Outcome-Wide Studies, Religious Communities, and Human Flourishing

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#### **Plan of Presentation**

Increasing Evidence-Base on Religion and Health
 Gaps in Our Knowledge
 Human Flourishing
 Outcome-Wide Studies and Methodology
 Outcome-Wide Studies of Religion
 Implications

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#### **Religion and Health**

Levin (2022) Preface for Koenig et al. (2022) "The coalescence of the scattered work in this area into a field *qua* field is owed in largest part to the labors of our late colleague Dave Larson, dearly missed physician, epidemiologist, professor, and Public Health Service officer."

There are quite possibly now 10,000+ quantitative studies on religion and health (Koenig et al., 2022)

With all of this research, what is it that we now know?
What justifies moving beyond just research and evidence to claims of knowledge?
What are the current gaps in our knowledge?
How can we more rapidly expand our knowledge?

### Knowledge in Religion and Health

Knowledge: True justified belief... the evidence for which cannot be overturned(Plato, refined in light of contemporary discussions in epistemology)

To what extent have we attained this in research on religion and health? Associations abound... but are these causal? What do we know?

Critical Challenge: The vast majority of research remains crosssectional, threatening causal conclusions and causal knowledge

Example: Religious participation is associated with less depression
 Does religious service attendance protect against depression?
 Or do depress people leave cease attending religious services?
 There is evidence for both (Maselko et al., 2012; Li et al., 2016; 4
 VanderWeele et al., 2016) but with cross-sectional data we cannot tell

# Study Design

Different study designs allow for different levels of robustness to confounding and reverse causation; we can establish a certain hierarchy (Lash et al., 2021; VanderWeele et al., 2016, 2021):

- Cross-sectional studies
- Cohort / follow-up with adjustment for baseline confounders
- Cohort / follow-up with adjustment for baseline outcome also
- Studies looking at change in exposure i.e. which also allow for adjustment for prior exposure
- Longitudinal studies allowing for time-varying exposures and outcomes and for feedback
- Randomized controlled trial

For evidence for causation control for baseline outcome should generally be considered a minimum threshold
Ideally we want meta-analyses of rigorous longitudinal studies, robust to confounding, perhaps also supplemented by quasi-experimental studies
VanderWeele, T.J. (2021). Can sophisticated study designs with regression analyses
of observational data provide causal inferences? JAMA Psychiatry, 78:244-246.

# Important Moments in *Longitudinal* Evidence Synthesis

- Koenig, H.G., McCullough M.E., & Larson D.B. (2000). Handbook of Religion and Health. OUP.
- Chida, Y., Steptoe, A., & Powell, L. H. (2009). Religiosity/spirituality and mortality. Psychotherapy and psychosomatics, 78(2):81-90.
   27% (95% CI: 16%-37%) reduction in mortality risk in follow-up
- Koenig, H.G., King, D., & Carson, V.B. (2012). Handbook of Religion and Health. OUP, 2<sup>nd</sup> Edition.
- Garssen, B., Visser, A., & Pool, G. (2021). Does spirituality or religion positively affect mental health? Meta-analysis of longitudinal studies. *The International Journal for the Psychology of Religion*, 31(1):4-20.
  - 33% (95% CI: 19%-42%) reduction in odds of depression
- Koenig, H.G., VanderWeele, T.J., & Peteet, J. (2022). Handbook of Religion and Health. OUP, 3<sup>rd</sup> Edition.

# Knowledge in Religion and Health

In any objective assessment of the meta-analytic evidence, it is difficult to dismiss causal effects of attendance on mortality and depression

- The evidence is across numerous longitudinal studies with control for baseline outcome
- Associations are relatively robust to potential unmeasured confounding (VanderWeele et al., 2022)
- > We have increasing knowledge of the mechanisms (Kim et al., 2019)
- There are likewise quasi-experimental studies suggesting evidence for causation (Fruehwirth et al., 2019)

To date, most meta-analyses include cross-sectional studies (cf. Oman, 2018)

However, there is probably now an adequate number of rigorous longitudinal studies with control for baseline outcome for longitudinal meta-analysis with:

- Drug use, alcohol abuse, smoking
- Suicide
- Life satisfaction

But a lot of research remains to be done (Koenig et al., 2022)

# Gaps in Knowledge

Our *knowledge* concerning religion and health has expanded in important ways and will continue to do so

However, numerous open questions remain:

- What about aspects of religion/spirituality beyond attendance?
- What about other health and wellbeing outcomes?
- What about non-Western and non-Christian contexts?

