Special Article

LACK OF HEALTH INSURANCE AND DECLINE IN OVERALL HEALTH IN LATE MIDDLE AGE

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ABSTRACT

Background The number of adults in their 50s and 60s in the United States who do not have health insurance is increasing. This group may be particularly vulnerable to the ill effects of being uninsured.

Methods We conducted a prospective cohort study using files from the Health and Retirement Study, a national survey of adults who were 51 to 61 years old in 1992. We determined the risks of a major decline in overall health and of the development of new physical difficulties between 1992 and 1996 for participants who were continuously uninsured (uninsured in 1992 and in 1994), those who were intermittently uninsured (uninsured either in 1992 or in 1994), and those who were continuously insured. We used logistic regression to determine the independent effects of being uninsured on health outcomes after adjustment for base-line sociodemographic factors, preexisting medical conditions, and types of health-related behavior such as smoking and alcohol use.

Results We analyzed data for 7577 participants. The 717 continuously uninsured participants and the 825 intermittently uninsured participants were more likely than the 6035 continuously insured participants to have a major decline in overall health between 1992 and 1996 (21.6 percent, 16.1 percent, and 8.3 percent of the three groups, respectively; $P<0.001$ for both comparisons). According to a multivariate analysis, the adjusted relative risk of a major decline in overall health was 1.63 (95 percent confidence interval, 1.26 to 2.08) for continuously uninsured participants and 1.41 (95 percent confidence interval, 1.11 to 1.78) for intermittently uninsured participants, as compared with continuously insured participants. A new difficulty in walking or climbing stairs was also more likely to develop in the continuously or intermittently uninsured participants than in the continuously insured participants (28.8 percent, 26.4 percent, and 17.1 percent of the three groups, respectively; $P<0.001$ for both comparisons). The adjusted relative risk of such a new physical difficulty was 1.23 (95 percent confidence interval, 1.02 to 1.47) for the continuously uninsured participants and 1.26 (95 percent confidence interval, 1.01 to 1.54) for the intermittently uninsured participants.

Conclusions The lack of health insurance is associated with an increased risk of a decline in overall health among adults 51 to 61 years old. (N Engl J Med 2001;345:1106-12.)

NUMEROUS studies have shown that people without health insurance use fewer health care services[1-4] and report greater unmet health care needs[5] than people with health insurance. However, far fewer studies have examined the effects on health of being uninsured. In the general population, persons without health insurance have a higher mortality rate than persons with private insurance.[6,7] There is a similar difference between uninsured and insured women with breast cancer.[8] Less is known about the effects of being uninsured on overall health and physical functioning. In two studies, persons who lost insurance coverage reported poorer general health and worse blood-pressure control than those who maintained insurance coverage.[9-11] However, access to care for the uninsured varies greatly among communities,[12] so the independent association between the lack of health insurance and the risk of a decline in health is not well defined.

Approximately 16 percent of adults in late middle age in the United States are uninsured.[13] The proportion of people 55 to 64 years old who were uninsured increased from 12.9 percent in 1998 to 16.1 percent in 1999.[13,14] This group may be particularly vulnerable to the ill effects of being uninsured. Using data from the Health and Retirement Study, we examined the relation between the lack of health insurance and changes in health over four years for adults who were 51 to 61 years old in 1992.

METHODS

Study Population

Our study was approved by the institutional review board of the MetroHealth Medical Center. The Health and Retirement Study is a nationally representative, longitudinal study sponsored by the National Institute on Aging and conducted by the Institute for Social Research at the University of Michigan. Analyses were conducted with the use of publicly available data files from the Health and Retirement Survey.[15] That study targeted community-dwelling

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adults in the contiguous United States who were 51 to 61 years old in 1992. Blacks, Hispanics, and Florida residents were oversampled. The spouses or partners of participants who were not eligible for the study themselves because of their age were interviewed, but we excluded them from our analysis because they are not representative of the U.S. population. In the Health and Retirement Study, in-home interviews were conducted in 7702 households (an 82 percent response rate), yielding 9824 participants between 51 and 61 years old for the initial interview. Follow-up interviews were conducted every two years. Vital status was determined through the National Death Index and household contacts.

