

Generational and Cohort Concordance  
of Familial Health Behaviors

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## Abstract

The present study examines interindividual differences in health behaviors within familial dyads. Subjects consist of parents and their adult offspring and adult sibling pairs who are participants of the Seattle Longitudinal Study (SLS). Study members completed a health behaviors questionnaire in 1993. The current sample includes 709 pairs of first-degree relatives consisting of 437 pairs of parent-offspring ( $M_{AgeP}=70.33$ ,  $SD_{AgeP}=9.24$ ;  $M_{AgeO}=41.75$ ,  $SD_{AgeO}=8.70$ ) and 272 pairs of siblings ( $M_{AgeI}=61.61$ ,  $SD_{AgeI}=13.28$ ,  $M_{AgeS}=60.71$ ,  $SD_{AgeS}=14.02$ ). Generational (parent-offspring pairs) and cohort (adult sibling pairs) concordance were examined for medical and health services usage, health and disease status, body mass indices and exercise, and substance use. Evidence for generational and cohort similarities and differences for these health behaviors were found.

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A major revolution has taken place in the search for comprehending the role that personal behaviors play in maintaining health status. With an increase in expected lifespan attributed to changes in medical technology, control of acute diseases, and a more thorough multi-dimensional knowledge of health; the search continues for better methods and models to expand our understanding. Health behaviors have been widely used to address questions of personal influence over health outcomes.

One under-examined area in the health behavior field is the role of familial similarity or concordance of behaviors within the family structure. While behavior genetic research has used twin designs to examine numerous aspects of similarity, designs examining first-degree relatives have been scarce. Studies examining health behaviors for first-degree relatives within the familial context are even less common. Pratt (1976) provides an early attempt at using systems theory to describe certain family types or characteristics which foster members' care for their health. Results showed that the family played a role in promoting health behaviors both within its own structure, and in its interactions with large social contexts.

Blaxter (1990) examined health behaviors; primarily nutrition habits, exercise, smoking, and alcohol consumption, within social and familial environments to determine whether patterns of behaviors could be established. Earlier work by Blaxter (1983),

examined similarity of health behaviors between mothers and their pre-adolescent and adolescent daughters. Results showed low to moderate familial correlations, primarily in the nutrition and exercise realms.

Recent studies examine familial concordance of health behaviors primarily for parents and their young children or adolescent offspring. Sallis and Nader (1988) suggested that the family represents the primary influencing social institution in performing health behaviors. Activity modeling and support from parents has been found to be a strong predictor of later exercise participation for daughters (Greendorfer, 1983; Butcher, 1983). While early familial influences on behavior are scarcely studied, even fewer studies have examined the similarity of health behaviors for relatives later in the lifespan.

Rosow and Rise (1994) studied the similarity of health behaviors between parents and offspring into young adulthood. Significant family components were found for dietary habits, smoking, alcohol consumption and exercise, with exercise having the weakest associations. It appears that parental influence and habits may be important in determining the health behaviors of children up to approximately 20 years of age. Stafleu, Van Staveren, De Graaf, Burema, and Hautvast (1994) provide one of the few studies to examine multi-generational health behaviors. This study examined nutritional intake practices for three generations of women. Family resemblance was found for height, weight and body mass index, as well as nutritional habits, with higher

correlations noted between the two younger generations. Correlations were weaker the greater the range in age was between generations.

The current study examines health behaviors across a broader age range than previous studies. Concordance of health behaviors is examined to determine the degree of similarity between parent-adult offspring pairs and adult sibling pairs. The mean age difference between parents and offspring is 28.57 years, while siblings differ by slightly more than one year. Is there evidence of concordance in self-reported health behaviors for first degree relatives across these age ranges?

#### Methods

##### Subjects

Participants for this study were drawn from the larger framework of the Seattle Longitudinal Study (SLS). This study has been in progress for over 35 years and has collected data with the primary goal of assessing cognitive development across the lifespan. Longitudinal subjects are members of a large Health Maintenance Organization (HMO) in the Seattle metropolitan area and are recruited at random, stratified by age and gender, from this population. Testing has been conducted at seven year intervals throughout the study. The sample is representative of the community dwelling population in this area and represents a broad range of occupations, educational, and economic backgrounds (Schaie, 1995).

