

A Confirmatory Investigation of the Dimensionality of the Pay Satisfaction Questionnaire

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In the past, researchers have reached contradictory conclusions about the ability of the Pay Satisfaction Questionnaire (PSQ) to measure dimensions of pay satisfaction. Using a more rigorous and extensive series of tests than has been the case with past research and using longitudinal data from 2 samples of workers, the present study supported the 4 dimensions suggested by H. G. Heneman and D. P. Schwab (1985). The 4-factor solution was supported at both Time 1 and Time 2, despite the fact that a compensation intervention occurred between the time intervals. These results suggest favorable conclusions about the ability of the PSQ to measure pay satisfaction and are discussed in light of additional tests that may further substantiate the validity of the PSQ.

Research on the antecedents and consequences of pay satisfaction has received considerable attention during the past 2 decades (Miceli & Lane, 1991). Along with the escalating interest in understanding how individual and organizational phenomena relate to pay satisfaction, research on the measurement of the construct has kept pace by progressing from development of measures of overall pay satisfaction to a more comprehensive measure based on the assumption that pay satisfaction is a multidimensional construct. H. G. Heneman and Schwab (1979, 1985) developed the Pay Satisfaction Questionnaire (PSQ) to test this multidimensionality. The PSQ subsequently has become a popular instrument because it can be used to better understand satisfaction with the various components of compensation (e.g., base pay, raises, benefits, and structure and administration of pay).

Even though use of the PSQ has increased over the years, there is still debate regarding the appropriateness of the factor structure and, thus, the suitability of the current measure. H. G. Heneman and Schwab (1985) hypothesized that pay satisfaction comprised five facets (pay level, pay raises, benefits, structure, and administration). Confirmatory factor analysis (CFA) results supported the five dimensions as hypothesized. However, subsequent exploratory factor analysis (EFA) results suggested that combining the structure and administration scales would yield a more parsimonious measure of pay satisfaction. This four-factor solution was then replicated on another sample of workers. Subsequent work has supported the multidimensional

nature of pay satisfaction but has reached divergent, often conflicting conclusions about the adequacy of the PSQ for measuring dimensions of pay satisfaction.

Table 1 illustrates the confusion in past research over the proper number of dimensions represented by the PSQ. The number of factors that has emerged ranges from 1 to 5. Several limitations with these studies may explain the inconsistent results. First, most of the studies have used EFA, which, as H. G. Heneman and Schwab (1985) noted, is severely restricted in its ability to confirm the proper factor structure because the analysis is data driven rather than theory driven (Bobko, 1990). Inconsistent results also may have been generated by past research because some studies used oblique factor rotations whereas others used varimax rotations (orthogonal rotations that assume zero intercorrelations among the factors). Given that past research has suggested that the PSQ dimensions are significantly related, this is clearly a dubious assumption.

A second point to keep in mind when evaluating past research on the PSQ is that the dimensions of pay satisfaction are not independent, and, in fact, several are fairly highly related. However, this does not necessarily undermine the validity of the PSQ. Dimensions of compensation are not independent, so one should not expect dimensions of pay satisfaction to be independent. For example, because pay raises subsequently affect pay level, employees satisfied with their pay raises are likely in turn to be more satisfied with their level of pay. Rather than subjectively determining whether a particular factor intercorrelation is too high, the real issue seems to be whether the dimensions are conceptually and empirically separable (i.e., are they capable of being distinguished from one another?).

Finally, the fact that specific items contained in the PSQ have high cross-loadings (i.e., load on factors in addition to the factor on which they are hypothesized to load) is a valid concern. However, one would expect some degree of cross-loadings if the factors were conceptually related. Even well-accepted measures of job satisfaction, such as the Job Descriptive Index, have items that cross-load on other factors (Smith, Kendall, & Hulin, 1969). It also is important to note that cross-loadings may have been generated by past research through the inappropriate use of orthogonal factor rotations, which generate more cross-loadings than do oblique rotations.

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Table 1
Past Research on the Dimensionality of the Pay Satisfaction Questionnaire

Study	Type of factor analysis used	No. of factors
H. G. Heneman & Schwab (1985)	Confirmatory	5
	Exploratory—V	4
Ash, Dreher, & Bretz (1987)	Exploratory—V	3
Orpen & Bonnici (1987)	Exploratory—V	1
R. L. Heneman, Greenberger, & Strasser (1988)	Exploratory—O	4
Scarpello, Huber, & Vandenberg (1988)	Exploratory—O & V	3, 4
Carraher (1991)	Exploratory—O	3
Mulvey, Miceli, & Near (1992)	Confirmatory	—
Judge (1993)	Confirmatory	4

Note. Dash indicates that this confirmatory factor analysis yielded inadmissible results. O = oblique rotation; V = varimax rotation.

