

Spirituality and Harmful or Hazardous Alcohol and Other Drug Use

A Meta-Analysis of Longitudinal Studies

Howard K. Koh, MD, MPH; Donald E. Frederick, PhD; Tracy A. Balboni, MD, MPH; Samantha M. O'Reilly, MPH; John F. Kelly, PhD; Keith Humphreys, PhD; Michael Botticelli, MEd; Maya B. Mathur, PhD; Constantine S. Psimopoulos, MBE, PhD(c.); Katelyn N. G. Long, DrPH; Tyler J. VanderWeele, PhD

[+ Supplemental content](#)

IMPORTANCE This meta-analysis examines rigorous longitudinal 21st century studies on the associations of spirituality with harmful or hazardous alcohol and other drug (AOD) use.

OBJECTIVE To synthesize findings from independent studies about spirituality and AOD use and to produce a comprehensive estimate of the overall effect size of the associated risk reduction.

DATA SOURCES Studies previously identified in the Balboni and colleagues review on the association between spiritual exposures (including religion) and alcohol, tobacco, marijuana, or other drugs were pooled. Studies were identified through the search terms *spirituality* or *religion* or *spiritual** or *religio** or *faith* and also intersected with a long string of terms that captured health outcomes of interest.

STUDY SELECTION From an initial retrieval of more than 20 000 articles, a total of 55 spirituality studies (as defined by Puchalski and colleagues) that were (1) published 2000-2022 in the English language, (2) used validated measures of spirituality, (3) examined longitudinal associations between spirituality and AOD use, and (4) were either prospective cohort studies with sample sizes of 1000 or more or randomized clinical trials (eg, public health interventions) with sample sizes of 100 or more, were captured.

DATA EXTRACTION AND SYNTHESIS Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) reporting guidelines were used for abstracting data and assessing quality and validity. Eligible studies were those that reported quantitative outcomes measuring AOD use in relation to spiritual exposures, provided sufficient data to calculate log-relative risks (log-RR) and associated error terms, and focused on either preventive effect (eg, delayed initiation) or recovery-related outcomes (eg, cessation). Effects extracted were transformed into log-RR based on the type of effect.

MAIN OUTCOMES AND MEASURES The primary outcome was the association between spiritual or religious involvement and AOD. Subgroup analyses examined differences by AOD use type (alcohol, tobacco, marijuana, and illicit drugs) and exposure type (spiritual or religious attendance vs broader spiritual exposures).

RESULTS Results from the 55 studies, which collectively included 540 712 participants, documented a significant protective association related to both prevention and recovery between spirituality and AOD use outcomes. Specifically, a consistent 13% risk reduction extended across the studied drugs (RR, 0.87; 95% CI, 0.84-0.91), a figure that reached 18% for individuals engaging in spiritual or religious communities (defined as >weekly religious service attendance; RR, 0.82; 95% CI, 0.75-0.89). Virtually all 134 effects extracted from the studies demonstrated protective, not detrimental, results. Multiple sensitivity analyses confirmed the robustness of evidence.

CONCLUSIONS AND RELEVANCE The results of this meta-analysis regarding a protective association between spirituality and AOD use have implications for clinicians and communities regarding future strategies for AOD use prevention and recovery.

JAMA Psychiatry. doi:10.1001/jamapsychiatry.2025.4816
Published online February 18, 2026.

Author Affiliations: Author affiliations are listed at the end of this article.

Corresponding Author: Howard K. Koh, MD, MPH, Harvard T. H. Chan School of Public Health, 677 Huntington Ave, Boston, MA 02115 (hkoh@hsph.harvard.edu).

Harmful or hazardous alcohol and other drug (AOD) use has profound implications for individuals and communities. This health threat, which is also broadly referred to as substance misuse or substance use disorders and includes 48.5 million (16.7%) US individuals who have a diagnosable AOD disorder,¹ imposes major societal burdens related to hospitalizations, deaths, and economic costs.² Only about a quarter of affected individuals received treatment in the past year,¹ and effective prevention often fails to reach those at risk.³

Spirituality may represent an added avenue to lower AOD use risk and improve chances for recovery. Spirituality was defined in an international consensus conference by Puchalski and colleagues⁴ as “a dynamic and intrinsic aspect of humanity through which persons seek ultimate meaning, purpose, and transcendence, and experience relationship to self, family, others, community, society, nature, and the significant or sacred.” Although spirituality encompasses religion as part of established faith institutions, it also broadly includes other ways people find meaning, purpose, and connection to something greater than themselves.⁵

As the definition by Puchalski and colleagues is relatively recent and intended for clinical contexts, efforts to operationalize it for research are still emerging. A 2022 review by Balboni and colleagues⁶ of rigorous 21st century studies focused on the search terms *spirituality* and *religion* in their relation to serious illness and health and demonstrated beneficial associations for a range of outcomes that included not only all-cause mortality, but also specific conditions, such as substance use and misuse. The latter conclusion was also supported by a 2021 scoping review by Galanter and colleagues.⁷ A major textbook on religion and health, which also reviews alternative definitions of spirituality, likewise summarizes studies linking spirituality with reduced risk related to AOD use.⁸ However, to our knowledge, no meta-analysis has yet quantified longitudinal associations between spirituality and harmful or hazardous AOD use prevention or recovery.

The present study represents the first such meta-analysis. By pooling and analyzing the most rigorous longitudinal 21st century data available based on the Balboni and colleagues review,⁶ it quantifies how a range of specific spirituality exposures, including the major example of regular religious service attendance, is associated with use outcomes related to alcohol, tobacco, marijuana, and other drugs. The results can be used to advance dialogue about possible future directions for spirituality’s role in evidence-based prevention and treatment of AOD use.

Methods

Study Selection

We analyzed studies previously identified in the review by Balboni and colleagues⁶ on the association between spiritual exposures (including religion) and AOD use outcomes (alcohol, tobacco, marijuana, or illicit drugs) (Figure). Studies were identified through the intersection of the search terms *spirituality* or *religion* or *spiritual** or *religio** or *faith* and a long string

Key Points

Question What is the association between spiritual exposures and related drug use outcomes?

Findings This meta-analysis of 55 rigorous studies on spirituality and harmful or hazardous drug use (alcohol, tobacco, marijuana, or illicit drugs) documented a significant protective association of 13% related to both prevention and recovery. The risk reduction, which extended across all 4 drug categories, reached 18% for individuals with greater than weekly religious service attendance.

Meaning These results have implications for clinicians and communities regarding future strategies to address harmful or hazardous alcohol or other drug use.

of terms intended to capture health outcomes (see Balboni and colleagues).⁶ The search does not necessarily capture all studies broadly related to spirituality as defined by Puchalski and colleagues,⁴ but only those making explicit reference to spirituality, religion, or faith. Included studies (1) were published from 2000-2022 in the English language, (2) used validated measures of spirituality, (3) examined longitudinal associations between spirituality and AOD use and/or related health outcomes, and (4) were either prospective cohort studies with sample sizes of 1000 or more or randomized clinical trials (eg, public health interventions) with sample sizes of 100 or more. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) reporting guidelines were followed.

Additional Inclusion Criteria

Additional criteria guided article inclusion and extraction of effects. Eligible studies were those that reported quantitative outcomes measuring AOD use in relation to spiritual exposures, provided sufficient data to calculate log-relative risks (log-RR) and associated errors, and focused on either preventive effect (eg, delayed initiation) or recovery-related outcomes (eg, cessation of harmful or hazardous use).

