RESEARCH

The Role of Personality in Treatment-Related Outcome Preferences Among Pharmacy Students

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Objective. To examine whether personality traits, particularly conscientiousness and agreeableness, were associated with systematic differences in health outcome preferences in cancer treatment scenarios among second-year Doctor of Pharmacy students.

Methods. An online survey that quantified outcome preferences using profile best-worst scaling tasks was administered to pharmacy students (n=185). The Big Five personality inventory was used to categorize respondents into tertile-based levels of each trait. Treatment-related health outcomes were described using the EQ-5D-Y system and framed with hypothetical cancer treatment scenarios. Preferences were obtained using count analysis for each treatment-related outcome, and differences based on the level of trait were tested using analysis of variance. Logistic regression was used to test for significant associations between higher levels of a trait and choosing dead over a severe health state.

Results. Higher conscientiousness was associated with students who had an approximately 20% more positive preference for “no problems” in the Usual Activities and Pain/Discomfort attributes, as well as a 19% more negative preference for “a lot of problems” in the Pain/Discomfort attribute. No differences in treatment preferences were observed across agreeableness tertiles. Higher levels of personality traits were not significantly associated with choosing death over being in moderate health.

Conclusion. Conscientiousness appears to be a factor in treatment-related outcome preferences among pharmacy students. Individuals with higher levels of conscientiousness may be more likely to recommend treatments that are less likely to cause pain or discomfort and negatively impact a patient’s usual activities.

Keywords: best-worst scaling, personality traits, stated preferences, cancer outcomes, pharmacist

INTRODUCTION

The process of shared decision-making is an important vehicle for patient-centered care. Shared decision-making mandates sharing of knowledge, experiences, and values between the clinician and the patient.¹ If a clinician is to act as an advocate for the patient, understanding how a clinician values treatment-related outcomes is necessary to better characterize the patient-clinician dynamic in shared decision-making.

The shared decision-making process may be affected by the personalities of the parties involved. Two personal-

ity traits, conscientiousness and agreeableness, may be particularly important traits in clinicians. Both traits are part of the Big Five framework, a psychological model that represents personality traits within five broad domains: extraversion, agreeableness, conscientiousness, emotional stability, and openness to experience.² Conceptually, conscientiousness is defined as the ability to control impulses to facilitate task- and goal-directed behavior; agreeableness is described as altruism, cooperation, and willingness to exhibit warmth and kindness.³ In principle, having higher levels of conscientiousness and agreeableness may enable a clinician to better accommodate the perspective of the patient and potentially empathize with the patient’s emotional mindset. Previous studies have shown that in patients, conscientiousness and agreeableness traits were associated with differences in patients’ health preferences as well as increased engagement with clinicians in

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shared decision-making.^{4,5} Therefore, these two personality traits are considered important characteristics for a clinician to have to be able to make health care decisions that are in the best interest of the patient. However, this literature is in its infancy. The extent to which the personality traits of practicing and future pharmacists, particularly their conscientiousness and agreeableness, are relevant to their ability to select among health outcomes in life-threatening conditions where the input of an experienced health care professional is highly valued is unclear.

One method to quantify the value that respondents place on different health outcomes is to use choice-based preference elicitation techniques such as discrete choice experiment or best-worst scaling. Initially developed for market research, the discrete choice experiment is an ordinal-based approach that gathers information on preferences by asking individuals to choose their preferred products or health states.^{6,7} The best-worst scaling method is an extension to the discrete choice experiment. The case 2 (or profile based) best-worst scaling method aims to elicit preferences for a set of attributes, their associated levels or alternatives by estimating the relative importance on a common scale.⁸⁻¹⁰ Best-worst scaling assumes that respondents are capable of making judgments regarding the best and the worst item out of three or more characteristics in a decision or choice.^{11,12} Ordinal-based methods have significant advantages over traditional methods of assessing preferences, such as Likert-type scale items in simple surveys. Although Likert-type questions ask respondents about the importance of outcomes (eg, 1=not important, 5=extremely important), they do not provide information on trade-offs required in real-life clinical decisions. Stated preference techniques attempt to simulate actual decision making by requiring respondents to assess trade-offs in a realistic, albeit hypothetical, decision context.¹⁰

Given the conceptual basis and support in the literature for the association between conscientiousness and agreeableness with shared decision-making, we sought to examine the relationship between these two traits and health outcome preferences in future pharmacists. Specifically, this study aims to compare the importance assigned to cancer treatment outcomes by levels of conscientiousness and agreeableness; and to examine whether the perception of death as an outcome choice systematically differs by levels of conscientiousness and agreeableness among second-year pharmacy students.