In 1989/1990, a family study was conducted which collected data from the adult siblings and offspring of the SLS members who participated in the 1984 data collection. Longitudinal members were asked to nominate their family members after being given a brief description of the study. Offspring and siblings were also found for longitudinal members who dropped out of the study due to death or illness. In 1993/1994, the Health Behaviors Questionnaire (HBQ) was mailed to all participants of the family study.

Response to the mail survey was good, with 709 respondent pairs received. These pairs include 437 pairs of parent-offspring ( $M_{AgeP}=70.33$ ,  $SD_{AgeP}=9.24$ ;  $M_{AgeO}=41.75$ ,  $SD_{AgeO}=8.70$ ) and 272 pairs of siblings ( $M_{AgeI}=61.61$ ,  $SD_{AgeI}=13.28$ ,  $M_{AgeS}=60.71$ ,  $SD_{AgeS}=14.02$ ). Parent age range is 48 to 92 years, offspring range from 26 to 74 years, while siblings range from 28 to 88 years. The mean education level for parent-offspring pairs ( $M_{EduCP}=14.65$ ,  $SD_{EduCP}=2.80$ ;  $M_{EduCO}=15.53$ ,  $SD_{EduCO}=2.44$ ) and for the sibling pairs ( $M_{EduCI}=15.28$ ,  $SD_{EduCI}=2.69$ ;  $M_{EduCS}=14.73$ ,  $SD_{EduCS}=2.75$ ) for the longitudinal member and sibling, respectively.

#### Measures

As part of a larger battery, subjects completed the Health Behaviors Questionnaire (HBQ) and the Life Complexity Inventory (LCI), a demographic information form (Gribbin, Schaie & Parham, 1980). The HBQ is a new addition for the participants in the

sixth wave of the SLS and the family study, and is used to assess health behaviors and health related issues in adults. This questionnaire was completed in-home by subjects upon receipt.

The HBQ consists of 86 items tapping seven health related domains. These domains include: substance use, nutrition behaviors, medical check-ups, health maintenance activities, health perceptions, general health status, and cardiovascular health status. A confirmatory factor analysis by Maier (1995) found an eight factor model of health behaviors and two health status factors fitted items from the HBQ best. Thirty items were used resulting in factors labelled: 1) not smoking, 2) alcohol abstention, 3) avoiding unhealthy foods, 4) food preparation, 5) exercise, 6) seat belt use, 7) dental care and, 8) medical checkups. Health status domains reflected: 1) self-reported health status and, 2) health perceptions. The current study examines self-reported rather than latent behaviors in the substance use, exercise, medical check-ups, health maintenance, and health status domains. Indices of body size and mass are also examined.

Demographic information was obtained from the Life Complexity Inventory (LCI) which examines a broad range of adult activities and interests (Gribbin, et al., 1980). For the current study, we use only general demographic information about subjects including age, gender, height, weight, body mass index (BMI), and education. Once relatives were matched and verified, Pearson, Polychoric or Polyserial correlation coefficients were calculated to reveal

the degree of concordance of health behaviors between parents-adult offspring and adult sibling pairs. Contingency tables were also used to determine the extent of concordance for health behaviors. Cells containing both members of a pair were noted and percentage of concordance for the behavior are displayed.

Concordance exists for both positive and negative endorsement of behaviors, while discordance was classified in the off-diagonal categories where only one member of a pair endorses an activity. Results of these analyses follow.

#### Results

Measures of concordance will be discussed for the parent-adult offspring (generational) and adult sibling (cohort) pairs. Results are reported for the following health behavior domains: body mass measures, substance use, medical service utilization, health status, and exercise.

#### Body Mass Indices

Parent-Offspring. The parent generation reported body weight ranging from 90-290 pounds and height ranging from 56-76 inches. Calculated values for BMI are from 18.06 - 47.30. Offspring report a range of weights from 88 - 340 pounds, heights between 54 - 79 inches, and BMI's ranging from 16.31 - 50.03. BMI correlates moderately ( $r=.25$ ).

Sibling Pairs. The longitudinal study members reported body weight ranging from 90-280 pounds and height ranging from 58-78 inches. Calculated values for BMI are from 17.03 - 43.32. Their

siblings report a range of weights from 72 - 320 pounds, heights between 57 - 85 inches, and BMI's between 13.20- 40.42. BMI correlates moderately ( $r=.29$ ). Body Mass Index correlates slightly higher in sibling pairs than for parent-offspring pairs.

