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Type A Behavior and Occupational Stress: A Cross-Cultural Study of Blue-Collar Workers

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Psychophysiological, archival, unobtrusive observation, and self-report data were compared for Type A and Type B male bus drivers in the United States and India. Type A bus drivers in comparison with their Type B counterparts have more accidents, absenteeism, official reprimands, and self-reports of occupational stress. In India, but not in the United States, Type A drivers brake, pass, and blow their horns more often than Type B drivers. Although drivers exhibited expected elevations in blood pressure and catecholamines on the job, the magnitude of these increases did not differ as a function of the Type A/B classification.

Western industrialized societies have achieved revolutionary increases in economic standards of living along with marked reductions in mortality and morbidity from infectious diseases. Concurrent with these accomplishments has been a marked rise in the prevalence of coronary heart disease in these societies. This association has led scientists to wonder about the potential role of psychosocial factors associated with modern life styles in the etiology of coronary heart disease. Moreover, the traditional coronary risk factors including diet, blood pressure, and smoking account for less than half of the total variability in coronary heart disease (Cooper, Deitre, & Weiss, 1981; Siegel, 1984).

Nearly 3 decades ago, clinical observations of cardiac patients led two eminent cardiologists to hypothesize that a coronary-prone behavior pattern might help explain the link between the high-pressure job environment of business and management executives and coronary heart disease (Friedman & Rosenman, 1959). Their early observations and subsequent clinical and laboratory studies indicate that Type A individuals engage in a chronic and incessant struggle to do more and more in less and less time. Behavioral manifestations of this struggle include time urgency, competitiveness, and high-achievement striving. Aggression and hostility also arise when the Type A individual is unable to overcome rapidly obstacles to maximum achievement (Matthews, 1982).

Interest in the Type A behavior pattern has mushroomed in the ensuing 30 years for two basic reasons. First, both retrospective and prospective epidemiological studies indicate a two-fold increase in relative risk for coronary heart disease among Type A men that is independent of the traditional biomedical risk factors for heart disease (Friedman, Thoreson, & Gill, 1981; Siegel, 1984).

The other reason for continued interest in the Type A behavior pattern is that some psychophysiologically mediated mechanisms for the link between Type A behavior and coronary heart disease have been posited. Glass (1977), for example, hypothesized that Type A individuals struggle to control environmental contingencies that cause them to exert extreme efforts to respond to difficult performance requirements, especially when threat to personal control is highly salient. Such efforts may cause psychophysiological reactivity, at least during initial exposure to uncontrollable stimuli. Currently, the overall evidence for the reactivity model linking Type A to coronary heart disease is equivocal (Krantz & Manuck, 1984; Wright, Contrada, & Glass, in press).

The present study grew out of a concern with the generalizability of the Type A construct. Many recent reviews of the Type A literature underscore the importance of examining the Type A behavior pattern in a broader sociocultural context (Chesney & Rosenman, 1980; Matthews, 1982; Siegel, 1984). Our research builds on the Type A literature in two important ways. First, we investigate the construct validity of the Type A construct with a multiple method strategy. Whereas most studies have been limited to correlations between Type A behavior and either self-report or psychophysiological indices, we examine self-reports, psychophysiological, archival, and unobtrusive observational data on the job for Type A and Type B public transit operators.

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Second, most research on the Type A behavior pattern has occurred in college samples, clinical populations, or management personnel in North America or Western Europe. There is a marked paucity of data on the Type A behavior pattern among working-class people and on people from non-Western cultures. We address this limitation in the Type A literature by examining the validity of the Type A construct among blue-collar workers in cross-cultural samples from the United States and India. These samples are interesting because they examine working populations that may be less entrapped by the high-pressure, achievement-striving life style of the stereotypic, high-risk business executive. Furthermore, the Indian sample allows us to determine, at least initially, whether the Type A construct has meaning in a culture that does not embody the Western sociocultural preoccupation with occupational achievement.

