The Relationship Between Perceived Social Support and Health Outcome in the Seattle Longitudinal Study

Hayden B. Bosworth & K. Warner Schaie

The Pennsylvania State University

Department of Human Development and Family Studies

August 9, 1995

Running Head: SOCIAL SUPPORT AND HEALTH OUTCOMES

AUTHOR'S NOTE: This research is supported by Grant R37 AG08055 to the second author and partial support for the preparation of this manuscript was from an institutional grant, Grant T32 MH18904-07 to the first author. The authors gratefully acknowledge the members and staff of the Group Health Cooperative of Puget Sound for their enthusiastic collaboration. The authors acknowledge Robert C. Intrieri and Rebecca Essinger for earlier comments on this paper. We also thank Anna Shuey for her help in preparing this manuscript.

Address correspondence regarding this paper to Hayden B. Bosworth, Department of Human Development and Family Studies, 115 Henderson Building South, The Pennsylvania State University, University Park, PA 16802. (814) 863-3972.

Abstract

This cross-sectional study examined the impact of perceived social support on health outcomes and cost utilization over a 1-year period in a community sample of Seattle Longitudinal Study (SLS) participants (N=387; 173 Males, 214 Females). Cluster analysis was used to group individuals based upon characteristics of their perceived social support to test whether cluster groups differed across sociodemographic factors, health outcome and health care utilization . Cluster analysis of subjects on a revised version of the Moos Scale revealed significant differences between cluster membership and sociodemographic variables, estimated outpatient costs and number of disease episodes. In addition, gender by cluster membership interactions were found for total health care costs, and number of medications used. Members of the cluster group with the lowest social support had greater health problems and tended to be more disadvantaged (i.e., lower levels of education and income).

The Relationship Between Perceived Social Support and Health Outcome in the Seattle Longitudinal Study

Social support has been credited with reducing the impact of many health problems (Berkman & Syme, 1979; Wallston, Alagna, DeVellis, & DeVellis, 1983). Since the rates of disease and disability increase in older adults, social support is important for this segment of our population. Social ties, aid, and support become critical factors in the maintenance of older individuals' independence. In addition, social relationships play an important role in older adults maintenance of mental health, and physical well-being by acting as a buffer for stressful life experiences. A better understanding of this relationship between social support and health outcome may insure the maintenance of one's independence through old age.

Perceived social support me

addition to physical health while more objective measures (i.e., physicians' ratings of health or symptom checklist) are only related to physical health (Hooker & Siegler, 1992; Rosencranz & Pihlblad, 1970).

Physical health measures which overlap with measures of psychological functioning may be biased in favor of demonstrating an exaggeration of the relationship between social support and physical health (Schaefer, Coyne, & Lazarus, 1981). Thus, social support may share a higher correlation with subjective health measures than objective ones since the latter may not be empirically distinct from other measures of psychological health (i.e., well-being, life satisfaction, morale, happiness). Nevertheless, there has been a tendency to equate subjective judgement of health with objective health which can be problematic.

This study examined the association between social relationships (operationalized in terms of perceived quality) and health outcomes and utilization for community residing adults across the life-span. Health outcome and utilization refer to the dependent variables which included number of hospital visits, disease episodes and medications used. Additional variables included the estimation of total health care costs, outpatient costs, and number of primary care visits.

Cluster analysis was used to create typologies of individuals based upon the characteristics of their perceived social support and the relationship between these typologies and health outcome were examined. Cluster analysis, unlike analytical techniques based on covariance matrices, is not a variable-oriented approach, but rather, a subject- oriented approach. It differs from other methods of classification, such as discriminant function analysis in that in

cluster analysis, the number of characteristics of the groups are to be derived from the data and are not usually known prior to the analysis.

This study had two primary goals: First, we wished to understand how factors such as social relationship relate to health in the middle to later years. This relationship is important since the elderly are at highest risk for nearly all morbidity and mortality events (Seeman, Kaplan, Knudsen, Cohen, & Guralnik, 1987). Second, we examined the association of social support and morbidity; relatively few previous studies of social support and health have addressed dependent health measures other than mortality. In addition, this study examined how an often underutilized analytical technique (subject-orientated approach) may contribute information to the broader question of the relationship between social support and health. It was hypothesized that individuals who have relatively low levels of social support will be at the lower end of the socioeconomic stratum and experience more health problems and expenses relative to those with higher levels of social support.

