

# An investigation of path-goal and transformational leadership theory predictions at the individual level of analysis

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## Abstract

This study tested the recent path-goal leadership theory prediction [House, R.J., 1996. Path-goal theory of leadership: Lessons, legacy, and a reformulated theory. *The Leadership Quarterly*, 7, 323–352] that leader contingent reward behavior negatively moderates relationships between transformational leadership and subordinate performance and job satisfaction at the individual level of analysis. Also tested was the prediction that transformational leadership would positively augment the effects of leader contingent reward behavior [Bass, B.M., 1985. *Leadership and performance beyond expectations*. New York: Free Press]. Confirmatory factor analyses, hierarchical linear multiple regression, and within- and between-entity analyses were employed, along with a sample of 169 social services workers in 40 groups. No evidence was found supporting either the path-goal or additive augmentation hypotheses. However, a positive moderator effect was found for some transformational leader behaviors and the leader contingent reward behavior variable, supporting a form of “augmentation effect” that is not incongruent with Bass’s [Bass, B.M., 1985. *Leadership and performance beyond expectations*. New York: Free Press] approach to transformational leadership. Additionally, strong support was obtained for the level of analysis prediction. Future research directions are briefly considered.

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Path-goal leadership theory (Evans, 1970; House, 1971) has existed for over three decades (Evans, 1968), and it is currently one of the major approaches to leadership that is covered by virtually all basic textbooks on management and organizational behavior (Hunt, 1996). Additionally, over 120 scholarly articles and several in-depth reviews have been written exploring the theory’s scientific merits (e.g., Wofford & Liska, 1993; Yukl, 1998). Despite its prominence, however, a number of authors have asserted that “. . .the theory has yet to be adequately

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tested” (Yukl, 1998, p. 269) (see also, Bass, 1990; Evans, 1996; House, 1996; Schriesheim & Neider, 1996; Wofford & Liska, 1993).

Although there are a number of concerns about how the theory has been tested, three appear paramount. One issue is the often poor quality of the measures that have been used in previous path-goal theory tests. This shortcoming is believed to have limited the level of support for the theory (House, 1996) and this concern is more directly addressed in our Method section below.

A second concern is that “. . .most researchers have tested only a few aspects of the theory while ignoring other aspects” (Yukl, 1998, p. 269). It has been suggested that this has occurred because:

. . .scholars generally feel uncomfortable in refining, extending, and testing the path-goal framework, partly because the easiest relationships have already been tested. . . and partly because of the difficulty of developing meaningful extensions of or modifications to the theory (Schriesheim & Neider, 1996, p. 319).

Addressing this second concern, House (1996) developed a substantial revision of the original theory (House, 1971), further explicating its theoretical underpinnings and providing a clearer basis for future tests of the path-goal approach. In particular, House not only clarified and extended the key propositions of earlier versions of the theory (e.g., House & Mitchell, 1974), but he also linked the theory into the rapidly growing stream of theory and research on what he calls “value based leadership” (commonly discussed under the labels “charismatic leadership” or “transformational leadership” by other theorists; e.g., Bass, 1985; Bass & Avolio, 1993; Conger & Kanungo, 1987). However, no tests of this extended theory have yet been conducted. This is despite the fact that one of the transformational leadership predictions contained in the revised theory of House (1996) (i.e., Proposition 24) differs from that advanced by another prominent theorist in the transformational leadership area (Bass, 1985, 1990).

A third concern about the path-goal theory is the lack of suitable tests of its level of analysis predictions. To date, all direct tests of path-goal theory hypotheses have employed only raw score or compound analyses (a compound analysis uses a mixture of some raw score variables and some variables that are measured at the within- and/or between-group level of analysis; cf. Katerberg & Hom, 1981). Failing to appropriately test the level of analysis at which relationships occur can result in effects being missed or misidentified.

Furthermore, a (non)significant raw score (or compound) correlation is uninformative and possibly misleading if the existence of within- and between-unit effects have not been tested. For example, a non-significant raw score correlation could actually be masking a significant between-group relationship. However, this might not be discovered if appropriate data-analytic methodologies are not employed (see Markham, 1988, for an excellent illustration of this point).

Without testing for within- and between-unit effects, we cannot determine whether and where the relationships actually occur—at the individual level, at the within-unit level, or at the between-unit level (see Schriesheim, Cogliser, & Neider (1995) for an in-depth explanation and another example of misidentified relationships when inappropriate methodologies are applied). Thus, raw score relationships should not be unambiguously interpreted since they may be due to relationships at different levels of analysis (the same is true for compound analyses such as those of Katerberg & Hom, 1981; cf. Dansereau, Alutto, & Yammarino, 1984). (The Appendix to this paper mathematically demonstrates the ambiguity of raw score analyses and provides technical information on the data analytic approach that we employ to test for levels of analysis; this is discussed in greater detail below.)

In general, the lack of explicit attention to level of analysis issues has been strongly criticized as a very serious deficiency and limitation of previous leadership and management research (cf. House, Rousseau, & Thomas-Hunt, 1995; Klein, Dansereau, & Hall, 1994). Perhaps for this reason, House (1996) directly addressed the level of analysis issue in his revised theory by stating that, “Path-goal theory . . .does not address the effect of leaders on groups or work units” (p. 325). However, since none of the approximately 120 studies investigating the theory have directly tested both path-goal hypotheses and their hypothesized level(s) of analysis, suitable research is clearly needed and that is one purpose of this study.

The second purpose is to examine a difference in predictions made by House (1996) and Bass (1985, 1990) with respect to transformational leadership effects; this difference was briefly alluded to above and is further elaborated upon below.

## 1. Review of the literature

### 1.1. Path-goal and augmentation hypotheses

In extension of earlier versions of path-goal theory, House (1996) advanced the theory's central or "meta proposition" as being that

...leaders, to be effective, engage in behaviors that compliment subordinates' environments and abilities in a manner that compensates for deficiencies and is instrumental to subordinate satisfaction and individual and work unit performance (House, 1996, p. 323).

Using this and five axioms, House (1996) then elaborated twenty-six propositions, most of which do not concern transformational or value based leadership. Proposition 24 of House (1996), however, directly involves transformational leadership. This proposition appears particularly important since it hypothesizes a unique relationship between this form of leadership and one of the central subdimensions of traditional, exchange-based, or "transactional" approaches to leadership (i.e., contingent reward). This relationship is stated by House (1996) as follows:

**Proposition 24.** *The ...effectiveness of value based leadership will be enhanced to the extent that... [t]he leader refrains from the use of extrinsic rewards contingent on subordinate performance (House, 1996, p. 345).*

Proposition 24 thus clearly predicts that leader reward behavior should serve as a *negative moderator* for transformational leadership behaviors. In other words, Proposition 24 asserts that transformational leadership should have its strongest relationships with subordinate "outcome" variables, such as performance and job satisfaction, under conditions of low leader reward behavior. According to House (1996, p. 345), this moderator expectation is based upon cognitive dissonance theory (Festinger, 1980), which predicts that when extrinsic incentives are absent, followers will look for self-related justifications for their efforts. Also, the lack of extrinsic rewards will help a leader "foster an ideological orientation toward work" (House, 1996, p. 345).<sup>1</sup> Thus, since both of these conditions are believed to be likely to enhance the impact of transformational leadership, Proposition 24 was developed and advanced by House (1996).

