

Psychometric Evaluation of Measures of Organizational Commitment and Intention to Quit Among Pharmaceutical Scientists

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This study utilized different statistical techniques to evaluate the reliability (internal consistency) and the discriminant validity of the most widely used measures of organizational commitment and intention to quit (the employing organization). Data were obtained from a national mail survey of members of the American Association of Pharmaceutical Scientists (AAPS) working in the pharmaceutical industry. Both instruments had high Cronbach alpha values in this sample of pharmaceutical scientists. There was a substantial correlation between the scale designed to measure organizational commitment and that for intention to quit. Factor analysis revealed that there was only one common factor underlying the 20 items that were originally designed to measure two distinct constructs. The findings in this study suggested that the most widely used instruments designed to measure organizational commitment and intention to quit may be actually measuring one construct, or the theoretical constructs named as organizational commitment and intention to quit may not be empirically distinct.

KEY WORDS: organizational commitment; intention to quit; internal consistency; factor analysis; discriminant validity; pharmaceutical scientists.

INTRODUCTION

Since the early 1970s, the concept of employees' commitment to an organization has received increased attention from the organizational behavior and social psychology literature (1,2). Although recent years have witnessed increased research interests in the area of employees' organizational behavior among health-care professionals, such as pharmacists (3) and nurses (4), little attention has been devoted to pharmaceutical scientists working in the pharmaceutical industry. The American Association of Pharmaceutical Scientists (AAPS) has been surveying its members, including those working in the pharmaceutical industry, for several years (5). The surveys, however, have been focused mainly on descriptive information about AAPS members, such as educational level, salary, hours worked, and intention to change employers. Although organizational commit-

ment (to be defined later) has been a major research topic in the organizational behavior literature for more than 20 years, no research has been found published on the pharmaceutical scientist.

It has been estimated that the average corporation can count on losing 50% of its college-educated recruits within the first 5 years of employment (1). Although no exact numbers are available for the pharmaceutical industry, the recruitment of pharmaceutical scientists has been expensive. For successful product development, pharmaceutical manufacturers need highly educated, highly committed, innovative scientists. Therefore, research on employee organizational commitment among pharmaceutical scientists would be beneficial to the industry and the society.

The present study utilized data from a national mail survey of pharmaceutical scientists to evaluate the reliability and discriminant validity of the most widely used measures of organizational commitment and intention to quit. Also examined are the effect of gender, racial background, tenure (number of years employed by the present organization), turnover history (number of different employers prior to the present one), and community size (size of population of the community where the respondent was living during the time of this study) on the level of organizational commitment and intention to quit among a highly educated group of employees in the pharmaceutical industry—pharmaceutical scientists. The results of this study may be used to determine the applicability of the widely used measure of organizational commitment in pharmaceutical scientists and to compare the level of organizational commitment with other professionals (e.g., physicians and pharmacists) and research scientists. This study may also provide a framework for future research on employee organizational commitment in other employees in the pharmaceutical industry and in health-care professionals, e.g., pharmacists.

DISTINCTIONS BETWEEN THE TWO CONSTRUCTS AND THEIR MEASURES

Organizational Commitment

The two most significant developments in the literature on organizational commitment seem to be the approaches of *organizational behavior* and *social psychology* (1). Organizational behavior researchers use the term organizational commitment to describe the process by which employees come to identify with the goals and values of the organization and desire to maintain membership in the organization. This approach has been referred to as *attitudinal commitment* (1,2). In contrast, social psychological researchers have often taken a behavioral commitment approach.

Several problems may exist with the attitudinal approach to defining commitment: (a) commitment is conceptualized largely from the standpoint of the organization (employer) and it may have missed some of the psychological processes central to the individual's (employee's) own perception of being committed; (b) many aspects of attitudinal commitment (goal identification, desire for membership) may be constructs in their own right, and summarizing them into a single concept may cause loss of information and may

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not be justified on theoretical ground; and (c) some aspects of the attitudinal commitment are simply verbal expression of the behaviors that one seeks to predict (1).

In contrast to the notion of attitudinal commitment, behavioral commitment focuses on the process by which an individual's past behavior serves to bind him or her to the organization (1). Several social psychologists have described commitment as a process in which employees make "side-bets" with the organization (6,7). This side-bet notion represents a process of linking previously irrelevant or extraneous actions and rewards to a given line of action in such a way that the individual loses degrees of freedom in his or her future behavior. Once these commitments are made, individuals must find mechanisms for adjusting to such commitments *psychologically*. In short, a self-reinforcing cycle emerges in which a behavior causes the development of congruent attitudes, which in turn lead to further behaviors, and so forth (1).