METHODS

A brief 10-item questionnaire, known as the Ten-Item Personality Inventory (TIPI)¹³, was used to measure the level of each of the Big Five personality traits. The

TIPI has been validated across multiple demographic groups in the US general population.¹³⁻¹⁵ The TIPI measures responses on a 7-point scale ranging from 1 (disagree strongly) to 7 (agree strongly) with two items for each of the Big Five personality traits. Items were reverse scored where appropriate, summed, and the individual mean personality trait score for each respondent was calculated, where higher values correspond to more of that trait. Individual respondent mean scores for each dimension could range from 1 to 7. Respondent mean scores for each personality trait were then categorized into “low,” “moderate,” or “high” tertiles.

This study was approved by the the University of Illinois at Chicago (UIC) Institutional Review Board. All participants provided informed consent. Doctor of Pharmacy (PharmD) students from the University of Illinois at Chicago College of Pharmacy in Chicago were recruited to participate in the study. An email was sent directly or forwarded to second-year students via UIC list servers. The email included information about the study and a link to the online questionnaire; the respondents were instructed to follow the link if they agreed to participate in the study.

The online questionnaire was developed using Qualtrics (Provo, Utah). The questionnaire included several sections presented in the same sequence for all respondents. In the first section, respondents were asked to fill out the Ten-Item Personality Inventory (TIPI)¹³ to measure their level of each of the Big Five personality traits. The TIPI has been validated across multiple demographic groups in the US general population.¹³⁻¹⁵ The TIPI measures responses on a seven-point scale ranging from 1=disagree strongly to 7=agree strongly, with two items included to measure each of the Big Five personality traits. Items on the TIPI were reverse scored where appropriate, summed, and the individual mean personality trait score for each respondent was calculated, where higher values correspond to having more of that trait. Respondent mean scores for each personality trait were then categorized into low, moderate, or high tertiles.

In the second section of the questionnaire, the students were asked to complete the EQ-5D-Y, which was used to describe treatment-related outcomes (Appendix 1).¹⁶ The EQ-5D-Y is comprised of five dimensions of health: self-care, defined as having mobility, able to look after myself; usual activities, defined as able to do my usual activities; pain/discomfort, defined as having pain or discomfort; and anxiety/depression defined as feeling worried, sad, or unhappy.¹⁷ On the EQ-5D-Y, each of the five dimensions of health is assessed based on three severity levels: no problem (level 1), some or a bit of a problem (level 2), and very or a lot of problems (level 3).¹⁸

Each unique health state described by the EQ-5D-Y system is represented by a five-digit descriptor that ranges from 11111 (perfect health; no problems in any dimension) to 33333 (worst possible state; a lot of problems in every dimension of health). In the five-digit EQ-5D-Y descriptor, each digit represents one dimension of health; thus, the descriptive system defines 243 (3^5) health states. The dimensions (attributes) and levels of the EQ-5D-Y were explained in the questionnaire, and the respondents were asked to complete the EQ-5D-Y measure based on their own health as a warm-up exercise.

To address the first aim of the study, in the third section of the questionnaire, respondents were presented with 15 profile-based, best-worst scaling choices comprised of health states based on the EQ-5D-Y descriptive system (Appendix 2). Health states included in the best-worst scaling items were selected by employing a simple, orthogonal main-effects plan (OMEP) using statistical software (Sawtooth Software, Sequim, WA).¹⁰ The OMEP is a balanced design which ensures that all attributes and all attribute levels are presented with a balanced frequency to responders (Appendix 3). For each best-worst scaling task, the same hypothetical scenario was presented in which the respondent is asked to assume the role of a clinical pharmacist on a multidisciplinary oncology team that makes decisions for patients with cancer (Appendix 2). Respondents were asked to assess a list of five attribute levels (each level is a combination of one health dimension and a corresponding severity level) for each task and choose which attribute levels they considered to be the best and worst treatment-related outcomes.

To examine the second study aim, respondents were asked to choose between death and moderate (“22222”) or severe (“33333”) health states in two additional scenarios. This task was presented as it was suspected that perceptions surrounding this choice might differ by respondent personality traits. Also, considerations for quality (eg, health outcomes) and quantity (eg, survival) of life are important factors in medical decision-making, particularly in many oncology settings. Further, the place of states worse than “dead” on the health state utility scale (ie, values < 0) is a major issue in health state valuation.