We restricted our study to participants who reported having private health insurance or no insurance in 1992. We excluded those who were covered by Medicare or Medicaid at base line, because these persons are likely to have had qualifying medical conditions (e.g., renal failure) or disabilities that were not fully measured in the Health and Retirement Study. Participants who were covered exclusively by the Department of Veterans Affairs or the Civilian Health and Medical Program of the Uniformed Services at base line were also excluded, but those who had private insurance in addition to such coverage were included and classified as insured.

Insurance Status

Insurance status was determined for 1992 and 1994. Participants were classified as uninsured if they did not have public or private insurance at the time of their interview or if they had only catastrophic coverage. For 1992, participants were classified as insured if they had private insurance. For 1994, participants were classified as insured if they had either private or public insurance. Thus, the 244 participants who switched to coverage by Medicare or Medicaid in 1994 were included in all analyses and were classified as insured in 1994 regardless of whether or not they were insured in 1992. Participants were then classified as continuously insured (insured in both 1992 and 1994), continuously uninsured (insured neither in 1992 nor in 1994), or intermittently uninsured (uninsured either in 1992 or in 1994).

Covariates

All multivariate models were adjusted for age, sex, race or ethnic background, marital status, educational level, household income, past or current smoking, alcohol consumption, and number of positive responses on the CAGE questionnaire.[16] This questionnaire is a four-question screening instrument for alcoholism whose name is a mnemonic designating someone who has attempted to "cut down" on alcohol consumption, is "annoyed" by criticism of his or her drinking, feels "guilty," and needs an "eye-opener" drink in the morning. The presence of two or more of these characteristics is considered indicative of an alcohol-use disorder. Body-mass index (the weight in kilograms divided by the square of the height in meters), number of chronic conditions (hypertension, diabetes, heart disease, chronic lung disease, cancer, arthritis, stroke, or difficulties with vision),[17] and presence or absence of a change in overall health in the year before study entry were also included in all models.

Self-Reported Overall Health and Physical Difficulties

Self-reported overall health was assessed with the following question: "Would you say your health is excellent, very good, good, fair, or poor?" On the basis of participants' responses to this question in 1992 and 1996, we created the dichotomous outcome variable "major decline in self-reported health between 1992 and 1996," defined as the presence or absence of either a decline from excellent, very good, or good health in 1992 to fair or poor health in 1996 or a decline from fair health in 1992 to poor health in 1996. We also analyzed the dichotomous outcome "any improvement in self-reported health."

To assess changes in physical functioning, we used two sets of questions previously described by the Health and Retirement Study investigators.[18] The four questions about mobility assess the ease or difficulty of activities requiring large-muscle strength, asking how difficult it is for the participant to walk several blocks, walk one block, climb one flight of stairs without resting, and climb several flights of stairs without resting. The six questions about agility assess the ease or difficulty of activities required to perform instrumental activities of daily living; they ask participants how difficult it is for them to sit for two hours, get up from a chair after sitting for long periods, lift or carry weights of more than 4.5 kg (10 lb), stoop, kneel, or crouch, pull or push a large object, and reach or extend their arms above the shoulder level.

Different options for the responses to the questions about physical functioning were used in 1992 and 1996. In 1992, the options were "not at all difficult," "a little difficult," "somewhat difficult," and "very difficult or can't do." In 1996, respondents were asked "Do you have any difficulty?" and were asked to choose among "no," "yes," and "can't do." Because of these differences, we thought the most valid indicator of a change in health was the development of a new physical difficulty (i.e., a shift from "not at all difficult" in 1992 to a response of "yes" or "can't do" in 1996). We do not present data on improvements in physical functioning because a substantial proportion of these changes consisted of shifts from "a little difficult" in 1992 to "no" in 1996. Thus, an apparent improvement may not represent a true change in physical functioning but may instead be an effect of the 1996 response options, which did not encourage respondents to report minimal physical difficulties.

