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Correspondence of perceptions about centenarians' mental health

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Abstract

Objectives—The goals of this study were to uncover the criteria by which centenarians, proxy/caregivers, and interviewers rated centenarians' mental health. Often proxy and interviewer reports are obtained in studies of the oldest-old and become a primary source of information.

Methods—Data were from a population-based sample of mentally competent US centenarians in northern Georgia. The dependent variables were based on alternative reports for the centenarians' mental or emotional health. Regression analysis was used to predict each source's rating of mental health separately with the same set of variables. These variables included information obtained from the centenarians and proxies about their distal experiences, demographics, and proximal resources including Mini-Mental Status Examination (MMSE), health, personality, socioeconomic resources, and coping behaviors.

Results—Examination of mean-level differences between sources revealed similarity across mental health ratings. For centenarians and proxies, perceived economic status was a very important predictor of mental health. For centenarians and interviewers, personality (neuroticism and extraversion) was an important common predictor. The interviewer and proxy mental health ratings were strongly associated with MMSE, but that was not the case for centenarians.

Conclusion—Mean-level findings and the comparative regression results provide corroborating evidence that centenarians' self-reports of mental health are similar based on average ratings and presence of common associations with other raters (i.e., perceived economic status and personality). Implications of differences across rater pairs are discussed as guidance about the comparative value of substitution of proxies as informants for addressing specific influences on mental health.

Keywords

extreme old age; mental health assessment; quality of life/well-being

Introduction

With increased longevity and the expansion of the oldest-old population, attention to understanding the consequences of surviving to extreme age has grown substantially (Poon & Perls, 2007). Understanding the correlates of psychological well-being among the oldest-

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old is important because that may lead to prescriptions for enhancing life quality in extreme age and also suggest important factors associated with longevity. Still, concerns have been expressed about whether centenarians and oldest-old adults are fully reliable in their mental health assessments as compared to younger-old. For example, Pinquart and Sörenson (2000) suggested that those among the very old who suffer less from incapacitating losses may have especially high subjective well-being because they compare themselves to those who have experienced more losses. Thus, more investigation is needed to assess self-reported mental health among oldest-old adults and to refine understanding of the factors contributing to their positive mental health. The main objectives of this study were to: (a) investigate mean-level differences in mental health ratings as assessed by centenarians themselves and two other raters, and (b) examine the relation of each sources' rating with proximal and distal resources in order to determine the factors influencing each rater.

Gerontologists have long relied on proxy reporters to obtain data about the oldest-old, but there has not been much attention paid to the comparative value of that kind of alternative reporting. Except for measuring constructs that are about others' perspectives on study participants, the use of proxy informants is dictated by necessity if the oldest-old person is unable to self-report, or to reduce respondent burden by obtaining proxy reports about aspects the proxies are presumed to know well enough. That is, proxy reports are desirable for increasing analysis sample size and for efficiency in data collection. Additionally for situations where multiple indicators are needed or appropriate to reduce measurement error with latent factor analysis techniques, proxy reports can provide valuable supplementary information.

Prior studies suggest that informant perceptions may vary, but that each may add a potentially valuable perspective on the characteristics of the oldest-old, and together reports from varied sources provide a unique opportunity to compare and contrast ratings of mental health and the relationship of those ratings to a variety of relevant domains. Under certain circumstances, proxy data are reliable as a source of information. For example, elder-proxy concordance is typically high for such items as activities of daily living (ADL), medical history, and instrumental activities of daily living (Schatzberg, Sudha, & Mutran, 1998). Data from personality research suggests that even though there are mean differences in some personality trait ratings, these differences are only in degree and not in substance (Martin, 2007). Collectively considered, results from these studies indicate that the use of proxies to collect data across selected domains is important (Walsh, Wu, Mitchell, & Berkmann, 2003). However others have suggested that proxy scores cannot simply be used as substitutes (Kane et al., 2005), but should be viewed as additional important information. Additionally some results have led investigators to be concerned about the accuracy of proxy informants. Kolanowski, Hoffman, and Hofer (2007) reported that the concordance of self report and informant assessment of emotional well-being among nursing home residents was quite low. Lum, Lin, and Kane (2005) noted that the agreement on ADL assessments based on nursing home residents and family or staff report differed as well.

Given the difficulty of interviewing extremely old individuals who have more physical and mental impairments than any other adult age group, our study may suggest whether proxy reporters are needed to obtain reliable reports about their mental health. The centenarian, the proxy, and the interviewer were all considered subjects for analysis, so our strategy was to obtain multivariate estimates of the effects of the same set of predictors within separate analysis samples for each of the three types of mental health reports. Similar results for different reporters would corroborate the importance of specific variables for centenarians' mental health. Differences between the centenarians' versus others' results would suggest caution for firm conclusions about the reliability of centenarians' own mental health reports, but may also establish what areas of centenarians' lives seem more salient to the proxy/

caregiver and the study interviewer from their perspectives. As a practical matter, there may be a concern that if proxies (who are often caregivers) have very different views of what constitutes healthy mental status than centenarians, there may be a disconnect about priorities for maintaining or enhancing resources for a mentally healthy lifestyle among exceptional survivors.

