

Individual Difference Moderators In Job Design Research: A Re-Examination Of the Empirical Evidence And Suggestions For Future Research.

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The empirical evidence relating to the various job design individual difference moderators is re-examined in light of Arnold's (1982) distinction between form and degree of relationships and the appropriate statistical procedures for each type of moderator effect. Studies testing the moderating effects of urban-rural background, Protestant work ethic, high order need strength, growth need strength, and other achievement oriented individual differences are analyzed using this distinction. Most of the studies, including those commonly referenced in the literature, failed to make this distinction, and used inappropriate statistical methods. They, therefore, cannot be used as the basis for accepting or rejecting the hypothesized moderator effects of these individual differences on the form of the job scope - employee responses relationship. However, the limited appropriate empirical evidence relating to the moderating effects of achievement oriented individual differences shows some support. The implications for different methods of conceptualizing and statistically uncovering moderator variables are discussed and suggestions for the future conduct of job design moderator research are made.

For the past twenty years, there has been an increasing interest in uncovering individual difference variables as moderators in job design research. Stimulated by the work of Tinner and Lawrence (1965), most of the research has been concentrated on investigating the moderating effects of rural and urban background of the employees, Protestant work ethic and related work values (Hulin and Blood, 1968), and achievement oriented individual needs and motives (Aldag and Brief, 1979a; Hackman and Lawler, 1971; Hackman and Oldham, 1980). The basic assumption underlying all this research is that individual characteristics interact with job scope to determine employee work attitudes and behavior. However, there has been considerable debate in the industrial and organizational psychology literature with respect to: (a) the conceptual meaning of moderator variables; (b) the appropriate analytical and statistical procedures for uncovering moderator variables.

Arnold (1982) differentiates between degree and form of relationship between variables. These two terms correspond to the two different ways in which the term moderator is used. The term "moderator" variables has been used when the research question of interest is to discover whether or not the correlation coefficient between a predictor (X) and a criterion (Y) variable is stable across the entire population, or whether it varies for different types of population subgroups defined by a third

variable (Z). In this case, the term moderator is used to refer to the *degree* of relationship between X and Y, the degree of relationship being different values of Z – the hypothesized moderator variable. This is the sense in which the term is commonly used in discussions of differential validity in personnel selection (Schmidt & Hunter, 1978, p. 22). It is also the sense in which Saunders (1956) used the term, although he developed it further to include discontinuous moderator variables.

The term moderator has also been used by theorists hypothesizing the existence of an interaction effect between an independent variable (X) and a "moderator" variable (Z) as the two variables influence a dependent variable (Y). This implies that the *form* of the relationship between X and Y is conditional upon a third variable Z. In this case, the theorist is referring to the *form* (and not degree) of relationship in describing the moderator effects of variable Z. Emphasizing the distinction, Arnold states:

... any theory which hypothesizes the *interaction* of two independent variables X and Z in determining a dependent variable Y, or equivalently hypothesizes that a dependent variable Y is a *joint* function of two independent variables X and Z, is hypothesizing that the form of the relationship between X and Y is conditional upon Z. (1982: pp. 154-5).

In job design research, as in most theory-based models in management, the term moderator is used in the latter sense. Specifically, internal motivation is hypothesized to be a joint function of job scope and growth need strength, i.e., the theory hypothesizes that individuals high on growth need strength will respond *more positively* to jobs high on the core job dimensions than will individuals low on growth need strength.

Figure 1 graphically demonstrates the distinction between *degree* and *form* of relationship between two variables. It clearly shows the two different ways of depicting the relationship between job scope and internal motivation as moderated by growth need strength (GNS).

Figure 1a demonstrates a situation in which the *degree* of relationship between job scope and internal motivation is moderated by growth need strength. It indicates that for individuals who are high on growth need strength, the relationship converges closer to the line of "best fit" than for those low on growth need strength. In essence, this implies differing degrees of predictability such that the relationship between job scope and internal motivation is more predictable for individuals high on growth need strength than those low on growth need strength. This will be evidenced by a stronger correlation between job scope and internal motivation for individuals high on growth need strength than for individuals low on growth need strength.

Figure 1b, on the other hand, illustrates a situation in which the *form* of relationship is moderated by growth need strength. It shows that job scope results in higher levels of internal motivation for individuals high on growth need strength than for those low on growth need strength. In other words, there is an interaction effect between job scope and growth need strength in determining the level of internal motivation. It does not in any way imply differing degrees of predictability for individuals high and low on growth need strength (as indicated by the equal degrees of spread around the hypothesized regression lines).

A close examination of the job design literature indicates that the term moderator variable is employed to imply a difference in *form* of relationship between job scope and internal motivation for different types of individuals (Hackman and Oldham, 1976; Hackman, Oldham, Janson and Purdy, 1975, p. 67). Nowhere in the literature is it suggested that individuals with high middle class values of high need for

FIGURE 1

Degree vs Form of Relationships Between Job Scope and Internal Motivation Moderated by Growth Need Strength

