ORIGINAL RESEARCH

Religious Attendance: More Cost-Effective Than Lipitor?

Daniel E. Hall, MD, MDiv

Background: **A recent meta-analysis demonstrates a robust but small association between weekly religious attendance and longer life. However, the practical significance of this finding remains controversial.**

Methods: **Age specific, actuarial death rates were modified according to published odds ratios to model the additional years of life attributable to: (1) weekly religious attendance; (2) regular physical exercise; and (3) statin-type lipid-lowering agents. Secondary analyses estimated the approximate cost for each additional year of life gained.**

Results: **Weekly attendance at religious services accounts for an additional 2 to 3 life-years compared with 3 to 5 life-years for physical exercise and 2.5 to 3.5 life-years for statin-type agents. The approximate cost per life-year gained was between \$2,000 and \$6,000 for regular exercise, \$3,000 and \$10,000 for regular religious attendance, and between \$4,000 and \$14,000 for statin-type agents.**

Conclusion: **The real-world, practical significance of regular religious attendance is comparable to commonly recommended therapies, and rough estimates even suggest that religious attendance may be more cost-effective than statins. Religious attendance is not a mode of medical therapy, but these findings warrant more and better quality research designed to examine the associations between religion and health, and the potential relevance such associations might have for medical practice. (J Am Board Fam Med 2006;19:103–9.)**

Of all the research investigating the associations between faith and health, the strongest findings come from epidemiologic mortality studies.[1] A recent meta-analysis demonstrates a robustly lower mortality rate for those who attend religious services once a week or more when compared with the general population (odds ratio [OR] = 0.78, 95% CI, 0.72, 0.83, $P < .001$).[2] Although critics of this research accept the statistical and methodological rigor of this finding,[1,3] they have criticized the results as clinically insignificant compared with other health interventions.[3]

Odds ratios and proportional hazards are powerful abstractions, but in the setting of mortality risk, they are often difficult to translate into intuitive terms that are easily interpretable for real-world practical significance. McCullough et al[4] used the binomial effect size to suggest that the practical impact on mortality of weekly religious attendance is similar to the impact of (1) statin-type drugs for high-risk coronary heart disease (CHD), (2) exercise-based rehabilitation following myocardial infarction or coronary artery bypass graft, and (3) the risk of heavy drinking. However, the importance of the statistical association between religious attendance and mortality remains debatable for at least 2 reasons: first, the binomial effect size requires the unlikely assumption of a 50% base mortality rate[5]; second, the analysis of McCullough et al compares religious attendance with secondary prevention therapies despite the fact that religious attendance is most analogous to primary prevention strategies such as daily physical exercise.

An alternative approach to interpreting the practical importance of mortality statistics is to express the odds ratio or proportional hazard in terms of life expectancy. Age-adjusted mortality rates are calculated from census data and constitute the foundation of standard life tables. By adjusting the

Submitted 5 October 2004; revised 5 October 2005; accepted 11 October 2005.
From the Department of General Surgery, University of Pittsburgh Medical Centers, Pittsburgh, PA.
Funding: This work has been supported in part by a grant from the John Templeton Foundation (JTF 2065).
Conflict of interest: none declared.
Corresponding author: Daniel E. Hall, MD, MDiv, Department of Surgery, UPMC-F1281 PUH, 200 Lothrop Street, Pittsburgh, PA 15261 (E-mail: revdocdan@aya.yale.edu).

all-cause, age-specific mortality rate according to the OR, it is possible to calculate and compare the life tables for the intervention and control arms of any given study. This article examines the practical importance of weekly religious attendance by comparing the improvement in life expectancy attributable to weekly religious attendance, regular physical exercise, and statin-type lipid-lowering agents.

This analysis is intended primarily as a thought experiment designed to explore the controversial association between religious attendance and longer life, and it is not intended for use in economic or clinical decision making. Although religious attendance appears to be a "health behavior" like physical exercise, it is not open to conventional modes of therapeutic manipulation for both ethical and scientific reasons.[6,7] However, even if it is not therapeutically manipulable, there may be compelling reasons to study the association between religious attendance and mortality if the magnitude of that association is of sufficient practical importance.