In a recent review of the Type A behavior pattern and occupational settings, Chesney and Rosenman (1980) concluded that although Type A individuals are more likely to achieve higher occupational status and to advance more rapidly, there are no consistent relations between Type A and indices of occupational stress. For example, whereas Friedman, St. George, Byers, and Rosenman (1960) found that Type A individuals had greater psychophysiological reactivity on the job, De Backer et al. (1979) and Caplan and Jones (1975) did not find psychophysiological differences between Type A and Type B workers.

Remarkably little research has examined the Type A construct outside of North American or Western European cultures. Cohen (1978) found that a smaller proportion of Japanese-American men scored as Type A in comparison with American Caucasian men. In addition, Cohen noted that Type A Japanese-American men who were more acculturated into American values had a three-fold-increase risk for coronary heart disease. These data on acculturation and coronary heart disease are consistent with earlier work suggesting that more "Westernized" Japanese-American men are at greater risk for coronary heart disease (Marmot & Syme, 1976). More recently, Levine and Bartlett (1984), in a pilot study, found that college students' attitudes toward punctuality and pace of life were positively correlated with Type A scores in the United States, but not in India.

In the present study, we measured job-related behaviors as well as psychophysiological and psychological indices of stress during the daily job of bus drivers in the United States and in India. Our analyses focus on comparisons of Type A and Type B bus drivers within each culture plus the reactions of these two groups of workers to occupational stress. We hypothesized that Type A public transit operators would, in comparison with their Type B counterparts, exhibit more stress on the job as evidenced by greater psychophysiological reactivity, poorer job performance, more nonverbal indices of stress, and self-reports of greater levels of occupational stress.

Method

Subjects

The initial Indian sample consisted of 120 male bus drivers in the city of Pune, Maharashtra State. The initial American sample contained 80 male bus drivers from Long Beach, California. Both of these sites are industrialized urban areas. We selected Type A and Type B individuals from each sample on the basis of whether subjects scored in the upper or lower quartile on the Jenkins Activity Survey (JAS), Form B. Extreme scores were used to maximize accuracy in the Type A/B classification (Jenkins, 1978). Unweighted scoring procedures were used as suggested by several researchers (cf. Glass, 1977). Unweighted scoring is preferable in a cross-cultural context because investigators have validated weighting criteria only in the United States. The JAS was translated into Marathi and checked by back translation into English for use in the Indian sample. All subjects received payment for their participation.

The mean unweighted JAS scores for the initial U.S. and Indian samples were 7.50 (SD = 4.20) and 7.75 (SD = 2.30), respectively. The range of actual scores varied from 1 to 15 out of a possible 0 to 21 in both samples. Glass (1977) reported a mean of 7.50 for male college students using Form B of the JAS, which was revised for students.

The mean ages of the 30 Type A and 30 Type B subjects in the Indian sample were 35.35 and 36.39 years, respectively, and 37.50 and 43.95 years, respectively, for the 20 Type A and 20 Type B American drivers. In the U.S. sample, 21 of the drivers were white, 17 Black, 2 Hispanic, and 1 Middle Eastern. There were no significant differences in the age, income, or racial characteristics of Type A and B drivers within either sample. All subjects in both samples were asymptomatic for coronary heart disease as determined by a recent medical physical and self-reports of coronary heart disease history.

Dependent Variables

Most measures were collected in both samples. Some additional dependent measures were also available in the United States. The latter measures will be described after we present the measures common to both studies.

Psychophysiological. We manually recorded diastolic and systolic blood pressure in the Indian sample by using a stethoscope and sphygmomanometer. In the U.S. sample, an automatic blood pressure recorder (Physiometrics SR-2) was used. For the blood pressure recordings as well as all other dependent variables, the experimenters were blind to the subjects' Type A/B classification. Blood pressure was recorded 2 times, approximately 10 to 15 min prior to each driver's shift and 10 to 15 min immediately following the end of each driver's shift the same day.