To identify participants in whom a new physical difficulty developed, all 1992 and 1996 questions were collapsed into dichotomous variables indicating no difficulty or some difficulty.[19] Participants who said they had no difficulty with an activity in 1992 and then said they "did not do" an activity in 1996 (7.5 percent of participants for any item related to mobility and 6.0 percent for any item related to agility) were categorized as having a new physical difficulty.[18] We based this categorization on the assumption that most persons 51 to 61 years old routinely perform the activities covered by the survey unless they have physical limitations, as well as on the empirical observation that the participants who said they "did not do" an activity had overall health that was similar to that of those who said they had difficulty. Finally, we created dichotomous outcome variables for both the questions about mobility and those about agility that indicated the presence or absence of a new physical difficulty with one or more activities.

Statistical Analysis

Analyses were conducted with the use of Stata statistical software (version 6, Stata, College Station, Tex.). All analyses were adjusted for the complex design of the survey and for the person-level analytic weights provided by the Health and Retirement Study. Bivariate analyses were conducted with the use of second-order corrected Pearson statistics for dichotomous variables[20] and adjusted Wald statistics for continuous variables.[21] Multivariate analyses were conducted by means of logistic regression with adjustment for the covariates listed above. Because a decline could not occur and a new difficulty could not develop in participants who reported being in the worst possible state of health in 1992, the relevant analyses excluded the 360 participants (4.8 percent of the cohort) who were in poor health at base line, the 453 participants (6.0 percent) who had difficulties with four of the activities related to mobility, or the 236 participants (3.1 percent) who had difficulties with six activities related to agility. Conversely, 1798 participants who were in excellent health at base line (23.7 percent of the cohort) were excluded from the analysis of improvement in overall health. Odds ratios were converted to relative risks by means of published formulas.[22]

RESULTS

Of the 9824 participants between 51 and 61 years old who were interviewed in 1992, 1138 (11.6 percent) were lost to follow-up, 377 (3.8 percent) died, 665 (6.8 percent) were excluded from our study be-

cause they had public insurance in 1992, and 67 (0.7 percent) had missing data. Of the remaining 7577 participants, 6035 (79.6 percent) were continuously insured, 825 (10.9 percent) were intermittently uninsured, and 717 (9.5 percent) were continuously uninsured. The continuously uninsured and intermittently uninsured participants were more likely than the continuously insured participants to be women, nonwhite, and unmarried and had less education and a lower income (Table 1). The continuously or intermittently uninsured participants were also more likely to smoke, to have a history of problem drinking (i.e., two or more positive responses on the CAGE questionnaire), to be in fair or poor health, to have had a decline in health during the year before study entry, and to report more chronic medical conditions and physical difficulties.

Self-Reported Overall Health

Both the continuously and the intermittently uninsured participants were more likely to have a major decline in self-reported overall health between 1992 and 1996 than the continuously insured participants (21.6 percent, 16.1 percent, and 8.3 percent, respectively, of the three groups; $P<0.001$ for both comparisons) (Table 2). After adjustment for other base-line characteristics, the continuously uninsured participants had a higher risk of a major decline in health than the continuously insured participants (adjusted relative risk, 1.63; 95 percent confidence interval, 1.26 to 2.08). The relative risk of a major decline in health for the continuously uninsured participants varied according to the base-line health status (Fig. 1A), with the risk being greatest for those who were in excellent health at base line. The intermittently uninsured participants were also at higher risk for a major decline in health than the continuously insured participants (adjusted relative risk, 1.41; 95 percent confidence interval, 1.11 to 1.78) (Table 2). The relative risk for the uninsured participants was similar regardless of sex, race or ethnic background, and income (data not shown).

