Patient adherence to multi-component continuing care discharge plans

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ABSTRACT

Intuitively, it is assumed that greater patient adherence to treatment recommendations in substance use disorder (SUD) treatment is associated with favorable outcomes, but surprisingly, there is limited research systematically examining the adherence–outcome relationship in the context of the continuing care phase post-discharge from residential treatment. This study sought to determine the effect of adherence to multi-component continuing care plans on long-term outcomes among patients following the primary treatment episode. Data were abstracted from electronic medical records for 271 patients (59.0% male) discharged from a U.S. residential program between 2013 and 2015. Patients were categorized based on their level of adherence to their individualized continuing care discharge plan, and studied through retrospective record review for 12 months post-discharge. 12-month outcomes included past 30-day and continuous abstinence, re-admission, and quality of life. With the exception of re-admission rate, fully adherent patients demonstrated significantly better results on all study outcomes at 12 months compared to patients who were partially or non-adherent. Fully adherent patients were 9.46 times (95% CI: 5.07–17.62) more likely to be continuously abstinent through 12 months relative to the other adherence groups. Fully adherent patients were 7.53 times (95% CI: 2.41–23.50) more likely to report a positive quality of life at 12 months relative to the other adherence groups. The findings support the widely held contention that greater adherence to continuing care discharge plans is associated with favorable long-term outcomes, and provide insight into realistic outcomes expectations for patients who are adherent to their multi-component continuing care discharge plans.

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1. Introduction

Poor adherence—defined as the patient's inability to adequately participate in the recommended treatment regimen of a health care provider—has long been considered a major barrier in the treatment of a variety of chronic medical conditions, such as diabetes, hypertension, and asthma (Clark, 1991; Dekker, Dieleman, Kaptein, & Mulder, 1993; Garcia-Perez, Alavarez, Dilla, Gil-Guillen, & Orozco-Beltran, 2013; Graber, Davidson, Brown, McRae, & Woolridge, 1992; Ho, Bryson, & Rumsfield, 2009; Kurtz, 1990). Long-term and complex treatment regimens in particular are inherently susceptible to poor adherence (Aronson, 2007; Dunbar-Jacob & Dwyer, 1991; Griffith, 1990). A sizeable knowledge base, derived primarily from the medical treatment literature, supports a link between the extent to which a patient's behavior (e.g., taking medication, executing lifestyle changes) coincides with his or her prescribed medical treatment (Dunbar, 1980; Lieberman, 1996; Sackett, 1979) and positive treatment outcomes (for reviews see DiMatteo, Giordani, Lepper, & Croghan, 2002; Simpson et

al., 2006). Similarly, the treatment of substance use disorder (SUD) is increasingly being contextualized within a disease management framework, much like that of the aforementioned chronic medical conditions (Institute of Medicine [IOM], 2006; McLellan, Lewis, O'Brien, & Kleber, 2000).

Accordingly, there has been a shift in focus in recent years from the primary to secondary or continuing care phase of treatment. The continuing care phase involves providing some form of less-intensive, tapered care (e.g., standard outpatient treatment, community-based self-help/support groups). The overarching goal of any continuing care model is to sustain treatment gains attained in the primary phase in an effort to manage SUD and ultimately achieve remission. Intuitively, it is assumed that greater patient adherence to SUD treatment is associated with favorable outcomes, but surprisingly, there is limited research systematically examining the adherence–outcome relationship in the context of psychosocial (i.e., non-medication-assisted treatment) SUD treatment (Mattson et al., 1998; Project Match Research Group, 1998), and no studies have explicitly focused on adherence to multi-component continuing care plans post-discharge from the primary treatment episode.

According to the U.S. Surgeon General's recent report on alcohol, drugs, and health (Department of Health and Human Services, 2016),