Self-report and archival data. A questionnaire measure of job stress during a specific workday was developed. Four items measured drivers' feelings on the job for a specific day. Each of the scales had three alternatives (e.g., *a lot of irritation/annoyance, some irritation/annoyance, no irritation/annoyance*). Perceived irritation/annoyance, tension, relaxation, and time pressure were combined into a single measure (α = .62).

Archival data were available from official company records. The number of traffic accidents per month was calculated for each driver.

Observation. All drivers were informed that they would be observed at some time while on the job. Drivers did not know who would observe them or when this would occur. Bus drivers in both samples are subject to periodic unobtrusive observations by company inspectors. Each driver was observed for 2 half-hour periods during their normal shift. The drivers were actually observed the same day the self-report and physiological data were collected. The observers, who were trained graduate students, recorded the number of times each driver blew the horn, passed another vehicle, or applied the brakes. Observer reliability for the three measures was excellent: horn blowing (Ebel r = 1.00), passing another vehicle (Ebel r = 1.00), and braking (Ebel r = .90). As previously noted, all data were collected by experimenters blind to subjects' classification.

Additional U.S. measures. Urine catecholamine assays were performed with high-performance liquid chromatography (Riggin & Kissinger, 1977). A resting urine sample was obtained immediately after each subject rose from sleeping, and it was placed on ice before he left for work. Eight-hour urine collection made throughout the subject's shift was stored on ice in a cooler on the bus. The volume of urine voided was measured, and 3 ml were extracted randomly and stored at −70 °C until the assays were performed. Self-reports of caffeine and nicotine ingestion were also recorded. Type A and Type B drivers did not differ in their ingestion of caffeine or nicotine.

Additional archival data available in the United States included number of sick-day absences plus official reprimands. Frequent reasons for official reprimands were unexcused absences or missouts. The U.S. bus drivers were also asked to fill out a standardized measure of occupational stress developed by Pearlin and Schooler (1978). This scale measures overall stress on the job rather than for a specific workday. This scale exhibited excellent internal consistency ($\alpha = .87$).

Finally, the observers also recorded audible sighs (Ebel $r = .74$) and nonverbal indices of stress. These indices included automanipulative behaviors (e.g., scratching, playing with hair; $\kappa = .87$) and repetitive object play (e.g., tapping fingers on steering wheel; $\kappa = .64$). The observers recorded the nonverbal behaviors as present or absent only when the bus was completely stopped. For purposes of data analysis, these two measures were combined into one measure of nonverbal indices of stress.

Table 1
Psychophysiological Results

Measure	Indian sample		U.S. sample	
	Type A	Type B	Type A	Type B
Diastolic blood pressure (mm Hg)				
Resting	81.00	81.95	77.50	81.10
On the job	82.43	85.78	79.90	77.70
Systolic blood pressure (mm Hg)				
Resting	118.17	117.91	129.10	129.50
On the job	123.56	125.56	134.20	130.40
Urine adrenaline (ng/hr)[a]				
Resting	—	—	100.96	90.55
On the job	—	—	495.09	729.51
Urine noradrenaline (ng/hr)[a]				
Resting	—	—	1053.71	980.25
On the job	—	—	2176.78	2641.85

[a] Catecholamine data not available in Indian sample.

Procedures

Volunteer drivers filled out the JAS, a background questionnaire, and signed an informed consent form at the transit headquarters for each district. We later contacted a subset of the drivers (upper and lower quartiles) for additional participation in the study.

The resting urine sample was collected from the driver as soon as he arrived for his shift (U.S. sample only). Each driver was then given oral and written instructions for the study. Following this (approximately 10 min elapsed time), we administered two blood pressure readings. Only the second reading was used as a baseline measure. All data except where noted were obtained from individual drivers under quiet, private conditions.

Each driver then boarded the bus for his normal shift. The driver was observed during that same shift by an unobtrusive observer. For the U.S. sample, the driver collected all urine voided during his shift. He also kept a record of all caffeine and nicotine ingestion during the day.

