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A Two Year Longitudinal Outcome Study of Addicted Health Care Professionals: An Investigation of the Role of Personality Variables

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Abstract: The co-morbidity of personality disorders (PDs) and other dysregulatory personality patterns with addiction have been well-established, although few studies have examined this interplay on long-term sobriety outcome. In addition, health care professionals suffering from addiction have both a significant public health impact and a unique set of treatment and recovery challenges. The aim of this study was to investigate if personality variables differentiated sobriety outcome in this population over a two year interval. A clinical sample of health care professionals participated in a substance abuse hospital treatment program individually tailored with respect to personality. Participants took the Temperament and Character Inventory and the Millon Clinical Multiaxial Inventory at intake, and were tracked two years post-discharge to determine sobriety status. Univariate analyses showed antisocial personality, female gender, and alcohol dependence were independent predictors of relapse, however a significant relationship between personality and substance use did not exist in multivariate analysis when controlling for demographic variables. The lack of multivariate relationships demonstrates the heterogeneity in self-report measures of personality, which suggests the interplay of personality and addiction is complex and individualized.

Keywords: addiction, tailored treatment, personality disorders, health professionals, MCMI, TCI

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Addiction and Personality Disorder Co-Morbidity

The prevalence of substance abuse disorders in the United States is a significant public health problem. The lifetime prevalence of drug use disorders has been reported to be 10.3%, with a higher odds ratio for men than women.¹ Estimates for lifetime alcohol dependence are also disparate by gender with the rate for men being approximately 17% and that for women being 8%.² Results from the National Epidemiologic Survey on Alcohol and Related Conditions also found a 5.6 odds ratio for comorbid alcohol and drug use disorders when adjusted for both demographic variables and other psychiatric conditions.¹ Interestingly, this same epidemiologic study found individuals with any drug use disorder were 2.2 times more likely to have a comorbid personality disorder (PD) when adjusted for demographic variables and other psychiatric conditions.¹ Prior research has also found PDs are more than twice as prevalent among individuals with alcohol use disorders than in the general population.³ Further, the rates of specific comorbid PDs with addiction has also been varied, although multiple studies have identified the Cluster B PDs, specifically Antisocial and Borderline Personality Disorders, as most prevalent across various types of substance abusers.⁴⁻⁶ As such, treatment for such individuals is not without considerable difficulty; the presence of a comorbid PD has been associated with failure to complete treatment as well as poorer treatment outcomes and a higher propensity for relapse.⁶⁻⁹ The study of PDs and other dysregulatory personality patterns with addiction has thus become the subject of recent research interest and the high prevalence rates suggest an increased need for understanding possible predictors of substance abuse as well as researched treatment outcomes that include longevity specific to the treatment population. Characteristics unique to PDs highlight the need to guide and tailor addictions treatment in order to best meet individual needs.

Common personality profiles in addictions

The Temperament and Character Inventory (TCI),¹⁰ has been used to describe typologies in terms of both biologically driven aspects of personality (Temperament) as well as behavioral and experience-driven components (Character). The developer of the TCI, Robert Cloninger, posits that biologically

influenced temperament traits have a central role in addictions, which is consistent with the disease model of addiction.¹¹ His tridimensional theory of alcohol abuse postulates alcohol abuse is related to high novelty seeking (NS), low harm avoidance (HA), and low reward dependence (RD), which has received support in the literature.^{12,13} NS is described as a tendency to seek out new and exciting experiences, which has been linked to the construct of sensation-seeking.¹⁴ Such a temperament has been linked as a factor that both increases risk for substance abuse and other risk-taking behaviors, and such sensation seeking has been consistently associated with substance abuse in a number of populations.¹⁵ The literature also supports NS most consistently as a predictor of alcohol misuse across both setting and population.¹⁶⁻¹⁹ HA is a construct associated with anxiety, with low levels being indicative of fearlessness and higher levels being indicative of anxiety and distress.¹¹ RD reflects the degree to which an individual is dependent on others (high RD), or can function autonomously (low RD). Cloninger further asserts that individuals with the high NS, low HA, and low RD typology consume alcohol for the enjoyment of disinhibition, which additionally increases the likelihood of engaging in antisocial behaviors.²⁰

Applications of Cloninger's theory have more recently been extended to drugs other than alcohol. In a nonclinical sample of university students, alcohol and drug users scored significantly higher on NS relative to non-substance users.²¹ Additionally, this study used TCI scores to generate a measure of antisocial personality using high NS, low HA, and low RD, and found antisocial personality to be positively related to the social deviance (legal vs. illegal status) of substances used as well as the quantity consumed.²¹ Similar to these findings that NS increases with the degree of social deviance of the substance, research using a community sample found NS to be higher among heroin users than alcohol users.²² While there have been disparate findings regarding personality typologies of substance abusers, there is converging evidence to support that high NS is related to substance abuse regardless of drug of choice.