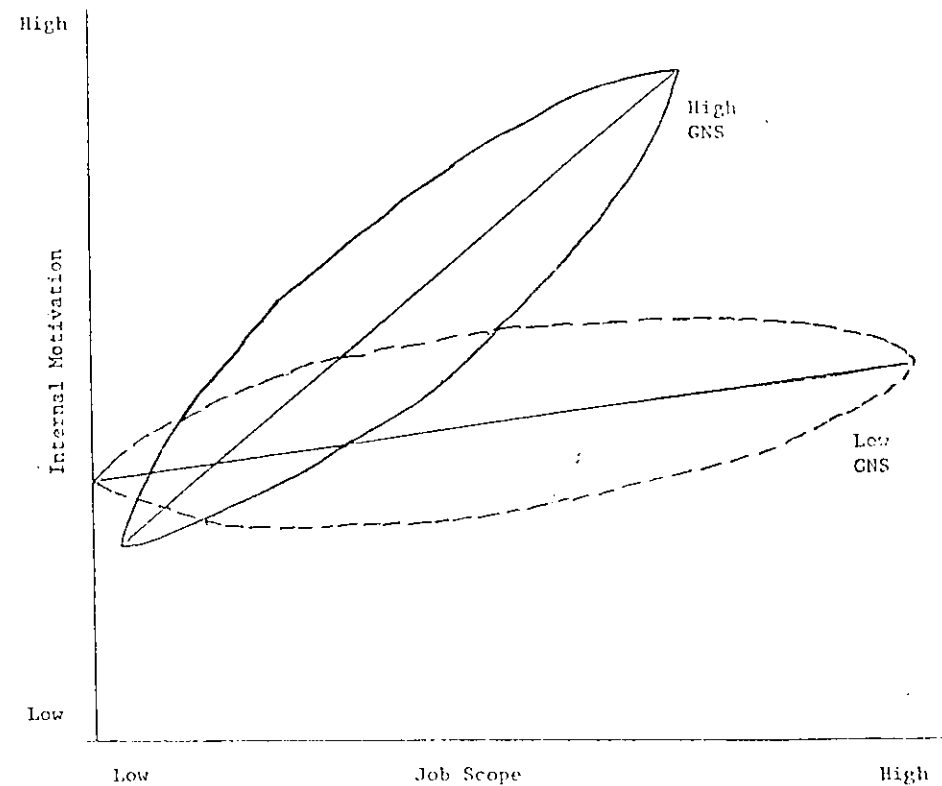


Figure 1 (a). Degree of Relationship.

achievement are more *predictable* in terms of their responses to enriched jobs than individuals who are low on these or similar moderator variables. Instead, researchers refer to the *form* and not degree of relationship. For example, in making the case for growth need strength as an individual difference moderator variable, Hackman and Oldham put it this way:

The basic prediction is that people who have high need for personal growth and development will respond *more positively* to a job high in motivating potential than people with low growth need strength (1976, p. 258, emphasis added).

This statement, when applied to a wide range of values of job scope, would be consistent with Figure 1b. It is not consistent with the conceptualization of the moderator variable as depicted in Figure 1a.

FIGURE 1

Degree vs Form of Relationships Between Job Scope and Internal Motivation Moderated by Growth Need Strength

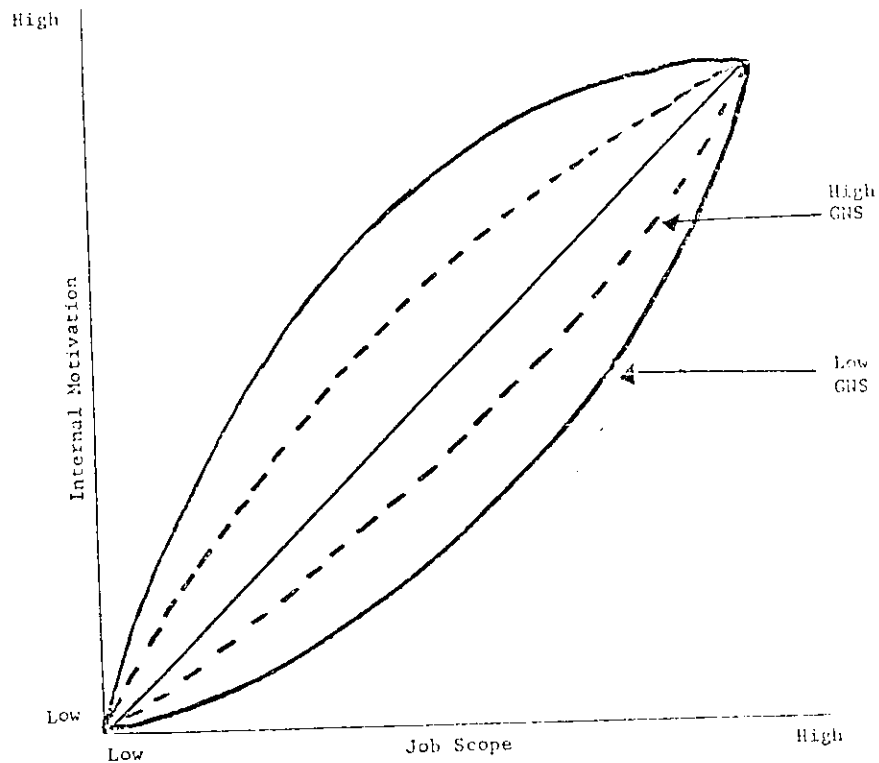


Figure 1 (b): Form of Relationship

In recent years, several studies have reviewed the empirical evidence relating to the existence of moderator effects in job design (White, 1978; Pierce and Dunham, 1976; Hackman and Oldham, 1980; O'Connor, Rudolf, and Peters, 1980; Roberts and Glick, 1981). These reviews have arrived at different conclusions regarding the usefulness of moderator research. For example, after reviewing several studies Hackman and Oldham concluded:

... there is now substantial evidence that differences among people do moderate how they react to the complexity and challenge of their work, and studies using direct measures of individual needs seem to provide more consistent and strong support for this finding than do measures of subcultural or generalized work values. (1976, p. 255).

However, a recent review by White (1978) does not share the same optimism. White (1978) reviewed 29 empirical studies of individual differences in job design research, focusing mainly on the 3 commonly used moderator variables of i) rural and urban background of the employees; ii) Protestant work ethic; and iii) higher-order need strength. After examining the empirical findings of these studies, he concluded that the results of these studies are: a) insignificant; b) inconsistent; and c) hard to generalize. He therefore concluded that more research in this area would not be fruitful. In effect, he was calling for a moratorium of this line of research when he stated:

Nineteen years of theory building and empirical research have not provided much hope in finding generalizable individual difference moderators of the relationship between job quality and work responses. Why continue! (1978, p. 278).

