Use of an Income-Equivalence Scale to Understand Age-Related Changes in Financial Strain

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Abstract

Income-equivalence scales (IES) provide distinct advantages over poverty indices to adjust family income for differences in family size, including improved specification of hypothesized causal relationships involving objective measures of economic well-being. In a novel IES application, cancer patients' out-of-pocket health costs are adjusted for differences in family income and size and, along with five other subindices, contribute to an overall index of "objective family financial stress." Age-related changes are modeled simultaneously within relationships between overall objective family financial stress and subjective patient perceptions about financial strain. Among the findings, the impact of age on one area of subjective financial strain, "difficulty paying bills," is negative and curvilinear. Regardless of adjusted out-of-pocket costs, as age advances, patients appear increasingly likely to accommodate to financial stress by reporting less difficulty paying bills. This phenomenon could serve to mask and isolate older adults who are foregoing needed yet unaffordable medical care and prescriptions.

The use of income-equivalence scales (IES) to adjust family income for differences in family size is described, with a novel application to derive out-of-pocket health costs that are adjusted for family income and family size. IES provide distinct advantages over the use of poverty indices. One important empirical advantage pertains to improved specification of hypothesized functional causal relationships involving objective measures of economic well-being.

Causal relationships involving social structural variables and measures of objective and subjective economic well-being will be our initial focus for discussion. This will lead to a discussion and derivation of IES, which are necessary to specify this causal relationship. Then, in a unique application of IES, out-of-pocket health costs incurred by patients with recurrent cancer are adjusted for differences in family size and income and will be incorporated into an even broader index of overall objective family financial stress. Finally, curvilinear and moderated relationships based on this overall index and adult patient age will be tested in simultaneous causal relationships to three measures, in addition to a latent construct, of "subjective patient financial strain."

Social Stratification as a Description of Accommodation

According to social stratification theory and empirical findings, the social structural features reflected by demographic variables such as sex, race, and age interact over time to reflect different degrees of restrictions or barriers over access to economic resources and opportunities. This results in greater barriers within groups that are older, female, and/or a minority (Becker, 1971; Blau, 1977; Blau & Duncan, 1967; Chiswick & O'Neill, 1977; Corcoran & Duncan, 1978; Duncan, 1968; Foner, 1975; Lloyd & Niemi, 1979; Moody, 1994; Riley, Johnson, & Foner, 1972). Disadvantaged groups are more likely to experience fixed economic situations due to these economic barriers, which are linked to restricted

opportunities in education, occupational advancement, and accumulation of private pensions and government transfers. Such cumulative disadvantages entrench these disadvantaged groups over time into the lower tiers of socioeconomic status (Crystal, 1996; Crystal, Shea, & Krishnaswami, 1992; Moody, 1994).

Although subject to changing economic conditions, cohorts of younger and middle-age adults tend to increase in economic status over time (Duncan, 1984, 1988), whereas the financial resources of elderly cohorts characteristically decline with age or time after retirement (Duncan, Hill, & Rodgers, 1987; Harris, 1986; Palmore, Fillenbaum, & George, 1984). Further, lower socioeconomic status over the life course reflects cumulative disadvantages in the acquisition of power, prestige, and wealth that persist through old age (Dowd, 1980; Henretta & Campbell, 1976). Within cohorts of older adults, relative income inequality continues to increase as age advances (Crystal, 1996; Crystal & Shea, 1990a; Crystal & Waehrer, 1996; Hedstrom & Ringen, 1990; Pampel & Hardy, 1994). Unmarried older women, for instance, may suffer due to earlier inequities generated from employment in low-wage industries, wage discrimination, interrupted employment, and divorce (O'Rand, 1983). An inverted U-curve of perceived social status or prestige across the lifespan was replicated on survey samples of students (Baker, 1985) and senior citizens (Graham & Baker, 1989); further, the surveyed students considered middle-age women to have significantly lower status than their middle-age male counterparts.

Social structural variables, such as age, and curvilinear forms and interactions of social structural variables may be conceptualized as indicators for the phenomenon of accommodation. Accommodation is reflected by differences in the strength of the relationship between objective and subjective measures of economic well-being among demographic groups (Campbell, Converse, & Rogers, 1976; Carp & Carp, 1982; Fletcher & Lorenz, 1985; Strumpel, 1974).

The hypothesis of accommodation predicts that those who experience fixed economic situations, like elders or those facing multiple deprivation, are more likely than others to hold minimizing perceptions about the importance of their economic situations to their overall well-being, thus accommodating to their objective economic situations (e.g., Brandstadter & Baltes-Gotz, 1990). Accommodation may be reflected in more positive responses to subjective measures of economic well-being despite a lack of commensurate improvement in objective economic conditions, resulting in a weakened linear relationship between objective and subjective economic well-being. Thus, accommodation may be conceptualized as a generalized coping response, and it may be explained, for instance, by theoretical perspectives such as personal competence and situational deprivation, relative deprivation, adaptation-level processes, and stressful life event-chronic strain relationships.

Evidence suggests that elders accommodate to their financial situations to a greater extent than younger adults. Carp and Carp (1982) provide evidence that, compared to younger adults, the elderly perceive greater equity in their fixed economic situations, which clarifies previous findings by Campbell et al. (1976) that the elderly often report high financial satisfaction even when they fail to reach their financial aspirations. The elderly appear to be satisfied with maintenance of their economic position relative to others in their age cohorts (Henretta & Campbell, 1976).

However, recent longitudinal data on separate cohorts in later-life do not support this status maintenance perspective but rather reveal turnover in relative position over time. It is not yet understood which subgroups of older adults tend to change in relative position. Still, evidence of a widening income-inequality gap with advancing age may support the perspective of social stratification, even if this is not rigidly maintained (Crystal & Waehrer, 1996).

Younger adults may accommodate less due to their higher aspirations that may be fueled by a greater sense of recent achievements (Campbell et al., 1976; Carp & Carp, 1982; Henretta & Campbell, 1976). Based on a national sample of nonelderly married couples, Mirowsky (1987) demonstrates that the relationship between levels of pay and perceived underpayment changes as income rises. At lower income levels, responses are based on the pay needed to "get along;" however, as incomes rise, responses increasingly reflect the pay needed to "get ahead."