Two of the studies cited in Table 1 have provided in-depth analyses of the PSQ but, nonetheless, have reached divergent conclusions about the adequacy of the PSQ in measuring pay satisfaction. Scarpello, Huber, and Vandenberg (1988) theorized that contextual variables might be responsible for the conflicting results. Their study supported the hypothesis that the factor structure of the PSQ varied by job classification, which is actually consistent with suggestions made by H. G. Heneman and Schwab (1985). Additionally, Scarpello et al. (1988) found that both three- and four-factor solutions were supported in various samples and that several items displayed substantial cross-factor loadings. On the basis of these results, Scarpello et al. argued that significant modification or abandonment of the PSQ was warranted. Judge (1993), on the other hand, conducted a series of CFAs and found that the four-factor solution provided the best fit to the data. He further ascertained that the four dimensions displayed a significantly different pattern of correlations with a series of hypothesized predictors. Thus, Judge, in contrast with Scarpello et al., reached a favorable conclusion about the validity and usefulness of the PSQ.

Both studies offer unique contributions toward understanding why the PSQ has yielded inconsistent results in various settings. Judge's study (1993) made a contribution to the literature in that it suggested discriminant validity of the PSQ dimensions, but it was limited because only one organization was studied and no longitudinal data were available. On the other hand, Scarpello et al.'s (1988) study utilized an extensive multiorganizational database but did not use confirmatory techniques, meaning that the results can only indirectly speak to the validity of the PSQ dimensions. Therefore, although these two studies have used new techniques and approaches toward understanding the dimensionality of the PSQ, because of their contradictory conclusions, questions about the dimensionality of the PSQ remain unanswered.

Present Study

In the present study, we address a number of research needs regarding the PSQ. First, given that a reasonable basis exists for hypothesizing the dimensions of pay satisfaction, CFA rather than EFA was used, because with CFA the hypothesized factor structure appropriately guides the analysis rather than the anal-

ysis being data driven (Bobko, 1990). Second, other than Judge's (1993) single-organization cross-sectional study, there have been no direct tests of the empirical distinction between the PSQ dimensions. Covariance structure modeling is well suited for this purpose. Furthermore, we used multiorganizational and longitudinal data, which permit examination of the generalizability of the PSQ factor structure.

Consistent with Judge (1993), we believed that items from the PSQ would load on their hypothesized dimensions and that the four dimensions of pay satisfaction would be empirically distinguishable. This follows from the dimensions hypothesized by H. G. Heneman and Schwab (1985). As pointed out by H. G. Heneman (1985) and by H. G. Heneman and Schwab, each dimension reflects a relatively distinct (although perhaps related) aspect of pay. For example, the criteria used to establish benefit coverage of employees is not likely to strongly depend on how pay structures are established, the magnitude of pay raises awarded, and so forth. Although we expected some dimensions to be highly related (in particular, the pay raise and structure and administration dimensions), we hypothesized that even those PSQ dimensions that were highly related would be discrete. Furthermore, we expected the factor structure of the PSQ to remain stable over time. Taken together, these tests should overcome several important shortcomings of previous research on the PSQ.

Method

Setting, Subjects, and Procedure

The data were obtained from two separate companies in the Rocky Mountain region that implemented gain-sharing programs. Both firms installed customized gain-sharing plans that paid employees quarterly bonuses based on improvements in revenue, customer service, and quality and decreases in operating expenses. Both firms retained their previous methods for determining individual pay, and they did not make any changes in benefits during the time period studied. The gain-sharing program was expected to influence mean levels of several dimensions of pay satisfaction (e.g., benefits and pay level), but there was no reason to believe that the intervention would affect the PSQ factor structure, although this was an assumption that was tested with our data.

The first research site was a high-technology company with over \$1 billion in annual revenues. Study participants were employees in the

company's corporate services department, which comprised 200 service, maintenance, and security personnel. The second site was a food-processing plant within a large consumer products company that also generated over \$1 billion in annual revenues. This company employed 115 production, maintenance, clerical, and supervisory personnel.

In both firms, a survey was administered on site prior to a compensation intervention. The gain-sharing plan was then implemented 1 month after the first survey was administered. After three quarters of experience with the plan (9.5 months after the gain-sharing plan was implemented), a second survey was administered to all employees at both sites. To ensure accurate responses, we told employees who participated in the study that the findings would be used for research purposes only and that their responses would remain anonymous.