Therefore, we propose:

**Hypothesis 1.** Contingent reward will negatively moderate the relationship between transformational leadership and outcomes (job satisfaction and performance) such that when contingent reward is low, the transformational leadership–outcome relationship will be more positive.

In most recent theory and research, contingent reward behavior has been treated as an aspect of transactional leadership, which differs from transformational leadership (Bass, 1990; Yukl, 1998). Transactional leadership involves subordinate motivation based upon contractual, negotiated exchanges between a leader and a follower, while transformational leadership involves motivation that derives from the followers' values being transformed (by the leader) to become more congruent with those of the leader (House, 1996; House & Podsakoff, 1994; Podsakoff, MacKenzie, Moorman, & Fetter, 1990). This latter process is believed to be responsible for exceptionally high follower commitment to leader-articulated goals and for follower performance beyond routine or normal expectations (cf. Bass, 1985, 1990).

Notably, the relationship between transformational and transactional leadership hypothesized by House's theory differs from that hypothesized by the theory of Bass (1985). Bass (1985) has suggested that transformational leadership should supplement or "augment" transactional leadership, such that transformational leadership should be positively associated with higher levels of subordinate motivation, effort, satisfaction, and performance above

<sup>1</sup> Although not cited by House (1996), Kohn's (1993) piece supports House's Proposition 24. Kohn argues that incentive plans do not work for a multitude of reasons (e.g., rewards do not motivate).

those associated with transactional leadership alone. In other words, using multiple regression analyses, transformational leadership should have a positive regression weight and account for unique incremental variance in outcome variables over that accounted for by the effects of transactional leadership (cf. Bass & Avolio, 1988, 1993). Thus,

**Hypothesis 2.** Transformational leader behavior will positively augment the relationship between transactional leader behavior and subordinate outcomes (job satisfaction and performance).

It should be noted that predicting positive augmentation effects for transformational leadership over leader reward behavior (Hypothesis 2) does not necessarily conflict with the Proposition 24 of House (1996) (Hypothesis 1). Augmentation involves predicting that leader reward behavior will have a positive main effect, while Proposition 24 predicts a negative interaction effect. Both effects could occur simultaneously (cf. Cohen & Cohen, 1983). However, while there is some research supporting Bass's augmentation hypothesis (e.g., Bycio, Hackett, & Allen, 1995; Hater & Bass, 1988; Kirby, Paradise, & King, 1992), no research to-date has empirically investigated the Proposition 24 of House (1996).

### 1.2. Level of analysis hypothesis

There are several plausible levels of analysis at which leadership phenomena could operate. First, a leader may exhibit a similar pattern of behavior toward the entire group of followers. Correspondingly, another leader might act differently but still exhibit a particular "style" within his/her work group. In other words, leader–follower interactions could be homogeneous within each work group, yet relationships with followers could vary between leaders (i.e., *between-groups*). Alternatively, leaders may exhibit different behaviors toward each subordinate within the work group. In such a *within-group* phenomenon, distinct differences in relative leader–follower relationships within work groups would be evident.

These possibilities can be illustrated by noting that for individuals ( $i$ ) within work units or groups ( $j$ ), raw scores ( $X_{ij}$ ) can be conceptualized as having two components—a unit or group average component ( $\bar{X}_j$ ) and an individuals-within-groups or deviation from group average component ( $X_{ij} - \bar{X}_j$ ). Based upon the revised theory of House (1996), we would generally expect empirical effects to be manifest at both the within-group and the between-group levels. This indicates that work groups do not impact upon the relationships and it provides support for what Yammarino & Markham (1992) called the *individual* level of analysis (An individual level of analysis signifies that relationships between leaders and followers are defined according to each subordinate's perception of their leader's behaviors, and that the work unit or group has no empirical effect.). This, of course, is the prediction that the revised path-goal theory now makes. As indicated in the quotation from House (1996, p. 325—see above), the theory clearly predicts that leadership effects should occur regardless of groups (i.e., both within-groups and between-groups).

Since no research has tested the path-goal theory moderator prediction (Hypothesis 1) with respect to level of analysis using appropriate data analytic methods, research is needed on this issue. Thus, we propose:

**Hypothesis 3.** The relationships between transactional and transformational leadership and the outcome variables will occur at the individual level of analysis.

The current investigation is a first step in accumulating a weight of scientific evidence concerning the path-goal theory's predicted level of analysis. To do this, we employ within- and between-entity analysis (WABA; Dansereau et al., 1984; Schriesheim, 1995), and more detail on this method is given in the next section and in the Appendix.

## 2. Method

### 2.1. Sample

The researchers administered a questionnaire to 295 state social services agency employees in the southeastern U.S. All American Psychological Association (1992) and Academy of Management Code of Ethical Conduct

(2003) guidelines were followed. The research was identified as university-sponsored, and both written and oral confidentiality assurances were provided and emphasized. The employees were asked to identify themselves on the survey for matching with performance ratings (that their supervisors provided), and only 27 failed to do so.

More than 95% of the agency employees participated in the survey, and less than 1% of the non-participants actually refused to participate (most non-participants were either on vacation, out sick, or on a job emergency that required extended off-site attendance). Of the total sample, 242 (82%) provided questionnaires with no missing data. The respondents' age averaged 39.0 years, and they averaged 65.5 months of organizational tenure, 35.7 months of job tenure, 78.4 months of occupational tenure, and 16.4 months with their current supervisor. About 63% of the sample was female, 19% non-Hispanic white, 29% Hispanic American, 40% African American, 1% Asian American, and 11% of other background. A total of 70% of the respondents had a bachelor's degree and 27% had graduate degrees; the positions held within the organization were 58% counselors, 16% senior counselors, and 12% supervisors.

While the counselors and senior counselors were completing their surveys, their supervisors filled out a performance rating form on each. These were administered separately by the university researchers under assurances of complete confidentiality. To ensure consistency across our analyses and to prevent possible problems in our confirmatory factor analyses, we employed only respondents who (a) had complete survey and performance data and (b) were in units with at least one other respondent with full survey and performance data. This yielded an effective sample size of 169 (59% of the total sample) embedded in a total of 40 groups; the average group size was 5.5 members, and the range was from 2 to 12 members. The sample of 169 was employed in the confirmatory factor, correlation, regression, and WABA analyses that are reported below. However, overall and separate tests for differences in age, gender, race, organizational tenure, job tenure, occupational tenure, time under current supervisor, educational attainment, and job title revealed no significant differences between the samples of 169 and 242 respondents.

## 2.2. Measures

To date, much of the research testing the path-goal theory of leadership has used measures of perceived leader behavior that Bass (1990), House (1996), Schriesheim, House, & Kerr (1976), Schriesheim & Von Glinow (1977), and Wofford & Liska (1993), among others, have characterized as theoretically and psychometrically deficient and therefore inappropriate. The most important criticism advanced in this regard is that the measures used have been content-invalid (cf. Nunnally & Bernstein, 1994). That is, they have contained a substantial proportion of items which have measured theoretically inappropriate or extraneous constructs, such as "punitive, autocratic, and production oriented items" (Schriesheim & Von Glinow, 1977, p. 399). These constructs are not included in original formulation of the theory of House (1971).