#### Substance Use - Smoking

Smoking questions asked whether you: 1) smoke at the present time, 2) don't smoke now, but have smoked in the past, and 3) never smoked. This was used to develop a current-smoking variable by examining those who never smoked and past smokers against those who presently smoke. An ever-smoke variable asked if respondents have smoked any time in their lives by collapsing options (1+2) compared to option (3).

Parent-Offspring. Forty-nine percent of the parent generation answered yes to the ever-smoke question although seven percent currently smoke. The offspring had a similar response rate with 45% saying they had smoked at some time in their lives, while only 12.4% currently smoke. Over 81% of the pairs are not currently smokers, while less than 1% are. Examining concordance of smoking at some time in the past, almost 24% of the parent-offspring pairs have smoked. The greatest proportion (46%) of this variable is comprised of discordant pairs with only one member smoking. No significant relationship was found between age and current or ever-smoking status in the parent-offspring pairs.

Sibling Pairs. Fifty-two percent of the longitudinal siblings reported smoking at some time, while only four percent currently

smoke. Their siblings had a similar response rate with 49% saying they had smoked at some time in their lives, and 11.4% currently smoking. The sibling correlation for ever-smoking was ( $r=.18$ ), while the concordance for current smokers was significantly higher than for parent-offspring ( $r=.21$ ). Age and current smoking status were significantly correlated for both siblings ( $r_{\text{long}} = .25; r_{\text{sib}} = .28$ ). Over 85% of the sibling pairs do not currently smoke, with slightly greater than 1% concordance of smokers (12.92% discordance). Concordance for pairs that have ever smoked and those who have never smoked are almost identical (28.78% and 28.04%), with a high number of discordant pairs (43.17%).

#### Substance Use - Alcohol

Three aspects of alcohol consumption are addressed. First, a global question asks subjects to describe their use of alcohol using a 7-point scale (1=never drank, 2=not in last year, 3=few times a year, 4=once or twice a month, 5=once a week, 6=two or three times weekly, 7=daily or almost daily). Three frequency of alcohol consumption categories were formed: infrequent (using responses 1, 2, 3), casual/moderate drinking (responses 4 and 5), and frequent alcohol consumption (responses 6 and 7). Second, respondents answered how many glasses of wine they drank last week. Finally, a question asks how many bottles or cans of beer were consumed during the last week.

Parent-Offspring. The parent generation had 51% report infrequent alcohol use, 18% with moderate use, and 29% drink from 2 to 3

drinks/week up to daily use. Glasses of wine consumed in the last week ranged from 0 to 21. Beer consumption ranged from 0 - 12 bottles consumed last week. Offspring had 41% in the infrequent range, 26% reporting moderate drinking, and 31% in the frequent category. Glasses of wine in the last week range from 0-35 and bottles of beer ranged from 0-45 per week. Concordance for the parent-offspring pairs show 44.6% fall into the same category, while 55.51% report differences in frequency of alcohol consumption.

Parent-offspring correlation for frequency of alcohol use was ( $r=.33$ ). Correlations for glasses of wine consumed was not significant while amount of beer consumed was significant ( $r=.35$ ). The correlation between beer and wine consumption was not significant suggesting drinkers select and drink one or the other but not both.

A negative correlation was found between self-reported global health and alcohol consumption for both parents and adult offspring ( $r_p = -.23, r_o = -.14$ ). Those reporting more frequent drinking behavior report worse health with a stronger relationship for the parent generation. A significant negative relationship was found between age and frequency of alcohol use for the parent generation ( $r = -.14$ ), indicating that frequency of consumption declines with increased age. This relationship was not found for offspring.

Sibling Pairs. The longitudinal members had 44% report infrequent alcohol use compared to 48% of their siblings. Moderate use was

reported by 27% of longitudinal sibs versus 21% for their brothers and sisters. Twenty-seven percent of the longitudinal sibs report frequent alcohol use compared to 31% of their siblings. Concordance between siblings was 50.73% reporting the same frequency of consumption, and 49.27% having discrepant responses. For the target siblings, glasses of wine consumed in the last week ranged from 0-14. Beer consumption ranged from 0-36 bottles in the last week. Their siblings report a range of 0-21 glasses of wine and 0-32 bottles of beer consumed.

