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ORIGINAL RESEARCH

Predictors of Nurse Practitioner Prescription of Opioids for Cancer Pain: Quantitative Results

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Abstract

Background: Nurse practitioners (NPs) have assumed a greater role in the management of pain related to cancer. Several studies have associated adequate management of cancer pain with improved survival. Opioids are an essential treatment for cancer pain management and thus it is important to understand influences on prescribing these substances. However, due to a lack of previous studies on this topic, little is known about the influences on NP prescription of opioids for patients with pain due to cancer. **Purpose:** Competent decision-making is highly correlated with dominant personality characteristics and dominant decision-making styles in everyday life. The rational approach to decision-making has demonstrated superior performance with different daily tasks, including career-related tasks. However, it is unknown whether dominant personality and/or decision-making style impacts the decisions of medical professionals. Using the Diffusion of Innovations theoretical framework, this study evaluated whether dominant personality, dominant decision style, advanced specialty certification, and/or demographic factors influenced oncology NP opioid prescribing proficiency (termed opioid decision score, or ODS) according to the National Comprehensive Cancer Network (NCCN) Guidelines. Other advanced practice providers (APPs) were excluded from the study due to controlled substance prescribing limitations. **Methods:** An internet-based descriptive comparative study was performed evaluating the dominant personality characteristic and dominant decision-making style as a predictor of opioid prescribing among NPs working in oncology. Participants were recruited using lists from the Oncology Nursing Society (ONS) and American Association of Nurse Practitioners (AANP). A nationwide convenience sample of NPs working with adult oncology patients was evaluated for opioid prescribing according to recommendations in the NCCN Cancer Pain Guidelines. **Results:** Univariate linear regression revealed a statistically significant increase in the ODS as the Big Five Inventory (BFI) Openness scale score

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increased (estimate = 0.36, standard error [*SE*] = 0.17, 95% confidence interval [CI] = 0.03–0.69). Nurse practitioners reporting advanced specialty certification in oncology and/or hospice or palliative care scored significantly higher on the ODS compared with those with no advanced specialty certification (n = 81, M = 2.86, 2.34, t = –2.75, df = 178, p = .0065). **Conclusion:** This study provides preliminary findings regarding the decision-making of NPs working with oncology patients and prescribing opioids for cancer pain. Nurse practitioners with a dominant personality characteristic of openness and those reporting an advanced specialty certification in oncology and/or hospice or palliative care were more likely to prescribe opioids for patients with cancer according to NCCN Guidelines. Further investigation is needed to determine additional factors impacting prescribing of controlled substance by NPs and other prescribers.

The nurse practitioner (NP) role has evolved over time within the healthcare workforce. The addition of prescriptive privileges for NPs has led to greater role independence. Nurse practitioners have the ability to prescribe controlled substances in all states (American Association of Nurse Practitioners [AANP], 2020). However, a number of states continue to restrict the schedule or number of opioids NPs prescribe (AANP, 2016).

The Health Resources and Service Administration (HRSA) and the AANP report close to one third of NPs are practicing in specialty settings (AANP, 2016; Coombs, 2015; HRSA, 2014). 15.9% of NPs across specialties are prescribing 15 or more opioids per week (AANP, 2016).

There is a paucity of literature on the topic of NP opioid prescribing practices in the United States. No data exist describing whether NPs prescribe as recommended in clinical guidelines such as those published by the National Comprehensive Cancer Network (NCCN, 2021). Moreover, the subsequent influences on NP prescribing practices remain unclear.

A portion of the literature on the topic of decision-making suggests competent decision-making in everyday life is highly associated with one's dominant personality characteristic and decision-making style (Dewberry et al., 2013). Human behavior is contingent on the personality of the individual and the context of the specific situation (Appelt et al., 2011). Consensus regarding decision-making proposes it is a practice of considering potential options, choosing an action, and initiating it as a behavior (Ernst & Paulus, 2005; Hastie, 2001; Jackson et al., 2016; Teodorescu & Usher, 2013). On a daily basis, individuals use both rational and intuitive types of decision-making during multiple decision-making opportunities (Evans & Stanovich, 2013). Generally, one type of decision-making is dominant for individuals. The term used to describe the dominant manner an individual employs to make decisions is decision-making style (Dewberry et al., 2013). Individuals using a rational approach to decision-making demonstrated superior performance with different daily tasks, including career-related tasks (Phillips et al., 2015).

Personality is described by the American Psychological Association (APA) as "a relatively stable, consistent, and enduring internal characteristic that is inferred from a pattern of behaviors, attitudes, feelings, and habits in the individual. The study of personality traits can be useful in summarizing, predicting, and explaining an individual's conduct" (APA, n.d.). Personality traits are predictive of several socioeconomic factors, including education and job performance, and certain personalities execute decisions better in stressful situations than others (Borghans et al., 2008).