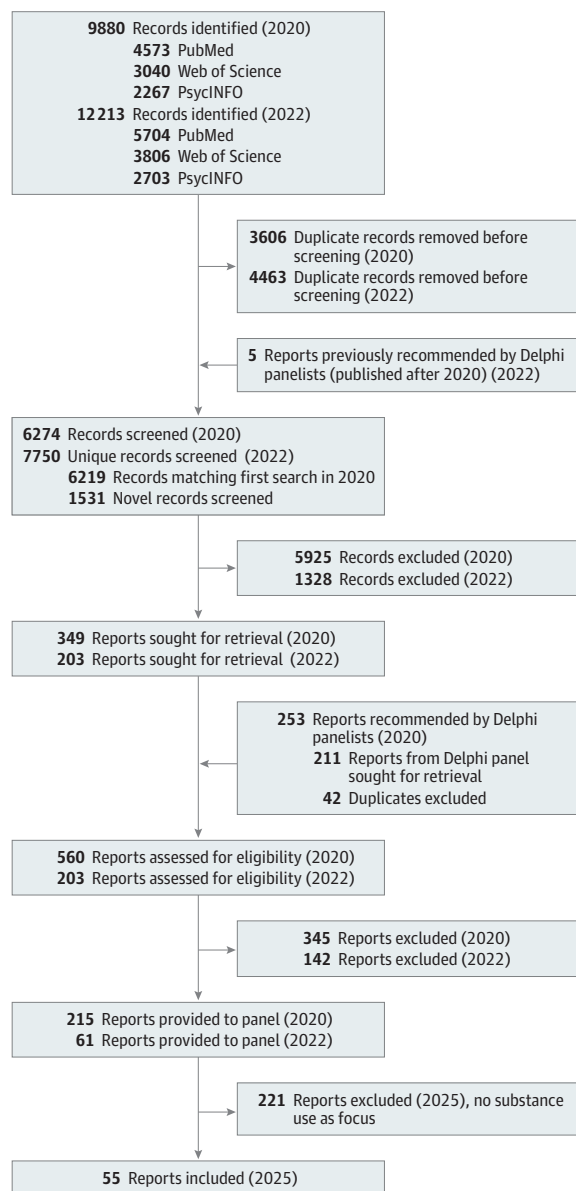
A single effect was extracted for each exposure-outcome pair, with priority generally given to the most comprehensive statistical model available. Due to its prevalence in the literature, spiritual or religious community involvement—as exemplified by attending religious services once a week or more—was analyzed separately as a distinct exposure category.

Data Extraction and Transformation

Effects extracted were transformed into log-RR based on the type of effect (eg, odds ratios were square root transformed for common outcomes; hazard ratios were treated as equivalent to RRs for rare outcomes; continuous variables were converted to odds ratios using standard meta-analytic transformations and then to RRs).^{9,10} Missing precise error terms were estimated conservatively using threshold *P* values (eg, a reported *P* value of <.05 was set to .05). All transformations and analyses were documented for reproducibility (the eMethods in Supplement 1).¹¹

Statistical Analysis

We used robust variance estimation (RVE) meta-analysis via the `robu` function in the `robumeta` R package (R Foundation),¹²

Figure. PRISMA Flow Diagram^a

PRISMA flow diagram based on 2 prior systematic reviews as reported in Balboni and colleagues,⁶ which appeared in *JAMA* in 2022: (1) 2000-2020 and (2) 2020-2022.

following methods outlined by Mathur and VanderWeele.¹³ RVE accounted for clustering of effects within studies, ensuring robust estimates of average effects while avoiding restrictive distributional assumptions. For visual presentation, calibrated estimates were derived using nonparametric methods from Wang and Lee.¹⁴ These estimates adjusted individual point estimates toward the meta-analytic mean; the least precise studies received the greatest adjustment, providing a clearer representation of population-level effects rather than point estimates. To further explore heterogeneity in effect sizes, we also estimated the proportion of population effects less than

a predefined threshold (RR = 0.8 and 0.9) for a scientifically meaningful effect size, as per Mathur and VanderWeele.¹³

Subgroup analyses examined differences by AOD use type (alcohol, tobacco, marijuana, and illicit drugs) and exposure type (spiritual or religious community involvement vs broader spiritual exposures). Recovery outcomes were also examined separately. Individual subgroup models were also explored to examine similarity with patterns observed in the overall analysis.

Sensitivity analyses evaluated the robustness of the results.¹⁵ Leave-one-out tests systematically excluded individual studies to determine their influence on effect size estimates. E-value calculations assessed the potential impact of unmeasured confounding. Worst-case scenario analyses focused on nonaffirmative effects to evaluate corresponding evidence. Publication bias was assessed using the Egger test for funnel plot asymmetry, supplemented by visual inspection of funnel plots. Two analysts (D.E.F. and M.B.M.) with very different views on spirituality and religion oversaw statistical analyses to ensure the integrity of results.

Results

Study Characteristics

In total, 55 articles met the inclusion criteria; from these, we extracted 139 effects categorized as preventive (121 [87%]) or recovery related (18 [13%]) (Table 1, Table 2, and Table 3).¹⁶⁻⁷⁰ Error terms were available for 102 effects (73%); conservative assumptions were applied to 42 (30%). The primary analysis included 134 effects (see eFigures 1-4 in Supplement 1), after excluding 5 (due to overlapping classifications [see the eResults in Supplement 1] in the drug and marijuana categories), although such excluded effects were used as appropriate in subgroup analyses. Full details on methods addressing inclusion criteria, decision-making processes, and effect categorization are provided in the eMethods in Supplement 1; the Balboni and colleagues article⁶ also contains further details on methods for that review.

All studies were longitudinal cohort studies, including 1 randomized clinical trial. In the meta-analysis, 48 studies focused on prevention, 4 on recovery, and 3 on both recovery and prevention (Table 1, Table 2, and Table 3). The sample included 41 US studies and 14 international studies published from 2001 to 2022. The sample size ranged from 1045 to 68 376 participants; the collective total was 540 712 participants.

Primary Results

The overall analysis indicated a significant protective effect of broad spiritual practices, including community involvement, on AOD use outcomes (RR, 0.87; 95% CI, 0.84-0.91; $\tau = 0.06$; $P < .001$), corresponding to an approximate 13% reduction in risk. We estimated the proportion of effects exceeding predefined thresholds for meaningful risk reduction. Specifically, an estimated 60% (95% CI, 39%-77%) of effects were more protective than RR = 0.90 (at least 10% reduction in risk), while an estimated 17% (95% CI, 6%-29%) exceeded a stricter threshold of 0.80 (20% reduction in risk). The forest plots

Table 1. Studies From 2001-2012 (n = 18)