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there are a number of evidence-based interventions for the treatment of SUD with demonstrated efficacy and effectiveness. Considerable work also supports the widely held contention that the provision of lower intensity continuing care services delivered in the context of outpatient treatment after the primary treatment phase (e.g., residential) is associated with favorable long-term clinical outcomes (e.g., for reviews see McKay, 2009; Proctor & Herschman, 2014). As elaborated by McKay (2009), however, there is significant between-patient variability in response to continuing care interventions, which can be influenced by a number of patient-level and program-level factors. One patient-level factor of particular interest is adherence given that poor adherence often leads to attrition, which in turn is associated with unfavorable long-term outcomes (e.g., Simpson, Joe, & Brown, 1997). Although participation in continuing care activities (e.g., community-based self-help groups, formal outpatient aftercare programming) is a reliable predictor of positive long-term functioning (McKay, 2009; Proctor & Herschman, 2014), few patients are adherent in that many participate in minimal or no available continuing care options (Etheridge, Hubbard, Anderson, Craddock, & Flynn, 1997), and even fewer receive continuing care for any appreciable length of time. For instance, findings from two large evaluation studies revealed that only about 1 in 5 patients remained in treatment or participated in continuing care beyond 3 months following residential treatment discharge (Ershoff, Radcliffe, & Gregory, 1996; Peterson, Swindle, Phibbs, Recine, & Moos, 1994).

Perhaps the most comprehensive evaluation of SUD treatment adherence comes from a large-scale, multisite clinical trial conducted by the Project MATCH Research Group (1993). Two independent but parallel matching studies were conducted with patients recruited from outpatient treatment settings (Outpatient arm), and patients receiving continuing care treatment following residential treatment completion (Aftercare arm). Reported findings indicated that higher adherence was associated with better outcomes for all patients (Project Match Research Group, 1998). More in-depth analysis of the adherence—outcome relationship from a subsequent Project MATCH investigation among patients with an alcohol use disorder revealed that adherence (i.e., treatment attendance) was positively related to the trial's two primary drinking outcome measures (i.e., % of days abstinent, and drinks per drinking day), and favorable treatment response was contingent on adequate treatment retention (Mattson et al., 1998).

Although Project MATCH was revolutionary for the addictions treatment field and its study design included a number of strengths with important implications for both treatment and research adherence (see monographs by Carroll, 1997; Zweben et al., 1998), further comment on a number of key methodological limitations is necessary. First, Mattson et al. failed to distinguish between the two study arms (i.e., "Outpatient" and "Aftercare") with respect to reported outcomes. The Outpatient arm was comprised of patients recruited from ambulatory clinics and newspaper advertisements, while the Aftercare arm included patients recruited from residential and partial-hospitalization treatment programs. Although the Aftercare group completed a more intensive level of care (e.g., residential) prior to enrollment in the study, the results were presented for the combined sample, which makes it difficult to glean any specific outcome expectations for patients in the continuing care phase of treatment based on level of adherence. Considering that the complexity of long-term treatment regimens in particular make them inherently vulnerable to poor adherence (Aronson, 2007; Dunbar-Jacob & Dwyer, 1991; Griffith, 1990), the association between adherence and outcome for the continuing care group is unclear and warrants further investigation.

Second, it is important to highlight that the indicator of patient adherence in Mattson et al. (1998) was limited solely to attendance through the 12-week treatment phase. In other words, Aftercare patients were only assessed for their level of treatment adherence to 3 months of continuing care; which was used to determine the relationship between early (i.e., 3-month) adherence and long-term outcomes up to 15 months after initiation of treatment. A final limitation relates

to the use of strict inclusionary criteria, which warrants caution in generalizing the findings to other naturalistic treatment settings in which patient composition is more clinically diverse. That is, participation was limited to patients with an alcohol use disorder only (i.e., exclusionary criteria included a current drug dependence diagnosis or any intravenous drug use in the 6 months prior to enrollment), and those who were able to identify at least one collateral source to assist in tracking for follow-up evaluations, among other criteria (e.g., patients with current or planned involvement in a more intensive form of treatment for alcohol problems were also excluded). This methodological limitation (although a relative strength in some respects) is particularly salient considering that the use of strict inclusionary criteria often translates to a sizeable proportion of patients being excluded from study. As a result, the clinical implications may be more limited in scope due to the inherent difficulties associated with attempting to generalize findings derived from studies involving homogenous samples to the clinically diverse patients seen in "real world" community treatment settings. Conversely, clinical research studies conducted in naturalistic treatment settings afford researchers with the opportunity to address and overcome traditional barriers to applying laboratory-based research to clinical practice (Atkins, Frazier, & Cappella, 2006; DeFife et al., 2015). Results from naturalistic research designs also have immediate applications for routine practice and can offer important evidence not readily available from tightly controlled efficacy research or clinical trials.

