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Citation Information

Hagemeyer, Nicholas E.; and Murawski, Matthew M.. 2014. An Instrument to Assess Subjective Task Value Beliefs Regarding the Decision to Pursue Postgraduate Training. *American Journal of Pharmaceutical Education*. Vol.78(1). <https://doi.org/10.5688/ajpe78111> ISSN: 0002-9459

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An Instrument to Assess Subjective Task Value Beliefs Regarding the Decision to Pursue Postgraduate Training

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RESEARCH

An Instrument to Assess Subjective Task Value Beliefs Regarding the Decision to Pursue Postgraduate Training

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Submitted February 27, 2012; accepted June 18, 2013; published February 12, 2014.

Objectives. To develop and validate an instrument to assess subjective ratings of the perceived value of various postgraduate training paths followed using expectancy-value as a theoretical framework; and to explore differences in value beliefs across type of postgraduate training pursued and type of pharmacy training completed prior to postgraduate training.

Methods. A survey instrument was developed to sample 4 theoretical domains of subjective task value: intrinsic value, attainment value, utility value, and perceived cost. Retrospective self-report methodology was employed to examine respondents' (N=1,148) subjective task value beliefs specific to their highest level of postgraduate training completed. Exploratory and confirmatory factor analytic techniques were used to evaluate and validate value belief constructs.

Results. Intrinsic, attainment, utility, cost, and financial value constructs resulted from exploratory factor analysis. Cross-validation resulted in a 26-item instrument that demonstrated good model fit. Differences in value beliefs were noted across type of postgraduate training pursued and pharmacy training characteristics.

Conclusions. The Postgraduate Training Value Instrument demonstrated evidence of reliability and construct validity. The survey instrument can be used to assess value beliefs regarding multiple postgraduate training options in pharmacy and potentially inform targeted recruiting of individuals to those paths best matching their own value beliefs.

Keywords: faculty members, residency, fellowship, graduate education, career, motivation

INTRODUCTION

The knowledge and skill requirements for specific roles within the healthcare professions vary widely; thus, the educational programs, including postgraduate programs, available to health professions students and graduates to prepare for these roles also vary widely. The decision to pursue postgraduate training after earning a PharmD degree is undoubtedly complex. Scholars have examined pharmacy students' interest in postgraduate training,^{1,2} barriers to pursuing postgraduate training,³⁻⁶ reasons for pursuing postgraduate training,⁷⁻¹⁴ perceptions regarding research,¹⁵ and exposure to postgraduate training paths.¹⁶ Despite a substantial amount of research in these areas, leaders within the profession have

expressed concern regarding the relatively small number of PharmD graduates who choose to pursue postgraduate training.^{14,17,18} Because of the unique characteristics of each postgraduate training path, recruitment of pharmacy graduates to postgraduate training cannot be approached from a "one size fits all" perspective. Task choice models indicate that students' perceptions are task specific¹⁹ ie, a student's perceptions regarding residency training may be different from those regarding graduate education. Motives for choosing a specific postgraduate training path have been studied in an exploratory manner in the pharmacy literature.^{7,12} However, there remains a need to theoretically understand the task-specific beliefs of PharmD graduates toward postgraduate training to effectively and efficiently target postgraduate training recruitment efforts.

Pursuance of postgraduate training constitutes a task choice. For example, the new PharmD graduate has many potential career options, each of which can be considered a task. Expectancy-value theory posits that the choice of task, which in this case is postgraduate training, is influenced

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by motivational beliefs. Value beliefs, in particular, are of interest in this study because they play a more prominent role in predicting task choice than do expectancy beliefs, which tend to predict persistence with a task or task performance once a task has been chosen.^{20,21}

Eccles²⁰ expectancy-value model has been used to examine task-choice perceptions and career decision-making processes.^{22,23} Her original model proposed 4 constructs for subjective task value: intrinsic value, attainment value, utility value, and perceived cost. Intrinsic value is a measure of the enjoyment of a task. Attainment value is a measure of the perceived importance of completing the task. Utility value is a measure of the usefulness of completing the task. Perceived cost is a measure of the sacrifice and effort necessary for task completion. Eccles²⁴ has since posited that perhaps attainment value should be constructed not so much as a perception of task importance but more as the extent to which a task confirms aspects of both personal and collective identities.

Based on Eccles' expectancy-value model, Battle and Wigfield²³ constructed the Valuing of Education (VOE) Scale to examine subjective task value of graduate education in a sample of college women (N=216) and examine the extent to which value beliefs regarding graduate school predicted likelihood of future graduate education enrollment. Enrollment in graduate education was not examined in their study. Factor analysis indicated a 3-factor subjective task value construct: intrinsic-attainment value; utility value; and perceived cost. Intrinsic value and attainment value were not perceived to be distinct value constructs by the study sample. Factor analysis conducted in a study that employed a modified VOE instrument to examine pharmacy students' (N=584) perceptions of graduate education and the relationship between value beliefs and likelihood of pursuing graduate education revealed a different 3-factor solution for the pharmacy student sample as compared to Battle and Wigfield's: intrinsic value, attainment-utility value, and perceived cost.²⁵ Therefore, pharmacy students did not differentiate between attainment and utility value constructs in the study.