In the final section of the questionnaire, respondents were asked demographic questions about age, gender, race/ethnicity, and prior education. The full survey was piloted with three graduate students (some of whom were recent PharmD graduates) to ensure questions were understood as intended and precisely worded. Differences in characteristics between the low, moderate, and high conscientiousness groups were compared using independent *t* tests for continuous variables and chi-square or Fisher exact test for categorical variables. Separate count ana-

lyses were used to determine preference weights for each of the conscientiousness and agreeableness tertiles, which included counting the individual selection frequencies,¹⁹ calculation of best-worst score, and calculating the maximum difference between the individual scores.^{20,21} Best-worst scores were also standardized to allow comparisons across groups.²¹ Attributes were ranked on the basis of average best-worst scores. Differences in average best-worst scores were examined using analysis of variance (ANOVA) across conscientiousness and agreeableness tertiles when appropriate.

Logistic regression models evaluated the association between higher levels of conscientiousness and agreeableness and choosing death over a moderate health state (22222) or the worst health state (33333); with odds ratios (ORs) and 95% confidence intervals (CIs) reported. Unadjusted models were favored for statistical efficiency as there were no differences in baseline characteristics seen between conscientiousness or between agreeableness tertiles (data not reported).

RESULTS

Of 200 potential respondents, 185 completed the questionnaire (93% response rate) between April and May 2015. The mean age of the cohort was 25.9 years ($SD=4.9$), 100 (54%) respondents were female, and the largest racial/ethnic group was white (87 respondents, 47%) (Table 1). Mean scores for the Big Five personality traits were significantly different across all tertiles; therefore, heterogeneity was observed in each trait among the students (Table 2). Mean score (SD) for low, moderate, and high conscientiousness tertiles were 4.1 (0.9), 5.8 (0.3), and 6.7 (0.3), respectively. For low, moderate, and high agreeableness tertiles, mean scores (SD) were 3.5 (0.6), 4.7 (0.3), and 6.0 (0.5), respectively.

Figure 1 illustrates the average best-worst scores across tertiles of conscientiousness. Respondents reporting the highest levels of conscientiousness had a 21% higher positive preference for “no problems” in usual activities (UA1) than those with the lowest conscientiousness scores (ANOVA, $p=.03$). For the pain/discomfort attribute, those in the high conscientiousness group found “no problems” (PD1) to be 22% more positively preferred (ANOVA, $p=.03$) and “a lot of problems” (PD3) to be 19% more negatively preferred (ie, greater aversion) than those in the low conscientiousness group (ANOVA, $p=.04$). No significant differences in attribute-level preferences were observed across agreeableness tertiles.

The results of the logistic regression analysis for choosing death over moderate and severe health states are reported in Table 3. More conscientious respondents showed trends towards a higher likelihood of choosing

Table 1. Pharmacy Student Respondent Characteristics (N=185)

Respondent Characteristic	
Female, No. (%)	100 (54)
Age in years, No. (SD)	25.9 (4.9)
Race, ^a No. (%)	
White	87 (47)
Black	12 (7)
Asian	70 (38)
Hispanic	16 (9)
Other ^b	14 (8)
Highest current level of education, No. (%)	
High school	6 (3.2)
Bachelor's/associate degree	178 (96.3)
Master's degree	1 (0.5)

^{a, b} Respondents may choose more than one option; thus, percentages sum to more than 100%

^b Includes those who preferred not to answer

death over a moderate health state (OR, 3.9; 95%CI, 0.4-34.7), but this difference was not significant. Respondents with higher agreeableness showed a trend toward a lower chance of choosing death over a moderate (OR, 0.2; 95% CI, 0.02-1.5) or severe health state (OR, 0.7; 95% CI, 0.4-1.4) compared to those with lower agreeableness, but the results were not significant.

DISCUSSION

The results of this study suggest that certain personality traits among health care providers influence their preferences for health outcomes in treatment decision making. Specifically, pharmacy students (future pharmacists) who had higher levels of conscientiousness valued a patient having “no problems” with pain or discomfort or with usual activities more positively and “lots of problems” with pain or discomfort more negatively compared to those with lower levels of conscientiousness in the context of cancer clinical decision-making. These findings imply that future pharmacists place greater importance on alleviating pain or discomfort and restoring usual

activities as treatment-related outcomes. In addition, while not significant, a large magnitude of effect was noted where pharmacy students who rated high in agreeableness were more likely to prefer a treatment approach that would favor the patient living in a moderately poor health state over death, while the more conscientious pharmacy students were more likely to select death over living in a health state with moderate problems.