For the present study, the specific leader behavior measurement problems mentioned above do not hold. Earlier versions of path-goal theory focused on supportive and directive leadership behavior. However, this study focuses on the revised theory and the newly incorporated behaviors of transformational and contingent reward behaviors. Nonetheless, there are still some measurement concerns related to these new variables that we should briefly address.

In particular, the dominant measure of transformational leadership, the Multifactor Leadership Questionnaire (MLQ; Bass, 1985, 1988; Bass & Avolio, 1988, 1989), has been shown to sometimes suffer from psychometric shortcomings (cf. Bycio et al., 1995; Kirby et al., 1992; Tepper & Percy, 1994; Yukl, 1998) and theoretical problems (cf. House & Podsakoff, 1994; Podsakoff et al., 1990; Yukl, 1998). We therefore chose to use the transformational leadership inventory (TLI) developed by Podsakoff et al. (1990), as recent evidence indicates that its factor structure, internal reliability, and concurrent and predictive validity are quite good (Podsakoff, MacKenzie, & Bommer, 1996; Schriesheim, Castro, Williams, Medsker, & DeChurch, 2000).

Although we collected data using the full TLI, House & Podsakoff (1994) contend that two of the six TLI subdimensions, Individualized Support and Intellectual Stimulation, are not transformational. They argue that these behaviors are displayed by "ordinary" leaders and do not necessarily result in transformational effects (such as the exertion of extra effort). In fact, Intellectual Stimulation has been found to have negative effects on organizational outcomes in some studies (Podsakoff et al., 1990; Seltzer & Bass, 1990; Seltzer, Numerof, & Bass, 1989). Thus, for the purpose of this investigation, only the vision, role modeling, group goals, and high

performance expectation subscales of the TLI are employed. These are defined by Podsakoff et al. (1990) as follows:

*Identifying and Articulating a Vision* is behavior targeted at identifying opportunities for an organization and using a vision of the future to inspire others through the development and articulation of this vision.

*Providing an Appropriate Model* involves the leader setting an example for employees that is consistent with the values the leader espouses.

*Fostering the Acceptance of Group Goals* involves leader behavior aimed at promoting employee cooperation with each other in order to achieve a common goal.

*High Performance Expectations* are achieved through leader behavior which demonstrates expectations of high performance, quality, and standards of excellence on the part of followers.

These four dimensions would seem to adequately represent most of the behaviors House proposes as characteristic of transformational or value-based leadership. Specifically, House (1996) lists vision, symbolic behavior, self-sacrifice, confidence and high performance expectations, arousal of motives, risk-taking, and positive evaluations of subordinates as behaviors typical of transformational leaders.

Extrinsic contingent reward behaviors were assessed using the contingent reward (CR) subscale of the Leader Reward and Punishment Questionnaire (LRPQ; Podsakoff & Skov, 1980; Podsakoff, Todor, Grover, & Huber, 1984). This measure was deemed especially appropriate for the current research since substantial support exists for its reliability and validity (Podsakoff et al., 1984; Podsakoff & Schriesheim, 1984; Schriesheim, Hinkin, & Tetrault, 1991; Schriesheim & Podsakoff, 1984). Additionally, the LRPQ deals only with leader behavior that involves the provision of extrinsic rewards (such as praise and verbal recognition) contingent upon a subordinate's satisfactory job performance. Thus, in the current study we are able to investigate the Proposition 24 of House (1996) with less concern about the theoretical and psychometric quality of the leadership measures employed.

Job satisfaction and job performance were employed as the dependent variables in our study. This is because they are theoretical "outcomes" of transformational leadership (cf. Avolio & Bass, 1988; Bass & Avolio, 1993) and because they are "traditional criteria" that have frequently been used in research on the path-goal theory (Wofford & Liska, 1993) and on transformational leadership and contingent reward behavior (Bass, 1990).

The measure employed for satisfaction was the short form of the Minnesota Satisfaction Questionnaire (MSQ; Weiss, Dawis, England, & Lofquist, 1967), because extensive research supports the validity and reliability of this instrument (e.g., Dunham, Smith, & Blackburn, 1977; Wanous, 1974).

The performance measure completed by each employee's supervisor was a scale that is based on the instrument of Mott (1972). Previous research using this measure (e.g., Fulk & Wendler, 1982; Schriesheim, Neider, & Scandura, 1998; Schriesheim, 1980) indicates that it also has good psychometric properties—such as high internal consistency reliability and statistically significant and practically meaningful correlations with various "objective" performance indicators. In the current study, the minimum score was 7, maximum 35, mean 28.12, standard deviation 4.94, skewness  $-.68$ , and kurtosis  $.80$ .

### 2.3. Data analysis

#### 2.3.1. Descriptive statistics

Means, standard deviations, and coefficient alpha internal consistency reliabilities were computed for each measure. Additionally, intercorrelations were calculated among the measures.

#### 2.3.2. Confirmatory factor analyses

As mentioned briefly above, confirmatory factor analyses (CFAs) were conducted on the reduced sample of 169. These were undertaken to increase confidence in the measures we employed. All of the CFAs used the maximum likelihood procedures of Lisrel 8 (Jöreskog & Sörbom, 1993) to assess the dimensionality of the five independent and moderator variable measures (i.e., the four TLI subscales and the CR subscale). Sample covariances served as input for the estimations, and rival models were tested.

A one-factor model was first examined, with all the items loading on a single factor. Multiple two-, three-, and four-factor models were then tested to ascertain whether TLI and CR subscales should be collapsed. A five-

factor model was also run, with one factor representing each subscale. In all of these models, each item was specified as loading on only one factor, the errors were specified as uncorrelated among themselves, and the latent trait factor correlations were freely estimated. Full tabular results are available from the authors upon request.

Overall, the five-factor model fit the data significantly better than the next best-fitting model ( $\chi^2$  difference = 67.32;  $df=4$ ;  $p < .001$ ), and the fit was reasonable overall: NNFI = .91, CFI = .93, and RMSR = .05. Additionally, all of the factor loadings of the five-factor model were statistically significant ( $p < .01$ ) and all of the completely standardized loadings were .50 or greater.

### 2.3.3. Raw-score regressions

The tests of Proposition 24 were conducted by first using the moderator variable procedure of hierarchical linear multiple regression recommended by Cohen & Cohen (1983).<sup>2</sup> This approach entails conducting three regressions for each set of independent, moderator, and dependent variables.

In the first regression, the independent variable (one of the four TLI subdimensions) is regressed against the dependent variable (performance or satisfaction). The second step involves regressing the independent and contingent reward moderator variables on the dependent variable. Finally, the independent and moderator variables are regressed on the dependent variable, with a third “predictor” being added: the interaction of the independent and moderator variables. If a statistically significant increase in explained variance ( $\Delta R^2$ ) is obtained for the third step over the second, then interactive or moderator effects are indicated. The nature of these effects is then determined using the follow-up procedures outlined in Cohen & Cohen (1983).