How might our knowledge advance more rapidly?

I will discuss what I think are two potentially helpful approaches
 ➢ Incorporation of broader wellbeing or "flourishing" measures
 ➢ The use of outcome-wide studies

I will address each in turn...

### Visions of Human Flourishing

Our institutions and academic disciplines often aspire to grand visions of human flourishing:

- World Health Organization (1948): Health is "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity"
- Economics: Maximization of expected utility, taking into account all aspects of an agent's preferences
- Positive Psychology (Penn): "the scientific study of the strengths that enable individuals and communities to thrive"

But in practice, our discussions and studies are often restricted to <sup>9</sup> specific disease states, simple measures of feeling happy, or to income

# Flourishing

Flourish (OED): Grow or develop in a healthy or vigorous way Flourish (AHD): To do or fare well

Etymology: from Latin florere "to bloom, blossom, flower"

Translation: Often used to translate Aristotle's "Eudaimonia" (sometimes also translated as "happiness")

Working Definition:

Flourishing (or complete human well-being): A state in which all aspects of a person's life are good

This is arguably what we are after as individuals and should be seeking after as a society

### **Psychological Well-being**

Numerous measures of well-being and conceptualizations in the positive psychology literature (cf. Diener et al., 1985; Ryff, 1989; Hyde et al., 2003; Keyes et al., 2008; Diener et al., 2010; Seligman, 2012; Huppert and So, 2013; Su et al., 2014)

Notably absent from the psychological well-being measure are...

Health... are we fully flourishing if not healthy?
 Often missing Virtue or Character... contra Plato, Aristotle, etc.

Is it ever possible to "measure" flourishing...? Conceptions of what this includes will differ across persons, and cultures and philosophical and theological traditions Can we achieve consensus?

# **Domains of Flourishing**

Whatever else might be included I would argue the following domains would be included as well (VanderWeele, 2017):

(1) Happiness and life satisfaction
 (2) Physical and mental health
 (3) Meaning and purpose
 (4) Character and Virtue
 (5) Close social relationships

These things do not exhaust "flourishing" but are arguably a part of it Each of these domains satisfies the following two criteria:

- Nearly universally desired
- An end in itself

These criteria might be useful on shaping consensus on what to measure

#### **Measurement of Flourishing**

 For a short index, two questions chosen in each domain based on what is already regularly in use (for comparison) and has received some validation

> cf. NRC, 2013; OECD, 2013; Diener, 1985; Lyubomirsky and Lepper, 1999; Steger et al., 2006; CEL, 2015; Prawitz et al., 2006

 Virtue questions were newly proposed based on philosophical and psychological literature on "cardinal virtues" (practical wisdom, justice, fortitude, moderation)
 – cf. Pieper, 1966; Petersen and Seligman, 2004

# **Measurement of Flourishing**

- Life satisfaction How satisfied are you with life as a whole these days? (0-10)
- Affective happiness In general, how happy or unhappy do you usually feel?
   (0-10)
- **Physical health** In general, how would you rate your physical health? (0-10)
- **Mental health** How would you rate your overall mental health? (0-10)
- Worthwhile Activities Overall, to what extent do you feel the things you do in your life are worthwhile? (0-10)
- **Purpose in life** I understand my purpose in life (0-10)
- Seeking to do good I always act to promote good in all circumstances, even in difficult and challenging situations (0-10)
- Delayed Gratification I am always able to give up some happiness now for greater happiness later (0-10)
- **Content with Relationships** I am content with my friendships and relationships (0-10)
- **Satisfying relationships** My relationships are as satisfying as I would like them to be (0-10)

### **Measurement of Flourishing**

Such measures could be used to measure flourishing at a given point in time (Average of 10 Questions = Flourishing Index 0-10); nothing more than a composite of the 5 more meaningful individual measures

For flourishing over time, financial and material resources should be such that the other dimensions can be sustained

Two Additional Questions (Financial and Material Stability):

- How often do you worry about being able to meet normal monthly living expenses? (0-10)
- How often do you worry about safety, food, or housing? (0-10)

Average of 12 Questions = Secure Flourishing Index (0-10)

- Less satisfactory conceptually (financial resources are means not ends)
- But perhaps more satisfactory in practice (flourishing over time)

### **Current Data Collection Efforts**

Data Now Available in the Workplace Setting:

- Employees at Aetna, Kohler, Owens Corning, World Bank
- > Factory Workers in Mexico, Poland, Sri Lanka, Cambodia, China
- International Flight Attendants