Other theoretical perspectives argue that the influence of social stratification as a reflection of accommodation may operate through the internalization by individuals of societal prejudices such as ageism, racism, and sexism that promote discrimination and disadvantage (Moody, 1994).

Evidence for a Social Stratification Perspective

Several studies explore the causal relationship between objective and subjective measures of economic well-being (Duncan, 1975; Easterlin, 1974; Fletcher & Lorenz, 1985; George & Landerman, 1984; Liang & Fairchild, 1979; Vaughan & Lancaster, 1980, 1981; Strumpel, 1974; Vaughan, 1985; Yuchtman-Yaar, 1976). However, only four of these studies test and provide evidence that the overall relationship between income and financial satisfaction may either be curvilinear or moderated (Fletcher & Lorenz, 1985; Vaughan, 1985; Vaughan & Lancaster, 1980, 1981). Logarithmic transformations of the family size and income variables are employed in the last three of these four studies (Vaughan, 1985; Vaughan & Lancaster, 1980, 1981) to account for some of the curvilinearity within the main-effects regressions,[1] although moderator effects remain untested; conversely, the Fletcher and Lorenz (1985) study neglects curvilinear effects while testing for moderation. The estimates of the strength of the relationship between income and financial satisfaction in the remaining studies may especially be attenuated due to neglect of curvilinearity *and* moderation.

Only Fletcher and Lorenz (1985) assess the moderator effects of age, race, and sex as well as higher order moderator effects of age-race-sex social subgroups on this relationship. These moderator effects allow for better descriptions and more valid reflections of the hypothesized social stratification perspective in comparison to main-effects insights, which may even be misleading when higher order effects are plausible.

For instance, in the Fletcher and Lorenz (1985) study, Blacks and nonelderly adults report lower subjective economic well-being (a single measure of financial satisfaction), whereas the main-effect of sex is not statistically significant. It appears that with increasing age, respondents report higher subjective economic well-being controlling for objective economic well-being. However, in the absence of simultaneous testing for higher order curvilinear and moderator effects of age, it would be unclear whether this main-effect trend is linear across the age range, curvilinear with increasing age, and/or increasingly magnified or diminished across the age range at different levels of objective economic well-being. It should be noted that although the study does test for moderation by age, it neglects age curvilinearity.

Fletcher and Lorenz (1985) apply ANOVA to the large annual national probability samples (each with about 1,500 respondents) that make up the General Social Surveys from 1972-1978 and in 1980. Their study supports the hypothesis that the linear relationship between objective

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[1]Dubnoff and Vaughan (1981) use a natural logarithm transformation of income to reflect the extensive evidence that the marginal satisfaction with income diminishes as income rises. Vaughan (1985) uses the same natural logarithm transformation of income as well as a natural logarithm transformation of family size. The latter natural logarithm transformation reflects that there is a smaller increment in utility or satisfaction with a given level of income as family size increases. The log transformations of both variables serve to improve the fit (R^2) of the regression equations.

economic well-being (total family annual income) and subjective economic well-being (a single measure of financial satisfaction) is weakest among the oldest age group (54 and older) compared to the two younger age groups. This is detected at a statistical significance level of $p = .01$ (interaction of age and objective economic well-being).

Because Fletcher and Lorenz (1985) categorized age and used ANOVA rather than treating age as a continuous variable within multiple regression, the curvilinear effect of age (i.e., age^2) could not simultaneously be tested. Furthermore, if the intercorrelation between mean-centered measures of age and income exceeds .40 and the reliability of the predictors is less than .70, the interaction of age and objective economic well-being could be spurious. The true effect might be the curvilinear impact of age represented by an age^2 term (see MacCallum and Mar, 1995, for an explanation). Nevertheless, in eithercase, the accommodation hypothesis—the tendency to accommodate increasingly with age—would still be supported.

Similar support is not found for the moderating effects of sex or race. However, the ranking of regression slopes from separate analyses for each of the 12 age-sex-race subgroups reveals the following:

1. Four of the six subgroups with the weakest coefficients include the oldest age group.

2. Similar ranking patterns are found (with one exception) for the sex and race subgroups as one advances from the youngest through the oldest age categories.

These rankings are stable over time.

Fletcher and Lorenz (1985) conclude that these distinctive patterns support the accommodation hypothesis that subgroups that are older, female, and/or non-White demonstrate a weaker linear relationship between income and financial satisfaction. Note that these conclusions are valid even though the main effect of sex is insignificant and the main effect of race reveals that Blacks report lower subjective economic well-being, controlling for objective economic well-being.

Age appears to be more robust than sex or race because it is a significant second-order moderator and behaves as expected within the rankings of the third-order b-coefficients representing the age*sex*race subgroups. Only in the rankings of the third-order b-coefficients representing age*sex*race subgroups do sex and race appear to have substantive influence as moderators.

A plausible explanation why the main effects and moderator effects attributed to sex are statistically insignificant is that marriage and living with others each may complicate the role of sex. Financial needs, the impacts of financial inadequacy, and financial dependency may be greater (and not less) for elders who live with others (Waehrer & Crystal, 1995). This implies that living with others constitutes a situational deprivation vulnerability to incur financial strain even if living alone contributes to situational deprivation for incurring financial stress (Dean, Kolody, Wood, & Matt, 1992). For respondents who are not married or who live alone, sex signifies current and future perceptions of their own financial stress and strain. However, for respondents who are married or live with others, financial stress and strain incurred by others

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[2]In descending order, the three lowest rankings of regression slopes were the oldest categories for White females, Black females (closely tied with White females), and Black males. One reason for this ranking pattern may be that older women of either race are more likely to be widowed than older men. Therefore, older Black males might perceive higher financial inadequacy and financial strain as a result of being married, even if older Black females have lower incomes.