One possible confounding variable identified for differences in TCI personality profiles is education level. In a more recent investigation,²³ a stratified random sample of 917 adults was obtained to ascertain



normative data on the temperament and character scales by demographic strata, one of which being education level. The levels of education in this study were broken down as follows: no high school diploma, high school diploma only, some post-high school education but no degree obtained, college degree, and graduate degree or higher. Given the availability of these norms, a further examination of the interplay between personality and addiction can be conducted comparing a clinical sample of individuals with the non-addicted community sample holding education level constant. By holding education level constant in such a comparison, the potential unique contribution of addiction on personality can be better identified, and treatment recommendations can be appropriately tailored to the population.

Addiction and the health care professional

One well-identified population of individuals with a relatively homogenous high education level is that of health care professionals. Further, while the population of addicted health care professionals has received attention in the clinical literature,²⁴ there is a paucity of empirical research that examines the interplay of personality variables with the clinical treatment for addiction in this population and the subsequent impact on post-discharge outcome. With the role of health care professionals in maintaining public health, it is critically important to understand potential underlying factors of addiction, such as personality, that may predict both substance abuse and treatment outcome.

It is estimated that at some point during their career, 10%–15% of all health care professionals will misuse drugs or alcohol.²⁵ This estimate implicates a serious public health impact due to the responsibility of health care professionals to care for the health and well-being of the general population. Research has also indicated the rate of addiction for physicians is near to or higher than the rate of addiction in the general population.²⁶ In order to estimate the prevalence of substance abuse among physicians, 5,426 randomly selected physicians were surveyed from the American Medical Association. Nearly 8% of physicians who participated in the study reported substance abuse or dependence at some point in their lives, and the majority also reported receiving treatment.²⁷ In another survey study, dentists, physicians and the general population were compared for prevalence

data and substance abuse rates.²⁸ Lifetime use of drugs reported by dentists and physicians exceeded the general population for people aged 50–54 years.²⁸ Given the prevalence of addiction in this population and its importance to maintaining public health and safety, attention to treatment and outcome is critical.

As such, health care professionals with addiction face unique challenges in treatment. Treating health care professionals with substance abuse disorders is not only challenging, but requires a multidisciplinary team with experience working with addiction in this population, as the degree of resistance to treatment may be great. Further, the intellect and education level inherent to this population has been associated with exceptional rationalization and denial, which can further perpetuate treatment difficulties.^{25,26} Many may also face losing a medical license, and thus admission to treatment may not be completely voluntary. A five year review of medical records in the United States was conducted to evaluate the overall effectiveness of physician's health programs in treating physicians with substance abuse disorders.²⁹ Of the 515 physicians who completed their contracted period of health programs, there were 159 documented incidents of substance abuse, 10 of which were while actively practicing medicine. A five year follow-up concluded that 95% of physicians who completed their respective program and 82% of whom had extended contracts in the program still had their licenses, whereas only 21% of physicians who did not complete the program retained their licenses.²⁹ Other studies have also suggested health care professionals may have better abstinence outcomes than the general addicted population if properly treated and monitored.²⁴ In a longitudinal, 7-year investigation of 278 professionals who completed an addiction program with particular attention on challenges inherent to their profession, only 15% relapsed; of 101 physicians, 17.8% relapsed.²⁴ These findings point to the capability of returning addicted medical professionals to work, yet also highlight the need for actively addressing unique challenges inherent to their field. It is therefore necessary to gain an understanding of treatment modalities for addicted health care professionals in order to maintain both their well-being and that of the general population.

In addition to understanding the unique considerations inherent to treatment of the health care professional, investigating risk factors in relation to relapse



rates is essential. Unfortunately, research in this area is lacking. In one study, Domino and colleagues³⁰ investigated opioid use versus alcohol and non-opioids as a risk factor for relapse in health care professionals. Of the 292 participants, one fourth of the total sample relapsed at least once, and 58% of relapses happened within the first two years of monitoring. Family history of substance abuse and dual diagnosis also nearly doubled the risk of relapse. Specific Axis I and Axis II diagnoses were not listed for dual diagnoses in this study, although it was noted that 93% of dual diagnoses were on Axis I.³⁰ This study further illuminates the need for treatment outcome and longevity research for health care professionals, particularly in regards to specific dual diagnoses of personality dysregulation on Axis II.

