



Preferences Offset Stressors in Determining Survivability

According to mixed preference models, preventive medicine strategies for promoting health can operate either by alleviating stress or by enhancing subjective preferences attaining survival power.

Yoichi Ando

Professor Emeritus, Kobe University

ABSTRACT: Pure stress-based models of health predict that accumulated stresses promote illnesses that result in lower life expectancies. However, in mixed subjective preference models, effects of stress, seen as negative preference, can potentially be offset by achievement of positive personal preferences. According to mixed preference models, preventive medicine strategies for promoting health can operate either by alleviating stress or by enhancing subjective preferences. Over many decades we developed a theory and practice of rational, psychoacoustically-driven architectural acoustic design of concert halls.¹⁻³ The theory incorporates both negative acoustic annoyance attributes (stressors, negative preferences) and positive ones. Using self-assessment surveys of 30 dialysis patients in Kobe, Japan, we used the methodology to assess the effects of subjective preferences on delaying onset of dialysis treatment (dialysis onset age, DOA). Hayashi's multivariate regression method (I) for nonparametric data^{5,8} was used to estimate effects of reported factors. Of these, six factors proved predictive of DOA (p-values): better or worse interpersonal relations (0.003), decades of full-time work (0.050), alcohol consumption (0.031) according to individual preference, present noisy home environment (0.090), other pollution (0.060), smoking (0.115). Other factors were either weakly- or un- correlated: hospitalizations, house moves, past hypertension, proteinuria, sex, pet ownership, presence of bad odors, past noise pollution. Preventative measures that enhance subjective preferences may thus delay the need for dialysis.

KEYWORDS: Offset Stressors; Survivability

MAIN

Since the early 1950's, stress has been recognized as an important contributing factor in illness and morbidity.⁴ The stresses of modern life include ill human relations, financial pressures, hyper-competitiveness in business, noise and environmental pollution, and most lately, the coronavirus pandemic. Regretfully stress too often drains away pleasure derived from the process of living. Today it is well appreciated that a variety of stressors set into motion defense reactions mediated through the immune, hormonal,

and nervous systems. As a result, ever-increasing numbers of people suffer from kidney and heart disease, cancer, intractable pain disease cognitive impairment, and a host of other ailments.

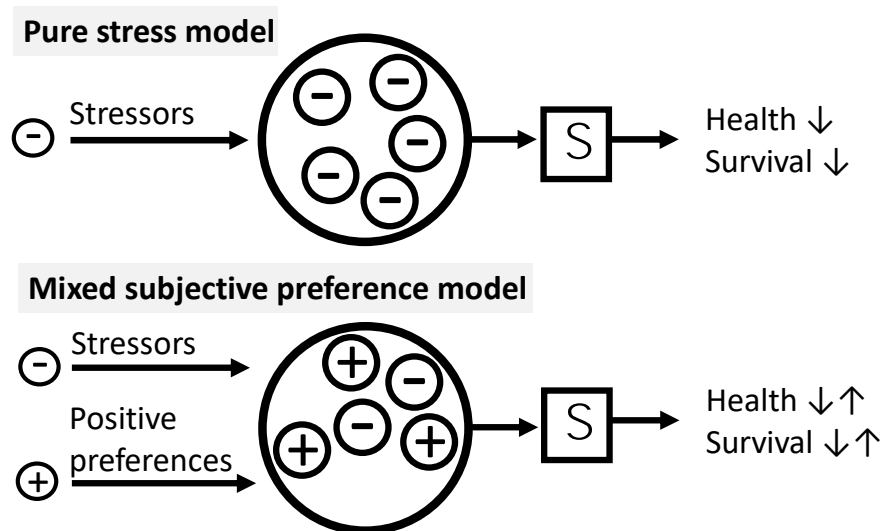


Figure 1. Pure stress models (top) vs. mixed subjective preference models (bottom).

Stress has conventionally been conceptualized in terms of a set of negative factors that decrease health and longevity (Figure 1). In pure stress models individuals have certain limited survival propensities that are decreased by negative stress factors. Mixed subjective preference models combine both negative stress-increasing factors and positive, stress reducing ones.

We have encountered both negative and positive effects of sounds in our studies of environmental and architectural acoustics. The negative effects constitute acoustic annoyance, whereas the positive effects involve the realization of subjective preferences. Annoyance creates stress by obstructing preferred psychological states, whereas optimization of sound preferences facilitates their attainment, thereby potentially offsetting the effects of negative stress factors.