A related reason that the moderating effects of sex or race were not statistically significant in the initial ANOVA of the entire sample data appears to be that sex and race moderate only within specific subgroup contexts involving age, race, and sex. It is possible that Fletcher and Lorenz (1986) did not expand their initial ANOVA of the entire sample data to model age-race-sex subgroup contexts due to estimation problems in testing a fourth-order interaction (age*race*sex*income) along with all lower order derivative terms.

in the household are also likely to be reflected in many cases. It appears that marital state and household size might be more robust moderators (or more robust predictors of income adequacy) than sex, which may be confounded with each of these variables when they are not also included as predictors, as in the Fletcher and Lorenz (1985) study.[2]

Fletcher and Lorenz (1985) fail to discuss the weakness that objective economic well-being (total family annual income) is not adjusted to reflect family size. The two younger age groups of respondents (ages 18-33 and 34-53) are more likely to have dependent children living at home (resulting in a family size adjustment that would reduce total family income). As a result, the strength of the relationship between objective economic well-being (total family annual income) and subjective economic well-being (financial satisfaction) in the two younger age groups may be overstated. However, this confounding weakness may be offset to the extent that the oldest age category reflects retirees living on fixed incomes (i.e., low objective economic well-being) who, nonetheless, report disproportionately high subjective economic well-being. Thus, it is unclear whether a family size adjustment would significantly weaken the moderator effect of age. As discussed in the next section, total family income can be adjusted to reflect family size through the use of a specific exponential value that was derived to reflect a family IES.

Family IES Based on Attitudinal Survey Data: A Derivation and Explanation

Dubnoff and Vaughan (1981), Vaughan (1985), and Bradbury (1989) discuss very similar models for the derivation of the specific exponential value that are based on attitudinal questions concerning the family's own income, standard of living, or both. (This approach is in contrast to one that queries respondents to rate the adequacy of income per se for described hypothetical families of various sizes). Dubnoff and Vaughan (1981) state,

> By regressing (satisfaction with current income and standard of living) on income and a difference in circumstances, such as family size, we can use the resulting coefficients to find the level of income at which individuals in different circumstances will achieve the same level of satisfaction or utility. We thus produce a true cost of living index. (p. 348)

The IES version of Vaughan (1985) requires the specification of two separate regression equations (one for families with four members, the other for all other families) in which income satisfaction is regressed on income, family size, and important covariates. Dubnoff and Vaughan (1981) list the important covariates of region, age of household head, perceived change in financial position over the previous year and over 2 years, life-cycle stage, retirement status, housing ownership, and receipt of various types of in-kind income.

Here, a simplified illustration of the derivation of a family IES based on attitudinal survey data that excludes control variables will be adopted from Vaughan (1985) (who subsequently derives a comprehensive formulation that includes all covariates).

Income satisfaction by families of all sizes except four family members (S_i) can be regressed on family size (FS_i) and income (Y_i):[1]

$$S_i = b_0 + b_1 \ln(FS_i) + b_2 \ln(Y_i) + e \tag{1}$$

Similarly, income satisfaction by families with four members (S_4) can be regressed on family size (FS_4) and income (Y_4):

$$S_4 = b_0 + b_1 \ln(FS_4) + b_2 \ln(Y_4) + e \tag{2}$$

Equating both equations such that $S_i = S_4$ yields:

$$b_0 + b_1 \ln(FS_i) + b_2 \ln(Y_i) + e = b_0 + b_1 \ln(FS_4) + b_2 \ln(Y_4) + e \tag{3}$$

This equation can be solved for Y_i/Y_4 (where $S_i = S_4$). This reveals the ratios of income where families of size i are as satisfied with their incomes as are families of size four. Thus,

$$(Y_i/Y_4) = (FS_4/FS_i)^{b1/b2} \tag{4}$$

Equivalently,

$$Y_i/(FS_i)^{b2/b1} = Y_4/(FS_4)^{b2/b1} \tag{5}$$

Thus, the exponential value *(b2/b1)* makes up the family IES.

Note that income alone *(Y_i)* may be an inadequate measure of poverty, defined as low consumption, because some people with adequate incomes may still entail deprivation in consumption whereas many low-income people may not (Callan, Nolan, & Whelan, 1993; Ringen, 1987, 1988). Whelan (1992) and Beverly (2001) argue that although the literature concerning economic hardship strongly focuses on the effect of income, it has tended to neglect measures of poverty or deprivation, such as income adequacy.

Through the simple application of an IES, income can be converted into a measure of income adequacy that reflects family size and mediates income and financial satisfaction. Specifically, the U.S. IES equals income divided by a denominator composed of family size raised to the .38 power (Buhmann, Rainwater, Schmaus, & Smeeding, 1988; Leclere, Jensen, & Biddlecom, 1994). Leclere et al. (1994) provide an empirical application of the U.S. IES to specify relative objective financial stress. Francoeur (manuscript under review) adjusts out-of-pocket costs using the U.S. IES to understand diverging perceptions of financial strain within the age-related contexts of disability and work status.

It should be noted that other studies of financial stress use more crude measures of relative objective financial stress unadjusted by IES (e.g., Houts et al., 1985; Krause, Jay, & Liang, 1991). The poverty ratio, for instance, is based on the division of family income by the poverty line for a given family size. Nevertheless, there is much evidence that current objective measures of income adequacy—such as poverty index levels for various family sizes based on the prices of a static and rather arbitrary bundle of necessities—are invalid approximations of income adequacy (George, 1992; Triest, 1998). Even if this bundle of necessities could be shown to be valid during a given period, differences in consumption patterns over time and across nations limit the application of poverty indices.

Thus, IES are preferred. In the empirical analysis discussed in the next section, the family size exponent (.38) used within the IES was derived from the national survey, Expenditures—U.S. 1972-73, which reveals preferences of consumer spending constrained by disposable income. There is evidence of *strong stability over time* with regard to the family size exponent. First, the national survey, Expenditures—U.S. 1960-61, resulted in a virtually identical value (.37) (Buhmann et al., 1988). Second, eight of the nine IES (derived from six different data sets making up three types of direct subjective measures) span a relatively narrow range from .31 to .39, despite important differences in study design and implementation (Vaughan, 1985). Once again, a comprehensive set of covariates was incorporated in both regression equations used to estimate each of these IES.