On returning to the transit headquarters at the end of his shift, the driver's blood pressure was recorded. We then administered the self-report measures (stress on the job during the day, etc.) and obtained archival records from official company files.

Results

Psychophysiological

Table 1 shows the mean resting and on-the-job blood pressure readings for the drivers in both samples. The data were analyzed by using a 2 × 2 analysis of variance (ANOVA) with repeated measures for the work factor.[1] For the U.S. bus drivers, there were no main effects of work, $F(1, 38) < 1.0$, or Type A, $F(1, 38) < 1.0$, on diastolic blood pressure, but there was a significant interaction of work and Type A, $F(1, 38) = 3.78$, $p < .05$. Inspection of the means in Table 1 reveals that for the U.S. sample, diastolic blood pressure rose at work for Type A drivers and fell for Type B drivers.

In the Indian sample, we found no significant main effects for work, $F(1, 58) = 1.29$; Type A, $F(1, 58) < 1.0$; or the interaction term, $F(1, 58) = 1.79$, on diastolic blood pressure.

Systolic blood pressure was unaffected by Type A in both samples: for the U.S. sample, $F(1, 38) < 1.0$ for the Indian sample, $F(1, 58) < 1.0$. The interaction of Type A and work was also nonsignificant for both samples: for the U.S. sample, $F(1, 38) = 1.01$; for the Indian sample, $F(1, 58) = 1.72$. In Indian drivers, the main effect of work was highly significant on systolic blood pressure, $F(1, 58) = 23.70$, $p < .001$, whereas in the U.S. drivers this effect was marginal, $F(1, 38) = 2.87$, $p < .10$. As suggested in Table 1, systolic blood pressure increased on the job for bus drivers in both samples but at comparable rates for Type A and Type B drivers.

Table 1 also includes the results of the urinary catecholmaine assays from the U.S. sample. As noted in Table 1, there were significant increments in both adrenaline and noradrenaline on the job, $F(1, 37) = 23.33$, $p < .001$, and $F(1, 37) = 21.53$, $p < .001$, respectively. Type A drivers did not differ from Type B drivers in overall levels of adrenaline, $F(1, 37) = 1.66$, *ns*. The interaction of Type A and work, $F(1, 37) = 1.28$, was not significant (see Table 1). For noradrenaline, neither the effect of Type A, $F(1, 37)$ $p < 1.0$, nor the interaction of Type A and work, $F(1, 37) < 1.0$, was significant.

Self-Report and Archival Data

Table 2 depicts the self-report and archival data from each study. In each sample, Type A bus drivers reported greater stress on the job during the day of the study: for the U.S. sample, $t(38) = 2.61$, $p < .005$, and for the Indian sample, $t(58) = 2.01$, $p < .025$. The U.S. drivers also rated their overall occupational stress as higher than did their Type B counterparts, $t(38) = 2.63$,

[1] Because changes in psychophysiological measures can be strongly influenced by initial resting values (Wilder, 1968), we also performed analyses on residualized gain scores. Residualized gain scores are the difference scores subtracting resting levels from on-the-job levels, while controlling for initial resting levels. The results of these analyses were the same as with the analysis-of-variance approach reported here.

Table 2
Self-Report and Archival Results

Measure	Indian sample		U.S. sample	
	Type A	Type B	Type A	Type B
Workday job stress	3.45	2.20	4.20	2.70
Occupational stress[a]	—	—	16.15	12.05
Accidents per month	0.020	0.004	0.020	0.009
Sick days per month[a]	—	—	0.39	0.17
Official reprimands per month[a]	—	—	0.16	0.05

[a] Data not available in Indian sample.

$p < .005$. We did not measure overall occupational stress in the Indian study.

Analyses of archival records of traffic accidents revealed that Type A bus drivers had more accidents per month in both the United States, $t(38) = 1.90$, $p < .05$, and India, $t(58) = 1.30$, $p < .05$. Additional archival records in the United States recorded sick-day absences and official reprimands. As shown in Table 2, the number of absences per month was substantially higher for Type A drivers than for Type B drivers, $t(38) = 2.34$, $p < .01$. Type A drivers also received more official reprimands, $t(38) = 1.94$, $p < .05$.