The purpose of this study was to explore subjective task-value beliefs regarding pharmacy postgraduate training paths using a novel retrospective approach. Unlike previous studies that predicted future task choice, we sought to inform knowledge regarding the selection of postgraduate training paths by soliciting the perceptions of individuals who had successfully pursued a specific path. The objectives of the study were: (1) to develop and validate a modified VOE subjective task-value instrument to assess the value beliefs of individuals who chose to pursue specific postgraduate training paths; and (2) to evaluate differences in value beliefs across

respondents' type of postgraduate training pursued and type of pharmacy training completed prior to postgraduate training. The rationale for this study is that an instrument rigorously developed and validated in a cohort of individuals who successfully completed commonly pursued postgraduate training paths could be used to inform student career decision-making processes. Specifically, institutions could administer validated path-specific modules to student pharmacists as a means of assessing postgraduate training-specific motivational (ie, value) beliefs and optimizing student/pathway "fit."

METHODS

We developed a 40-item value beliefs survey instrument based primarily on items included in the VOE Scale.²³ All responses to items were based on a 5-point Likert scale (strongly disagree to strongly agree). We altered the tense and structure of VOE items to reflect a retrospective instead of a prospective choice. Additionally, references to "graduate education" were changed to "postgraduate training" for the current study. For example, the original VOE item "I'm excited about the idea of going to graduate school" was rephrased as "I was excited about the idea of completing postgraduate training" to reflect a task choice that was broader than graduate school alone and which had already occurred. Additional value items were developed by the researchers, using Eccles' expectancy-value framework, to elicit respondent value beliefs regarding discipline-specific aspects of postgraduate training and perceptions of overall use of postgraduate training as a means to facilitate career goals. We deemed these values to be inadequately assessed by the existing VOE instrument for purposes of this study. Instrument items specific to subjective task value are presented in Table 1. Demographic items were also included in the survey instrument.

Prior to large-scale instrument administration, a 5-member panel with expertise in expectancy-value theory, postgraduate training pathways, psychometrics, career decision-making, and survey development assessed the appropriateness of each of the items being considered for inclusion. Thereafter, a pilot study was conducted with assistant professors at 1 college of pharmacy to ensure instrument items were interpreted as intended. The pilot study did not lead to any changes to the instrument items, but did reveal a need to provide clearer directions and define postgraduate training paths for respondents. Pilot study participants were excluded from the national study. Using a mixed-mode Tailored Design Method,²⁶ a national study of pharmacy faculty members was conducted during the spring 2011 semester.

Table 1. Items Included in 40-Item Postgraduate Training Value Instrument within Theoretical Domains

Intrinsic Value	
1.1 ^a	Pursuing postgraduate training was very appealing to me.
1.2 ^a	I enjoyed advancing my knowledge by exploring new and challenging ideas in postgraduate training
1.3 ^a	The challenge of postgraduate work was exciting
1.4 ^a	I liked the challenge of doing the work required to complete postgraduate training
1.5 ^a	Increasing my knowledge through completion of postgraduate training was exciting to me
1.6 ^a	I enjoyed learning from individuals who were experts in their field during postgraduate training
1.7 ^a	I was excited about the idea of completing postgraduate training
Attainment Value	
2.1 ^a	I valued the prestige that came with completion of postgraduate training
2.2 ^b	Completing postgraduate training was important in enabling me to feel successful
2.3 ^a	I felt that I had something to prove to myself by completing postgraduate training
2.4 ^a	I felt that completing postgraduate training was a necessary part of what would make me feel good about myself in the future
2.5 ^a	I would have been very upset had I not been able to complete postgraduate training
2.6 ^b	Completing postgraduate training was important in allowing me to show that I was competent
2.7 ^a	I thought that completing postgraduate training would allow me to attain a high sense of self-worth
2.8 ^a	I would have felt like a failure had I not completed postgraduate training
2.9 ^b	I completed postgraduate training because I thought I would gain confidence in my pharmacy-related abilities
2.10 ^a	I needed postgraduate training to fulfill my potential
2.11 ^a	Completing all the work necessary to meet postgraduate training requirements made me feel good about myself
2.12 ^b	My family would have been disappointed in me had I not completed postgraduate training
2.13 ^a	Postgraduate training was of great personal value to me
Utility Value	
3.1 ^a	My life goals could have been met without postgraduate training.
3.2 ^b	I completed postgraduate training because it was required for certain careers I wanted to pursue
3.3 ^b	Completing postgraduate training allowed me to pursue a career that fit my values
3.4 ^a	I wanted to complete postgraduate training so I could make more money
3.5 ^b	I completed postgraduate training because I had a desire to specialize in a specific area
3.6 ^a	I thought postgraduate training was integral for what I wanted to do in the future
3.7 ^b	I completed postgraduate training because I thought I would be more satisfied with a job that required the training
3.8 ^b	Completing postgraduate training was necessary to differentiate myself from others
3.9 ^b	I completed postgraduate training because I wanted to gain pharmacy-related knowledge and experience
3.10 ^a	I wanted to complete postgraduate training so that I could support myself financially
3.11 ^a	Completing postgraduate education was important because it provided me better job opportunities
3.12 ^a	I thought postgraduate training would help assure me of what to do with my life
Perceived Cost	
4.1 ^a	I worried that spending time completing postgraduate training would take time away from other activities I wanted to pursue
4.2 ^b	Completing postgraduate training was worth it regardless of financial barriers I may have faced while completing it
4.3 ^b	Completing postgraduate training was worth it even if, while completing training, I earned less money than I could have in another pharmacy position
4.4 ^a	Completing postgraduate training was worth it in the end, despite all the work and heartache required to get through it
4.5 ^a	Prior to postgraduate training, I was concerned that, considering what I wanted to do with my life, completing postgraduate training would not be worth the effort
4.6 ^a	I was concerned that completing postgraduate training would prevent me from being able to focus on marriage and family as soon as I'd like to
4.7 ^a	I worried that I would waste a lot of time and money before I found out that I didn't want to continue in postgraduate training
4.8 ^a	Completing postgraduate training would not have been worth it if completing it caused my family relationships to suffer

^a Items included from Valuing of Education Scale.²³

^b Items developed by researchers.