It should be noted that none of these reviews differentiated between those studies investigating *form* versus *degree* of relationship as discussed above (see Figure 1). It is therefore possible that the source of controversy and confusion stems from using empirical evidence from studies using inappropriate methods to test for job design moderator effects. The purpose of this paper is to re-examine the empirical evidence of the individual difference moderator research in job design by differentiating those studies investigating the form versus degree of relationships.

In addition to clarifying the conceptual differences between degree and form of relationships as they relate to an understanding of types of moderator variables, Arnold (1982) also specifies and illustrates the appropriate statistical procedures for testing for moderator variables of either type. He argues, and demonstrates empirically, that the appropriate test of whether or not the *degree* of relationship between variable X and variable Y is moderated by a third "moderator" variable Z, is the comparison of their correlation coefficients for different values of Z, using the appropriate Z test (Arnold, 1982; Cohen and Cohen, 1975; Schmidt, Hunter and Pearlman, 1981).

On the other hand, when testing whether a variable moderates the *form* of relationship between two other variables, the appropriate statistical procedures involve the comparison of the regression weights B_{1j} , derived from hierarchical multiple regression analyses. Arnold (1982) argues, and empirically demonstrates, that in order to determine whether or not the *form* of the relationship between variables X and Y is conditional upon variable Z (a hypothesized moderator variable) one must determine whether or not changes in the value of Z are associated with changes in B_{1j} . These procedures can be used whether the moderator variable is continuous or discontinuous. In essence, since a conditional form of relationship implies a product of variables, its statistical test requires finding a significant interaction between the moderator and the independent variable. (For a formulation of the appropriate regression equation and test of statistical significance of the partial coefficients, see Arnold (1982: pp. 154-159).

In drawing the distinction between the two conceptual meanings of moderator variables, and their corresponding appropriate statistical procedures, Arnold observes that testing for differing degrees of relationships between a predictor and a criterion for different values of a moderator variable requires testing the differences of correlation coefficients for the different values of the moderator. On the other hand, determining whether the *form* of relationship between a predictor and a criterion varies with a third variable Z (the hypothesized moderator) requires a comparison of the regression coefficients B_{1j} for the two groups. Therefore, studies using other

statistical methods like subgroup analyses of differences in correlations cannot claim to have tested for moderator effects of the *form* of relationships. Empirical evidence derived from such studies cannot be used as the basis for accepting or rejecting the hypothesized moderator effects of these individual difference variables of the *form* of the relationships between job scope and employee responses.

This is an important distinction which has not been adequately addressed by previous reviewers (Hackman and Oldham, 1976; Schuler, 1977; White, 1978; Roberts and Glick, 1981). However, it should be noted that other research contributions of degree studies to the area of job design are not disputed by this paper. It should also be noted that other approaches to moderator research have been proposed in the literature (e.g. Stone and Hollenbeck, Note 3).

Empirical Studies Of Individual Difference Moderators In Job Design Research

In this section, we examine the empirical evidence relating to the most commonly used individual difference moderator variables of rural and urban background, Protestant work ethic, high order need strength, and growth need strength. For each moderator variable, we shall examine the extent to which investigators have tested for moderators of the *form* of the relationship, *degree* of relationship, or both. Investigations using subgroup analyses of correlation differences for uncovering moderator effects test only whether the degree of relationship varies with the moderator. Testing for differences in the form of relationships require application of multiple regression analysis. Since, as we have shown, theoretical statements hypothesize that individual differences moderate the *form* (not the degree) of job scope - individual response relationships (see Figure 1), it follows that an assessment of the statistical techniques employed in the various studies can be used to determine the extent to which investigators have used the appropriate conceptualization and statistical procedures in testing for individual difference moderator variables in the job design area.

The most current and comprehensive model of job design (Hackman and Oldham, 1980) specifies three types of relationships whose form may be moderated by individual differences. These are: (i) the core job dimensions - psychological states relationship; (ii) the psychological states - outcomes relationships; and (iii) the job dimensions - outcomes relationships. ² Using the commonly employed individual difference moderators in job design research, we shall assess the extent to which the existence of moderators of each of these relationships has been adequately tested using appropriate statistical procedures. It should be noted that previous reviewers have not always made the distinction among the three job scope - psychological states - outcomes relationships (White, 1978; Roberts and Glick, 1981).

Identification of Studies

The selection of studies used in this paper was based on two review papers by White (1978) and Roberts and Glick (1981). White's (1978) study was considered a good starting point because it was quite comprehensive, especially in its coverage of studies investigating the moderating effects of rural and urban background, the Protestant work ethic, and higher order need strength. However, it was considered rather dated and incomplete in its coverage of studies dealing with growth need

strength and other achievement oriented individual differences. Moreover, the review did not adequately cover empirical studies investigating the moderating effects of these individual differences for relationships involving the critical psychological states (White, 1978, p. 269). To remedy these problems, a more recent and comprehensive review of the job design literature by Roberts and Glick (1981) was used. Roberts and Glick (1981) classified the studies they reviewed into those which were investigating main effects of task scope and other variables, and those which were concerned with interaction effects of task scope and other variables (see Roberts and Glick, 1981: Table 1). The empirical studies investigating the interaction effects of job scope and the individual difference variables of interest to the present study were identified and selected for analysis. Finally, these two sources were checked for completeness against the bibliography of Hackman and Oldham's (1980) recent book on job design.

Studies were included in the present analysis of the present study if they were published, and if they had measures of job scope. Unpublished studies were excluded due to practical problems of accessibility. Studies which did not have measures of job scope (e.g., Fossum, 1974; Schuler, 1972; Searfoss and Moheczka, 1973), and those on participation (e.g., Ruh, White, and Wood, 1975; Siegel and Ruh, 1973; Tosi, 1970; Vroom, 1959; White and Ruh, 1973) were excluded from the analysis. Also excluded were studies (e.g. Dunham, 1977), using organizational variables like structure and environment as the independent variables instead of job scope. In all, 43 studies were included in the analysis and the results are summarized in Tables 1 - 5.

