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Making It Without Losing It: Type A,
Achievement Motivation, and Scientific Attainment Revisited

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Abstract

In a study by Matthews et al. (1980), responses by academic psychologists to the Jenkins Activity Survey for Health Prediction, a measure of the Type A construct, were found to be significantly, positively correlated with two measures of attainment, citations by others to published work and number of publications. In the present study, JAS responses from the Matthews et al. sample were subjected to a factor analysis with oblique rotation and two new subscales were developed on the basis of this analysis. The first, Achievement Strivings (AS) was found to be significantly correlated with both the publication and citation measures. The second scale, Impatience and Irritability (I/I), was uncorrelated with the achievement criteria. Data from other samples indicate that I/I is related to a number of health symptoms. The results suggest that the current formulation of the Type A construct may contain two components, one associated with positive achievement and the other with poor health.

Making It Without Losing It: Type A, Achievement Motivation, and
Scientific Attainment Revisited

In studies of scholarly attainments by academic scientists from several disciplines (Helmreich, Beane, Lucker, & Spence, 1978) and social-personality psychologists with academic appointments (Helmreich, Spence, Beane, Lucker, & Matthews, 1980), both number of publications and number of citations by others have been found to relate significantly to an objective, self-report measure of several intrinsic achievement motives. The measure of achievement motivation employed in these studies, the Work and Family Orientation Questionnaire (WFOQ; Helmreich & Spence, 1978), contains three subscales reflecting Mastery needs (preference for challenging, difficult tasks), Work orientation (a positive attitude towards work), and interpersonal Competitiveness (a desire to best others in interpersonal situations). These components of achievement motivation related differentially to the two criteria. Work and Mastery were significantly related in a positive direction to Citations by others while Competitiveness was significantly, negatively correlated with this criterion. All three factors correlated positively, although less strongly, with the number of publications. Similar findings have been found with other groups and other measures of attainment (e.g. Spence & Helmreich, 1984).

Although the Type A behavior pattern has been implicated

primarily in the occurrence of cardiovascular heart disease (CHD), data suggest that Type A individuals may be more achievement oriented and successful than their counterparts, the Type B's (Friedman & Rosenman, 1974; Jenkins, Rosenman, & Zyzanski, 1974). In the original formulation of the construct, Friedman and Rosenman (1974, p. 67) described those classified as Type A as being "aggressively involved in a chronic, incessant struggle to achieve more and more in less and less time..." This view of the Type A behavior pattern suggests that while the work output of Type As should exceed that of those lacking this behavior pattern, the effects of this pattern on quality of work are not clearly specified; quantity could be achieved at the expense of quality, or there could, in fact, be an elevation in both quantitative and qualitative criteria.

To explore linkages between scientific attainment and the Type A behavior pattern, Matthews, Helmreich, Beane, and Lucker (1980) obtained data on responses to an objective, self-report measure of the construct, the Jenkins Activity Survey for Health Predictions (JAS; Jenkins, Zyzanski, & Rosenman, 1971), from a subset of the scientist sample in the Helmreich et al. (1980) study. The respondents were members of the Society for Experimental Social Psychology, an organization whose members are nominated and elected on the basis of significant research attainment. Scores on three unit-weighted JAS scales were

obtained for each respondent: an overall A-B score and two, unit-weighted factor scores: Factor H (Hard-driving competitiveness) and Factor S (Speed and impatience).¹ Even within this highly selected group, there were significant correlations between one or more of the indices and both Citations and Publications (Matthews, Helmreich, Beane, & Lucker, 1980). Similarly, Taylor, Locke, Lee, and Gist (1984) have reported higher productivity among Type A university faculty. Positive relationships have also been found with other performance measures. For example, Type A college students report more academic honors (Glass, 1977) and earn higher grades (Waldron, Hickey, McPherson, Butensky, Gross, Overall, Schmader, & Wohlmuth, 1980) than Type B's. These results suggest that the Type A pattern is associated with both quantity and quality of work. They further raise the distressing possibility that some of the same personal characteristics that lead to superior achievement may also lead to greater risk for CHD and other related disorders.

More recently, questions have been raised about the "active ingredients" in the Type A construct. In essence, it has been suggested that the Type A pattern is multifaceted and that only certain aspects are related to CHD. Several research groups (e.g. Rosenman, 1985; Williams, Haney, Lee, Kong, Blumenthal, & Whalen, 1980) have singled out what Spielberger, Johnson,

Russell, Crane, Jacobs, and Worden (1985) have labeled the AHA! Syndrome - anger, hostility, and aggression. This hypothesis is supported by data from Matthews, Glass, Rosenman, and Bortner (1977) who analyzed responses to the Structured Interview, the most favored technique for classifying individuals as Type A or B, and found that the items that best discriminated CHD subjects from those not developing the disease were those related to irritability, anger, and hostility. Similar results have recently been found by Weinstein, Davison, DeQuattro, and Allen (1986).