The proportion of participants who had any improvement in overall health was similar among the continuously insured participants, the intermittently uninsured participants, and the continuously uninsured participants (28.9 percent, 26.4 percent, and 27.9 percent, respectively; $P=0.80$ for the comparison of the three groups); the results of multivariate analysis also showed no significant differences (Table 2).

Physical Functioning

New difficulties with mobility were more likely to develop in the continuously and intermittently uninsured participants between 1992 and 1996 than in the continuously insured participants (Table 3). The adjusted relative risk was greater for those who reported no difficulties or difficulty in performing one activity at base line than for those who reported difficulties in two or three areas (Fig. 1B). According to unadjusted analyses, new difficulties with agility were slightly more likely to develop in the continuously and intermittently uninsured participants than in the continuously insured participants (Table 3). However, multivariate analyses did not show such increases in risk (Table 3).

Sensitivity Analyses

We used a random-number generator to add hypothetical data indicating the presence of one additional chronic condition to the profiles of 10 percent of the continuously uninsured participants to account for possible underreporting of medical conditions. This addition caused only small reductions in the relative risk of a major decline in overall health and in the risk of a new difficulty with mobility. Under a more extreme assumption that 20 percent of the continuously uninsured participants were unaware of a chronic medical condition, their relative risk of a major decline in health as compared with the continuously insured participants was 1.53 (95 percent confidence interval, 1.19 to 1.96; $P=0.002$), and their relative risk of a new difficulty with mobility was 1.19 (95 percent confidence interval, 0.98 to 1.42; $P=0.07$).

DISCUSSION

After adjustment for base-line differences, we found that the continuously uninsured participants were 63 percent more likely than the privately insured participants to have a decline in their overall health between 1992 and 1996 and 23 percent more likely to have a new physical difficulty that affected walking or climbing stairs (i.e., a difficulty with mobility). Our findings are consistent with those of two previous studies that showed that persons who lost insurance coverage were more likely than others to have a decline in health.[9-11] The strength of these earlier studies is that they were natural experiments in which patients categorically lost insurance coverage without regard to their individual characteristics or preferences. However, the small size of the studies limited their generalizability to the broader uninsured population, in which the ability to obtain medical care may vary greatly among communities.[12] In contrast, we used data from a nationally representative sample.

We used multivariate methods to adjust for differences in base-line socioeconomic status, health, and health-related behavior between the insured and the uninsured participants. The chief threat to the validity of our findings is the possibility that we were unable to adjust completely for these differences. Moreover, uninsured persons may differ from insured persons in ways that we were unable to measure. For example, Fiscella et al. reported that persons who are skeptical about medical care use less health care[23] and have a higher mortality rate.[24] Such persons could also be