Source	Country and population	Participants, No.	Design (follow-up period)	Religious or spiritual exposure (type of measure)	Outcome (description) and prevention (P) or recovery (R)	Summary
Strawbridge et al, ¹⁶ 2001	US; adults aged 17-65 y from Alameda County, California	2676	Prospective cohort study (30 y)	Religious attendance (frequency scale)	Quitting smoking (dichotomous); becoming physically active (dichotomous); R	For both men and women, weekly attendance was associated with a statistically significant improvement in quitting smoking (OR = 1.78; 95% CI, 1.22-2.61) and becoming often physically active (OR = 1.54; 95% CI, 1.22-1.94)
Whooley et al, ¹⁷ 2002	US; adults aged 20-32 y from the CARDIA Study in 4 cities	4544	Prospective cohort study (3 y)	Religious attendance (frequency scale)	Current smoker (dichotomous); initiation of smoking (dichotomous); cessation of smoking (dichotomous); P and R	Those who attended religious service infrequently (<1/mo or never) were significantly more likely than frequent religious attenders (1/mo or more) to be current smokers (AOR = 1.5; 95% CI, 1.3-1.8; P < .001), were significantly more likely to initiate smoking during the 3-y follow-up period (AOR = 1.9; 95% CI, 1.3-2.7; P < .001 among nonsmokers at baseline), and were suggestively less likely to quit smoking (AOR = 0.8; 95% CI, 0.6-1.1; P = .2 among smokers at baseline)
Regnerus and Elder, ¹⁸ 2003	US; adolescents aged 12-18 y from Add Health	9189	Prospective cohort study (2 y)	Religious service attendance (frequency scale); importance of religion (scale)	Drinking (frequency scale); drug use (scale); P	Church attendance among adolescents is significantly protective against vulnerability to alcohol use (OR = 0.825; P < .01), while a high importance of religion was suggestively protective (OR = 0.869; P < .10). Importance of religion was significantly protective against drug use [OR [importance of religion] = 0.736; P < .001], while church attendance was not significantly associated [OR [church attendance] = 0.943; P > .10]
Wills et al, ¹⁹ 2003	US; 7th-10th graders from New York City area	1182	Prospective cohort study (3 y)	Religiosity (composite importance scale: belief in God, rely on religious teachings, turn to prayer, beliefs as guide for living)	Alcohol and other substance use (frequency scale); P	Religiosity has an inverse association with substance use at each assessment time point (B = -0.07 to -0.09; all P < .01). Stressful life events had a significant interaction with religiosity (B = -0.05 to -0.07; all P < .05), suggesting that religiosity can buffer the impact of stressful life events on substance use. Latent growth analysis showed that religiosity reduced the impact of life stress on initial level of substance use and on rate of growth in substance use over time (model had a reasonable fit; RMSEA = 0.031; 95% CI, 0.019-0.043)
van den Bree et al, ²⁰ 2004	US; adolescents aged 12-18 y from Add Health	14 333	Prospective cohort study (1 y)	Religiosity (composite of importance, frequency of prayer, frequency of attendance)	Cigarette smoking (trajectory based on experimental and regular smoking); P	Higher levels of religiosity among boys led to lower odds of progression to regular smoking (AOR[boys] = 0.83; 95% CI, 0.73-0.93) and greater success in discontinuation of regular smoking (OR = 1.32; 95% CI, 1.13-1.54). However, this was not significant among girls (fell out of all the adjusted models)
van den Bree et al, ²¹ 2005	US; adolescents aged 11-21 y from Add Health	13 718	Prospective cohort study (1 y)	Religiosity (composite of attendance, importance, prayer, and belief)	Marijuana use initiation (categorical changes in use over time); P	Higher religiosity predicted less initiation of experimental marijuana a year later among girls (OR = 0.78; 95% CI, 0.70-0.87); it also predicted less initiation of regular use by both boys and girls (OR = 0.83; 95% CI, 0.71-0.97)
Jeynes, ²² 2006	US; 12th graders from the National Education Longitudinal Survey	18 726	Prospective cohort study (4 y)	Religious commitment (dichotomous from composite of classification as religious and participation)	Marijuana consumption (frequency); cocaine consumption (frequency); alcohol consumption (frequency); P	Very religious young adults (measured at baseline) consume alcohol at follow-up at lower levels than their less religious counterparts (lifetime effect = 0.46; P < .001; 12-mo effect = 0.38; P < .001; 30-d effect = 0.25; P < .001). Very religious young adults were also less likely than their less religious counterparts to take marijuana (lifetime effect = 0.39; P < .001; 12-mo effect = 0.32; P < .001; 30-d effect = 0.22; P < .001). Very religious young adults were less likely to take cocaine than their less religious counterparts (lifetime effect = 0.13; P < .001; 12-mo effect = 0.10; P < .01)
Nonnemaker et al, ²³ 2006	US; adolescents in grades 7-12 from Add Health (no religious affiliation excluded)	11 707	Prospective cohort study (1 y)	Public religiosity (service attendance and activity attendance, both frequency scales); private religiosity (religious importance and prayer. scale and frequency scale, respectively)	Cigarette smoking (trajectory of frequency scale for the previous 30 d); P	Private religiosity was protective against initiation of regular smoking among nonsmokers (β = -0.343; P < .01). It also was protective against initiation of experimental smoking, but only when the young person frequently attended religious services or a religious youth group (β[public*private] = -0.132; P < .01). Although private religiosity appeared to discourage the uptake of smoking, it was unrelated to reduction or cessation once a young person has become addicted to cigarettes. In contrast, public religiosity did predict reduction and cessation of cigarette use among regular smokers (β[experimental to none] = 0.289; P < .05; β[regular to none] = 0.336; P < .05)

(continued)

Table 1. Studies From 2001-2012 (n = 18) (continued)

Source	Country and population	Participants, No.	Design (follow-up period)	Religious or spiritual exposure (type of measure)	Outcome (description) and prevention (P) or recovery (R)	Summary
Adamczyk and Palmer, ²⁴ 2008	US; adolescents from Add Health	1449	Prospective cohort study (1 y)	Individual religiosity (composite scale, service attendance frequency of prayer, importance of religion); parent's religiosity (same scale)	Initiating marijuana use (dichotomous); P	A 1-unit increase in individual religiosity is associated with a 15% decrease in the odds of initiating marijuana use in the 1-y follow-up period ($P < .05$). Parent's religiosity is not significantly related to marijuana initiation during the 1-y period
Benjamins and Buck, ²⁵ 2008	Mexico; adults aged ≥ 50 y from a subset of MHAS	10 399	Prospective cohort study (2 y)	Religious attendance (scale); religious salience (dichotomized scale)	Smoking (categorical); alcohol use (categorical); P	Religious salience and participation in religious activities are both significantly associated with smoking status but not alcohol use. Individuals with religious salience are significantly less likely to be current smokers compared with never having smoked ($OR = 0.74$; $P < .01$); however, those with high levels of salience are no less likely to be former smokers. Individuals who participate in religious activities sometimes or \geq weekly are significantly less likely to be both former smokers and current smokers ($OR = 0.56$; $P < .001$; $OR = 0.59$; $P < .001$, respectively). Sometimes attenders also were less likely to be former smokers ($OR = 0.62$; $P < .001$) compared with never attenders
Hill and McCullough, ²⁶ 2008	US; adult women from low-income neighborhoods in 3 cities (Welfare Children and Families Project)	2087	Prospective cohort study (2 y)	Religious attendance (frequency scale)	Alcohol intoxication (frequency scale); P	Religious attendance of \geq weekly is associated with lower levels of intoxication 2 y later ($OR[\text{weekly attendance}] = 0.42$; 95% CI, 0.01-0.82; $P < .001$; $OR[\text{more than once a week}] = 0.38$; 95% CI, 0.24-0.99; $P < .01$). Age, ethnicity, and number of children also impacted levels of intoxication
Jang et al, ²⁷ 2008	US; children aged 7-12 y from National Survey of Children	1127	Prospective cohort study (10 y)	Religious upbringing (scale, answered by parent); child's religiosity (composite, frequency of attendance, importance of religion, answered by parent at wave 1)	Child drug use (composite, self-use of drugs); P	Participants who were raised by parents who believed in religious training and thought service attendance was important for children were suggestively (not statistically significantly) less likely to use drugs during early adulthood ($\beta = -0.04$; $P > .05$) than those who were not raised by such parents. There does appear to be some significant other pathways for both child religiosity and religious upbringing to impact drug use—for example, through later-life religiosity (in a cross-sectional analysis of religiosity vs drug use at wave 3)
Chu and Sung, ²⁸ 2009	US; adults from Drug Abuse Treatment Outcome Study in 11 cities	2560	Prospective cohort study (3 y)	Church attendance (frequency scale)	Drug use desistance (dichotomous); P	Higher frequency of church attendance at follow-up increased the log-odds of being a desister by approximately 15% ($b = 0.136$; $SE = 0.067$; $\exp[b] = 1.145$; $P < .05$). However, the frequency of church attendance at intake did not have a significant effect on client's desistance from substance abuse. For Black participants, church attendance at 1-y follow-up was positively associated with their recovery from substance abuse ($b = 0.214$; $SE = 0.096$; $\exp[b] = 1.238$; $P < .05$); in contrast, religious behavior was not a significant predictor in White participants' desistance from substance abuse
Yong et al, ²⁹ 2009	Malaysia and Thailand; adult Malaysian Muslim and Thai Buddhist smokers	3453	Prospective cohort study (mean 1 y)	Religiosity (scale); religious norms (scale)	Smoking quit attempts (dichotomous); smoking quit success (dichotomous); R	Very religious smokers were more likely to attempt to quit smoking within 6 mo ($AOR = 1.39$; 95% CI, 1.05-1.86). Participants who would be motivated by a religious leader's advice to quit were also significantly more likely to attempt quitting than those unmotivated by a leader's advice ($AOR[\text{a little}] = 1.70$; 95% CI, 1.17-2.48; $AOR[\text{a lot}] = 2.65$; 95% CI, 1.82-3.86). Individuals who said that their religion discourages smoking also were more likely to attempt quitting, but only among Malay Muslims ($AOR = 3.337$; 95% CI, 1.77-6.40). There was only 1 significant association between quit success and the religious or spiritual measures: participants who would be motivated "a little" by a religious leader's advice were less likely to have quit success ($AOR = 0.66$; 95% CI, -0.44 to 0.99)