Aims of the present study

Although there is a substantial amount of research on addiction with both personality patterns and disorders as well as among the population of health care professionals, there is a paucity of research that examines the interplay of personality and addiction in this population. The present study aims to narrow the deficit in the extant literature by integrating personality and addiction factors with two-year treatment outcomes for health care professionals, for which longitudinal data is lacking. Personality variables that may be predictors of sobriety outcome at the two-year follow-up interval will also be examined for prevalence and also to investigate potential differences in treatment needs from that of the general population.

Methods

Institutional Review Board approval of this study # 2010–11 was obtained from St. Joseph Hospital prior to its initiation. All investigators completed human subjects training through the National Institutes of Health and certificates were on file.

Participants

A clinical sample of participants ($N = 116$) were patients at an intensive substance abuse hospital day-treatment program with associated supervised independent living. All participants were health care professionals referred to treatment by their respective Professional Board of Regulation, wherein successful completion and adherence to treatment program

recommendations was a requirement to keep their professional license. 68.1% of participants were male ($n = 79$) and 31.9% were female ($n = 37$). Inclusion criteria for admission required medical stabilization, an active diagnosis as alcohol or other substance dependent, and occupation as a health care professional. The breakdown of profession in the sample is as follows: doctors ($n = 56$), nurses ($n = 28$), pharmacists ($n = 21$), dentists ($n = 8$), medical student ($n = 1$), optometrist ($n = 1$), and physician's assistant ($n = 1$). The mean age of the sample was 43.5 years, $SD = 9.42$, and had a range from 22–77. There was no significant difference in age across gender (males ($M = 45.1$), female ($M = 40.1$), $P > 0.05$).

Procedure

To be included in the study, program patients had to meet DSM-IV criteria for a clinical diagnosis of chemical dependency as well as provide informed consent to review de-identified clinical charts and testing materials. All 116 participants who were eligible for inclusion completed the professionals' treatment program. The program is an abstinence-based, 12-step oriented boarded partial setting with a therapeutic community comprised of licensed healthcare professionals. The program ranged from 6–8 weeks in duration, which was largely determined based on recommendations made by the patient's individual Professional Board of Regulation for the maintenance of their health care licensure. These recommendations were supplemented by those of the clinical treatment team with regard to patient personality and individual need. The program structure complements the therapeutic community living environment, with a community check-in each morning followed by guided meditation and a three-hour group therapy session with a licensed addictions treatment clinician. Afternoons consist of psycho-education on topics related to chemical dependency, recovery, 12-step programs, the neurobiology of addiction, coping skills, emotion regulation strategies, the disease concept of addiction, and the impact of personality variables with respect to ongoing maintenance of sobriety and recovery. A board certified physician in addiction psychiatry provided ongoing medical management of all patients.

Within one week of admission, participants completed both the TCI-R and the MCMI-III self-report instruments, which are both components in routine



clinical assessment and treatment at the program. Upon completion of both testing instruments, each patient received a 60 minute individual feedback session to go over their testing results and to identify personality patterns that may contribute to chemical dependency. Patients then met individually on a weekly basis thereafter to discuss the impact of their individual personality profile on components of their addiction (eg, craving and motivations for use) and recovery strategies. Assessment findings were presented to the rest of the clinical team so as to inform treatment needs and duration. In cases wherein criteria for a PD were met, the clinical team recommended an extended stay, averaging two additional weeks. In conjunction with personality assessment, patients participated in a 90-minute weekly group workshop facilitated by the program medical director. The aims of the workshop were to openly discuss the patients' influence of personality on their addiction so as to gain feedback and insight from the therapeutic community as well as to allow insight of individual personality variables to emphasize or de-emphasize aspects of the program, thereby tailoring the program with respect to personality. All program components were equivalent in intensity and frequency for all patients, the only difference being the tailoring of individual sessions with respect to patients' personality.

Upon primary treatment completion, all patients were required to attend a weekly After-Care program for a period of two years. The After-Care program consists of a 90 minute, professionally facilitated weekly post-discharge and Caduceus group for health professionals to monitor ongoing progress and provide a forum to discuss professional issues related to addictions. The program also mandates adjunctive random urine monitoring through an automated system that requires patients to check in daily. Two-year sobriety status was obtained through self-disclosure at After-Care program follow-up, as well as through reports by post-discharge treatment coordinators. Status was biologically confirmed through urine monitoring. Participants were then classified as either relapsed or sober at the end of the two year interval. All data was kept strictly confidential and de-identified by respective clinicians before being transferred to the researcher for data entry. A unique participant identification number was assigned to each participant

for matching individual self-report measures and follow-up variables for analyses.