OBJECTIVES

The primary objective of this study was to determine the impact of the dominant personality characteristic and dominant decision-making style on opioid prescribing proficiency for NPs working with oncology patients experiencing pain. The secondary objective was to determine the effect of demographic factors as well as advanced specialty certification on the proficiency of NPs working in oncology to prescribe opioids according to NCCN Guidelines.

THEORETICAL MODEL: ROGER'S DIFFUSION OF INNOVATIONS MODEL

The theoretical model for this study is the Diffusion of Innovations model, developed by Everett

Rogers (2003). Rogers (2003) describes diffusion as a process of information sharing regarding an innovation (such as a new idea, practice, or object) with members of a group. Using this framework, norms or culturally-based behaviors are altered by change agents or opinion leaders. These informal leaders are able to influence others in a desired way. Innovators, or early adopters, are necessary to begin the change process. Late adopters are those who either take a longer period to adopt new innovations or do not adopt the innovation at all.

Adoption of an innovation undergoes several stages, including knowledge acquisition, opinion formation, decision to adopt or reject the innovation, implementation, and confirmation. Several factors may influence the rapidity of adoption of the innovation, including the relative advantage, the compatibility with present needs, and the ability of the potential adopters to understand the innovation (Rogers, 2003; Rogers et al., 2005).

Rogers (2003) and Rogers and colleagues (2005) identified five categories of adopters. They suggest that particular personality characteristics correspond with each category of adopter. Early adopters, or those more likely to lead in innovation adoption, have more empathy, greater intelligence, higher goals, social personalities, are more connected with change agents, have a greater propensity to seek new information, and know more about innovations (Rogers, 2003; Rogers et al., 2005). These characteristics are also associated with people demonstrating a dominant openness personality characteristic.

REVIEW OF LITERATURE

Temel and colleagues (2010) were the first to publish literature that associates adequate management of symptoms in advanced cancer with improved patient survival. Yoong and colleagues (2013) also reported the implementation of early palliative care extended survival in a population of cancer patients. Data from these initial studies compelled providers to understand the influences on prescriptive decisions as they may ultimately reveal implications for cancer outcomes.

Most states require pharmacology credits for license renewal for all NPs prescribing controlled substances (AANP, 2020). Competency in the management of pain is the goal of cancer pain education (Gordon et al., 2018). Competency entails the ability to provide the appropriate medication and dosage, patient education regarding the intended treatment, and the potential side effects associated with the treatment (Gordon et al., 2018). However, each state requires the achievement of a certain level of education and professional licensing to prescribe controlled substances, with competence presumed based on those requirements (Fishman et al., 2013; Lippincott Nursing Center, 2018). Professional organization consensus statements such as those from the Oncology Nursing Society (ONS) recommend provider education on the topic of cancer pain management (ONS, 2016).

Cancer Pain

Cancer pain is similar to non-cancer pain in that it shares the same physiological pathways (Russo & Sundaramurthi, 2019). However, cancer pain is often more challenging due to compression and/or invasion of adjacent tissue, including organs, blood vessels, nerves, and bone (Russo & Sundaramurthi, 2019). As a result of tissue invasion, the patient may experience a simultaneous combination of nociceptive and neuropathic pain (Russo & Sundaramurthi, 2019). Unlike most non-cancer pain, cancer treatment may also result in the development of pain (Kanzawa-Lee et al., 2019).

A recent meta-analysis estimates the prevalence of cancer pain at 55% during cancer treatment, 39.3% after treatment, and 66.4% in advanced disease (van den Beuken-van Everdingen et al., 2016). Estimates vary based on the type of tumor, the stage of disease, and the goal of treatment (van den Beuken-van Everdingen et al., 2016). Several classes of medications are frequently required to achieve adequate management of cancer pain (Davis, 2018). A small portion of patients with cancer may also require procedures to control their pain due to medication-related side effects or lack of efficacy (Vayne-Bossert et al., 2016).

Previous literature has established that opioids remain the treatment of choice for moderate to severe cancer pain due to some of their inherent properties (Bennett et al., 2012; Bennett et al., 2017; Wiffen et al., 2017). Opioids bind to receptors in the central nervous system (CNS) and ultimately interfere with transmission of nociceptive impulses, resulting in analgesia (Wiffen et al., 2017).

Opioids possess the ability to interfere with nociception without interfering with the other functions of nerves involved with vibration, light touch, temperature, or position sense (George et al., 2019). Pure μ agonists are preferred to mixed agonist-antagonist agents as they lack a ceiling dose and may be titrated to effect (George et al., 2019). The development of side effects is the dose-limiting toxicity of pure μ agonists (Wiffen et al., 2017).