METHOD

Participants

The Seattle Longitudinal Study has collected data from more than 5,000 participants between the ages of 22 and 95. Subjects were selected randomly from within gender and age/cohort groups from membership of a large Health Maintenance Organization (HMO) in the Seattle, Washington, area. The sampling frame was a community dwelling population representing a wide variety of occupational, educational. and economic backgrounds (for detailed

discussion of the SLS see Schaie 1994, 1995). Individuals were selected from the larger Seattle Longitudinal Study sample if they had medical history data through 1991.

The study sample included 173 males and 214 females (N=387) with a mean age of 58.28 years (range 36-82 years) at the time of testing in 1991. The sample represented a wide variety of educational (M=14.50 years, SD=2.81) and income levels ($32,600, SD=7,580) (see Table 1).

Insert Table 1 about here

Measures

The Life Complexity Inventory (LCI) - Various demographic and personal information were extracted from the Life Complexity Index (LCI) survey of background characteristics (see Gribbin, Schaie, & Parham, 1980; Schaie, 1995 for greater detail). Information from the LCI included subject's age, occupation, family income, and education.

Perceived Social Support Measures - Moos and Moos (1986) constructed a 90-item true-and-false Family Environment Scale which measured 10 different dimensions of family life. Each dimension is comprised of 9 items. Three dimensions describe relationships, 5 relate to growth, and 2 describe system maintenance and change dimensions. The sub-scales comprise an assessment instrument that examines perceived environmental context of adaptation (Moos, 1985; Moos, 1987). Schaie and Willis (1995) modified 8 of these sub-scales by selecting 5 items per scale and changing the response format to a Likert form: (1=Strongly Disagree; 2=Somewhat

Disagree; 3=In Between; 4=Somewhat Agree; and 5= Strongly Agree). Only six of the eight dimensions were included in this study. Individuals were asked what their perceived support was with respect to their present family environment (Appendix A).

Health Outcome Measures - Complete medical histories were available over the course of the study because of our participants' membership in a Seattle area Health Maintenance Organization. Health outcome variables that included number of physician visits, and number of disease episodes were recorded over a one year period of time (1991). Disease episodes refer to the unique manifestations of a particular diagnosis. Participants reported the number of medications they used regularly for at least one month prior to the study.

Medical technicians abstracted the medical data for each individual and organized it according to the diagnosis made by physicians at each clinic visit (Parham, Gribbin, Hertzog, & Schaie, 1978). The medical data were then coded using the International Classification of Diseases (ICDA, eighth revision, USPHS, 1968). Inter-rater reliabilities for coded medical histories in earlier studies on this sample have ranged from .93 to .99 (Hertzog, Schaie, & Gribbin, 1978).

Estimated total care costs, outpatient costs, and number of primary care visits for 1991 were estimated based upon Chronic Disease Score (CDS). The CDS was based on empirically derived weights based on age, gender, and pharmacy utilization of the HMO's pharmacies. These weights were then used to calculate a predicted score for total care costs, outpatient costs, and primary care visits (Clark, Von Korff, Saunders, Baluch, & Simon, 1994).

ANALYSES

Cluster Analysis

The group average agglomerative method with cosine similarity measures was used to cluster individuals on the six sub-scales of the revised Moos scale. Group average is an agglomerative method which begins with N clusters (i.e. each observation constitutes its own cluster. In successive steps, this agglomerative method combines the two closest clusters, thus reducing the number of clusters by one in each step). Group average is defined as a group of entities in which each member has a greater mean similarity with all members of the same cluster than it does with all members of any other cluster (Blashfield, 1976).

Similarity indices used in cluster analysis guides cluster formation. Objects are represented as points in multidimensional space such that observed dissimilarities between objects correspond to the metric distance between the respective points. Cosine coefficient is an example of a similarity measure and was chosen for this analysis because this similarity index accounts for the shape, scatter, and elevation of the profiles (Cronbach, & Gleser, 1953).

RESULTS

The means and standard deviations for the number of disease episodes, number of doctor visits, number of medications used, as well as the estimated yearly health care costs, outpatient costs, and primary care visits for 1991 are shown in Table 2.