Conceptual framework and literature review

Our analysis comparing correlates of alternative reports of mental health is also intended to provide new evidence about factors that enhance or hinder centenarians' psychological well-being. Because centenarians are rare survivors and have not been studied extensively, it is important to consider evidence about them in the broader context of what has been learned from research with samples of other old-age groups. Additionally, centenarian studies have used a variety of psychological well-being measures so that it was necessary to consider measures other than mental health per se to guide the analysis, thereby including morale, life-satisfaction, happiness, etc.

The theoretical basis for the analyses reported here is the model of proximal and distal resource influences in developmental adaptation to aging (Martin & Martin, 2002). That model guided priorities for the Georgia Centenarian Study, which provides the data for our analyses. In essence, the developmental adaptation model suggests that distal and proximal experiences, as well as personal and social resources, determine to what extent old and very old adults maintain relatively high levels of physical and mental functioning. Additionally, a survey of the recent literature concerning what contributes to mental health and other aspects of psychological well-being for the oldest-old guided choices about predictor variables available from the study. For the empirical literature search of this study, we considered research on the mental health, morale, happiness and overall life satisfaction of oldest-old adults. In that sense we have pursued the line of research begun by Gerda Fillenbaum, which focused on self and interviewer ratings of mental health as part of the Older Americans Resources and Services (OARS) multidimensional functional assessment of older adults (Fillenbaum, 1988). The OARS mental health ratings are designed to help the informants make a summary assessment. For the interviewer these judgments are to be based on the overall impression of the participant from information contained in the survey questionnaire and from all other sources (Fillbenbaum, 1988, p. 73).

Mental health—For the purposes of this study, mental health refers to the emotional aspects of mental well-being. There have been only a few studies of mental health among the oldest-old (MacDonald, 2007). Selim et al. (2005) emphasized psychological resilience as the critical factor for US centenarian veterans' mental health advantage based on the OARS question. Martin (2002) found that both economic resources and social resources were positively related to mental health (OARS rating by the interviewer) in the first phase of the Georgia Centenarian Study. An additional insight Martin obtained was that adverse cumulative life event experiences of Georgia centenarians reduced both social and economic resources, and adverse events also had a direct, negative effect on mental health. Landau and Litwin (2001) also analyzed the influence of background variables, physical capacity, and perceptions of social network supportiveness on mental health among Israelis aged 75 and older using the Zung Depression Scale (Zung & Zung, 1986). They found that locus of control and network supportiveness were positive influences and education was positively related to locus of control. Available centenarian studies have also begun to elucidate the linkages among a variety of influences that have direct as well as indirect effects on mental health, particularly for research focused on the personality domain. Although Adkins, Martin, and Poon (1996) found that extraversion was positively related to morale of Georgia

centenarians, Martin (2002) rejected the hypothesis that extraversion mediated the influence of negative event history on the interviewer's OARS mental health rating for them.

Life satisfaction—This construct refers to overall well-being, or feelings about life as a whole, and thus may involve summary assessments across sub-domains such as for subjective physical health, perceived economic status, emotional health or mental health, etc. Hence although evidence about the correlates of life satisfaction may be useful to suggest influences on mental health, it is also the case that life satisfaction is a much broader construct. However the paucity of research on the mental health of the oldest-old and centenarians in particular requires that we consider studies of life satisfaction because they are potentially relevant. The authors of the cross-sectional studies of elderly populations that characterize oldest-old adults as remarkably well-off psychologically relative to younger groups have summarized their conclusions about three important domains, which are: health-related behaviors, psychological resilience, and social resources. Berg, Hassing, McClearn, and Johannson (2006) conducted one of the few analyses designed to examine the relative impact on life satisfaction of psychosocial and health variables among 315 Swedish participants aged 80–98 years, and concluded that social network quality, self-rated overall health, sense of being in control of one's life and depressive symptoms were significant factors (in that order of importance) but that the specific influences were different for men than women. Ozaki, Uchiyama, Tagaya, Oshida, and Ogihara (2007) reported that the most well-off (‘autonomous’) Japanese centenarians had better nutritional habits, had never smoked, rarely or never drank alcohol, and exercised regularly. Hilleras, Jorm, Herlitz, and Winblad (1999) also documented that among Swedes 90 years or older, those with high life satisfaction spent more time in physical activity during a day. Similarly, Yi and Vaupel (2002, p. 733) attributed Chinese old-old individuals' ability to maintain life satisfaction to ‘being more positive in self-feeling of life’. For Italian centenarians, there was a stronger relationship between satisfaction with social and family relations and life satisfaction than for octogenarian and nonagenarian Italians (Dello Buono, Urciuoli, & de Leo, 1998). From their meta-analysis, Pinquart and Sörenson (2000) concluded that social networks were more important influences on subjective well-being for the oldest-old, as was personal competence. In their most comprehensive analysis based on the Berlin Aging Study, Smith, Fleeson, Geiselmann, Settersten, and Kunzmann (1999) conducted a path analysis for overall well-being, which linked sociodemographic characteristics, objective life conditions (including health status, income, and social participation) to sub-domains of subjective well-being as causal influences. Apart from subjective health, satisfaction with social participation and social relationships (together) had the strongest effects on overall well-being.