Methods

Microsoft Excel (2003) was programmed to calculate life expectancy tables from age-specific mortality rates ($_nM_x$) according to the method used by the National Center for Health Statistics.[8] The probability of dying ($_nq_x$) between ages x to x + n was calculated such that $_nq_x = 2 \cdot n(_nM_x)/2 + n(_nM_x)$ where n is the number of years in the given age interval (in this case 5 years). The probability of death was constrained to 1.0 for ages over 85 years. The number of persons surviving to age x (l_x) was calculated assuming a cohort of 100,000 live births such that $l_{x+n} = l_x - {_nd_x}$ where $_nd_x$ is the number of persons dying between ages x to x + n and is calculated by multiplying the number of persons alive at the beginning of the age interval (l_x) by the probability of dying within that age interval (ie, $_nd_x = l_x \cdot {_nq_x}$). The number of person-years lived between ages x to x + n ($_nL_x$) was calculated such that $_nL_x = (n/2)(l_x + l_{x+n})$. The total number of person-years lived above age x (T_x) is the sum of the person-years lived to that age ($\Sigma_{(0\text{-}x)}\ {_nL_x}$). Life expectancy at age x (e_x) is finally calculated by dividing the number of person-years lived above age x (T_x) by the number of persons alive at age x (l_x): $e_x = T_x/L_x$.

The spreadsheet programming was validated by entering the 2001 age-specific, all-cause mortality rates ($_nM_x$) from census data and comparing the calculated life expectancy with the published life tables from the same data.[9] The spreadsheet accurately calculated life tables with values equivalent to the published tables.

The spreadsheet was then further programmed to calculate the improvement of life expectancy attributable to a given "modality" by adjusting the age-specific, all-cause mortality rate ($_nM_x$) according to the published OR or relative risk (RR) for a given modality. Because ORs can be interpreted as accurate estimates of RR when the incidence of the studied event is rare (<10%),[10] and because the mortality rates for 2001 ranged from 0.02% to 7.12% the adjusted life tables were calculated using ORs as estimates of RR. Two life tables were calculated for each modality corresponding to the probabilities that constitute the numerator and denominator of relative risk. The first table described that portion of the population that accrued the benefit of the modality where $_nM_{x(\text{adjusted})} = {_nM_x}(1 - (1 - RR)/(1 + RR))$. The second table described the life expectancy of that portion of the population that did not accrue the benefit of the modality where $_nM_{x(\text{adjusted})} = {_nM_x}(1 + (1 - RR)/(1 + RR))$. The improvement of life expectancy ($e_{x(g)}$) attributable to a given "modality" was calculated for each age interval by subtracting the shorter life expectancy ($e_{x(s)}$) from the longer life expectancy ($e_{x(l)}$). Finally, the raw cost per life-year gained was calculated using an estimate of the yearly cost of the modality, multiplying the cost by the longer life expectancy ($e_{x(l)}$) and dividing it by the life years gained.

Using parameter estimates from published meta-analyses or reviews (see Table 1), comparative life tables were calculated for weekly religious attendance,[2] regular physical exercise,[11] and statin-type cholesterol-lowering drugs.[12] Rough cost estimates for each modality focused exclusively on monetary costs without attempting to quantify other relevant costs such as time costs. Although individuals can exercise and attend religious services for free, this analysis assumes some modest financial commitment from those who exercise and attend religious services regularly. The average yearly cost for statin-type therapy ($836) was derived from a published review of usage patterns of 6 statin brands in 1079 managed care plans.[13] The

Table 1. Published Estimates for Modeled Parameters

Modality	OR/RR	Range*	Cost
Regular physical exercise†	0.66[11]	Not reported	$500
Statin-type medication	0.74[12]	0.60 to 0.92	$836[13]
Weekly religious attendance	0.775[2]	0.719 to 0.833	$516[14,15]

* Range corresponds to the 95% CI for each point estimate.
† Relative risk of regular physical exercise was calculated and reported separately by these authors for both women (0.66) and men (0.65). Given that these values are nearly identical, the more conservative estimate is used in this analysis.

cost of regular exercise was estimated as the annual cost of membership at the local gym ($500). The yearly cost of regular religious attendance was estimated by dividing the average yearly household contribution to religious institutions ($1336)[14] by the average household size (2.59).[15]

Sensitivity analyses were performed by calculating separate life tables for the upper and lower confidence intervals of the parameter estimates. An upper cost estimate of weekly religious attendance was also tested corresponding to the Old Testament "tithe" that required 10% of all income be offered to God. Published estimates of median household income ($42,000[15]) and household size (2.59[15]) yield a median, per capita tithe of $1,620.