Insert table 2 about here

Cluster Analysis

The results will be presented for each analyses in the following order: the determination of the number of clusters, a description of the cluster groups, and finally, the relationship between these patterns and health outcome.

Determination of the Number of Clusters

Data were standardized by subtracting the mean and dividing by the standard deviation for each variable. Four clusters were retained using two retention criteria. The first was the use of Analyses of Variances to test the difference between the four cluster groups for each set of observed measures; there were significant differences for all variables tested. Post-hoc tests were then performed to determine which cluster groups differed significantly from each other on each of the clustered variables. Each cluster group was differentiated from every other one, except for Intellectual-Culture Orientation which did not distinguish any two of the four groups.

The final method used to determine the number of clusters is called the agglomeration schedule. The agglomeration schedule displays the order in which and the distances at which items and clusters combine to form new clusters. Using the agglomeration schedule, four cluster groups for perceived social support were able to differentiate participants in a unique but parsimonious way (see Figure 1).

Insert Figure 1 about here

---.

Description of Cluster Groups

The four clusters did not differ significantly across age; however, cluster 3 was the oldest cluster (M=60), followed by cluster 2 (M=59), cluster 1 (M=58) , and cluster 4 (M=57). Differences across education and income were assessed by 2(gender) by 4(cluster membership) Analyses of Covariance (ANCOVAs) with age covaried for both models. A mean difference for education across gender was found (F[1,378]=19.6, p<.001). Men had 15.12 years of education, on average, as opposed to women who had 14 years of education. Clusters also differed significantly on amount of education attained (F[3,378]=3.01, p<.03). Cluster 4 had M=14.94 years of education followed by, cluster 1 (M=14.74), cluster 2 (M=14.00), and finally cluster 3 (M=13.73). Men had higher incomes than women. In addition, subjects in cluster 4 had the highest income level (M=$29,620), followed by cluster 1 (M=$29,450), cluster 2 (M=$28,120) and finally cluster 3 (M=$22,900).

Group 1 (n=142) was the only group above the sample mean for all six domains. This group had the highest level of Intellectual-Culture and Active-Recreation Orientation and the second highest for Cohesion and Expressiveness. Group 2 (n=101) scored below the sample mean on all measures and overall did the worst on three of the six dimensions. Group 3 (n=22) represents a unique group because they were below the sample mean for four of the six measures and had consistently low scores on all measures except for Achievement Orientation. Group 4

(n=101) was above the sample mean for four of the six domains and had the highest level of Cohesion, Expressiveness, and lowest amount of Conflict (score was reversed). However, this group was below the sample average for Active-Recreation and Achievement.

The Relationship of Cluster Membership and Health Outcome and Utilization

To investigate the role of gender and cluster membership on perceived social support, a series of 2(gender) by 4(cluster membership) Analyses of Covariance (ANCOVA) were performed with age covaried for each dependent variable. Age was controlled for because it is significantly related to health outcomes; chronic illness and disability become more prevalent with increased age (Revenson, 1986).

Gender Differences Among the Dependent Variables

There were gender differences for a number of medications used; women used more medications (M=2.00) than males (M=1.69). In addition, women were likely to experience more disease episodes (M=4.58) and more primary care visits (M=3.71) as compared to men (M=3.97) and (M=3.49), respectively.

Cluster Membership Differences Among the Dependent Variables

There was a significant difference among clusters for disease episodes. Cluster 3 had the most (M=6.13), followed by cluster 2 (M=4.46) cluster 4 (M=4.28) and finally cluster 1 (M=3.92). There was also a significant trend for outpatient costs. Again, we saw the same

pattern for disease episodes as for outpatient costs (M=4.41, 3.67, 3.55, 3.48), respectively, cluster 3, and cluster 2, cluster 4, and cluster 1.

Gender and Cluster Membership Interaction

An interaction was found for health care costs ($F[3,378]=2.17$, $p<.09$); men in cluster 1 and 4 had higher expenses relative to women members of the same cluster, whereas women in cluster 2 and 3 had more expenses than men (see figure 2). An interaction was also found for number of medications used ($F[3,378]=3.56$, $p<.01$); women in cluster 1 and 2 used more medications relative to men of the same clusters while men in cluster 4 used more medications than women. Men and women in cluster 3 used the same amount of medications; however, the amount surpassed any other group (see figure 3).