To summarize, the literature for oldest old adults and for centenarians in particular characterizes them as resilient with respect to mental health and life satisfaction despite their health disadvantages relative to the young-old. Based on multivariate studies reviewed here, the sources of mental resiliency at extreme age include health habits, personality, locus of control, and social resources (social network support and interpersonal relationships). With the exception of one study of centenarians' mental health that relied on an interviewers' report (Martin, 2002), research to date has been based on self-assessment of mental health and well-being and there have been no comparisons with mental health assessments by proxies or interviewers. Although Pinquart and Sörenson (2000) suggested that downward comparisons may help to explain psychological resilience in extreme age, research to date has not tested whether self-assessments are reliable in comparison with other informants' assessments. We have no guidance from prior research on mental health or life satisfaction that compares alternative raters and so formulated only some general hypotheses for this exploratory study.

Hypotheses

Based on our review of prior research, there were two main hypotheses:

1. Proxy and interviewer informants will rate mental health of centenarians lower than the centenarians' self-assessments.
2. Among domains of influence, physical health, personality, and social support were expected to be stronger predictors of mental health ratings than distal experiences (i.e., events that occurred more than 20 years ago) or other types of resources (e.g., income, or community support services).

Methods

Data and samples

The recruitment of participants in a 44-county area of Northern Georgia from lists of nursing facilities and personal care homes and for registered voters with date-of-birth information resulted in an 83% response rate for a population-based sample of 239 community-dwelling and institutionalized centenarians and near-centenarians. Because our study was not intended to make comparisons to other birth cohorts, the issue of selection into our sample due to mortality has not yet been analyzed; yet we must still exercise caution with respect to interpretation of the influence of the participants' characteristics on mental health because they are a very special group of extreme survivors with a high mortality rate once they reach centenarian status. Based on the survival analysis using the first two phases of the Georgia Centenarian Study for a community-dwelling sample Poon et al. (2000) found that gender, race, and functional health were significantly related to mortality within 18 months for their participants ranging in age from 99 to 110 years. On the other hand, compared to most other studies of centenarians, our sampling frame for this study is not restricted to community-dwelling centenarians and thus represents the entire population of survivors better on that account. In order to participate in the interview section about resources and subjective well-being, centenarians needed to score 17 or higher on the Mini-Mental Status Examination (MMSE: Folstein, Folstein, & McHugh, 1975). The reason for this relatively low MMSE cutoff score is that lower education levels for this cohort and the inclusion of different ethnic groups may yield lower MMSE scores than would be expected in more highly educated or majority populations (Tombaugh & McIntyre, 1992). In very old populations, vision impairment may also account for lower MMSE scores (Holtsberg, Poon, Noble, & Martin, 1995). Although the relatively low MMSE cutoff may include cases with mild cognitive impairment, that may permit a stronger test of inter-rater reliability because proxy and interviewer ratings should deviate more from mildly impaired centenarians' ratings. After that restriction, the sample included 137 centenarians and near centenarians (mean age of 99.7 years, age range from 98 to 108). The average MMSE score was 23.58 (SD = 3.94).

Although 71.8% of centenarians reported that their overall physical health was good or excellent, 44.9% lived in either a skilled nursing facility (23.5%) or in assisted living residences (20.4%) while the remaining 56.2% lived in their private home or apartment. Most of the participants were women (78.8%). By ethnicity, 83.2% were White and the other 16.8% of the participants were African-American. Only 3.6% were married; 6.6% were divorced, and 84.7% were widowed.

Proxy informants were nominated by the centenarians to obtain a close family member first and then other relatives, or if no relatives were available another knowledgeable person (e.g. neighbors, nurses, etc.); 61.1% of proxies were adult children, 13.9% nephews and nieces, 9.9% granddaughters, and the other 15.1% of informants included spouses (2.2% of all proxies) siblings, or friends. Of the proxies, the majority were women. From the target

sample of 239 proxy informants, 230 (96%) filled out a questionnaire and mailed the questionnaire back to the interviewer. Beyond inability to locate the selected proxy, we suspect that the burden of cooperating with the multiple demands of our larger program project that included physical testing and other contacts with the proxy may explain why some did not respond.

The single interviewer for the centenarians was a trained social worker, and the interviewer completed a rating form to provide additional information about the centenarian based on the interview. Hence the interviewer was informed about everything that the centenarian reported in the interview, including aspects of the centenarians' history as well as their performance on the MMSE (which was part of the OARS protocol).