### 2.3.4. Within- and between-entity analysis

To test the path-goal theory’s level of analysis predictions, the relationships suggested by Proposition 24 were next examined using the regression analog of Schriesheim (1995) to within- and between-entity analysis (WABA; cf. Dansereau et al., 1984). In general, WABA involves partitioning data into within-cell and between-cell components, which are then examined in three basic steps. WABA I involves looking at variation within-entities and between-entities (“entities” in this particular study refer to the supervisors’ work groups) using tests of statistical ( $F$ ) and practical ( $E$ ) significance.

WABA II is concerned with examining the covariation within-entities and between-entities. In this second step, the *magnitudes* of the within- and between-entity correlations are tested for statistical ( $t$  or  $F$ ) and practical ( $R$ ) significance, and the *differences* between the within- and between-entity correlations are tested for statistical ( $Z$ ) and practical ( $A$ ) significance. Finally, the third step involves looking at the inferences drawn from the WABA I and WABA II analyses, as well as the within- and between-entity correlation components (decomposed raw-score correlations) to come to an overall inference (see Appendix A, Dansereau et al., 1984; Yammarino & Markham, 1992, for more information).

The multivariate regression extension of Schriesheim (1995) to the WABA procedures of Dansereau et al. (1984) allows researchers to analyze multivariate relationships that involve continuous variables. Raw-score multiple regressions are first computed, from which the unstandardized partial regression weights are used to create composites (composed of the independent and moderator variables that were included in the raw-score regressions).

Within-entity scores are next used to compute a weighted composite “within-entities variable” by multiplying within-entity scores by their appropriate partial regression weights and then summing the scores; between-entity scores are similarly created, as are composite raw scores. These new multivariate composites are then substituted into the computations outlined by Dansereau et al. (1984) for “traditional” WABA, adjusting degrees of freedom for the statistical tests to reflect the additional parameters (for further details and examples, see Schriesheim, 1995; Schriesheim et al., 1995, 1998; for revised WABA computer programs that incorporate this approach, see Dansereau & McConnell, 2000 or the Institute for Theory Testing website).

<sup>2</sup> It is important to note that hierarchical linear multiple regression was used in these analyses, not hierarchical linear modeling (HLM). HLM, in fact, is not appropriate to answer the types of questions we hypothesized.

### 3. Results

#### 3.1. Raw-score results

##### 3.1.1. Descriptive statistics and raw-score correlations

The descriptive statistics and raw-score correlations are presented in Table 1. All the coefficient alpha internal consistency reliabilities are greater than .70, and the relationships among the variables fluctuated substantially. The correlations between the leadership and dependent variables range from  $r = .10$  (ns) to  $r = .49$  ( $p < .001$ ). Only the high performance expectations dimension does not obtain statistically significant correlations with performance and satisfaction.

The three strongest correlates of performance and satisfaction are contingent reward, goals, and vision. Within the leadership dimensions themselves, there is a range of intercorrelations. The highest value is .77, while four are less than .55; all are significant ( $p < .001$ ), and the lowest is .32. Although these correlations are higher than might be desired, they are quite typical of those reported in earlier research (e.g., Podsakoff et al., 1990) and they may reflect the fact that effective leaders simultaneously use aspects of both transformational and transactional leadership (cf. Bass, 1985; Bass & Avolio, 1993). Additionally, as discussed above, the CFAs supported all the leadership measures as indicators of distinct constructs.

##### 3.1.2. Raw-score performance regressions

Table 2 presents the raw-score regression results for performance. As can be seen in the third steps of the regressions shown in Table 2, a statistically significant contingent reward moderator effect is found only for the vision subdimension, although the effect for modeling is close to significance ( $p < .11$ ). Employing the approach suggested by Cohen & Cohen (1983) and computing regression equations for low and high contingent reward behavior (at one standard deviation below and one standard deviation above the mean, respectively; cf. Cohen & Cohen, 1983) shows that the direction of these two moderator effects is *opposite* the path-goal theory prediction. Under low contingent reward, the regression equations are  $\hat{Y} = 26.39 + .01X$  for vision and  $\hat{Y} = 27.51 - .06X$  for modeling. Under high contingent reward, the corresponding equations are  $\hat{Y} = 25.02 + .16X$  for vision and  $\hat{Y} = 27.63 + .15X$  for modeling.

Since negative moderation requires that regression slopes become less positive or more negative under high levels of the moderator (than under low levels of the moderator), it is clear that these results do not support the path-goal theory prediction (Hypothesis 1). The same can be seen for Hypothesis 2. Here, as shown in Table 2, none of the transformational leadership dimensions are significant performance correlates when contingent reward is also in the regression. Hence, the augmentation hypothesis of Bass (1985, 1990) (our Hypothesis 2) is not supported, as these transformational leadership dimensions do not augment contingent reward's relationship with performance.

##### 3.1.3. Raw-score satisfaction regressions

Table 3 presents the raw-score regression results for satisfaction. As shown in Table 3, significant moderator effects are found for the vision, modeling, and goals leadership dimensions. Unfortunately, again, use of the Cohen & Cohen (1983) procedure shows all three of these to be in a direction opposite the path-goal theory prediction

Table 1  
Raw-score variable means, standard deviations, coefficient alpha reliabilities, and intercorrelations

Variable	<i>M</i>	SD	Intercorrelations							
			1.	2.	3.	4.	5.	6.	7.	
1. Vision	22.52	7.52	(.86)							
2. Modeling	14.88	5.61	.76**	(.86)						
3. Goals	21.42	6.71	.77**	.76**	(.93)					
4. Expectations	16.59	4.08	.53**	.58**	.54**	(.72)				
5. Contingent reward	47.67	15.24	.68**	.66**	.74**	.32**	(.92)			
6. Performance (supervisor)	28.47	4.76	.28**	.19*	.29**	.10	.30**	(.92)		
7. Satisfaction	67.51	11.37	.35**	.29**	.38**	.15	.49**	.14	(.85)	

Coefficient alpha internal consistency reliabilities are shown in parentheses on the main diagonal.

\* $p \leq .01$ . \*\* $p \leq .001$ .



Table 2  
Raw-score regression results for performance

Step and independent variable added	Unstandardized partial regression coefficient			$\Delta R^2$ when added	Total $R^2$
	Step 1	Step 2	Step 3		
1. Vision (V)	.18**	.09	-.16	.08**	.08**
2. Contingent reward (C)	–	.06*	-.05	.02*	.10**
3. Vision $\times$ contingent reward (V $\times$ C)	–	–	.01*	.02*	.12**
1. Modeling (M)	.16*	-.01	-.29	.04*	.04*
2. Contingent reward (C)	–	.10**	.00	.05**	.09**
3. Modeling $\times$ contingent reward (M $\times$ C)	–	–	.01	.01	.10**
1. Goals (G)	.20**	.10	-.04	.08**	.08**
2. Contingent reward (C)	–	.06 <sup>†</sup>	-.03	.02 <sup>†</sup>	.10**
3. Goals $\times$ contingent reward (G $\times$ C)	–	–	.00	.01	.11**
1. Expectations (E)	.11	.00	-.11	.01	.01
2. Contingent reward (C)	–	.09**	.05	.08**	.09**
3. Expectations $\times$ contingent reward (E $\times$ C)	–	–	.00	.00	.09**

<sup>†</sup> $p \leq .10$ . \* $p \leq .05$ . \*\* $p \leq .01$ .

