Does religious activity distinguish the mortality experiences of older Taiwanese? An analysis using nineteen-years of follow-up data

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The lead author is supported by the Social Sciences and Humanities Research Council of Canada through the Canada Research Chairs Program.
Religious participation

Mortality
Distribution of religious denomination in Taiwan, age 55+, 1999

- Taoist: 58.1%
- Buddhist: 28.2%
- Unaffiliated: 9.4%
- Christian: 2.7%
- Other: 1.5%
Current study uses nineteen years of follow-up data to ask:

1) Do religiously active in Taiwan live longer than others?

2) To what degree are any associations a function of behaviors, social support and psychological characteristics?
Data


N=3,849, age 60+.

Death monitored from March 1989 to December 2007 (227 months).

64.3% of the initial sample deceased.

<table>
<thead>
<tr>
<th></th>
<th>Taiwanese</th>
<th>Mainlanders</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>1,489</td>
<td>725</td>
</tr>
<tr>
<td>Females</td>
<td>1,498</td>
<td>137</td>
</tr>
</tbody>
</table>

Taiwanese Mainlanders
## Life expectancy at age 60, Taiwan

<table>
<thead>
<tr>
<th></th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Published</td>
<td>19.2</td>
<td>22.0</td>
</tr>
<tr>
<td>Estimated from data</td>
<td>19.7</td>
<td>22.3</td>
</tr>
</tbody>
</table>
**Measures**

How often do you worship gods, perform rites, pray and read religious texts?

<table>
<thead>
<tr>
<th></th>
<th>Total</th>
<th>Male Taiwanese</th>
<th>Female Taiwanese</th>
<th>Male Mainlander</th>
<th>Female Mainlander</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>3,849</td>
<td>1,489</td>
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<td>725</td>
<td>137</td>
</tr>
<tr>
<td>% never or seldom</td>
<td>61.2</td>
<td>61.7</td>
<td>49.9</td>
<td>82.6</td>
<td>66.4</td>
</tr>
<tr>
<td>% less than once a week</td>
<td>10.1</td>
<td>10.6</td>
<td>11.5</td>
<td>6.2</td>
<td>9.5</td>
</tr>
<tr>
<td>% once or twice a week</td>
<td>6.6</td>
<td>6.4</td>
<td>9.0</td>
<td>1.8</td>
<td>6.6</td>
</tr>
<tr>
<td>% more frequently</td>
<td>22.2</td>
<td>21.3</td>
<td>29.6</td>
<td>9.4</td>
<td>17.5</td>
</tr>
</tbody>
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<td>Taiwanese</td>
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<td>Mainlander</td>
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Kaplan Meier survival curves by religious activity

Sx

X (months since initial observation)

More than twice a week
Once or twice a week
Less than once a week
Not active
Test for parametric distributions to describe mortality

Covariates: age, sex and Mainlander status

<table>
<thead>
<tr>
<th>Distribution</th>
<th>Model specific distributions</th>
<th>AIC</th>
<th>Log-Likelihood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exponential</td>
<td>1</td>
<td>9,186.2</td>
<td>-4591.6</td>
</tr>
<tr>
<td>Weibull</td>
<td>2</td>
<td>8,831.2</td>
<td>-4413.6</td>
</tr>
<tr>
<td>Gompertz</td>
<td>2</td>
<td>8,767.4</td>
<td>-4381.7</td>
</tr>
<tr>
<td>Log-normal</td>
<td>2</td>
<td>9,211.4</td>
<td>-4603.7</td>
</tr>
<tr>
<td>Log-logistic</td>
<td>2</td>
<td>8,962.8</td>
<td>-4479.4</td>
</tr>
<tr>
<td>Gamma</td>
<td>3</td>
<td>8,825.0</td>
<td>-4410.0</td>
</tr>
<tr>
<td>Models</td>
<td>Variables</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------</td>
<td>---------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Unadjusted</td>
<td>Age, sex, mainlander</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Demographic</td>
<td>Model 1 + married, urban</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Socioeconomic</td>
<td>Model 2 + education, economic assessment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Health</td>
<td>Model 3 + self-assessed health, chronic conditions, functional limitations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 Behaviors</td>
<td>Model 4 + smoking, chewing, drinking, exercise</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6 Network</td>
<td>Model 4 + Emotional support index, living alone, engaging in social activity, engaging in leisure activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7 Psychological WB</td>
<td>Model 4 + CES-D, Life satisfaction A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 Fully adjusted</td>
<td>All variables</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Gompertz hazard religiosity $\beta$s and 95% confidence intervals
Fully adjusted model results summary showing effect on hazard of dying