Although some proxies were present during the centenarians' interview, most of them were not. Additionally, proxies were numerous, and varied in the extent to which they had recently or ever known about aspects of the centenarians' histories and characteristics. With respect to our method of comparing alternate sources' reports of mental health and associations with other variables, it is important to note that while some participants may not be able to give accurate reports of their own mental health, unreliability between raters may be caused as well by interviewers and proxies providing inaccurate assessments of centenarians' mental health. Also, to obtain information about economic resources we relied on proxy reports whereas our other predictor variables are based on centenarians' self-reports.

Because collecting comprehensive information from centenarians is very expensive and thus necessitates relatively small samples even before considering missing data on specific variables, it seemed best to maximize the number of cases for separate analyses for each of the different mental health raters. In addition to case number differences that result from the use of the proxy reporter (not all proxies were interviewed), the centenarians and the proxies varied with respect to missing values on variables included in the analysis. To avoid restricting the entire analysis to the smaller subset of cases available for each reporter type with no missing data for any of the predictor variables, the number of cases differs across the regressions we obtained. In preliminary regressions shown in Table 1, we used subsets of predictors representing construct domains (e.g., economic resources) so that the number of cases involved at that step depended on the rater type as well as the extent of list-wise deletion for missing data in each subset of predictors. In the final regressions for Table 2, the respective sample sizes for each rater type were: interviewer (n = 101); proxy, (n = 91); and centenarian (n = 95).

Dependent variables

Our measures for the mental health dependent variable are based on the OARS protocol (Fillenbaum, 1988) to obtain reports from centenarians and the proxy/caregiver as well as from the interviewer. The centenarians were asked ‘How would you rate your mental or emotional health at the present time—excellent, good, fair, or poor?’ The proxy reporter was asked: ‘How would you rate his/her mental or emotional health or ability to think at the present time compared to the average person living independently—excellent, good, fair, or poor?’ There was one study interviewer and for each centenarian this interviewer filled out the rating form provided by the OARS to rate mental health. Specific instructions included: ‘Rate the current mental functioning of the person being evaluated along a six point scale. Mark the ONE answer which best describes the person's present functioning’. The interviewer had six categories to choose from: outstanding mental health, good mental health, mildly mentally impaired, moderately mentally impaired, severely mentally impaired, and completely mentally impaired. Each of the anchor points included specific definitions (e.g. for outstanding mental health: intellectually alert and clearly enjoying life,

manages routine and major problems in his/her life with ease and is free from any psychiatric symptoms). Thus the instructions to the interviewer and question for the proxy informant did not specify that they were expected to separate the cognitive health aspect of mental health from the emotional aspect, whereas the question for the centenarian referred to mental or emotional health without reference to mental impairment or ability. Of course in retrospect it would have been better for the purposes of this particular study to define 'mental health' for all the raters to be primarily about emotional or psychological well-being.

Upon examining the distribution of responses for the three raters, it was quite apparent that converting the interviewer responses to a four-point scale would be feasible for comparisons. The interviewer categories for mildly or moderately mentally impaired correspond well to the 'fair' response category in the centenarian and proxy scale. After also converting 'severely and completely' mentally impaired to correspond to 'poor', we obtained a four-point scale with four as high for the interviewer's rating. Hence for all sources, the mental health ratings were coded from one to four with four as the highest category.

Predictors

Table 1 contains the entire list of independent variables, which are grouped by domains for demographics and distal variables, and also for the proximal resource domains of health, personality, social and economic resources (social interactions and perceived economic status), other economic resources (e.g., income or assistance received from others), and aspects of stress and coping. As designated in the next two segments, the information for the majority of the predictor variables was obtained from the centenarian interviews. However because there was substantially greater missing data in centenarians' reporting of economic variables (such as their annual income in particular) compared to proxy informants reports on those same variables, we relied on proxy interviews to create predictors representing economic resources. Many proxies may know the financial situation of the centenarians better than centenarians themselves.

Variables from centenarian interviews—The demographic variables include exact age, gender (female = 1, male = 0), residence (residence in a nursing home = 1, otherwise 0) and ethnicity (African-American = 1, otherwise 0; all of the non-white participants identified themselves as African-American). Past engaged lifestyle activities were defined by answers about a series of cognitive engagement tasks (Hultsch, Hertzog, Small, & Dixon, 1999) to construct a scale based on eight dichotomous questions about activities such as continued education, learning a foreign language, volunteer working, preparing income tax, taking a major vacation, or giving a public talk ($\alpha = 0.54$). Higher scores for the engaged lifestyle scale indicated greater engagement. Distal (and proximal) events were selected from a life events lists for occurrences such as death of a parent, marriage, divorce, deaths of close family members, births or loss of children, job events, and major financial losses. Proximal events were defined as occurring two or fewer years ago, and distal events had happened more than 20 years ago. Both events variables count the number of events reported so that the variables involved indicate a greater number of events as the highest values. Education was coded in eight categories for a continuous variable coded from 1 to 8 to represent the range of education from 0–4 years to postgraduate education. Occupation was coded from 0 to 10 as a continuous variable corresponding to ten categories respectively from 'homemaker' to e.g. 'unskilled', 'clerical, sales, technical' and so on up to 'professional' coded as 10. This occupational coding is admittedly crude but sufficient for our purpose, which was simply to distinguish between more skilled and less skilled occupations. For health, participants responded to the Duke Older Adults Resources and Services (OARS)