Insert Figures 2 & 3 about here

Discussion

Cluster membership was found to be related to health outcome and utilization. Cluster groups 2 and 3 had the lowest levels of education and income, as well as increased age, highest number of disease episodes, and highest estimated outpatient costs. Group 3 was particularly interesting in that its members had higher rates of negative health outcomes and health service utilizations. However, because there were fewer individuals in this group (n=22) power was lacking to significantly differentiate this group from the others on the remaining health variables.

It is possible that Intellectual-Cultural and Active-Recreational Orientation represent indirect assessments of activity and involvement. Consequently this group may be more isolated than the rest of the sample and/or their disorders are preventing them from interacting with others. It is also possible that these individuals are at a greater risk of mortality. Cluster groups three and four had the highest levels of Cohesion and Expressiveness and had the least amount of health problems. Subsequently, perceived cohesiveness in one's family and freedom to express oneself may insure a supportive social network which moderates stress.

The gender differences in this study were also similar of previous studies. Women are more likely to seek medical attention than men. Women accounted for about 60% of all medical office visits (U.S. Department of Health & Human Services, 1991). In addition, women are more likely to use more medications than men (Bosworth & Schaie, 1995; Chrischilles, Foley, Wallace, Lemke, Semla, Hanlon, Glynn, Ostfeld, & Guralnik, 1992). Additionally, women are more likely to have certain types of illnesses, problems, and conditions that are amenable to drug therapy (e.g., urinary tract infections and menopause)(Lipton & Lee, 1988).

A dilemma confounding much research on social support and health outcomes centers on the direction of causality. A negative association between social support and subsequent morbidity and mortality is usually interpreted as support for the protective impact of social support. However, Berkman (1986) points out that a decrease in social ties may be a consequence and not a cause of illness. A negative coefficient between social support and health can reflect the inability of the sick to maintain social roles and relationships (Forster & Stoller, 1992). Another consideration is that social support, like health, is dynamic; it is always changing

as resources and environment continue to change. Hence, it would be important to determine how likely the cluster groups we identified will remain invariant.

In summary, the structural differences in the patterns of social support illustrate the importance of multidimensional assessment. These social support measures differentiated individuals on observed demographic and health outcome variables. There were distinct patterns of individuals who lacked social support and had an increased likelihood of having medical problems and more medical expenses.

The results of this study demonstrate that there are some benefits to examining patterns among individuals as opposed to relying upon patterns across variables. Typologies of support patterns may be particularly useful for gerontological research since older adults are quite differentiated and non-linear analytical approaches allow researchers to treat groups as heterogenous.

References

Berkman, L.F., & Syme, S.L. (1979). Social networks, host resistance, and mortality: A nine-year follow-up study of Alameda county residents. *American Journal of Epidemiology, 109,* 186-204.

Berkman, L.F. (1986). Social Networks, support, and health: Taking the next step forward. *American Journal of Epidemiology, 123,* 559-562.

Blashfield, R. (1976). Mixture models tests of cluster analysis accuracy of four agglomerative hierarchical models. *Psychological Bulletin, 83,* 377-388.

Bosworth, H.B., & Schaie, K.W. (1995). *Medication use and perceived therapeutic purpose of medication across the life-span in the Seattle Longitudinal Study.* Presented at the 107th American Psychological Association conference, New York, NY.

Bowling, A., & Farquhar, M. (1991). Associations with social networks, social support, health status and psychiatric morbidity in three samples of elderly people. *Social Psychiatry and Psychiatric Epidemiology, 26,* 115-126.

Chrischilles, E.A., Foley, D.J., Wallace, R.B., Lemke, J.H., Semla, T.P., Hanlon, J.J., Glynn, R.J., Ostfeld, A.M., & Guralnik, J.M. (1992). Use of medications by persons 65 and over: Data from established populations for epidemiological studies of the elderly. *Journal of Gerontology, 47,* M137-M144.

Clark, D.O., Von Korff, M., Saunders, K., Baluch, W.M. & Simon, G.E. (1994) A chronic disease score with empirically derived weights. Unpublished manuscript.

Cohen, S., & Syme, S.L. (1985). Issues in the study and adaption of social support. In S. Cohen & S.L. Syme (Ed.), *Social support and health* (pp. 3-22). New York: Academic Press.