Measures

Millon Clinical Multiaxial Inventory (MCMI)³¹

The Millon Clinical Multiaxial Inventory-III (MCMI-III) is a 175 item self-report questionnaire comprised of true-false items designed to measure personality traits. It is widely used in the assessment of chemical dependency, is easy to administer, and can be completed relatively quickly (less than 30 minutes). The measure yields fourteen PD scales (Axis II), ten Axis I clinical syndrome scales (including drug and alcohol dependence), as well as Disclosure, Desirability and Debasement correction scales. Raw scores are adjusted to base rate scores for analyses. A base rate score of 85 or higher is indicated in the manual as conservatively indicative of a clinical PD and is the base rate score used to detect PDs in this study. The reliability of the MCMI-III has been found acceptable in substance abusers.³² Reliability and validity studies indicate it is a well-constructed psychometric instrument. Measures of internal consistency are strong, with alpha coefficients exceeding 0.80 for 20 of the 26 scales, and ranging from 0.66 to 0.90. The MCMI-III manual reports that over a 5- to 14-day interval, test-retest reliability has a median of 0.91, ranging from 0.82 to 0.96. More than 20 factor-analytic studies have been performed on the measure, which have supported the keying of its items and organization of scales. Correlations with other clinical measures have all yielded findings in expected directions and are reported in detail in the MCMI-III manual.³¹

Temperament and Character Inventory-Revised (TCI-R)¹⁰

The Temperament and Character Inventory-Revised (TCI-R) is a 240 item self-report questionnaire consisting of 5-point Likert scale items. The measure yields four temperament dimensions, postulated to be indicative of relatively fixed emotional drives which guide one's automatic responses to experiences. The four dimensions include: Novelty Seeking (NS), Harm Avoidance (HA), Reward Dependence (RD) and Persistence (P). Three dimensions of character are also obtained, which may change over time in response to one's actions and collective experiences. These dimensions include: Self-Directedness (SD),



Cooperativeness (CO) and Self-Transcendence (ST). Reliability for the TCI-R is generally high. Chronbach alphas for the temperament scales of NS, HA, RD and P are 0.78, 0.87, 0.76, and 0.65 respectively. Chronbach alphas for the character scales of SD, CO and ST are 0.86, 0.89, and 0.84 respectively.¹⁰ Convergent validity between the TCI-R and the MCMI has been established, wherein the seven dimensions of the TCI accounted for most of the variance in MCMI measures of both Axis I and Axis II disorders.³³

Post-treatment sobriety outcome

Post-treatment sobriety outcome was measured by tracking the relapse behavior of participants through the two year period following discharge. Participants were followed with random urine-monitoring at an average of twice a month during this interval, and also participated in a weekly After-Care group to discuss their sobriety status. Classification was made into one of two groups: (1) remained sober or completely abstinent with no positive urine toxicologies; or (2) relapsed to substance use based on positive urine toxicologies and corroborating follow-up reports by post-discharge treatment coordinators.

Results

All data entry and statistical analyses were computed using the Statistical Package for the Social Sciences (SPSS) version 18.0 for Windows.

The overall two-year sobriety outcome was determined categorically as either relapsed or sober at the end of the follow-up interval through weekly check-ins with after care coordinators and confirmed through random urine monitoring. At the end of the two-year interval, 85 of the 116 health care professionals (73.3%) had maintained complete abstinence from all addictive substances.

The prevalence of PDs in the sample was calculated using the MCMI-III base rate scale ≥ 85 for each of the PD scales. Of the total sample, 35.3% (41) of participants scored in the clinical range. Of those participants with a detectable PD on the MCMI-III, 24.4% (10 of the 41) met criteria for more than one PD. To determine if the presence of any PD differentially affected sobriety outcome status at the end of the two-year follow-up interval, a 2×2 Pearson's Chi Square analysis was conducted using the presence of

any PD on one dimension (no vs. yes) and outcome status (sober vs. relapsed) on the other. No significant association was found between having any PD and outcome status; $\chi^2 (1) = 0.210, P = 0.666$. The analysis was repeated to determine if meeting criteria for more than one PD differentially affected outcome sobriety status, and again no significant association was found; $\chi^2 (1) = 0.600, P = 0.726$.

Sample means of each of the MCMI-III and the TCI-R scales were calculated and are presented in Tables 1 and 2 with respect to two-year sobriety outcome group. Significant differences between outcome groups are noted at the $P < 0.05$ level. To determine if personality variables were predictive of longitudinal sobriety, the data were analyzed in two steps. First, univariate comparisons were made between sobriety outcome groups and categorical demographic variables using Pearson's Chi Square tests, and between sobriety outcome groups and personality variables using independent sample *t*-tests. Gender was significantly associated with outcome. Of the 79 males, 16 relapsed, whereas of the 37 females, 15 had relapsed. The Pearson Chi Square analysis thus showed that women were more likely than men to have relapsed at the end of a two-year follow-up interval; $\chi^2 (1) = 5.296, P < 0.05$. Alcohol dependence as assessed by the MCMI-III was significantly associated with outcome. The Levene's test for equality of variance first showed that equal variances were not assumed; $F (114) = 5.447, P = 0.021$. The independent sample *t*-test revealed a significant mean difference between groups of 10.84, where the mean for the sober group was 58.29, $SD = 29.80$, and

Table 1. TCI-R scale means for sober and relapsed outcome groups within the sample.