Given that SUD is increasingly being recognized as a chronic condition requiring protracted disease management—comparable to other chronic medical conditions (e.g., hypertension, asthma, diabetes)—studies investigating the impact of patient adherence to continuing care plans and its impact on various outcomes are of paramount importance (McLellan, McKay, Forman, Cacciola, & Kemp, 2005). Several reviews of the vast SUD treatment literature suggest that long-term care strategies produce lasting benefits for individuals with a SUD (McKay, 2009; McLellan et al., 2000; Proctor & Herschman, 2014). However, the availability of evidence-based continuing care treatments in the absence of patient adherence, presumably renders such options of limited clinical value. Extensive evidence, primarily from the diabetes, hypertension, and asthma treatment literature, supports a link between patient adherence and positive treatment outcomes (for reviews see DiMatteo et al., 2002; Simpson et al., 2006). Similar findings, albeit to a lesser extent, have been reported in the SUD treatment literature, such that patients who are adherent to their recommended treatment regimen demonstrate favorable outcomes (e.g., Casati, Piontek, & Pfeiffer-Gerschel, 2014; Mattson et al., 1998; McLellan et al., 2000; Miller, Book, & Stewart, 2011; Nosyk, Marsh, Sun, Schechter, & Anis, 2010; Volpicelli et al., 1997; Weiss, 2004). The SUD treatment adherence research, however, has largely focused on adherence to medication-assisted treatment regimens involving the use of methadone, buprenorphine-based formulations, disulfiram, or naltrexone.

For such pharmacological interventions, the measurement of adherence is relatively straightforward and involves whether or not the patient is taking his/her prescribed medication as directed. Conversely, the measurement of adherence for psychosocial interventions is understandably more challenging given the variability in treatment regimens and complexity of quantifying adherence. Furthermore, even among the limited studies investigating patient adherence to psychosocial approaches, indicators of adherence have been inconsistent or based solely on patient adherence during the primary phase of treatment. Regarding the former, definitions of adherence vary widely (Mattson et al., 1998; Milligan, Nich, & Carroll, 2004) and often focus exclusively on attendance at continuing care group therapy (Lash & Blosser, 1999; Lash, Petersen, O'Connor, & Lehmann, 2001). As a result, much of the extant support for the adherence—outcome relationship in the SUD literature has neglected the multi-faceted psychosocial continuing care phase of SUD treatment. The use of strict inclusionary criteria in studies demonstrating the strongest support to date linking adherence to psychosocial treatment with long-term successful outcomes (Mattson et al.,

1998) also necessitates further work with a naturalistic treatment population. Thus, in light of scant empirical evidence, it remains unclear to what extent patient adherence to multi-component post-discharge continuing care plans is associated with long-term clinical outcomes. The current study sought to address these apparent knowledge gaps and determine whether patient adherence to continuing care plans during the initial 12-month period post-discharge from residential treatment predicted a number of long-term clinical outcomes using data derived from a naturalistic treatment sample.

2. Material and methods

The present investigation is a secondary analysis of a subset of data from a previously published study evaluating the effectiveness of a protracted telephone-based care plan management intervention (Proctor, Wainwright, Herschman, & Kopak, 2017). The primary study conducted by Proctor et al. (2017) evaluated the effectiveness of three formats of an intensive, protracted telephone-based care plan management approach known as *AiRCare* on adherence to continuing care plans and substance use outcomes. AiRCare involves 12 months of personalized, telephone-based support for patients and/or their families post-residential treatment discharge. Given that AiRCare was included as a standard component of care provided by the treatment provider, patients were automatically enrolled at treatment admission and subsequently received telephone contacts in one of three formats based on their specified preference (i.e., patient only, family only, or both the patient and the family).

Data for the current study were derived from patient records utilizing the management information system of a large behavioral health care management services provider. Patients were identified based on specified inclusionary criteria. The study sample was comprised of patients who were discharged from a single residential substance use treatment program located in the southwestern United States during the period of December 8, 2013 to January, 17, 2015 and agreed to receive telephone-based protracted care plan management post-discharge (only 25 patients admitted during this period were excluded due to electing not to participate in the care plan management program and subsequently not receiving any telephone follow-up contact). Of the 379 patients initially identified based on the aforementioned inclusionary criteria, 72 were excluded from analyses given that only cases for whom study outcomes were derived from patient self-report (as opposed to collateral family report only) were included. That is, considering that outcomes for the Family Only group were derived from family report and not patient self-report (as was the case for the other two AiRCare formats), patients in the Family Only group were excluded. An additional 36 patients were excluded due to missing 12-month adherence ($n = 4$) or outcomes data ($n = 32$), which resulted in a net sample of 271 patients.