Data Available for Other Settings:

- Clinical: BU Mental Health Patients, Johns Hopkins, UPMC
- Universities: Yale, Stony Brook, NYU, West Point
- Secondary Schools: in US, UK, India, China
- Communities: Columbus Foundation
- Cohorts: Nurses Health Study, NHS2, ALSPAC, JAGES
- Randomized Trials: Forgiveness Workbooks
- For 2022: Gallup-Templeton-Baylor-Harvard "Global Flourishing Study"

Some Patterns (Cross-Cultural Comparisons Need Careful Consideration)

- Financial is often ranked lowest
- Social connection is often ranked more highly in other countries
- Most dimensions increase with age
- > Happiness higher in developed countries; purpose higher in developing

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# Global Flourishing Study with Gallup: 240,000 Individuals



22 Countries with Nationally Representative Sampling 5 Years of Annual Panel Longitudinal Data Collection Representing Roughly Half of the World's Population (with Open Access Data)

https://hfh.fas.harvard.edu/global-flourishing-study

# **Constructs for Study**

General Wellbeing
Happiness
Life Satisfaction /
Evaluation
Optimism
Freedom
Peace
Balance
Mastery
Meaning / Purpose
Health
Self-Rated Physical /
Montal Heatlh
Health Limitations
Health Limitations
Health Limitations Pain PTSD
Health Limitations Pain PTSD Depression / Anxiety
Health Limitations Pain PTSD Depression / Anxiety Smoking
Health Limitations Pain PTSD Depression / Anxiety Smoking Drinking
Health Limitations Pain PTSD Depression / Anxiety Smoking Drinking Exercise

Financial-Economic	
Financial / Material Wo	orry
Education	
Employment	
Income	
Subjective Financial W	/ellbeing
Housing	
<b>Religion and Spiritua</b>	lity
Self-Report R/S	
Service Attendance	
Life after Death Belief	
Religious Experience	
Religious Reading	
Prayer-meditation	
Belief in God	
Intrinsic religiosity	
Religious comfort	
Loved by God	
Spiritual punishment	
Religious criticism	
Evangelism	

**Relationships and Community** Subjective Social Connectedness Loneliness Social Support/Intimate Friend Belonging City Satisfaction Trust Discrimination **Government Approval Political Voice Community Participation** Marriage Children Character **Promoting Good Delayed Gratification** Hope Gratitude Love Forgiveness Charitable Giving / Helping Volunteering

#### **Outcome-Wide Studies**

Outcome-Wide Studies (VanderWeele et al., 2017, 2020): Fix an exposure (Wave 1) and examine its effects on numerous outcomes simultaneously (Wave 2)

Regression: Fit a separate regression for each outcome

- Multivariate regression (Johnson and Wichern, 2002) or "seemingly unrelated regressions" generalization (Zellner, 1962) only modestly improve efficiency;
- With OLS estimates are identical (Oliveira and Teixeira-Pinto, 2015)

Covariates: Include as confounders all variables that are causes of the exposure or of any outcome; but use same set of confounders (ideally variables prior to the exposure in Wave 0) for each regression

Reduces the possibility of investigator discretion and cognitive biases

With outcome-wide analyses, we have a faster expansion of evidence <sub>19</sub> and knowledge

# Confounding (Methodological Point 1)

Disjunctive Cause Criteria: Control for each covariate that is a cause of the exposure, or of the outcome, or of both

[exclude from this set any variable known to be an instrumental variable; and include as a covariate any proxy for an unmeasured variable that is a common cause of both the exposure and the outcome]

VanderWeele, T. J. (2019). Principles of confounder selection. *European Journal* of *Epidemiology*, *34*:211-219.

Confounders: Control for covariates in "Wave 0" (prior to exposure) to ensure covariates are not on the pathway from exposure to outcome Baseline Outcome: Control for Wave 0 outcome to rule out reverse causation Baseline Exposure: When possible/appropriate, control for Wave 0 exposure to further rule out confounding and interpret estimates as exposure changes

Outcome-Wide: Apply these principles across all outcomes and...