It is unlikely that the hostility, irritability, anger cluster of characteristics is associated with the better performance of Type As. Overall, the data imply that there may be several dimensions in the Type A construct, one associated with CHD and other health symptoms and another associated with achievement strivings. Evidence for a Type A-achievement motivation link is provided by the Matthews et al. (1980) study in which significant correlations were found between the Type A scale of the JAS and measures of mastery and work-oriented achievement motives from the Work and Family Orientation Questionnaire (WFOQ; Helmreich & Spence, 1978).

The present investigators have addressed this question through psychometric analyses of JAS responses from college students and from male academic psychologists in the Matthews et

al. (1980) study (Pred, Helmreich, & Spence, in press).²² Factor analyses with oblique rotation of unit-weighted items from the JAS gave highly similar, two-factor solutions in all three samples. The first factor, designated Achievement Striving (AS), loaded with items reflecting achievement-related strivings while the second, labeled Impatience and Irritability (I/I), reflected impatience, irritability, and anger. Correlations between unit-weighted scales constructed from the factor analyses were low to moderate. The JAS items composing these scales are shown in Table 1.

Insert Table 1 here

Data on the academic performance (GPA) of two samples of male and female students were obtained from archival records along with responses to a health survey covering such areas as sleep disturbances, respiratory disorders, headaches, and digestive upsets (Spence, Helmreich, & Pred, in press). The results of this study provided strong support for the two-component model. The Achievement Striving (AS) scale correlated significantly and positively with overall grade point average in both sexes but only trivially with health symptoms. The Impatience and Irritability (I/I) scale, on the other hand, correlated significantly with scales reflecting health symptoms

in both sexes but non-significantly with academic performance.

In a recently completed dissertation, Chidester (1986) examined the relationship between several personality measures, including AS and I/I, and the performance and health of jet transport pilots. He found that Achievement Striving (AS) was significantly, positively correlated with the managerial aspects of flight whereas Impatience/Irritability was significantly, negatively correlated with evaluations of technical proficiency in flying and was further related to poor sleep quality, tension, and fatigue during multi-day flight operations.

The results of these studies suggested that the positive relationships reported by Matthews et al. between the two criteria of scientific attainment and the JAS scales were due not to the Type A pattern per se, but to those aspects related to achievement striving. The present study, which involved re-scoring JAS responses from Matthews et al. (1980) to obtain AS and I/I scores, was conducted to assess this possibility.

Method

Subjects.

The subjects were 118 male members of the Society for Experimental Social Psychology (SESP), all with academic appointments. In 1975 the respondents completed a survey containing a biographical data sheet, the Jenkins Activity Survey for Health Predictions (JAS: Jenkins, Zyzanski, & Rosenman, 1971)

and the Work and Family Orientation Questionnaire (WFOQ; Helmreich & Spence, 1978). The sample was predominantly middle-aged (Mean: 42.9 yrs) and high achieving, reflecting the selective membership of the Society from which they were drawn (Mean citations per year: 33.1). The sample is described in greater detail in Helmreich et al. (1980) and Matthews et al. (1980).

Type A scores.

The JAS, as originally scored in the study, provided an overall A-B score based on 21 items and two a priori factor scores: Factor H (Hard-driving Competitiveness), composed of 17 items, and Factor S (Speed and Impatience) composed of 22 items. The scoring system was based on unit-weighting of the items.

The new factor analytically derived scales each contain seven of the original JAS items. The Cronbach Alphas were .78 for Achievement Striving (AS) and .62 for Irritability/Impatience (I/I).

Achievement measures.

The WFOQ is a 23-item instrument providing three unit-weighted scales: Mastery, reflecting a preference for challenging endeavors; Work, indicating a positive attitude about effort; and Competitiveness, indicating a desire to engage in contests with others and to best them. Mastery and Work tend to be significantly, positively correlated and are employed as a

composite predictor (M X W) in this and the original (Helmreich et al., 1980) research on scientific attainment. Data on the psychometric properties and predictive validity of the WOFO are available elsewhere (Helmreich & Spence, 1978; Helmreich et al., 1980; Spence & Helmreich, 1984).

Criterion measures.