This study may have important implications for clinical practice and shared decision-making. Future clinicians who are less agreeable or conscientious may be more likely to make decisions that are different from those made by clinicians who are more agreeable or conscientious, which may not best reflect their patient's treatment-related outcome preferences. Therefore, it may be helpful to understand how pharmacy students' personalities are related to their beliefs about meaningful patient outcomes. Much like how a new manager attends workshops to ascertain how their tendencies or biases influence their management style, understanding how personality traits affect future clinicians' preferences has implications for education and patient-centered care. However, it is unclear whether health professionals having knowledge of their personality type and predispositions towards health outcomes and treatment preferences would help those involved in the decision-making process come to an agreement.

Few studies have explored the relationship between specific personality traits and health preferences (operationalized in this study as treatment-related outcomes) using a choice-based approach. Previous work in this area investigated the association between personality traits and health state choices in adolescents and adults and found that different levels of conscientiousness were associated with differences in choosing between health states with extreme deficits in at least one health dimension and choosing death over the worst health state. Increased levels of openness to experience were also found to be associated with increased odds of preferring a health state with extreme pain over extreme dysmobility.²² In another study by Chapman and colleagues, personality traits were evaluated

Table 2. Mean Ten-Item Personality Inventory (TIPI) Scores for Big Five Personality Trait Tertiles Among Pharmacy Students

	Level of Trait ^a					
	Low		Moderate		High	
	No.	Mean (SD)	No.	Mean (SD)	No.	Mean (SD)
Extraversion	63	2.6 (0.8)	53	4.23 (0.3)	69	5.7 (0.7)
Agreeableness	62	3.5 (0.6)	58	4.7 (0.3)	65	6.0 (0.5)
Conscientiousness	71	4.1 (0.9)	61	5.8 (0.3)	53	6.7 (0.3)
Emotional stability	52	2.8 (0.8)	73	4.4 (0.4)	60	6.1 (0.5)
Openness	70	4.0 (0.8)	65	5.3 (0.3)	61	6.3 (0.4)

^a All calculated mean differences across tertiles for each personality trait were statistically significant (*p* values <.001, ANOVA)

Figure 1. Relative Importance of Cancer Treatment-Related Outcome Dimension and Severity by Low (white bars), Moderate (gray bars), and High (dark bars) Conscientiousness Subgroups

* $p < .05$ for preference difference between high and low levels of Conscientiousness; CONC=Conscientiousness; Mod=moderate; MO=mobility; SC=self-care; UA=usual activities; PD=pain/discomfort; AD=anxiety/depression; Number after abbreviations indicates severity level of dimension; eg, MO1 indicates level 1 on mobility

as predictors of individual and societal valuations of health state among adult patients with chronic disease.²³ They demonstrated that individuals with higher levels of conscientiousness had less disutility associated with poor health, with the highest importance placed in the anxiety/depression dimension. In contrast, the present study did not find significant differences in preference weights between conscientiousness tertiles for anxiety/depression. The discordant results may be because of the differences in the populations assessed (ie, patients with chronic disease vs pharmacy students). Another reason could be the way the participants' preferences were obtained. Chapman and colleagues applied scores from another three-level version of the EQ-5D, the EQ-5D-3L, to self-reported health states. The present study directly elicited preferences for health states using hypothetical scenarios. Therefore, the perspec-

tive of the respondents and the approach to preference measurement in each study were different.

This study also found that a high level of conscientiousness or a low level of agreeableness may be associated with a greater willingness to select death over a poor or extremely poor health state. While these results were not significant, the magnitude of the point estimate was substantial (eg, OR four to five times that of low levels of conscientiousness for choosing death over having moderate health), and the study may have been underpowered to detect a difference. If such a relationship does exist, then it may have important implications for clinical practice, especially in areas such as palliative and hospice care. In such settings, clinicians and patients may find it more appropriate to favor treatment decisions that place greater importance on increasing health-related quality of

Table 3. Odds of Choosing Death Over Moderate (22222) and Severe (33333) Health States by Big Five Tertiles Among Pharmacy Students

Personality Trait	Odds Ratio (95% Confidence Interval)	
	Death > 22222	Death > 33333
High conscientiousness	3.9 (0.4-34.7)	0.9 (0.4-1.6)
Moderate conscientiousness	1.1 (0.3-4.4)	0.8 (0.4-1.9)
Low conscientiousness	REF	REF
High agreeableness	0.2 (0.02-1.5)	0.7 (0.4-1.4)
Moderate agreeableness	0.2 (0.02-1.9)	0.53 (0.3-1.1)
Low agreeableness	REF	REF

Abbreviations: REF=reference category

22222=health state with "some problems" in all health dimensions

33333=health state with "extreme problems" in all health dimensions

life than gains in quantity of life. Future studies with larger sample sizes are required to explore this issue adequately.