- Control for all causes of exposure and any outcome
- Control for all Wave 0 outcomes

This will require larger sample sizes (often in the 1000's) but will help ensure evidence for causation and help avoid cognitive investigator biases

# E-Values (Methodological Point 2)

E-Value: The minimum strength of association on the risk ratio scale an unmeasured confounder would have to have with both the exposure and the outcome to explain away the effect estimate

- Let U be an arbitrary set of unmeasured confounders
- Let RR<sub>UY</sub> be the maximum risk ratio relating any two categories of U to Y conditional on measure covariates C and exposure A
- Let  $RR_{AU}$  be the maximum risk ratio relating any two categories of U to A conditional on C

With an observed risk ratio of RR, we have that if  $RR_{UY}$  and  $RR_{AU}$  are greater than:

E-Value = RR + sqrt[ RR\*(RR-1) ]

Then this could suffice, but weaker confounding could not

We can apply this in a routine manner to both the estimate and the confidence interval limit closest to the null (VanderWeele and Ding, 2017) Online E-value Calculator: https://www.evalue-calculator.com/

# Multiple Testing (Methodological Point 3)

One can report the following:

(1) Nominal p-values

(2) Bonferroni corrected thresholds

- Conservative, but with some attractive properties
- With J Bonferroni-corrected rejections one can claim "at least J true associations" with no more than 5% false probability rate

#### (3) Romano and Wolf (2007) Correction

Preserves family-wise error rate but takes into account correlations among outcomes

(4) Mathur and VanderWeele (2020): 95% Interval for number of rejections under the global null of no effect

None of these is perfect, and evidence should never be entirely dismissed if it does not surpass a threshold, nor blindly accepted if it does Note, these adjustments are not made when results are published over many papers Strongest evidence will come from meta-analyses of numerous studies that are 22 themselves robust to unmeasured confounding (Mathur and VanderWeele, 2020)

- We used data from the Growing Up Today Study (GUTS) to examine associations between religious service attendance and prayer/meditation on subsequent health and well-being:
  - Chen, Y. and VanderWeele, T.J. (2018). Associations of religious upbringing with subsequent health and well-being from adolescence to young adulthood: an outcome-wide analysis. American Journal of Epidemiology, 187:2355–2364.
- Over 5000 participants, aged 9-14 at baseline followed from 1999 to 2010 (or 2007 or 2013 for some outcomes)
- Using an "Outcome-wide" approach (VanderWeele et., 2017, 2020) to examine many different outcomes



Table 1. Religious service attendance in adolescence and health and well-being in young adulthood (N ranged from 5,689 to 7,458)

	Religious Service Attendance				
	Never	Less than once/week	At least once/week		
	(Ref)	OR/RR/β (95% CI)	OR/RR/β (95% CI)		
Mental health					
Depressive symptoms	0.00	-0.03 (-0.11, 0.05)	-0.12 (-0.19, -0.04)**		
Depression diagnosis	1.00	0.90 (0.76, 1.06)	0.87 (0.75, 1.01)		
Anxiety symptoms	0.00	0.03 (-0.05, 0.11)	-0.04 (-0.11, 0.04)		
Anxiety diagnosis	1.00	1.01 (0.84, 1.22)	0.89 (0.75, 1.07)		
Probable PTSD	1.00	0.87 (0.67, 1.13)	0.72 (0.57, 0.93)**		

#### Table 1. Continued

	Religious Service Attendance					
	Never	Less than once/week	At least once/week			
	(Ref)	OR/RR/β (95% CI)	OR/RR/β (95% CI)			
Health Behaviors						
Cigarette smoking	1.00	0.99 (0.88, 1.11)	0.85 (0.76, 0.96)**			
Frequent binge drinking	1.00	1.05 (0.95, 1.17)	0.97 (0.87, 1.07)			
Marijuana use	1.00	1.01 (0.90, 1.12)	0.74 (0.66, 0.83)***			
Any other illicit drug use	1.00	0.96 (0.74, 1.25)	0.71 (0.55, 0.93)*			
Prescription drug misuse	1.00	0.96 (0.80, 1.15)	0.79 (0.66, 0.95)*			
Number of lifetime sexual partners	0.00	-0.02 (-0.09, 0.04)	-0.28 (-0.34, -0.21)***			
Early sexual initiation	1.00	0.91 (0.78, 1.06)	0.65 (0.55, 0.77)***			
History of STIs	1.00	0.99 (0.82, 1.20)	0.79 (0.66, 0.95)*			
Teen pregnancy	1.00	0.81 (0.47, 1.37)	0.76 (0.45, 1.28)			
Abnormal Pap test	1.00	0.87 (0.75, 1.02)	0.82 (0.71, 0.95)**			