Patients were studied through retrospective electronic record review for 12 months following discharge from primary treatment. Residential treatment included a combination of group and individual therapy using 12-step, mindfulness meditation, and cognitive-behavioral techniques, and the average length of stay for the study sample was 28.05 days ($SD = 8.58$). All personal identifiers were removed by the care plan management services provider prior to release of the data. Release of the de-identified data set was approved by the provider for use in secondary analyses, and all study procedures were approved by an appropriate institutional review board.

2.1. Participants

The study sample was comprised of 271 patients (59.0% male) with an average age of 40.43 years ($SD = 13.99$). With respect to the racial composition of the sample, 92.3% of patients were White. In terms of marital status, nearly half (43.9%) were single, while a similar percentage (43.5%) were married or in a romantic relationship at the time

they were admitted to treatment. Approximately half (55.3%) were employed, and 68.3% paid for treatment "out-of-pocket" (i.e., were self-pay). Upon admission to treatment, all patients received a comprehensive biopsychosocial assessment and diagnostic evaluation. Diagnostic determinations were made by trained clinical staff as per the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV; American Psychiatric Association [APA], 1994). Diagnoses were subsequently verified by the treatment provider's staff psychiatrist. The primary SUD diagnosis that predominated involved alcohol with two-thirds (66.3%) of patients meeting criteria for a DSM-IV alcohol use disorder. The second most prevalent SUD involved opioids (i.e., heroin or prescription pain relievers) with 17.6% receiving an opioid use disorder diagnosis, followed by stimulants (i.e., cocaine or amphetamines) at 9.5%. The majority of patients also received a co-occurring psychiatric disorder diagnosis with 60.9% of patients meeting criteria for a non-SUD mental health condition. Among those with a co-occurring disorder, major depressive disorder (30.9%) predominated as the most prevalent comorbid condition, followed by an anxiety disorder (21.8%), and posttraumatic stress disorder (15.2%).

Patients were categorized into one of three groups based on their level of adherence to their continuing care discharge plans through 12 months post-discharge from residential treatment (see Measures section): (1) Non-Adherent ($n = 47$), (2) Partially Adherent ($n = 73$), and (3) Fully Adherent ($n = 151$). Analyses were conducted to determine whether there were preliminary descriptive differences on demographic and clinical characteristics between the three adherence groups. A one-way between-groups analysis of variance was conducted for all continuous variables, and a chi-square analysis was conducted for all categorical variables. There were no significant differences between adherence groups on any of the demographic or clinical characteristics.

2.2. Measures

Prior to discharge from residential treatment, all patients and their multi-disciplinary treatment team collaboratively constructed a multi-component continuing care discharge plan, which included a detailed list of stated goals and expectations regarding continuing care. Although continuing care plans may have been variable—given they were personalized to the patient's unique needs—all plans included regular attendance at community-based self-help groups as well as standard outpatient treatment with a local provider in their home community, beginning within 7 days of discharge. Subsequent to discharge from primary treatment, all patients received protracted, telephone-based care plan management by master's level, licensed telehealth specialists for 12 months. In the context of the current study, patients answered an average of 23.92 ($SD = 0.99$) telephone calls. All telehealth specialists participated in a mandatory 3-week training prior to patient contact, and received ongoing clinical supervision consisting of a minimum of 1 h of individual supervision and 3 h of group supervision per week. Telephone contacts did not involve counseling, per se, but rather care plan management with a focus on whether the patient was adherent to his/her personalized discharge plan. Telephone contacts also included a standardized set of questions assessing patients' recent substance use and quality of life.

One of three possible adherence ratings was assigned by the telehealth specialist based on the extent to which the patient followed his/her continuing care plan. During each telephone contact, the patient was asked a series of "yes" or "no" questions corresponding directly to the patient's continuing care plan. The values for each continuing care plan element response were summed and divided by the total number of care plan elements. For example, a telehealth specialist may have asked the patient whether he/she attended a 12-step meeting, attended outpatient individual therapy with their local counselor, attended their medication management appointment, and took their prescribed medication as directed. If the patient responded "yes" to all continuing care discharge plan elements, the telehealth specialist would assign a "Fully

Adherent" rating. If the patient responded "yes" to 50% or more but less than all of his/her continuing care plan elements, the telehealth specialist would assign a "Partially Adherent" rating. Completing <50% of continuing care plan elements resulted in a "Non-Adherent" rating.