Despite the excellent reliability of IES based on attitudinal survey questions, there is evidence that the exponential values are somewhat attenuated (i.e., they do not fully reflect economies of scale in consumption) due to the inability to account for specific reference group comparisons. For example, a wealthy man may tend to compare his family with families of the same size in his wealthy social sphere rather than with families of the same size in the overall community. Thus, "the level of needs of the different family types are significantly closer to each other than when estimated by alternative methods" (Bradbury, 1989, p. 395).

Although this approach may be too conservative for policy decisions, this very feature may be desirable in explanatory research. However, even in policy applications, an important advantage is the capacity to assess the sensitivity of findings across a set of plausible IES (e.g., Klavus & Hakkinen, 1996).

Note as well that the family size exponent (.38) adopted for the empirical analyses in the next section is close to the value (.5) from the tradition of using the square-root transformation of family size. In recent years, academic analysts have increasingly employed this practice of dividing family income by the square-root of family size to convert measures of income into income adequacy (Atkinson, Rainwater, & Smeeding, 1995; Bittman & Goodin, 2000; Myles & Quadagno, 1994; Pampel & Hardy, 1994; Prus, 2000; Rainwater, Rein, & Schwartz, 1986).

Application of an IES Adjusting Out-of-Pocket Medical Expenses for Differences in Family Size and Income

As discussed in the last section, the national survey, Expenditures—U.S. 1972-73, yields a family size exponential value of .38. We now introduce a unique application of this IES to adjust out-of-pocket medical expenses for differences in family size and family income, resulting in a new measure of family financial stress. This new relative measure based on out-of-pocket costs is more appropriate than an absolute measure to reflect the extent to which out-of-pocket costs are an important component of objective family financial stress. In addition, the incorporation of economies of scale with increasing family size represents an improvement over the adjustment of out-of-pocket costs for per capita family income (e.g., Crystal, Johnson, Harman, Sambamoorthi, & Kumar, 2000; Hsieh, 2000, 2001; Waehrer & Crystal, 1995).

The variable "relative objective family financial stress due to out-of-pocket medical expenses" was created by dividing the total out-of-pocket costs in the past month due to medical expenses (the numerator) by a U.S.-derived IES based on total family income and family size (the denominator: $Y_i/(FS_i)^{b2/b1} = Y_i/(FS_i)^{.38}$). In addition to the inclusion of situations of high total out-of-pocket outlays and income losses (e.g., the uninsured), this relative measure captures situations where low total out-of-pocket outlays nevertheless represent financially catastrophic costs for low-income families (e.g., the underinsured or medically indigent). By reflecting family size and economies of scale in consumption, the IES component of this relative measure is an indicator of poverty or deprivation; it retains the focus on the family, which provides the social context that shapes the meaning of out-of-pocket costs to the patient and family.

Other evidence attests that relative measures of out-of-pocket spending on health expenditures and premiums are preferable to absolute measures, for the purpose of estimating the relationship between the objective stress from out-of-pocket costs and subjective financial strain within families. Rasell, Bernstein, and Kainan (1994) conducted a microsimulation model using data from the 1987 National Medical Expenditure Survey, the Internal Revenue Service's Individual Tax Model, and the Consumer Expenditure Survey. This model revealed that out-of-pocket health expenditures are highly regressive based on income: Low-income families pay 8.5 times the share of income paid by high-income families and, furthermore, family spending on health insurance premiums was also found to be regressive. Even comprehensive health insurance may leave lower income families underinsured because an uncovered out-of-pocket expense constitutes a larger portion of total family income for lower income families compared to other families (Farley, 1985). Houts et al. (1984) report that lower income families tended to spend more than 50% of their weekly total income on nonmedical costs due to outpatient chemotherapy.

Thus, relative measures reflect the extent that out-of-pocket spending on health expenditures and premiums (as well as lost wages expressed as a proportion of family income) contribute to "financially catastrophic" costs for the family. In addition to the inclusion of situations of high total out-of-pocket outlays and income losses (e.g., the uninsured), relative measures capture situations where low total out-of-pocket outlays nevertheless represent financially catastrophic costs for low-income families (e.g., the underinsured or medically indigent) (Berki, Wyszewianski, Magilavy, & Lepkowski, 1985; Coughlin, Liu, & McBride, 1992; Dicker & Sunshine, 1988; Wyszewianski, 1986).

The Sample and Measurement

The current study is based on a 1990-1991 survey ($n = 267$) of patients with recurrent cancer who were surveyed from five hospitals in an urban area of the northeastern United States. These patients were living at home, had recently transitioned from curative treatment into home-based palliative care, and were not deemed terminally ill. Forty-seven percent of all eligible patients agreed to participate. Each sex made up about half of the sample, which was almost entirely Caucasian. For a description of the sample and measures, see Schulz et al. (1995).

The current study is similar to the Fletcher and Lorenz (1985) study of the relationship between objective and subjective measures of economic well-being (i.e., between total family annual income and financial satisfaction). In the current study, the patient's total annual family income and family size are incorporated into the measure of objective measure of economic well-being to create the subcompisite "relative objective family financial stress due to out-of-pocket medical expenses." "Difficulty paying bills," "inadequacy of insurance/financial resources to meet future health needs," and "worry about finances" are subjective measures of economic well-being that appear to be closely related to the financial satisfaction measure used by Fletcher and Lorenz (1985).

These objective and subjective measures of economic well-being are further incorporated into still broader, comprehensive domains. The multidimensional index of objective family financial stress incorporates not only the subindex for relative objective family financial stress due to out-of-pocket medical expenses but five additional subindices as well (i.e., objective family financial stress due to medical bills management; wage loss due to the patient's illness; diversity of financial resources tapped due to the patient's illness; employment status changes by the patient and spouse caregiver; and overall finances trend).[3] (See Francoeur, manuscript under review, for a description of the composite items within each subindex).