#### Table 1. Continued

	Religious Service Attendance					
	Never Less than once/w		At least once/week			
	(Ref)	OR/RR/β (95% CI)	OR/RR/β (95% CI)			
Psychological Well-being						
Life satisfaction	0.00	0.04 (-0.05, 0.12)	0.13 (0.05, 0.21)***			
Positive affect	0.00	0.09 (0.01, 0.17)*	0.18 (0.10, 0.25)***			
Self-esteem	0.00	0.05 (-0.03, 0.12)	0.07 (0.00, 0.14)			
Emotional processing	0.00	0.04 (-0.04, 0.12)	0.03 (-0.05, 0.10)			
Emotional expression	0.00	0.04 (-0.04, 0.12)	0.04 (-0.03, 0.12)			

#### Table 1. Continued

	Religious Service Attendance					
	Never	Less than once/week	At least once/week			
	(Ref)	OR/RR/β (95% CI)	OR/RR/β (95% CI)			
Character and Virtue						
Frequency of volunteering	0.00	0.13 (0.06, 0.20)***	0.28 (0.21, 0.35)***			
Sense of mission	0.00	0.28 (0.20, 0.35)***	0.11 (0.03, 0.19)**			
Forgiveness of others	0.00	0.33 (0.24, 0.41)***	0.69 (0.61, 0.77)***			
Registered to vote	1.00	1.04 (1.01, 1.07)**	1.03 (1.01, 1.06)*			

# **E-values**

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Health and Walk Reinst Outcome	Religious Service Attendance			
nearmand weirbeing outcome	For Effect Estimate <sup>b</sup>	For CI Limit <sup>e</sup>		
Life satisfaction	1.50	1.28		
Positive affect	1.64	1.44		
Self-esteem	1.33	1.00		
Emotional processing	1.20	1.00		
Emotional expression	1.23	1.00		
Frequency of volunteering	1.90	1.72		
Sense of mission	1.90	1.71		
Forgiveness of others	3.15	2.88		
Registered to vote	1.21	1.11		
Number of physical health problems	1.16	1.00		
Overweight/obesity	1.11	1.00		
Depressive symptoms	1.47	1.25		
Depression diagnosis	1.56	1.00		
Anxiety symptoms	1.23	1.00		
Anxiety diagnosis	1.50	1.00		
Probable posttraumatic stress disorder	2.12	1.36		
Cigarette smoking	1.63	1.25		
Binge drinking	1.21	1.00		
Marijuana use	1.70	1.53		
Any other illicit drug use	2.35	1.77		
Prescription drug misuse	1.67	1.29		
Number of lifetime sexual partners	1.90	1.73		
Early sexual initiation	2.45	1.92		
History of sexually transmitted infections	1.85	1.29		
Teen pregnancy	1.96	1.00		
Abnormal Pap test	1.74	1.29		