It is important to note the complexity of the indicator of patient adherence used in the present study in that continuing care plans contained a number of elements beyond simply attendance at community-based self-help groups (e.g., Alcoholics Anonymous [AA] or Narcotics Anonymous [NA]). That is, adherence involved a combination of attendance at formal outpatient individual and/or group therapy sessions, community-based self-help groups, office-based medication management (when applicable), or any additional clinic visits or recommendations included in the patient's personalized continuing care discharge plan. In addition, the use of a categorical measure of patient adherence with three levels is consistent with prior relevant research in this area, in which adherence has been grouped into three levels (Mattson et al., 1998).

Primary outcomes included past 30-day abstinence at 12 months, and continuous abstinence through the entire 12-month period following residential treatment discharge. Secondary outcomes included re-admission rate to any residential level of care and self-reported quality of life. Past 30-day abstinence rate at 12 months was based on self-report at the 12-month telephone follow-up contact, but was also corroborated by collateral sources or urinalysis findings, if available. Continuous abstinence refers to patients' ability to maintain abstinence throughout the entire 12-month follow-up period post-discharge from residential treatment. Continuous abstinence rates were calculated by examining patients' abstinence based on all previous telephone contacts throughout the initial 12-month period. Re-admission rate was calculated by determining the number of patients who were re-admitted to any residential level of care within the initial 12 months following discharge from primary treatment. Re-admission rates considered both re-admission to the same residential treatment program from which patients were discharged as well as additional residential programs. Telephone contacts with patients and/or their designated family members (e.g., spouse, parent) assessed whether patients had sought residential care at any time during the study observational period, and patients' records were updated accordingly. Quality of life was dichotomously assessed via a single item, which asked patients to indicate their perceived quality of life at the time of the 12-month telephone follow-up contact.

All self-report data provided by patients were corroborated by one or more collateral sources. Collateral sources included at least one individual besides a member of the patient's family. Given that all patients' continuing care discharge plans included a local provider, it was possible for the same telehealth specialist to contact the provider for verification. Findings from regular urinalysis drug screening were also used for verification of self-reported abstinence rates. Among patients who provided 12-month outcomes data, 17.4% participated in monthly urinalysis drug screening ($M = 12.85$, $SD = 4.40$) as part of the care plan management program, and 26.7% of immunoassays were positive. The majority of patients who did not participate in drug screening ordered by the care plan management program, however, were still required to participate in routine screening administered through an alternative provider (intensive outpatient provider, "sober living home," etc.) as part of their continuing care discharge plan. Therefore, in instances in which drug screening was not ordered as a component of the care plan management program but patients participated in screening administered by their local service provider, it was possible to verify patient self-report data with urinalysis drug screen findings obtained from the local service provider.

2.3. Data analyses

Pearson's chi-square tests of independence were conducted to explore the relationships involving the three levels of adherence with the primary and secondary outcome variables. Crosstabulations were performed to ascertain whether adherence was associated with differential long-term clinical outcomes. Separate binary logistic regression models were fitted to the data to test the general hypothesis regarding the benefit of full adherence to each of the outcomes relative to patients who were partially adherent or non-adherent to their continuing care discharge plans. Telehealth specialist-assigned adherence determinations at 12 months were used to construct a dichotomous adherence predictor variable (e.g., Fully Adherent vs. Partially Adherent/Non-Adherent) for logistic regressions. Hierarchical logistic regressions were conducted to determine if adherence level was a significant independent predictor of study outcomes after controlling for relevant patient demographic characteristics known to impact outcome (i.e., age, sex, marital status, and employment status). Each model included demographic covariates entered as predictor variables at step 1 with adherence entered at step 2. Goodness-of-fit statistics were examined to assess the fit of each respective logistic model against actual outcome. One inferential test (i.e., Hosmer-Lemeshow) and two additional descriptive measures of goodness-of-fit (i.e., R^2 indices defined by Cox & Snell and Nagelkerke) were used to determine whether the various models fit to the data well.