As we may see, the notions of *attitudinal commitment* and *behavioral commitment* are along the same line with the debate about the causal direction of attitude and behavior. This "chicken and egg" problem has been debated in the social psychological literature for years. The notion of attitudinal commitment claims that attitude directs behavior, whereas that of behavioral commitment states the opposite. Many social psychological theories have been proposed to explain the phenomenon, such as the balance theory, the congruity theory, the cognitive dissonance theory, the impression management theory, the self-perception theory, the attribution theory, and the theory of reasoned action (8-10). Most of these theories have the assumption that *there is a strong tendency for people to maintain consonance (consistency) among the elements of a cognitive system*. When people hold a strong attitude toward an object, they would be more likely to act accordingly (attitude→behavior). When people have behaved in a certain way, on the other hand, they would try to find the mechanism for adjusting to such a behavior (behavior→attitude). Which is "correct"? Both! It depends on the situation, the costs and consequences of the behavior, and the information available to the individual (9-11).

Though many problems exist with the attitudinal approach to defining commitment as discussed above, since the object of attitudinal commitment is the organization, most researchers use organizational commitment and attitudinal commitment interchangeably. Many researchers and scholars approach the problem of organizational commitment from the standpoint of the organization, so they focus mainly on the attitudinal part of commitment and assume that individuals' attitude directs their behavior. The definition presented below (1) has been accepted by many organizational researchers and scholars as an established construct definition of organizational commitment (4,12-14):

Organizational commitment is the relative strength of an individual's identification with and involvement in a particular organization. Conceptually, it can be characterized by at least three factors: (a) a strong belief in and acceptance of the organization's goals and values; (b) a willingness to exert considerable effort on behalf of the organization; and (c) a strong desire to maintain membership in the organization.

Although attempts to measure organizational commitment have been quite diverse, two prevalent definitional trends have tended to emerge: moral and calculative. Representative of these trends are the instrument developed by Porter, Steers, Mowday, and Boulian (PSMB) (15) and the instrument by Hrebiniak and Alutoc (H and A) (16).

The PSMB instrument (Table II) is a 15-item scale specifically designed to tap the three aspects of the concept of organizational commitment presented above. The response format employed a 7-point Likert scale anchored from strongly disagree to strongly agree. Research evidence supported the reliability and construct validity of this instrument in different samples across different occupations (17). This instrument has been the most widely utilized to date.

Although different versions/revisions are available, the H and A instrument was developed on the basis of the exchange or reward-costs model or the notion of side-bets (18). The instrument measures the employee's propensity to leave an organization as a function of four alternative external inducements and, thus, measures the individual's calculative involvement with the organization. The response format were slightly different for different versions. Psychometric comparisons have found that the two measures of organizational commitment discussed above represent somehow different constructs (18,19). Other instruments (1,7,18) are available but they are not as well validated or as widely used as the PSMB scale.

Intention to Quit

Published references to behavioral intentions began to appear after 1975 in industrial and organizational psychology research domains. Added impetus for the study of behavioral intentions stems in part from theoretical arguments that have single them out as the most direct and immediate cognitive antecedents of overt behavior (8,20). Distinction has been made, however, between job turnover and company turnover (21). Job turnover is defined in terms of staying on a job versus leaving that job by moving either within the organization or outside of the organization, whereas organizational turnover refers to staying versus leaving an organization.

Although different terminology has been used, such as intention to quit, intention to stay, and turnover intention (Table I), the construct *intention to quit* refers to the employee's intention to leave the employing organization *voluntarily* and excludes the situation in which an employee is fired. Different instruments are available to tap the employee's intention to quit the employing organization. As shown in Table I, many researchers have utilized a single-item scale asking if the respondent intends to change the organization in the near-future (22-24). Hunt *et al.* (35) created a four-time scale assessing the employee's intent to leave the organization. The items do not make reference to intent to change profession or the type of work performed. Respondents were asked to select one of the five alternative answers for each question.

PROBLEMS STATEMENTS AND HYPOTHESES

Despite the plausibility of commonly accepted conceptual distinctions between organizational commitment and in-

Table I. Recent Studies on the Relationship Between Commitment and Intention to Quit

