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RESEARCH ARTICLE

Predicting Nurses' Views on Decriminalization of Psychedelics

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Abstract

Background: Despite being the largest sector of the health care workforce with potential to support advancing psychedelics in health care, nurses and their views toward psychedelics and changing legal restrictions remain mostly unknown.

Aims: To identify an optimal predictive model for nurses' support (or not) of decriminalization of psychedelics.

Methods: Secondary analysis of e-survey data from 1092 registered nurses and advanced practice registered nurses invited randomly from the Minnesota Board of Nursing registry. To develop an optimal predictive model, multinomial logistic regression with backward selection using the Akaike information criterion (AIC) was applied to the training set. The final model was fitted to the validation set for effect estimation, with performance assessed using multiclass area under the curve (AUC).

Results: Backward selection using AIC identified several key predictors of support for decriminalization of psychedelics in Minnesota: age, gender identity, specific spiritual orientation, awareness of Colorado's psychedelic decriminalization, and scores from the Attitudes and Perceptions Questionnaire legal and effects subscales. The final model demonstrated excellent discriminative ability with a multiclass AUC of 0.870 (95% confidence interval [CI]: 0.847–0.898). Pairwise comparisons revealed outstanding discrimination between supporters and opponents of decriminalization (AUC = 0.973, 95% CI: 0.952–0.987).

Conclusion: Age (younger/older), (awareness/lack of awareness) of Colorado's decriminalization laws, and attitudes (concerns/lack of concerns) toward effects and legal status of psychedelics predicted a nurse's (more/less positive) attitude toward psychedelics. This model offers an informative starting point for understanding nurses' and, by proxy, the communities in which they live and work and provides initial direction toward tailoring curricular and professional development resources on psychedelics for nurses across the United States.

Keywords: psychedelics, mental health, nursing, health care, policy

Introduction

With 29 million nurses worldwide,[1] including nearly six million registered nurses (RNs) in the United States (U.S.),[2] and at least 360,000 advanced practice registered nurses (APRNs) including over 39,000 psychiatric-mental health APRNs in the U.S.,[3–5] there is unrealized potential for the nursing workforce to support translating psychedelic science into practice. Mental health conditions continue to feature prominently in the health and well-being of Americans and in the landscape of the U.S. health care system. Currently, in the United States, one in five adults, or roughly 60 million Americans, have a

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diagnosable mental illness.[6] Those Americans with treatment-resistant depression, which accounts for nearly a third (30.9%) of those seeking medication management for major depressive disorders, represent particularly significant and outsized impacts on health care costs, productivity, disability, and unemployment.[7] Post-traumatic stress disorder (PTSD) is another common mental health condition with often debilitating impacts, which currently impacts 6.8% of Americans over the course of their lives; notably, 36.6% of those with PTSD experience ongoing and unresolved severe impairment in their functioning.[8] These societal and health care impacts require effective treatments and are critical drivers of finding those treatments, including psychedelics and psychedelic-assisted therapy (PAT). PAT is characterized by professionally guided preparatory and integrative sessions surrounding a psychedelic delivery session.[9]

Penn et al.[10] describe clearly how PAT is the primary accepted modality for using psychedelics in our existing health care system and is a process well within the scope of practice for APRNs such as psychiatric-mental health nurse practitioners (PMHNPs). Penn et al.[10] outline the requisite pathways for ensuring knowledge, competence, and skills in this nursing subspecialty and have begun to do so with intentionality in their current nursing curricula.[11] Anecdotally, there is evidence for some nursing programs incorporating educational content about psychedelic medicines and therapeutic modalities into their courses, particularly those programs preparing PMHNPs.[12] However, in reality, the current nursing workforce is generally lacking the requisite knowledge and skills to confidently support patients or communities seeking psychedelic-centric education, care, or support.[13,14]