TCI-R scales	Sober (N = 85)		Relapsed (N = 31)	
	M	SD	M	SD
Novelty seeking	102.39	16.05	102.90	10.63
Harm avoidance	99.25	17.47	101.52	19.87
Reward dependence	102.88	16.05	104.90	12.64
Persistence	122.00	20.11	123.26	16.60
Self directedness	146.18	20.30	145.06	17.91
Cooperativeness	146.74	18.14	145.87	12.73
Self-transcendence	75.23	16.51	74.97	16.43

Notes: Table 1 depicts the sample means for each of the TCI-R scales separated by sobriety outcome status (sober vs. relapsed) at the end of a two-year follow-up interval. No between group differences were found with regard to TCI-R scales and personality.

**Table 2.** MCMI-III scale means for sober and relapsed outcome groups within the sample.

MCMI-III scales	Sober (N = 84)		Relapsed (N = 31)	
	M	SD	M	SD
Paranoid	28.24	25.83	23.61	25.23
Schizoid	52.82	27.32	51.29	28.74
Schizotypal	27.12	27.23	25.48	25.67
Antisocial**	48.61	25.56	58.48	20.38
Borderline	35.10	25.82	36.84	21.63
Histrionic	46.86	22.26	46.90	21.91
Narcissistic	54.69	16.29	52.94	18.33
Avoidant	44.65	30.70	45.55	29.98
Dependent	48.61	27.80	49.52	29.70
Compulsive	55.57	16.62	55.52	14.86
Depressive	50.57	31.37	50.55	31.92
Negativistic	31.02	24.62	28.61	23.05
Aggressive	41.12	21.61	43.39	18.76
Masochistic	44.54	31.76	48.19	32.94
Anxiety disorder	49.82	32.91	44.58	35.33
Somatoform disorder	37.62	30.70	38.65	28.00
Bipolar mania	27.29	23.15	28.97	23.16
Dysthymic	49.02	32.23	46.32	32.22
Alcohol dependence**	58.29	29.80	69.13	24.24
Drug dependence	57.43	22.85	61.68	25.02
Post traumatic stress disorder	33.96	27.74	33.94	28.31
Thought disorder	36.45	27.31	25.90	25.76
Major depressive disorder	38.93	32.37	38.83	29.77
Delusional disorder	14.53	20.29	10.07	17.35

Notes: Table 2 depicts the sample means and standard deviations for each of the MCMI-III clinical syndrome scales separated into two-year follow-up outcome status group: Sober = 84, Relapsed = 31. **Scales with significant between group differences are flagged as being significant at the $P < 0.05$ level.

the mean for the relapsed group was 69.13, $SD = 24.24$; $t(65.44) = -1.996$, $P = 0.050$. Thus, greater scores on the MCMI-III scale for alcohol dependence were negatively associated with having maintained sobriety at follow-up and were independently predictive of relapse group membership. Antisocial PD assessed on the MCMI-III was also significantly associated with outcome group membership. As with Alcohol dependence, equal variances were not assumed with the Levene's test; $F(114) = 7.089$, $P = 0.009$. The independent sample t -test revealed a significant mean differences of 9.88, where the mean for the relapsed group was 58.48, $SD = 20.38$, which was higher than the mean for the sober group ($M = 48.61$, $SD = 25.56$); $t(66.80) = -2.146$, $P = 0.035$. Thus, greater antisocial scores on the MCMI-III were associated with

relapse group membership at follow-up. No significance differences between groups was found for any of the other MCMI-III scales, nor for any of the TCI-R dimensions.