(Hypothesis 1). Under low contingent reward behavior, the equations are  $\hat{Y} = 62.82 - .08X$  for vision,  $\hat{Y} = 64.23 - .27X$  for modeling, and  $\hat{Y} = 60.65 + .03X$  for goals. Under high contingent reward, the corresponding equations are  $\hat{Y} = 66.72 + .26X$  for vision,  $\hat{Y} = 68.71 + .28X$  for modeling, and  $\hat{Y} = 58.83 + .58X$  for goals. Table 3 also shows no augmentation effects, contrary to Hypothesis 2. In no instance did a transformational leadership behavior significantly contribute to explained satisfaction variance above that attributable to contingent reward behavior alone.

### 3.2. WABA results

#### 3.2.1. WABA I

Table 4 presents the WABA I results for each of the steps in the regression analyses of Tables 2 and 3. Although none of the WABA I comparisons of the within- and between-etags reach statistical significance, all but five of the within-etags are practically greater than the between-etags (by the  $E$  test). Still, using the conservative criteria advocated by Dansereau et al. (1984), the conclusion drawn is that variance is both within- and between-units for each step in the regressions.

Table 3  
Raw-score regression results for satisfaction

Step and independent variable added	Unstandardized partial regression coefficient			$\Delta R^2$ when added	Total $R^2$
	Step 1	Step 2	Step 3		
1. Vision (V)	.53**	.06	-.44	.12**	.12**
2. Contingent reward (C)	–	.34**	.13	.12**	.24**
3. Vision $\times$ contingent reward (V $\times$ C)	–	–	.01 <sup>†</sup>	.01 <sup>†</sup>	.25**
1. Modeling (M)	.59**	-.12	-.85*	.08**	.08**
2. Contingent reward (C)	–	.39**	.15	.16**	.24**
3. Modeling $\times$ contingent reward (M $\times$ C)	–	–	.02 <sup>†</sup>	.02 <sup>†</sup>	.26**
1. Goals (G)	.64**	.08	-.55 <sup>†</sup>	.14**	.14**
2. Contingent reward (C)	–	.34**	-.06	.10**	.24**
3. Goals $\times$ contingent reward (G $\times$ C)	–	–	.02*	.02*	.26**
1. Expectations (E)	.41 <sup>†</sup>	-.02	-.76	.02 <sup>†</sup>	.02 <sup>†</sup>
2. Contingent reward (C)	–	.36**	.09	.22**	.24**
3. Expectations $\times$ contingent reward (E $\times$ C)	–	–	.02	.01	.25**

<sup>†</sup> $p \leq .10$ . \* $p \leq .05$ . \*\* $p \leq .01$ .

Table 4  
WABA I

Step and variable(s)	Performance			Satisfaction		
	Etas		<i>F</i> test	Etas		<i>F</i> test
	Within	Between		Within	Between	
Performance/satisfaction	.73	.68	.35	.85 <sup>†</sup>	.52	.81
1. Vision (V)	.82 <sup>†</sup>	.58	.60	.82 <sup>†</sup>	.58	.60
2. V+contingent reward (C)	.84 <sup>†</sup>	.55	.69	.85 <sup>†</sup>	.52	.79
3. V+C+V×C	.83 <sup>†</sup>	.55	.65	.84 <sup>†</sup>	.54	.69
1. Modeling (M)	.75	.66	.39	.75	.66	.39
2. M+C	.86 <sup>†</sup>	.52	.81	.86 <sup>†</sup>	.51	.84
3. M+C+M×C	.84 <sup>†</sup>	.54	.69	.85 <sup>†</sup>	.53	.74
1. Goals (G)	.81 <sup>†</sup>	.58	.59	.81 <sup>†</sup>	.58	.59
2. G+C	.84 <sup>†</sup>	.54	.71	.85 <sup>†</sup>	.52	.79
3. G+C+G×C	.83 <sup>†</sup>	.56	.63	.84 <sup>†</sup>	.54	.69
1. Expectations (E)	.77	.64	.44	.77	.64	.44
2. E+C	.85 <sup>†</sup>	.52	.79	.85 <sup>†</sup>	.52	.79
3. E+C+E×C	.85 <sup>†</sup>	.52	.77	.85 <sup>†</sup>	.52	.77

Variables involving two (e.g., M+C) or three (e.g., M+C+M×C) terms are composite variables, computed as described in Schriesheim (1995). The *F*-tests are corrected for testing the significance of within-group effects.

<sup>†</sup>*E* test significant at 15°.

### 3.3. WABA II

Table 5 presents the WABA II results for performance, while Table 6 gives the results for satisfaction. In these tables, the first two columns show the within- and between-unit correlations (the magnitude of these

Table 5  
WABA II, correlation components, and inferences for performance

Step and variable(s)	Correlations <sup>a</sup>		Differences		Components		Total correlation	Inference <sup>b</sup>
	Within	Between	<i>A</i> <sup>c</sup>	<i>Z</i>	Within	Between		
1. Vision (V)	.18*	.44** <sup>†</sup>	.27 <sup>†</sup>	1.55	.11	.17	.28	Both
2. V+cont. rew. (C)	.24*	.45** <sup>†</sup>	.22	1.27	.15	.17	.32	Both
3. V+C+V×C	.27** <sup>†</sup>	.48** <sup>†</sup>	.23	1.26	.17	.18	.35	Both
1. Modeling (M)	.15*	.24	.09	.48	.08	.11	.19	Neither
2. M+C	.25*	.40** <sup>†</sup>	.16	.85	.16	.14	.30	Both
3. M+C+M×C	.27** <sup>†</sup>	.42** <sup>†</sup>	.16	.89	.16	.16	.32	Both
1. Goals (G)	.18*	.45** <sup>†</sup>	.29 <sup>†</sup>	1.60	.11	.18	.29	Both
2. G+C	.24*	.46** <sup>†</sup>	.24	1.38	.14	.17	.31	Both
3. G+C+G×C	.25** <sup>†</sup>	.45** <sup>†</sup>	.21	1.15	.15	.17	.32	Both
1. Expectations (E)	.05	.16	.11	.59	.03	.07	.10	Neither
2. E+C	.25** <sup>†</sup>	.40** <sup>†</sup>	.16	.85	.16	.14	.30	Both
3. E+C+E×C	.25** <sup>†</sup>	.40 <sup>†</sup>	.15	.84	.16	.14	.30	Both

Variables involving two (e.g., M+C) or three (e.g., M+C+M×C) terms are composite variables, computed as described in Schriesheim (1995).  
<sup>a</sup> <sup>†</sup>*R* test significant at 15°.

<sup>b</sup> Inference column refers to the inference made based on the WABA I, WABA II, and correlation component results, as suggested by Dansereau et al. (1984) (not a traditional inference about statistical significance).

<sup>c</sup> <sup>†</sup>*A* test significant at 15°.

\* *p* ≤ .05.

\*\* *p* ≤ .01.