So while there is a large and available nursing workforce, and while psychedelic and PAT-related knowledge, skills, and competencies are well within the scope of practice for RNs and APRNs, without intentional curriculum enhancement, and professional development opportunities for practicing nurses, the field will persist with a largely untapped and underutilized nursing workforce with respect to supporting safe and well-informed use of psychedelics. In making the case for the value of the nursing workforce to advancing translation of psychedelic science into practice, the potential value of nurses in this emerging field should not be overlooked, recognizing their critical roles "*sitting*" with patients for extended periods of time, taking extensive trauma-informed histories including reviewing medications, providing education/teaching and therapeutic behavioral interventions, managing physical and mental health conditions and crises, leading care coordination for multidisciplinary teams, providing post-intervention care and support, and so on. Nurses are arguably some of the most versatile and well-equipped health care professionals working in diverse settings in every U.S. city, community, county, and state. They are often the ones individuals will disclose incredibly personal health concerns, behaviors, and questions to and, as such, are a part of the workforce that must be equipped with psychedelic science, knowledge, and supportive skills.

Although illegal at the federal level since the Controlled Substances Act of 1970, laws governing psychedelics are rapidly evolving at the state and city levels. Following the FDA's "breakthrough designation" for psilocybin and 3,4-methylenedioxy-methamphetamine (MDMA) in 2018, more than 25 states have considered psychedelic reform bills.[15] Cities such as Oakland, Cambridge, Detroit, and Washington have decriminalized possession of some psychedelics. Likewise, there has been state-level decriminalization in Oregon and Colorado, where supervised use is also legal. However, there continues to be an active debate among researchers, policymakers, health care providers, advocates, and the public about how to best move forward, balancing concerns about the potential for harm with increased access to psychedelics, with the need to ensure access for those who might benefit from them. Some favor decriminalization, which "remov[es] criminal sanctions against an act, article, or behavior."[16] With decriminalization, psychedelics would remain illegal, but people would not face criminal prosecution for possession, although, depending on how the laws are written, they could be fined or required to attend drug treatment. Critics argue that decriminalizing psychedelics would not establish safety regulations and thus could be ineffective in preventing misuse or other kinds of harm. Legalization, on the contrary, establishes a regulatory framework for production, distribution, and use, similar to alcohol and tobacco. This might promote safe or safer access to psychedelics, but concerns exist around increased potential for misuse and abuse.[17] What is not known are the opinions about possible regulatory changes of nurses. Thus, as part of a larger study on the knowledge and opinions of nurses toward the therapeutic use of psychedelics,[13,14] this study sought to examine predictors of the opinions of nurses and advanced practice nurses toward decriminalization.

Methods

After this study was determined to be exempt and approved by the University of Minnesota Institutional Review Board (IRB # STUDY00017187), contact information for potential participants, including both RNs and APRNs, was obtained through the state Board of Nursing registry. Twenty percent of all active licensed RNs, 100% of PMHNPs (a subset of APRNs), and 50% of other APRNs were randomly selected to participate in the exploratory, cross-sectional online survey. Of 11,778

email survey invitations sent between February and April 2023, 1133 surveys were completed.

The survey contained 91 items assessing knowledge, attitudes, and beliefs regarding psychedelics. Some items were designed using existing surveys, including the Attitudes on Psychedelics Questionnaire (APQ) (theoretical score range 20–100). The APQ contains four five-item subscales, *Legal Use of Psychedelics*, *Effects of Psychedelics*, *Risk Assessment of Psychedelics*, and *Openness to Psychedelics*, each using five-point Likert scale response ("Strongly Disagree" [1] to "Strongly Agree" [5]). The survey also included an assessment of participants' awareness of decriminalization in Colorado ("Yes," "No"), support for similar decriminalization in Minnesota ("Yes," "No," "Unsure"), and a comment box to further elaborate on their decriminalization response. Sociodemographic information was also collected. Descriptive findings are summarized and discussed elsewhere in Porta et al.[14] and Graefe et al.[13]

Statistical methodology

The analytical sample consisted of nurses in Minnesota who responded to the parent study survey item on psychedelics decriminalization, identified as "Male" or "Female," and held either an "RN" or "APRN" license.[14] Other gender identities (e.g., non-binary, transgender) and license types were excluded due to low frequencies and the impracticality of combining them for meaningful statistical analysis.