Sibling correlations for frequency of alcohol use was ( $r=.36$ ) or slightly higher than the parent-offspring relationship. Correlations for glasses of wine consumed was not significant while amount of beer just reached significance ( $r=.20$ ). Correlations between age and alcohol consumption were significant but low, with older subjects drinking less ( $r=-.14$ ). As was seen in the parent-offspring data, a negative correlation exists between self-reported health and alcohol consumption for both siblings ( $rJ=-.19$ ,  $rS=-.10$ ). These values are lower than for parent-offspring comparisons.

#### Medical Service Utilization

Subjects were asked how many visits they made to a physician within the past 12 months, and a similarly worded question asked about dental visits. A related question asked whether subjects had a medical checkup in the past 12 months even though they felt well. This examines general preventive health visits versus

seeing a physician for a specific problem.

**Parent-Offspring.** Number of doctors visits ranged from 0-51 during the past 12 months. Offspring report between 0-35 visits with 1 or 2 visits the most frequent responses (22% and 24% respectively). Eighty-four percent of the parent generation had made a preventive health visit while 63% of the offspring report this. Concordance for medical check-ups showed 53% of the pairs made regular visits, 6.86% do not visit their physicians regularly, and almost 40% discordance for this behavior.

Over 77% of the parents and 80% of adult offspring report making at least an annual visit to the dentist. Concordance for dental visits was slightly higher than doctor visits, with 67.97% or pairs seeing the dentist regularly, only 4.15% of pairs saying they do not have dental check-ups, and 27.87% discordant pairs. The parent-offspring correlations for doctor and dental visits are low but significant ( $r=.13$  and  $r=.12$ ).

**Sibling Pairs.** Number of doctor's visits for sibling pairs range from 0-40. Eighty-five percent of the longitudinal siblings report regular dental visits while only 81% of their brothers and sisters do. Over 72% of sibling pairs do see their dentist regularly, only 3.1% do not, and 24% concordance was found. Eighty percent of the sibling pairs report making a preventive health visit during the past year. Sixty-six percent of siblings pairs see have regular medical check-ups, 5.17% of pairs do not, and over 28% of pairs have only one member who makes regular medical visits. A significant correlation exists between the

regular visits to the dentist and doctor ( $\bar{x}=29$ ), and for siblings attending regular and preventive visits to physicians ( $\bar{x}=20$ ).

#### Health Status

Subjects rated their overall health status as compared to other people their age. They were also asked whether a physician had ever told them they had diabetes and/or high blood pressure. Subjects reported whether they were taking medication for their blood pressure.

Parent-Offspring. Over 95% of the both parents and offspring reported their health as at least moderately to very good. Only 5% reported their health to be poor. Thirty-three percent of the parent generation have high blood pressure with 27% taking medication for the condition. Only 15% of the offspring have high blood pressure with only 6% taking blood-pressure medications. Concordance for high blood pressure showed 6.6% of pairs have the condition, 57.83% do not, and 35.48% have one member of the pair with high blood pressure. Diabetes had a very low rate of prevalence in this sample, with only 8% of the parents and 2% of their offspring reporting this condition.

A significant correlation was noted for high blood pressure between parents and adult offspring ( $\bar{x}=18$ ). Interestingly, the correlation for taking blood-pressure medications was even higher ( $\bar{x}=21$ ).

Sibling Pairs. For sibling pairs, 96% reported their health as at least moderately to very good. Less than 4% reported their health

to be poor. Twenty-eight percent of the longitudinal siblings have high blood pressure and 18% take medication. Twenty-six percent of their siblings have high blood pressure with only 16% taking blood-pressure medications. Concordance was higher for siblings than for parent-offspring pairs. There were 12.64% of the sibling pairs who have high blood pressure, 57.99% who do not, and 29.37% discordant pairs. Diabetes had a very low rate of prevalence in this sample, 3% and 4% siblings respectively.

#### Exercise

Subjects were asked to report the number of hours of exercise they perform in an average week (not counting job or housework activities). A second question asked how many different times in the past 7 days they had exercised or played sports in order to keep in shape or for fun (not counting job or housework activities).

Parents-Offspring. Parents reported exercising 3.6 hours per week, and an average of 2.8 days per week. Their adult offspring report an average of 2.8 hours per week and exercise on average, 2.4 days per week. Correlations were not significant for either exercise variable.