# Chen et al. (2020) Outcome-Wide Study: Data from GUTS, NHSII, HRS

	Never(Ref.)b	GUTS	NHSII	HRS			Sample-size	
		Atleast	At least	At least			weighted	
		once/week	once/week	once/week			Meta-Analytic	
						Co	mbined Estimate	
		RR/β	RR/β	RR/β	RRc	β <sup>d</sup>	95% CI	p-value <sup>e</sup>
		(95% CI)	(95 % CI) <sup>c,d</sup>	(95% CI) <sup>c,d</sup>				
Physical health								
All-cause mortality	1.00	_	0.74 (0.63, 0.86)	0.72 (0.63, 0.83)	0.74		0.65, 0.84	< 0.002***
No. of physical-health	0.00	-0.02 (-0.10, 0.06)	-0.04 (-0.05, -0.02)	-0.02 (-0.09, 0.05)		-0.03	-0.05, -0.01	< 0.002***
problems								
Diabetes	1.00	0.67 (0.25, 1.75)	0.92 (0.85, 1.01)	1.09 (0.97, 1.24)	0.91		0.81, 1.03	0.141
Hypertension	1.00	0.85 (0.55, 1.32)	_	1.04 (0.96, 1.12)	0.95		0.79, 1.15	0.354
Stroke	1.00	_	1.01 (0.86, 1.18)	0.95 (0.80, 1.12)	1.00		0.87, 1.14	0.398
Heart Disease	1.00	_	0.93 (0.78, 1.10)	0.93 (0.81, 1.07)	0.93		0.80, 1.07	0.235
Cancer	1.00	0.37 (0.15, 0.94)	0.96 (0.91, 1.01)	0.97 (0.84, 1.12)	0.87		0.78, 0.97	0.015*
Overweight/obesity	1.00	1.02 (0.90, 1.16)	0.97 (0.95, 1.00)	1.05 (0.94, 1.18)	0.99		0.96, 1.02	0.343
Health behaviours								
Heavy drinking	1.00	0.66 (0.54, 0.81)	0.57 (0.50, 0.64)	1.31 (0.92, 1.86)	0.66		0.59, 0.73	< 0.002***
Current cigarette smoking	1.00	0.83 (0.70, 0.98)	0.70 (0.62, 0.79)	0.67 (0.40, 1.14)	0.71		0.63, 0.80	< 0.002***
Short sleep duration	1.00	0.96 (0.80, 1.15)	0.98 (0.93, 1.02)	_	0.97		0.93, 1.02	0.207
Frequent physical activity	1.00	_	1.01 (0.98, 1.03)	1.10 (0.86, 1.42)	1.02		0.98, 1.07	0.245
Preventive-healthcare use	1.00	0.98 (0.90, 1.06)	1.02 (1.00, 1.05)	_	1.02		1.00, 1.04	0.103
Psychological distress								
Depression diagnosis	1.00	0.69 (0.57, 0.84)	0.86 (0.82, 0.91)	0.85 (0.69, 1.04)	0.84		0.80, 0.89	< 0.002***
Depressive symptoms	0.00	-0.18 (-0.29, -0.07)	-0.10 (-0.11, -0.08)	-0.13 (-0.20, -0.06)		-0.11	-0.13, -0.09	< 0.002***
Anxiety symptoms	0.00	-0.04 (-0.12, 0.05)	-0.06 (-0.08, -0.03)	_		-0.05	-0.07, -0.03	< 0.002***
Hopelessness	0.00	-0.09 (-0.22, 0.04)	-0.08 (-0.10, -0.05)	-0.05 (-0.11, 0.02)		-0.07	-0.10, -0.05	< 0.002***
Loneliness	0.00	-0.19 (-0.29, -0.10)	-0.03 (-0.05, -0.01)	-0.11 (-0.20, -0.02)		-0.06	-0.08, -0.04	< 0.002***
Psychosocial well-being								
Positive affect	0.00	0.14 (0.06, 0.22)	0.09 (0.07, 0.11)	0.10 (0.01, 0.20)		0.10	0.08, 0.12	< 0.002***
Life satisfaction	0.00	0.13 (0.04, 0.22)	_	0.11 (0.03, 0.20)		0.12	0.06, 0.18	< 0.002***
Social integration	0.00	_	0.27 (0.25, 0.29)	0.22 (0.13, 0.28)		0.26	0.24, 0.28	< 0.002***
Purpose in life	0.00	_	0.29 (0.27, 0.30)	0.05 (-0.02, 0.11)		0.25	0.23, 0.26	< 0.002***

	GUTS		NHSII		HRS		Combined estimate	
	Effect estimate <sup>b</sup>	CI limit <sup>e</sup>	Effect estimate <sup>b</sup>	CI limit <sup>c</sup>	Effect estimate <sup>b</sup>	CI limit <sup>c</sup>	Effect estimate <sup>b</sup>	CI limit <sup>c</sup>
All-cause mortality	_	_	2.04	1.60	2.12	1.70	2.04	1.67
No. of physical problems	1.16	1.00	1.23	1.17	1.16	1.00	1.20	1.12
Diabetes	2.35	1.00	1.39	1.00	1.40	1.00	1.43	1.00
Hypertension	1.63	1.00	_	_	1.24	1.00	1.29	1.00
Stroke	_	_	1.11	1.00	1.29	1.00	1.00	1.00
Heart disease	_	_	1.36	1.00	1.36	1.00	1.36	1.00
Cancer	4.85	1.32	1.25	1.00	1.21	_	1.56	1,21
Overweight/obesity	1.16	1.00	1.21	1.00	1.28	1.00	1.11	1.00
Heavy drinking	2.40	1.77	2.90	2.50	1.95	1.00	2.40	2.08
Current cigarette smoking	1.70	1.16	2.21	1.85	2.35	1.00	2.17	1.81
Short sleep duration	1.25	1.00	1.16	1.00	_	_	1.21	1.00
Frequent physical activity	_	_	1.11	1.00	1.43	1.00	1.16	1.00
Preventive-healthcare use	1.16	1.00	1.16	1.00	_	_	1.15	1.00
Depression diagnosis	2.26	1.67	1.60	1.43	1.63	1.00	1.67	1.50
Depressive symptoms	1.64	1.36	1.42	1.36	1.50	1.30	1.43	1.37
Anxiety symptoms	1.23	1.00	1.30	1.23	_	_	1.27	1.19
Hopelessness	1.39	1.00	1.36	1.29	1.27	1.00	1.33	1.26
Loneliness	1.66	1.41	1.20	1.11	1.46	1.21	1.31	1.24
Positive affect	1.53	1.30	1.39	1.33	1.42	1.13	1.41	1.34
Life satisfaction	1.50	1.25	_	_	1.45	1.19	1.47	1.30
Social integration	_	_	1.88	1.83	1.69	1.51	1.86	1.81
Purpose in life	—	_	1.93	1.89	1.27	1.00	1.81	1.77