Similarly, a latent construct for subjective patient financial strain incorporates not only past- and present-oriented perceptions about "difficulty paying bills" but future-oriented perceptions about "inadequacy of financial resources/insurance to meet future health needs" and present- and future-oriented affect from "worry about finances." All three single-item, ordinal measures include five or fewer categories and are moderately intercorrelated based on Pearson correlation coefficients (which are likely to be attenuated because they are based on an underlying assumption of continuous data). Given the extent of intercorrelation, the latent construct of subjective financial strain is necessarily a unidimensional first- or second-order factor.

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[3]Prior to the survey prompt concerning the total dollar estimate of medical expenses, the survey queries the patient about whether 11 types of medical expenses were incurred. This serves to define medical expenses and may refresh patients' memories of expenditures. The categories of medical expenditures are doctor bills, nursing home expenses, medications, private duty or hired nurses, home health aide, special equipment and supplies, special foods or supplements, hospital bills, ambulance services, health insurance premiums, and other.

Hypotheses

Similar to the Fletcher and Lorenz (1985) hypothesis, female and older patients were hypothesized to accommodate in their financial strain responses (i.e., each of the three single-item measures) to overall family financial stress (i.e., the objective family financial stress index). That is, female and older patients were hypothesized to report lower subjective financial strain when the overall level of objective family financial stress is high (i.e., objective family financial stress is moderated by age and/or gender).

Unlike the Fletcher and Lorenz (1985) model, terms are specified for the curvilinear impacts of objective family financial stress and age (i.e., [objective family financial stress]^2 and age^2) to reflect the hypothesis that at higher objective family financial stress levels, or with increasing age, the extent of accommodation increases.

Method and Results

The model is tested as an ordinal probit Multiple Indicators—Multiple Causes (MIMIC) regression. The interaction effects of gender were not statistically significant.[4] In addition to predictors that serve as controls for sampling error, Figure 1 accounts for effects from predictor variables that otherwise would wrongly be attributed to age, in addition to terms that reflect curvilinearity and moderation by age. The model specifies both direct and indirect effects from predictors to the latent construct for subjective patient financial strain and to individual items loading onto this latent construct. Results are reported in Table 1.

A follow-up simple slopes plot (Figure 2) facilitates interpretation of these results. Regardless of out-of-pocket health costs adjusted for family size and family income, older patients are more likely than younger patients to report lower financial strain from difficulty paying bills ($p < .05$), and the degree of this accommodation increases with advancing age (i.e., the impact of age was curvilinear) ($p < .05$). The impact of age seems to lessen as the level of objective family financial stress increases (i.e., objective family financial stress is moderated by age).

In addition to this comprehensive model to test age moderation of overall objective family financial stress, follow-up models were estimated to detect the separate impact from each of the six subindices that make up objective family financial stress (see Table 2). In these models, linear and curvilinear terms for objective family financial stress are based on the overall index, whereas the interaction term is based on age and the respective subindex. This results in a more valid follow-up test of age moderation and curvilinearity because effects due to the linear and curvilinear components of objective family financial stress are not misattributed to the interaction term.

In Table 2, note that the linear term for age is negative and statistically significant in all subindices except "medical bills management" (subindex 2). Further, note that the curvilinear term for age (age^2) remains negative and statistically significant within five of the six subindices (exception: "wage loss due to the patient's illness" [subindex 3]). These consistent findings, in addition to consistent findings for the lower order derivative term for age, provide additional support that the negative curvilinear age effect within the initial explanatory model is genuine and robust. The negative curvilinear age effect is revealed within the simple slopes plot (Figure 2).

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[4]Recall in the Fletcher and Lorenz (1986) study that the interaction effects of sex or race were not statistically significant in the initial ANOVA using the entire sample data, however subgroup rankings of regression coefficients for each age-race-sex subgroup did reveal evidence of stratification. Unfortunately, there are too few Blacks in our small sample for a similar ranking. Furthermore, even with a more optimal sampling of Blacks, our small sample would remain considerably underpowered to derive subgroup rankings from separate regressions on each age-race-sex subgroup. In both studies, whatever the moderating effect of sex may be, we do know that it is not sufficiently robust to be detected outside the comoderating contexts of age and race.

Thus, regardless of objective family financial stress, as we move across the adult age span, patients become increasingly likely to accommodate with regard to relative out-of-pocket costs adjusted for family size and income (subindex 1, $p < .01$), medical bills management (subindex 2, $p < .02$), diversity of financial resources tapped due to the patient's illness (subindex 4, $p < .01$), ending employment by the patient and/or spouse caregiver (subindex 5, $p < .10$), and overall finances trend (subindex 6, $p < .05$).

Table 2 also reveals that the interaction term (age*OFFS) remains positive and statistically significant for three subcomposites: wage loss due to the patient's illness (subindex 3, $p < .01$), ending employment by the patient and/or spouse caregiver (subindex 5, $p < .10$), and overall finances trend (subindex 6, $p < .10$).

Again, these consistent findings, in addition to consistent findings for all negative lower order derivative terms, suggest that age buffers the impact of objective family financial stress and that this effect within the initial, explanatory model is genuine and robust. We can also see the impact of the interaction term within the simple slopes plot (Figure 2): At the youngest adult age of 40, the three curves for objective family financial stress intersect the y-axis within a narrow range; however at the oldest age of 84, the three curves are spread farther apart.

Thus, patients affected by loss of wages or ended employment (quit, retired, laid off, terminated) as a result of their illness appear more apt to accommodate with age in their perceptions about difficulty paying bills, especially when they incurred lower levels of objective family financial stress. These patients were either younger than 65 years of age or recent retirees. This implies that at lower levels of objective family financial stress, the younger the patient reporting loss of wages or employment, the greater the perceived difficulties in paying bills. At higher levels of objective family financial stress, subjective perceptions about difficulty paying bills become more similar across the span of adult ages, although accommodation may still be somewhat higher among older adults.