Cronbach, L., & Gleser, G. (1953). Assessing similarity between profiles. *Psychological Bulletin, 50,* 456-473.

Forster, L.E., & Stoller, E.P. (1992). The impact of social support on mortality: A seven-year follow-up of older men and women. *Journal of Applied Gerontology, 11,* 173-186.

Hertzog, C., Schaie, K.W., & Gribbin, K. (1978). Cardiovascular disease and changes in intellectual functioning from middle to old age. *Journal of Gerontology, 33,* 872-883.

Hooker, K., & Siegler, I.C. (1992). Separating apples from oranges in health ratings: Perceived health includes psychological well-being. *Behavior, Health, and Aging,2,* 81-92.

House, J.S., & Kahn, R.L. (1985). Measures and concepts of social support. In S. Cohen & S.L. Syme (Eds.), *Social support and health* (pp.83-108). New York: Academic Press.

Lipton, H.L., & Lee, P.R. (1988). *Drugs, and the elderly: Clinical, social, and policy perspectives.* Stanford, CA: Stanford University Press.

Moos, R.H. (1985). Context and coping: Toward a unifying conceptual framework. *American Journal of Community Psychology, 12,* 5-25.

Moos, R.H. (1987). *The social climate scales: A user's guide.* Palo Alto, CA: Consulting Psychologists Press.

Moos, R.H., & Moos, B.S. (1986). *Family Environment Scale Manual.* (2nd ed.), Palo Alto, CA: Consulting Psychologists Press.

Parham, I.A., Gribbin, K., Hertzog, C., & Schaie, K.W. (1975). *Health status change by age and implications for adult cognitive change.* Paper presented at the 10th annual International Congress of Gerontology, Jerusalem, Israel.

Revenson, T.A. (1986). Debunking the myth of loneliness in late life. In E.Seidman, & J. Rappaport (Eds.), *Redefining social problems* (pp. 115-135). New York: Plenum.

Rosencraz, H., & Pihlblad, T. (1970). Measuring the health of the elderly. *Journal of Gerontology, 25,* 129-138.

Schaefer, C., Coyne, J.C., & Lazarus, R.S. (1981). The health related functions of social support. *Journal of Behavioral Medicine, 4,* 381-406.

Schaie, K.W. (1994). The course of adult intellectual development. *American Psychologist, 49,* 304-313.

Schaie, K.W. (1995). *Adult intellectual development: The Seattle Longitudinal Study.* New York: Cambridge University.

Schaie, K.W. & Willis S.L. (1995). Perceived family environments across generations. In V.L. Bengston, K.W. Schaie, and L.Burton (Eds.), *Societal impact on aging: Intergenerational perspectives.* New York: Springer Publishing Co.

Seeman, T.E., Kaplan, G.A., Knudsen, L., Cohen R., & Guralnik, J. (1987). Social network ties and mortality among the elderly in the Alameda county study. *American Journal of Epidemiology, 126,* 714-723.

Throits, P. (1982). Conceptual, methodological, and theoretical problems in studying social support as a buffer against life stress. *Journal of Health and Social Behavior, 23,* 145-59.

U.S. Department of Health and Human Services (1991). *Advance data (1991) National Ambulatory Medical Care survey: 1989 summary.* DHHS pub. #(PHS) 91-1864. Hyattsville: MD.

Wallston, B.A., Alagna, S.W., DeVellis, B.M., DeVellis, R.F. (1983). Social support with many aspects of health and illness. *Health Psychology,2,* 367-391.

Table 1: Summary of Sociodemographic Indicators

N=387	Mean	Standard Deviations	Range
Age	58.28	11.28	36-84
Income	$28,600	7,580	$2000->$50.000
Education	14.50	2.81	7-20

Table 2: Means and Standard Deviations for Health Outcome and Medical Utilization for 1991

	Mean	Standard Deviation	Range
Total Health Care	$3203.43	$2270.06	$465-11,835
Outpatient Care Costs	$1450	$858.90	$383-6,076
Primary Care Visits	3.61	1.59	2-10
Hospital Visits	1.7	5.3	0-50
Disease Episodes	4.31	3.52	0-23
Medication Usage	1.86	2.01	0-11
Medical Utilization	9.52	11.76	0-134