# Health and Wellbeing Outcomes

There is evidence, from rigorous longitudinal studies, that participation in religious community also has beneficial effects on numerous other health and well-being outcomes...

- All-Cause Mortality: Strawbridge et al. (1997); Hummer et al. (1999); Musick et al. (2004); Chida et al. (2009); Li et al. (2016); etc.
- Depression (Li et al., 2016; Garssen et al. 2021; VanderWeele, 2021)
- Suicide (Kleiman and Liu, 2014; VanderWeele et al., 2016; Chen et al., 2020)
- Life Satisfaction: Lim and Putnam (2010); Fancourt and Steptoe (2018); Chen and VanderWeele (2018)
- Meaning and Purpose: Krause and Hayward (2012); Chen et al. (2020)
- Less Substance Abuse: Green et al. (2010); Nonnemaker et al. (2003), Chen and VanderWeele (2018)
- Less Crime: Johnson et al. (2001)
- Generosity/Volunteering/Civic Engagement/Prosocial Behavior: Putnam and Campbell (2012); Shariff et al. (2016); Chen et al. (2020)
- Social Relationships and Marital Stability: Strawbridge et al. (1997); Call and Heaton (1997); Wilcox and Wolfinger (2016); Li et al. (2018)

### Health and Wellbeing Outcomes

But for a number of these outcomes there are still only 1 or 2 rigorous longitudinal studies with control for baseline outcomes

The application of the outcome-wide approach could...

- Quickly expand our evidence base
- Ultimately serve as input for meta-analyses of longitudinal studies
- More easily allow for the publication of null results, thereby improving our understanding, and eliminating selection bias

When used in conjunction with data resources such as the Global Flourishing Study, or other existing longitudinal cohort studies, our knowledge could dramatically expand, possibly very quickly

#### **Public Health Impact**

Public health impact is assessed as a function of (i) prevalence of the exposure and (ii) size of the effect size

Religious participation is common:

Approximately 84% of the world's population report a religious affiliation

Within the United States (Gallup Poll, 2015-2016):
89% believe in God or a universal spirit
78% consider religion a very important or fairly important part of life
79% identify with a particular religious group
36% report having attended a religious service in the last week

The effect sizes as we have seen are relative large Religious participation is an important social determinant of health (idler, 2014) Should be included in curricula (VanderWeele and Koenig, 2017; Oman, 2018)

#### **Public Health Impact**

VanderWeele, T.J., Li, S. and Kawachi, I. (2017). Re: Religious service attendance and suicide rates. *JAMA Psychiatry*, 74:197-198.

The public health implications are potentially important

The CDC recently reported an increase in the suicide rate from 10.5-(per 100,000) in 1999 to 13.0 in 2014

During this period, the Gallup Poll indicates a decline in weekly service attendance from 43% in 1999 to 36% in 2014

If we were to extrapolate our study estimate to the general population, this would indicate that about 40% of the increase in suicide could be attributed to the decline in religious service attendance

# **Clinical Practice**

**Two Difficult Questions:** 

- Should questions of religion and spirituality be addressed in medicine?
- Is it ever appropriate to encourage religious service attendance?

Sloan et al. (NEJM, 2000): "Should physicians prescribe religious activities?":

- Endorsement of service attendance is premature and unethical
- Religion can often cause tensions and antagonism
- It is difficult for physicians practically to address this as religious views differ; they are also not trained to do so; it generally shouldn't be done

#### Koenig (2000) responds:

- Sloan et al. approach the question by setting up and attacking an extreme position i.e. physicians should prescribe religious activities
- This is very different from a recognition that such activities may be important in the patient's life and understanding of illness
- The current recommendations for physicians are to take a short fourquestion spiritual history
  <sup>35</sup>
- For those who are not religious, the discussion can quickly move on

To the Editor: In 16 years of family practice, my experience could hardly be more in conflict with the conclusions of Sloan et al. Although I do not routinely inquire about patients' religious or spiritual lives, it is not unusual for me to do so. Most frequently, I ask such a question when patients are suffering from progressive, incurable, or fatal illness. It also seems relevant to inquire when patients are struggling with mental anguish or addiction.