A multinomial logistic regression model was developed to predict nurses' views on psychedelics decriminalization, with "Yes" as the reference category.[18] The dataset was randomly split into equal training and validation sets (50% each). Variable selection was performed on the training set using backward selection with the Akaike information criterion (AIC). To mitigate selection bias and ensure valid post-selection inference, model estimation and inference were performed on the validation set.[19,20]

A set of candidate variables from the survey was initially included in the model, including demographic characteristics (age, gender identity, spirituality), socioeconomic factors (income), professional attributes (APRN/RN, medication prescription privileges, patient care involvement, research participation), geographical factors (population type of home and work ZIP codes), awareness of psychedelic decriminalization in Colorado, and scores from the APQ, which includes subscales on Legal Use of Psychedelics, Effects of Psychedelics, Risk Assessment of Psychedelics, and Openness to Psychedelics. Other variables from the survey were excluded due to sparse response frequencies and unfeasible category combinations. Only complete cases for these selected candidate variables were included in the analysis.

The final model was then applied to the validation set to estimate coefficients and confidence intervals (CIs). Model performance was assessed using 10-fold cross-validation,[21] with the multiclass area under the receiver operating characteristic (ROC) curve (AUC) computed for the validation set.[22]

Model diagnostics included the Hosmer–Lemeshow test, variance inflation factor, and analyses of Pearson residuals and calibration plots. To assess the potential impact of missing data and the representativeness of the analytical sample (i.e., Male and Female nurses holding an RN or APRN license), demographic and professional characteristics of included and excluded participants were compared using *t*-tests for continuous variables and chi-squared or Fisher's exact tests for categorical variables, as appropriate. All data analyses were conducted using R software (version 4.3.1). Statistical significance was determined using $\alpha = 0.05$ and two-tailed tests.

Results

Overview of included and excluded participants

Of the 1133 participants sampled, 1092 (96.4%) completed the survey item on psychedelics decriminalization. The analytical sample comprised 980 participants (89.7%) who met the inclusion criteria (Male/Female gender identity and RN/APRN licensure), while 112 (10.3%) were excluded due to non-RN/APRN licensure, non-binary gender identities, or incomplete data.

Table 1 presents the characteristics of the included participants, with 45.5% supporting psychedelics decriminalization, 19.7% opposing it, and 34.8% unsure. The mean age of included participants was 47.1 years (SD = 13.53), and 65.7% reported having a specific spirituality. For this analysis, we dichotomized respondents into endorsing a spirituality or not; refer to our previous publications for types of spirituality reported in the parent study, as well as reported race/ethnicity.[13,14] Our Minnesota nurse respondents were demographically similar to the state nursing distribution of race/ethnicity, which was also somewhat similar to the national nursing distribution for RNs and APRNs, namely, 80%+ White. Regarding professional attributes, 23.4% had medication prescription privileges, and 57.3% were actively seeing patients. Additionally, 34.7% of the included sample reported awareness of Colorado's psychedelics decriminalization policy.