3. Results

Results from the various crosstabulations involving level of patient adherence with study outcomes at 12 months revealed several notable findings (Table 1). First, 12-month outcomes for patients who received a Fully Adherent rating were compared to patients who received a Non-Adherent rating. Fully Adherent patients evidenced significantly higher rates of continuous abstinence [X^2 (1, $N = 198$) = 75.589, $p = .001$, $\varphi = .618$], past 30-day abstinence [X^2 (1, $N = 198$) = 73.651, $p = .001$, $\varphi = .610$], and a positive quality of life [X^2 (1, $N = 198$) = 28.567, $p = .001$, $\varphi = 0.380$] at 12 months. Fully Adherent patients did not significantly differ from Non-Adherent patients on 12-month re-admission rate to any residential level of care post-discharge [X^2 (1, $N = 198$) = 1.007, $p = .316$, $\varphi = -.071$]. Next, crosstabulations comparing Fully Adherent and Partially Adherent groups on study outcomes (Table 1) revealed that patients who received a Fully Adherent rating demonstrated significantly higher rates of continuous [X^2 (1, $N = 224$) = 26.866, $p = .001$, $\varphi = .346$] and past 30-day [X^2 (1, $N = 224$) = 6.793, $p = .009$, $\varphi = .174$] abstinence at 12 months relative to patients who received a Partially Adherent rating. Fully and Partially Adherent groups did not significantly differ on re-admission rate [X^2 (1, $N = 224$) = 1.160, $p = .282$, $\varphi = .072$] or quality of life [X^2 (1, $N = 224$) = 2.251, $p = .134$, $\varphi = .100$] at 12 months. Finally, Non-Adherent and Partially Adherent groups were compared on 12-month study outcomes (Table 1). Non-Adherent patients evidenced significantly lower rates of continuous abstinence [X^2 (1, $N = 120$) = 13.506, $p = .001$, $\varphi = .335$], past 30-day abstinence [X^2 (1, $N = 120$) = 25.865, $p = .001$, $\varphi = .464$], and a positive quality of life [X^2 (1, $N = 120$) = 9.711, $p = .002$, $\varphi = .284$] at 12 months. No significant difference was found between Non-Adherent and Partially Adherent patients on rate of re-admission to any residential level of care within 12 months post-discharge [X^2 (1, $N = 120$) = 3.0888, $p = .079$, $\varphi = -.160$].

Table 1
Associations between level of patient adherence and study outcomes.

12-month outcome	Adherence		
	Non ($n = 47$)	Partially ($n = 73$)	Fully ($n = 151$)
Past 30-day abstinence[a,b,c]	51.1%	91.8%	98.7%
Continuous abstinence[a,b,c]	23.4%	57.5%	88.1%
Re-admission	12.8%	4.1%	7.9%
Quality of life[a,c]	72.3%	93.2%	97.4%

[a] Non and Partially Adherent groups significantly differed at $p < .01$.
[b] Partially and Fully Adherent groups significantly differed at $p < .01$.
[c] Non and Fully Adherent groups significantly differed at $p < .01$.

Results from the separate logistic regressions revealed that patient adherence was a significant predictor of 12 months of continuous abstinence after adjustment for relevant demographic covariates [Model $X^2(5) = 67.865$, $p = .001$, $R^2 = .22$ (Cox & Snell), $R^2 = .31$ (Nagelkerke)]. The Hosmer-Lemeshow goodness-of-fit test was insignificant [$X^2(8) = 5.681$, $p > .05$], suggesting that the model was fit to the data well. Specifically, patients who received a Fully Adherent rating through 12 months were 9.46 times (95% CI: 5.07–17.62) more likely to be continuously abstinent through the initial 12 months post-discharge from residential treatment relative to patients in the Non-Adherent or Partially Adherent groups. Patient adherence was also a significant independent predictor of a positive quality of life [Model $X^2(5) = 20.089$, $p = .001$, $R^2 = .07$ (Cox & Snell), $R^2 = .17$ (Nagelkerke), Hosmer-Lemeshow $X^2(8) = 7.778$, $p > .05$], such that Fully Adherent patients were 7.53 times (95% CI: 2.41–23.50) more likely to report a positive quality of life at 12 months relative to patients were not fully adherent to their continuing care discharge plans.