Second, binary logistic regression was used to identify the multivariate contribution of all explanatory variables that were significant in the univariate analyses, and sought to determine the contribution of each of the independent predictors of sobriety outcome while holding the effects of other predictors constant. The dependent variable in the regression model was the two-year sobriety outcome status (sober = 0, relapsed = 1). As independent variables, all the variables that were significant in the univariate analyses were included in the model. The following covariates were included in the model: gender (male = 0, female = 1), alcohol dependence score, and antisocial personality score. A test of the full model versus a model with the intercept only was significant: $\chi^2(3) = 9.042$, $P = 0.029$. The percent classification rate for the model was 73.9%, which was better than that predicted by the intercept alone. The Cox & Snell R square was 0.076, indicating the model accounted for about 8% of the total variance in longitudinal sobriety outcome. The Homer and Lemeshow Chi Square test was not significant, revealing that the data fit the model well; $\chi^2(8) = 9.603$, $P = 0.294$. Table 3 presents the variables in the binary logistic regression equation, their coefficients, standard error terms, the Wald Chi Square statistic, significance values, and the predicted odds of relapse. Although the full model is significant, the only individual predictor that was

Table 3. Binary logistic regression predicting sobriety outcome from gender, antisocial, and alcohol dependence.

Predictor	B	Standard error	Wald χ^2	P	Exp(B)
Gender	-0.969	0.464	4.365	0.037	0.380
Antisocial	0.006	0.012	0.223	0.637	1.006
Alcohol dependence	0.013	0.011	1.523	0.217	1.014
Constant	-1.545	0.729	4.494	0.034	0.213

Notes: Table 3 presents the regression coefficients, standard error terms, the Wald chi square tests of the unique contribution of each predictor holding the effects of the other predictors constant, the significance value, and the model predicted odds of relapse for the overall binary logistic regression model predicting sobriety outcome. Gender was coded in binary, with male as the reference code. The overall regression equation is thus: $\ln(\text{Odds}) = -1.545 + 0.013 \text{ Alcohol Dependence} + 0.006 \text{ Antisocial} - 0.969 \text{ Gender}$.



significant was gender. The Exp (B) for gender was 0.380, 95% CI [0.153, 0.942] using male gender as the reference term. Inverting this statistic for interpretation, the odds ratio for women to relapse is 2.63 times that for men. For antisocial and alcohol dependence scores, the odds of relapse did not increase significantly for every one point increase on the MCMI-III scale. Overall, the multivariate model is significant and predicts relapse better than an intercept only model. Gender is, however, the only significant predictor in the model when holding the effects of all other variables constant, and thus suggests heterogeneity among the factors that may influence relapse.

Finally, in an effort to better understand the interplay between addiction and personality, we compared the raw TCI-R mean scores of our sample of health care professionals with the TCI-R community sample mean scores, stratified by education level. As health care professionals represent a highly educated subset of the population, having normative data from a non-addiction sample of comparable education level enabled these comparisons. One sample *t*-tests were used to compare the addicted health care professional sample means with the community sample using the means for graduate degree level of education as the test values. Table 4 shows the raw score means for the present sample compared with the community sample of comparable education level. The sample of addicted health care professionals scored significantly higher on novelty seeking than the community sample ($t(115) = 4.034, P < 0.001$), on harm avoidance ($t(115) = 8.251, P < 0.001$), and on cooperativeness ($t(115) = 2.247, P = 0.027$). The addicted health care

professionals scored significantly lower on persistence than the community sample ($t(115) = -2.625, P = 0.010$), on self-directedness ($t(115) = -3.910, P < 0.001$), and on self-transcendence ($t(115) = -2.511, P = 0.013$). There was no difference between the two graduate sample educated groups on reward dependence ($P > 0.05$).

Discussion

This is the first study to date to integrate a range of health care professionals and multiple drugs of choice. This study provides 2-year longitudinal outcome data for health care professionals outside of a formal employer sponsored monitoring program and includes the heterogeneity of addiction in this population.

Univariate factors predictive of relapse in this sample were female gender, alcohol as drug of choice, and higher scores on personality inventories consistent with antisocial personality. These factors were more commonly found among those in the relapsed outcome group than the sober outcome group. These indicators, in conjunction with previous research, can be utilized to identify tools by which treatment providers can use to achieve best practice.

Gender

Finding gender as a predictor of relapse is an extension of prior findings among previous research. The current findings demonstrate a need to understand gender-related socialization roles that may interfere with relapse prevention. In general, research has indicated that women form identity through attachment

Table 4. Comparison of raw TCI-R sample means with community sample means of comparable education level.