Sibling Pairs. Longitudinal siblings reported exercising 3.42 hours per week, and an average of 2.7 days per week. Their siblings report an average of 3.22 hours per week and exercise on average, 2.8 days per week. Correlations were not significant for either exercise variable.



#### Discussion

Results from this study support previous work on concordance of health behaviors between parents and their young offspring, and for younger sibling pairs. Measures of body mass correspond well into late life, which is to be expected. Smoking behaviors were similar for parents-offspring pairs and for adult siblings though the correlations were low. Concordance rates were high for current smoking status with most subjects reporting that they do not smoke. Using an ever-smoke status provides a greater degree of discrepancy or disagreement in paired responses for both the parent-offspring and sibling pairs.

Alcohol consumption was fairly consistent for both parent-offspring and sibling pairs. Over one third of each group reports drinking between 2 to 3 days per week up to daily use, a surprisingly high percentage. Concordance was also higher than expected, with almost 45% of the parent-offspring pairs reporting similar frequency of alcohol use and over 50% of sibling pairs having similar frequency of drinking behavior. Results are quite consistent across the sample, as a slightly higher percentage of pairs of siblings report low frequency of use than for parent-offspring pairs (28% versus 26.6%). Surprisingly, the percentage of concordant pairs in the high frequency category are almost identical for siblings and parent-offspring (12.86% versus 12.84%).

High blood pressure shows fairly low prevalence within this

sample, though a higher percentage of concordant pairs among siblings than for parent-offspring is noted. Considering the 28 year mean age difference between parent-offspring versus the few year difference and older average age of the sibling pairs, this finding is not surprising. The parent-offspring "average" age is 56.04 years, less than the 61.16 years for sibling pairs. Both parent-offspring and adult-sibling pairs appear to make regular medical and dental visits. A higher percentage of sibling pairs use medical services regularly than parent-offspring pairs. There is greater discordance noted for the parent-offspring pairs. For medical visits, over 40% of these pairs have only one member performing the behavior, while only 28% of the sibling pairs are discordant.

A consistent pattern is noted for the health behaviors observed. Studying concordance of these behaviors for parents and their adult offspring and for adult sibling pairs provided a useful method for understanding generational and cohort similarities and differences in the performance of health behaviors. Advanced modeling techniques using behavior genetic methods and latent factors would provide a more thorough understanding of the relationships observed in this data. Future studies should include these methods to better comprehend the nature of similarities of health behaviors within first-degree relatives.

## References

- Blaxter, M., & Paterson, E. (1982). Mothers and daughters: A three-generational study of health attitudes and behaviour. London: Heinemann Educational Books.
- Blaxter, M. (1990). Health and lifestyles. London: Tavistock/Routledge.
- Butcher, J. (1983). Socialization of adolescent girls into physical activity. Adolescence, 18, 753-766.
- Greendorfer, S. L. (1983). Shaping the female athlete: The impact of the family. In M. Boutslier & L. San Giovanni (Eds.), The sporting woman (pp. 135-155). Champaign, IL: Human Kinetics Publishers.
- Gribbin, K., Schaie, K. W., & Parham, I. A. (1980). Complexity of life style and maintenance of intellectual abilities. Journal of Social Issues, 36, 47-61.
- Maier, H. (1995). Health behaviors in adults: Interrelationships and correlates. Unpublished doctoral dissertation, Pennsylvania State University, University Park.
- Pratt, L. (1976). Family structure and effective health behavior: The energized family. Boston: Houghton Mifflin.
- Rosow, I. & Rise, J. (1994). Concordance of parental and adolescent health behaviors. Social Science and Medicine, 38, 1299-1305.

- Sallis, J. F. & Nader, P. R. (1988). Family determinants of health behaviors. In D. S. Gochman (Ed.), Health behavior: Emerging research perspectives (pp. 107-123). New York: Plenum Press.
- Schaie, K. W. (1995). Intellectual development in adulthood. New York: Cambridge University Press.
- Stafleu, A., Van Staveren, W. A., De Graaf, C., Burema, J. & Hautvast, J.G.A.J. (1994). Family resemblance in energy, fat, and cholesterol intake: A study among three generations of women. Preventive Medicine, 23, 474-480.