Results

Table 2 summarizes the analysis of the 3 modalities. The first column records the standard life table for the 2001 all cause mortality data showing a 77.2 year life expectancy at birth. For each additional age range, the life expectancy is shown from the beginning of that age range. For example, according to the standard 2001 life table, a 40-year-old person is expected to live an additional 39.3 years

Table 2. Comparative Life Tables

		Regular Exercise				Statins				Religious Attendance			
Age Range	$e_{x(all\ cause)}$*	$e_{x(l)}$	$e_{x(s)}$	$e_{x(g)}$	$\$/e_{x(g)}$	$e_{x(l)}$	$e_{x(s)}$	$e_{x(g)}$	$\$/e_{x(g)}$	$e_{x(l)}$	$e_{x(s)}$	$e_{x(g)}$	$\$/ e_{x(g)}$
0	77.2	80.1	75.0	5.2	7,772	79.3	75.5	3.7	17,816	78.9	75.8	3.1	12,950
1 to 4	76.7	79.7	74.5	5.2	7,675	78.8	75.1	3.7	17,592	78.5	75.3	3.2	12,787
5 to 9	72.8	75.8	70.6	5.2	7,318	74.9	71.2	3.7	16,766	74.5	71.4	3.2	12,184
10 to 14	67.9	70.8	65.6	5.2	6,850	69.9	66.2	3.7	15,679	69.6	66.4	3.2	11,392
15 to 19	62.9	65.9	60.7	5.2	6,382	65.0	61.3	3.7	14,593	64.6	61.5	3.1	10,600
20 to 24	**58.1**	**61.0**	**55.9**	**5.1**	**5,944**	**60.2**	**56.5**	**3.7**	**13,581**	**59.8**	**56.7**	**3.1**	**9,860**
25 to 29	53.4	56.3	51.2	5.0	5,571	55.4	51.8	3.6	12,718	55.1	52.0	3.1	9,231
30 to 34	48.7	51.5	46.5	5.0	5,175	50.6	47.0	3.6	11,801	50.3	47.3	3.0	8,563
35 to 39	43.9	46.7	41.8	4.9	4,771	45.8	42.3	3.5	10,868	45.5	42.5	3.0	7,881
40 to 44	**39.3**	**42.0**	**37.2**	**4.8**	**4,382**	**41.2**	**37.7**	**3.5**	**9,965**	**40.8**	**37.9**	**2.9**	**7,223**
45 to 49	34.7	37.4	32.7	4.7	4,006	36.6	33.2	3.4	9,094	36.2	33.4	2.8	6,587
50 to 54	30.3	32.9	28.3	4.5	3,645	32.1	28.8	3.2	8,261	31.8	29.0	2.7	5,978
55 to 59	26.0	28.5	24.2	4.3	3,295	27.7	24.6	3.1	7,452	27.4	24.8	2.6	5,388
60 to 64	21.9	24.3	20.2	4.1	2,962	23.6	20.6	2.9	6,680	23.3	20.8	2.5	4,825
65 to 69	18.1	20.4	16.5	3.8	2,655	19.7	16.9	2.8	5,968	19.4	17.1	2.3	4,306
70 to 74	**14.7**	**16.7**	**13.2**	**3.5**	**2,365**	**16.1**	**13.6**	**2.5**	**5,297**	**15.9**	**13.7**	**2.1**	**3,815**
75 to 79	11.6	13.5	10.2	3.2	2,081	12.9	10.6	2.3	4,639	12.6	10.7	2.0	3,334
80 to 84	8.9	10.6	7.7	3.0	1,790	10.1	7.9	2.1	3,962	9.9	8.1	1.8	2,840
85+	6.6	8.3	5.5	2.8	1,471	7.8	5.8	2.0	3,215	7.6	5.9	1.7	2,293

* $e_{x(all\ cause)}$ is the standard all cause life expectancy as published in the census data.[9] $e_{x(l)}$ is the longer life expectancy attributable to the modality's health benefit. $e_{x(s)}$ is the shorter life expectancy predicted for those not exposed to the modality's health benefit. $e_{x(g)}$ is the years of life gained attributable to the specific modality. $\$/e_{x(g)}$ is the raw cost per life year gained through exposure to the specific modality. Rows for ages 20, 40, and 70 are emphasized for ease of comparison.

for a total life span of 79.3 years. Alternatively, an 85-year-old is expected to live only 6.6 more years.