Table 6  
WABA II, correlation components, and inferences for satisfaction

Step and variable(s)	Correlations <sup>a</sup>		Differences		Components		Total correlation	Inference <sup>b</sup>
	Within	Between	A	Z	Within	Between		
1. Vision (V)	.34** <sup>†</sup>	.39** <sup>†</sup>	.05	.21	.23	.12	.35	Both
2. V+cont. rew. (C)	.46** <sup>†</sup>	.57** <sup>††</sup>	.13	.79	.33	.16	.49	Both
3. V+C+V×C	.48** <sup>†</sup>	.55** <sup>††</sup>	.08	.52	.35	.16	.51	Both
1. Modeling (M)	.30** <sup>†</sup>	.27* <sup>†</sup>	-.03	-.11	.19	.09	.28	Both
2. M+C	.46** <sup>†</sup>	.58** <sup>††</sup>	.14	.85	.33	.16	.49	Both
3. M+C+M×C	.48** <sup>†</sup>	.57** <sup>††</sup>	.10	.68	.35	.16	.51	Both
1. Goals (G)	.36** <sup>†</sup>	.44** <sup>†</sup>	.09	.59	.25	.13	.38	Both
2. G+C	.46** <sup>†</sup>	.57** <sup>††</sup>	.13	.90	.33	.16	.49	Both
3. G+C+G×C	.50**	.53** <sup>††</sup>	.03	.21	.36	.15	.51	Both
1. Expectations (E)	.23*	.00	-.22	-1.23	.15	.00	.15	Neither
2. E+C	.45** <sup>†</sup>	.57** <sup>††</sup>	.09	.90	.33	.16	.49	Both
3. E+C+E×C	.49** <sup>†</sup>	.52** <sup>††</sup>	.04	.21	.36	.14	.50	Both

Variables involving two (e.g., M+C) or three (e.g., M+C+M×C) terms are composite variables, computed as described in Schriesheim (1995).

<sup>a</sup> † *R* test significant at 15°; †† *R* test significant at 30°.

<sup>b</sup> Inference column refers to the inference made based on the WABA I, WABA II, and correlation component results, as suggested by Dansereau et al. (1984) (not a traditional inference about statistical significance).

\*  $p \leq .05$ .

\*\*  $p \leq .01$ .

correlations were tested using *t* or *F* tests of statistical significance and *R* tests of practical significance). The next two columns present the tests for practical (*A*) and statistical (*Z*) significance of the difference between each pair of within- and between-unit correlations. The fifth and sixth columns show the within- and between-unit correlation components (how the raw-score correlations may be partitioned into within- and between-unit effects); these were subjected to *A* tests to determine if there was a practically significant difference between them (none were different). Finally, the last column shows the inference that is suggested by Dansereau et al. (1984) concerning level of analysis effects, based upon combining the WABA I, WABA II, and correlation component analyses.

As shown in Table 5, all of the within correlations were statistically and/or practically significant with the exception of the first step for Expectations. Similarly, most of the between correlations were statistically significant and/or practically significant (exceptions were the first step for modeling and the first step for Expectations). However, none of the *Z* statistical tests of the differences between the correlations attained significance. Only two of the *A* tests showed practically meaningful differences (for the first steps in the analyses with vision and goals). Additionally, since none of the correlation components were meaningfully different, the inference drawn for all but the bivariate modeling and Expectations relationships is that covariation occurs both within- and between-units.<sup>3</sup> For the modeling and Expectations bivariate relationships, the safest conclusion is that covariation with performance does not occur. In sum, ten out of the twelve relationships tested result in the conclusion that the effects are operating at the individual level of analysis. Thus, the path-goal prediction of “individual differences” or variation both within- and between-units for the performance dependent variable is strongly supported.

Table 6 shows a pattern of results for satisfaction that is almost identical to that presented in Table 5. The only notable differences are that modeling attains both statistically and practically significant within- and between-unit

<sup>3</sup> Please note that finding both within- and between-group effects does not lead to the conclusion that both levels are operative in the data. Rather, the conclusion drawn is that covariance is concurrently occurring within and between groups. We are grateful to an anonymous reviewer for pointing out this distinction.

correlations with satisfaction (while Expectations still does not), and that none of the *A* tests show meaningful differences between the within- and between-units correlations. Based upon these results, the inference drawn is that covariation occurs both within- and between-units for all of the relationships except the bivariate Expectations–satisfaction correlation (where the “null” or no covariation condition holds).<sup>4</sup> The findings for both performance and satisfaction, then, clearly support Hypothesis 3.

#### 4. Discussion

The results of this study provide strong support for Hypothesis 3 and for interpreting the relationships among the leadership variables, employee performance, and satisfaction as generally occurring at the individual level of analysis (i.e., both within- and between-units). With few exceptions, both the variance and covariance analyses (WABA I and WABA II, respectively) supported this conclusion. This, of course, is in agreement with the specification of House (1996) that the path-goal theory applies at the individual level of analysis. This finding also agrees with other theoretical positions, such as many of those dealing with charismatic or transformational leadership (e.g., Bass, 1985; Conger & Kanungo, 1987).

Practically speaking, an individual level effect means that relationships between supervisors and subordinates are defined according to each subordinate’s perception of his/her leader’s behaviors, and that the work unit or group has no empirical effect. Finding effects to occur almost entirely at the individual level of analysis allows the raw-score regression results to be interpreted without concern for possible misrepresentation of the nature of the obtained effects.

The specific moderator results with respect to the Proposition 24 of House (1996) (Hypothesis 1) provide no support for the most recent revision of path-goal theory. For leader contingent reward behavior, although one of the four performance and three of the four satisfaction interactions were statistically significant, *positive* moderator effects were obtained. In fact, examining the moderator regression equations presented earlier shows that under conditions of low contingent reward behavior, the slopes of the lines were negative or, at best, positive but trivial (the most positive slope, for goals and satisfaction, was only  $+0.03X$ ).

In contrast, under high contingent reward behavior, all of the regression slopes were positive and substantially larger—ranging from a low of  $.16X$  (vision and performance) to a high of  $.58X$  (goals and satisfaction). Furthermore, statistically significant positive moderator effects were obtained for vision with both performance and satisfaction. However, the revised path-goal theory and its underlying logic would appear to predict that the vision dimension should yield the strongest support for the theory (since it is ideologically based)—not the strongest support against it.

The positive moderator results obtained for contingent reward can possibly be explained using distributive justice theory. Distributive justice is defined as the fairness of the ends or rewards received (Greenberg, 1987). Previous research has found a positive relationship between distributive justice and job performance (see the review by Greenberg, 1990) and between distributive justice and job satisfaction (e.g., Dailey & Kirk, 1992; McFarlin & Sweeney, 1992).