The NCCN Guidelines are a credible source of information for the care of oncology patients in the US. The guidelines offer information for providers regarding cancer treatment as well as supportive care. In a recent survey of NCCN member institutions, palliative care was offered in 100% of responding institutions, yet institutions varied in the degree of the cancer pain guideline implementation (Albizu-Rivera et al., 2016). Treatment of cancer pain occurs with some variation, even among highly trained individuals. The responses in this study were evaluated with the awareness that participants may not be members of the NCCN, yet the reference for cancer pain treatment is used by cancer providers within and outside of NCCN member institutions.

The management of cancer pain requires a thorough assessment of the pain per the patient report. Assessment entails explication of an accurate pain history and performance of a physical examination of the patient experiencing pain. The pain management plan should be tailored to the patient needs. Interventions recommended to manage pain necessitate evidence-based practice.

Decision-Making

Human behavior is contingent on the personality of the individual and the context of the specific situation (Appelt et al., 2011). Executive function involves higher-level cognitive processes that organize behavior, including purposeful behavior (Jackson et al., 2016). One facet of executive function is decision-making. Accurate decision-making requires intact cognitive processes regarding an effective course of action (Jackson et al., 2016).

Decision-making relies on several processes, including assessment and formation of options, choice, initiation of an action, and evaluation of the outcome (Jackson et al., 2016; Ernst & Paulus, 2005; Hastie, 2001; Teodorescu & Usher, 2013). Decisions are made daily as a part of life. Much of what we decide is accomplished automatically, without thought or effort. This is referred to as intuitive (Type 1) processing and does not rely on working memory. Deliberative processes, commonly referred to as rational (Type 2) are slower, more deliberate, more reliable, and unique to humans (Evans & Stanovich, 2013).

Rational decision-making occurs with effort in that it takes time to consciously process the information under consideration. It enables suppositious thinking, intellectual arousal, and consideration of the consequences of decision-making (Evans & Stanovich, 2013). Decision-making styles and personality account for a significant amount of the variation in decision-making competence (Dewberry et al., 2013).

Personality

Personality has been associated with impacting the execution of everyday tasks and has been found to have considerable influences on decision-making competence (Dewberry et al., 2013). Certain personalities execute decisions better in certain situations than others. Certain personalities do not perform decision-making well under pressured conditions (Byrne et al., 2015). Individuals who exhibit high levels of self-control, openness to experience, lower anxiety, and excitement seeking tend to make suitable decisions in the setting of ambiguity (Borghans et al., 2008). In general, conscientiousness and emotional stability are associated with many positive aspects of decision-making performance (Dewberry et al., 2013).

Literature regarding decision-making suggests the rational decision-making style is more likely to prove beneficial in many circumstances (Dewberry et al., 2013). In addition, the dominant personality of an individual exerts a major influence on decision-making. It is important to understand whether the dominant personality and decision-making style also impacts clinical practice. Understanding the degree to which dominant personality characteristic and dominant decision-making style impacts NP proficiency in managing pain for patients diagnosed with cancer may be beneficial in clinical practice.

Nurse practitioners are a highly educated group of professionals, all of whom have achieved an advanced degree in a specialized area of nurs-

ing. Thus, the education and training of NPs are, at the very least, similar based on core competency requirements by the National Organization of Nurse Practitioner Faculties (NONPF, 2017). Yet, in clinical practice, the skills of NPs vary. Additionally, as with all clinicians, NPs incorporate new knowledge into their practice at different rates.

Rogers (2003) and Rogers and colleagues (2005) proposed that, in general, innovations are most likely to be implemented and/or promoted by certain types of individuals whom he referred to as innovators and/or, more likely, early adopters. Early adopters tend to remain more open to new information and more likely to incorporate new information into practice. Adherence to clinical guidelines may be viewed as an innovation for several reasons. Clinical guidelines are recommendations for practice based on clinical evidence and expert opinion. Guidelines are not a requirement. Consequently, guidelines must be adopted by the intended audience to change practice. In this situation, the audience is NPs. In addition, most guidelines are updated on a regular basis, thus requiring the clinical provider to repeatedly incorporate new knowledge into practice.

The innovation in this case is the use of NCCN Guidelines for adult cancer pain that are evidence-based and aim to improve the management of pain experienced by patients with cancer. To that end, this study was undertaken to determine the impact of the dominant personality characteristic and decision-making style of NPs on opioid prescribing proficiency in the clinical setting since Rogers (2003) and Rogers and colleagues (2005) suggest people possessing certain personality characteristics are more likely to implement innovations.