At the high-technology firm, 172 surveys were collected at Time 1 (an 86% return rate) and 151 completed questionnaires were obtained at Time 2 (a 76% return rate). Between the Time 1 and Time 2 data collections, 20 temporary employees left the organization. The typical respondent of the high-technology firm was an individual between 31 and 40 years of age, with 4 or less years of tenure, with a high school education, and with an equal probability of being either male or female. Ninety-two completed surveys were collected at the consumer products firm at Time 1 (an 80% return rate). Later, 70 completed surveys were obtained at Time 2 (a 61% return rate). The typical respondent at the consumer products firm was an individual over 40 years of age, with 4 to 10 years of tenure in the firm, with a high school education, and with a strong likelihood of being male.

Because of the anonymous nature of the study, individual responses could not be matched from Time 1 to Time 2. The supervisors of the departments worked closely with the researchers to ensure that those employees who attended the meetings at Time 1 also attended sessions at Time 2. On the basis of their feedback, we learned that the reduction in response rate was almost entirely due to loss of temporary and part-time workers and full-time workers' vacations. In addition, we compared the distribution of several respondent characteristics with the Time 1 and Time 2 data. Specifically, in both organizations, Time 1 respondents were not significantly different from Time 2 respondents with respect to the means or variances of age, education, gender, or tenure. These results, along with the feedback from supervisors, suggest that Time 2 respondents were representative of Time 1 respondents.

CFA

We conducted CFAs in the present study with LISREL 7 (Jöreskog & Sörbom, 1989). Although strict guidelines for minimum sample sizes in conducting CFA do not exist (Anderson & Gerbing, 1988), Bentler (1985) suggested that a sample size to parameter ratio of 5:1 or more is sufficient to achieve reliable estimates in maximum likelihood estimation. Because the sample size to estimated parameter ratio used in testing the hypothesized model was 5.8:1 for the Time 1 analysis and 5.0:1 for the Time 2 analysis, the sample sizes were considered adequate for the analyses.

When using CFA, it is essential to examine the overall fit of the model. If a model does not fit the data acceptably, interpretation of specific parameter estimates in the model may be inappropriate (James, Mulaik, & Brett, 1982). The most widely used measure of fit is the chi-square statistic. Perhaps the most popular use of the chi-square statistic is to examine the ratio of chi-square relative to the degrees of freedom, although chi-square has been found to depend on the sample size (Marsh, Balla, & McDonald, 1988) and is insensitive to improper solutions (Gerbing & Anderson, 1987). Indexes that have been recommended in recent research include the Tucker-Lewis index (Marsh et al., 1988) and the comparative fit, or relative noncentrality, index (Bentler, 1990; McDonald & Marsh, 1990).

Results

Sample covariances served as input for all LISREL estimations. To determine if the two samples could be combined for the analyses, we performed multisample analysis (Jöreskog & Sörbom, 1989). Multisample analysis allows determination of the degree to which the factor loadings and factor intercorrelations are similar between two or more independent samples. If the factor loadings (provided in the λ_X matrix) and factor intercorrelations (provided in the ϕ matrix) are not significantly different, this suggests that the samples can be combined. In accordance with Anderson and Gerbing's (1988) caveat to avoid confounding of significant and nonsignificant factor loading or factor correlation differences, we conducted tests of equality of factor structures one pair at a time. Results from the multisample analysis revealed that only 3 out of 48 parameters (18 factor loadings for each time period and 6 factor intercorrelations for each time period) were significantly different. These parameters were the correlation between the pay level and structure and administration factors at Time 1 and Time 2 and the correlation between the benefits and pay level factors at Time 1. Because so few parameters were found to be unequal, the samples were combined for subsequent analyses. Prior to combining the samples, we centered each PSQ variable at its mean to eliminate mean differences between the groups.

Table 2 provides the parameter estimates (factor loadings) of the PSQ items on their hypothesized dimensions at both Time 1 and Time 2. All factor loadings for the four dimensions were relatively strong (average loading, Time 1 = .80; average loading, Time 2 = .78) and highly significant ($p < .01$). These results supported the hypothesis that the specific items from the PSQ would converge on their hypothesized dimensions. Table 3 provides the reliabilities for the PSQ subscales and the intercorrelations among the pay satisfaction dimensions as measured by the PSQ subscales at Time 1 and Time 2. Consistent with past research (Judge, 1993; Scarpello et al., 1988), results indicated that some of the dimensions were highly correlated, particularly the pay raise and structure and administration scales (see Table 3). Examination of the factor loadings in Table 2 and the factor intercorrelations in Table 3 suggests very similar results across the two time periods. In fact, the mean absolute difference in factor loadings between Time 1 and Time 2 was .04 (mean raw difference = .01). Similarly, the absolute and raw mean differences in factor intercorrelations between Time 1 and Time 2 were .05. This evidence indicates that the pattern of factor loadings and the factor structure of the PSQ were robust over time. These results are particularly impressive given that a compensation intervention took place between the Time 1 and Time 2 assessments. Table 4 specifies the fit statistics for the Time 1 and Time 2 estimations. All statistics, by typical conventions, indicate that the hypothesized measurement model fit the data acceptably at both Time 1 and Time 2.