Possibly, those individuals who report low levels of contingent reward may have felt that they were not being fairly rewarded (i.e., they perceived distributive justice to be low). If followers do not feel fairly rewarded for effort they are

<sup>4</sup> We think it is important to note that we only tested for the following conditions: within-group, between-group, both within- and between-group, and none (a null condition). Another possible level that could be hypothesized and investigated is the dyad level (as contrasted with the group level). At the dyad level of analysis, each supervisor–subordinate relationship is important and independent of others within the group. A dyadic level analysis would look at each supervisor–subordinate pair and determine whether effects were present at the within-dyad level, between-dyad level, both, or neither. In order to empirically evaluate dyad level effects, matching data from each supervisor–subordinate pair must be available on all variables of interest. In this study, the focus would have been on each supervisor–subordinate relationship independent of the work group or others in the group. The between entity scores would be represented by the average of the data from each supervisor and subordinate. The within entity scores would be calculated by subtracting the between-dyad score from either the supervisor’s or subordinate’s corresponding score. A between-dyad effect would be evidenced if more differentiation would be found between dyads than within. It would be advantageous to test these relationships in order to rule out alternative theoretical possibilities. Unfortunately, we did not have the data to test these relationships. This would have necessitated that each supervisor fill out a questionnaire containing each of the same measures the subordinates responded to (the transformational measure, the contingent reward measure, and the satisfaction measures) for each subordinate. In some cases, this would have required 12 surveys by one supervisor!

currently exhibiting, it seems reasonable to expect that transformational leader behaviors (asking for *additional* effort and performance) would not be very successful. Indeed, if low levels of contingent reward reduce or decrease perceptions of distributive justice, it is perhaps not surprising that some of the regression slopes were negative under the low contingent reward conditions. Additionally, perceptions of contingent reward may have impacted the subordinates' trust of their supervisors, so that transformational leader behavior was most credible (and impactful) when accompanied by leader contingent reward behavior (cf. Pillai, Schriesheim, & Williams, 1999; Podsakoff et al., 1990).

On the other hand, the positive moderator effects which were obtained for contingent reward may be viewed as offering support for a different augmentation effect than has traditionally been hypothesized and tested by Bass and his associates (e.g., Bass, 1985, 1990; Bass & Avolio, 1993). Traditionally, augmentation is tested via linear multiple regression, entering transactional leadership at the first hierarchical step. Then, in the next step, transformational leadership is added and the change in explained variance of the dependent variable is tested for statistical significance. Augmentation thus predicts a significant increase due to the main effect of transformational leadership (and no interaction is required).

In the current study, this type of traditional or "additive augmentation" was not supported, contrary to Hypothesis 2. Re-running the regressions to enter contingent reward behavior first and each TLI transformational leadership dimension second did not yield any significant increases in explained variance at the second steps in the regressions. This is in direct contrast with previous studies which have found support for the augmentation effect using the MLQ of Bass and associates (Bass, 1985, 1988; Bass & Avolio, 1988, 1989; see Bass, 1985; Bycio et al., 1995; Dubinsky, Yammarino, Jolson, & Spangler, 1995; Koh, Steers, & Terborg, 1995; Seltzer & Bass, 1990; Waldman, Bass, & Yammarino, 1990, for studies of augmentation).

Our findings, when coupled with the significant positive moderator effects noted above, appear to suggest that effective transformational leadership was dependent upon, or at least enhanced by, the supervisor's display of contingent extrinsic reward behavior. This might reflect the effect of perceived distributive justice or trust in the supervisor, particularly since the organization in which our study was conducted is a large state bureaucracy in which cynicism abounds and in which complaints about employee compensation are widespread. Quite possibly, how employees interpret the receipt or non-receipt of contingent extrinsic rewards may be affected by the organizational context, in addition to individual difference factors such as cognitive dissonance (Festinger, 1980). Thus, perhaps a boundary condition needs to be added to the new path-goal theory of House (1996) to reflect justice, trust, and/or contextual organizational factors. In particular, and with respect to the Proposition 24 of House (1996), it may be that only extrinsic financial rewards produce the hypothesized effect. Extrinsic nonfinancial rewards (praise, recognition, etc.) may enhance the credibility of transformational leader behaviors such as vision and not cause cognitive dissonance processes to be evoked.

Finding significant positive interactions (instead of only positive main effects) may not indicate lack of support for Bass's (1985) framework. Main effects should not be interpreted in the presence of significant interactions (Cohen & Cohen, 1983). While the simple additive effect proposed by Bass (1985, 1990) was not found, the results clearly support augmentation through positive moderation. Our findings support the notion that transformational leadership enhances the relationship between transactional (contingent reward) leadership and subordinate performance and satisfaction. Thus, managers engaging in transformational behaviors (e.g., articulating a vision, role modeling, fostering the acceptance of group goals, and communicating high performance expectations) concurrently with strong contingent reward behaviors will have significantly better results than those engaging in contingent reward behaviors alone.

#### 4.1. Limitations

One issue regarding this study is the extent to which common method variance should be viewed as problematic (cf. Podsakoff, MacKenzie, Lee, & Podsakoff, 2003; Richardson, Simmering, Sturman, Minsky, & Roman, 2005). We did not include a theoretically appropriate marker variable in our survey that would have allowed us to make post hoc corrections for common method variance (Richardson et al., 2005). However, we should mention four things that should at least somewhat reduce concerns about our findings being only artifacts and due to common method bias.

First, we used a number of procedural study design remedies that should have at least somewhat reduced the susceptibility of our data to common source bias (for example, very strong assurances of respondent confidentiality and use of different questionnaire sections, instructions, and response scales for different measures; Podsakoff et al., 2003).

Second, our CFA results (comparing multiple measurement models) clearly supported the five-factor model. Substantial common source variance might very well have resulted in supporting four or fewer factors (Podsakoff et al., 2003; Podsakoff & Organ, 1986). (Parenthetically, we did not use the method factor CFA approach recommended by Podsakoff et al. [2003, Fig. 1, Situation 7] because Richardson et al. [2005, p. 39] specifically recommended “. . .that the unmeasured latent factor method *not* be used to correct for CMV [common method variance] in leadership data.”)

Third, one of our dependent variables was supervisor-rated performance, a variable not affected by common source variance (Podsakoff et al., 2003). The pattern of results for this variable was no different than that obtained for the satisfaction dependent variable.

Finally, it has been suggested by Hunt, Osborn, & Larson (1973), Kerr & Schriesheim (1974), Schriesheim & DeNisi (1981), and others that the testing of moderator predictions is, in itself, a partial control for this bias. As noted by Cummins (1972), “There is no a priori reason to suggest that the . . .difference between correlations of two variables measured at . . .levels of a third [moderator] variable. . .is influenced by method specificity [common method or source variance]” (p. 657).

Some of the idiosyncrasies of our particular sample may have influenced the results we obtained. The sample was comprised of state social service agency employees, and, given the low pay and bureaucracy that the employees had to endure, we should probably assume that the majority of these employees were at least somewhat altruistically motivated. This ties in to the self-interest boundary condition of House (1996, p. 327). House proposes that employees will exert effort based on the expectation that they will receive valuable outcomes. Typically, we would think of “self-interest” as related to things such as pay raises, training opportunities, promotions, working conditions, etc. However, in this particular sample, most of these things were not generally available or alterable. Thus, the actual act of providing services to people in great need and the resulting satisfaction may have been the “valuable outcome” these employees sought. Given these circumstances, we must caution that our results may not generalize to other samples, and therefore call for similar studies to be conducted in other organizations.

#### 4.2. Future research

There are several directions for future research suggested by the current study. First, as there appears to be an inconsistency between our findings and those predicted by the Proposition 24 of House (1996) with respect to the contingent reward moderator, replication of this investigation is highly desirable. We should note that any such replication(s) should be attentive to both measurement and level of analysis issues, as we have tried to be in this investigation.