METHODS AND VARIABLES

Study Design

This investigation involved a descriptive study design using a quantitative, comparative approach to measure the influence of demographic factors, advanced specialty certification, dominant personality, and dominant decision-making style on NP prescribing of opioids for patients diagnosed with pain related to cancer. Participants included a convenience sample of eligible NPs working with adult oncology patients across the US. The study was conducted online using a data capture tool (REDCap; Harris et al., 2009; Harris et al., 2019). Eleven variables were considered for the power analysis for the multiple regression equation. In anticipation of a medium effect (.15) with $n = 123$, the model has an 80% power to detect the R^2 change of 5% for 11 covariates (demographic variables).

Study Population

Nurse practitioners actively working with adult oncology patients in the US were recruited to participate in the study. Inclusion criteria also included the unrestricted ability to prescribe controlled substances in the state of practice as well as possession of a Drug Enforcement Administration (DEA) registration certificate. Clinical nurse specialists (CNSs), physician assistants (PAs), nurse midwives, and certified registered nurse anesthetists (CRNAs) were excluded from the study due to controlled substance prescribing limitations.

Outcome Measures

Participants were asked to provide a narrative description of a recent patient visit that resulted in a change in dose or type of opioid prescription for a patient with cancer. A number of specific assessment and pain treatment details were requested for the narrative in the instruction portion of the item in an effort to elucidate as much detail as possible from the participants. The text provided by the participants was quantified for the purposes of this study (Sandelowski, 2000).

The NCCN adult cancer pain assessment and treatment guidelines contain 26 items to address cancer pain. The scoring for this study was accomplished by consolidating the original 26 NCCN cancer pain assessment and management items into five categories for the purposes of scoring and analysis. The categories used for scoring included pain assessment, opioid pain treatment, opioid risks/education, opioid adjustments/adjuvants, and referrals. Study participants were assigned a score of zero or one for each category based on the appropriateness of the information provided for the description of the visit. The total score possible for the sum of the categories ranged from zero to five.

Scoring of the participant answers was initially completed by the principal investigator (PI). Two NPs possessing cancer pain expertise

served as consultants for validation of the scoring guide used for the purpose of this study. Each of the consultants also scored participant answers for the patient visit separately. Scores from the PI were compared to each consultant, and consensus was reached on more than 90% of the items. The resulting scores for each study participant were termed the opioid decision score (ODS) and included in the quantitative analysis.

Instruments

The 44-item Big Five Inventory (BFI) is a previously validated, widely used multidimensional personality inventory. The instrument is used to differentiate between the five most prevalent characteristics associated with personality (John & Srivastava, 1999). The instrument contains short phrases that represent characteristics intended to reveal the dominant personality of the participant. The participant rates their agreement or disagreement with each of the statements on the instrument using a Likert scale ranging from one (strongly disagree) to five (strongly agree; John & Srivastava, 1999). The scores are tabulated according to a formula provided by John and Srivastava (1999) to determine the dominant personality characteristic of the participant.

Validity and Reliability of the Big Five Inventory

The original BFI, developed by John and Srivastava (1999), built upon the works of many previous investigators on the topic of personality. Tupes and Christal (1961) performed the seminal work in this area, delineating the five most common attributes associated with personality. These five traits associated with personality have been defined as extraversion vs. introversion (I); agreeableness vs. antagonism (II); conscientiousness vs. lack of direction (III); neuroticism vs. emotional stability (IV); and openness vs. closedness to experience (V). John and Srivastava (1999) suggest a major strength of the Big Five taxonomy is the ability to represent the common attributes broadly and conceptually among most personality traits. They suggest the taxonomy of the BFI offers a sound foundation for research.

The original work by John and Srivastava (1999) compared the BFI with previously validated instruments investigating the five traits most associated with personality. These instruments included the Trait Descriptive Adjectives (TDA; Goldberg, 1992) and the NEO Personality Inventory (Costa & McCrae, 1992). Comparison of these instruments by John and Srivastava (1999) revealed the mean reliability for the three instruments as 0.84. The mean reliability across factors for the BFI was 0.83, for the TDA 0.89, and for the NEO Five-Factor Inventory (NEO-FFI) 0.79. The mean convergence across all instruments was 0.75.

Results demonstrated convergence between the BFI and the TDA was strongest (mean r = 0.81), closely followed by the BFI and NEO (mean r = 0.73), and lastly, the TDA and NEO (mean r = 0.68; John & Srivastava, 1999). Across the three instruments, the BFI demonstrated mean validities across the first three of five groups at a level greater than .90. However, validities for neuroticism (.88) and openness (.83) were lower (John & Srivastava, 1999). Convergence between the BFI and TDA was significant (corrected mean r = .95) and the BFI and NEO (mean r = .93; John & Srivastava, 1999). The convergence for extraversion and openness were both less than .90, suggesting these items were not fully equivalent across these two instruments. None of the discriminant correlations reached .40 across the instruments (John & Srivastava, 1999).