Study participants were recruited from the 2,700 individuals classified as assistant professors at US colleges and schools of pharmacy by the American Association of Colleges of Pharmacy (AACP). It is unknown whether the database was sufficiently comprehensive to constitute a census. The sample was restricted to assistant professors in order to garner the perceptions of individuals who had made value decisions regarding postgraduate training in the relatively recent past. Whereas all individuals who complete postgraduate training do not enter academia, academia is a potential destination for most postgraduate training paths. After omitting individuals in the directory for whom adequate contact information could not be located, 2,634 assistant professors remained as potential study subjects.

Personalized recruitment efforts occurred over a 5-week period and consisted of a prenotification e-mail, 2 personalized e-mails with links to a Web-based survey instrument, and a final paper-based mailing that included a cover letter, the survey instrument, and an addressed, stamped return envelope. Identification numbers were assigned to faculty members and used strictly to remove individuals who returned survey instruments from subsequent recruitment attempts. Study approval was granted by the Purdue University Institutional Review Board. Completion of the survey instrument was voluntary and constituted informed consent for participation in the study.

Qualtrics survey software (Qualtrics, Provo, UT) was used to construct and gather responses to the online survey instrument. Data were analyzed using PASW/SPSS, version 19.0, and Amos, version 20.0 (IBM, Corp; Armonk, NY). An *a priori* significance level of $\alpha=0.05$ was set. Chi-square tests were used to examine differences in demographic characteristics of respondents as compared to normative faculty data published by AACP.²⁷ Normality and homogeneity of variance were assessed for value belief items by examination of item histograms, item variances, and the Shapiro-Wilk test of significance. Factor analysis, when applied in different contexts (eg, differences in culture, cohort, time, geographical location) can lead to differences in the relative dominance of factors in the analysis. Given the non-uniform factor loadings appearing in the previous literature using variations of the VOE instrument, exploratory factor analysis (EFA) was conducted on the responses of approximately 50% of the study respondents (N=586), selected randomly. A conservative rule of thumb for a minimally adequate sample size when conducting EFA is 10 responders for each item being analyzed.²⁸ A sufficient number of usable responses was obtained to meet this minimum criterion and cross-validate the instrument with the remaining respondents.

Prior to EFA, factorability of the items was considered. In order for items to be considered suitable, correlations of at least 0.3 should be present between a majority of items,²⁹ the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy should be >0.9 ,³⁰ and the Bartlett test of sphericity should be significant, indicating absence of an identity matrix. The factor loading cutoff was set at 0.4.³¹ Furthermore, an item's factor loading for which-ever factor it loaded to most was required to exceed that item's loading on other factors by at least a difference of 0.2 for the item to be considered for inclusion as a representative item for a factor.³² The Kaiser criterion and the Catell scree test are tools used to help researchers determine the optimal number of factors to retain. These tests, along with interpretability of the resulting factors, were used to evaluate the number of factors to retain from EFA.^{31,33} Principal axis factoring was the extraction method used in the study given that the data were found to have a non-normal distribution.^{34,35} Factors were hypothesized to correlate; therefore, an oblique (promax) rotation was performed.^{31,34}

Internal consistency reliability was assessed after EFA with a Cronbach alpha of ≥ 0.7 desired for all factors.^{31,33,36} Item/factor correlations were calculated to examine the correlation of each item with the rest of the items included in the value construct (ie, factor). To maximize internal consistency in the resulting factor loadings, an item representing a construct was removed from the instrument if the construct's Cronbach alpha increased as a result of item exclusion.

Cross-validation of the survey instrument resulting from EFA was conducted on the remaining study respondents (N=562). Confirmatory factor analysis (CFA) was used to examine the extent to which the model resulting from half of the sample was supported by data from the remaining sample. If the model adequately fits the new data, construct validity of the model is supported. Model goodness-of-fit was examined using the root mean square error of approximation (RMSEA) and the standard root mean residual (SRMR). Whereas there are multiple goodness-of-fit indices, the RMSEA and SRMR offer the benefit of decreased correlations between them as compared to other potential indices.³⁷ To demonstrate acceptable model fit, the RMSEA cutoff should be close to 0.06 and the SRMR cutoff close to 0.08. Modification indices were used to increase model fit. Modification indices suggest means by which the proposed model can be altered, ie, re-specified, to increase model fit.

After conducting EFA and CFA, item responses on the Likert scale (1-5) were summed and divided by the total number of items representing each factor to produce mean factor scores. Value beliefs were thereafter compared

across respondents' type of postgraduate training completed and type of pharmacy degree earned, if any. Type of postgraduate training completed was defined as the terminal training that the respondents pursued. Therefore, a respondent who pursued residency and fellowship training would have only responded specific to the pursuance of fellowship training. Pearson correlations and multivariate and one-way ANOVA techniques with post-hoc Tukey tests were used to examine differences in value scores across demographic characteristics. Factorial ANOVA techniques were used to examine interactions between faculty member demographic characteristics.