Ref. no.	Sample	Organizational commitment (OC)			Intention to quit (IQ)		Bivariate correlation between OC and IQ ^a
		Label	No. of items	α	Label	No. of items	
25	288 employees of a financial service institution	Value commitment	9 items from Ref. 26	0.90	Intention to stay	1 item, self-created	0.39 ($P < 0.001$)
		Continuance commitment	10 items from Ref. 26	0.85	Intention to stay	1 item, self-created	0.38 ($P < 0.001$)
27	244 nurses in two hospitals	Career commitment ^b	7 items from Ref. 28	0.84	Turnover intention	2 items from Ref. 29	-0.21 ($P < 0.05$)
24	463 special educators, 493 general educators	Professional commitment attitude	15 items from Ref. 15	0.86	Intent to stay in teaching	1 item, self-created	0.54 ($P < 0.05$) ^c 0.54 ($P < 0.05$) ^d
		Professional commitment behavior	4 items from Ref. 30	0.87	Intent to stay in teaching	1 item, self-created	0.41 ($P < 0.05$) ^c 0.44 ($P < 0.05$) ^d
		Organizational commitment school	4 items, self-created but based on Ref. 30	0.87	Intent to stay in teaching	1 item, self-created	0.11 ($P < 0.05$) ^c 0.20 ($P < 0.05$) ^d
31	129 white-collar employees in three firms	Organizational commitment	9 items, self-created	0.86	Organizational withdrawal intention	3 items based on Ref. 32 definition	-0.52 ($P < 0.001$)
		Occupational commitment	9 items, self-created	0.87	Occupational withdrawal intention	3 items based on Ref. 32 definition	-0.33 ($P < 0.001$)
		Job commitment	9 items, self-created	0.87	Job withdrawal intention	3 items based on Ref. 32 definition	-0.31 ($P < 0.001$)
12	72 hospital staff	Organizational commitment	15 items from Ref. 17 ^e	0.91	Intent to stay	4 items from Ref. 25	0.40 ($P < 0.001$)
	71 bank tellers	Organizational commitment	15 items from Ref. 17	0.89	Intent to stay	4 items from Ref. 25	0.76 ($P < 0.001$)
33	85 graduate students of business	Organizational commitment	13 items from Ref. 17	0.93	Intention to quit	2 items from Ref. 34	-0.69 ($P < 0.01$)
22	253 hospital care-givers	Organizational commitment	15 items from Ref. 17	0.91	Intention to stay	1 item, self-created	0.40 ($P < ?$)
	285 clerks in government	Organizational commitment	15 items from Ref. 17	0.90	Intention to stay	1 item, self-created	0.50 ($P < ?$)
14	175 evening students (full-time employees)	Organizational commitment	15 items from Ref. 17	0.88	Intention to quit	3 items from Ref. 14	-0.61 ($P < 0.001$) ^f

^a P values were given in the original studies.

^b Organizational commitment was not measured in Ref. 27.

^c For special educators only.

^d For general educators only.

^e References 15 and 17.

^f This r value was calculated from $R^2 = 0.376$ given by the original authors.

tention to quit (1,12,22,36), there is surprisingly little rigorous empirical evidence of discriminant validity between the measures of the two constructs in the literature. Listed in Table I are examples of recent studies on the relationship between organizational commitment and intention to quit. This list provides a snapshot of empirical studies using various measures of the two constructs. All of the studies presented in Table I treated organizational commitment and intention to quit as two distinct constructs, but no effort was made to check the discriminant validity of the measures of the two constructs. Many researchers reported high Cronbach alpha values of the measures of the two constructs and

claimed that organizational commitment is the single best predictor of intention to quit (22,36). We believe, however, that in the absence of rigorous empirical evidence of their discriminant validity, the substantial associations that have consistently been found between measures of the two constructs raise the possibility that organizational commitment and intention to quit may not be empirically distinct.

If the two scales originally designed to measure organizational commitment and intention to quit are really measuring two distinct psychological constructs, the following two null hypotheses should be rejected by the data from this study.

Hypothesis 1. The items from these two instruments will be loaded on a single factor when the correlation matrix of all items from the two instruments is factor analyzed.

Hypothesis 2. There will be no differences when comparing the correlations between these two measures and demographic variables, such as gender, race, tenure, turnover history, and community size.

METHODS

Data Collection

This study was a section of a larger study designed to test three theoretical models of social support among pharmaceutical scientists. The sample of this study was members of the American Association of Pharmaceutical Scientists (AAPS). The sampling frame included only those who provided mailing addresses in the pharmaceutical industry at the time of the survey. A 100-item survey questionnaire was mailed to each of the 600 AAPS members randomly selected from the 1991 AAPS Directory of Members. A follow-up postcard and a second questionnaire were sent to the non-respondents 2 and 4 weeks after the first mailing, respectively. Three hundred thirty-four completed questionnaires were returned, yielding a response rate of 55.7%.

Instruments

The major variables covered in the original instrument included organizational commitment, turnover intention (intention to quit), job stress, social support, and sociodemographic variables. The present paper focused only on the scales of organizational commitment and intention to quit.

Organizational Commitment. The measure of organizational commitment evaluated in this study was the most

widely utilized 15-item PSMB scale (15). The scale is presented in Table II.

Intention to Quit. The scale of intention to quit was the modified version of the Hunt *et al.* (12,35) Intention to Leave scale. One item was added to the four-item scale, asking if the respondent's suggestions would be given to a friend who was interested in working in the respondent's organization. The pharmaceutical scientists were instructed to select one of five alternative answer options. The items are presented in Table III.