Standard validity coefficients from the confirmatory factor analysis (CFA) averaged .91 for the BFI, .87 for the TDA, and .79 for the NEO. This suggests the BFI most closely represents the characteristics of the Big Five. External validity was not addressed in this study and was addressed by the authors of the study as a weakness (John & Srivastava, 1999). The BFI is an open-access document for researchers. The authors of the BFI have stipulated permission to use the instrument for noncommercial research without requesting permission from the authors. As a result, no permission was sought to perform this study using the BFI.

The Rational and Intuitive Decision Styles Scale (DSS) is a previously validated 10-item instrument used to differentiate between the rational and intuitive aspects of decision-making. Participants use a five-point Likert scale to rate their agreement with short phrases to differentiate between intuitive and rational decision-making. The tallied results are used to determine the

dominant decision-making style of the participant (Hamilton et al., 2016). The authors of the DSS report it as a reliable predictor of the dominant decision-making style (Hamilton et al., 2016). The DSS stipulated permission to use the instrument for non-commercial research without requesting permission from the authors. Hence, permission to use the instrument was not required.

The DSS was reduced from the original 25-item General Decision Making Style (Scott & Bruce, 1995) instrument to a 10-item instrument. The final items were chosen employing the results of two studies comprising independent samples (Hamilton et al., 2016).

Consensus was reached on the final 10 items and demonstrated high test-retest reliability for both the rational ($r = .79, p < .01$) and intuitive ($r = .79, p < .01$) components (Hamilton et al., 2016). Internal consistency reliability was tested using chi-square and relative chi-square statistics, fit indexes, including the Non-Normed Fit Index (NNFI; Bentler & Bonett, 1980), the Comparative Fit Index (CFI; Bentler, 1990), the Standardized Root Mean Square Residual (SRMR; Hu & Bentler, 1999), and the Root Mean Squared Error of Approximation (RMSEA; Browne & Cudeck, 1993). Indices of fit were above the recommended level for the two samples studied (Hamilton et al., 2016), except the NNFI and CFI in the final sample were below the recommended .95, but above a .90 cutoff. The results also propose a two-factor analysis as evidenced by the final design of the instrument (Hamilton et al., 2016). The authors (Hamilton et al., 2016) report a limitation of their instrument was the use of two college student samples in their testing.

DATA COLLECTION

After institutional review board (IRB) approval, a list of potential NP participant addresses was compiled using email/mail lists from the ONS and AANP. Twelve hundred potential participants were approached via email or a mailed invitation, depending on the requirements of the organization providing the contact information. Non-responders received one additional invitation to participate 1 to 2 weeks after the initial invitation. Screening questions were presented at the beginning of the survey for the purpose of excluding non-eligible participants. Potential participants not meeting the eligibility criteria were not forwarded the informed consent form (ICF). To maintain anonymity, eligible potential participants were presented the ICF and informed that by clicking next, they consent to participate in the study.

DATA ANALYSIS

Data analysis occurred in several stages. Descriptive statistics describe the demographic information of the sample. The mean, standard deviation, and distribution of responses are reported. Cronbach's alpha was utilized to confirm the reliability of each subscale of the instruments. The subscales of the Big Five Inventory include extraversion, agreeableness, conscientiousness, neuroticism, and openness (John & Srivastava, 1999). The factors in the DSS subjected to Pearson's correlation coefficient include the rational and intuitive portions of decision-making (Hamilton et al., 2016). Pearson's correlation coefficient was performed on each of the variables and then each instrument subscale to determine significant correlations. Subscales demonstrating a correlation of 0.1 or greater were selected for multiple regression analysis. Multiple regression tested the research question, "Is there a relationship between the study variables (BFI, DSS, and demographic variables) and opioid prescribing by NPs caring for oncology patients experiencing pain"?

RESULTS

Data collection occurred from the last week of June 2018 through the first week of August 2018. Three hundred and ninety-eight NPs responded to the invitation to participate in the study (33.1% response rate) prior to closing enrollment. Of those screened, 361 were eligible to participate based on their responses to the screening questions. The final sample included 180 NPs (50% completion rate) from 36 of the 38 eligible states and the District of Columbia recruited from the ONS and AANP databases.

The data analyses were performed using the Statistical Package for the Social Sciences (SPSS version 25). Demographic data were collected to describe the study population (Table 1).

Cronbach's Alpha

Cronbach's alpha was used to determine the internal consistency of the items in the BFI and DSS.