Appendix A:
Modified Moos Scale

A. Cohesion (Relationship)
Example: "Family members really help and support one another."

B. Expressiveness (Relationship)
Example: "We tell each other about our personal problems."

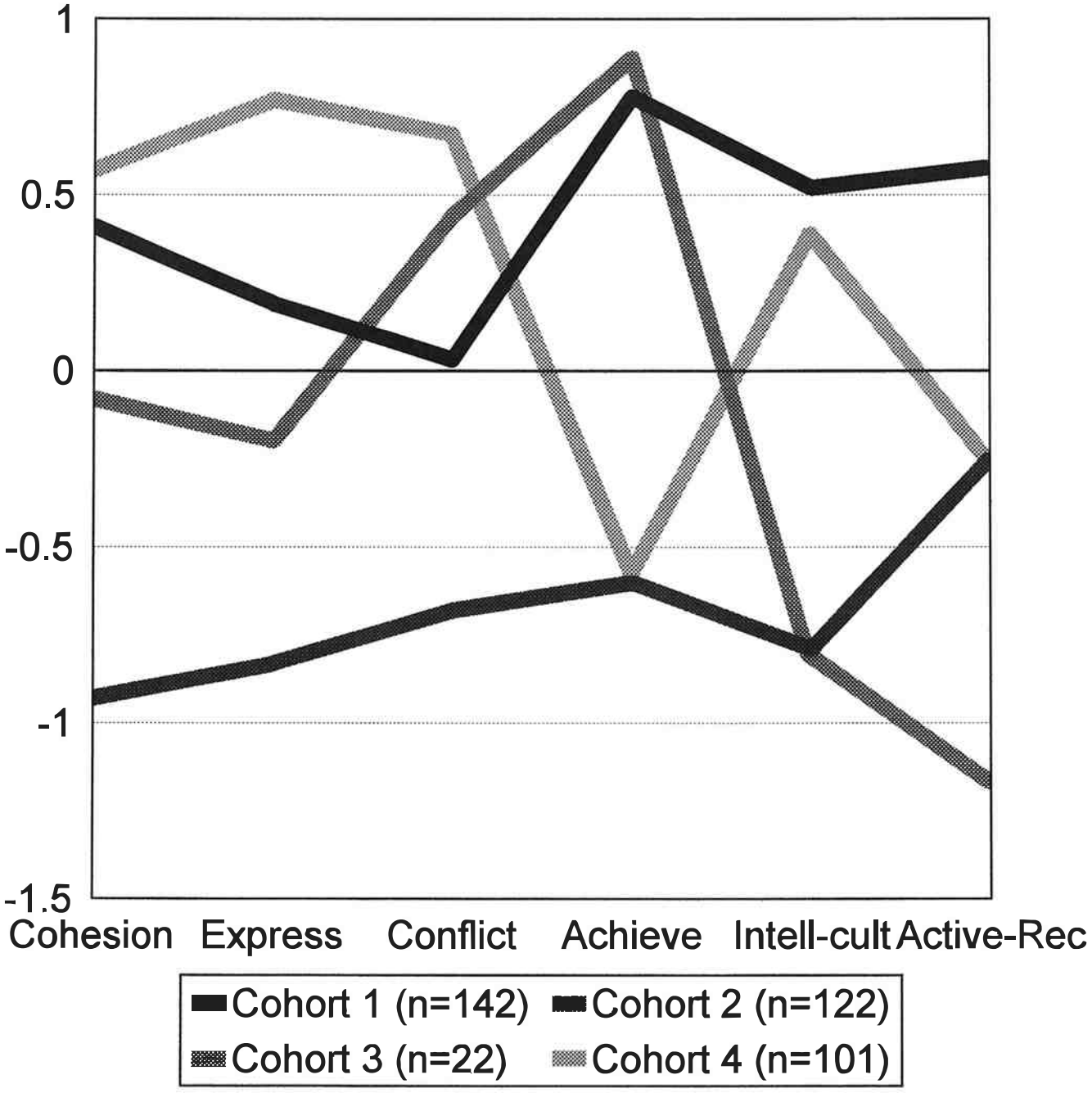
C. Conflict (Relationship)
Example: "Family members hardly ever lose their temper."