It is my practice to ask patients whether spirituality or religion is important in their lives. I then listen, respectfully, to their experience. Some patients report little engagement with these matters, and we go on to other subjects. Many patients talk of the central part God plays in their lives and in their experience of illness. Some describe the comfort and support they obtain from religious and spiritual sources, and I validate this response and encourage them. Some say they have lost touch with religion and spirituality and wish to reconnect with them, and we discuss that. We then go on to the issues of diagnosis and treatment.

I have had many hundreds of such conversations, and not a single patient has responded negatively. The information informs my approach to patients in discussing their illness and their medical choices, sometimes in important ways. I come to know my patients in a deeper way, and they feel seen and heard in ways that matter to them. This approach helps me treat them, and heal them, particularly when they are facing incurable illness or death.

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# Taking a Spiritual History

Koenig (2000 JAMA) proposes routinely taking a spiritual history:

- (1) "Is faith (religion, spirituality) important to you in this illness?"
- (2) "Has faith been important to you at other times in your life?"
- (3) "Do you have someone to talk to about religious matters?"
- (4) "Would you like to explore religious matters with someone?"

These 4 questions are from a consensus panel of the American College of Physicians for end-of-life care (Lo et al., 1999)

See also Puchalski (2014) for another common set of four questions (FICA) World Psychiatry Association likewise endorses taking a spiritual history (Moreira-Almeida et al., 2016)

If considered too long, could be simplified further (VanderWeele, AJE 2022):

- "Are religion or spirituality important to you in thinking about health and illness, or at other times?"
- Do you have someone to talk to, or would you like someone to talk to about spiritual matters?"

These can be asked even if patient and clinician differ in religious views

# **Clinical Practice**

But... would it ever be ethical to encourage service attendance within the context of an annual physical exam, or within psychiatric care?

- People do not make decisions about religion based on health
- Religious commitments are shaped by: experiences, upbringing, values, truth claims, evidence, relationships, systems of meaning etc.
- But for those who already positively self-identify it would not seem unethical to encourage attendance as a form of meaningful social participation

Importantly...

- Context needs consideration (e.g. former child abuse) with referrals made as appropriate
- This too might be facilitated by taking a spiritual history

#### Service Attendance Encouragement

A reasonable approach in clinical practice might then be to first take a brief spiritual history (VanderWeele et al., AJE 2022) and then...

- Religious service attendance could be encouraged for those who positively self-identify with a particular religious tradition
- Other forms of community involvement could be encouraged otherwise
- For those who have had past negative experiences with religious community, offer of referral to chaplains or counselors could be made

#### **Other Considerations:**

- Palliative care guidelines are to inquire about religion/spirituality (WHO, 2004)
- Religion can be protective for mental illness; religion can also sometimes be the source of tensions; it is important to inquire
- Patients state R/S as one of the top 2 factors of 7 in medical decisionmaking; physicians rank it 7<sup>th</sup> (Silvestri et al., 2003)

#### We can also turn the questions around...

- The effects of attendance across numerous outcomes are profound
- Are we doing harm by withholding this information...?

#### **Related Papers**

- Chen, Y. and VanderWeele, T.J. (2018). Associations of religious upbringing with subsequent health and well-being from adolescence to young adulthood: an outcome-wide analysis. *American Journal of Epidemiology*, 187:2355–2364.
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- VanderWeele, T.J., Yu, J., Cozier, Y.C., Wise, L., Argentieri, M.A., Rosenberg, L., Palmer, J.R., and Shields, A.E. (2017). Religious service attendance, prayer, religious coping, and religiousspiritual identity as predictors of all-cause mortality in the Black Women's Health Study. *American Journal of Epidemiology*, 185:515-522.
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- VanderWeele, T.J. and Koenig, H.G. (2017). A course on religion and public health at Harvard. *American Journal of Public Health*, 107:47-49.
- VanderWeele, T.J. (2021). Can sophisticated study designs with regression analyses of observational data provide causal inferences? *JAMA Psychiatry*, 78(3):244-246.
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