Table 1. Sample Demographic Characteristics (*N* = 180)

Variable	No.	%
Age group		
25–34	25	13.9
35–44	49	27.2
45–54	48	26.7
55–64	50	27.8
≥ 65	8	4.4
Gender		
Male/other	12	6.7
Female	168	93.3
Race		
Not Hispanic or Latino White	158	87.8
Other	22	12.2
Highest academic degree		
DNP/PhD nursing	28	15.6
MSN	150	83.3
Other	2	1.1
Years of experience as an NP		
1–5	41	22.8
6–10	48	26.7
11–15	35	19.4
16–20	38	21.1
≥ 21	18	10.0
Region of practice		
Midwest	32	17.8
Northeast	70	38.9
South	23	12.8
West	55	30.6
Type of practice		
Non-academic affiliation	74	41.1
Academic affiliation	106	58.9
Practice setting		
Home care/other	10	5.6
Inpatient hospital	26	14.4
Outpatient hospital	78	43.3
Outpatient office	66	36.7
Location of practice		
Urban	100	55.6
Suburban	63	35.0
Rural	17	9.4
Focus of NP preparation		
Adult acute care	24	13.3
Adult primary care	51	28.3
Gerontology	40	22.2
Other	61	33.9
Missing	1	0.6
Opioid decision score (*M, SD*)	2.58	1.29

According to John & Srivastava (1999), the BFI has good internal consistency with a mean of 0.83. In the current study, the Cronbach's alpha coefficient was 0.79 (Table 2). Hamilton and colleagues (2016) reported an internal consistency of 0.79 for the rational and intuitive scales of the DSS. The Cronbach's alpha coefficient in this study was 0.83.

Pearson's Correlation

The relationship between all continuous scores (as measured by the BFI, DSS, and ODS) was investigated using Pearson's correlation coefficient. There was a significant correlation between the opioid prescribing score and the BFI openness score ($r = 0.1590$, $p = .0331$). There was a significant positive correlation between the BFI extraversion score and the BFI agreeableness, conscientiousness, and openness scores ($r = 0.2465$, 0.2519, 0.3259; $p = .0009$, .0006, and .0001, respectively), and a significant negative correlation with neuroticism ($r = -0.2266$; $p = .0022$).

There was a significant positive correlation between the BFI agreeableness score and conscientiousness and openness scores ($r = 0.4725$, 0.1525; $p = < .0001$ and $< .0001$, respectively), and a significant negative correlation with neuroticism ($r = -0.5086$, $p = .0410$). There was a significant positive correlation between the DSS rational score and the BFI agreeableness, conscientiousness, and openness score ($r = 0.3165$, 0.3739, 0.2938; $p = < .0001$, $< .0001$, $< .0001$, respectively), and a significant negative correlation between the DSS rational score and the BFI neuroticism score ($r = -0.2242$; $p = .0025$). There was a significant negative correlation between the DSS intuitive score

Table 2. Reliability Coefficients and Descriptive Statistics of BFI and DSS Scores (*N* = 180)

Instrument/Scale	No. of items	Reliability (alpha)	*M*	*SD*
Big Five Inventory (BFI)				
Extraversion	8	0.87	3.64	0.81
Agreeableness	9	0.79	4.33	0.52
Conscientiousness	9	0.75	4.42	0.47
Neuroticism	8	0.78	2.25	0.65
Openness	10	0.77	3.60	0.57
Decision Styles Scale				
Rational	5	0.89	4.46	0.54
Intuitive	5	0.78	2.50	0.68

and the BFI conscientiousness score (r = –0.2143; p = .0039). Notably, there were no significant correlations between the confidence rating and ratings on the BFI, DSS, or opioid prescribing score.

The demographic variables and items from the BFI and DSS were included in a linear regression model (Table 3). Variables demonstrating significance at the 0.20 level were entered into a backwards selection multivariable model. Variables were removed one at a time based on the largest p value until all variables remaining in the final model were significant at the 0.05 level (as well as 0.10 and 0.20 level).

The univariate general linear regression model results for the ODS demonstrated that gender (p = .1007), and the BFI Openness scale (p = 0.0331) were statistically significant at the 0.20 level and were included in a full multivariable regression model (Table 4). After backwards elimination with a stopping criteria of p = .05 (or p = .10), only the BFI Openness scale remained as a significant predictor of the ODS, and thus, the final model is represented by the univariate model for BFI Openness scale. Specifically, there is a 0.36 increase in ODS for each 1-unit increase in the BFI Openness scale (estimate = 0.36, *SE* = 0.17, 95% CI = 0.03–0.69). When adjusting the stopping criteria to 0.20, both gender (p = .1007), and BFI Openness scale (p = .0331) remained in the final model (Table 5).