Observation

In India, but not the United States, Type A bus drivers braked more often, $t(58) = 1.61$, $p < .05$, passed more frequently, $t(58) = 3.89$, $p < .01$, and blew their horns nearly twice as often, $t(58) = 1.97$, $p < .025$, than did their Type B counterparts (see Table 3). None of these behaviors differed, however, as a function of Type A/B classification among the U.S. bus drivers: for braking, $t(38) < 1.0$; for passing, $t(38) < 1.0$; and for blowing the horn, $t(38) < 1.0$.

Additional observations performed in the United States indicated that only Type A bus drivers sighed more often, $t(38) = 1.83$, $p < .05$, and had marginally more occurrences of nonverbal indices of stress, $t(38) = 1.07$, $p < .10$ (see Table 3).

Discussion

The primary purpose of this study was to examine, using a multimethod strategy, the generalizability of the Type A construct among blue-collar workers in the United States and a non-Western culture, India. To date, there has been insufficient multimethod validation of the Type A behavior pattern. Moreover, the vast majority of Type A studies have used samples of upper-class North Americans or Western Europeans. We found moderate support for the construct validity of the Type A construct in both of our samples. Type A bus drivers in comparison with Type B drivers in both the United States and India perceive greater occupational stress, have poorer job performance, and behave differently while operating buses. There are, however, two noteworthy anomalies in the pattern of results.

First, in general, there is little support of the reactivity and Type A hypothesis. We found no consistent evidence of greater on-the-job increases in blood pressure or catecholamines among Type A drivers in comparison with Type B drivers. Our findings augment the pattern of inconsistent psychophysiological results found between Type A and occupational stress in previous studies (Chesney & Rosenman, 1980). The general pattern of the psychophysiological data was consistent in both samples, which lends confidence to our results. For both samples, systolic, but not diastolic, blood pressure increased on the job. Furthermore, in the U.S. sample, both adrenaline and noradrenaline were elevated at work. Elevations of systolic blood pressure and catecholamines during the workday were consistent with previous research on psychophysiological components of the stress response (Baum, Grunberg, & Singer, 1982; Frankenhaeuser, 1971). In addition, all resting levels were equivalent for Type A and Type B drivers, which was expected from the previous literature (Krantz & Manuck, 1984; Wright et al., in press).

Two possible reasons are apparent for why the reactivity hypothesis was not supported. First, previous research suggests that individuals classified as Type A or B by the JAS are less sensitive to sympathetic nervous system activity and the coronary-prone behavior pattern (Wright et al., in press) than those so classified by the Structured Interview. This explanation can, at least partially, be countered here, however, because we used extreme scores on the JAS. Extreme JAS scores highly correlate with Structured Interview classification of Type A and B individuals (Jenkins, 1978).

The second reason that differences in reactivity were not uncovered may be related to the nature of the stressor used to elicit reactivity. Most reactivity studies have used a discrete, acute stressor such as an aversive stimulus or a challenging task presented under laboratory conditions (Matthews, 1982; Wright et al., in press). In this study, the stressor, driving a bus, is obviously multifaceted and continuous. An important issue for continued research on psychophysiologic reactivity and cardiovascular risk is the careful enumeration of situational factors in real-world contexts that influence reactivity (Krantz & Manuck, 1984).