RESULTS

Undeliverable e-mails and paper-based survey instruments and return e-mails indicating individuals should be excluded from the study were excluded for an adjusted response rate of 50.3% (1,262 responses). Omitting respondents who did not complete at least 75% of the value belief items resulted in a response rate of 45.4%, or 1,148 usable responses. Demographic information for the study sample is summarized in Table 2. The mean age of the study sample was approximately 37 years. The mean number of years of employment at the current rank was 4.0 (± 3.5) years. Pharmacy practice described the department of employment for 67% of the study sample, and 93% of respondents indicated they were currently employed at the rank of assistant professor. Approximately 4% of the study sample had been promoted to the rank of associate or full professor despite being listed as an assistant professor by AACP. Over 50% of respondents indicated they had student loan debt in the range of \$0 to \$25,000 prior to beginning postgraduate training, whereas approximately 14% indicated student debt load in excess of \$100,000. Over 50% of respondents did not engage in outside employment while completing postgraduate training, whereas about 10% of respondents worked more than 20 hours per week while pursuing postgraduate training. Demographic characteristics able to be compared to existing AACP data included type of degree earned, gender, ethnicity, type of institution, and department of employment.²⁷ Results of chi-square goodness-of-fit tests indicating significant differences were noted for 3 demographic characteristics (ethnicity, departmental affiliation, and level of postgraduate training completed) despite an overall similarity between the study sample and AACP-reported descriptive statistics.

An examination of item factorability resulted in 3 items (3.1, 3.9, 4.8) being removed from further analysis because correlations between the 3 items and all other items were less than 0.3. The KMO measure of sampling adequacy for the remaining 37-item instrument was

Table 2. Faculty Member Demographic Characteristics (N=1077)

Variable	Frequency (%)
Gender, No. (%)	
Female	624 (58.5)
Male	443 (41.5)
Ethnicity, No. (%)	
African American	46 (4.3)
American Indian	3 (0.3)
Asian	178 (16.7)
Caucasian	755 (70.9)
Hispanic	36 (3.4)
Pacific Islander	12 (1.1)
Other	35 (3.3)
Institution type, No. (%)	
Private	453 (42.5)
Public	613 (57.5)
Department, No. (%)	
Medicinal Chemistry/ Pharmacognosy	56 (5.3)
Pharmaceutics	90 (8.4)
Pharmacology	73 (6.8)
Pharmacy Practice	723 (67.4)
Social/Behavioral	54 (5.0)
Other	76 (7.1)
Professorial rank, No. (%)	
Assistant	993 (92.9)
Associate	43 (4.0)
Full	4 (0.4)
Other	29 (2.7)
Level of postgraduate training, No. (%)	
Post-BS PharmD	73 (6.4)
Residency	530 (46.5)
Fellowship	62 (5.4)
Master's Degree	108 (9.5)
Doctoral Degree	359 (31.5)
Other	2 (0.2)
Pharmacy degree type, No. (%)	
Foreign pharmacy degree	101 (9.3)
No pharmacy degree	229 (21.1)
US pharmacy degree	755 (69.6)
Student loan debt prior to pursuing postgraduate training, No. (%)	
\$0-\$25,000	595 (55.7)
\$25,001-\$50,000	134 (12.5)
\$50,001 - \$100,000	194 (18.1)
> \$100,000	146 (13.6)
Extent of outside work during postgraduate training, No. (%)	
Did not work	541 (50.6)
1-5 hours/week	153 (14.3)
6-10 hours/week	174 (16.3)
11-20 hours/week	96 (9.0)
> 20 hours/week	105 (9.8)
Age, Mean (SD)	36.9 (8.8)
Years at current rank, Mean (SD)	4.0 (3.5)

acceptable (0.916). The Bartlett test was significant ($p < 0.001$), indicating absence of an identity matrix. Item correlation matrices indicated no issues related to multicollinearity or singularity. Seven factors were extracted that had Eigenvalues greater than 1 (Table 3). The Catell scree plot indicated a point of inflection after the fifth factor noted by a distinct flattening of the curve. Examination of the 7-factor solution did not indicate a theoretical foundation on which the factors could be defined. Given variability in factor loadings in previous graduate education-specific value scales and the scree plot output, a theory-based 4-factor solution was forced and analyzed. However, the 4-factor solution did not produce factors that could be interpreted theoretically. Based on the point of inflection in the scree plot, a 5-factor model was thereafter forced and analyzed.

Overall, 30 of the 37 items subjected to EFA loaded distinctly on 1 of the 5 factors. The percent of variance explained in the 5-factor model was 43.3%. The 8 items loading on the first factor corresponded to the theoretical construct intrinsic value. Factor 2 was comprised of 9 items representing the attainment value construct. The 6 items that loaded on the third factor represented the utility value construct. One of the items that loaded on the third factor stated, "I needed postgraduate training to fulfill my potential." This item could be perceived as an element of one's self-schema (ie, attainment value) or from a utility value perspective. The item loaded somewhat on both factors but met the requirements necessary to represent the third factor. The fourth factor included 4 items that represented the perceived cost construct. The fifth factor was comprised of 2 items that could be considered specific to pursuing postgraduate training for financial reasons and 1 item that evaluated family perceptions of pursuing postgraduate training. Internal consistency analysis resulted in removal of two items (2.9, 2.12) from the instrument because of increases in construct internal consistency reliability upon item removal. Coefficient alphas for the 28-item instrument and individual constructs

ranged from 0.70-0.88. Factor loadings for the 28 retained items are presented in Table 4.