It should be noted at the outset that other criticism of job design research have been discussed and debated in the literature (Alderfer, 1977; Lawler and Cummings, 1980; Salancik and Pfeffer, 1978) and will not be repeated here. These include, as for example: (1) use of paper and pencil perceptual measures of job scope, outcome, and moderator variables all from the same respondents (Jenkins, Nadler, Lawler and Cammann, 1975; Kiggundu, 1980); (2) incomplete, ethnocentric conceptualizations and taxonomies of job scope (Hofstede, 1980; Roberts and Glick, 1981); and (3) inadequate attention to salient organizational and contextual characteristics (Aldag and Brief, 1979a; Katz, 1978b). The proper conceptual and statistical procedures discussed below cannot by themselves overcome these limitations.

Rural-Urban Background

Table 1 gives a summary of the empirical results of nine studies testing for the moderating effects of the rural-urban background variable. For each study, the table shows the size and type of sample used, and the type of moderating effect examined (form vs degree) for each of the three sets of relationships between job characteristics, psychological states, and work and personal outcomes.

Several interesting points can be drawn from Table 1. First, only two out of nine studies (Cherrington and England, 1980; Kidron, 1977) tested for the *form* of the moderating effects of the rural-urban background variable. Other studies, including the often cited studies of Blood and Hulm (1967), Turner and Lawrence (1965), and Wanous (1974), tested only whether rural-urban background moderates the *degree* of relationships. According to the arguments presented above, these studies constitute an inappropriate test of the hypothesized moderator effects on the *form* of relationships. None of the studies tested the form of the moderating effects of the rural-urban variable on the job scope - psychological states and psychological

TABLE 1

Summary Results of the Studies Testing for Form vs. Degree of Relationships of Urban-Rural Background.

Author(s)	Type of Sample	Relationship Tested		
		Degree/Form ^c		
		JS-PS ^b	PS-OU ^c	JS-OU ^d
Turner & Lawrence (1965)	470 rural and urban workers from 11 industries and 47 different jobs			tested (some support)
Blood & Hulin (1967)	1300 Blue Collar in 21 plants			tested (some support)
Sheppard (1970)	117 auto maintenance craftsmen, 92 oil refinery operators and 96 auto assemblers			tested (no support)
Susman (1973)	256 workers in 26 different plants in 7 different industries			tested (no support)
Wanous (1974)	80 newly hired female telephone operators			tested (limited support)
Orpen (1976)	107 black South African workers			tested (some support, no RS reported)
Brief & Aldag (1975)	104 correction employees			tested (no support)
Kidron (1977)	Insurance, hospital & university employees			tested (no support)
Cherrington & England (1980)	3053 workers in 53 companies throughout the U.S.			tested (some support)

a = Blank cells indicate the relationship was not tested.

^bJS-PS = Job Scope - Psychological States Relationships

^cPS-OU = Psychological States - Outcomes Relationships

^dJS-OU = Job Scope - Outcomes Relationships

e = Upper cells indicate degree; lower cells indicate form

states - outcomes relationships. Third, the results of the two studies which tested the *form* of the moderating effects of this variable yield conflicting results. Kidron (1977) found no support for the moderating effects of the rural-urban variable³. However, Cherrington and England (1980) found some support for 2 out of 3 satisfaction measures. Consistent with Arnold (1982), this study showed that it is possible to find moderating effects of the *form* of relationships without necessarily finding moderating effects of the *degree* of relationships. Therefore, studies which failed to find significant moderating effects of the degree of relationships (Sheppard, 1970; Susman, 1973; Wanous, 1974) cannot be used as the basis for rejecting the existence of the hypothesized moderating effects on the *form* of relationships of the rural-urban variable.

In conclusion, the empirical evidence relating to the moderating effects of the rural-urban variable is rather limited. Only two studies performed the appropriate statistical tests, and yielded conflicting results. Moreover, only the job scope - outcomes relationships were tested, and not the elaborated job design model. This evidence does not support a call for a moratorium on this line of research. Available appropriate empirical evidence is not adequate for definitive conclusions, one way or the other.

The Protestant Work Ethic (PE).

Table 2 summarizes the results of seven studies testing for the moderating effects of the Protestant work ethic variable. As in the previous table, Table 2 shows that most of the studies (e.g., Blood 1969; Wanous, 1974) have tested only the moderating effects of the Protestant work ethic on the *degree* of relationships between variables. Only three studies (Kidron, 1977; Cherrington and England, 1980; Stone, 1976) have tested for differences in the form of relationships and, therefore, constitute an appropriate test of the moderator effects of PE. Data from three studies, however, yield conflicting results.

While Kidron (1977) found no support for the moderating effect of the Protestant work ethic on the form of relationships, both Stone (1976) and Cherrington and England (1980) found some support. For example, Cherrington and England (1980) found that one component of the Protestant ethic (moral importance of work) yielded two out of four significant interactions with job attractiveness and overall performance as dependent variables. However, the interaction effects when general satisfaction and company satisfaction were used as dependent variables, were not statistically significant. Stone (1976) found that the job scope - Protestant ethic interaction term yielded significant effects on satisfaction with work. One possible explanation is that Kidron's (1977) study was based on small sample sizes which reduces the probability of finding moderator effects even when they do exist (see below). On the other hand, both Stone (1976) and Cherrington and England (1980) used large sample sizes drawn from a variety of job types representing many different organizations. Such variations may have contributed to high reliability coefficients for the measures of job scope and, therefore, increased the probability of uncovering moderator effects.

Table 2 also shows that all seven studies have exclusively tested for moderators of the job scope - outcome relationships. None of the studies has attempted to test for the moderating effects of the form of the Protestant ethic variable using the elaborated job design model.