Data on the two indices of attainment were initially obtained by Helmreich et al. (1980). The first, Citations, consisted of the average number of citations (excluding self-citations) to the respondent's work during the three year period, 1973-1975, in the Social Science Citation Index for the years 1974-1976. The second, Publications, was the annual mean number of publications for the same years in the Source Index of the Social Science Citation Index for the years 1974-1976. Because the distributions of both indices are substantially skewed, they were subjected to log transformation ($\log(e)X + 0.5$).

Results

JAS and WOFO correlations.

Correlations among the three Type A measures suggested by Jenkins et al. (1971) and the new AS and I/I scales are shown in Table 2. The high correlations ranging, from .6 to .7, among the A-B, H, and S scales suggest that the conceptual distinctions between hard-driving competitiveness and speed and impatience are not sharply drawn. The AS and I/I scales, on the other hand, are

less highly correlated in this sample ($r = .37$). Further, they relate differentially to the global A-B measure, $r = .71$ in the case of AS and $r = .48$ in the case of I/I. AS is most highly correlated (.82) with H, but is still substantially correlated ($r = .67$) with S. All of these relationships reflect the substantial presence on the original JAS scales of items related to achievement-related characteristics and behaviors.

Insert Table 2 here

Also reported in Table 2 are correlations of the JAS scales with the achievement motivation measures. The Mastery-Work (MXW) composite from the WOFO yields correlations in the .30 range with all three of the JAS scales and a similar correlation with AS. The obtained pattern of correlations again indicates that the scales derived from the JAS, especially the global A-B scale, are weighted more heavily with achievement-related items than with items reflecting the AHA! syndrome of irritability, impatience, and anger. Competitiveness yields significant, but modest correlations with both old and new measures derived from the JAS. I/I shows modest correlations with Mastery-Work ($r = .20$) and with Competitiveness ($r = .15$).

Relationships with Publications and Citations.

Correlations of the JAS measures with the criterion variables are shown in Table 3. For purposes of comparison, the data from the original JAS measures as well as the new AS and I/I scales are reported.²⁹

As mentioned earlier, all of the original JAS measures correlate positively with the performance criteria, although several of the correlations are small. Factor H correlates most strongly with Citations and Factor S with Publications, but the differences in magnitude are not great.

Insert Table 3 here

The pattern of criterion correlations obtained with the new scales, AS and I/I is quite different. Achievement Striving is significantly and positively correlated with both Citations and Publications whereas I/I does not correlate significantly with either. Partial correlations were also computed. The correlations between AS and the criteria remain significant (r_s of .20 and .24 with Citations and Publications, respectively) with the effects of I/I controlled while the partial correlations between I/I and the criteria drop to near zero when AS is controlled.

Discussion

As in the studies of students (Spence et al., in press) and jet transport pilots (Chidester, 1986), these results show the

utility of personality factors as predictors of long-term performance.⁴ They also support the importance of drawing a distinction between quantity and quality of work as criteria of scientific performance. The number of papers published by an investigator can be interpreted as a primary indicator of effort expended and a secondary measure of quality of effort. On the other hand, citations by others to an investigator's published work can be viewed as a more direct measure of influence and quality of work.

That the two criterion measures, Citations and Publications, represent different aspects of attainment is demonstrated by the strikingly different correlations they show with Competitiveness, significantly negative with Citations and significantly positive with Publications. This negative relationship with recognition of performance by others and positive relationship with quantitative scientific output reaffirms the pivotal nature of this competitiveness as a determinant of performance and as an independent construct. It will be recalled that Competitiveness is significantly correlated with the I/I scale as well as with the AS scale. Further, competitiveness is one of the prominent features in descriptions of the Type A pattern (e.g. Friedman & Rosenman, 1974).

The question that naturally arises is whether competitiveness, as measured by the WOFO, is predictive of poorer

health as well as performance of poorer quality. Health data were not available for the sample of psychologists who are the subject of the study but were obtained in our investigation of students (Spence, Helmreich, & Pred, in press). In the latter study no significant relationships between Competitiveness scores and responses to the health survey were found in males and only a slight ($r = -.11$, $p < .05$) negative relationship was found in females. Such results strengthen the the conjecture that irritability, hostility, and aggression are the primary factors in the Type A pattern that have deleterious effects on health.

In summary, the present results, taken in conjunction with the results of the Spence et. al. (in press) findings for college students and the Chidester (1986) findings for pilots, demonstrate that the elements of the Type A pattern that affect academic and vocational performance are not the same as those that affect health. Together, these studies of the newly isolated factors of achievement striving and impatience/irritability suggest that it is crucial to re-examine the Type A construct and to reconsider its usefulness. If, as seems possible, both the definition of Type A and the instruments designed to measure it are multifactorial, it may be more profitable to decompose it and to determine the implications of its separate components for different criterion measures. For investigators whose interests are in the psychological factors contributing to CHD and other

health related disorders, the influence of the impatience and irritability construct, or more generally, the AHA! Syndrome, is especially important to pursue.