Initial examination of the model goodness-of-fit revealed index discrepancies in model fit. The RMSEA value was above 0.06 (RMSEA=0.081) whereas the SRMR was at the suggested cutoff point for acceptable fit (SRMR=0.080). Two particular modifications were generated that improved goodness-of-fit to a large degree. First, multiple paths were suggested from the error term associated with item 3.12 ("I thought postgraduate training would help assure me of what to do with my life") to other item error terms and latent constructs (utility value, perceived cost and financial value). Second, allowing the error term associated with item 2.13 ("Postgraduate training was of great personal value to me") to be treated as a free parameter (ie, an unknown coefficient estimated by the model) was suggested. Expectancy-value theory did not justify either of these modifications. Therefore, items 2.13 and 3.12 were removed from the model. The re-specified model displayed significantly improved goodness of fit ($p < 0.0001$; RMSEA=0.067; SRMR=0.062). The Cronbach alpha for the re-specified 26-item instrument was $\alpha = 0.834$. Construct-specific internal consistency values and standardized regression weights are presented in Table 5.

The MANOVA model indicated a significant difference in value beliefs across postgraduate training level ($p < 0.001$). Overall, 4 of the 5 value constructs significantly differed ($p < 0.001$) across type of postgraduate training completed by faculty members. Effect sizes for value construct differences across level of postgraduate training ranged from $d = 0.23-0.77$. Mean scores and Tukey post hoc differences across postgraduate training level are presented in Table 6. Faculty members who had obtained a post-BS PharmD degree as postgraduate training had significantly lower intrinsic and utility value scores than individuals who pursued other levels of postgraduate training ($p = 0.015$). Additionally, utility value scores for doctoral degree earners were significantly

Table 3. Descriptive Statistics Resulting From Exploratory Factor Analysis (N=586)

Factor	Initial Eigenvalue	Initial Variance	5-Factor Model-	5-Factor Extraction	5-Factor Rotation
		Explained (%)	Variance Explained (%)	Sums of Squares Loadings	Sums of Squares Loadings
1	10.02	27.07	25.62	9.48	8.02
2	3.70	9.99	8.44	3.12	7.23
3	1.86	5.03	3.65	1.35	6.81
4	1.71	4.63	3.09	1.14	2.37
5	1.51	4.09	2.50	0.92	3.39
6	1.33	3.60			
7	1.16	3.14			

Table 4. Exploratory Factor Analysis Factor Loadings (N=586)^c

Item	Description	Value Construct				
		Intrinsic Value	Attainment Value	Utility Value	Perceived Cost	Financial Value
1.3 ^a	The challenge of postgraduate work was exciting	0.92				
1.4 ^a	I liked the challenge of doing the work required to complete postgraduate training	0.90				
1.5 ^a	Increasing my knowledge through completion of postgraduate training was exciting to me	0.84				
1.2 ^a	I enjoyed advancing my knowledge by exploring new and challenging ideas in postgraduate training	0.83				
1.7 ^a	I was excited about the idea of completing postgraduate training	0.64				
1.1 ^a	Pursuing postgraduate training was very appealing to me.	0.53				
1.6 ^a	I enjoyed learning from individuals who were experts in their field during postgraduate training	0.50				
2.13 ^a	Postgraduate training was of great personal value to me	0.48				
2.7 ^a	I thought that completing postgraduate training would allow me to attain a high sense of self-worth		0.95			
2.4 ^a	I felt that completing postgraduate training was a necessary part of what would make me feel good about myself in the future		0.68			
2.6 ^b	Completing postgraduate training was important in allowing me to show that I was competent		0.65			
2.3 ^a	I felt that I had something to prove to myself by completing postgraduate training		0.59			
2.11 ^a	Completing all the work necessary to meet postgraduate training requirements made me feel good about myself		0.56			
2.2 ^b	Completing postgraduate training was important in enabling me to feel successful		0.55			
2.1 ^a	I valued the prestige that came with completion of postgraduate training		0.46			
3.12 ^a	I thought postgraduate training would help assure me of what to do with my life		0.42			
3.2 ^b	I completed postgraduate training because it was required for certain careers I wanted to pursue			0.78		
3.7 ^b	I completed postgraduate training because I thought I would be more satisfied with a job that required the training			0.74		
3.6 ^a	I thought postgraduate training was integral for what I wanted to do in the future			0.69		
3.11 ^a	Completing postgraduate education was important because it provided me better job opportunities			0.62		
2.10 ^a	I needed postgraduate training to fulfill my potential			0.47		
3.5 ^b	I completed postgraduate training because I had a desire to specialize in a specific area			0.41		
4.1 ^a	I worried that spending time completing postgraduate training would take time away from other activities I wanted to pursue				0.77	
4.6 ^a	I was concerned that completing postgraduate training would prevent me from being able to focus on marriage and family as soon as I'd like to				0.67	
4.7 ^a	I worried that I would waste a lot of time and money before I found out that I didn't want to continue in postgraduate training				0.55	

(Continued)

Table 4. (Continued)

Item	Description	Value Construct				
		Intrinsic Value	Attainment Value	Utility Value	Perceived Cost	Financial Value
4.5 ^a	Prior to postgraduate training, I was concerned that, considering what I wanted to do with my life, completing postgraduate training would not be worth the effort				0.54	
3.4 ^a	I wanted to complete postgraduate training so I could make more money					0.68
3.10 ^a	I wanted to complete postgraduate training so that I could support myself financially					0.66

^a Items included from Valuing of Education Scale.¹⁶

^b Items developed by researchers.