Patient adherence was not found to significantly predict the likelihood of being re-admitted to any residential level of care through 12 months post-discharge. Finally, the separate logistic regression that was performed to ascertain the effect of patient adherence on the likelihood of achieving past 30-day abstinence at 12 months produced a relatively large odds ratio, but even broader confidence interval. One potential explanation is that the overwhelming majority of patients, irrespective of adherence rating, evinced a high past 30-day abstinence rate at 12 months (i.e., 88.6% of the total sample). Also of interest, nearly all patients who received a Fully Adherent rating demonstrated past 30-day abstinence at 12 months (i.e., 98.7%). It is likely that the sparse data field and classification table for this particular model impacted the reliability of estimation and contributed to an abnormally broad confidence interval. As such, due to insufficient information to fit this model, the observed findings for this outcome are not reported.

4. Discussion

As the SUD treatment field's paradigm shift from the primary to continuing care phase moves onward, there is an identified need for studies to systematically investigate the role of relevant variables that may impact continuing care outcomes. One such understudied variable is patient adherence to continuing care plan recommendations. Consistent with earlier work (Mattson et al., 1998), the current study found that greater adherence was associated with better long-term outcomes. However, the current study extends prior findings regarding the adherence–outcome relationship through the use of a naturalistic treatment sample and a more sophisticated measure of patient adherence. The observed findings provide empirical evidence to support the widely held assumption that greater patient adherence to psychosocial continuing care options is associated with favorable treatment response. Although, theoretically, the assumed positive correlation between adherence to continuing care plans and outcome among SUD patients is a reasonable notion, surprisingly, very few studies have empirically tested the effect of adherence in SUD treatment outcome beyond medication-assisted treatment evaluations.

The current findings contribute to the extant knowledge base and provide insight into realistic outcomes expectations for patients who are adherent to their multi-component continuing care discharge plans. In the context of the present study, several notable findings were found with respect to abstinence, which is arguably the most important outcome for patients receiving SUD treatment. For instance, patients who were adherent to all elements of their continuing care discharge plans through 12 months were significantly more likely to demonstrate both continuous and past 30-day abstinence at 12 months post-discharge relative to patients who were not adherent. Remarkably, patients who received a Fully Adherent rating through 12 months were over 9 times more likely to be continuously abstinent through the entire 12-month period following residential treatment discharge relative to

patients in the Non-Adherent or Partially Adherent groups. Psychoeducation provided to patients prior to discharge from residential treatment during discharge planning sessions regarding the observed findings and the apparent long-term benefits of following all continuing care discharge plan elements may address traditional barriers to adherence (e.g., failure on the patient's part to understand the importance of adherence; Aronson, 2007) and possibly lead to increased motivation and successful long-term outcomes.

It is also important to note that adherence was associated with additional long-term outcomes beyond abstinence. Although abstinence, or more specifically, remission, is the gold standard of SUD outcomes, it alone is insufficient to adequately measure the broader construct of recovery (Betty Ford Institute Consensus Panel, 2007). That is, measures of disease status alone are insufficient to fully capture the burden of illness in chronic and severe disorders (Muldoon, Barger, Flory, & Manuck, 1998) such as SUD. As such, the inclusion of measures of quality of life is becoming an increasingly more common practice to demonstrate evidence of therapeutic benefit in SUD treatment outcomes research (Donovan, Mattson, Cisler, Longabaugh, & Zweben, 2005) as well as clinical trials for many other chronic illnesses (Reeve, 2007). The current study found that patients who were fully adherent to their continuing care discharge plans were nearly 8 times more likely to report a positive quality of life at 12 months relative to patients who were not fully adherent. This suggests that adherence may impact additional indicators of post-residential treatment functioning. Although the achievement of abstinence was presumably a result of greater adherence to continuing care plans—which in turn likely contributed to patients' perception of a positive quality of life—testing for the mediating role of abstinence on quality of life was beyond the scope of the present investigation. Therefore, future research is warranted in order to delineate the specific mechanisms by which adherence influences quality of life.

Interestingly, there were no significant differences between adherence groups in terms of re-admission rate following primary treatment discharge. Specifically, patients who were not fully adherent to their continuing care plans were no more likely to be re-admitted to any residential level of care in the initial 12 months following discharge than patients who were fully adherent. One potential explanation for the observed null finding is the lack of variance between groups on this outcome in that very few patients were re-admitted, irrespective of level of adherence. In fact, only 21 of the 271 (7.7%) patients in the total study sample were re-admitted within 12 months, which is substantially lower than estimates reported in the extant literature (Dennis, Scott, & Funk, 2003; Peterson et al., 1994; Simpson, Joe, & Broome, 2002). Considering the frequency of telephone contacts that all patients received post-discharge (i.e., $M = 23.92$ calls, $SD = 0.99$) as a standard component of the protracted care plan management intervention, it is possible that patients at risk for re-admission were identified early and subsequently referred for more intensive outpatient services before residential treatment placement was indicated.