Descriptive statistics were generated for the ODS according to dominant BFI and DSS groups to test whether the dominant personality characteristic, measured using the BFI, and dominant decision style, measured using the DSS, significantly impact the ODS. The most common dominant personality characteristic, as measured by the BFI for the sample, included conscientiousness (n = 74, 45.7%, M = 2.64, SD = 1.31), followed by agreeableness (n = 59, 36.4%, M = 2.63, SD = 1.45), and extraversion (n = 19, 11.7%, M = 2.63, SD = 0.96). The most prevalent decision style for the group was rational (n = 158, 97.5%, M = 2.49, SD = 1.31). The most prevalent combination for BFI and DSS was conscientious/rational (n = 73, 45.1%, M = 2.63, SD = 1.32). There was no significant change in ODS for the dominant BFI paired with the dominant DSS (p = .4078, .5419, .3372 respectively). Note that participants with more than one dominant characteristic for BFI and DSS were excluded (n = 18), and thus, the sample for these analyses was n = 162.

The final quantitative statistical measure was a comparison of the ODS based on advanced specialty certification. Certification in the area of NP training was reported by 127 (70.6%) of the participants. Eighty-one (45%) of the participants reported an advanced specialty certification in oncology (n = 69; 38.3%), hospice/palliative care (n = 12; 6.7%), or both (n = 6; 3.3%). A two-tailed t-test was performed to evaluate the impact of advanced specialty certification on the ODS. There was a statistically significant difference in ODS between the advanced specialty certified NPs vs. no advanced specialty certification (n = 81, M = 2.86, 2.34, t = –2.75, df = 178, p = .0065; Table 6).

DISCUSSION

The results of this research demonstrate the dominant personality characteristic of openness and

Table 3. Univariate Model Results for Opioid Decision Score

Variable	Estimate	*SE*	95% CI	*p* value
Demographics				
Age				.3065
25–34	0.14	0.52	(−0.89–1.17)	.7885
35–44	−0.26	0.49	(−1.22–0.71)	.6026
45–54	0.23	0.49	(−0.74–1.20)	.6405
55–64	0.24	0.49	(−0.72–1.20)	.6238
≥ 65	REF	REF	REF	
Gender				
Female	−0.63	0.38	(−1.39–0.12)	.1007*
Male/other	REF	REF	REF	
Race				
Not Hispanic or Latino White	0.24	0.29	(−0.33–0.82)	.4059
Other	REF	REF	REF	
Highest academic degree				.3345
DNP/PhD nursing	0.89	0.94	(−0.96–2.75)	.3438
MSN	1.13	0.91	(−0.68–2.93)	.2197
Other	REF	REF	REF	
Years of experience as an NP				.2526
1–5	0.22	0.36	(−0.50–0.93)	.5477
6–10	−0.15	0.35	(−0.85–0.55)	.6666
11–15	−0.38	0.37	(−1.12–0.35)	.3045
16–20	0.15	0.37	(−0.57–0.88)	.6787
≥ 21	REF	REF	REF	
US census region of practice				.3529
Midwest	−0.21	0.29	(−0.77–0.35)	.4639
Northeast	0.24	0.23	(−0.22–0.69)	.3060
South	0.25	0.32	(−0.38–0.88)	.4376
West	REF	REF	REF	
Type of practice				
Academic affiliation	0.11	0.20	(−0.28–0.49)	.5767
Non-academic affiliation	REF	REF	REF	
Practice setting				.5505
Home care/Other	−0.10	0.44	(−0.96–0.76)	.8194
Inpatient hospital	−0.12	0.30	(−0.70–0.47)	.6995
Outpatient hospital	0.23	0.22	(−0.19–0.66)	.2859
Outpatient office	REF	REF	REF	

☞ *Continued on following page*

Table 3. Univariate Model Results for Opioid Decision Score (cont.)

Variable	Estimate	*SE*	95% CI	*p* value
Location of practice				.5762
Urban	−0.32	0.34	(−0.99, 0.34)	.3400
Suburban	−0.19	0.35	(−0.88, 0.51)	.5931
Rural	REF	REF	REF	
Focus of NP preparation				.3026
Adult acute care	−0.50	0.31	(−1.11, 0.12)	.1119
Adult primary care	−0.36	0.24	(−0.84, 0.13)	.1470
Gerontology	−0.11	0.26	(−0.63, 0.40)	.6695
Other	REF	REF	REF	
Specialty certifications				
Yes	0.12	0.21	(−0.30, 0.54)	.5651
No	REF	REF	REF	
Confidence and Decision Scores				
Confidence Rating Scale	0.08	0.12	(−0.15, 0.31)	.4797
Big Five Inventory (BFI)				
Extraversion	−0.07	0.12	(−0.30, 0.17)	.5706
Agreeableness	0.04	0.18	(−0.33, 0.40)	.8475
Conscientiousness	0.16	0.20	(−0.25, 0.56)	.4395
Neuroticism	0.06	0.15	(−0.24, 0.35)	.7065
Openness	0.36	0.17	(0.03, 0.69)	.0331*
Decision Styles Scale (DSS)				
Rational	0.05	0.18	(−0.31, 0.40)	.7999
Intuitive	0.10	0.14	(−0.18, 0.38)	.4610