The remaining columns show the life tables adjusted to correspond with the 3 modeled modalities of statin-type therapy for high-risk coronary artery disease (CAD), regular physical exercise and weekly religious attendance. Consider the first columns corresponding to regular physical exercise. A 40-year-old person who exercises regularly is expected to live 42.0 years for a total life span of 82.0 years whereas a similar 40-year-old who does not exercise is expected to live only 37.2 years. For such a 40-year-old person, regular exercise accounts for an extra 4.8 years of life. If the cost of such regular exercise were equivalent to a membership in a local gym, the raw cost per year of life gained through regular exercise would be $4,382. The amount of life gained and the cost per year of life gained vary throughout the life table depending on the age at which an individual starts exercising regularly (thereby accruing the health benefit). For example, regular exercise from the age of 20 accrues 5.1 additional years of life at a cost of $5,944 per year of life gained. Alternatively, regular exercise from the age of 70 accrues only 3.5 years of additional life at a cost of $2,465 per year of life gained.

In similar fashion, a 40-year-old person with CAD taking statins is likely to live 3.5 years longer than a similar person not taking statins, and the raw cost per year of life gained for initiating statin therapy at age 40 is $9,965. Likewise, a 40-year-old person who attends religious services regularly is predicted to live 2.9 years longer than a similar person who does not attend religious services, and the raw cost per year of life gained for attending religious services from the age of 40 is $7,223.

Life expectancies and costs are reported for all age ranges and can be interpreted from Table 2 in a similar fashion. However, the adjusted life expectancies for each modality from birth to age 20 are tabulated only for the sake of completeness. It makes little sense to suppose that an infant or young adult would have CAD requiring statin therapy. Likewise, none of the data examining religious attendance or regular exercise included subjects younger than 20 years of age, and it is therefore not possible to draw any justifiable conclusions from the first 5 rows of the table.

Full life tables for the sensitivity analyses are not shown, but estimates from the 60-year-old age range of the relevant life table are reported below. Age 60 was chosen because the average age of subjects in the meta-analysis of religious attendance was approximately 60.[2] At the upper confidence interval, statins and religious attendance accounted for 5.1 ($4,104) and 3.2 ($3,785) additional years of life (and cost per year of life gained), respectively. At the lower confidence interval, statins and religious attendance accounted for 0.8 ($23,042) and 1.8 ($6,631) additional years of life, respectively. No sensitivity analysis for physical exercise was possible because no confidence intervals were reported.[11] Finally, assuming a complete tithe of household income, the upper limit for the cost of religious attendance per year of life gained ranged from $15,000 if the tithe began at age 60 to $31,000 if the tithe began at age 20.

Discussion

Regular physical exercise, statin-type therapy and weekly religious attendance account for an additional 2 to 5 years of life, suggesting that the real world, practical significance of weekly religious attendance is of similar magnitude as these other widely recommended therapies or health behaviors. Regular physical exercise was both the most effective (3 to 5 additional years of life) and least expensive ($2,000 to $6,000 per year of life gained). Statins were more effective than regular religious attendance (2.1 to 3.7 vs 1.8 to 3.1 additional years of life), but they were also more expensive ($4,000 to $14,000 vs. $3,000 to $10,000 per year of life gained).

Sensitivity analyses suggest that the lowest estimate for the years of life gained attributable to regular religious attendance is 1.8. The practical significance of nearly 2 additional years of life is intuitively obvious, but it is also nearly twice as large as the estimated health liability attributable to obesity that led Olshansky et al[16] to conclude that obesity may lead to an overall decline in life expectancy in the United States in the 21st century.

Although the secondary analysis of cost makes no claims to be a formal cost-benefit analysis, the estimate calculated here ($4,000 to $23,000 per life-year gained) corresponds to previously published cost-effectiveness ratios (CERs) for statin-based therapy that range from $5,000 to $50,000 per year of life gained.[17–19] The cost per life-year gained attributable to religious attendance is as high as $31,000, but even this estimate falls within the range of CERs that previously published literature judges to be societally acceptable. Thresholds have been proposed between $20,000 and $100,000 per life-year gained, with most accepted modalities falling below $40,000.[20] However, many commonly accepted medical interventions have significantly higher CERs such as hemodialysis[21] ($274,000) or cardiopulmonary resuscitation[22] ($226,000).