This study should be considered in the context of several limitations. First, the generalizability of these findings to other health care professionals is limited by the small and relatively homogenous sample of pharmacy students. Moreover, our sample included second-year pharmacy students who had not formally participated in practice rotations, including those in the oncology setting. Therefore, our respondents may not have fully comprehended the role of the pharmacist described in our questionnaire. It remains unclear in the literature whether these preferences, which we quantified in students who were relatively early in their pharmacy career path, are “stable” relative to more advanced students or practicing pharmacists. Second, the scope of treatment-related attributes was limited to generic (or universal) health outcomes; non-health attributes such as cost of care were excluded. Third, the best-worst scaling experimental design assumed only main effects for each attribute level, and therefore interaction effects between attribute levels could not be explored. Finally, another possible explanation for the difference observed between conscientiousness tertiles is that individuals with high levels of conscientiousness are more likely to pay attention to the best-worst scaling tasks.⁹ More attention to the task may reduce measurement noise to a point where the differences noted are significant. However, the point estimates (ie, average best-worst scores) differed by more than 20%, which supports the conclusion that an actual dissimilarity in preferences existed.

CONCLUSION

According to the results of this study, conscientiousness appears to be an important factor for treatment-related outcome preferences among future pharmacists. Conscientiousness and agreeableness may also impact choosing death over specific health states based on the effect magnitude; however, larger studies are needed to confirm this association. The results of this exploratory study highlight several areas that may warrant further investigation to improve understanding of treatment-related outcome preferences. A direct comparison of preferences between clinicians and patients, including caregivers, would be an important addition to the literature. Moreover, differences between professional disciplines (eg, pharmacist versus physician, generalist versus subspecialist physician, etc) could be evaluated, including comparisons within a profession (eg, pharmacy students vs residents vs experienced clinicians), to identify

sources of preference heterogeneity. Finally, the results of this study suggest that psychological traits are related to the values future pharmacists place on different treatment-related outcomes. Future studies could evaluate whether health providers understanding their own intrinsic biases, such as those indicated by their personality traits, help clinicians and patients better navigate the shared decision-making process.

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Appendix 1. Attributes and Levels of the EQ-5D-Y¹⁶

Attribute	Levels
Mobility	No problems walking about Some problems walking about A lot of problems walking about
Self-care	No problems washing or dressing myself Some problems washing or dressing myself A lot of problems washing or dressing myself
Usual Activities	No problems doing my usual activities Some problems doing my usual activities A lot of problems doing my usual activities
Pain/Discomfort	No pain or discomfort Some pain or discomfort A lot of pain or discomfort
Anxiety/Depression	Not worried, sad or unhappy A bit worried, sad or unhappy Very worried, sad or unhappy

Appendix 2. Example of Best-Worst Scaling Item Presented to Respondent

You are a clinical pharmacist who works with a multidisciplinary oncology team. Your role is to help make optimal treatment decisions for patients with cancer.

There have been several treatments developed for cancer. All of these treatments have the same likelihood of curing the cancer, but also have the potential to negatively impact different aspects of a patient's health-related quality of life.

For the following side effect profile, which health-related outcome of a treatment would you consider BEST for the patient and which is the WORST for a patient?

Best treatment outcome (choose only one)		Worst treatment outcome (choose only one)
☐	No problems doing their usual activities	☐
☐	No problems in walking about	☐
☐	A bit worried, sad or unhappy	☐
☐	Some pain or discomfort	☐
☐	Some problems washing or dressing themselves	☐

Appendix 3. EQ-5D-Y Health States Included in the Best-Worst Scaling Scenarios

Item	Health state
1	13113
2	12122
3	21232
4	33312
5	22322
6	32211
7	22133
8	11221
9	33233
10	13331
11	12213
12	23121
13	21311
14	31323
15	31132

EQ-5D-Y health states are represented by a five-digit descriptor that ranges from 11111 (perfect health; no problems in any dimension) to 33333 (worst possible state; a lot of problems in every dimension of health)