Although the parameter estimates and fit statistics reported above suggest that the PSQ items adequately load on their hypothesized dimensions, this evidence does not address the issue of whether the dimensions are distinct. Are the measures capable of distinguishing the PSQ dimensions? This question is particularly important given the relatively high correlations between some of the PSQ dimensions. The distinction between the

Table 2

LISREL Estimates of Factor Loadings for the Pay Satisfaction Questionnaire at Time 1 (T1) and Time 2 (T2)

Item	Pay level		Benefits		Pay raise		Structure & administration	
	T1	T2	T1	T2	T1	T2	T1	T2
My current salary	.95	.94						
My overall level of pay	.91	.92						
Size of my current salary	.96	.88						
My take-home pay	.88	.93						
My benefit package			.90	.95				
The value of my benefits			.94	.91				
Amount the company pays toward my benefits			.88	.77				
The number of benefits I receive			.90	.78				
My most recent raise					.74	.81		
Influence my supervisor has over my pay					.77	.70		
The raises I have typically received in the past					.63	.59		
How my raises are determined					.83	.80		
The company's pay structure							.78	.77
Information the company gives about pay issues of concern to me							.64	.67
Pay of other jobs in the company							.54	.53
Consistency of the company's pay policies							.79	.79
Differences in pay among jobs in the company							.59	.72
How the company administers pay							.70	.69

Note. All loadings were significant at $p < .01$. $N = 246$ at Time 1; $N = 209$ at Time 2.

PSQ dimensions was investigated by comparing the fit of the hypothesized model to alternative models. If the measures are not sufficiently distinct, the fit of the alternative models would not be significantly worse than the hypothesized four-factor model.

As can be seen from an examination of Table 4, the null model (a model in which the 18 PSQ items were not allowed to load on the factors and the four PSQ dimensions were not allowed to intercorrelate) provided a very poor fit to the data, as did the orthogonal model (zero correlations among the PSQ dimensions) and the single-factor model. Because past research has suggested that the pay raise and structure and administration dimensions are the most highly related PSQ dimensions (Judge, 1993) and that the benefits subscale is less related to the other PSQ dimensions, we investigated two other alternative models. A three-factor model, in which the pay raise and struc-

ture and administration factors were combined, also yielded a significantly worse fit to the data than did the hypothesized model. The same was true for a two-factor model, in which the pay raise, pay level, and structure and administration subscales were combined. We also estimated a five-factor model in which we separated the structure and administration subscales. However, the five-factor solution produced correlations between the structure and administration subscales that were greater than 1.0, indicating that such a model produces improper estimates with these data.

Discussion

The present study provides supportive evidence for the dimensions of pay satisfaction measured by the PSQ. Using confirmatory methods, we obtained results that supported predic-

Table 3
Reliabilities and Intercorrelations of Dimensions of the Pay Satisfaction Questionnaire at Time 1 and Time 2

Dimension	Time 1				Time 2			
	1	2	3	4	1	2	3	4
1. Pay level	.96	.12	.71	.69	.95	.17	.82	.73
2. Benefits	.13	.95	.25	.22	.15	.90	.29	.31
3. Pay raise	.66	.23	.82	.81	.73	.25	.81	.86
4. Structure & administration	.63	.19	.67	.84	.66	.27	.73	.85

Note. $N = 246$ for Time 1; $N = 209$ for Time 2. Correlations estimated with LISREL, corrected for unreliability, are above the diagonal. Uncorrected correlations are below the diagonal. Coefficient alpha reliability estimates are in boldface and on the diagonal.