(continued)

Table 1. Studies From 2001-2012 (n = 18) (continued)

Source	Country and population	Participants, No.	Design (follow-up period)	Religious or spiritual exposure (type of measure)	Outcome (description) and prevention (P) or recovery (R)	Summary
Good and Willoughby, ³⁰ 2011	Canada; 9th-12th graders from Ontario	3993	Prospective cohort study (5 y)	Religious service attendance (frequency scale)	Substance use: alcohol, cigarettes, marijuana use (frequency scales); P	Levels of religious service attendance predicted lower substance use over time ($b = -0.05$; $P < .001$), after controlling for stability over time in substance use and religious attendance. In contrast, there was no support for association between nonreligious activities and substance use
Adamczyk and Felson ³¹ 2012	US; youth (median age; 15) from the National Study of Youth and Religion	2530	Prospective cohort study (2 y)	Nonreligious activities sponsored by religious organizations (frequency scale); service attendance (frequency scale); importance of faith (composite scale); parent's religious attendance (frequency scale)	Initiation for smoking or alcohol (dichotomous); P	Involvement in activities sponsored by nonreligious organizations (vs activities sponsored by religious organizations) is associated with more alcohol use ($OR = 1.03$; $P < .001$). There was not a significant finding for the outcome of initiation to cigarette smoking ($OR = 0.98$; $P > .05$); however, frequency of prayer appeared to be a significant predictor of a lower odds of smoking initiation ($R = 0.8$; $P < .01$)
Chu, ³² 2012	US; female college students aged 18-22 y from Longitudinal Study of Violence Against Women	1569	Prospective cohort study (4 y)	Church attendance (frequency scale); religious attitude (scale of influence)	Marijuana use (dichotomized scale); P	Religious attitude is associated with less marijuana use in high school ($b = -0.732$; $SE = 0.148$; $P < .001$), in year 2 college ($b = -0.754$; $SE = 0.108$; $P < .001$), and in year 4 college ($b = -0.374$; $SE = 0.165$; $P < .01$). Religious attendance was also found to be associated with less marijuana use in high school ($b = -0.223$; $SE = 0.096$; $P < .01$; cross-sectional), suggestively protective in year 2 ($P = .07$) and in year 4 college ($b = -0.468$; $SE = 0.146$; $P < .001$). A 1-unit increase in religious attitude reduced the odds of being a marijuana user by about 52%; a 1-unit increase in church attendance was associated with a 20% reduction in the odds of being a marijuana user
Ulmer et al, ³³ 2012	US; adolescents from National Longitudinal Survey of Adolescent Health	7331	Prospective cohort study (1 y)	Religious involvement (composite of attendance frequency, importance, prayer frequency)	Cannabis use (trend categories); P	Religious involvement significantly decreases the initiation of marijuana use (model estimate = -0.06 ; $SE = 0.023$; $P < .05$) and persistent use of marijuana (model estimate = -0.101 ; $SE = 0.039$; $P < .05$). Religious involvement was not a significant predictor of desistance (vs either persistent or intermittent users). The level of the parent's religious involvement did not have a significant effect on the use trajectories

Abbreviations: AOR, adjusted odds ratio; CARDIA, Coronary Artery Risk Development in Young Adults; MHAS, Mexican Health and Aging Study; OR, odds ratio.

(see eFigures 1-4 in Supplement 1) include calibrated estimates and confidence intervals for each study, as well as the overall estimated effect.

Subgroup Analyses

In the primary analysis, no significant differences were observed among AOD types (alcohol, marijuana, tobacco, and other drugs), suggesting consistent evidence of protective associations of spirituality across outcome categories. Alcohol was the reference group in the combined model (RR, 0.87; 95% CI, 0.83-0.91). Detailed results and individual models for each subgroup are provided in eTables 1 and 2 in Supplement 1. When restricting to recovery studies (with assessments commonly at 1 year but ranging from 6 months to 30 years), the estimated RR was 0.82 (95% CI, 0.64-1.04), similar to that for prevention.

Sensitivity Analyses

Sensitivity analyses confirmed the robustness of the findings across several approaches. A leave-one-out analysis (of the 134

effects) showed that excluding individual studies did not significantly alter effect size estimates, with the vast majority of such effect estimates between $RR = 0.86$ and $RR = 0.87$ (see eFigure 6 in Supplement 1). The so-called worst-case scenario analysis, which uses only nonsignificant studies (or those with effect sizes in the opposite direction), still indicated a protective association (RR, 0.96; 95% CI, 0.94-0.99; $P = .005$). The Egger test for funnel plot asymmetry related to publication bias was nonsignificant. The E-value for the point estimate to evaluate robustness to potential unmeasured confounders was 1.56. This E-value indicates that an unmeasured confounder associated with both spirituality and drug use with risk ratios of 1.56 each, above and beyond the measured covariates, could suffice to explain away the association, but weaker joint confounder associations could not. The analogous E-value for the confidence interval estimate was 1.44.

Secondary Analyses

Spiritual or religious community involvement (as exemplified by regular religious service attendance) demonstrated a

Table 2. Studies From 2013-2018 (n = 20)