TABLE 1. BASE-LINE CHARACTERISTICS OF THE 7577 PARTICIPANTS.*

CHARACTERISTIC	INSURANCE STATUS IN 1992 AND 1994			P VALUE†
	CONTINUOUSLY INSURED (N=6035)	INTERMITTENTLY UNINSURED (N=825)	CONTINUOUSLY UNINSURED (N=717)	
Age (yr)	55.9±0.05	55.7±0.11	55.8±0.15	0.09
Female sex (%)	51.7	56.7	59.5	<0.001
Race or ethnic group (%)				<0.001
Non-Hispanic white	87.4	76.8	63.0	
Non-Hispanic black	7.3	11.7	14.0	
Hispanic	3.4	8.2	19.1	
Other	1.8	3.2	3.9	
Marital status (%)				<0.001
Married	80.6	70.0	62.1	
Separated, divorced, or widowed	16.4	25.3	34.1	
Never married	3.1	4.7	3.9	
Years of education (%)				<0.001
0–8	5.3	15.5	27.7	
9–11	12.4	17.9	23.8	
12 or GED	38.2	35.2	28.6	
>12	44.0	31.4	19.9	
Income(%)‡				<0.001
<100% of poverty level	2.0	14.8	23.3	
100–149% of poverty level	2.2	8.2	14.6	
150–199% of poverty level	4.3	8.9	11.0	
200–299% of poverty level	12.2	15.5	20.1	
300–499% of poverty level	27.8	25.0	17.7	
≥500% of poverty level	51.5	27.6	13.3	
Smoking status (%)				<0.001
Never	37.6	35.8	34.9	
Past	39.1	31.3	26.3	
Current	23.3	32.9	38.9	
Daily alcohol consumption (%)				<0.001
None	32.6	39.4	49.0	
<1 drink	50.7	45.3	34.6	
1–2 drinks	12.0	10.2	9.7	
≥3 drinks	4.7	5.0	6.8	
No. of positive responses on CAGE questionnaire (%)§				0.002
0	77.5	77.0	70.8	
1	10.6	8.2	12.5	
≥2	12.0	14.8	16.7	
Body-mass index¶	26.9±0.07	27.2±0.23	27.4±0.35	0.14
No. of chronic diseases‖	1.05±0.01	1.18±0.05	1.15±0.05	0.02
Self-reported health status (%)				<0.001
Poor	3.4	7.6	8.7	
Fair	9.9	15.0	21.0	
Good	26.3	28.6	28.5	
Very good	33.4	26.2	26.2	
Excellent	27.0	22.6	15.7	
Change in health during previous year (%)				<0.001
Worse	8.4	16.0	14.2	
Same	77.0	69.7	71.0	
Better	14.6	14.3	14.8	
No. of difficulties with mobility**	0.79±0.02	1.12±0.06	1.23±0.07	<0.001
No. of difficulties with agility††	1.46±0.03	1.84±0.08	1.88±0.10	<0.001

*All results have been adjusted for the complex design of the survey and analytic weights. Because of rounding, percentages may not total 100. Plus–minus values are means ±SE. GED denotes general equivalency diploma.

†Significance tests for continuous variables were performed with an adjusted Wald test (approximate F statistic). Significance tests for categorical variables were performed with the Pearson chi-square statistic.

‡The federal poverty-level guidelines are based on the total household income and family size.

§The CAGE (a mnemonic designating someone who has attempted to "cut down" on alcohol consumption, is "annoyed" by criticism of his or her drinking, feels "guilty," and needs an "eye-opener" drink in the morning) is a four-question screening instrument for alcoholism; the presence of two or more of these characteristics is considered indicative of an alcohol-use disorder.

¶The body-mass index is the weight in kilograms divided by the square of the height in meters.

‖Chronic diseases included hypertension, diabetes, heart disease, chronic lung disease, cancer, arthritis, stroke, and difficulties with vision.

**The mobility scale ranges from 0 to 4, with higher scores indicating more difficulty walking and climbing stairs.

††The agility scale ranges from 0 to 5, with higher scores indicating more difficulty with instrumental activities of daily living.

TABLE 2. CHANGES IN SELF-REPORTED OVERALL HEALTH STATUS FROM 1992 TO 1996.*

VARIABLE	CONTINUOUSLY INSURED	INTERMITTENTLY UNINSURED	P VALUE	CONTINUOUSLY UNINSURED	P VALUE
Decline in overall health					
No. of participants eligible for analysis	5815	757		645	
Major decline — no. (%)	483 (8.3)	122 (16.1)	<0.001	139 (21.6)	<0.001
Relative risk of decline — risk (95% CI)					
Crude	1.00	1.94 (1.57–2.38)	<0.001	2.59 (2.15–3.10)	<0.001
Adjusted†	1.00	1.41 (1.11–1.78)	0.006	1.63 (1.26–2.08)	<0.001
Improvement in overall health					
No. of participants eligible for analysis	4500	662		617	
Any improvement — no. (%)	1300 (28.9)	175 (26.4)	0.67	172 (27.9)	0.62
Relative risk of improvement — risk (95% CI)					
Crude	1.00	0.97 (0.84–1.11)	0.67	0.96 (0.81–1.13)	0.62
Adjusted†	1.00	0.97 (0.82–1.13)	0.70	0.93 (0.77–1.10)	0.41