Although the general pattern of psychophysiological results were consistent in the two samples, there was one nonreplication. The interaction of Type A and the job factor was significant for diastolic blood pressure in the U.S. sample, but not in the Indian sample. The significant interaction was produced by a crossover in which Type Bs' diastolic blood pressure actually dropped on the job among the U.S. sample, whereas the Type As' blood pressure increased slightly on the job. We have no

Table 3
Observation Results

Measure	Indian sample		U.S. sample	
	Type A	Type B	Type A	Type B
Braking per minute	1.46	1.08	1.15	1.20
Passing per minute	0.78	0.37	0.008	0.011
Horn blowing per minute	5.02	3.20	0.03	0.02
Audible sighs per minute[a]	—	—	0.08	0.02
Nonverbal stress indexes[a]	—	—	0.36	0.08

[a] Observation data not available in Indian sample.

explanation for the slight decrease found among Type B drivers' diastolic blood pressure on the job. In the context of the overall pattern of results found in both samples, we conclude that driving a bus increases systolic blood pressure and catecholamine secretion, but at similar magnitudes for Type A and Type B bus drivers.

A second nonreplication in our data was the absence of Type A/B differences in actual driving behaviors among the U.S. sample. Type A drivers in India braked, passed, and blew their horns more frequently than their Type B counterparts, but these differences did not replicate in the United States. One possible reason for this could be general cross-cultural differences in driving behaviors in the two countries. Inspection of Table 3 reveals considerably lower overall frequencies of passing and horn blowing in the United States. Our own impressions of driving behaviors in these two countries is that driving is more congested and less regulated (e.g., extent to which vehicles stay within lane markings) in India than it is in the United States. Although the three driving behaviors did not differ as a function of Type A/B classification in the U.S. sample, Type A drivers in the United States did manifest greater stress while driving, as evidenced by other observational measures as well as self-report data. These nonverbal indices (repetitive and automanipulative behaviors) of greater stress in the Type A drivers while on the job build on previous laboratory studies of nonverbal cues and the Type A behavior pattern. Most of this previous work has examined differences in speech patterns among Type A and B individuals, often during the Structured Interview. A few studies have also found motor differences that indicate greater restlessness among Type As. Little nonverbal cue research has been done with the JAS, and none has focused on field samples of blue-collar workers (Hall, Friedman, & Harris, 1986). The significant difference in sighing behavior in the U.S. sample is also of interest because it documents the clinical description of Type As as sighing more often than Type Bs in the Type A Structured Interview (cf. Rosenman, 1978).

Our data offer partial support for the hypothesis that Type A bus drivers experience greater levels of occupational stress than do their Type B counterparts, both in the United States and in India. Although the psychophysiological data are equivocal (see Table 1), behavioral observations, perceived occupational stress, and archival records (see Tables 2 and 3) support the hypothesis. Moreover, in India, but not in the United States, Type A public transit drivers operate their buses differently. They brake, pass other vehicles, and blow the horn more often than do Type B drivers. Because the data are correlational, it is possible that some third variable is the causal factor linking Type A behavior with greater occupational stress. Because the samples within each culture are matched with respect to sociodemographic characteristics, such background factors are not likely alternatives. It is also possible that some bus drivers become more Type A as a result of greater occupational stress. Longitudinal research would be necessary to disentangle the temporal sequalae in the Type A and occupational stress association found in our study. What the data do indicate is that several predictable differences in Type A and Type B drivers exist on the job as measured by multiple methods. Moreover, most of these differences hold up among bus drivers in a non-Western culture. Although there were some nonreplications across the two samples, the general pattern of results suggests moderately good construct validity for the Type A behavior construct among blue-collar workers both in the United States and in India. Further research is needed to explore more reasons for the two nonreplications (diastolic blood pressure reactivity and driving behaviors). As already noted, the driving conditions differ in the two countries, and this may partially explain the nonreplications.

The emergence of developing countries like India into economically more advanced societies provides research opportunities to explore the relations among modernization, occupational stress, and health as well as potential sociocultural buffers of those relations. Changes from labor-intensive to capital-intensive production, rapid urban migration, and modification of traditional extended-family structures to more isolated, nuclear families (Singer, 1972) all appear to be heightening chronic stress and strain in India today. It is hoped that India and other developing countries will be able to adopt their own cultural solutions to raising living standards while minimizing some of the social costs that seem to accompany Westernized economic development.

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