TABLE 2

Summary Results of the Studies Testing for Forms vs.
Degree of Relationships of the Protestant
Work Ethic^a

Author(s)	Type of Sample	Relationship Tested		
		Degree/Form ^e		
		JS-PS ^b	PS-OU ^c	JS-OU ^d
Blood (1969)	448 airmen and noncommissioned officers from the U.S. Air Force	/	/	tested (some support)
Wanous (1974)	80 newly hired female telephone operators	/	/	tested (no support)
Clone (1975)	149 enlisted personnel in the U.S. Navy	/	/	tested (no support)
Stone (1976)	594 nonmanagerial workers	/	/	tested (no support) tested (some support)
Armenakas, Field, Holley, Bedeian & Ledbetter (1977)	55 textile weavers and spinners	/	/	tested (no support)
Kidron (1977)	Insurance, hospital & university employees	/	/	tested (no support)
Cherrington & England (1980)	3053 workers in 53 companies throughout the U.S.	/	/	tested (no support) tested (some support)

a = Blank cells indicate the relationship was not tested

^bJS-PS = Job Scope - Psychological States Relationships

^cPS-OU = Psychological States - Outcomes Relationships

^dJS-OU = Job Scope - Outcomes Relationships

e = Upper cells indicate degree, lower cells indicate form

In conclusion, the appropriate statistical evidence relevant to the moderating effect of the Protestant work ethic on the form of job characteristics - outcomes relationships is very limited indeed. Of the seven studies summarized in Table 2, only 3 employed appropriate statistical methods, and of these, two provided some support. Moreover, the moderating effects of the Protestant work ethic on both the job scope - psychological states, and the psychological states - outcomes relationships remain untested. Our analysis shows that the empirical evidence relating to the moderating effects of the Protestant work ethic variable is rather scanty, but somewhat supportive.

Individual Needs as Moderators

This section discusses the results of the empirical studies using individual needs as the moderator variables. It includes higher order need strength, growth need strength (GNS), and other achievement oriented individual difference moderators which have been used as potential moderators in job design research. Each of these, and two formats of GNS are discussed in turn.

High Order Need Strength

Table 3 summarizes the results of seven studies testing the moderating effects of higher order growth needs (HONS). All the studies, except Kidron (1977) tested the moderating effects of higher order need strength on the degree and not form of relationship between job scope and outcomes. None of the studies tested for the moderating effects of higher order need strength on the form of the job scope - psychological states, and psychological states - overcome relationships.

Kidron (1977) who tested for the moderating effects of higher order need strength on the form of the job scope - outcomes relationship did not find strong support. Out of 60 regression equations, only 15 yielded statistically significant interaction terms between measures of job scope and various dependent variables. However, these were scattered across the three samples used, the measures of job scope, and the various JDI dependent variable subscales. Consequently, no clear pattern emerged out of this study (see Kidron, 1977, p. 73).

Table 3 also shows that Hackman and Lawler (1971), Lawler, Hackman and Kaufman (1973), and Wanous (1974) tested and found support for the moderating effects of higher order need strength on the *degree* of job scope - outcomes relationships. These studies did not test whether high order need strength moderates the *form* of the relationships. Therefore, they cannot be used as the basis for accepting or rejecting higher order need strength as moderating the form of the job design relationships. Yet, these studies are widely cited as the basis for using higher order need strength as a moderator variable. Moreover, Wanous (1974) is often referenced for rejecting the moderating effects of the rural-urban variable and the Protestant work ethic. However, as we have shown, these studies used inappropriate statistical procedures, and their results should, therefore, be interpreted with caution. They do not speak to the moderating effects of higher order need strength on the *form* of any of the three job design relationships. Due to the small sample sizes used by most of these studies (see Table 3), it can be predicted that if these data sets were reanalysed, the chances of finding significant moderator effects of the form of relationships would be rather small. This is because the power of any statistical test is a function of sample size and the psychometric properties of the scales used

TABLE 3

Summary Results of the Studies Testing for Form vs.
Degree of Relationship for Higher Order Need Strength (HONS)^a

Author(s)	Type of Sample	Relationship tested		
		Degree/Form ^e		
		JS-PS ^b	PS-OU ^c	JS-OU ^d
Hackman & Lawler (1971)	208 utility company employees			tested (some support)
Lawler, Hackman & Kaufman (1973)	60 female telephone company operators and service assistants			tested (no support reported)
Wanous (1974)	80 female telephone operators			tested (some support)
Brief & Aldag (1975)	104 correction employees			tested (some support)
Farr (1976)	90 introductory psychology students			tested (some support, no results reported)
Armenakis et al. (1977)	55 textile workers			tested (some support)
Kidron (1977)	Insurance (N=237), hospital (N=75) and university (N=41)			very limited support 15/60 A.R's sign

- ^a = Blank cells indicate the relationship was not tested
^b JS-PS = Job Scope - Psychological States Relationships
^c PS-OU = Psychological States - Outcomes Relationships
^d JS-OU = Job Scope - Outcomes Relationships
^e = Upper cells indicate degree; lower cells indicate form

In summary, we found only one study which tested whether higher order need strength moderates the form of relationships among job design variables. This single example did not provide empirical support for the moderating effects of higher order need strength on the form of job design relationships involving the psychological states. Accordingly, the empirical evidence relating to the moderating effects of higher order need strength on the form of job design relationships is very limited indeed.

Growth Need Strength (GNS)

Table 4 summarizes the results of twelve studies which have tested for the moderating effects of GNS. Of these, only Hackman and Oldham (1976), and Arnold and House (1980) have a more complex test of the full model. Moreover, only Arnold and House (1980), Champoux (1980), Pierce, Dunham and Blackburn (1979), and Katz (1978b) have tested whether GNS moderates the form of the hypothesized relationships using the appropriate statistical procedures.

In analyzing the results regarding GNS as a moderator, it is necessary to distinguish the Would Like and the Job Choice formats of GNS. These are two separate subscales of the Job Diagnostic Survey (Hackman and Oldham, Note 1) which use different formats for measuring growth need strength. This distinction is necessary because, although both subscales are supposed to tap the same construct, recent empirical studies have shown significant differences in their psychometric properties (Aldag and Brief, 1976b; Arnold and House, 1980; Kiggundu, Levanoni and Sales, Note 2).