4.1. Limitations

There are a number of study limitations that require further comment. First, the current study used a convenience sample consisting of patients who were discharged from a single residential treatment program. Moreover, the context of the present investigation was an evaluation of a protracted telephone-based care plan management intervention in which all patients received regular telephone contacts for 12 months post-discharge. As such, findings may not generalize to all patients discharged from residential treatment given the disparate practices and treatment philosophies that often accompany different programs. Second, the sample was predominately White (92.3%) and over two-thirds of the total sample funded their own treatment (i.e., were self-pay), which represents another potential limitation pertaining to the generalizability of the findings for other settings. The overrepresentation of White patients in the current sample is particularly salient

considering that recent national data suggest that approximately one-third (38%) of national SUD treatment admissions are a member of a racial/ethnic minority group (Substance Abuse and Mental Health Services Administration, 2016). Third, the quality of life measure used in the current study was based on patients' self-report to a single item. The use of an established, psychometrically sound quality of life measure may yield a more valid and informative estimate of perceived quality of life in a number of additional relevant domains (psychological, medical, occupational, etc.). Fourth, the study sample was comprised primarily of patients who had successfully completed residential treatment, which may be indicative of higher levels of motivation and readiness to change, and may not be representative of all patients. Further research is warranted to determine if continuing care plan adherence predicts long-term outcomes among patients who are prematurely discharged from residential care.

The breadth of clinical and demographic data included in the data set used for the current study represents another limitation. Several clinical factors known to impact post-treatment functioning, including ancillary services data, patient satisfaction, as well as extent of prior substance use and treatment admissions history data (Brewer, Catalano, Haggerty, Gainey, & Fleming, 1998; Kedia & Williams, 2003; Simpson, Joe, Fletcher, Hubbard, & Anglin, 1999; Zhang, Gerstein, & Friedmann, 2008), were not included. Moreover, motivation and readiness to change, as well as perceived self-efficacy are important individual difference factors to consider in future work given their influence on adherence and various substance use outcomes (Bandura, 1999; DiClemente, Schlundt, & Gemmell, 2004; Nosyk, Geller, et al., 2010; Warren, Stein, & Grella, 2007). Additionally, closer examination of the role of other relevant factors/barriers likely to impact patient adherence (e.g., employment, transportation, child care) is warranted and requires further investigation. Another limitation involves the classification system used for SUD diagnostic determinations in the current study. That is, all SUD diagnoses were assigned in accordance with the previous version of the diagnostic criteria (i.e., DSM-IV). However, considering that a growing body of work indicates that substance dependence per the DSM-IV is highly concordant with severe SUD per the DSM-5 (APA, 2013) for a number of substance classes (Kopak, Metze, & Hoffmann, 2014; Kopak, Proctor, & Hoffmann, 2012; Proctor, Kopak, & Hoffmann, 2012; Proctor, Kopak, & Hoffmann, 2014), it is likely that the observed findings will generalize to patients with a DSM-5 severe SUD. In addition, the master's level telehealth specialists who contacted all patients post-discharge were responsible for collecting both adherence data as well as outcomes data. As such, there may have been a potential bias present due to such a procedure. Finally, although collateral verification of self-report data and the use of urine toxicology data represent an obvious strength of the current study, due to the inherent limitations associated with archival data, it was not possible to determine concordance rates on study outcomes between patient self-report data and data from collateral informants or toxicology screenings.

5. Conclusions

The current study contributes to the extant knowledge base regarding the relationship between continuing care treatment adherence and outcome, and included a number of strengths. Perhaps most importantly, findings were derived from a naturalistic treatment population in which patients had a considerable degree of control over their treatment. Additional strengths included the use of a robust measure of adherence, urinalysis drug screen findings and/or collateral report to substantiate patient self-reported outcomes, as well as a relatively long follow-up interval (i.e., 12 months post-discharge). If patients and providers aspire to positive long-term outcomes post-discharge, adherence to multi-component continuing care plans appears to be a requisite—a notion supported by the current study's observed findings.

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