ANALYSES, RESULTS, AND DISCUSSION

Of the 334 pharmaceutical scientists who completed the survey, 257 (76.9%) were male, and 257 (76.9%) were white and 73 (18.6%) Asian. Two hundred eighty (80.8%) were married, 40 (12.2%) single, and 17 (5.1%) divorced. Presented in Tables II and III are the items of the measures of organizational commitment and intention to quit, as well as the means and standard deviations of the responses to each individual item. As we may see, the pharmaceutical scientists tended to give a higher response score to the positive items but a lower response score to the negative items. The pharmaceutical scientists gave a low score to the item "I would accept almost any type of job assignment in order to keep working for this organization," although it is a positive item. This may be due to the fact that all of the respondents in this study held a bachelor's or higher degree and 62.0% held a PhD. Research has suggested that experts (highly educated professionals, such as pharmaceutical scientists) are less likely to be loyal to their employing organization than to their profession because of the skills acquired through extensive training (37).

Item-Total Statistics

As shown in the correlation matrix in Table IV, each

Table II. The Scale of Organizational Commitment, Means and Standard Deviations (SD)

Item	Content ^a	Means	SD
OC1	I am willing to put a great deal of effort beyond that normally expected in order to help this organization be successful.	6.02	1.16
OC2	I talk up this organization to my friends as a great organization to work for.	5.45	1.46
OC3	I feel very little loyalty to this organization.	2.59	1.83
OC4	I would accept almost any type of job assignment in order to keep working for this organization.	2.69	1.74
OC5	I am proud to tell others that I am part of this organization.	5.81	1.30
OC6	I find that my values and the organizational values are very similar.	4.86	1.67
OC7	I could just be working for a different organization as long as the type of work was similar.	4.26	1.65
OC8	This organization really inspires the very best in me in the way of job performance.	4.52	1.70
OC9	It would take very little change in my present circumstances to cause me to leave the organization.	2.84	1.63
OC10	I am extremely glad that I chose this organization to work for over others I was considering at the time I joined.	5.48	1.47
OC11	There's not too much to be gained by sticking with this organization indefinitely.	3.16	1.87
OC12	Often, I find it difficult to agree with the organization's policies on important matters relating to its employees.	3.64	1.85
OC13	I really care about the fate of the organization.	5.92	1.23
OC14	For me this is the best of all possible organizations for which to work.	4.60	1.67
OC15	Deciding to work for this organization was a definite mistake on my part.	1.68	1.15

^a Response to each item is measured on a 7-point scale, with 1 indicating "strongly disagree" and 7 "strongly agree."

Table III. The Scale of Intention to Quit, Means and Standard Deviations (SD)

Item	Content	Mean	SD
IQ1	Which of the following statements most clearly reflects your feelings about your future with this organization in the next year? 1. I definitely will not leave. 2. I probably will not leave. 3. I am uncertain. 4. I probably will leave. 5. I definitely will leave.	2.03	1.03
IQ2	How do you feel about leaving this organization? 1. I am presently looking and planning to leave. 2. I am seriously considering leaving in the near-future. 3. I have no feelings about this one way or another. 4. As far as I can see ahead, I intend to stay with this organization. 5. It is very unlikely that I would ever consider leaving this organization.	3.55	0.99
IQ3	If a friend of yours told you that he/she was interested in working for your organization, what would you tell him/her? 1. Strongly recommend it. 2. Probably recommend it. 3. No recommendation either way. 4. Probably advise him/her against it. 5. Strongly advise him/her against it.	1.83	0.86
IQ4	If you were completely free to choose, would you prefer or not prefer to continue working for this organization? 1. Prefer very much to continue working for this organization. 2. Prefer to work here. 3. Don't care either way. 4. Prefer not to work here. 5. Prefer very much not to continue working for this organization.	2.08	1.06
IQ5	How important is it to you personally that you spend your career in this organization rather than some other organization? 1. It is of no importance at all. 2. I have mixed feelings about its importance. 3. It is of some importance. 4. It is fairly important. 5. It is very important for me to spend my career in this organization.	2.95	1.24

item in each scale is correlated with at least one other item in the same scale ($r \geq 0.3$). Generally, the correlations between the items in the scale of organizational commitment are lower and less homogeneous than those in the scale of intention to quit.

The (corrected) item-total correlation is the correlation coefficient between the score on an individual item and the

sum of the scores on the remaining items (37). Its value has been used to decide whether the item belongs to the scale under examination. Any item that correlates near zero with (total) tests scores should be carefully inspected. Unless there are strong grounds for deciding otherwise, such an item should be discarded because it is more likely that the item is ambiguous or actually has little to do with the topic (39).

As shown by the corrected item-total correlation in Table V, when the two scales were analyzed independently of each other, all items were acceptable if the criterion was set at ≥ 0.30 . Consistent with the correlation matrix examination discussed above, the item "I would accept almost any type of job assignment in order to keep working for this organization" has the lowest item-total correlation value.

