

## Modernization, stress and blood pressure: An application of lifestyle incongruity model by University of Alabama Team.

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INDIVIDUAL MODEL: Determinants of BP = age, sex, occupation, education, social status, diet, physical activity.....

→Sufficient to explain the health problems in developing countries under modernization???

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### Social status, social context, and arterial blood pressure.

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**ABSTRACT.** As social change and economic development have proceeded, the prevalence of chronic diseases, especially cardiovascular diseases, has increased in the developing world. In part this is due to the adoption of diets and other health behaviors characteristic of industrialized nations; in part it is a function of changing social and economic circumstances. In this paper, we describe the development and testing of a model designed to account for social and economic effects on cardiovascular disease risk. The model incorporates the fact that global economic processes have made a lifestyle characterized by the consumption of Euroamerican material goods and information a basis for the assignment of social status in local communities. But economic change at the local level is rarely sufficient to provide a foundation for individuals' status aspirations. Hence, many individuals attempt to maintain a lifestyle inconsistent with their economic standing, a variable we term lifestyle incongruity. Here we describe how this factor is associated with higher blood pressure in a variety of settings and also how the effects of lifestyle incongruity can be modified in local contexts by social class and social role processes.

This latter process, contextual modification, is illustrated by data from American Samoa. In this example, the association of lifestyle incongruity with blood pressure is examined in 30 male household heads and 26 spouses. After an examination of Samoan ethnography focused attention on the importance of age and gender differences as defining social contexts of intracultural variation, the model was modified to assess interactions between age and gender as they affect the association of lifestyle incongruity and blood pressure. Lifestyle incongruity is strongly associated with higher systolic and diastolic blood pressure for the younger household heads, minimally associated with blood pressure for older household heads, and only slightly associated with the blood pressure of their spouses. The regression coefficients for the lifestyle incongruity by age by sex interaction term was significant at P 0.01 for both systolic and diastolic blood pressure. The consistency of these results with expectations based on the ethnographic record is emphasized in the interpretation. We feel that the lifestyle incongruity model represents an empirically successful attempt to link global political-economic processes, local social structure, and biological outcomes.

### ● MODERNIZATION AND BLOOD PRESSURE

Figure 1. BP is higher in more modernized countries. WHY?

Hypothesis-1: High intake of fat, cholesterol, sodium, and energy, together with less physical activity predispose toward obesity and high blood pressure.

→The available evidences account for some but not all of the cross-cultural and intracultural variability in risk.

Hypothesis-2: Stress of modernization accounts for an increase in BP. STRESS OF

MODERNIZATION: the adoption of wage labor, increased requirements for formal education, exposure to new sources of information, and a diminished emphasis on conventional forms of social relationships.

STRESS: the responses of the individual to some external stimulus, a function of how that individual construes or perceives, whatever affects the individual filtered through belief and perception?

→EFFORT to contextualize in the macro-level social processes (changes in society, politics, and culture)

TOO SIMPLE: Modernization → dietary change and stress → high BP (e.g., cross-cultural studies)

### ● SOCIAL CHANGE AND DISEASE RISK

SOCIAL THEORY: .....attaining a valued lifestyle is insufficient to be granted associated prestige unless one's status with respect to the means for achieving that lifestyle is commensurate.

Operationally,

$$Y = a + b_1(x_1 + x_2) + b_2(x_1 - x_2) + e$$

Y: any biological or behavioral outcome hypothesized to be influenced by the acquisition of Euroamerican middle class values and lifestyles, x1: lifestyle (e.g., material goods, information), x2: household economic resources (e.g., occupation, education).

→STATUS INCONSISTENCY MODELS (A term of Medical Sociology) → more specifically, "lifestyle incongruity model." Previous eight field studies (West Indies, Mexico, Brazil, USA, Samoa, England) all showed that the higher lifestyle incongruity was associated with higher BP after controlling for age, sex and anthropometric indicators (e.g., BMI); e.g., Brazil: the association was found independently from the effects of dietary difference.

MECHANISMS: Individuals are motivated to accumulate elements of lifestyles in order for them to display their self-defined place in the system of social stratification. So, the individual struggling to maintain a higher style of life in the context of low SES feels stress. The individuals who are status-incongruent are continually scanning the social field searching to determine if they are being responded to with the sense of respect that they desire. /Laboratory evidence.