questions about overall subjective health, and activities of daily living (Fillenbaum, 1988) from which a scale for functional health was constructed ($\alpha = 0.85$). The participants' Mini-Mental Status Exam score (MMSE) measured their cognitive ability (Folstein et al., 1975). Psychological resources were assessed through self-reports administered for the NEO-PI R (Costa & McCrae, 1994), for a subset of personality traits chosen based on experience with the first Georgia study: Extraversion ($\alpha = 0.61$), Neuroticism ($\alpha = 0.85$), Ideas ($\alpha = 0.54$), Competence ($\alpha = 0.70$), and Trust ($\alpha = 0.73$). To measure social resources, the centenarians' responses on 12 items were combined ($\alpha = 0.68$) for the Social Provisions Scale (Cutrona & Russell, 1987). Examples of social provision items are: ‘There are people I can depend on to help me, if I really need it’; and ‘There is no one I can trust to turn to for guidance’. Perceived economic status was measured on a three-item scale ($\alpha = 0.74$) from the OARS questions pertaining to income adequacy (Fillenbaum, 1988). Selected items concerning religious, and seeking support coping ($\alpha = 0.62$) were based on the Coping Response Indices Scale (Moos, Cronkite, Billing, & Finney, 1985).

Economic resource variables reported by the proxy—The variables in this domain were obtained from the proxy interview and were based primarily on OARS resource questions (Fillenbaum, 1988). Including these items permits a test of whether economic resources have effects on mental health separate from that for the centenarians' perceptions about resource adequacy. The income variable was obtained as a response for selection among thirteen annual income brackets, coded from 1 to 13 to represent rank-order by income. The Care Services variable is the sum of the number of types of care received by the centenarian (ranging from zero to five, $\alpha = 0.81$) and could include personal care, nursing care, checking on the centenarians' well-being, home chores, and meal preparation. A question sequence adapted from the Asset and Health Dynamics survey (Soldo, Hurd, & Rodgers, 1997) determined whether the centenarians had received any special services such as from a social worker, an adult day center, outpatient rehabilitation, transportation, or meals assistance. The proxy responses were coded to indicate whether any of those services had been received (Community Services). A binary variable also indicates that the proxy reported the centenarian had received help to pay for health costs that were not covered by insurance, Medicare, or Medicaid (Health Cost Help).

Analysis

The analysis involved three steps. First, we obtained the means of the mental health reports for all three raters and tested for differences in those averages to understand how the different raters may have assessed the overall level of mental health for the centenarians. Second, restricted lists of independent variables within domains (e.g., distal resource variables) were used to predict mental health with multiple regression to learn which variables within domains had statistically significant relationships with each mental health rating. Third, for each mental health dependent variable (i.e., for each type of rater), the significant predictors from the within-domain regression results were considered as candidates for the final multiple regression specifications. Initially we planned to include all variables that were significant in the preliminary regressions as final predictors. However based on related analysis of perceived economic status and its relationship to caregiving services and physical health we decided to exclude caregiving services from the final regressions to avoid multicollinearity with ADL. Additionally based on another study in progress we included extraversion as a predictor that we had found to be associated with mental health in an analysis of the effects of caregiving services. Comparisons of the final regression results across the analysis samples for mental health (centenarian, interviewer, and proxy reports) provided the basis for discussion of the different perspectives.

Results

Paired t-tests on the differences between means for the respective pairs clearly rejected the hypothesis of any mean differences ($p > 0.05$). The means of the mental health ratings for the largest number of cases before any reductions for missing data were 1.92 for the centenarians ($N = 117$), 1.94 for the proxy reporters ($N = 117$), and 1.98 for the interviewer ratings ($N = 131$). In other words, with respect to the average level of the mental health score for centenarians, all rater sources were in agreement. Hence we can reject our first hypothesis, which was that proxy and interviewer informants would rate mental health lower than the centenarians' themselves.

Table 1 exhibits the standardized regression coefficients for the mental health predictors within the domains of interest for our three mental health raters, and provides the adjusted R-squared measure of explanatory power for each domain. For all rater types, every domain included at least one variable that had a significant ($p < 0.05$) relationship to mental health. There are obvious differences among the results for the domains across raters. For example, the regressions for the health domain have the greatest explanatory power for the interviewer and proxy ($R^2 = 0.29$ and 0.27, respectively) but for centenarians the social and economic domain possessed greatest explanatory power ($R^2 = 0.20$). In absolute value the largest effect size for the significant predictors varied across raters. For centenarians and proxies, perceived economic status was the most important predictor, whereas for interviewers it was nursing home residence. Still, there were many similar results. Nursing home residence had a substantial negative effect for all rater types, and for all raters the centenarians' perceived economic status had a positive effect. Furthermore, there were common predictors across mental health raters for every domain. Specifically there was cross-rater pair corroboration of significance ($p < 0.05$) or a statistical trend ($p < 0.10$) for distal events, nursing home residence, MMSE, subjective health, personality (neuroticism, and ideas), perceived economic status, the number of types of instrumental care received, and religious coping.