Similar results were obtained when the items in the two scales were analyzed as if they were from a single scale. Adding items of one scale to the other did not significantly change the item-total correlation values of the original scale (Table IV). This finding suggests that the two sets of items intended to measure two constructs may actually measure a single construct.

The Cronbach alpha value of the combined scale is larger than that of each individual scale because the Cronbach alpha value is a function of the intercorrelations between the items and the number of items in the scale. Therefore, when the number of items is increased, the Cronbach alpha value will be increased if all of the items are positively correlated (Table IV).

Separate Factor Analysis of Each Individual Scale

While internal consistency (Cronbach coefficient alpha) implies interrelatedness among a set of items in a test scale, it is not necessarily a good indicator of unidimensionality among the items (40). It has been suggested that alpha is too complexly determined to be a suitable index of homogeneity and that factor analysis should be performed to see how tenable the notion of homogeneity (unidimensionality) is for the items (40). The method of principal-axis factoring (PAF) was used to obtain estimates of common factors from the correlation matrices. The PAF proceeds much as principal-components (PC) analysis, except that the diagonals of the correlation matrix are replaced by estimates of the communalities (38). The PC analysis was not used here because it uses ones (1.0s) in the diagonal and assumes perfect reliability in all measures (41), which is often a problem in social/psychological measures. Moreover, the purpose of this study was to determine if the two measures were loaded on one common factor (common variance).

In practice, deciding on the number of factors is difficult since there is no universally accepted method (42,43). Two methods were used to determine the number of factors extracted in this study: the Kaiser-Guttman rule and the Scree test. The Kaiser-Guttman rule states the following: (a) obtain the eigenvalues of the correlation matrix; (b) ascertain how many eigenvalues are greater than 1.0, and that number is the number of nontrivial factors. By the Scree test, the user plots successive eigenvalues on a graph and arrives at a decision based on the point at which the curve of decreasing eigenvalues changes from a rapid, decelerating decline to a

Table IV. Correlation Coefficients Between Items

	OC1	OC2	OC3	OC4	OC5	OC6	OC7	OC8	OC9	OC10
OC2	0.5000									
OC3 ^a	0.2675	0.4186								
OC4	0.1665	0.2569	0.0078							
OC5	0.3862	0.7376	0.4215	0.2736						
OC6	0.3768	0.5772	0.3102	0.3389	0.6681					
OC7 ^a	0.1768	0.3250	0.2964	0.2462	0.3182	0.2506				
OC8	0.4330	0.5856	0.3682	0.2511	0.6237	0.6590	0.2712			
OC9 ^a	0.1285	0.3650	0.3088	0.1395	0.3924	0.3208	0.2591	0.4522		
OC10	0.3865	0.5455	0.3413	0.2423	0.6072	0.5524	0.2172	0.5442	0.3424	
OC11 ^a	0.3158	0.5321	0.3670	0.2461	0.5716	0.5293	0.3371	0.5665	0.4853	0.4978
OC12 ^a	0.2455	0.4339	0.2628	0.2439	0.4706	0.5468	0.2853	0.5087	0.3860	0.3285
OC13	0.4038	0.3994	0.3412	0.2132	0.4581	0.4128	0.1653	0.4236	0.3213	0.4189
OC14	0.4054	0.6502	0.3628	0.3532	0.6277	0.5748	0.3901	0.6610	0.4049	0.6130
OC15 ^a	0.3322	0.5565	0.4160	0.1849	0.6081	0.5187	0.2297	0.4775	0.3256	0.6100
IQ1 ^b	0.2151	0.3975	0.2389	0.2092	0.4197	0.3644	0.2714	0.4305	0.4709	0.3777
IQ2	0.2935	0.4238	0.2844	0.3103	0.4763	0.3984	0.2675	0.4946	0.5167	0.4535
IQ3 ^b	0.3454	0.6995	0.3941	0.2414	0.7317	0.6086	0.3097	0.6173	0.4209	0.6099
IQ4 ^b	0.3596	0.6581	0.3789	0.2708	0.6547	0.5942	0.3297	0.6084	0.4182	0.6008
IQ5	0.3117	0.4088	0.2944	0.4331	0.3898	0.3761	0.3136	0.4572	0.4306	0.4091
	OC11	OC12	OC13	OC14	OC15	IQ1	IQ2	IQ3	IQ4	
OC12 ^a	0.5014									
OC13	0.3805	0.2761								
OC14	0.5733	0.4408	0.4804							
OC15 ^a	0.4696	0.3234	0.4192	0.5496						
IQ1 ^b	0.5115	0.4029	0.2640	0.4531	0.3337					
IQ2	0.5516	0.3857	0.3205	0.5549	0.4582	0.7187				
IQ3 ^b	0.5368	0.4879	0.4027	0.6510	0.6502	0.4429	0.4899			
IQ4 ^b	0.5653	0.4503	0.4416	0.6232	0.6248	0.5316	0.5145	0.6791		
IQ5	0.5347	0.3716	0.4162	0.5219	0.3862	0.4779	0.5331	0.4336	0.5181	

^a Recoded so that higher scores indicate higher level of organizational commitment.