^c Factor loadings are presented only for significant loadings (≥ 0.4).

lower than residency completers ($p < 0.001$). Perceived cost scores ranged from 2.09 to 2.42. A high cost score indicates an increased perception of opportunity cost associated with the task. Individuals who completed the PharmD degree as postgraduate training had significantly higher relative cost scores than individuals who completed a residency ($p = 0.004$). Additionally, individuals who completed a doctoral degree indicated significantly higher relative cost scores than individuals who completed residency training ($p < 0.001$). Financial value mean scores ranged from 2.3 to 3.0. Individuals who earned a doctoral degree (eg, PhD) had significantly higher financial value scores than individuals who completed residency training, fellowship training, and a master's degree ($p < 0.001$). Residency trained respondents indicated significantly lower financial value scores than their PharmD-trained colleagues ($p = 0.007$).

Value construct scores were compared across presence/absence of a pharmacy degree and, if a pharmacy degree was earned, whether the degree was earned in the United States or another country (Table 7). Intrinsic and attainment value scores ranged from 4.44 to 4.51 and 3.78 to 3.97, respectively, and did not differ significantly across pharmacy background. Utility value scores differed significantly between individuals with no pharmacy background and those who had a US pharmacy degree (4.33 vs 4.20, $p = 0.029$). Individuals who earned a pharmacy degree from an institution outside the United States indicated higher relative cost scores as compared to individuals who earned a US pharmacy degree (2.38 vs 2.15, $p = 0.011$). Individuals with no pharmacy degree and individuals who had earned a foreign pharmacy degree had significantly higher financial value scores as compared to individuals who had earned a US pharmacy degree ($p < 0.001$).

One significant interaction was noted for financial value when examining the interaction of level of postgraduate training and pharmacy background in relation to value beliefs ($p < 0.001$). Specifically, doctoral degree earners with no pharmacy background and a foreign pharmacy background indicated significantly higher financial value scores as compared to US pharmacist doctoral degree earners (means = 3.21, 3.10, 2.35, respectively).

DISCUSSION

Expectancy-value beliefs are commonly gathered *a priori* to predict future performance and/or future choices. In prospective study designs, present measurements or observations are compared to prior measures of abstract expectancy-value beliefs to evaluate the extent to which expectancy-value beliefs predict success (eg, task choice) or failure. In the current study, however, pharmacy faculty members were asked to recall or, if the respondents had not previously weighed certain factors, perhaps even construct value beliefs that accompanied the decision to pursue their highest level of postgraduate training. This retrospective design did not include a future time of measurement, or observation to determine the extent to which the value beliefs predict task choice. The choice of the task had already been made and success in that task achieved. The validity of such a retrospective self-report study design specific to subjective task value has not been reported in the literature. Battle and Wigfield briefly discussed issues related to the proximity of graduate education in their study and the ability of respondents to “fine-tune their perspectives”^{23(p69)} given the distance of the task from the present in terms of time. The retrospective nature of the current study enabled the researchers to circumvent this concern. The study design also allowed the researchers to obtain a sample size that would be

Table 5. Standardized Regression Weights and Cronbach's Coefficient Alphas Resulting After Confirmatory Factor Analysis and Model Re-Specification (N=562)

Construct and Item Number	Description	Standardized Regression Weight	Construct Cronbach Alpha
Intrinsic Value			0.88
1.4	I liked the challenge of doing the work required to complete postgraduate training	0.77	
1.5	Increasing my knowledge through completion of postgraduate training was exciting to me	0.76	
1.3	The challenge of postgraduate work was exciting	0.76	
1.7	I was excited about the idea of completing postgraduate training	0.74	
1.2	I enjoyed advancing my knowledge by exploring new and challenging ideas in postgraduate training	0.73	
1.6	I enjoyed learning from individuals who were experts in their field during postgraduate training	0.62	
1.1	Pursuing postgraduate training was very appealing to me.	0.59	
Attainment Value			0.84
2.7	I thought that completing postgraduate training would allow me to attain a high sense of self-worth	0.74	
2.4	I felt that completing postgraduate training was a necessary part of what would make me feel good about myself in the future	0.74	
2.2	Completing postgraduate training was important in enabling me to feel successful	0.66	
2.3	I felt that I had something to prove to myself by completing postgraduate training	0.63	
2.6	Completing postgraduate training was important in allowing me to show that I was competent	0.63	
2.1	I valued the prestige that came with completion of postgraduate training	0.58	
2.11	Completing all the work necessary to meet postgraduate training requirements made me feel good about myself	0.57	
Utility Value			0.76
3.6	I thought postgraduate training was integral for what I wanted to do in the future	0.77	
3.7	I completed postgraduate training because I thought I would be more satisfied with a job that required the training	0.69	
2.10	I needed postgraduate training to fulfill my potential	0.63	
3.11	Completing postgraduate education was important because it provided me better job opportunities	0.53	
3.2	I completed postgraduate training because it was required for certain careers I wanted to pursue	0.53	
3.5	I completed postgraduate training because I had a desire to specialize in a specific area	0.47	
Perceived Cost			0.70
4.7	I worried that I would waste a lot of time and money before I found out that I didn't want to continue in postgraduate training	0.73	
4.5	Prior to postgraduate training, I was concerned that, considering what I wanted to do with my life, completing postgraduate training would not be worth the effort	0.62	
4.1	I worried that spending time completing postgraduate training would take time away from other activities I wanted to pursue	0.55	

(Continued)

Table 5. (Continued)

Construct and Item Number	Description	Standardized Regression Weight	Construct Cronbach Alpha
4.6	I was concerned that completing postgraduate training would prevent me from being able to focus on marriage and family as soon as I'd like to	0.52	
Financial Value			0.70
3.4	I wanted to complete postgraduate training so I could make more money	0.76	
3.10	I wanted to complete postgraduate training so that I could support myself financially	0.69	

difficult to obtain in a prospective study design given the large number of postgraduate training/pharmacy background/additional demographic characteristic categories.