Within the admittedly limited assumptions of this thought experiment, religious attendance appears to be more cost-effective than statin-type lipid-lowering agents. However, this analysis should not be interpreted to mean that health care payers should start covering the annual tithe of religious patients. Religious attendance is not a therapy, and although the association between attendance and health is well established, there is no evidence that changing attendance causes a change in health outcomes. (The data supporting the association are derived from prospective, observation epidemiologic studies.) Furthermore, even if a patient did start attending church to get well, there are ethical, theological, and methodological problems with this instrumental approach to the associations between faith and health.[6,7] For example, it is not clear that the observed reduction in mortality would accrue due to religious attendance. From a theological perspective such instrumental use of religion is idolatrous. From a methodological perspective, it is not at all clear that "instrumental faith" is sufficiently genuine to accrue the observed reduction in mortality. And finally, neither of these qualifications address the ethical quagmire engendered by any medical recommendation to attend religious services.

However, given the fact that religious attendance might account for up to 3 additional years of life, the associations between religiousness and health may remain relevant for medical practice even if such religiousness is not therapeutically manipulable. Rather than approaching religious belief and practice as a health behavior, it may be more appropriate to approach religiousness as a demographic factor.[6] For example, the incidence of gastric cancer is higher among Japanese men, and knowledge of this fact might guide a physician to initiate early and frequent screening for gastric cancer among male Japanese patients. It is not possible to manipulate or therapeutically change a patient's ethnicity, but knowledge of the association between ethnicity and gastric cancer remains relevant for appropriate medical care. Likewise, even though it is not therapeutically manipulable, specific religious beliefs and practices may be associated with both positive and negative health outcomes that might appropriately influence medical care and decision-making. The details of the associations between religiousness and health are far from clear, but the analysis described here suggests that the practical significance of the association between mortality and religious attendance is sufficiently large to warrant more and better quality research designed to examine the associations between religion and health, and the potential relevance such associations might have for medical practice.

As with any analysis of data, this study has several limitations. First, the data regarding statin-type lipid-lowering agents are derived from randomized controlled trials (RCTs), and are therefore a stronger form of evidence than the epidemiologic cohort studies that describe the association between religious attendance and mortality. It is also not entirely appropriate to compare a secondary prevention therapy like statins to religious attendance that, if anything, is most analogous to primary prevention. Furthermore, the point estimate used for the effectiveness of statin-type therapy is applicable only to populations with high-risk CAD, which corresponds to only 0.7% of 50- to 59-year-old men and as few as 0.1% of 40- to 49-year-old men.[12] While acknowledging this asymmetry, this study included statin-type therapy as a comparator for 2 reasons. First, statin-type therapy is frequently used as a quasi-primary prevention of CAD,[19] and second, it provides continuity with the previously published debate regarding the relevance of weekly religious attendance.[2,3]

To make a more direct comparison, the study also analyzed the mortality data regarding regular physical exercise. Despite the widely accepted practice of encouraging regular physical exercise, there are no RCTs investigating the impact of regular exercise on mortality in healthy populations. Rather, the data supporting the benefits of regular exercise derive from large epidemiologic studies that are not categorically different in design from the studies examining religious attendance. In fact, the epidemiologic findings regarding regular exercise are so widely accepted that nobody has actually invested the effort to perform a rigorous meta-analysis of the health benefits of regular exercise. After a careful search of the literature and consultation with experts in the field, this analysis used the largest and most complete quantitative review of existing data regarding regular exercise.[11]

Although the meta-analysis of religious attendance is actually a stronger form of evidence than the quantitative review of regular exercise, it is not without its own limitations. McCullough et al[3] note that their analysis did not control for all relevant confounding variables. However, the 2 best controlled, single-population studies demonstrate similar or more favorable hazard ratios than those modeled here (0.77[23] and 0.67[24]). In fact, critics of McCullough's analysis concede that it is methodologically rigorous, comparable in quality to other meta-analyses, and definitive; but their critique challenges the meaning of the finding rather than impeaching the finding itself. Indeed, the same critics have recently published their own well-controlled analysis of the EPESE cohorts that found a relative risk of religious attendance (RR = 0.78, 95% CI, 0.70, 0.88) nearly identical to the risk modeled here.[25]

Finally, one potential source of bias in any study is the investigator's world view (or paradigm) that constrains both the types of questions that can be asked and the available answers. Such paradigm bias may be especially relevant in the study of religious belief and practice. Although the author of this study is a practicing Christian, he has worked to ensure that the design and interpretation of this study can stand on purely scientific grounds.

Despite the limitations of the available data, this analysis suggests that the practical, real world significance of regular religious attendance (2 to 3 additional years of life) is similar to widely recommended health practices like regular physical exercise and statin-based therapy of CAD. Rather than dismissing this finding as weak or nonexistent,[3] it may be more fruitful to invest the necessary resources to better understand the nature and relevance of the associations between religious attendance and health.