	Health care professional sample mean	Community sample (graduate degree) mean	<i>t</i>	<i>P</i>	Mean difference	95% CI (mean difference)	
						Lower	Upper
TCI-R subscale							
Novelty seeking	102.53	97	4.03	<0.001	5.53	2.81	8.24
Harm avoidance	99.85	86	8.25	<0.001	13.85	10.53	17.18
Reward dependence	103.42	105	-1.12	0.266	-1.58	-4.37	1.22
Persistence	122.33	127	-2.63	0.010	-4.67	-8.20	-1.15
Self-directedness	145.88	153	-3.91	<0.001	-7.12	-10.73	-3.51
Cooperativeness	146.51	143	2.25	0.027	3.51	0.42	6.6
Self-transcendence	75.17	79	-2.51	0.013	-3.83	-6.85	-0.81

Notes: Table 4 shows the comparison of the present sample mean ($N = 116$) with Cloninger's community sample stratified by education level using one-sample *t*-tests. The education stratum selected for comparison was graduate degree or higher ($N = 131$).



and thus social support and networks are pertinent to satisfactory functioning.³⁴ Because of the emphasis on social networks for women, it is important to consider the difficulty of removing a network that is promoting substance use. Additionally, society offers a double standard that shames females' use of alcohol and drugs more than that of males.³⁴ The interplay of these variables may provide insight into the relapse rates for women in the current study.

Female physicians are a unique population that have reportedly less spousal and workplace support and higher utilization of psychotherapeutic support than their non-physician counterparts.^{35,36} Consequently female physicians have also been found more likely to be dependent upon alcohol and to use alcohol exclusively, which links the independent predictors of gender and drug of choice in the present findings.³⁶ Previous research suggests that women, compared to their male counterparts, are less likely to enter treatment for substance abuse.³⁷ This further supports the notion of the integral part of various systems that may impact the support for gaining treatment.

Gender appears to influence the treatment process, retention, completion, and outcome of substance abuse recovery programs.³⁸ More specifically, the rate of relapse has been varied between men and women substance users. It has been found that women's relapse is associated with psychosocial factors including stress from marriage, being apart from children, being depressed, and substance use within the context of romantic relationships.³⁸ Exposure to trauma, victimization, diagnoses of depression and anxiety, as well as intimate partner violence (IPV), have been linked to risk factors for substance use in women.^{39,40} Baseline characteristics differ between gender in that women's baseline variables have been linked to poorer relapse prevention, compared to male counterpart.⁴¹ Many of the abovementioned triggers to relapse are a result of gender-related norms,³⁴ which suggests a need for treatment tailored to provide a frame of reference for clinicians. This is especially pertinent as research has demonstrated that most treatment modalities for substance use have been standardized for male populations.³⁹

Substance use

Alcohol was the most prominent substance in relapse, although not significant in multivariate findings. As such, the workplace was generally spared the issue

of diversion of controlled substances, although job impairment remains a significant problem. Opiate dependence was not a factor associated with higher risk of relapse as previously indicated.³⁰ These divergent findings may be related to re-entry assessments and aids for opioid dependent health care professionals, including opiate antagonist medications and the transparency and careful monitoring in the workplace setting of those who diverted narcotics as part of their addiction presentation. Alcohol as the drug of choice most used in relapse also correlates with clinical observation that this is the substance most readily available and where home and/or social pressures for alcohol consumption are high. This would especially be a factor in a highly controlled workplace environment. The interpretation that alcohol is a predictive factor for relapse is not supported by this study's findings, merely a descriptive factor worth noting for relapse prevention efforts in community based settings.

Personality

Univariate analyses indicated a relationship between personality and alcohol use but this was not evident in multivariate analyses when controlling for other variables. This may be an indication that, when taken as a whole, other variables may be more prominent in predicting relapse. Thus, focusing on previous studies' implications of the relationship between personality and substance use can provide insight into the current results and suggestions for future research. In a previously published comparison of physicians between the 1980s and 1990s, it was noted that increases in psychiatric co-morbidity, including antisocial PDs, contributed to relapse.⁴² Impulsivity has consistently been found to be related to substance use and treatment failure, and is a main characteristic of antisocial PD (ASPD).⁶ Thus, individuals with ASPD that are functioning in a controlled work environment (such as health care) may seek substances for instant gratification that cannot otherwise be found. Further tailored treatment can promote variables that have been found to generate successful treatment in co-occurring diagnoses of substance abuse and antisocial PD. These include anticipating, being deliberate, and planned harm or manipulation.⁶ More research on the relationship between ASPD and addiction recovery is needed to examine associated factors that may be required for relapse prevention in this population.



In examining the TCI-R personality profiles of the sample with a comparable community sample controlling for education, some significant differences were found. Increased scores on novelty seeking and harm avoidance as well as decreased scores on persistence maybe explained by the underpinnings of addiction or addiction-prone individuals, which have been previously described. Higher scores on harm avoidance also reflect a more cautious dimension, given the professional group that could help with outcome and increase the likelihood of better treatment outcomes. That the sample population was comprised of health care professionals offers an explanation for the higher cooperativeness scores relative to the community sample, as membership to this professional group requires a certain degree of helpfulness, empathy, and compassion for others. Additionally, the lower relative scores on self-directedness and self-transcendence can be expected for those initiating addictions treatment and can be interpreted as a consequence of the addiction.