The Would Like Format

The studies using the Would Like format of GNS are shown in Table 4. Of these Evans, Kiggundu and House (1979), Hackman, Pearce and Wolfe (1978), Katz (1978a), Oldham (1976), Orpen (1979), and Umstot, Bell, and Mitchell (1976) tested only the degree (not form) of relationship in investigating the moderating effects of the Would Like format of GNS. The rest, Arnold and House (1980), Katz (1978b), and Pierce, Dunham and Blackburn (1979) tested the moderating effects of this format on the form of the job design relationships. None of the studies tested for the full model, although Arnold and House (1980) tested 2 of the three hypothesized relationships. It should be noted that Katz (1978a, 1978b) used a "modified" form of the Would Like format and therefore the results of these two studies may not be comparable with others using the same GNS format.

Katz (1978b) and Pierce et al. (1979) found some support for the moderating effects of the GNS - Would Like format on the job scope - outcomes relationships. However, Katz (1978b) and Pierce et al. (1979) included job longevity and organization structural variables respectively, as additional potential moderators. Therefore, the results of these studies are hard to interpret within the limited context of the Hackman and Oldham (1976) theory of job design.

Only Arnold and House (1980) tested the moderating effects of the Would Like format on the form of the job scope - psychological states and - psychological states outcomes relationships. The results for the job scope - psychological states relationships were not encouraging. Of the five core job dimensions tested, the Would like format successfully moderated only the feedback-knowledge of results relationship. Other theory-specified relationships between the core job dimensions and the critical psychological states were not successfully moderated by the Would Like format of GNS. The results relating to the psychological states - outcomes

TABLE 4

Summary Results of the Studies Testing for Form vs. Degree of Relationship for the Two Formats of Growth Need Strength (GNS)^a

Author(s)	Type of Sample	GNS Format Used	Relationships Tested		
			Degree/Form ^b		
			JS-PS ^b	PS-OU ^c	JS-OU ^d
Hackman & Oldham (1976)	658 heterogeneous types of employees	Job Choice	tested (some support)	tested (some support)	tested (some support)
Oldham (1976)	60 clerical workers	Would like			tested (some support)
Oldham, Hackman & Pearce (1976)	201 clerical workers	Job Choice			tested (some support)
Umstot, Bell & Mitchell (1976)	42 subjects	Would like			tested (some support)
Hackman, Pearce & Wolfe (1978)	94 bank employees	Would like			tested (some support)
Katz (1978a)	2094 public employees	Modified would like			tested (some support)
Katz (1978b)	1085 public sector employees	Modified would like			tested (some support)
Evans, Figgundu & House (1979)	343 automobile assembly plant workers	Job Choice			tested (some support)
Prpen (1979)	72 clerical agency workers	Would like			tested (some support)

(Continued)

Author(s)	Type of Sample	GNS Format Used	Relationships Tested		
			Degree/Form ^a		
			JS-PS ^b	PS-OU ^c	JS-OU ^d
Fierce, Dunham & Blackburn (1979)	398 insurance company employees	Would like			tested (some support)
Arnold & House (1980)	120 exempt engineering employees	1. Would like 2. Job Choice	both tested (some support)	both tested (no support)	
Champoux (1980)	3 different samples: research & development (N=1198); Federal Agency A (N=66); Federal Agency B (N=151)				tested (some support)

a = Blank cells indicate the relationship was not tested

^bJS-PS = Job Scope - Psychological States Relationships

^cPS-OU = Psychological States - Outcomes Relationships

^dJS-OU = Job Scope - Outcomes Relationships

e = Upper cells indicate degree; lower cells indicate form

relationships were even less encouraging. Using the three personal outcomes of internal motivation, general satisfaction and growth satisfaction, and four measures of performance, Arnold and House (1980) did not find support for the moderating effects of the Would Like format on the form of any of the psychological states - overcome relationships.

In conclusion, it should be noted that about one half of the studies using the GNS - Would Like format investigated only the degree and not the form of relationships. Only three studies provided evidence relating to the moderating effects of the form of the relationships. Three studies clearly do not provide adequate empirical evidence regarding whether or not the Would Like format measure of GNS moderates the form of the job design relationships. Therefore, on the basis of the available empirical evidence, we cannot conclude that the Would Like format of the GNS scale does or does not moderate the form of these relationships. However, the evidence suggests the need for better empirical research.

The Job Choice Format

This is the GNS format which was used in the original Hackman and Oldham (1976) test of the theory. Table 4 shows four studies which have used this format. Of these, only Arnold and House (1980) tested for moderators of the form of relationships. Specifically, Arnold and House (1980) tested for the moderating effects of the Job Choice format of the form of job scope - psychological states, and psychological states-outcomes relationships. They found that the Job Choice format measure of GNS moderated the form of the relationships between skill variety and experienced meaningfulness, and autonomy and experienced responsibility. However, it did not moderate the relationships between job feedback and experienced knowledge of results or task identity and experienced meaningfulness.

It should be remembered that the same study found some support for the job scope – psychological states form of relationship using the Would Like format. The supportive results regarding the moderating effects of growth need strength on the form of the job scope – psychological states relationship, using both GNS formats, provide consistent evidence of the moderating potential of this individual difference variable.

As Table 4 shows, Arnold and House (1980) is the only study which tested the moderating effects of the Job Choice format on the form of the psychological states – outcome relationships. Using the dependent variable of internal motivation, general satisfaction, growth satisfaction, and four different measures of performance, Arnold and House (1980) did not find significant moderating effects of this GNS format on the form of the relationships between the three psychological states of experienced meaningfulness, experienced responsibility, and experienced knowledge of results and any of these dependent variables. It should be remembered that the same study failed to find any significant moderator effects on the form of the relationships between the psychological states and the outcomes variables using the Would Like format.