The data suggesting that different characteristics contribute to health problems and to achievement have important therapeutic implications. Advice to relax and lower work involvement given to individuals diagnosed as Type A who are in fact primarily high in achievement striving may be counterproductive. These individuals' health may not be endangered by the expression of achievement strivings and the frustration associated with attempts to suppress them may bring on the very consequences a more relaxed regimen is meant to avoid.

References

- Chidester, T. R. (1986) Mood, sleep and fatigue effects in flight operations. Unpublished doctoral dissertation, The University of Texas at Austin.
- Friedman, M., & Rosenman, R. (1974) Type-A behavior and your heart. Greenwich, CT: Fawcett.
- Glass, D.C. (1977) Behavior patterns, stress, and coronary disease. Hillsdale, New Jersey: L. Erlbaum.
- Helmreich, R.L., & Spence, J.T. (1978) The Work and Family Orientation Questionnaire: An Objective Instrument to Assess Components of Achievement Motivation and Attitudes Toward Family and Career. JSAS Catalog of Selected Documents in Psychology, 8.
- Helmreich, R.L., Beane, W., Lucker, W., & Spence, J.T. (1978) Achievement motivation and scientific attainment. Personality and Social Psychology Bulletin, 4, 222-226.
- Helmreich, R.L., Spence, J.T., Beane, W.E., Lucker, G.W., & Matthews, K.A. (1980) Making it in academic psychology: Demographic and personality correlates of attainment. Journal of Personality and Social Psychology, 39, 896-908.
- Jenkins, C.D., Zyzanski, S.J., & Rosenman, R.H. (1971) Progress toward validation of a computer scored test for the Type A coronary prone behavior pattern. Psychosomatic Medicine, 33, 193-202.

Jenkins, C.D., Rosenman, R.H., & Zyzanski, S. (1974) Prediction of clinical coronary heart disease by a test for the coronary-prone behavior pattern. New England Journal of Medicine, 23, 1271-1275.

Matthews, K.A., Glass, D.C., Rosenman, R.H., & Bortner, R.W. (1977) Competitive drive, Pattern A, and coronary heart disease: A further analysis of some data from the Western Collaborative Group Study. Journal of Chronic Diseases, 30, 489-498.

Matthews, K.A., Helmreich, R.L., Beane, W.E., & Lucker, G.W. (1980) Pattern A, achievement striving, and scientific merit: Does pattern A help or hinder? Journal of Personality and Social Psychology, 39, 962-967.

Pred, R.S., Helmreich, R.L., & Spence, J.T. (in press) The Jenkins Activity Survey and the Type A pattern: A psychometric analysis. Social and Behavioral Science Documents.

Rosenman, R.H. (1985) Health consequences of anger and implications for treatment. In M.A. Chesney & R. H. Rosenman (Eds.) Anger and hostility in cardiovascular and behavioral disorders (pp. 103-126). New York: Hemisphere/McGraw-Hill.

- Spence, J.T., & Helmreich, R.L. (1983) Achievement-related motives and behavior. In J.T. Spence, (Ed.), Achievement and achievement motives: Psychological and sociological approaches (pp. 10-74). San Francisco: W.H. Freeman & Co.
- Spence, J.T., Helmreich, R.L., & Pred, R.S. (in press) Impatience versus achievement strivings in the Type A pattern: Differential effects on students' health and academic achievement. Journal of Applied Psychology.
- Spielberger, C.D., Johnson, E.H., Russell, S.F., Crane, R.J., Jacobs, G.A., & Worden, T.J. (1985) The experience and expression of anger: Construction and validation of an anger expression scale. In M.A. Chesney and R.H. Rosenman (Eds.) Anger and hostility in cardiovascular and behavioral disorders (pp. 5-30). New York: Hemisphere/McGraw-Hill.
- Taylor, M.S., Locke, E.A., Lee, C. & Gist, M. (1984) Type A behavior and faculty research productivity: What are the mechanisms? Organizational Behavior and Human Performance, 34, 402-418.
- Waldron, I., Hickey, A., McPherson, C., Butensky, A., Gross, L., Overall, K., Schmader, A., & Wohlmuth, D. (1980) Type A behavior pattern: Relationship to variation in blood pressure, parental characteristics, and academic and social activities of students. Journal of Human Stress, 6, 16-27.

Weinstein, K.A., Davison, G.C., DeQuattro, V., & Allen, J.W.