^b Recoded so that higher scores represent lower intention to quit.

flat gradual slope (42); 0.30 was used as the cutoff value for nonzero loadings.

For the measure/scale of organizational commitment (15 items), the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was 0.92768. Although three eigenvalues were greater than 1.0, the first factor accounted for 45.7% of the total variance. The second and the third factors accounted for only 7.3 and 7.0%, respectively. While two subscales were created by previous researchers (44) based on factor analysis results and some later studies used one of the subscales consisting of different items (12,25), the present study revealed a rather irregular factor pattern if three factors were intentionally extracted. In fact, while all items had a loading of ≥ 0.30 on factor 1 in the unrotated factor matrix, only one item was loaded on factor 2 (item OC9, 0.37) and two items on factor 3 (items OC3, 0.37, and OC4, 0.35). Therefore, based on the Scree test, it was concluded that only one common factor existed for the scale of organizational commitment.

For the scale of intention to quite (five items), the KMO value was 0.79124. One eigenvalue was greater than 1.0 and the first factor accounted for 63.5% of the total variance. Therefore, the factor analysis produced a single-factor solution for each of the two instruments and thus suggests that the items in each instrument were measuring a single underlying construct.

Factor Analysis of the Two Scale Combined as a Single Test Scale

The Cronbach alpha and factor analysis of each individual scale examined the internal consistency of the test scale. A high internal consistency indicates that the items in each individual scale are correlated with each other. In other words, the items in each scale belong to one cluster. These analyses of each individual scale, however, did not provide us with any information about whether the items in different scales were really differentiated from each other.

Factor analysis is the method of choice when an investigator wishes to analyze a set of variables to discover a new set of variables which represent the original set of variables parsimoniously (43,45). When correlations between the items in each individual scale are factor analyzed, as seen previously, the main purpose is to determine if all items are loaded on only one "clean" factor. This is a technique to evaluate the homogeneity/unidimensionality of the scale (40). A matrix of item correlations can also be factored to determine whether item responses "cluster" together in patterns predictable in light of the theoretical structure of the construct of interest. The issue here is whether the constructs, empirically identified through the factor analysis, correspond to the theoretical constructs which the test developer hypothesized in developing the test (40). In the

Table V. Item-Total Statistics of the Measures of Organizational Commitment and Intention to Quit^a

Items	Two scales combined and used as a single scale			Each scale analyzed individually		
	Corrected item-total correlation	Squared multiple correlation	α if item deleted	Corrected item-total correlation	Squared multiple correlation	α if item deleted
OC1	0.4671	0.3643	0.9272	0.4727	0.3465	0.9026
OC2	0.7416	0.6819	0.9219	0.7414	0.6492	0.8936
OC3 ^b	0.4655	0.3132	0.9286	0.4671	0.3089	0.9041
OC4	0.3515	0.3075	0.9309	0.3302	0.2033	0.9090
OC5	0.7757	0.7069	0.9217	0.7787	0.6858	0.8933
OC6	0.7091	0.6164	0.9224	0.7188	0.6078	0.8937
OC7 ^b	0.4106	0.2437	0.9292	0.4042	0.2349	0.9057
OC8	0.7452	0.6235	0.9216	0.7429	0.6151	0.8926
OC9 ^b	0.5319	0.4097	0.9264	0.4998	0.3395	0.9021
OC10	0.6734	0.5476	0.9233	0.6649	0.5358	0.8962
OC11 ^b	0.7139	0.5468	0.9224	0.6938	0.5056	0.8946
OC12 ^b	0.5773	0.4199	0.9259	0.5697	0.4040	0.8999
OC13	0.5393	0.3764	0.9260	0.5388	0.3547	0.9007
OC14	0.7794	0.6566	0.9208	0.7704	0.6393	0.8917
OC15 ^b	0.6551	0.5691	0.9242	0.6428	0.5047	0.8982
IQ1 ^b	0.5809	0.5861	0.9257	0.6811	0.5635	0.8131
IQ2	0.6562	0.6449	0.9248	0.7160	0.5897	0.8050
IQ3 ^b	0.7683	0.6848	0.9239	0.6352	0.5007	0.8278
IQ4 ^b	0.7693	0.6526	0.9229	0.7020	0.5673	0.8073
IQ5	0.6275	0.5107	0.9245	0.6039	0.3747	0.8415

^a Alpha values: $\alpha_1 = 0.9283$ when two scales were combined and analyzed as a single scale; $\alpha_2 = 0.9048$ when the scale of org. commitment was analyzed alone; $\alpha_3 = 0.8556$ when the scale of intention to quit was analyzed alone. The "corrected item-total correlation" values are similar in the two sets of analysis. The alpha value is a function of correlations between items and number of items in the scale. When all items in a scale are correlated significantly, the number of items will make a big difference in the alpha value. Therefore, $\alpha_1 > \alpha_2 > \alpha_3$.