References

1. Powell LH, Shahabi L, Thoresen CE, et al. Religion and spirituality: linkages to physical health spirituality, religion, and health: an emerging research field. Am Psychol 2003;58:36–52.
2. McCullough ME, Hoyt TH, Larson DB, et al. Religious involvement and mortality: a meta-analytic review. Health Psychol 2000;19:211–22.
3. Sloan RP, Bagiella E. Religion and health[comment]. Health Psychol 2001;20:228–9.
4. McCullough ME, Hoyt WT, Larson DB, et al. Small, robust, and important: reply to Sloan and Bagiella. Health Psychol 2001;20:228–9.
5. Rosenthal R. Effect sizes: Pearson's correlation, its display via the BESD, and alternative indices. Am Psychol 1991;46:1086–7.
6. Hall DE, Koenig HG, Meador KG. Conceptualizing "religion": how language shapes and constrains knowledge in the study of religion and health. Perspect Biol Med 2004;47:386–401.
7. Shuman JJ, Meador KG. Heal thyself: spirituality, medicine, and the distortion of Christianity. New York: Oxford University Press; 2003.
8. Anderson A. Method for constructing complete annual U.S. life tables. National Center for Health Statistics. Vital Health Statistics 1999;2(129).
9. Arias E, Anderson R, Hsiang-Ching K, et al. Deaths: final data for 2001. National Vital Statistics Reports 2003;52 (3).
10. McNutt L, Wu C, Xue X, et al. Estimating the relative risk in cohort studies and clinical trials of common outcomes. Am J Epidemiol 2003;157: 940–3.
11. Oguma Y, Sesso H, Paffenbarger R Jr, et al. Physical activity and all cause mortality in women: a review of the evidence. Br J Sports Med 2002;36:162–72.
12. Smith GD, Song F, Sheldon TA. Cholesterol lowering and mortality: the importance of considering initial level of risk. BMJ 1993;306:1367–73.
13. Brazalo G. Managed care trends in statin usage. Managed Care 2001;2001:48–59.
14. The Nonprofit Almanac In Brief. 2003 [cited 2003 15 December, 2003 http://www.independentsector.org/PDFs/inbrief.pdf].
15. US Census, 2000. 2003 [cited 2003 Dec 15 http://factfinder.census.gov/servlet/SAFFFacts?geo_id=&_geoContext=&_street=&_county=&_cityTown=&_state=&_zip=&_lang=en&_sse=on].
16. Olshansky S, Passaro D, Hershow R, et al. A potential decline in life expectancy in the United States in the 21st century. N Engl J Med 2005;351:1138–45.
17. Troche CJ, Tacke J, Hinzpeter B, et al. Cost-effectiveness of primary and secondary prevention in cardiovascular diseases. Eur Heart J 1998;19 Suppl C:C59–65.
18. Ganz DA, Kuntz KM, Jacobson GA, et al. Cost-effectiveness of 3-hydroxy-3-methylglutaryl coenzyme A reductase inhibitor therapy in older patients with myocardial infarction. Ann Intern Med 2000; 132:780–7.
19. Prosser LA, Stinnett AA, Goldman PA, et al. Cost-effectiveness of cholesterol-lowering therapies ac-

cording to selected patient characteristics. Ann Intern Med 2000;132:769–79.

20. Provenzale D. Cost-effectiveness of screening the average-risk population for colorectal cancer. Gastrointest Endosc Clin North Am 2002;12:93–109.
21. Hamel MB, Phillips RS, Davis RB, et al. Outcomes and cost-effectiveness of initiating dialysis and continuing aggressive care in seriously ill hospitalized adults. SUPPORT Investigators. Study to understand prognoses and preferences for outcomes and risks of treatments. Ann Intern Med 1997;127:195–202.
22. Lee K, Angus DC, Abramson N. Cardiopulmonary resuscitation: what cost to cheat death? Crit Care Med 1996;24:2046–52.
23. Strawbridge WJ, Cohen RD, Shema SJ, et al. Frequent attendance at religious services and mortality over 28 years. Am J Public Health 1997;87:957–61.
24. Hummer R, Rogers R, Nam C et al. Religious involvement and US adult mortality. Demography 1999;36:273–85.
25. Bagiella E, Hong V, Sloan RP. Religious attendance as a predictor of survival in the EPESE cohorts. Int J Epidemiol 2005;14:443–51.