Source	Country and population	No.	Design (follow-up period)	Religious or spiritual exposure (type of measure)	Outcome (description) and prevention (P) or recovery (R)	Summary
Desmond et al, ³⁴ 2013	US; 11th graders from Add Health	13 568	Prospective cohort study (1 y)	Religiosity (composite of importance, frequency of attendance and prayer)	Marijuana use over last y (frequency scale); drinking to intoxication over last y (frequency scale); P	Adolescent's religiosity has a negative effect on marijuana use (unstandardized $\beta = -0.038$; $P < .01$) and alcohol consumption to intoxication (unstandardized $\beta = -0.029$; $P < .01$). Religiosity also predicts an individual's self-control ($\beta = 0.90$; $P < .01$), which also has a significant negative association to both marijuana and alcohol use. There appears to be some interaction between religiosity and self-control; specifically, the effect of self-control on alcohol use for adolescents with low religiosity was significantly greater than the effect of self-control for adolescents with high religiosity ($t = -2.27$) and almost significantly greater than the effect for medium religiosity ($t = -1.86$)
Silins et al, ³⁵ 2013	Australia; adults aged 23-26 y from PATH	2045	Prospective cohort study (4 y)	Religiosity (index of religiousness)	Marijuana use initiation (frequency scale); P	Higher levels of religiosity were protective against cannabis initiation (AOR = 0.89; 95% CI, 0.83-0.95; $P < .01$)
Fletcher and Kumar, ³⁶ 2014	US; 7th-12th graders from Add Health (with subsample of sibling pairs)	10 774	Prospective cohort study (13 y)	Religiosity (composite of frequency of prayer, frequency of attendance, and importance)	Cigarette smoking (frequency scale); binge drinking (frequency scale); marijuana use (frequency scale); P	In all categories, individuals who were more religious reported significantly less cigarette smoking (β [attendance] = -0.022 ; $P < .01$; β [prayer frequency] = -0.026 ; $P < .05$; β [importance] = -0.040 ; $P < .05$), binge drinking (β [attendance] = -0.015 ; $P < .10$; β [frequency of prayer] = -0.19 ; $P < .05$; β [importance] = -0.029 ; $P < .05$), and marijuana use (β [attendance] = -0.021 ; $P < .01$; β [frequency of prayer] = -0.020 ; $P < .05$; β [importance] = -0.045 ; $P < .05$). When putting all measures of religiosity into a single model, importance of religion was the strongest predictor of the outcomes
Haug et al, ³⁷ 2014	Switzerland; men aged ≥ 19 y from Cohort Study on Substance Use Risk Factors	2774	Prospective cohort study (15 mo)	Religiosity (RBB scale)	Onset of cannabis use (dichotomous); onset of illegal drug use (dichotomous); P	Belief in god and practicing religion was negatively associated with the onset of cannabis use (AOR = 0.54; 95% CI, 0.31-0.96; $P < .01$) compared to being atheist. Similarly, belief in god and practicing religion (compared with atheist) was also negatively associated with the onset of illegal drug use other than cannabis (OR = 0.28; 95% CI, 0.14-0.55; $P < .01$); however, this was not included in the fully controlled model. The ORs for the other categories compared to atheist were also below 1, but did not reach a significant level
Hoffmann, ³⁸ 2014	US; adolescents aged 13-17 y from National Study of Youth and Religion	2276	Prospective cohort study (6 y)	Religiousness (composite of frequency of attendance, prayer, religious salience); parent religiousness (composite, frequency of attendance, prayer, encouraging child belief)	Marijuana use (frequency scale); P	Higher values of religiousness at wave 2 were associated with about 10% less marijuana use at wave 3 one year later ($\beta = -0.97$; $P < .05$). In a more limited model with fewer included confounders, higher levels of religiousness are associated with decreased marijuana use in both wave 2 and 3 (β [wave 1] = -0.123 ; $P < .01$; β [wave 1] = -0.100 ; $P < .01$). The data suggest that religiousness also predicts decreases in drug using peer networks, increases in religious networks, and increases in moral schema, which might be pathways for religion to impact marijuana use. Religiousness of adults or parents was also significantly associated with a decrease in marijuana use ($\beta = -0.200$; $P < .01$)
Bailey et al, ³⁹ 2015	US; adults aged 20-79 y from the Midlife in the United States study	4496	Prospective cohort study (9-10 y)	Multiple measures (religious attendance, religious importance, spiritual importance, religious or spiritual comfort seeking, religious or spiritual decision-making; all dichotomized)	Smoking status (dichotomous); P and R	All measures of religious involvement (measured at 2 time points, hence 2 values [eg, high-low]) were associated with decreased odds of being a persistent smoker compared to a nonsmoker, including religious attendance (OR[high-high] = 0.30; 95% CI, 0.22-0.41; OR[high-low] = 0.59; 95% CI, 0.41-0.85), religious importance (OR[high-high] = 0.61; 95% CI, 0.47-0.82), spiritual importance (OR[high-high], 0.61; 95% CI, 0.45-0.82; OR[low-high], 0.58; 95% CI, 0.38-0.88), religious or spiritual comfort seeking (OR[high-high], 0.59; 95% CI, 0.46-0.75), and religious or spiritual decision-making (OR[high-high] = 0.58; 95% CI, 0.45-0.74). In 4 of 5 religious dimensions, high religious involvement at both time points was associated with decreased odds of having been a smoker: religious attendance (OR[high-high] = 0.51; 95% CI, 0.34-0.76), religious importance (OR[high-high] = 0.66; 95% CI, 0.47-0.93), religious or spiritual comfort seeking (OR[high-high] = 0.67; 95% CI, 0.48-0.92), and religious or spiritual decision-making (OR[high-high] = 0.70; 95% CI, 0.51-0.97). No effect modification by gender or race or ethnicity

(continued)

Table 2. Studies From 2013-2018 (n = 20) (continued)

Source	Country and population	No.	Design (follow-up period)	Religious or spiritual exposure (type of measure)	Outcome (description) and prevention (P) or recovery (R)	Summary
Becker et al, ⁴⁰ 2015	Switzerland; male adults aged ≥19 y from Cohort Study on Substance Use Risk Factors	4230	Prospective cohort study (15 mo)	Religiosity (RBB categories)	Onset of daily cigarette use (dichotomous); P	Having no religion (as compared to the Christian religion) was associated with a greater risk of onset of daily smoking (OR = 1.42; 95% CI, 1.03-1.97; P = .04). Believing in God and practicing was associated with lesser onset of smoking than atheist persons in a category-specific model (but when entered in with the other religion model, this fell out) (OR = 0.49; 95% CI, 0.29-0.84; P = .01)
Hill and Pollock, ⁴¹ 2015	US; adolescents aged 15-21 y and adults from National Youth Survey Family Study	1174	Prospective cohort study (1 y)	Religious attendance (frequency scale); belief in religion or God (scale)	Substance use (dichotomous, 9 drugs); P	More frequent religious service attendance was associated with lower levels of tobacco use both in adolescence (standardized β = -0.74; P = .04) and adulthood (standardized β = -0.157; P < .001). Similarly, more frequent service attendance predicted lower levels of alcohol use in adolescence (standardized β = -0.202; P < .001) and marijuana use in adulthood (standardized β = -0.211; P < .001). There were suggestive predictions for alcohol use in adulthood (standardized β = -0.083; P = .09) and marijuana use in adolescence (standardized β = -0.060; P = .09). However for the outcome hard drug use there was no statistically significant association with attendance in either age group. A high importance of belief in God was not statistically significant as a predictor of alcohol use in adolescence or adulthood. A high importance of belief in God did predict lower levels of marijuana use a year later in both adolescents (standardized β = -0.097; P = .006) and adulthood (standardized β = -0.102; P < .001). High importance of belief in God was significantly associated with lower hard drug use in adolescence (standardized β = -0.098; P = .04) but not in adulthood (P = .32)
Kobayashi et al, ⁴² 2015	Japan; adults who participated in annual health check-up program at St. Luke's International Hospital	28 948	Prospective cohort study (5 y)	Religiosity (scale)	Alcohol consumption (dichotomized scale); smoking (frequency scale); exercise (dichotomized scale); P	Compared with those who were not religious at baseline, religious or somewhat/slightly religious participants had more favorable health behavioral profiles at annual follow-up visits, including lower odds of using excessive alcohol (OR[religious] = 0.87; 95% CI, 0.77-0.98), lower odds of being a current smoker (OR[somewhat religious] = 0.75; 95% CI, 0.65-0.87; OR[religious] = 0.88; 95% CI, 0.71-1.08), and higher odds of regularly exercising (OR[somewhat religious] = 1.07; 95% CI, 1.01-1.14; OR[religious] = 1.06; 95% CI, 0.98-1.16)
Tran et al, ⁴³ 2015	Australia; adult women at first prenatal visit from Mater-University of Queensland Study of Pregnancy	6597	Prospective cohort study (6 mo)	Church attendance (frequency scale)	Alcohol consumption (categorized based on frequency and amount); P and R	Little (<1/mo) or no church attendance is an independent predictor of being less likely to be in the abstaining from alcohol group (AOR[<1/mo] = 0.48; 95% CI, 0.40-0.58; P < .001; AOR[no attendance] = 0.45; 95% CI, 0.38-0.53; P < .001) and more likely to be in the heavy consumption group (AOR = 1.61; 95% CI, 1.09-2.04; P < .05)
Mumford and Liu, ⁴⁴ 2016	US; mothers from ECLS-B	9050	Prospective cohort study (5 y)	Religious attendance (frequency scale)	Smoking (trajectory); P	Religious service attendance was a protective factor against postpartum smoking in the fully adjusted model. Specifically, for persistent smokers, any attendance proved protective (AOR[once or twice/y] = 0.70; P < .05; AOR[several times/y] = 0.40; P < .01; AOR[once or twice/mo] = 0.43; P < .01; AOR[nearly weekly or more] = 0.18; P < .01) compared with never attenders. For temporary quitters and pregnancy-inspired quitters, protective influence was seen for only nearly weekly or more attendance levels (AOR[temporary quitters] = 0.39; P < .01; AOR[pregnancy-inspired quitters] = 0.45; P < .01)
Hill et al, ⁴⁵ 2017	US; adults aged ≥50 y from Health and Retirement Study	4514	Prospective cohort study (4 y)	Religious attendance (frequency scale)	Smoking status (ever, dichotomous); P	Religious service attendance did have direct longitudinal effects on smoking (unstandardized coefficient = -0.323; P < .001)
Stansfield, ⁴⁶ 2017	US; juvenile offenders in Maricopa County, Arizona, and Philadelphia, Pennsylvania, from Pathways to Desistance Study	1354	Prospective cohort study (7 y)	Religiosity (composite of importance and religion as coping mechanism)	Substance use (self-reported offending inventory); P	Among juvenile offenders, higher levels of religiosity were associated with reduced illicit substance abuse (including marijuana) (β = -0.054; P < .01). When analyzed by race or ethnicity, similar results were found for both White (β = -0.087; P = .005) and Black youth (β = -0.064; P = .011), but not for Hispanic youth