*P values are for the comparison with continuously insured participants (the reference category). Because participants who were in poor health in 1992 could not have a decline and those who were in excellent health in 1992 could not have an improvement, the analyses excluded 360 and 1798 participants, respectively. CI denotes confidence interval.

†Relative risks have been adjusted for age, sex, race or ethnic group, income, educational level, smoking status, level of alcohol consumption, presence or absence of evidence of an alcohol-use disorder, body-mass index, number of chronic diseases, base-line health status and physical functioning, and change in health in the year before study entry.

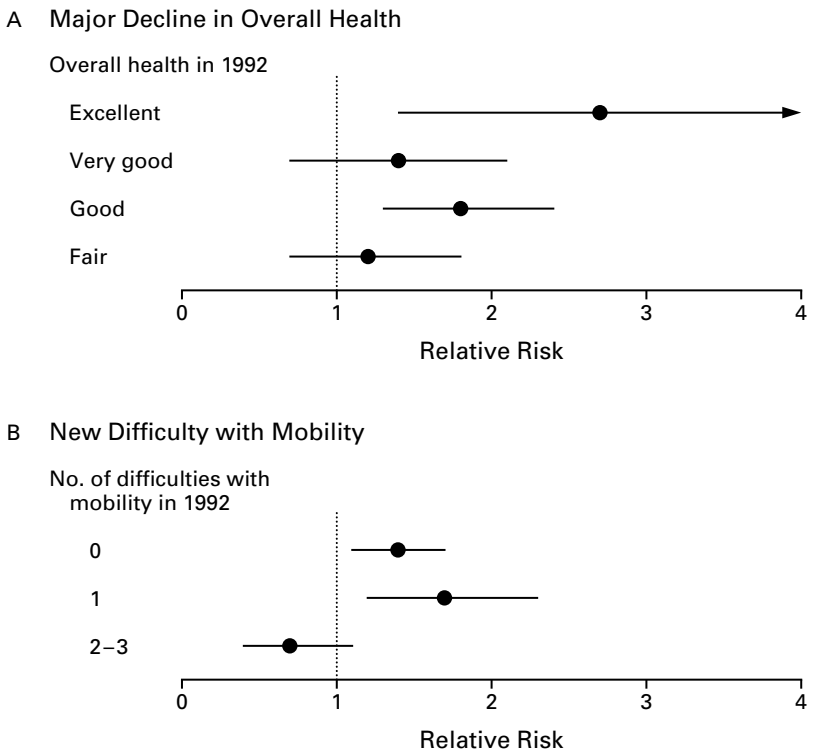

Figure 1. Estimated Adjusted Relative Risk (with 95 Percent Confidence Intervals) of a Major Decline in Overall Health (Panel A) and the Development of a New Difficulty with Mobility (Panel B) between 1992 and 1996 for Continuously Uninsured Participants as Compared with Continuously Insured Participants, According to Overall Health Status and the Number of Difficulties with Mobility at Base Line.

The interactions between insurance coverage and overall health status at base line and between insurance coverage and difficulties with mobility at base line were both significant ($P<0.05$).