Champoux (1980) found strong support for the moderating effects of GNS on the form of the job scope – outcomes relationships in all three samples studied. Results of two of the samples (R & D and Federal Agency A) supported the moderating effects of GNS on the form of the relationships between job scope and general satisfaction. Results of another pair of samples (R & D and Federal Agency B) also yielded statistically significant interactions between GNS and job scope for growth satisfaction and internal motivation. This study, using 3 separate samples, and the dependent variables specifically hypothesized by the theory, provides some strong empirical support for the moderating effects of GNS on the form of the job scope – outcomes relationships. However, the study did not specify the GNS format used. Nor did it test for the other job design relationships involving psychological states.

Finally, it should be noted that the original study by Hackman and Oldham (1976) did not provide a complete test of the theory. Specifically, it did not test for moderators of the form of any of the three relationships as specified in the model. Rather, it concentrated on testing for moderators of the degree of these relationships (Hackman and Oldham, 1976, 269-270). In the same manner, Evans, Kiggundu and House (1979) and Oldham, Hackman and Pearce (1976) did not test for moderators of the form of these relationships. Consequently, these studies are of limited value for providing empirical evidence relating to the moderating effects of the Job Choice format of GNS on the form of the three job design sets of relationships.

In summary, we note that proper testing of the moderating effects of GNS is just a beginning. Early returns show some promising results. The empirical base is so small that no definite conclusions can be drawn. However, available evidence points to some support for the moderating effects of GNS. This support is limited to testing the model with job satisfaction and internal motivation but not performance as the dependent variable (see below).

Other Achievement Oriented Individual Difference Moderators

Table 5 summarizes the results of 8 studies which have tested the moderator effects of several other achievement oriented individual difference measures. These include for example, Steers and Braunstein's (1976) Manifest Needs Questionnaire, Jackson's (1967) Personality Research Form, and Gough and Heilbrun's (1965) Adjective Check List. The justification generally given for testing such alternative moderators are that: a) these measures are conceptually similar to GNS or BONS; b)

TABLE 5
Summary Results of the Studies Testing for Form vs.
Degree of Relationships of Other Achievement Oriented
Individual Differences^a

Author(s)	Type of Sample	Moderator Variable(s) Tested	Relationships Tested		
			Degree/Form ^b		
			JS-PS ^b	PS-OU ^c	JS-OU ^d
Reber (1974)	60 college students	Intrinsic/extrinsic work values	/	/	tested (some support)
Steers (1976)	133 female first level supervisors	R ach: adjective check list (Gough & Heilbrun 1965)	/	/	tested (limited support)
Sims & Zillagui (1976)	766 Paramedical & support staff	1. self-actualization 2. locus of control	/	/	tested (some support) tested (no support) tested (some support)
Stone, Noddy & Porter (1977)	340 mixed work groups of a manufacturing firm	1. N ach: 2. Autonomy (Jackson 1967 Research Form)	/	/	tested (some support) tested (no support) both tested (some support)
Steers & Spencer (1977)	115 manufacturing managers	N ach M R Q	/	/	tested (some support) tested (some support)
Evans et al. (1979)	93 automobile plant workers	N ach: I A T	/	/	tested (no support)
O'Reilly & Caldwell (1979)	57 graduate business students	M R Q	/	/	tested (some support)
Ein (1980)	96 undergraduate students	Eysenck (1976) Introversion/extraversion	/	/	tested (some support)

a = Blank cells indicate the relationship was not tested

^b JS-PS = Job Scope – Psychological States Relationships

^c PS-OU = Psychological States – Outcomes Relationships

^d JS-OU = Job Scope – Outcomes Relationships

e = Upper cells indicate degree, lower cells indicate form

they are psychometrically superior to the measures of GNS and HONS; and c) they provide a constructive replication of the original job design model.

Stone, Mowday and Porter (1977) measured the need for achievement and the need for autonomy using the Jackson Personality Research Form. They found support for the moderating effects of need for achievement on the form of the job scope - satisfaction with work relationship. However, they did not find support for need for autonomy as a moderator on the same form of relationship. Steers and Spencer (1977) measured need for achievement using the Manifest Needs Questionnaire (MNQ), and found some support for the moderating effects of the need for achievement on the form of the job scope - outcomes relationships, using performance as the dependent variable. Sims and Szilagy (1976) also found some support for the moderating effects of self actualization need strength on the form of the job scope - outcomes relationships. However, they did not find support for the moderating effect of locus of control. It should be noted that none of the studies in Table 5 tested the moderator effects of the form of relationships involving the psychological states. Rather, they have concentrated exclusively on the job scope - overcome relationships.

These studies, collectively, show that there is some empirical support for the moderating effects of some individual differences on the form of relationships stipulated in the theory of job design. Specifically, they suggest that need for achievement, whether measured by either format of GNS, MNQ, or the Jackson Personality Research Form, is more likely to yield positive results than other individual difference measures (e.g., locus of control, need for autonomy, etc.). These scales have better psychometric properties and therefore the positive results associated with them provide stronger support for the existence of moderator effects.

The studies which yielded differential results share some common qualitative descriptions. For example, those which yielded supportive results tend to have rather larger samples (e.g. Champoux, 1980; Cherrington and England, 1980; Katz, 1976b) drawn from a wide variety of jobs (e.g. Katz, 1978b; Stone, 1976; Stone et al. 1977) representing a wide spectrum of organization types and working environments (e.g. Champoux, 1980; Katz 1978b). The also tend to be drawn from nonmanagerial samples (e.g. Champoux, 1980; Kim, 1980; Robey, 1974; Sims and Szilagy, 1976; Stone, 1976). On the other hand, studies which do not find significant results of the moderator effects of the form of relationships tend to be drawn from smaller sample sizes often drawn from a single division of an organization (e.g. Arnold and House, 1980; Kidron, 1977). These results seem to suggest that sampling methods used by the researchers may affect the probability of uncovering moderator effects even when they do in fact exist.