On a related note, there is a need for further theoretical development to address the positive moderator effect of contingent reward on satisfaction and performance. The literature on transformational leadership and the augmentation effect should be considered and possibly integrated with the path-goal theory. At the very least, future research needs to explore the conflicting predictions of these two theories, perhaps by adding additional variables to further reflect both individual differences and organizational context effects.

#### 4.3. Summary and conclusion

In conclusion, while the current research provided support for the level of analysis prediction that transformational leadership–subordinate performance and satisfaction relationships occur at the individual level, there was no support for Proposition 24 of the revised path-goal theory of leadership (House, 1996). In particular, for leader contingent reward behavior, a number of statistically significant *positive* moderator effects were obtained, conflicting with the revised path-goal theory (House, 1996). Additionally, our analyses indicated that the traditional additive augmentation model of Bass (1985) and his associates was also not supported, although positive interactive effects were obtained. Clearly, since these findings are potentially important, future research that replicates and further extends the current investigation appears quite desirable.

## Appendix A. Within- and between-entity analysis (WABA)

WABA was developed by Dansereau et al. (1984). In WABA, within- and between-entity indicators are computed and compared to each other by tests of statistical and practical significance. Drawing upon the logic of analysis of variance, data are divided into within-cells (deviation from cell average) and between-cells (cell average) components, with the cells representing analytic entities such as work groups or other organizational units. The relationships which result from these calculations are summarized in the basic WABA equation as:

$${}^rT_{xy} = {}^nB_x {}^nB_y {}^rB_{xy} + {}^nW_x {}^nW_y {}^rW_{xy}, \quad (1)$$

where  ${}^rT_{xy}$  is the total (raw-score) correlation of variables  $x$  and  $y$ ,  ${}^nB_x$  and  ${}^nB_y$  are the between-entity etas for variables  $x$  and  $y$ ,  ${}^nW_x$  and  ${}^nW_y$  are the corresponding within-entity etas, and  ${}^rB_{xy}$  and  ${}^rW_{xy}$  are the corresponding between-entity and within-entity correlations of variables  $x$  and  $y$ .

The within-entity etas,  ${}^nW_x$  and  ${}^nW_y$ , are computed by correlating the raw-scores with the appropriate within-entity deviation scores for  $n$  parts (e.g., the 1 to  $N$  respondents) within  $k$  entities (e.g., the 1 to  $K$  work groups); the between-entity etas,  ${}^nB_x$  and  ${}^nB_y$ , are computed by correlating the raw-scores of the  $n$  parts with their between-entity scores (i.e., the appropriate mean for the entity within which each part is situated). The within-entity correlation ( ${}^rW_{xy}$ ) is calculated by correlating the within-entity deviation scores for the  $n$  parts, while the between-entity correlation ( ${}^rB_{xy}$ ) is calculated by assigning each part its appropriate between-entity scores and then correlating these across the parts.

As shown Eq. (1), raw-score correlations can be partitioned into two separate components—a between-entity ( ${}^nB_x {}^nB_y {}^rB_{xy}$ ) and a within-entity ( ${}^nW_x {}^nW_y {}^rW_{xy}$ ) component; both are the products of multiplying their appropriate etas and component correlations.

### A.1. WABA I

WABA I examines each variable's variance by partitioning the original raw-score into within- and between-entity component scores; these component scores are then correlated with the original raw-score to yield within-entity ( $\eta_W$ ) and between-entity ( $\eta_B$ ) etas. Finally, the etas are tested (relative to each other) with  $F$  tests of statistical significance and  $E$  tests of practical significance.

The traditional  $F$  tests of statistical significance have  $K - 1$  and  $N - K$  degrees of freedom for the between- and within-entity etas, respectively, where  $K$  is the number of entities and  $N$  is the total number of parts within entities. When a between-entities eta exceeds its corresponding within-entities eta, a traditional  $F$  test is used. However, when the within-entities eta is larger, a corrected  $F$  test, which is simply the inverse of the traditional  $F$  test, is employed (Dansereau et al., 1984; Haggard, 1958):

$$\text{Corrected } F = [(\eta_W^2)/(N - K)] / [(\eta_B^2)/(K - 1)] = 1/F. \quad (2)$$

The  $E$  (eta ratio) tests assess the magnitude of within- versus between-effects relative to each other; they are geometrically-based, not dependent upon degrees of freedom, and are calculated as:

$$E = \eta_B / \eta_W. \quad (3)$$

### A.2. WABA II

WABA II examines relationships among variables by first computing within- and between-entity correlations (using all within- or all between-entity scores for the  $n$  parts). The magnitude of these correlations is then tested for statistical significance (using traditional  $t$  tests for bivariate relationships or  $F$  tests for multivariate relationships) and for practical significance (using newly developed  $R$  tests). The  $t$  tests have  $K - 2$  and  $N - K - 1$  degrees of freedom for the between- and within-entity correlations, respectively; the  $F$  test degrees of freedom are adjusted for the number of variables involved. The geometrically based  $R$  (correlation) tests of practical significance are not dependent upon degrees of freedom and are computed as:

$$R_B = r_B / (1 - r)^{1/2}, \quad (4)$$

and

$$R_W = r_W / (1 - r)^{1/2}. \quad (5)$$

Finally, differences between within- and between-entity correlations which involve the same variables are tested using Fisher  $Z$  transformation tests of statistical significance (with  $K - 3$  and  $N - K - 2$  degrees of freedom for the between- and within-entity correlations, respectively), and  $A$  (angular) tests of practical significance (for the  $Z$  and  $A$  tests, only differences in absolute magnitudes are tested). The  $A$  tests are geometrically based and not dependent upon degrees of freedom, and are computed as:

$$A = \theta_W - \theta_B, \quad (6)$$

where  $\theta_W$  and  $\theta_B$  are the angles associated with the within- and between-entity correlations (respectively).

### A.3. Drawing inferences

Inferences are drawn using the .05 and .01 levels of statistical significance for the  $F$ ,  $Z$ , and  $t$  tests and the  $15^\circ$  and  $30^\circ$  levels of practical significance for the  $E$ ,  $R$ , and  $A$  tests. The  $15^\circ$  and  $30^\circ$  angle criteria arise from the fact that a  $90^\circ$  angle represents unrelated variables, while a  $0^\circ$  angle represents a perfect relationship; smaller angles thus represent stronger relationships (in the  $R$  tests), while angular ratios different from 1.0 or larger differences between angles (in the  $E$  and  $A$  tests, respectively) indicate more meaningful differences in the magnitudes of relationships (see Dansereau et al., 1984, for additional details). Decomposed raw-score correlation components are also computed by multiplying the product of the WABA I (within- or between-entities) etas with their WABA II (within- or between-entities) correlations; these results can then be examined by the  $A$  test to determine whether one component is meaningfully greater than the other. Finally, the WABA I and II results and the decomposed correlations are examined and an overall conclusion drawn concerning the phenomenon under investigation. (Dansereau et al., 1984 (pp. 183–185) present guidelines for integrating WABA I and II results; for excellent yet brief descriptions of WABA I and II procedures, see Markham & McKee, 1991; Schriesheim et al., 1998; Yammarino & Dubinsky, 1992; and Yammarino & Markham, 1992).

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