Discussion

Summary and Interpretation

The evidence suggests that accommodation may not only be a feature of aging but may become pronounced in the context of particular financial stressors. Tentative findings ($p < .10$) suggest that these stressors may include ending a job or negative trends in personal finances. The evidence is much stronger for low levels of stress from limited wage loss ($p < .01$). Note that such stressors are not borne by any of the oldest patients—all of the patients who end a job or incur wage loss are younger than age 65 or recent retirees.

The remaining two types of financial stress occur across the adult age span. The level of stress from "relative out-of-pocket costs adjusted for family size and income" and from "diversity of financial resources tapped due to the patient's illness" do not appear to influence age-based accommodation beyond impacts from aging.

That is, as patients age, they may increasingly accommodate in their perceptions about difficulties paying bills, regardless of adjusted out-of-pocket costs (relative to income and family size) or the diversity of tapped financial resources. In some respects, increasing accommodation as patients age may be an important mechanism for coping with the financial strain of paying bills.

Nevertheless, this phenomenon appears to occur regardless of the level of objective family financial stress, suggesting that it may serve to mask or further isolate older adults who may be foregoing needed yet unaffordable medical care and/or refills on prescriptions in order to

meet bills and financial obligations (Francoeur, 2001). This may include taking less medication than prescribed to delay the need for refills. Such older adults may incur low adjusted out-of-pocket costs relative to their income and family size, as well as low overall objective family financial stress. Mentnech, Ross, Park, and Benner (1995) reason,

> It is conceivable that lower income Medicare enrollees who lack supplemental coverage and who are neither in excellent health or very poor health may be foregoing care until their health status deteriorates further because of the out-of-pocket expense. The implication is that these enrollees may be better served by earlier intervention. If it is true that vulnerable subgroups are foregoing care, this could become more of a problem with the pressure to contain costs in public programs. (p. 59)

Other older adults may incur high adjusted out-of-pocket costs for medical care and/or refills on prescriptions but may forego other important needs such as sufficient food, heat, utilities, housing costs, and transportation (Francoeur, 2001). Thus, there is a need for additional research to determine how these two at-risk subgroups of older patients may differ based on socioeconomic characteristics, insurance coverage, attitudes, and hierarchy of values.

Limitations and Comparisons With Other Studies

Interpretations of the findings must be made cautiously, given limitations posed by the nonrandom sample, the cross-sectional data, and even the IES. The use of cross-sectional data does not permit us to distinguish effects of aging from those due to cohort differences.

In an interesting longitudinal study of trends in financial satisfaction among middle-age and older adults, an aging effect, in which financial satisfaction increases over time, is distinguished from a strong intercohort replacement effect, in which financial satisfaction is lower within younger cohorts (Hsieh, 2000). However, limitations of this longitudinal study involve weaknesses in the measure of financial satisfaction and the lack of an IES that adjusts for household economies of scale with increasing family size (i.e., a per capita family income adjustment was used).[5] The lack of adjustment for family size differences may be more important in the context of this particular study given that reductions in family size are common between middle- and old-age. Thus, the intercohort replacement effect could be overstated.

In the current study, the use of separate IES for elderly families and for families headed by younger adults would have been desired, however validity of IES is questionable when they are created solely with elderly populations based on their subjective financial perceptions. Experts agree that the typically high financial satisfaction reported by the elderly would result in substantial underestimation of elders' objective economic needs or income adequacy (Dubnoff & Vaughan, 1981; Vaughan, 1985). The family IES created by Vaughan (1985) indicate that households with elderly heads require only 30% of the income required by other families of the same size. Note, however, that this very type of invalidity within family IES created for elderly populations would appear to provide empirical evidence for the accommodation hypothesis because the elderly reach equal levels of financial satisfaction as younger adults at substantially lower levels of income, although other explanations are also possible (e.g., Bradbury, 1989).

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[5]Data from the General Social Surveys, 1972-1996 were analyzed (Hsieh, 2000, 2001). Some attempt to incorporate household economies of scale is reflected through the specification of a subjective or crude predictor. Hsieh (2001) accounted for the respondent's perception of family income in relation to American families in general using a 5-point scale, and Hsieh (2000) accounted for poverty status using a dummy variable.

The wording of the single-item measure of financial satisfaction may be confusing to some respondents, especially adults with less education and in the oldest cohorts. As a result, financial satisfaction could be understated for these adults. This item is, "So far as you and your family are concerned, would you say that you are pretty well satisfied with your present financial situation, more or less satisfied, or not satisfied at all?" *Pretty well satisfied* and *more or less satisfied* could be interpreted to have very similar meanings. Better wording for these categories would be *very satisfied* and either *moderately satisfied* or *somewhat satisfied*.

IES can be created solely on elderly populations, or any group, if the dependent variable(s) are objective measures rather than subjective perceptions. The inclusion of variable(s) reflecting chronic illness and/or disability is important in estimating IES for use with households that include chronically ill or disabled members because income adequacy is lowered by expenditures for these health care needs. Jones and O'Donnell (1995) estimate separate IES to predict budget shares of fuel, transport, services, food, alcohol, clothing, and other goods. The predictors across the various estimates of IES include five disability dummy variables (i.e., physical, mental, hearing, sight, and other disability). Klavus (1999) estimates IES to predict an imputed value of outpatient care and the actual value of sickness insurance reimbursements. The predictors across the various estimates of IES included three or four need variables (chronic illness and/or self-assessed health, age, size of household) and several control variables.

In the current study, the Buhmann IES does not account for chronic illness or disability, however this is not a weakness because disability is specified as a comoderator. In the prediction of difficulty paying bills, the disability moderator was not found to be statistically significant. Only age moderation and curvilinearity were statistically significant, and so this simpler model is reported.