Problems of Finding Moderator Effects

The argument advanced in this paper is that the substantive statements underlying moderator effects of the job scope - psychological states - outcomes relationships imply differing forms of relationships. The evidence of the empirical studies using regression analyses has shown that the results are inconclusive. This does not mean that the theory is necessarily wrong because of a number of psychometric problems which make it difficult for moderator effects to be found even when they in fact exist. These problems include low reliability coefficients of measures of job scope (the independent variable), and use of small sample sizes (see Tables 1 - 5). These issues have been extensively discussed and illustrated (see Arnold, 1982: pp. 164-169) in the literature and will not be repeated here.

However, it must be noted that the lower the reliability of measures of job scope, and the smaller the sample size used, the less likelihood of finding moderator effects

even when they do in fact exist.

Of the 43 studies reviewed in this paper, 28 used samples of less than 200 respondents, and over 42% used sample sizes of less than 100. Assuming an average reliability coefficients of .70 for measures of job scope and using Arnold's (1982, Table 7) calculations of the statistical power of the moderator tests, it was estimated that over 62% of the studies reviewed in this paper had a 50% chance of finding moderator effects even when they actually did exist. With a median sample size of 115 for these studies, the overall probability of finding moderator effects is only slightly higher than .5. These results suggest rather strongly that the failure to find moderator effects may be more due to the low statistical power of the tests used rather than to the substantive weakness of the theory itself.

Dependent Variables.

The primary dependent variable hypothesized to be influenced by the nature of the work itself is internal work motivation (Hackman and Oldham, 1976). However, many researchers use dependent variables other than internal motivation and expect to obtain empirical evidence which may serve to support or reject the original theory. These other dependent variables include job satisfaction, general satisfaction, other satisfaction facets (e.g. pay, co-workers, supervision, etc.), commitment, job involvement, and performance. While these studies may provide interesting extensions of the theory, they must not be treated as tests of the original theory itself. For example, research using the JDI as the primary source of dependent variable measures cannot appropriately test motivational theories of job design since the JDI contains no scales measuring intrinsic work motivation. Likewise, studies using performance as one of their dependent variables must note that although Hackman and Oldham (1980) include work effectiveness as a dependent variable influenced by job redesign, they also point out that the specific effects of work redesign on quality and quantity of performance will vary with other aspects of the situation. Therefore, researchers using these other dependent variables must invoke their own theoretical frameworks regarding how and why these variables should be influenced by job design rather than stretching the original theory.

Summary and Conclusions

This paper re-examines the empirical evidence relating to the individual difference moderators in job design by distinguishing *form* from *degree* of relationship and spelling out the appropriate statistical procedures for uncovering the different types of moderator effects. The results show that few studies have used the appropriate statistical procedures in testing for the presence of moderators. Fewer still have appropriately tested the full job design model using either format of GNS. No study was found which tested for moderators of the form of relationships of the full model using any individual difference variable. Due to limitations of systematic comparable information across studies, only a limited number of broadly-based, qualitative generalizable observations have been made with implications for the future conduct of job design moderator research.

Available appropriate empirical evidence is too limited to permit conclusive statements to be drawn about moderating effects on the form of the hypothesized relationship of the rural-urban variable, Protestant work ethic, or higher order need strength. However, the few studies which have used appropriate statistical procedures provide some support. Moreover, the more recent studies seem to support the

moderating effects of achievement oriented individual differences. This evidence does not justify a call for a moratorium on this line of research.

Instead, we suggest that research in this area should be done *differently*. Researchers should uncover moderator effects by testing for moderators of the *form* of relationships, using hierarchical multiple regression analyses, and testing for statistical significance of appropriate interaction terms. Correlational analyses should not be used for this line of research. Secondly, researchers should specify the conceptual and operational nature of their moderator variables, especially when different GNS formats are being used. Attention should be paid to the statistical power of the moderator tests used by using: (1) larger sample sizes (e.g., Cherrington and England, 1980); and (2) reliable measures of job scope. Efforts should also be directed towards testing the full job scope – psychological states – outcomes model using these methodological and statistical procedures. However, as indicated above, there are other limitations which proper statistical procedures alone cannot overcome. Therefore, in addition to the above suggestions, researchers should pay attention to: (1) developing more comprehensive, theoretically grounded models of job scope which specify relationship with specific moderator and outcome variables; (2) obtaining measures of job scope using objective, standard instruments; (3) using valid, projective measures of the moderators, especially achievement-oriented individual differences which seem to yield more supportive results; and (4) proper control and measures of organizational and contextual variables which affect the job scope – individual differences – outcomes relationships. Finally, in some cases, instead of collecting more data, a "study of studies" or meta analysis should be undertaken. For example, joining together various data sets relating to the moderating effects of any of the individual differences reviewed here and analyzing them using appropriate statistical procedures would provide more conclusive evidence based on more powerful statistical tests of the hypothesized moderator relationships.

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FOOTNOTES

1. The suggestions and comments by Hugh J. Arnold and Martin G. Evans are gratefully acknowledged.
2. Hackman and Oldham (1976) did not test the moderating effects of GNS on the job scope - outcome relationships, and it is not clear as to whether or not this is part of their theory. However, before the introduction of the critical psychological states in job design research, moderator research was almost exclusively focused on the job scope - outcomes relationships. Although some replications of the original theory have ignored the job scope - outcomes relationships (Arnold and House, 1980), others (Evans et al.) have included them in their test of the theory. Moreover, studies using other achievement oriented individual differences have exclusively tested for the job scope - outcomes relationships (see Table 5). It is for these reasons that the job scope - outcome relationships are included in the following discussion.
3. In Tables 1 to 5, the word support is used in two different ways. When testing for degree of relationship, support means that the author(s) found differences in correlations between job scope and employee responses for different population subgroups as defined by the potential moderator variable. When testing for form of relationships, on the other hand, support means that the change in R^2 , resulting from the addition to the regression equation of the interaction term between measures of job scope and the potential moderator variable, is statistically significant.