D. Achievement Orientation (Personal Growth)
Example: "We felt it is important to be the best at whatever we do."

E. Intellectual-Cultural Orientation (Personal Growth)
Example: "We often talk about politics and social problems."

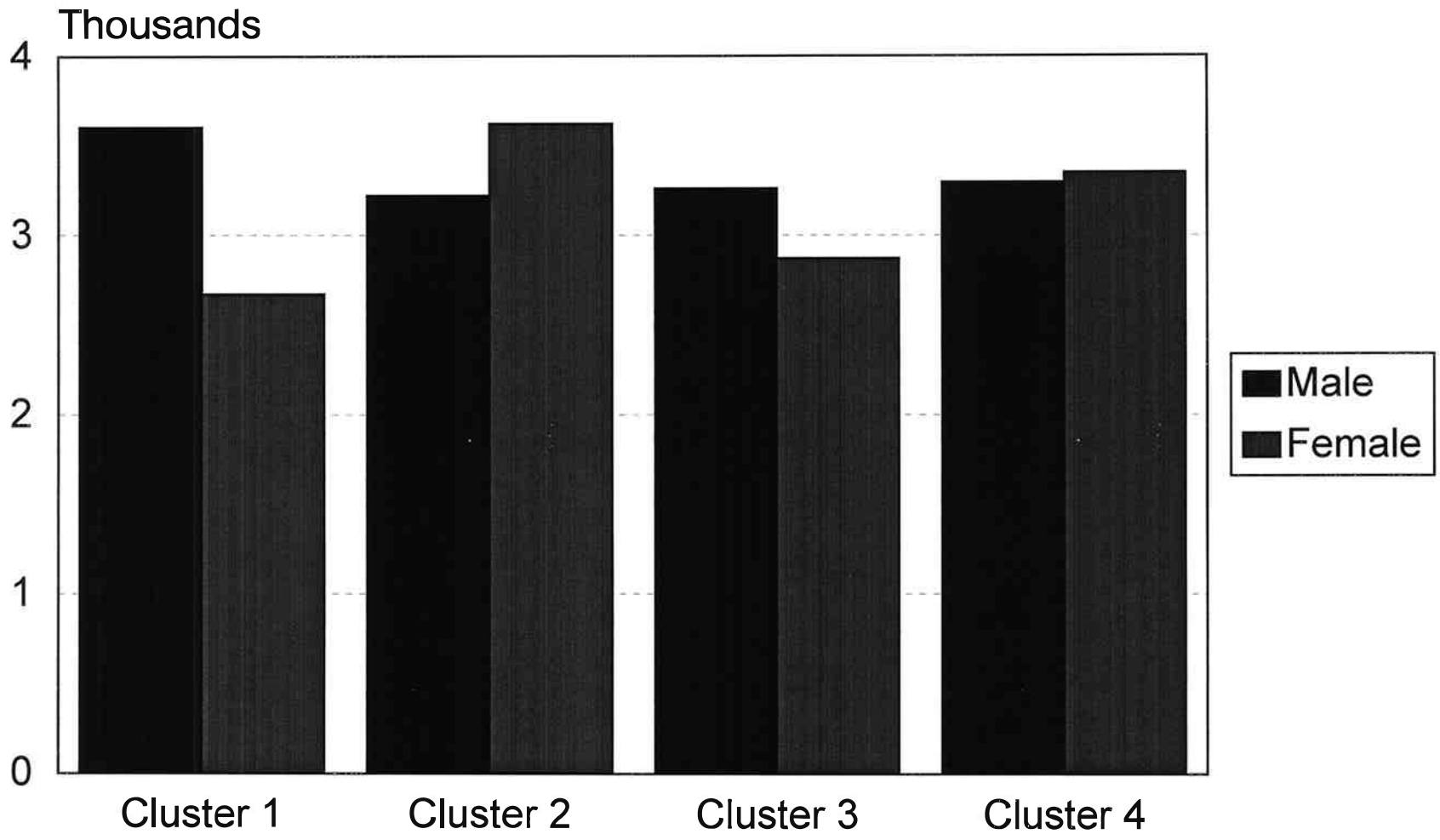
F. Active-Recreational Orientation (Personal Growth)
Example: "Friends often come over for dinner or to visit."

Cluster Profile for Perceived Social Support



Gender and Cluster Interaction for Estimated Health Care Costs

Structural Social Support



Gender and Cluster Interaction for Medication Usage

Perceived Social Support