(continued)

Table 2. Studies From 2013-2018 (n = 20) (continued)

Source	Country and population	No.	Design (follow-up period)	Religious or spiritual exposure (type of measure)	Outcome (description) and prevention (P) or recovery (R)	Summary
Terry-McElrath et al, ⁴⁷ 2017	US; 12th graders from the National Monitoring the Future Study	9831	Prospective cohort study (32 y)	Religious commitment (composite of personal importance of religion and religious service attendance [low, medium, and high])	Marijuana use (participants assigned to use classes); P	The risk of being in any marijuana class involving use (vs nonuse) was higher for those who reported lower religious commitment at age 18 y (all $P < .001$)
Ahrenfeldt et al, ⁴⁸ 2018	Europe (10 countries); adults aged ≥ 50 y from SHARE	16 509	Prospective cohort study (9 y)	Religious participation (dichotomous); prayer (dichotomized frequency scale); religious education (dichotomous); religiousness (composite of above, categories)	Current smoking (dichotomous); alcohol consumption (scale); physical activity (scale); sleeping issues (dichotomous); P	Praying (at baseline) was associated with lower odds of smoking (OR = 0.82; 95% CI, 0.73-0.92) and alcohol consumption (OR = 0.71; 95% CI, 0.64-0.78). Praying was also associated with lower odds of physical inactivity, both moderate (OR = 0.88; 95% CI, 0.79-0.98) and vigorous (OR = 0.92; 95% CI, 0.85-0.98); however, while this effect was driven by respondents in wave 2, this association was not significant in other waves (and in some waves, the OR was > 1). Taking part in a religious organization was associated with lower odds of smoking (OR = 0.61; 95% CI, 0.53-0.70), alcohol consumption (OR = 0.76; 95% CI, 0.67-0.85), physical inactivity (OR = 0.54; 95% CI, 0.48-0.61), doing no vigorous physical activity (OR = 0.63; 95% CI, 0.58-0.68), and sleep problems (OR = 0.83; 95% CI, 0.76-0.91) in the overall mode (and when examining the waves individually, except sleep problems in waves 4 and 5). An overall association between religious education and smoking was indicated; however, effects were opposite for men and women. A similar pattern was found for alcohol consumption. The more religious (compared with all other respondents), found lower odds of smoking (OR = 0.60; 95% CI, 0.50-0.71), alcohol consumption (OR = 0.83; 95% CI, 0.73-0.95; not significant in all waves), physical inactivity (OR = 0.50; 95% CI, 0.43-0.58), no vigorous physical activity (OR = 0.59; 95% CI, 0.54-0.65), and sleep problems (OR = 0.78; 95% CI, 0.70-0.87; not significant in all waves). The results were similar when comparing the more religious to the less religious. The other behaviors did not have a significant finding
Burdette et al, ⁴⁹ 2018	US; mothers from the Fragile Families and Child Well-Being Study	3176	Prospective cohort study (9 y)	Religious attendance (frequency scale); religious salience (scale); religious transformation (dichotomous)	Prescription drug misuse (dichotomous); illicit drug use (dichotomous); marijuana use (dichotomous); P	Religious attendance at baseline reduces the odds of illicit drug use (OR = 0.74; $P < .001$) and marijuana use (OR = 0.78; $P < .01$). However, religious involvement at baseline did not have a significant effect on prescription drug misuse at follow-up. Respondents who increased their level of religious attendance over the study period also tended to exhibit a concurrent reduction in the odds of illicit drug use. Religious salience was not associated with any measure of drug use
Chen and VanderWeele, ⁵⁰ 2018	US; children of nurses aged 12-17 y from the Growing Up Today Study	5681	Prospective cohort study (13 y)	Religious attendance (frequency scale); prayer or meditation (frequency scale)	Multiple outcomes (substance and alcohol use, cigarette smoking, sexual initiation/number sexual partners, teen pregnancy); P	Compared with no attendance, \geq weekly attendance of religious services was associated with lower probabilities of many harmful health behaviors (marijuana use: RR = 0.83; 95% CI, 0.78-0.88; $P < .002$; other explicit drug use: RR = 0.67; 95% CI, 0.55-0.81; $P < .002$; early sexual initiation: RR = 0.65; 95% CI, 0.55-0.77; $P < .002$; cigarette smoking: RR = 0.85; 95% CI, 0.76-0.96; $P < .01$; and number of lifetime sexual partners: $\beta = -0.28$; 95% CI, -0.34 to -0.21 ; $P < .002$). However, there was no significant finding for differences in teen pregnancy (RR = 0.76; 95% CI, 0.45-1.28) or frequent binge drinking (RR = 0.97; 95% CI, 0.87-1.07). Similar patterns observed when looking at frequent vs no prayer or meditation (all significant findings had $P < .002$ except cigarette smoking, which had $P < .05$, and binge drinking and teen pregnancy, which did not reach significance)
Nordfjærn, ⁵¹ 2018	Norway; adults aged 40-80 y	2671	Prospective cohort study (6 y)	Religiosity (scale of importance to self)	Alcohol consumption (continuous measure combining frequency and quantity); R	Religiosity was associated with alcohol abstinence (AOR = 3.78; 95% CI, 2.21-6.47; Wald = 23.5). Among those who consumed alcohol, religiosity was associated with lower consumption levels (standardized adjusted $\beta = -0.12$; 95% CI, -0.28 to -0.13)

(continued)

Table 2. Studies From 2013-2018 (n = 20) (continued)

Source	Country and population	No.	Design (follow-up period)	Religious or spiritual exposure (type of measure)	Outcome (description) and prevention (P) or recovery (R)	Summary
Read et al, ⁵² 2018	UK; adolescents aged 11-13 y from the Determinants of Young Adult Social Well-Being and Health	4782	Prospective cohort study (4 y)	Religious attendance (frequency scale)	Smoking initiation (dichotomized); P	Adolescents who reported experiencing racism and never attending a place of worship were more likely (OR = 1.87; 95% CI, 1.31-2.67; P = .001) to start smoking compared to those who reported racism and attending a place of worship >once/wk. There was a significant interaction between reported racism and religious attendance on smoking initiation (OR = 2.25; 95% CI, 1.21-4.19; P = .01)
Zhang et al, ⁵³ 2018	South Africa; men from the Eastern Cape Province	1181	Prospective cohort study (6 mo)	Religious participation (composite frequency: service attendance, reading religious works, watching religious programs, prayer)	Binge drinking (frequency of ≥5 drinks in last mo); problem drinking (composite of friend opinion, guilty, hangover, need to reduce); P	The odds of binge drinking were lower for individuals with higher religious participation (OR = 0.73; 95% CI, 0.65-0.82). Problem drinking significantly predicted binge drinking at 6-mo follow-up (OR = 2.64; 95% CI, 2.04-3.41). After adding in problem drinking, religious participation stayed as significant predictors, with little changes in the OR

Abbreviations: AOR, adjusted odds ratio; ECLS-B, Early Childhood Longitudinal Study, Birth Cohort; OR, odds ratio; PATH, Personality and Total Health Through

Life; RBB, Religious Background and Behavior; SHARE, Survey of Health, Ageing and Retirement in Europe; RR, risk ratio.

possible stronger protective association over other exposures. In a model comparing the 2 exposures, the broader spiritual category indicated an RR of 0.90 (95% CI, 0.87-0.93), corresponding to a 10.2% reduction in AOD use risk, whereas spiritual or religious community involvement demonstrated an additional potential 8.5% reduction in risk, thus yielding a total of approximately 18% substance use reduction.

Effects labeled as low, moderate, and serious did not significantly differ (intercept RR, 0.88; 95% CI, 0.84-0.91). Effects labeled as critical (n = 3) were significantly larger (RR, 0.78; 95% CI, 0.73-0.84). A so-called headline analysis, which evaluated whether effects included in study abstracts differed in strength from those that were not, found no significant difference. The overall association for nonabstract effect estimates was also protective (RR, 0.90; 95% CI, 0.87-0.93), indicating consistent protective associations findings regardless of headline status. Full results for these secondary analyses are provided in eFigure 8 in [Supplement 1](#).