Finally, a criticism of the use of income adequacy as a measure of economic needs refers to the lack of distinction between earned income (e.g., wages) and unearned income (e.g., social security, capital earnings), especially because unearned income is more secure than earnings (Crystal & Shea, 1990b; Morgan, 1992). Unfortunately, this is not well-reflected within national IES to date. However, as Dubnoff and Vaughan (1981) discuss, covariate(s) for various sources of in-kind income (or for percentages of total income that is earned versus unearned) should be included as important covariate(s). Additional weaknesses are the exclusion of assets, such as home equity, savings (Beverly, 2001; Nelson, 1993), and non-cash income (Radner, 1997), as well as the exclusion of liabilities, such as patient and family cost-sharing in public and private insurance programs (Klavus & Hakkinen, 1996). A cogent and comprehensive review article by Bradbury (1989) discusses the following: (a) the various functional forms of regression-based equations used to derive the exponential values of regression-based IES, and (b) strengths and weaknesses of various types of IES.

Advantages of the MIMIC Regression Model

Compared to the Fletcher and Lorenz (1985) model, the MIMIC model in the current study affords more valid testing of accommodation hypotheses because each subindex of objective family financial stress and each item of subjective patient financial strain is tested within broader, comprehensive contexts of objective family financial stress and subjective patient financial strain. A useful illustration is derived from the literature on depression. In the case of a diagnosis of minor or major depression, symptoms of either dysphoric mood (sadness) or anhedonia must be present in the context of other symptoms. This permits the important distinction of dysphoria, anhedonia, or other depressive symptoms that manifest as part of episodes of minor or major depression from those that occur outside of such episodes. A MIMIC regression model permits these distinctions, which are important because depressive symptoms can be debilitating even when they occur outside the context of a diagnosis of minor or major depression.

Similarly, the measurement portion of the MIMIC model in the current study requires that all three items, or indicators, of subjective patient financial strain load onto the latent construct. This allows the joint impact when all three indicators occur together (i.e., direct effects to the latent construct) to be distinguished from separate, residual impacts (i.e., indirect effects) to any one or two indicators.

For instance, one patient may report high financial strain for all three indicators. Another patient may report low financial strain in terms of difficulty paying bills, yet as a result of disease progression, perceives high financial strain in terms of the adequacy of financial resources and insurance to meet future health needs; these divergent responses may lead this patient to report moderate or perhaps high financial strain in terms of worrying about finances.

Indeed, in the current study, this modeling flexibility resulted in the detection of statistically significant and negative curvilinear impacts from age to difficulty paying bills in the overall ordinal probit MIMIC model, and in all but one of the six follow-up runs to test age moderation of each subindex. In contrast, age curvilinearity was not detected within corresponding ordinal probit regressions (not shown) that predict difficulty paying bills without simultaneously assessing joint impacts from all three indicators of subjective patient financial strain. The detection of age curvilinearity as indirect effects within the MIMIC models despite the lack of detection within the corresponding ordinal probit regressions strongly implies that patients do not necessarily respond consistently across all three indicators.

Acknowledgements

Biography

Richard Benoit Francoeur, Ph.D., is an assistant professor and a research affiliate of the Center for the Study of Social Work Practice, Columbia University School of Social Work. He received a Social Work Leadership Development Award (Project on Death in America, Open Society Institute) to investigate material and financial barriers that prevent adequate pain and symptom control within inner-city minorities receiving palliative care. He was also recently awarded a 2-year research grant from the National Institute of Mental Health to investigate late-life depression masked by low sadness. Recent publications include "Reformulating Financial Problems and Interventions to Improve Psychosocial and Functional Outcomes in Cancer Patients and Their Families," in the Journal of Psychosocial Oncology.

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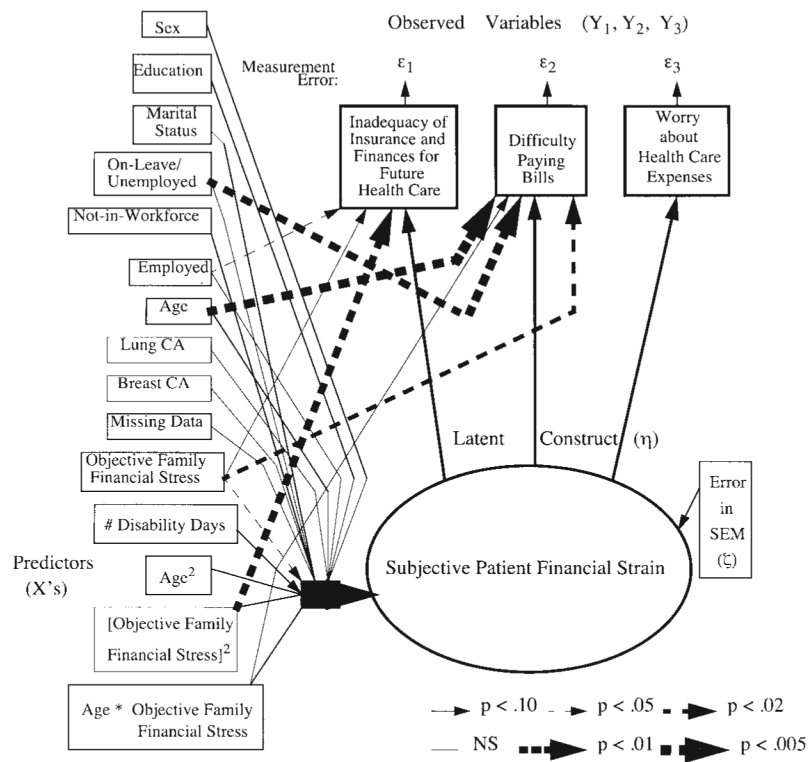**Figure 1.**
Ordinal Probit Multiple Indicators–Multiple Causes (MIMIC) Model of Accommodation With Increasing Age
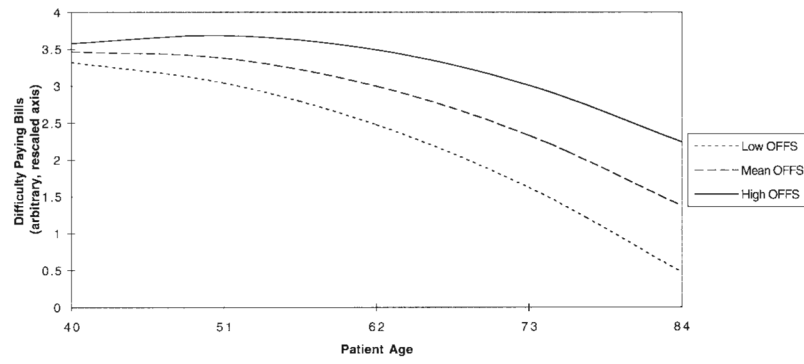
Figure 2.
"Difficulty Paying Bills" Across Objective Family Financial Stress (OFFS) Levels as Age
Advances