The comparison between included and excluded participants revealed similar distributions in support for decriminalization, age, spirituality, income, professional attributes (prescription privileges, patient care involvement, research participation), and attitudes toward psychedelics as expressed on the APQ scale. Significant

Table 1. Characteristics of Included and Excluded Participant[a]

	Included (N = *980*)	*Excluded* (N = *112*)	p-*Value*
Support of decriminalization of psychedelics (%)			
Yes	446 (45.5%)	53 (47.3%)	0.34
No	193 (19.7%)	27 (24.1%)	
Unsure	341 (34.8%)	32 (28.6%)	
Age, mean (SD)	47.1 (13.53)	48.8 (15.19)	0.26
Gender identity			
Male	117 (11.9%)	11 (12.9%)	—
Female	863 (88.1%)	74 (87.1%)	
Non-binary	—	27	
Specific spirituality (% yes)	644 (65.7%)	69 (61.6%)	0.45
License type			
RN	708 (72.2%)	74 (67.9%)	—
APRN	272 (27.8%)	35 (32.1%)	
Other	—	3	
Income (%)			
Under 69,999	129 (13.2%)	10 (8.9%)	0.16
70,000–99,999	201 (20.5%)	25 (22.3%)	
100,000–140,999	266 (27.1%)	40 (35.7%)	
Above 150,000	384 (39.2%)	37 (33.0%)	
Population type of work ZIP code (%)			
Metropolitan	591 (60.3%)	28 (57.1%)	0.75
Micropolitan	271 (27.7%)	16 (32.7%)	
Non-metro	118 (12.0%)	5 (10.2%)	
Missing	0 (0%)	63 (56.3%)	
Population type of home ZIP code (%)			
Metropolitan	444 (45.3%)	16 (28.1%)	0.03
Micropolitan	308 (31.4%)	25 (43.9%)	
Non-metro	228 (23.3%)	16 (28.1%)	
Missing	0 (0%)	55 (49.1%)	
Medication prescription privileges (% yes)	229 (23.4%)	31 (27.7%)	0.37
Currently seeing patients (% yes)	562 (57.3%)	63 (56.3%)	0.90
Conduct research (% yes)	67 (6.8%)	11 (9.8%)	0.33
Awareness of Colorado's psychedelic decriminalization (% yes)	340 (34.7%)	47 (42.0%)	0.16
APQ Legal, mean (SD)	19.2 (3.81)	18.7 (4.64)	0.30
APQ Effects, mean (SD)	15.7 (4.42)	15.5 (5.07)	0.80
APQ Risk, mean (SD)	16.2 (3.94)	15.7 (4.45)	0.26
APQ Openness, mean (SD)	20.6 (4.15)	20.2 (4.81)	0.30

[a]Participants included in the analysis met the following criteria: (1) no missing values, (2) identified as "Male" or "Female" for gender identity, and (3) held a license as either an RN or APRN.

APRN, advanced practice registered nurse; APQ, Attitudes on Psychedelics Questionnaire; RN, registered nurse; SD, standard deviation.

difference was observed in home ZIP code population types, with excluded participants more frequently residing in micropolitan (43.9% vs. 31.4%) or non-metropolitan (28.1% vs. 23.3%) areas ($p = 0.035$).

Comparisons were not conducted for gender identity and license type, as these variables defined group membership. The excluded group included 27 participants with non-Male/Female gender identities (e.g., non-binary, transgender), 3 with non-RN/APRN licenses, and Male/Female RN/APRN nurses with incomplete data. Despite these exclusions, the analytical sample remained generally representative, with some variation in geographic distribution.

Predictors of views on psychedelic decriminalization

Table 2 presents the results of the multinomial logistic regression model assessing nurses' views on psychedelic decriminalization, with "Yes" (support) as the reference category. Backward selection using AIC identified several key predictors: age, gender identity, specific spiritual orientation, awareness of Colorado's psychedelic decriminalization, and scores from the APQ Legal and Effects subscales. The following results summarize significant predictors from the model, comparing both "No" and "Unsure" responses to the reference group of nurses who expressed more positive views toward psychedelic decriminalization.