To account for the correlation of significant predictor variables across domains for each rater type and discover which ones are the most important predictors for each of the alternative mental health reports, the final step of the analysis was to include all of the significant predictors in a single regression (except omitting care services based on concern for multicollinearity with ADL, and retaining extraversion). Table 2 contains those final regressions. Considering all raters, the domains represented with at least one significant predictor include demographics, distal resources, health, personality, and social and economic resources.

Figure 1 depicts the significant effects for mental health within regressions for each reporter type. As the figure shows, there is one variable that is significant but not corroborated by another reporter for each analysis sample. Those are: functional health (ADL) for centenarians; distal events for proxy/caregivers; and nursing home residence for interviewers. For the centenarian and proxy rater pairs perceived economic status is a highly significant predictor of mental health. However for the proxies personality and functional health were not significant but those variables were significant predictors among centenarians. The interviewer results do corroborate that neuroticism, and extraversion influenced perceptions of centenarians' mental health. The centenarian's MMSE score was a highly significant predictor of mental health from the perspective of both the proxy and the interviewer, but the centenarians' reports of their mental health were not significantly related to their MMSE. That pattern of results may have occurred because the OARS question about mental health for the interviewer included reference to mental impairment, and the question for the proxy included a reference to the participant's ability to think, but the centenarians were asked simply to rate their mental or emotional health. On the whole, there is agreement

among results for either the proxy or the interviewer with the centenarians' results that extraversion, neuroticism, and perceived economic status were associated with mental health.

With respect to our second hypothesis concerning the relative importance of mental health predictors based on the literature review (such that physical health, personality, and social support would be the best predictors), we reject the hypothesis that social support is important. Instead, perceived economic status was an additional important predictor for the mental health as reported by the centenarian and the proxy. We confirmed our expectation that health is important, as functional capacity and nursing home residence were significantly associated respectively with self-rated and interviewer-rated mental health. Personality (extraversion positively, neuroticism negatively) was an important predictor for centenarians and interviewers, but not for proxies. The finding that MMSE as a measure of cognitive resources was a very strong predictor for the proxy and interviewer ratings also provides evidence to reject our second hypothesis, and thus adds substantially to what we know about mental health from the perspective of informants other than study participants.

Discussion

For centenarians who participated in the most recent phase of the Georgia Centenarian Study we obtained comparisons from mental health reports about the centenarian from proxy/caregivers, and from the interviewer. Contrary to the conjecture of Pinquart and Sörenson (2000) that very old individuals who remain relatively healthy are influenced by their good fortune relative to peers who have not, we found no differences in the mean for ratings of mental health as assessed by the centenarians, proxies, or the interviewer. Substantively, this adds to the existing evidence that centenarians as a group report mental health that is ‘fair’, despite their advanced age and likely reduced circumstances. Thus in the current sample centenarians did not appear to overstate their mental health. An alternative hypothesis we cannot address is that the proxies' involvement with ‘their’ centenarian and the interviewer's exposure to centenarians as a special group has caused them to construct a perspective that is biased upward via some sort of halo effect concerning the participant's mental health. Still, with respect to the single interviewer, systematic bias seems particularly unlikely as her experience interviewing all of the participants should have provided the basis for distinguishing among them for the OARS mental health rating task.

Our finding that there were no differences in mean ratings from the alternative sources encouraged us to examine differences and similarities in potential influences related to how the various raters arrive at the same overall conclusion. For that purpose we compared regressions that predicted mental health separately for each type of rater with common variables that indicated centenarians' distal and proximal resources.

As a general hypothesis about the relative importance of predictors for mental health, we expected to find that physical health, personality, and social support are critical for maintaining an overall sense of mental well-being. Although prior research with community-dwelling centenarians for Phase 1 of the Georgia Centenarian Study had also identified those variables as important positive influences on mental health (Adkins et al., 1996; Martin, 2002), we failed to confirm the importance of social support in the present study, which includes residents of nursing homes. Additionally, Martin (2002) measured social support by the interviewers' rating of social resources overall, while here social support was measured using the Social Provisions Scale (Cutrona & Russell, 1987) as reported by centenarians. Further research is recommended to identify what specific aspects of social support are most important for centenarians' mental health.

For personality, our finding that Extraversion was related to centenarians' self-assessment ($p < 0.05$) as well as to the interviewer's rating of mental health confirms the importance of that variable as found for morale by Adkins et al. (1996). Additionally, neuroticism had a negative effect on mental health (except for the proxy reporter). Other aspects of personality such as locus of control (Landau & Litwin, 2001) have also been found to predict mental health among oldest old adults. Hence, the current study once again emphasizes that personality may be a critical factor for resiliency in very late life.