^b Recoded so that higher scores represent greater commitment and lower intention to quit.

present study, different items were used to measure different underlying and predefined constructs—organizational commitment and intention to quit. Therefore, factor analysis of the intercorrelations between the items from the two scales was performed to check if the items from different scales were loaded on different factors as hypothesized.

As shown in Table VI, the initial statistics of factor analysis revealed that the first factor accounted for 46.7% of the total variance. Although three eigenvalues were greater than 1.0, it was concluded from the results in Table VI that there was only one common factor. Therefore, the items supposed to measure organizational commitment and intention to quit were, in fact, measuring only one underlying construct.

If the items were to measure two different constructs, they should have been loaded on two clean factors. Two factors were intentionally extracted in the next step to test the hypothesis that the items were indeed measuring two constructs—organizational commitment and intention to quit. The Varimax rotation of factors was performed. The Varimax rotation attempts to minimize the number of variables that have high loadings on a factor, which should enhance the interpretability of the factors (40). The method of Varimax rotation was performed because the goal here was to determine if the 20 items were loaded on different factors as originally designed. As shown in Table VII, when two

factors were extracted, it is difficult to interpret the Varimax rotation results. Therefore, based on the unrotated factor matrix and the Scree test, it was concluded that the 20 items created to measure two constructs were practically measuring a single underlying construct.

Relationships Between the Two Measures and Other Variables

As shown in Table VIII, there were no significant differences in the scores for the two measures between male and female, white and nonwhite, and persons who were married and those who were not. No significant differences were found among persons who lived in communities with different population sizes or among persons who had different employment histories (number of different employers prior to the present one). There seems to be no significant relationship between a person's tenure in the organization and his/her responses to the two survey scales.

Examining the last two columns in Table VIII, it may be seen that the response patterns to the two scales were similar. That is, if a group had a higher mean score on the organizational commitment measure, then the intention to quit score for that group would certainly be lower than the other group(s). The correlation coefficient between the two measures was substantially high ($r = 0.854$). These findings in-

Table VI. Initial Statistics When the Correlation Matrix Between the Items in the Two Scales Were Factor Analyzed with the Principal-Axis Method (PAF)^a

Item ^b	Communality	*	Factor	Eigenvalue	% of variation	Cumulative %
OC1	0.36863	*	1	9.34630	46.7	46.7
OC2	0.68130	*	2	1.38037	6.9	53.6
OC3	0.30844	*	3	1.09327	5.5	59.1
OC4	0.30859	*	4	0.92556	4.6	63.7
OC5	0.69906	*	5	0.91033	4.6	68.3
OC6	0.61174	*	6	0.78828	3.9	72.2
OC7	0.24807	*	7	0.70193	3.5	75.7
OC8	0.62249	*	8	0.55947	2.8	78.5
OC9	0.41551	*	9	0.51671	2.6	81.1
OC10	0.52677	*	10	0.49288	2.5	83.6
OC11	0.55365	*	11	0.46698	2.3	85.9
OC12	0.42441	*	12	0.43447	2.2	88.1
OC13	0.38309	*	13	0.41254	2.1	90.1
OC14	0.66276	*	14	0.38531	1.9	92.1
OC15	0.56132	*	15	0.37103	1.9	93.9
IQ1	0.59425	*	16	0.30371	1.5	95.4
IQ2	0.65142	*	17	0.26281	1.3	96.8
IQ3	0.68538	*	18	0.24143	1.2	98.0
IQ4	0.65912	*	19	0.21700	1.1	99.1
IQ5	0.51107	*	20	0.18960	0.9	100.0

^a Kaiser-Meyer-Olkin measure of sampling adequacy = 0.94142; Bartlett test of sphericity = 3727.6278; significance = 0.00000.

^b See Tables I and II for the content of each time.

Table VII. Factor Matrix When All 20 Items Were Factor Analyzed as a Single Scale^a

Item ^b	Unrotated matrix ^c		Quartmax rotation ^c		Varimax rotation ^c	
	Factor 1	Factor 2	Factor 1	Factor 2	Factor 1	Factor 2
OC1	0.48115		0.48992		0.49065	
OC2	0.77681		0.78861		0.76336	
OC3 ^d	0.48160		0.48616		0.43963	
OC4	0.36572		0.35963			0.31390
OC5	0.80487		0.81656		0.78435	0.30759
OC6	0.72716		0.73634		0.69179	
OC7 ^d	0.41623		0.41102			0.33101
OC8	0.77064		0.77289		0.64197	0.43105
OC9 ^d	0.55911		0.54361	0.31683		0.57437
OC10	0.69883		0.70644		0.65006	0.30584
OC11 ^d	0.74036		0.73129		0.47980	0.58567
OC12 ^d	0.59394		0.58950		0.41956	0.42643
OC13	0.56112		0.56444		0.48802	
OC14	0.80857		0.80854		0.64447	0.48872
OC15 ^d	0.69317		0.70083		0.64611	0.30172
IQ1 ^d	0.62822	0.45792	0.60395	0.48948		0.74981
IQ2	0.69873	0.44365	0.67510	0.47883		0.78265
IQ3 ^d	0.80929		0.81628		0.73066	0.38191
IQ4 ^d	0.80935		0.81003		0.65379	0.47829
IQ5	0.63936		0.62438	0.30866	0.32727	0.61483