Decades ago we found high levels of environmental (airplane) noise to have deleterious effects on human fetuses.⁵⁻⁷ On the positive, preference side, we developed a rational theory and practice of concert hall design that first assesses the sound preferences of human listeners and then uses acoustic models to optimize hall sizes, shapes and other characteristics.¹⁻³ In this psychoacoustically- and acoustically-driven adaptive design process there are both positive acoustic preference factors that we seek to maximize and negative acoustic preference factors that are best minimized. Can such a multifactor theory of preferences be used to predict indices related to state of health?



As we ourselves have been undergoing dialysis treatment for more than a decade now, we decided to apply the methods of the theory of psychological preferences to the prediction of when patients need to go on dialysis – the dialysis introduction age (DIA). We surveyed 30 dialysis patients at a hospital in Kobe, Japan to collect data on 16 response dimensions. For this analysis, we used the general method of Hayashi⁸ for transforming the nonparametric survey responses and constructing a regression model from the survey response data (Methods).

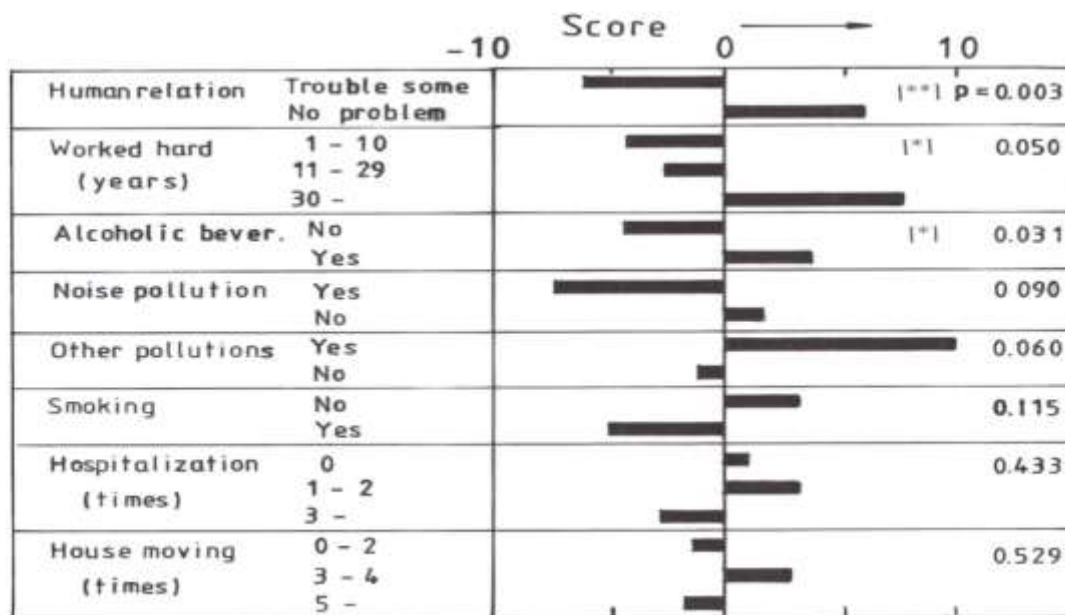


Figure 2. Factors that proved strongly- and weakly- predictive of dialysis onset age (DIA). Results of each category of eight predictive factors in estimation of DIA. Higher, positive scores produce higher estimates of DIA, i.e., later age of dialysis onset.

Symbols [**] and [*] indicate significance levels 0.01 and 0.05, respectively.

The results are shown in Figure 2. The eight factors in the table produced a moderately high coefficient of determination (R^2) of 0.59. These factors were 1) human relations (troublesome or not); 2) decades of hard work; 3) consumption of alcoholic beverages according to individual preference; 4) high levels of noise in one's current home; 5) air pollution; 6) smoking; 7) number of hospitalizations; 8) number of house moves. Other factors such as sex, pets, bad odors, and levels of noise in past domiciles were not predictive. It is remarkable that individual clinical histories of past high blood pressure and proteinuria were unexpectedly insignificant.

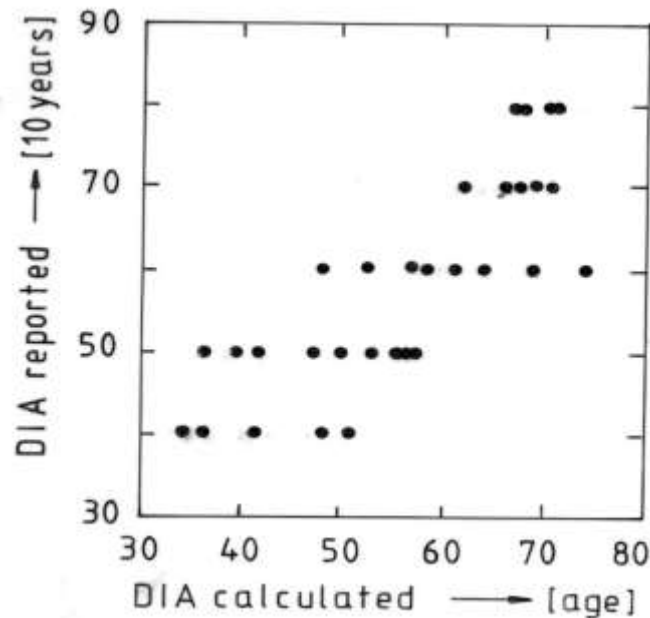


Figure 3. Relationship between predicted (calculated) DIA and actual, self-reported DIA (rounded downwards by decade). $R^2 = 0.59$.