TABLE 3. RISK OF DEVELOPMENT OF A NEW DIFFICULTY WITH MOBILITY OR AGILITY BETWEEN 1992 AND 1996.*

VARIABLE	CONTINUOUSLY INSURED	INTERMITTENTLY UNINSURED	P VALUE	CONTINUOUSLY UNINSURED	P VALUE
Mobility					
No. of participants eligible for analysis	5736	746		642	
New difficulty — no. (%)	981 (17.1)	197 (26.4)	<0.001	185 (28.8)	<0.001
Relative risk of new difficulty — risk (95% CI)					
Crude	1.00	1.54 (1.29–1.83)	<0.001	1.68 (1.45–1.93)	<0.001
Adjusted†	1.00	1.26 (1.01–1.54)	0.04	1.23 (1.02–1.47)	0.03
Agility					
No. of participants eligible for analysis	5884	780		677	
New difficulty — no. (%)	1895 (32.2)	297 (38.1)	0.003	262 (38.7)	0.003
Relative risk of new difficulty — risk (95% CI)					
Crude	1.00	1.18 (1.06–1.31)	0.003	1.20 (1.07–1.34)	0.003
Adjusted†	1.00	1.02 (0.90–1.15)	0.71	0.94 (0.81–1.09)	0.43

*P values are for the comparison with the continuously insured participants (reference category). Because participants who had the maximal number of difficulties with mobility or agility in 1992 could not have a new difficulty in that area, the analyses excluded 453 and 236 participants, respectively. CI denotes confidence interval.

†Relative risks have been adjusted for age, sex, race or ethnic group, income, educational level, smoking status, level of alcohol consumption, presence or absence of evidence of an alcohol-use disorder, body-mass index, number of chronic diseases, base-line health status and physical functioning, and change in health in the year before study entry.

less likely to participate in employer-sponsored insurance programs or to purchase individual policies. Thus, the relation between the lack of insurance and adverse health outcomes might be attributable in part to unmeasured, systematic differences between insured and uninsured persons. However, even under the extreme assumption that 20 percent of the uninsured participants were unaware that they had a chronic disease (e.g., hypertension) because they had received less medical care than the insured participants, the increase in the risk of a major decline in overall health remained significant.

Our finding that there was an increased risk in adverse health outcomes among the uninsured participants regardless of sex, race, and income is consistent with the results of a previous study which found self-reported barriers to care for the uninsured.[5] However, the increase in the risk of a major decline in health for the uninsured was greater among participants who were in better health at base line (Fig. 1). There are several possible explanations for this finding. Continuously uninsured participants who were in fair health at base line may have had established relationships with health care providers that mitigated the effect of being uninsured, whereas those who were in better health at base line may have sought care through emergency departments when problems developed. Alternatively, our findings could reflect the fact that questionnaires about health status are often less able to detect clinically important changes among those who are in worse health at base line.[25]

The intermittently uninsured participants were also at increased risk for declines in overall health and mobility. This finding is consistent with recent studies reporting that intermittently uninsured persons were less likely than others to have a primary care provider,[26] more likely to delay seeking care,[26] and more likely to go without needed care.[5,27] Nevertheless, our ability to draw definite conclusions from the Health and Retirement Study data is limited, because insurance coverage was assessed only every two years. Some participants may have lost health insurance coverage between 1992 and 1994 because a decline in health made them unable to work, although a previous study using this data set found that such occurrences were unusual.[28] Conversely, some participants may have become insured between 1992 and 1994 because a disabling condition developed that qualified them for Medicaid or Medicare. Inclusion of these two subgroups in the intermittently uninsured group would inflate our estimate of the relative risk of a decline in health for that group, but it might lower the estimates of risk among the continuously insured participants.

The number of uninsured adults in late middle age has been increasing,[13,14,29] and there is concern about whether this trend can be reversed by current policy initiatives.[28-31] Older adults are uninsured for many different reasons, and this makes it more difficult to increase insurance coverage substantially.[30,31] Proposals to allow selected persons between 62 and 64 years old to buy into Medicare would not reach

most of the target population of this study.[32] Renewed efforts at comprehensive reform of the U.S. system of health insurance may be needed to increase coverage among adults in late middle age.[30]

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