#### ● SOCIAL CONTEXT OF LIFESTYLE INCONGRUITY

E.g., the association between life incongruity and blood pressure has been found to be modified by age. Social context of lifestyle incongruity may differ by age of the individuals. Gender and other variables may also have the effects.

#### ● SUBJECTS AND METHODS

SAMPLING: Follow-up sample of 1976 survey/1989/Of 255 men surveyed in 1976, 136 were in the normotensive group and 119 were in the high BP group (SBP 140mmHg < or DBP 90mmHG<), 14 in the normal BP group and 16 in the high were sampled randomly. Furthermore, 26 of their spouses were surveyed (One was off-island, three men unmarried). Only one refusal.

MEASUREMENT: height, weight, triceps skinfolds, BP, employment, education, household structure, material culture, health history, and lifestyle (housing quality, material goods, media use and travel).

#### ● RESULTS

(1) SEE Table 3:

(2) SEE Figure 2:

#### ● INTERPRETATION

INTRACULTURAL VARIABILITY: gender, age

SMALL SAMPLE SIZE

Models in human biology ignore the larger political-economic forces influencing local communities?

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## Social context and psychosocial influences on blood pressure among American Samoans.

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**ABSTRACT.** This study explores social and economic influences on health within a model formulated to address explicitly both individual and household level phenomena. Dressler's lifestyle incongruity model is used as a basis from which to predict the effects of intracultural contexts of variability on blood pressure. The sample for this survey consists of 134 Samoan men and women living in

American Samoa. Based on previous experience and ethnographic sources, two key intracultural contexts were examined: gender, i.e., male-female differences in response to psychosocial stress, and household employment as indicated by whether or not both spouses in a household are employed. Our analysis indicates that lifestyle incongruity, defined as the difference between the material culture presented by a household and the economic resources of the family, is significantly associated with both systolic and diastolic blood pressure. Furthermore, males and females show opposite blood pressure associations with both lifestyle incongruity (male blood pressure increases with increasing incongruity while female blood pressure does not) and household employment (male blood pressure is higher when both spouses work but female blood pressure is lower).

Keywords: stress; lifestyle incongruity; Polynesians; sex differences

#### ● LIFESTYLE INCONGRUITY MODEL:

1. .... [can] assess the association between behavioral stress and blood pressure.
2. ....uses concepts derived from social theory (Weber, 1946) to operationalize stress as the discrepancy between an individual's style of life and household economic resources.
3. .... [assumes] that there is a small chronic excitation of the sympathetic nervous system, which over time produces cardiovascular symptoms.
4. .... has been found to be useful for understanding health related effects of lifestyle stress in numerous cultural contexts in many different societies.

● THE PURPOSE is to examine the relationship between sociocultural factors and blood pressure in American Samoa as they relate to attempts to acquire and manifest modern lifestyles. The crux is that the relationships vary intraculturally. 1

#### ● AMERICAN SAMOA

1. few jobs before 1960s.
2. the government and tuna canneries have become the major employers accounting for 33 and 34% of 1990 jobs, respectively.
3. increasing participation in the labor force by the women over the past two decades.
4. the number of people per household decreased.
5. males and females have different roles in the social system → men and women will show different blood pressure responses to lifestyle incongruity ?
6. Traditional form of household vs modern form of household

#### ● SAMPLE AND MEASURES

1. Samoan adults (69 men and 66 women) between the ages of 37 and 81 representing 135 different households in 22 villages from all geographic areas of the Tutuila Island (45043 people in 57 villages in total). One woman was excluded from the analysis. SELECTED SAMPLE (N=92) + OPPORTUNISTIC SAMPLE (N=42). Comparison with census (**Table 1**)
2. seated BP was measured three times after ten minutes resting
3. triceps skinfold, three readings
4. Social, economic, health, activity, and lifestyle data were obtained by interview.
  - a. ACTIVITY LEVEL = physical activity at work + frequency of vigorous aerobic exercise + frequency of less strenuous exercise
  - b. STYLE of LIFE = ownership of common consumer goods (e.g., telephone, car), exposure to mass media information sources (e.g., TV watching), travel, and membership in social organization. Items with item-total correlation values of <0.15 were eliminated → 20-item scale (**Table 2**). A reliability analysis for internal consistency was performed and the scale shows acceptable consistency as indicated by the Chronbach's alpha of 0.74 (0.76?) (this statistic reaches 1.0 when all items show perfect item-total correlation).
  - c. SOCIOECONOMIC STATUS = see **Table 3**
  - d. LIFESTYLE INCONGRUITY SCORES = style of life - socioeconomic status (each scale was converted to a mean of 50 and a SD of 10) = 0.15 (mean), 10.1 (SD), -22.4 ~ +25.7 (range). Negative score: c>b, positive score: b>c.
  - e. EMPLOYMENT STATUS: both spouses working vs. One or neither spouse working → "household employment"