DIA values predicted by the model using the 8 factors in Fig. 2 roughly agreed with actual DIAs reported by dialysis patients (Fig. 3). The analysis suggests that, of these response variables, troubled interpersonal relations (Fig. 2, top line) was the most potent predictor ($P < 0.01$) of the dialysis introduction age (DIA). More interpersonal conflict, as reported by self-assessment, constitute greater degrees of stress that hastened (reduced) the DIA. As indicated the second line of the table, working for more than 30 years postponed DIA ($p = 0.05$) as habituation. The preference factor of social drinking (Fig. 2, third line) postponed the DIA ($p < 0.05$). In Japan, social drinking widely regarded to be the best of all medicine and an effective means of stress reduction. Noise pollution (Fig. 2, fourth line) acted as a stress factor that accelerated (decreased) DIA ($p < 0.1$).

The results of this small study suggest that other health conditions might be predictable on the basis of relatively crude self-assessments of levels of stress and attainment of positive preferences. It may well be the case that these positive attainments, the elements of a "good life", in the form of preferred work, interpersonal relations, music, art, clothing, food, and well-designed environments may confer enhanced resistance against disease. The hypothesis that positive preferences can offset negative stresses has many implications for preventive medicine. If true, then the theory of subjective preference opens a whole realm of stress-reducing strategies for exploration. Our ultimate aim is to enable each individual to be situated in their preferred environment through all stages and aspects of their lives, so that each can remain as healthy as possible, and flourish as long as possible. A typical example is seat selection system introduced in Kirishima International Music Hall in 1994 with testing individual preference changing each of four orthogonal factors, according to the theory of subjective preference of the sound field². It is considered that such individual preference driven by DNA is the source of survival against various stressors.



METHODS

Questionnaire were distributed to 34 patients attending a dialysis clinic in Konan Hospital in Kobe, Japan. Responses related to 16 factors of stress and preference in addition to other data pertaining to environmental conditions and clinical history were collected. Four surveys were omitted from analysis due to incomplete responses. The general method of Hayashi⁸ for transforming nonparametric survey data and constructing a multivariate regression predictive model (Method I) was used; our specific method is presented elsewhere.⁵ DIA values were rounded downward to the nearest decade value, e.g., 55 --> 50 and 68 --> 60).

ACKNOWLEDGMENTS

The author himself has been on weekly clinical and home dialysis since 2009. Dr. Akira Fujimori, Director of the Kidney Center at Konan Hospital kindly allowed patients to be surveyed and provided useful comments on the report. Dr. Hiraku Kadoguchi, Director of the Kenshukai Clinic provided instruction for hemodialysis. Peter Cariani kindly improved English usage of this article.

REFERENCES

1. Ando, Y. Brain-Grounded Theory of Temporal and Spatial Design in Architecture and the Environment. Springer Tokyo (2016).
2. Ando, Y. (Peter Cariani, ed.). Auditory and Visual Sensations, Springer-Verlag, New York (2009).
3. Ando, Y. Concert hall acoustics. Springer-Verlag, Heidelberg (1985).
4. Selye, H. The physiology and pathology of exposure to stress. Acta Inc. Oxford, England (1950).
5. Ando, Y., and Hattori, H. Statistical studies on the effects of intense noise during human fetal life. J. Sound and Vib., 27, 101-110 (1973).
6. Ando, Y., and Hattori, H. Effects of noise on human placental lactogen (HPL) levels in maternal plasma. British Journal of Obstetrics and Gynecology, 84, 115-118 (1977).
7. Ando Y. Effects of daily noise on fetuses and cerebral hemisphere specialization in children. J. Sound and Vib., 127, 411-417 (1988).
8. Hayashi, C. On the quantification of qualitative data from the mathematico-statistical point of view. An approach for applying this method to the parole prediction. Annals of the Institute of Statistical Mathematics, 2, 35-47 (1950).

Cite this Article: Yoichi Ando (2021). Preferences Offset Stressors in Determining Survivability. International Journal of Current Science Research and Review, 4(9), 1167-1171