Discussion

This meta-analysis synthesized data from 55 published longitudinal studies on spirituality and harmful or hazardous AOD use risk and documented a significant protective association. Virtually all the 134 effects extracted from the studies demonstrated protective, not detrimental, outcomes (eFigures 1-4 in [Supplement 1](#)). Specifically, a consistent risk reduction of 13% extended across all AOD types studied—alcohol, tobacco, marijuana, and other drugs—a figure that reached 18% for individuals engaging in weekly or greater religious service attendance. The meta-analysis used validated measures of spirituality, involved longitudinal studies (including 1 randomized trial), applied robust variance estimation techniques to account for study heterogeneity, and confirmed the robustness of evidence through sensitivity analyses.

Spirituality in AOD Use Prevention

Most of the analyzed effects (87%) focused on AOD use prevention. Results reaffirmed the substantial and growing body of evidence that spiritual engagement—including involvement in religious communities—can serve as a protective factor against the initiation and misuse of AOD. Protective associations extended across various spirituality exposures—including religious service attendance, prayer, meditation, and seeking spiritual comfort—and across all 4 AOD categories studied. Participation in spiritual or religious communities may affect outcomes through mechanisms including social support, strong abstinence or nonintoxication or moderation social norms, meaning and purpose, and moral beliefs; emerging evidence from neuroscience suggests that spiritual practices can influence brain regions associated with stress regulation, reward processing, and social connection.⁸ While confounding or endogeneity may be a possibility, the E-value analyses suggest that the association is unlikely to be entirely due to some other unmeasured confounding factor. The effect sizes observed were consistent with previously published individual high-quality investigations; one followed up more than 5000 adolescents aged 12 to 17 years and found that spiritual community involvement was associated with a 15% reduction in cigarette smoking and a 33% reduction in illicit drug use.⁵⁰

The protective role of spirituality for youth can represent a major resource for prevention and delayed initiation, especially since early initiation is strongly associated with substance use chronicity and severity later in life. From a public policy viewpoint, while the Establishment Clause of the First Amendment of the US Constitution supports separation of church and state and, as such, prohibits government from endorsing any particular faith, public health agencies could still disseminate data and research findings on the potential protective effects of religious practice to parents, just as they do for other practices (eg, exercise).

Table 3. Studies From 2019-2022 (n = 17)

Source	Country and population	Participants, No.	Design (follow-up period)	Religious or spiritual exposure (type of measure)	Outcome (description) and prevention (P) or recovery (R)	Summary
Chen et al, ⁵⁴ 2019	US; children of nurses aged 19-24 y from the Growing up Today Study	6323	Prospective cohort study (3-6 y, depending on outcomes)	Sense of mission (scale from Brief Multidimensional Measure of Religiousness/Spirituality)	Multiple outcomes (smoking, binge drinking, drug use, use of preventive health care); P	Greater sense of mission was not associated with any behavioral outcomes other than a greater use of preventive health care (RR = 1.15; 95% CI, 1.08-1.24; P < .002)
Hai, ⁵⁵ 2019	US; adolescents aged 13-17 y from National Study of Youth and Religion	1969	Prospective cohort study (2 y)	Religiosity (dichotomized scale)	Alcohol use (frequency scale); binge drinking (frequency scale in last 2 wk); P	Among White young adults, religiosity was found to have a protective effect against alcohol use (ATE = -0.57; 95% CI, -0.83 to -0.32) and binge drinking (ATE = 0.54; 95% CI, 0.38-0.71). However, among non-White youth, religiosity was not found to have an effect on alcohol use (ATE = 0.08; 95% CI, -0.31 to 0.47) or binge drinking (ATE = 1.07; 95% CI, 0.68-1.64). The interaction term of religiosity and gender was not found to be significant for alcohol use or binge drinking
Jang, ⁵⁶ 2019	US; juvenile offenders aged 14-17 y	1289	Prospective cohort study (11 y)	Religious attendance (frequency scale); religious salience (scale); religious experiences (scale); religious efficacy (scale)	Marijuana use (frequency scale); binge drinking (frequency scale); P	Juvenile offenders whose attendance at religious activities increased over the 10-y follow-up period were more likely to decelerate or desist from marijuana use during the period (β[slope] = -0.368; P < .05), with suggestive but not statistically significant findings for binge drinking. Those whose religious salience, experience, and efficacy increased were more likely to decelerate or desist from binge drinking (β[slope] = -0.138; P < .05) and marijuana use (β[slope] = -0.209; P < .05). These changes were largely explained by decrease in antisocial factors (legal cynicism and moral disengagement) and increase in prosocial factors (impulse control and suppression of aggression)
Mak, ⁵⁷ 2019	US; adults aged 18-25 y with previous substance use from Add Health	1045	Prospective cohort study (7 y)	Church attendance (dichotomous); religious faith (dichotomous)	Substance nonuse in the past 30 d (dichotomous); R	Greater religious attendance was associated with greater nonuse of alcohol (log-odds = 1.426; P < .001), of marijuana (log-odds = 1.28; P < .01), and of any illicit drug (including marijuana) (log-odds = 1.4; P < .01). There was no association of religious attendance with smoking. Religious faith was associated with greater nonuse of alcohol in the last month (log-odds = 0.48; P < .05); no association was seen for smoking, marijuana, or illicit drugs
Pawlikowski et al, ⁵⁸ 2019	Poland; individuals aged ≥16 y from Social Diagnosis Panel Study	6396	Prospective cohort study (6 y)	Religious attendance (frequency scale)	Smoking tobacco products (dichotomous); high alcohol consumption (dichotomous); participation in sports (dichotomous); P	Religious service attendance was associated with reduced risk of smoking (AOR[1-3 times/mo] = 0.676; 95% CI, 0.536-0.853; AOR[weekly] = 0.572; 95% CI, 0.441-0.742; and AOR[>weekly] = 0.444; 95% CI, 0.306-0.644) compared with never attendance. Weekly religious service attendance was also associated with less alcohol use (AOR[weekly] = 0.50; 95% CI, 0.334-0.748; other categories not significant). More than weekly religious service attendance was associated with greater probability of practicing sports (OR[>weekly] = 1.318; 95% CI, 1.003-1.732; other categories not significant). These findings were robust and unlikely to be explained away by unmeasured confounding
Broman et al, ⁵⁹ 2020	US; adolescents from Add Health	15 000	Prospective cohort study (3 y)	Religious attendance (frequency scale)	Substance use: alcohol use, marijuana use, other illegal drug use, and prescription drug misuse; P	Multivariate analyses indicate that the predictors of heavy drug use in young adulthood vary by the drug used. However, the most general influences on heavy drug use in young adulthood are age, gender, race-ethnicity, and the prior use of drugs
Long et al, ⁶⁰ 2020	US Nurses Health Study II	54 703 and 51 661	Prospective cohort study (3 y)	Self-forgiveness and divine forgiveness as 2 separate exposures	Health behaviors (heavy drinking, current cigarette smoking, frequent physical activity, preventive health care use, dietary quality); P	Self-forgiveness was strongly associated with greater psychosocial well-being (eg, for top vs bottom level of self-forgiveness: β = 0.23; 95% CI, 0.20-0.25 for positive affect) and lower psychological distress (eg, β = -0.21; 95% CI, -0.23 to -0.18 for depressive symptoms). Self-forgiveness and divine forgiveness were not strongly associated with substance use
Sartor et al, ⁶¹ 2020	US; adolescent girls (Black and White only) aged 11-17 y from Pittsburgh area	2172	Prospective cohort study (11 y)	Importance of religion (scale); participation in religious activities (other than service attendance, frequency scale)	Alcohol initiation (scale, age); cigarette initiation (scale, age); marijuana initiation (scale, age); P	Increasing importance of religion significantly predicted less cigarette use initiation in White girls (HR = 0.68; 95% CI, 0.53-0.88), and participation in other religious activities remained significant for marijuana use initiation in White girls (HR = 0.63; 95% CI, 0.47-0.83). The authors conclude that the protective effects of religious involvement against cigarette and marijuana use initiation are more robust for White than Black adolescent girls and overall relatively weak for alcohol use initiation. Bivariate analyses of religious service attendance and frequency of prayer were not significant and not included in adjusted models