Respondents were asked to consider their perceptions of postgraduate training prior to pursuing postgraduate training; however, the extent to which the postgraduate training experience itself and/or career-related experience confounded perceptions of subjective task value must be considered. Internal processes (eg, perceptions of one's social world, affective memories, goals) inform and serve to construct task-specific motivational beliefs and therefore must be taken into consideration in the present study as potential, and as yet unexplored, confounding variables.

Exploratory and confirmatory factor analyses resulted in a survey instrument that displayed acceptable construct validity and internal consistency. While Eccles' task value constructs have been validated in the literature examining achievement motivation overall, the 2 previous studies that have used her model to examine task value beliefs associated with postgraduate training, specifically graduate education, have resulted in mixed factor loadings.^{23,25} In the current study, a 5-factor, 26-item instrument resulted from EFA, CFA, and internal consistency reliability analysis. Hagemeyer and Newton's research specific to student pharmacists' value beliefs regarding pursuance of graduate education resulted in factor scores

of intrinsic value, 2.75; attainment/utility value, 2.28; perceived cost, 3.15; and expectancy beliefs, 3.97.²⁵ Respondents with a US pharmacy background who had pursued graduate education in the current study indicated the following factor scores: intrinsic value, 4.57; attainment value, 3.81; utility value, 4.18; perceived cost, 2.29; and financial value, 2.37. Whereas the survey instruments are slightly different, the variations in scores are indicative of the manner in which instruments such as the one developed in this study could be used formatively to evaluate curricular exposure to postgraduate training paths and as a recruitment tool to track students based on training-specific value beliefs. For example, the Postgraduate Training Value Instrument could be administered specific to residency training, fellowship training, and graduate school training, and value beliefs scores thereafter used to facilitate discussion of postgraduate paths, and to assess and address barriers to pursuance. Likewise, path-specific modules could assist students in the selection of electives or concentrations that will best prepare them for their path or paths of particular interest.

The loadings of value belief items in this study supported Eccles' subjective task value model given that intrinsic, attainment, utility, and perceived cost loaded as distinct factors. From a theoretical perspective, fiscal aspects of a task choice could be conceptualized as an element of utility value or as an element of perceived cost if

Table 6. Mean Value Beliefs Scores across Type of Postgraduate Training

Construct	Type of Postgraduate Training					P
	Post-BS PharmD	Residency	Fellowship	Master's	Doctorate	
Intrinsic	4.10 ^a	4.47 ^b	4.48 ^b	4.34 ^b	4.47 ^b	<0.001
Utility	3.86 ^a	4.40 ^b	4.36 ^{b,c}	4.25 ^{b,c}	4.18 ^c	<0.001
Attainment	3.66	3.84	3.66	3.77	3.81	0.141
Financial	2.71 ^{b,c}	2.32 ^a	2.25 ^a	2.48 ^{a,b}	3.02 ^c	<0.001
Cost	2.42 ^a	2.09 ^b	2.23 ^{a,b}	2.27 ^{a,b}	2.33 ^{a,b,c}	<0.001

Note: Superscript letters indicate Tukey post hoc significant differences across type of postgraduate training (ie, superscript 'a' factor scores are significantly different from superscript 'b' factor scores).

Table 7. Mean Value Beliefs Scores Across Type of Pharmacy Degree Earned

Construct	Pharmacy Degree Type			P
	None	Foreign	US	
Intrinsic	4.44	4.51	4.44	0.341
Utility	3.78	3.97	3.81	0.055
Attainment	4.20 ^a	4.33 ^{a,b}	4.32 ^b	0.032
Financial	3.11 ^{a,b}	2.87 ^b	2.35 ^a	<0.001
Cost	3.12 ^a	2.92 ^a	2.38 ^b	<0.001

Note: Superscript letters indicate Tukey post hoc significant differences across type of postgraduate training (ie, superscript ‘a’ factor scores are significantly different from superscript ‘b’ factor scores).

money had to be sacrificed and/or spent in order complete a task. One item specific to pursuing graduate school to make more money was included in the original VOE instrument but did not survive factor analysis.²³ An additional item was included in this study because of research indicating low fiscal attractiveness, eg, decreased relative starting salaries of postgraduate training for specific cohorts of pharmacy faculty members.^{5,38,39} Financial characteristics of a task choice could also be classified as extrinsic characteristics, similar to job benefits or job flexibility.⁴⁰ Theoretically, extrinsic task characteristics would present in the utility value construct. However, the financial value items loaded distinctly on 1 factor regardless of the number of factors forced in EFA. This additional construct may be related to disparate perceptions of finances and other aspects of task utility, and is likely a result of utility value encompassing a broad selection of items that comprise task usefulness.