For mental health among community-dwelling centenarians in Georgia, (Martin, 2002), it has been established that perceived resource adequacy is positively related to well-being. The current study has confirmed the positive effect of perceived economic resources on centenarians' mental health assessment with the same effect for proxy reports on mental health. However the centenarians' report of resource adequacy was not a significant predictor in our model for interviewer mental health ratings. Instead, nursing home residence may have captured that effect, as it was a significant negative influence on interviewers' mental health rating and presumably basic resource needs are met by nursing homes. Hence, analyzing the relationship of services and resources to perceived economic status in future research could clarify the role of basic resources such as income and caregiving support as background factors that may also have direct effects on mental health in addition to their role as influences on perceived economic status.

Compared to earlier studies, the theoretical framework we adopted recommended more attention to distal influences such as an engaged life style, or cumulative experience with important life events. Additionally, the focus on adaptation behaviors in the developmental adaptation model (Martin & Martin, 2002) led us to include proximal events too as potential stressors and to consider specific coping responses via religion or seeking support as a coping mechanism. Distal events were found to be a significant and positive predictor in the sample for the proxy mental health raters, and in the preliminary regressions for the interviewer rating. From the distal domain preliminary analysis, we also found that engaged lifestyle (interviewer) and occupation (centenarian) had positive mental health effects. This tentative support for the importance of distal variables suggests that more careful disaggregation of event types and a focus on specific experiences could yield better information about how centenarians' individual histories contribute to their longevity. Whether proximal events or coping deserves further attention seems doubtful because the only significant result in that domain was restricted to religious coping in the preliminary analysis for the interviewer ratings. Perhaps the role of religious and other forms of coping is more important for global measures such as overall life-satisfaction, or constructs concerning meaning in life.

Our interpretation of the results across different sources and for rater pair comparisons may be misleading to the extent that the interviewer's reports of centenarians' mental health were affected by their knowledge of the centenarians' self-reports. Related to this point, the proxy would not have known about the centenarians' self-report, which would provide another source of bias for comparing the average reports of mental health levels across rater pairs as well as affecting comparisons about predictors for proxies compared to centenarians and the interviewer.

Implications for future research and practice

Our most distinctive finding may be that MMSE is an important predictor of mental well-being from the perspective of persons other than the centenarian. Evidently our study's proxy/caregivers and interviewers consider cognitive ability to be an important and readily observable aspect of mental health. However from the Georgia centenarians' own perspective the critical health domain variable for mental well-being is functional capacity.

An important next step could be to identify those centenarians for which cognition was likely impaired.

Another strong implication of this study is that gerontologists need to recognize that their findings related to associations between mental health and other variables may be strongly influenced by who provided the mental health data. For example, a study focusing on activities of daily living and mental health may be more likely to find a significant association with self-reports than if proxies are used. That is, although we found that there is high inter-rater reliability among self, proxy, and interviewer mental health reports and thus want to encourage the use of multiple informants, there is still the need to be aware that the type of report influences whether or not we find significant associations with other key variables.

Taking the comparative regression results here as a guide, it may help to be explicit about when to use proxies and when not. Using proxy reports on mental health may partially measure MMSE and thus not be as effective as centenarians' self-reports unless it is possible to identify better which centenarians are not cognitively impaired and focus on them entirely. Conversely, if resources do not permit testing for mental ability, proxy ratings of mental health may provide a useful measure that captures those informants' knowledge of the participants' mental ability and emotional health together. Caregiver/proxy reports of mental health were not related to personality traits reported by the centenarian in our study whereas we did find associations between those traits and self-reported mental health so that self-reports would be recommended for personality research. (However we have not analyzed how proxy reports of personality characteristics are related to proxy mental health reports, and that strategy could be fruitful.) Centenarians' perceived economic status was strongly related to both centenarians' own mental health and the proxy reports, indicating that studies concerned with economic resource issues may want to concentrate on proxies as informants about resource adequacy as well as using them to supply data about income and caregiving services. In fact our results relied on proxies for income and care service reports, which may have attuned the proxies to the resource adequacy aspects of their centenarians' well-being.

A recommendation for mental health professionals and caregivers concerned with maintaining psychological well-being among the oldest-old is to be aware that caregivers have a strong tendency to equate cognitive ability with mental health. However self-reported mental health ratings from centenarians in our study are correlated instead with their functional health and economic resources. Fortunately, even though elderly individuals' cognition tends to decline there are ways to maintain cognitive ability, overcome functional health limitations, and remain vigilant about and respond to their unmet economic needs.

