-level variables (N=1178)	
Female	63.33% (746)
Age	46.33 (11.83)
White	81.83% (964)
Master’s degree or higher	53.40% (629)
Years in substance abuse treatment field (tenure)	11.31 (8.81)
In recovery	46.10% (543)
Percent alcohol-dependent clients (scale 0–5)	4.80 (1.24)
Training: Tablet naltrexone (scale 1–7)	2.95 (2.07)
Training: Injectable naltrexone (scale 1–7)	2.49 (1.98)
Organizational-level variables (N=209)	
Hospital based	28.50%
Use tablet naltrexone	33.82%
Use injectable naltrexone	16.43%
12-step meetings required	65.70%
Program size (log-transformed FTEs)	2.79 (1.05)

Table 2

Logistic HLM Models of Diffusion, Perceived Effectiveness and Perceived Acceptability of Tablet Naltrexone and Injectable Naltrexone

	Tablet Naltrexone			Injectable Naltrexone		
	Diffusion N=209 orgs N=1178 counselors	**Effectiveness N=193 N=671**	**Acceptability N=198 N=727**	**Diffusion N=209 N=1178**	**Effectiveness N=172 N=477**	**Acceptability N=184 N=586**
	OR (CI) p-value	**OR (CI) p-value**	**OR (CI) p-value**	**OR (CI) p-value**	**OR (CI) p-value**	**OR (CI) p-value**
ICC for unconditional model	.189	.115	.158	.159	.221	.260
Counselor-level						
Female	1.261 (0.918,1.732) 0.152	0.797 (0.556,1.141) 0.216	**0.516 (0.352,0.758) 0.001**	1.150 (0.839,1.576) 0.385	0.893 (0.581,1.371) 0.603	**0.554 (0.368,0.835) 0.005**
White	0.731 (0.500,1.069) 0.106	1.125 (0.725,1.746) 0.599	1.289 (0.787,2.108) 0.315	0.982 (0.659,1.463) 0.928	1.272 (0.752,2.150) 0.370	1.343 (0.805,2.240) 0.260
Age	1.000 (0.980,1.015) 0.770	1.000 (0.982,1.018) 0.997	0.995 (0.974,1.016) 0.606	**1.015 (1.000,1.030) 0.045**	1.002 (0.979,1.026) 0.859	1.007 (0.985,1.030) 0.523
Master's degree	0.755 (0.526,1.084) 0.128	1.304 (0.881,1.931) 0.186	**1.623 (1.084,2.429) 0.019**	0.958 (0.686,1.337) 0.799	1.183 (0.643,2.174) 0.589	1.265 (0.775,2.066) 0.348
Tenure	**0.974 (0.952,0.995) 0.018**	0.979 (0.957,1.002) 0.073	1.000 (0.973,1.027) 0.974	**0.978 (0.957,0.998) 0.033**	0.984 (0.954,1.014) 0.296	0.999 (0.969,1.029) 0.931
Recovery status	1.110 (0.764,1.612) 0.584	**0.513 (0.363,0.726) <0.001**	**0.639 (0.436,0.936) 0.022**	0.878 (0.657,1.174) 0.380	**0.547 (0.340,0.880) 0.013**	**0.414 (0.272,0.630) <0.001**
% alcohol patients	0.910 (0.790,1.048) 0.191	**1.242 (1.060,1.456) 0.008**	**1.173 (1.020,1.349) 0.025**	1.001 (0.895,1.120) 0.988	**1.313 (1.085,1.589) 0.006**	1.147 (0.965,1.362) 0.119
Medication-specific training	**0.461 (0.402,0.528) <0.001**	**1.268 (1.154,1.393) <0.001**	**1.241 (1.134,1.359) <0.001**	**0.671 (0.618,0.730) <0.001**	**1.270 (1.143,1.411) <0.001**	**1.250 (1.120,1.396) <0.001**
Program-level						
Hospital based	0.841 (0.537,1.318) 0.449	0.973 (0.635,1.489) 0.899	1.187 (0.751,1.877) 0.462	0.804 (0.554,1.166) 0.250	1.104 (0.632,1.931) 0.726	1.286 (0.725,2.284) 0.389
Use medication	**0.616 (0.404,0.940) 0.025**	**2.117 (1.399,3.203) 0.001**	**1.929 (1.230,3.026) 0.005**	**0.355 (0.235,0.537) <0.001**	**3.106 (1.734,5.563) <0.001**	**3.226 (1.490,6.986) 0.004**
12-Step attendance required	1.002 (0.692,1.450) 0.992	**0.632 (0.423,0.943) 0.025**	**0.391 (0.261,0.586) <0.001**	0.808 (0.589,1.110) 0.189	**0.516 (0.306,0.870) 0.014**	**0.403 (0.228,0.711) 0.002**
Program size	1.063 (0.900,1.256) 0.470	0.851 (0.718,1.009) 0.063	0.864 (0.707,1.057) 0.156	1.063 (0.909,1.243) 0.445	0.797 (0.607,1.047) 0.103	0.782 (0.600,1.018) 0.067
Reliability Estimate	0.190	0.158	0.171	0.180	0.253	0.284
Variance component p-value	*p*=0.008	*p*=0.079	*p*=0.064	*p*=0.034	*p*=0.002	*p*=0.001