<table>
<thead>
<tr>
<th>Variable</th>
<th>Effect</th>
<th>Variable</th>
<th>Effect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Religiously active</td>
<td>-</td>
<td>Smoke</td>
<td>+</td>
</tr>
<tr>
<td>Female</td>
<td>-</td>
<td>Drink</td>
<td>+</td>
</tr>
<tr>
<td>Mainlander</td>
<td>-</td>
<td>Sport</td>
<td>-</td>
</tr>
<tr>
<td>Age</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>N.S.</td>
<td>Emotional support</td>
<td>N.S.</td>
</tr>
<tr>
<td>Rural</td>
<td>N.S.</td>
<td>Lives alone</td>
<td>N.S.</td>
</tr>
<tr>
<td>Education</td>
<td>N.S.</td>
<td>Social activity</td>
<td>N.S.</td>
</tr>
<tr>
<td>Economic condition</td>
<td>N.S.</td>
<td>Leisure activity</td>
<td>-</td>
</tr>
<tr>
<td>Chronic conditions</td>
<td>+</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Functional limitation</td>
<td>+</td>
<td>CED-D</td>
<td>N.S.</td>
</tr>
<tr>
<td>Self-assessed health</td>
<td>+</td>
<td>Life Satisfaction</td>
<td>N.S.</td>
</tr>
</tbody>
</table>
Survival curves, unadjusted model, by age (x), sex, Mainlander status
and religious activity

- Females Mainlander Active
- Females Mainlander Non-active
- Males Mainlander Active
- Males Mainlander Non-active
- Females Taiwanese Active
- Females Taiwanese Non-active
- Males Taiwanese Active
- Males Taiwanese Non-active
Estimate Ex, religiously active versus non-active, by age, Mainlander status and sex

Unadjusted

Adjusted
11.93 versus 12.94 = 1.01 year advantage

Religiously active live 8% longer lies.
Net gain in life expectancy for religiously active, showing point estimates and 95% confidence intervals.
Conclusions

1. Religiously active lived significantly longer than non-active.

2. Just a slight amount of religious activity made a difference.

3. The relationship remains robust after including mediators and covariates. \( \beta \) reduced from -.143 to -.100.

4. Mainlanders live longer than Taiwanese, but association with religiosity is similar.

5. Still uncertain about what explains the religiosity advantage in Taiwan.
Thank you

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## Model covariates

### Behaviors
- Smoking
- Drinking
- Sport

### Social support
- Emotional support index
- Living alone
- Engaging in social activity
- Engaging in leisure activity

### Psychological well-being
- CES-D depression
- Life Satisfaction scale

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Religious activity → **Mediators** → Mortality

---
## Model covariates

<table>
<thead>
<tr>
<th>Control variables</th>
<th>Mechanisms</th>
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<tbody>
<tr>
<td><strong>Demographic characteristics</strong></td>
<td>Behaviors</td>
</tr>
<tr>
<td>Age</td>
<td>Smoking</td>
</tr>
<tr>
<td>Sex</td>
<td>Drinking</td>
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<tr>
<td>Mainlander status</td>
<td>Sport</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
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<tr>
<td>Rural/urban residence</td>
<td></td>
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<td><strong>Socioeconomic characteristics</strong></td>
<td>Social support</td>
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<td>Education</td>
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<td>Economic assessment</td>
<td>Living alone</td>
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Survival curves, adjusted model, by age ($x$), sex, Mainlander status and religious activity

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