advanced specialty certification were associated with a statistically significant improvement in the likelihood of the participants to prescribe opioids according to recommendations in the NCCN Guidelines. Nurse practitioners with a dominant personality characteristic of openness are similar to the early adopters described by Rogers. Early adopters are more likely to incorporate new information into practice. Since the NCCN Guidelines are not used by all oncology providers, one may correlate the cancer pain guidelines with an innovation. As a result, NPs with a dominant personality characteristic of openness may serve as resources to their colleagues in the area of pain management, providing mentorship and guidance. However, in isolation, this finding highlights the need for further investigation.

The results of this study were also significant for higher ODS scores by NPs with advanced certification in oncology and/or hospice or palliative care. Seventy percent of the participants reported certification in the area of NP training; however,

Table 4. Final Multivariable Model Results for Opioid Decision Score (Stopping Criteria of *p* = .05 and *p* = .10)

Variable	Estimate	*SE*	95% CI	*p* value
Big Five Inventory (BFI)				
Openness	0.36	0.17	(0.03–0.69)	.0331

Table 5. Final Multivariable Model Results for Opioid Decision Score (Stopping Criteria of *p* = .20)

Variable	Estimate	*SE*	95% CI	*p* value
Gender				
Female	−0.57	0.38	(−1.32, 0.18)	.1330
Male/other	REF	REF	REF	
Big Five Inventory (BFI)				
Openness	0.34	0.17	(0.01, 0.67)	.0430

this did not demonstrate significance in terms of a higher ODS.

Advanced certification in the oncology or hospice/palliative care specialty requires NPs to practice for 2 or more years prior to taking the examinations. Both the advanced oncology and palliative care/hospice examinations include an opioid competency section. While specialty certification is generally not required for employment, it may provide an advantage to NP applicants in possession of the certification as it demonstrates increased skills in an essential segment of oncology NP practice.

Certification in the area of training is presently a practice requirement for NPs in 47 states (AANP, 2020), yet advanced specialty certification requirements generally occur at the institutional level. Research on the topic of certification has the potential to elucidate the differences in outcomes between advanced certification of NPs and other advanced practice providers (APPs) compared with those without advanced certification in terms of numerous specific outcome measures.

LIMITATIONS

The study involved a convenience sample of NPs from eligible states across the country. This is a possible source of study bias. Although NPs from most eligible states participated in this study, there was insufficient information from any state (or region) to reach significance in reference to any patterns of prescribing. The sample was homogeneous in terms of dominant decision-making style scores. Homogeneity may have been avoided using some form of probability sampling or quota convenience sampling (Bhardwaj, 2019). However, both methods would have required a much larger pool of participants, potentially limiting the ability to reach adequate power in the results.

The results of this study are limited to NPs working in oncology as this study included NPs working in oncology with the unrestricted ability to prescribe Schedule II substances. Prescriptive privilege limitation precluded the addition of other APPs in this study, and the results are not generalizable to other APPs.

The reliance on professional organization databases limits the ability to reach all NPs working in the oncology specialty. Generalizations for all NPs prescribing opioids regarding the findings associated with this study should be avoided. The use of an online data collection tool limited the authors' ability to provide additional prompts for participants. The study was anonymous, eliminating the possibility of contacting participants for clarification of answers.

CONCLUSION

This study was exploratory in nature. It provides baseline information regarding factors potentially influencing NP prescribing of opioids for patients with cancer. No previous studies specifically in-

Table 6. Advanced Specialty Certification and Mean ODS

	N obs	*N*	*M*	*SD*	Minimum	Maximum	*t*	*df*	*p* value
Advanced specialty certifications							−2.75	178	.0065
No	99	99	2.34	1.37	0	5.00			
Yes	81	81	2.86	1.12	0	5.00			

vestigating NP or other APP group opioid prescribing practices were available in the literature. The results are of interest and provide baseline data upon which to build.

The findings correlated with the theoretical framework in that participants displaying the dominant personality characteristic of openness were more likely to prescribe opioids according to the NCCN adult cancer pain guidelines. These participants parallel the early adopters described by Rogers (2003) and Rogers and colleagues (2005). The finding of one significant personality characteristic impacting prescribing suggests the need for further investigation to include other factors, such as cancer pain education, motivation, bias, stress, and other topics related to behavior and decision-making that may potentially impact practice.

Future research involving all APP groups provides the potential to demonstrate the contributions of the group to improved outcomes in the care of patients with cancer. Results from present and future investigations allow the opportunity to demonstrate the contribution of APPs with other professions as well as with consumers of health care.

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