Study limitations—To test the sensitivity of our results and conclusions that were based on the largest number of cases available for each mental health reporter separately we also obtained regressions using the same predictors for the smaller analysis samples for the two rater pair types involving centenarians. (e.g. the smallest listwise deletion $n = 74$ for centenarians-interviewers, and 71 for centenarians-proxies). Despite the reductions in the number of cases, the substantive results from the smaller paired samples were very similar to the results reported in Table 2 and summarized in Figure 1. However there was one exception. The effect of neuroticism for the centenarians' self-report in the interviewer–centenarian paired analysis sample became non-significant. Hence although our sensitivity analysis generally supported our strategy of relying on the largest analysis samples separately, the results of that analysis do suggest caution with respect to our conclusion that both the interviewer and the centenarian mental health reports are negatively associated with neuroticism. Throughout our study we have also relied primarily on the centenarians' self-

reports for most of the predictor variables, and thus we have not analyzed the correspondence between regression results based on proxy reports for defining predictor variables and their mental health rating to the centenarians' results when using centenarians reports on the predictors as well as their mental health. Such comparison could provide an additional basis for considering correspondence among correlates of mental health. With respect to omitted variables, our results may not capture systematic differences among centenarians on personality traits such as self-efficacy and locus of control that may moderate their sense of mental well-being. However we have established that there are important commonalities among mental health raters, which is encouraging to develop a measurement model with our three mental health reports as indicators of a latent mental health factor, and in that context we can contrast the predictive ability of proxy and centenarians' reports of centenarians' characteristics.

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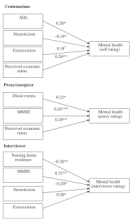

Figure 1.
Estimated effects of resource domain variables on mental health.
Note: $^{*}p < 0.05$; $^{**}p < 0.01$; $^{***}p < 0.001$; $^{\dagger}p < 0.10$.

Table 1

Standardized regression coefficients for mental health ratings by domain.

Domain	Self (*β*)	Interviewer (*β*)	Proxy (*β*)
Demographics	*n = 135*	*n = 133*	*n = 119*
Age	0.08	−0.02	0.01
Female	−0.17*	0.03	−0.05
Nursing home residence	−0.21*	−0.48**	−0.25**
African-American	0.04	−0.04	−0.05
Adjusted R^2	*0.04*	*0.20*	*0.06*
Distal resources	*n = 125*	*n = 125*	*n = 111*
Engaged lifestyle	−0.05	0.23*	0.13
Distal events	0.09	0.23*	0.28*
Education	0.11	−0.12	0.03
Occupation	0.22*	0.06	0.05
Adjusted R^2	*0.09*	*0.09*	*0.12*
Health	*n = 132*	*n = 129*	*n = 114*
ADL	0.24*	0.02	0.12
Subjective health	0.23*	0.19*	0.12
MMSE	0.10	0.49***	0.43***
Adjusted R^2	*0.17*	*0.29*	*0.27*
Personality	*n = 88*	*n = 88*	*n = 85*
Competence	0.05	0.06	0.01
Extraversion	0.13	0.17	0.11
Ideas	0.20†	0.07	0.18†
Neuroticism	−0.27*	−0.29**	−0.01
Trust	0.12	0.09	0.28*
Adjusted R^2	*0.14*	*0.13*	*0.13*
Social and economic	*n = 95*	*n = 95*	*n = 91*
Social provisions	0.19*	0.14	0.17†
Perceived economic status	0.42*	0.21*	0.36***
Adjusted R^2	*0.20*	*0.05*	*0.17*
Other economic resources	*n = 81*	*n = 81*	*n = 81*
Income	0.16	0.15	0.13
Care services	−0.21†	−0.35*	−0.27*
Community services	0.15	0.03	0.01
Health cost help	−0.04	−0.02	0.15
Adjusted R^2	*0.08*	*0.13*	*0.08*
Stress and coping	*n = 127*	*n = 125*	*n = 111*
Proximal events	−0.03	−0.03	0.01

Domain	Self (*β*)	Interviewer (*β*)	Proxy (*β*)
Religious coping	−0.02	0.29*	0.18†
Support coping	0.05	−0.07	0.01
Adjusted R^2	*0.02*	*0.06*	*0.03*

Note.

* $p < 0.05$;

** $p < 0.01$;

*** $p < 0.001$;

† $p < 0.10$.

Table 2

Standardized (Beta) coefficients for mental health ratings by centenarian, interviewer, and proxy/caregiver.

	Centenarian	Interviewer	Proxy
	n = 95	*n = 101*	*n = 91*
Domain and predictors			
Demographics			
Nursing home residence		−0.28**	
Distal resources			
Engaged lifestyle		0.05	
Distal events			0.22*
Health			
ADL	0.20*		
Subjective health	0.14	0.13	0.05
Mental status		0.32**	0.36***
Personality			
Extraversion	0.18†	0.20*	
Neuroticism	−0.19*	−0.20*	
Social and economic			
Social provisions	0.08	−0.04	0.11
Perceived economic status	0.26**		0.29**
Stress and coping			
Religious coping	−0.11	0.13	0.07
Adjusted R^2	*0.30*	*0.49*	*0.35*

Note.

* $p < 0.05$;

** $p < 0.01$;

*** $p < 0.001$;

† $p < 0.10$.