Table 2. Multinomial Logistic Regression Results Comparing the Odds of Nurses Supporting the Decriminalization of Psychedelics to Opposing ("No") and Being Unsure ("Unsure")

	Comparing "No" to "yes"		*Comparing "unsure" to "yes"*	
Variables	*Odds ratio (95% CI)*[a]	p-*Value*	*Odds ratio (95% CI)*[a]	p-*Value*
Age	1.00 (0.97, 1.03)	0.869	1.00 (0.98, 1.02)	0.736
Gender identity				
Male (reference)				
Female	0.84 (0.22, 3.27)	0.806	1.31 (0.56, 3.05)	0.533
Has specific spirituality				
No (reference)				
Yes	3.63 (1.36, 9.71)	0.010	1.41 (0.81, 2.46)	0.219
Awareness of Colorado's psychedelic decriminalization				
No (reference)				
Yes	0.82 (0.34, 2.01)	0.669	0.45 (0.25, 0.81)	0.008
APQ Legal	0.58 (0.49, 0.68)	<0.001	0.74 (0.66, 0.82)	<0.001
APQ Effects	0.55 (0.47, 0.65)	<0.001	0.77 (0.69, 0.86)	<0.001

[a]Odds ratios with 95% confidence intervals (CI) and *p*-values were derived from the validation set.

Nurses who reported having a specific spirituality were more likely to oppose decriminalization compared to those who supported it (odds ratio [OR] = 3.63, 95% CI: 1.36–9.71, $p = 0.010$). In addition, nurses who supported decriminalization had higher scores on the APQ Legal (OR = 0.58, 95% CI: 0.49–0.68, $p < 0.001$) and APQ Effects (OR = 0.55, 95% CI: 0.47–0.65, $p < 0.001$) than those who opposed it, indicating fewer concerns about the legal and psychological effects of psychedelic use.

When comparing nurses who were unsure about decriminalization to those who supported it, higher scores on the APQ Legal (OR = 0.74, 95% CI: 0.66–0.82, $p < 0.001$) and APQ Effects (OR = 0.77, 95% CI: 0.69–0.86, $p < 0.001$) were also associated with a lower likelihood of uncertainty. Furthermore, nurses who were aware of Colorado's decriminalization efforts were less likely to be uncertain (OR = 0.45, 95% CI: 0.25–0.81, $p = 0.007$).

Overall, our results demonstrate that fewer concerns about legal status and psychological effects (as reflected in higher APQ Legal and Effects scores) were associated with more positive views toward psychedelic decriminalization among nurses. Nurses who were aware of Colorado's psychedelic decriminalization policy and those who did not report a specific spiritual orientation also tended to have more favorable views. Notably, age was not associated with differences in attitudes. Gender showed a non-significant trend, with women more likely than men to be uncertain about decriminalization. In summary, nurses who were aware of Colorado's policy, had fewer concerns about the legal and psychological risks of psychedelics, and did not report a specific spiritual orientation were more likely to hold positive views and support psychedelic decriminalization.

Model discrimination and predictive power

Figure 1 presents the ROC curves for the multinomial logistic regression model predicting nurses' views on psychedelics decriminalization. The model demonstrated strong discriminative ability across response categories. The overall model performance, assessed by the multiclass AUC, was 0.870 (95% CI: 0.847–0.898), indicating excellent discrimination (Hosmer and Lemeshow, 2000, p. 162). Pairwise comparisons revealed outstanding discrimination between "Yes" and "No" responses (AUC = 0.973, 95% CI: 0.952–0.987). The model also showed excellent performance in distinguishing "Yes" from "Unsure" (AUC = 0.867, 95% CI: 0.827–0.904) and "No" from "Unsure" (AUC = 0.845, 95% CI: 0.801–0.902), though with slightly lower precision than the Yes–No discrimination.