Giving patients access to their TCI-R results and professional guidance for understanding them allows for the robust participation of improving their temperament and character scores and making adaptations to facilitate the recovery process. Because patients have unique personality configurations and motives for use, using the TCI-R creates an opportunity to delve into the unique adaptive personality style of the individual, which is essential to the understanding of what drives the addiction and what encourages recovery.⁴³ This study's favorable longitudinal outcome provides preliminary support for the effectiveness of individualizing treatment recommendations and planning with respect to personality variables. Furthermore, doing so in collaboration with the patient allows for their greater control and personalization of the recovery process.

Clinical implications and future research

Interestingly, results investigating the interplay of gender, alcohol use, and personality types did not find significant multivariate differences across outcome groups, thus revealing the heterogeneity of personality among addicts and alcoholics, particularly those of such a high functioning population. It is essential to examine character and temperament traits that may exist predominately in the healthcare population in

order to tailor treatment to individuals within this population.

Brown and colleagues found that matching age, gender, substance abuse profile, and psychological status to aftercare treatment had significant impact on relapse and recovery rate.⁴⁴ Specifically, females with multi substance abuse profile who were matched with 12-step facilitation had better alcohol outcomes than counterparts in a structured relapse prevention program. This highlights the need to take into account specific client characteristics that may impact treatment for substance users. The current findings also suggest a need to tailor treatment to individual needs based on gender, substance abuse profile, and personality types within a healthcare population. It may require substance abuse recovery programs to tailor interventions to be more gender sensitive as well as to take into account the impact of Axis II diagnosis, specifically successful communication with antisocial personality disordered individuals.

Research has indicated that gender differences exist in initiation and maintenance of substance use.³⁸ As previously stated, research has shown that women relapse due to depression, marriage stressors, and being apart from children.³⁸ This suggests a need to tailor treatment and address various motivations behind substance use and maintenance. Examining the impact of treatment from a systemic perspective may be essential in relapse prevention for women. Recovery programs that do not involve relational work and support may be positioning clients for relapse. Addressing the difficulty of separation from one's child while at a recovery program and exploring relationship discord may help reduce the rate of relapse for women. One hypothesis for the current study finding that females had a higher rate of relapse may coincide with previous research in that female health professionals may spend more time away from their children and partners for work commitments.

Further research should address the efficacy of individualized treatment planning on long-term sobriety and quality of life. Additionally, further research on healthcare populations may be necessary in order to examine characteristics exclusive to the population that may increase risk for substance abuse relapse.



Limitations

The limitations in this study provide opportunities for improvement in subsequent research. It is possible that the relationship between personality and outcome could be moderated either by specific drug of choice, motivations for use, or specific Axis I or Axis II diagnoses or their co-morbidities. A much larger sample size would be needed to examine this possibility, particularly as the small percentage of patients who relapsed presents a challenge in having adequate statistical power to be confident of findings. Given the limiting nature of a small sample size, it is difficult to interpret the logistic regression results with enhanced confidence. If it is possible to obtain detailed information on the temporal nature of when relapses take place, future research endeavors should attempt to use survival curves to strengthen analytic capabilities. Finally, it could be useful to re-administer the TCI-R upon program completion to determine if addiction treatment received produces meaningful changes in the mutable character dimensions of personality that may better predict abstinence and sobriety outcome long-term.

It is critical that more outcome studies be conducted so as to better understand the risks for relapse, and to inform and improve treatment and continuing care strategies. Relapse indicators in particular can be useful clinical tools by which treatment providers of the addicted professional can characterize potential risks for relapse in this population. Doing so could also better identify patients that may need more specialized treatment planning.

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Author Contributions

Conceived and designed the experiments: DA. Analyzed the data: SB. Wrote the first draft of the manuscript: SB. Contributed to the writing of the manuscript:

DA, SB, JC. Agree with manuscript results and conclusions: DA, SB, JC. Jointly developed the structure and arguments for the paper: DA, SB, JC. Made critical revisions and approved final version: SB. All authors reviewed and approved of the final manuscript.

Competing Interests

Author(s) disclose no potential conflicts of interest.

Disclosures and Ethics

As a requirement of publication author(s) have provided to the publisher signed confirmation of compliance with legal and ethical obligations including but not limited to the following: authorship and contributorship, conflicts of interest, privacy and confidentiality and (where applicable) protection of human and animal research subjects. The authors have read and confirmed their agreement with the ICMJE authorship and conflict of interest criteria. The authors have also confirmed that this article is unique and not under consideration or published in any other publication, and that they have permission from rights holders to reproduce any copyrighted material. Any disclosures are made in this section. The external blind peer reviewers report no conflicts of interest.

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