- f. SOCIOECONOMIC RANK = style of life (b) + socioeconomic status (c), which indicates aggregate socioeconomic status and which is orthogonal to the (d). This is used as a control for overall socioeconomic status effects.

● DATA ANALYSIS

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4(x_5 + x_6) + b_5x_4 + b_6(x_5 - x_6) + b_7x_7 + b_8x_4(x_5 - x_6) + b_9x_7x_4 + b_{10}x_7(x_5 - x_6) + \epsilon$$

Y: systolic or diastolic BP

x1 = age, x2 = the triceps skinfold measurement, x3 = the activity index, x4 = sex, x5 = Lifestyle, x6 = household economic status, x5 + x6 = aggregate socioeconomic resource measure (socioeconomic rank), x5-x6 = lifestyle incongruity, x7 = household employment. x4(x5-x6) = the sex by lifestyle incongruity interaction, x7(x5-x6) = the household employment by lifestyle incongruity interaction.

Three blocks of variables were entered hierarchically into the regression equation: First, (1) the covariates (age triceps skinfold, activity, and socioeconomic rank), next, (2) the main effect (sex, lifestyle incongruity, and household employment), and finally (3) the three two-way interactions between the main effects.

● RESULTS

Table 4: DESCRIPTIVE STATISTICS: BLOOD PRESSURE, Mean SBP=145.7mmHg, mean DBP=86.1mmHg; no difference by sex. TRICEPS SKINFOLD: women>men. SOCIOECONOMIC RANK & ACTIVITY LEVEL: men>women.

Table 5: BETA COEFFICIENTS: see notes in the table

Figure 1: The pattern of the two significant two-way interaction terms for SBP are graphically illustrated. (a) In households where both spouses are employed, female tend to have lower SBP than men, whereas in households where one or neither spouse is employed, men have lower SBP.

(b) Increasing incongruity is associated with higher pressure in men and lower in women.

● DISCUSSION

⊙ LIMITATION (1)---SAMPLING METHOD: Table 6 Comparison between selected and opportunistic samples. The latter is more representative of the population as indicated by the 1990 census. So the composite sample is more closely approximate the American Samoa. Yet it is true that the composite sample differs from the American Samoa population in rates of employment among men and women and % of households with two or more wage earners.

LIMITATION (2)---POTENTIAL BIAS: More individuals who had been suspected high blood pressure have participated? Comparison to an age-matched sample of their larger survey of Tutuila from 1976→Table 7.

LIMITATION (3)---SMALL R<sup>2</sup> VALUES:

→ The results should be treated PRELIMINARY and be confirmed on an more systematic and representative sample. Keeping these limitations in mind, there are some interesting aspects of the results that should be considered.

⊙ --A Samoan man's status is also supported by the role of his wife as domestic organizer.  
 --A household in which both spouses work is suggestive of greater involvement in the market economy; the men in these households pursue lifestyles in accordance with a new cultural definition of status. However, the new status symbols have not replaced the traditional *matai* system. An employed wife presents a conflict with traditional meanings of status. Thus the men whose spouse work experience greater psychological stress and hence higher BP.  
 --In Samoa, the extended family system provides a relief in domestic responsibility for employed wives. By providing an extra income and thereby contributing to the consumption of material goods, a women may feel satisfied that she is still caring for her household. (???)

● *Useful WEB SITES for further study*

Dressler WW: <http://www.as.ua.edu/ant/dressler.htm>

Bindon JR: <http://www.as.ua.edu/ant/bindon.htm>