^a Only two factors were extracted (PAF method).

^b See Tables I and II for the content of each item.

^c Factor loadings ≤ 0.3 are left blank.

^d Recoded so that higher scores indicate higher level of organizational commitment but lower level of intention to quit.

Table VIII. Means and Standard Deviations of the Responses by Each Group

Variable	Group	Number of cases ^a	Organizational commitment ^b	Intention to quit ^b
Gender	Male	254	75.2 ± 15.4	11.4 ± 4.2
	Female	72	74.9 ± 16.0	11.5 ± 3.9
Race	White	255	75.9 ± 16.1	11.3 ± 4.2
	Nonwhite	70	72.8 ± 13.1	12.1 ± 3.9
Marital status	Married	267	75.3 ± 15.3	11.4 ± 4.1
	Nonmarried	60	74.3 ± 16.6	11.7 ± 4.1
Town size	<5,000	29	76.5 ± 14.4	11.1 ± 3.6
	5,000–10,000	31	68.3 ± 18.0	12.2 ± 4.7
	10,000–50,000	83	76.5 ± 15.5	10.9 ± 3.7
	50,000–100,000	56	74.9 ± 16.0	11.8 ± 4.8
	>100,000	122	75.5 ± 14.8	11.5 ± 4.1
Employers worked for before the present one	0	88	75.9 ± 13.1	12.0 ± 3.7
	1	103	74.6 ± 15.9	11.8 ± 3.9
	2	74	77.1 ± 16.3	10.9 ± 4.2
	3	35	72.0 ± 17.6	12.2 ± 4.7
	≥4	22	75.0 ± 17.3	11.9 ± 5.0
Years worked in the organization	≤2.0	59	74.8 ± 17.5	11.4 ± 4.1
	2.1–5.0	89	76.6 ± 14.7	11.6 ± 4.3
	5.1–10.0	82	73.4 ± 15.0	11.9 ± 3.9
	10.1–20.0	56	74.9 ± 15.2	11.3 ± 4.2
	≥20.0	40	76.6 ± 16.1	10.5 ± 4.1

^a Some respondents did not answer every question, so small discrepancies exist in the numbers of cases between the two measures (commitment and intention to quit).

^b Statistically nonsignificant between any groups.

dicating that these two measures may be actually measuring one single underlying construct.

Therefore, based on the above analyses, it is reasonable to say that the two null hypotheses were not rejected in this study; that is, the two instruments originally designed to measure organizational commitment and intention to quit are, in fact, measuring one underlying construct.

CONCLUSIONS

This study found that the pharmaceutical scientists in this study reported a higher mean score on the organizational commitment scale than pharmacists (3) and scientists working in other fields (17). The 15-item instrument designed to measure organizational commitment performed well psychometrically in this sample of pharmaceutical scientists (high internal consistency and unidimensional). Therefore, the PSMB instrument can be used to study organizational commitment among pharmaceutical scientists.

Research so far, however, has treated organizational commitment and intention to quit as two distinct psychological constructs. Many researchers studying the relationship between these two constructs have checked only the internal consistency of the most widely used instruments and have claimed that organizational commitment is the single most significant predictor of intention to quit, but no discriminant validity was checked between the measures of these two constructs. The present study was based on the assumption that one measure would certainly be the best predictor of the other if they measure the same construct.

This study utilized different statistical techniques in evaluating the reliability (internal consistency) and the discriminant validity of the most widely used measures of or-

ganizational commitment and intention to quit. Although each instrument as a single measure, per se, had a high internal consistency coefficient alpha value in this sample of pharmaceutical scientists, the correlation between these two measures was substantially high. Factor analysis revealed only one common factor underlying the 20 items that were originally designed to measure two distinct constructs. Although the discriminant validity of measures of organizational commitment (the PSMB scale), job involvement, and job satisfaction has been documented (46), the findings in this study suggested that the two most widely used measures designed to measure organizational commitment and intention to quit may actually be measuring one construct, or the theoretical constructs named as organizational commitment and intention to quit may not be empirically distinct.

This study used a relatively homogeneous sample—pharmaceutical scientists. Similar evaluations in different samples are recommended to verify the conclusions of this study further.

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