Despite obtaining results validated by contemporary expectancy-value theory, less than half of the variance in the model was explained by the 5-factor solution. Additional perceptions of value and/or additional theoretical considerations (eg, self-efficacy beliefs, volition, goal orientation, outcome expectations) likely play a role in the choice of postgraduate training path that were not taken into consideration in this study. The reliability of the 26-item study instrument as a whole was acceptable. However, the reliability of the financial value ($\alpha=0.698$) and perceived cost ($\alpha=0.697$) constructs did not quite meet the minimum internal consistency value of 0.7 sought by the investigators. Only 2 fiscal-related items were included in the instrument. Had more items specific to fiscal aspects of postgraduate training been included in the original instrument, increased items may have loaded on that factor and an acceptable reliability value for the construct obtained. The perceived cost construct was comprised of 4 items. Perhaps the low internal consistency for this construct is a function of the context specificity of perceived cost. For example, 1 of the perceived

cost items focused on the impact of pursuing postgraduate training on marriage and family. This item may not have been applicable to all potential postgraduate pursuers.

Overall, the retrospective study design did result in the Postgraduate Training Value Instrument demonstrating acceptable internal consistency reliability and construct validity. Although examining the value beliefs of assistant professors is informative in its own right, the overarching intent of this study was to gain a better understanding of successful task completers’ perceptions and use this information to inform future recruitment of individuals to similar career pathways. In a lengthy educational program such as pharmacy, examining motivational beliefs to increase efficiencies in academic or programmatic progression could facilitate decreased time to degree and perhaps decreased perceptions of cost associated with the postgraduate training task. Examining value beliefs when considering career choices could serve to increase the “fit” of students with postgraduate pathways and subsequent careers.

Brief comparative analyses across respondents’ level of postgraduate training and pharmacy background indicated differences in value beliefs. From a significance standpoint, this has not been examined to date and has the potential to inform faculty and student recruitment efforts at schools and colleges of pharmacy. Across level of postgraduate training, scores on 4 of the 5 value beliefs constructs significantly differed with only attainment value being nonsignificant. Regarding intrinsic value beliefs, scores were similarly high across all levels of postgraduate training and across pharmacy degree characteristics. This self-reported enjoyment in the training itself could be considered encouraging from a pharmacy education perspective. In addition to PharmD earners having lower scores than all other postgraduate training paths, residency completers had significantly higher utility value scores than doctoral degree earners. Utility value encompasses career goals, job opportunities, and job satisfaction. Perhaps doctoral degree earners perceive graduate school to be a necessity for entry into relatively higher-paying positions as compared to positions available without a doctoral degree (realized as higher financial value scores as compared to other postgraduate paths), yet perceive the other extrinsic factors associated with graduate education to be less valuable. Alternatively, perhaps the more competitive job market for basic science faculty positions and positions in general has decreased the perceived value of the training.

Financial value scores also differed across level of postgraduate training; however, only 1 cohort, doctoral degree earners, reported a mean construct score that exceeded the midpoint of the 5-point response scale. This

finding indicates that, overall, financial attractiveness is lacking in postgraduate training. The doctoral degree earner's increased financial value scores as compared to other levels of postgraduate training could be attributed to the previously mentioned financial gains from the doctoral degree for foreign trained pharmacists and individuals with no pharmacy background. Comparing value beliefs across pharmacy background is somewhat similar to comparing value beliefs across postgraduate training, given the extent to which individuals with similar backgrounds trend in certain postgraduate paths. Two value belief constructs of particular interest are perceived cost and financial value. Perceived cost scores for foreign pharmacists were significantly higher than scores for US pharmacists. This finding could take into consideration the relational distance that often presents with studying in a foreign country and leaving one's family. The investigators initially expected perceived cost scores to be higher for US pharmacists as compared to foreign pharmacists and nonpharmacists given the opportunity cost realized in foregone income while completing postgraduate training. However, financial considerations likely are encompassed to a greater extent in the financial value construct. Financial value scores indeed were significantly lower for US pharmacists than for foreign pharmacists and nonpharmacists.

Several potential study limitations are noteworthy. First, the validity of self-report questionnaires cannot be guaranteed because respondents are responsible for ensuring the correctness of the responses. Second, respondents needed to be able to reflect upon and recall information as to why they chose to pursue postgraduate training. Recall bias is inherent in this study design, and it is impossible to determine how accurately respondents completed this task. A primary reason the study involved a survey of assistant professors was to minimize the time between postgraduate training and the study. Nonresponse bias is also a potential limitation of the current study despite employing evidence-based methods of survey recruitment within the parameters set forth by both AACP and the Purdue University IRB. Finally, translating future-oriented task value items into items that captured past perceptions had the potential to change the meaning of instrument items. Item rewording could strengthen the instrument in future revisions.

CONCLUSION

Subjective task value theory provided a theoretical basis for examining pharmacy faculty members' value beliefs regarding the pursuance of postgraduate training. Exploratory and confirmatory factor analyses resulted in a Postgraduate Training Value Instrument comprised of 5

value constructs: intrinsic value, attainment value, utility value, financial value, and perceived cost. Further research is warranted to evaluate the developed instrument and the use of expectancy-value theory to understand why an individual would choose to pursue both the path to the career and the career itself.

ACKNOWLEDGMENTS

This manuscript was part of a PhD dissertation completed by the corresponding author at Purdue University. The authors sincerely appreciate the contributions of Steven R. Abel, PharmD, Holly L. Mason, PhD, Helen Patrick, PhD, and Nicholas G. Popovich, PhD, to this project. Special thanks, too, to all pharmacy faculty members who completed the survey instrument.

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