Discussion

We aimed to identify a predictive model for nurses' views on decriminalization of psychedelics and yielded a strong predictive model including static and malleable factors. Our study findings confirm an important gap in knowledge about nurses, which is critical given their substantial composition and contributions to health care delivery and more broadly to the communities in which they live and work. Our findings further confirm the need for bolstering the knowledge base of nurses, RNs and APRNs, regarding all aspects of psychedelics including their use inside (e.g., PAT) and outside (e.g., psychedelic churches, individual use) of health care structures. Furthermore, the predictive factors identified in this study, by default, provide a prioritization schema for all other factors, which could be useful to educators seeking to develop efficient and targeted tools that promote nurses' education and/or engagement in dialogue about psychedelics and the science rapidly revealing their broad and reaching treatment and healing

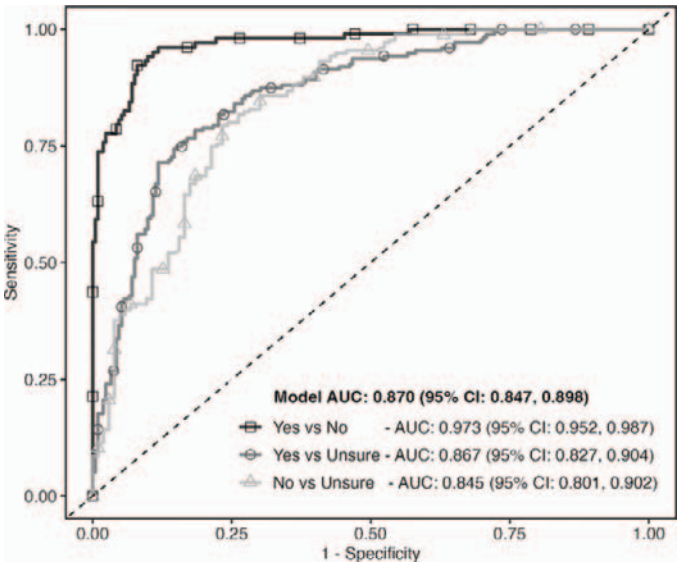

Fig. 1. Receiver operating characteristic curves for the multinomial logistic regression model predicting nurses' views on psychedelics decriminalization. AUC, area under the curve; CI, confidence interval.

indications.[23–29] Knowing which factors were predictive provides educators and curriculum developers with a shorter starting list of things they might want to know about their audience to optimize tailoring content and delivery. All good educators, health communicators, and outreach workers tailor their messaging so as to effectively connect with and reach intended audiences and yield desirable learning outcomes. Those in psychedelic science must do the same to equip a workforce that includes nurses and is capable of doing all that will be needed in the decades to come in psychedelic health care and PAT.[30] Further investigation testing these predictive factors with nurses in other U.S. states is warranted, as is development and testing of tailored educational offerings and messaging about psychedelics and PAT (i.e., continuing professional development, course content in nursing curricula).

The primary study limitation to note is the inherent limitations of secondary analyses and specifically, being constrained by the existing dataset items to inform the regression analysis and predictive modeling. Future research can and should replicate state-wide surveys and predictive modeling of nurses' perspectives on a range of issues critical to psychedelics and the advancement of psychedelic science into practice and policy across the United States.

Psychedelics have clear, established, and growing evidence for their benefits to those who have persisting and challenging mental and physical health conditions, substance use disorders, and more. The nursing workforce is well positioned to support integration of psychedelics into U.S. health care, just as they have adapted new interventions, technologies, and treatments for centuries. As with all disciplines, nurses simply require building a base of knowledge and competence that will then contribute to their confidence to join the team of health care professionals translating psychedelic science into practice in a sustainable, accessible, and effective manner.

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Authors' Contributions

C.M.P.: Conceptualization (lead), study implementation (lead), writing—original article development (lead), and writing—review and editing (equal). C.-C.W.: Data analysis and visualization (lead), and writing—review and editing (equal). A.G.: Study implementation (supporting), data analysis (supporting), and writing—review and editing (equal). N.G.: Analytical practice insights (lead), writing—original draft (supporting), and writing—review and editing (equal). C.D.: Conceptualization (supporting), methodological insights (equal), writing—original draft (supporting), and writing—review and editing (equal).

Author Disclosure Statement

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