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TABLE 1

Explanatory Second-Order MIMIC Model[a]

Centered X Variables	Indirect Effects of Latent Construct		Inadequacy of Insurance/ Finances for Future		Direct Effects to Latent Y Indicator[b]			
	Subjective Patient Financial Strain				Difficulty Paying Bills		Worry About Finances	
	b	S.E.	b	S.E.	b	S.E.	b	S.E.
Sex	−.172	.153						
Education	.005	.045						
Marital	.263	.296	−.133	.287				
On-leave/unemployed	.254	.227			−.802****	.296	.115	.313
Employed	.147	.196			−.606**	.266		
Age	−.0008	.008	.021**	.009	−.046*****	.011		
Lung cancer	−.067	.172						
Breast cancer	−.195	.257					−.213	.354
Income-equivalency missing	−.076**	.146						
OFFS	.224**	.098	.231*	.125	.282***	.114		
Disability days	.004*	.002						
Age²	−.0004	.0004			−.00087[c]	.0006		
OFFS²	−.014	.048	−.135****		.051			
AgeOFFS *	.002	.007			.015[d]	.008	−.014[e]	.007

NOTE: MIMIC = Multiple Indicators–Multiple Causes; OFFS = Objective Family Financial Stress Index.

[a] Fit of the data to the MIMIC model is good based on indices: chi-square (15 df) = 9.337 at p = .8593; descriptive fit value = .0023 < 1.5; root mean square residual = .079; goodness-of-fit = .9975.

[b] The respective lambda loadings, representing acceptable fit of the latent y indicators to the unidimensional latent construct, are .9414, .6092, and 1.000.

[c] The total effect (i.e., direct plus indirect effects) is statistically significant at p < .05 when this unique, direct effect is added to the shared, indirect effect of the latent construct.

[d] The total effect is statistically significant at p < .05 when this unique, direct effect (p < .10) is added to the shared, indirect effect of the latent construct.

[e] The total effect is not statistically significant (p < .10) when this unique, direct effect (p < .05) is added to the shared, indirect effect of the latent construct.

* p < .10.

** p < .05.

*** p < .02.

**** p < .01.

***** p < .005.

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TABLE 2

Follow-Up Prediction of Difficulty Paying Bills by Each Subindex (i = 1 through 6) of Objective Family Financial Stress[a]

| | Total Effect for Each Subindex, i[b] | | | | | | | | | | | |
| | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | |
Centered X Variables	b	S.E.	b	S.E.	b	S.E.	b	S.E.	b	S.E.	b	S.E.
Sex	-.1714	.154	-.1703	.439	-.1487	.149	-.1709	.153	-.1557	.150	-.1593	.147
Education	.0064	.045	.0029	.047	.0054	.045	.0076	.046	.0094	.044	.0025	.045
Marital	.2905	.310	.3194	.316	.2851	.280	.2937	.307	.2675	.300	.3093 *	.273
On-leave/unemployed	-.5131	.345	-.5132	.343	-.5444	.340	-.5009	.356	-.5578 *	.332	-.5841 *	.335
Employed	-.4165	.297	-.4396	.283	-.5273	.351	-.4446	.287	-.4945 *	.282	-.4693 *	.283
Age	-.0459 *****	.011	-.0455	.073	-.0429 *****	.012	-.0445 *****	.011	-.0454 *****	.011	-.0465 *****	.008
Lung cancer	-.0497	.169	-.0439	.170	-.0510	.170	-.0647	.169	-.0455	.165	-.0664	.170
Breast cancer	-.2165	.249	-.1841	.263	-.1483	.248	-.1677	.254	-.1861	.247	-.1632	.245
Income-equivalency missing	-.0519	.149	-.0602	.155	-.0642	.144	-.0639	.148	-.0396	.144	-.0631	.145
OFFS	.4473 *****	.120	.4667 *****	.126	.5368 *****	.106	.4393 *****	.121	.4587 *****	.114	.4864 *****	.115
Disability days	.0039 *	.002	.0039 *	.002	.0041 *	.002	.0038 *	.002	.0037	.002	.0039 *	.002
Age²	-.0014 ****	.0005	-.0013 ***	.0005	-.0009	.0006	-.0014 ****	.0005	-.0010 *	.0006	-.0012 **	.0005
OFFS²*	.0099	.051	.0049	.052	.0127	.049	.0033	.051	.0085	.048	-.0012 *	.049
Age OFFS$_i$[c]	.0052	.010	-.0012	.010	.0334 *****	.010	-.0019	.001	.0117 *	.006	.0155	.009

NOTE: OFFS = Objective Family Financial Stress Index.

[a] The subindices are (1) Out-of-Pocket Medical Expenses Adjusted for Income and Family Size; (2) Medical Bills Management; (3) Wage Loss Due to the Patient's Illness(es); (4) Diversity of Financial Resources Tapped Due to the Patient's Illness(es); (5) Employment Status Changes by the Patient and Spouse Due to the Patient's Illness(es); and (6) Overall Finances Trend.

[b] i.e., shared, indirect effect to the latent construct plus unique, direct effect to the latent y indicator, difficulty paying bills. Lambda loadings for all three latent y indicators remain stable and acceptable.

[c] Subindex i of the OFFS.

* $p < .10$.

** $p < .05$.

*** $p < .02$.

**** $p < .01$.

***** $p < .005$.