Table 4
Fit Statistics for Hypothesized and Alternative Models at Time 1 and Time 2

Model	χ^2	<i>df</i>	χ^2/df	TLI	CFI
Time 1					
Hypothesized	290.37	129	2.25	.946	.952
Null	3,536.03	147	24.05	—	—
Orthogonal	613.16	135	4.71	.846	.859
Single factor	1,604.71	135	11.89	.528	.566
Two factor: Combining raise, level, & structure & administration scales	868.88	134	6.48	.762	.783
Three factor: Combining raise & structure & administration scales	355.72	132	2.69	.926	.933
Time 2					
Hypothesized	249.43	129	1.93	.947	.953
Null	2,732.56	147	18.59	—	—
Orthogonal	597.49	135	4.43	.805	.821
Single factor	995.79	135	7.38	.637	.667
Two factor: Combining raise, level, & structure & administration scales	511.27	134	3.82	.840	.854
Three factor: Combining raise & structure & administration scales	288.16	132	2.18	.933	.939

Note. In all cases, the chi-square from the alternative models was significantly higher ($p < .01$) than the chi-square from the hypothesized model. TLI = Tucker-Lewis index; CFI = comparative fit index.

tions about the ability of the PSQ items to measure discrete facets of compensation satisfaction. In particular, given that the data were obtained from two separate companies—one consisting of service employees and the other employing production workers—and under conditions in which both firms implemented a compensation intervention, these results suggest that the measurement properties of the PSQ are adequate, if not exemplary. A number of specific confirmatory tests supported this inference.

First, results demonstrated that the PSQ dimensions were quite reliable and, more importantly, that the PSQ dimensions appear to be generalizable. The pattern of factor loadings and the factor intercorrelations were relatively similar across organizations and over time. As noted by James et al. (1982), this suggests that generalization of the results to other populations and other contexts is appropriate.

Second, items from the PSQ loaded strongly and significantly on their hypothesized dimensions, and the hypothesized measurement model provided a good fit to the data. To the extent that the items loaded weakly on their hypothesized dimensions or strong cross-factor loadings were observed, this fit would not have been achieved. In short, the fit statistics and factor loadings suggest that the PSQ is properly specified in terms of measuring the four dimensions of pay satisfaction.

Third, it is true that several PSQ dimensions displayed high intercorrelations. Although some of the high correlations appear troubling because they bear on distinction between the PSQ dimensions, a number of conceptual factors (discussed earlier) might explain this fact that do not undermine the validity of the PSQ. Furthermore, confirmatory tests suggested that the hypothesized model fit the data significantly better than all alternative models, even those joining the most highly related dimensions. This suggests that the PSQ dimensions are distinct

and, thus, apparently measure discrete components of pay satisfaction.

There are several limitations with this study that point to areas for future research. First, because dividing the samples into employee job classifications would have made the samples too small to conduct CFAs, we were not able to directly compare our results to those of Scarpello et al. (1988) with respect to the degree to which the factor loadings and factor structure varied by job classification. It should be noted, however, that Judge (1993) found little variation in factor structure across diverse employee groups. Future research should address this issue directly.

A second limitation with this study, and one that applies to almost all studies in this area, is that the PSQ dimensions were not linked to outcome variables. As noted by Deckop (1992), the usefulness of the PSQ rests on the ability of the PSQ dimensions to differentially predict important outcome variables. Although Judge (1993) recently demonstrated that the PSQ dimensions are differentially predicted by a number of antecedent variables, no work has established that the PSQ dimensions differentially predict a series of consequent variables. Thus, before one can be fully confident that the PSQ is a valid and useful instrument, research needs to demonstrate that the PSQ dimensions are differentially related to relevant dependent variables. It is likely that contextual factors (such as type of pay system) and referent comparisons (including internal and external referents for all four PSQ dimensions) need to be taken into account when relating the dimensions of pay satisfaction to outcomes (Ash & Bretz, 1988).

Although the limitations discussed above suggest some caution in interpreting the results as demonstrating the adequacy of the PSQ, the weaknesses of this study are accompanied by a number of strengths. First, the data that were analyzed came

from two relatively diverse organizations, yet the PSQ loadings and factor structure were generally consistent across the two organizations. This increases confidence in the generalizability of the results. Second, the pattern of factor loadings and the PSQ factor structure were evaluated with longitudinal data, which had not been done to date. Finally, given the limitations of EFA, the confirmatory methods used to test the dimensionality of the PSQ allow greater confidence to be placed in these results than in the results of past research efforts on the dimensionality of the PSQ.

The central contribution of this study is that it uses a more rigorous statistical method with a diverse longitudinal sample to address problems cited by previous researchers studying the PSQ. This resulted in one of the more extensive tests of the dimensionality of the PSQ that has been undertaken. When subjected to these confirmatory tests, the PSQ holds up well; this suggests that the PSQ does not need substantial modification. As discussed above, the next logical step of research on the PSQ is demonstrating that the four PSQ dimensions differentially predict theoretically relevant dependent variables. This evidence, combined with the data presented in this article, should answer remaining questions about the adequacy of the PSQ.

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