(1986) Type A behavior and cognitions: Is hostility the bad actor? Proceedings of the 94th Annual Convention of the American Psychological Association, Washington, D.C.

Williams, R.B., Haney, T.L., Lee, K.L., Kong, Y., Blumenthal, J.A., & Whalen, R.E. (1980) Type A behavior, hostility, and atherosclerosis. Psychosomatic Medicine, 42, 539-549.

Table 1

JAS Items on the Factor-Analytically Derived
Achievement Strivings and Impatience/Irritability Scales

Achievement Striving Items

1. Does your job "stir you into action"?
2. Nowadays, do you consider yourself to be hard-driving and competitive?
3. How would your spouse (or closest friend) rate your general level of activity?
4. Would people who know you well, agree that you take your work too seriously?
5. Do you ever set deadlines or quotas for yourself at work or at home?
6. In amount of effort put forth, I give: (much more to much less)
7. I approach life in general: (much more seriously-much less seriously)

Impatience/Irritability Items

1. Some people live a calm, predictable life. Others find themselves often facing unexpected changes, frequent interruptions, inconveniences or "things going wrong". How often are you faced with these minor (or major) annoyances or frustrations?

Table 1 (continued)

2. When you listen to someone talking, and this person takes too long to come to the point, do you feel like hurrying him/her along?
3. Do you find yourself hurrying to get places even when there is plenty of time?
4. When you have to "wait in line", such as at a restaurant, a store, or the post office, etc., do you: (accept calmly to refuse to wait in line)
5. Would people who know you well agree that you tend to get irritated easily?
6. Would people who know you well, agree that you tend to do most things in a hurry?
7. How is your "temper" nowadays?

Table 2
Correlations among JAS and WOFO Achievement Scales

I/I	.37**							
A-B	.71**	.48**						
H	.82**	.42**	.74**					
S	.67**	.75**	.72**	.63**				
MXW	.34**	.20*	.39**	.39**	.30**			
COMP	.22**	.15*	.16*	.21**	.25**	-.02		
	AS	I/I	A-B	H	S	MXW		

* $p < .05$

** $p < .01$

Key: AS - Achievement Striving; I/I - Impatience/Irritability;
 A-B - global A-B score; H - Factor H (Hard-driving
 Competitiveness); S - Factor S (Speed and Impatience); MXW
 - WOFO Mastery X Work composite scale; Comp - WOFO
 Competitiveness scale

Table 3
 Correlations of JAS and WOFO Achievement Scales
 with Attainment Criteria

	Citations	Publications
AS	.21**	.27**
I/I	.07	.09
A-B	.10	.17*
H	.22**	.15*
S	.10	.27**
MXW	.15*	.15*
COMP	-.25**	.22**

* $p < .05$

** $p < .01$

Key: AS - Achievement Striving; I/I - Impatience/Irritability;
 A-B - global A-B score; H - Factor H (Hard-driving
 Competitiveness); S - Factor S (Speed and Impatience); MXW
 - WOFO Mastery X Work composite scale; Comp - WOFO
 Competitiveness scale

Footnotes

1. The original JAS contains a third subscale, Factor J (Job involvement). Because the content of this scale was not particularly relevant for an academic-scientist population, it was not included in the research.

2. The two main methods used to classify individuals as Type A or Type B are the Structured Interview (SI), a complex procedure requiring skilled interviewers, and the Jenkins Activity Survey (JAS), an objective, self-report measure. Several versions of the JAS are available including a form suitable for students developed by Glass (1977). In a sample of male college students given the student form of the JAS, Krantz, Glass, and Snyder (1974) reported that two factors emerged which were similar to those found by the present investigators (Pred, et al, in press). The Factor H and S scales developed by Jenkins et al were also based on the results of factor analyses, using data from a sample of adult males, but involved a system of differential scoring weights tied to the SI that seems to be unnecessarily complicated if not indefensible.

3. Several correlations differ slightly from those reported in Matthews et al (1980). This discrepancy results from using a listwise deletion of cases for the several instances in which

responses to a critical item were omitted by the respondent.

4. The JAS and WOFO measures were collected from the SESP sample after the temporal interval for attainment, thus raising the possibility that instead of personality contributing to scholarly success or its converse, the latter brought about personality changes. The unlikeliness of this possibility, which implies lack of stability in personality characteristics over time, is discussed in Helmreich et al. (1980). Also mitigating against this interpretation are the Chidester (1986) data, involving essentially contemporaneous measurement of performance and personality, and the student data (Spence et al., in press) in which students' cumulative GPA's were determined several semesters after they had completed the personality questionnaires.