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## Nature . . . Nurture . . . ?



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The heredity/environment debate continues. Within the last two years, there have been editorials, letters, and articles in the *New England Journal of Medicine* in the United States and in *Nature* in Great Britain debating the impact of genetics versus environmental or lifestyle habits on health and disease. It is now generally agreed that we are in part a function of our heritage. It also is evident that environment must be an important consideration.

Despite an abundance of research, there has been little progress in identifying the relative contributions of genetics and environment in the genesis of health and disease. One reason is that the present models are inadequate.

Specifically, the emphasis has been on studies on parents and their children, twins and the orphaned. The model least used and potentially most helpful in resolving this issue is the husband-wife model. Here we have a situation where it is highly unlikely that genetics play a role in behavior or disease, while environmental closeness is a certainty.

### **Folklore And The Nature/Nurture Experience**

The "wife's tale" that if "you live with her long enough, you'll look like her" has been exemplified in a recent study from the University of Michigan. Undergraduate psychology students were given photographs of men and photographs of women who were recently married or had been married for many years. The students failed to correctly match the newly married couples. However, the students consistently paired long-term married couples.

### **The Scientific Story**

Throughout the scientific literature are numerous examples confirming similarities in diverse behavioral patterns of married couples. Dr. S. Garn and colleagues

studied couples during a 20-year period. They investigated weight, weight change, urinary and blood vitamins studies (i.e., vitamin A, vitamin C, riboflavin, thiamin) serum cholesterol and triglycerides, dental caries, bone, hemoglobin, and diet, and concluded that, with advancing time (i.e., length of cohabitation), familial characteristics become increasingly similar.

At the University of Alabama Medical Center, we have studied familial aggregation in a group of dental practitioners and their spouses and have published 20 papers during the past 12 years. Our model is shown in Table 1. Serum cholesterol was monitored in 261 couples. These scores were compared to age and sex-matched unrelated women. In addition, the two female groups were examined. This format allowed us to raise three questions: 1) What is the relationship of serum cholesterol in married couples? 2) How does the husband-wife correlation compare with the pattern in the husband and an age-paired unrelated female? 3) Is the correlation a function of time?

**Table 1** Correlation coefficients for serum cholesterol

Line		r	p
1	husband versus wife .....	+0.361	<0.01*
2	husband versus unrelated female	+0.075	>0.05
3	wife versus unrelated female	+0.189	<0.01
4	husband versus wife		
5	(husband's age <40) .....	+0.176	>0.05
6	(husband's age 40-49) .....	+0.279	<0.01*
7	(husband's age 50+) .....	+0.464	<0.01*

Line 1 shows a highly statistically significant correlation (referred to as "r") between the serum cholesterol values of a husband and wife. Therefore, husbands and wives appear to demonstrate similar serum cholesterol levels. In contrast, an examination of the men compared to the women age-paired against the wives (line 2) showed no relationship in serum cholesterol values. Therefore, there is no correlation coefficient between serum cholesterol concentrations in men and women unrelated by marriage.

Do couples, consciously or otherwise, select each other on the basis of serum cholesterol? Lines 5,6, and 7 show the r of the married groups in terms of advancing age. Line 5 represents the youngest combination of subjects, i.e., men who are less than 40-years-old and their wives, and shows no correlation in serum cholesterol values. In contrast, the next age group (men in their 40s) shows a greater correlation in cholesterol values between husband and wives. Finally, the oldest subset (men 50+ years and their spouses) shows an even stronger correlation. This data suggest a strong environmental effect on health and disease.

**Table 2** Correlation coefficients (in decreasing statistical order) for different parameters in relatively older married couples

Parameter	Total Correlation	
	r	p
enzymes/lactic dehydrogenase (LDH)/preliminary .....	+0.877	<0.01*
enzymes/lactic dehydrogenase (LDH)/final .....	+0.840	<0.01*
enzymes/creatine phosphokinase (CPK) .....	+0.806	<0.01*
diet/total carbohydrates .....	+0.652	<0.01*
diet/vitamin A .....	+0.636	<0.01*
blood chemistry/serum cholesterol .....	+0.558	<0.01*
clinical state/emotional problems .....	+0.502	<0.05*
blood chemistry/serum albumin .....	+0.365	<0.01*
hematology/hemoglobin .....	+0.347	<0.01*
diet/total protein .....	+0.343	<0.05*
diet/calories .....	+0.336	<0.05*
blood chemistry/blood glucose .....	+0.315	<0.005*
diet/fat .....	+0.223	>0.05
hematology/hemacrit .....	+0.215	<0.05*
enzymes/serum glutamic pyruvic transaminase (SGPT) .....	+0.085	>0.05

Table 2 summarizes observations in husbands and wives married for several years. All but two of the couples show significant correlations in a variety of parameters, including liver enzymes, diet, serum cholesterol, and hematocrits. Not shown here is the evidence that these correlations sharpen as the groups age.

In other words, the *r* is higher in the older couples than in the younger couples. Thus, the overall evidence shows that married couples generally become more similar with time of cohabitation.

### Summary

While the spouse-likeness model is relatively simple, inexpensive, and highly convincing in differentiating inheritance from environmental effects, it is not without problems. There are incontrovertible socioeconomic factors that interfere with results.

For example, the selection of a mate is in part a function of height, religion, economics, and geography. These factors, in turn, could influence biochemical and physiological parameters.

Despite design flaws and incomplete evidence, the general consensus is that both inheritance and environment dictate health and disease. This report attempts to cast additional light on the relative contributions of nature versus nurture by using spouse-likeness as a model. Within the limits of these studies, it appears that the environment plays a more singular role (and possibly a primary function) than previously appreciated.

*Bibliography available upon request.*