(continued)

Table 3. Studies From 2019-2022 (n = 17) (continued)

Source	Country and population	Participants, No.	Design (follow-up period)	Religious or spiritual exposure (type of measure)	Outcome (description) and prevention (P) or recovery (R)	Summary
Upenieks and Schafer, ⁶² 2020	US; adolescents between the ages of 14 and 18 y in 1979 from NLSY79	12 686	Prospective cohort study (1 y)	Religious attendance (frequency scale)	Smoking and heavy drinking; P	Consistent with hypothesis 2, those with stably high religious attendance had lower cumulative smoking scores (b = -.81; P < .001) and drinking scores (b = -.26; P < .001) relative to the consistent nonattenders. Study found evidence that increasing religiosity from early life to midlife was associated with better health behaviors. Those increasing from low/no to high religious attendance between early life and midlife had lower smoking (b = -.62; P < .01) and drinking scores (b = -.25; P < .001) than stably low attenders. Likewise, those who progressed from moderate levels of attendance in early life to high levels by midlife also had lower smoking (b = -.72; P < .001) and drinking scores (b = -.25; P < .001).
Bai, ⁶³ 2021	US; US youths born 1980-1984, drawing from NLSY97	10 666	Prospective cohort study (6 y)	Religious attendance (frequency scale); prayer or meditation (frequency scale); Roman Catholics and Protestants	Alcohol use reduction; P	The principal finding suggested that frequent prayer could help reduce alcohol consumption for those who drink at moderate levels in the Protestant group
Chen et al, ⁶⁴ 2021	US; Growing Up Today Study, NHSSII, and HRS	9862, 68 376, and 13 770, respectively	Prospective cohort studies, 3 cohorts (3 y)	Religious attendance (frequency scale)	Multiple outcomes (smoking, drinking, drug use, use of preventive health care); P	Estimates combining data across cohorts suggest that, compared with those who never attended religious services, individuals who attended services at least once/wk had a lower risk of all-cause mortality by 26% (95% CI, 0.65-0.84), heavy drinking by 34% (95% CI, 0.59-0.73), and current smoking by 29% (95% CI, 0.63-0.80). Service attendance was also inversely associated with a number of psychological distress outcomes (ie, depression, anxiety, hopelessness, loneliness) and was positively associated with psychosocial well-being outcomes (ie, positive affect, life satisfaction, social integration, purpose in life), but was generally not associated with subsequent disease, such as hypertension, stroke, and heart disease
Hodge et al, ⁶⁵ 2021	US Add Health, Black or African American individuals aged 2-19 y at wave I and 24-32 y at wave IV	3223	Prospective cohort study (2 y)	Religious attendance (frequency scale)	Substance use (cocaine (eg, crack, coca leaves), other types of illicit drugs (LSD, PCP, ecstasy, heroin, mushrooms, or inhalants), marijuana (hash, bhong, ganja), and cigarettes; P	Compared to never-attenders, consistent attenders had lower odds of almost all measures of substance use, including: lifetime cocaine use (OR = 0.28; 95% CI, 0.10-0.85; P < .05); lifetime illicit drug use (OR = 0.37; 95% CI, 0.15-0.93; P < .05); lifetime marijuana use (OR = 0.64; 95% CI, 0.46-0.91; P < .05); past-month cigarette smoking (OR = 0.39; 95% CI, 0.26-0.60; P < .001); past-month marijuana use (OR = 0.31; 95% CI, 0.19-0.50; P < .001); and past-day marijuana use (OR = 0.29; 95% CI, 0.15-0.55; P < .001)
Mintz et al, ⁶⁶ 2021	US; 9 Colorado high school students	2744	Randomized control trial (2 y)	Importance of spirituality	Likelihood of future drug use; P	Spirituality was not significantly associated with adolescents' likelihood of future alcohol, marijuana, or prescription drug use
Palm et al, ⁶⁷ 2021	US Pittsburgh Girls Study ages 13-17 y	2122 (57.4% Black, 42.6% White)	Prospective cohort study (1 y)	Assessments of religiosity, self-control, and alcohol use from ages 13-17 y	Alcohol use was assessed annually across ages 13-17 y via the Nicotine, Alcohol, and Drug Substance Use self-report measure; P	Self-control was associated with reduced alcohol use in both the majority (87.56% of the sample) and minority (12.44% of the sample) subgroups, but only the majority subgroup also demonstrated associations between religiosity, self-control, and alcohol use. Religiosity may predict lower alcohol use in most adolescent girls, but this association may not be present among all girls, suggesting that there is a qualitative difference in how religiosity is associated with self-control and alcohol use between subgroups
Rubenstein et al, ⁶⁸ 2021	US veterans	4750	Prospective cohort study (7 y)	Duke University Religion Index	Hazardous drinking, Alcohol Use Disorders Identification Test-Consumption scale; P	Frequency of organized religious activities was not significantly associated with incidence of hazardous drinking (RR = 0.87; 95% CI, 0.74-1.02). Frequency of private spiritual activities was associated with a higher incidence of hazardous drinking (RR = 1.19; 95% CI, 1.04-1.36; P < .05). Intrinsic religiosity was associated with a lesser incidence of hazardous drinking (RR = 0.89; 95% CI, 0.82-0.95; P < .01)
Shiba et al, ⁶⁹ 2022	UK adults	8951	Prospective cohort study (1 y)	Religious attendance	Unhealthy change in alcohol intake, self-report measure; P	Frequent online religious participation (≥weekly) during lockdown was associated with less unhealthy change in alcohol drinking in the past week (RR = 1.08; 95% CI, 1.01-1.15; P < .05). Frequency of online religious participation during lockdown was not significantly associated with other measures of health behaviors

(continued)

Table 3. Studies From 2019-2022 (n = 17) (continued)

Source	Country and population	Participants, No.	Design (follow-up period)	Religious or spiritual exposure (type of measure)	Outcome (description) and prevention (P) or recovery (R)	Summary
Wu et al, ⁷⁰ 2022	US Add Health 7th-12th graders during the 1994-1995 academic year (wave I; wave II in 1996; wave III in 2001-2002; wave IV in 2007-2008; and wave V in 2016-2018)	14 800	Prospective cohort study (2 y)	4 Types of religious service attendance during emerging adulthood	6 Measures of young adult substance use; P	Relative to the reference group (nonattenders at T1 and T2), the protective effects were largest for the consistent attendance group (attenders at T1 and T2: OR = 0.22-0.37; <i>P</i> < .001), followed by the adult attendance-only group (nonattenders at T1, attenders at T2: OR = 0.29-0.72; <i>P</i> < .01), and then the childhood attendance-only group (attenders at T1, nonattenders at T2: OR = 0.69-0.78; <i>P</i> < .01)

Abbreviations: AOR, adjusted odds ratio; ATE, average treatment effect; HR, hazard ratio; HRS, Health and Retirement Study; LSD, lysergic acid diethylamide; NHSII, Nurses' Health Study II; NLSY79, National Longitudinal

Survey of Youth 1979; OR, odds ratio; PCP, phencyclidine; PTSD, posttraumatic stress disorder; RR, risk ratio.

Most studies of spirituality and drug use focused on traditional religious forms of spiritual community involvement. However, given that 28% of US adults now identify as religiously unaffiliated,⁷¹ investigating the impact of less traditional forms of spiritual practice should be a future research direction; one included study⁶⁹ noted a protective effect from participation in online spiritual communities. Notably, these associations were demonstrated not only in the US, but also in studies from international settings, including the United Kingdom and Brazil. Regardless of setting, the way options are presented to people through choice architecture may influence decision-making; spiritual or religious community involvement may make some rewards (eg, joy, connection, meaning) more accessible to those in recovery while imposing social disapproval on decisions to use drugs.

Spirituality in AOD Use Recovery

The effect estimates focusing on recovery (13%) reaffirmed the impact of mutual support programs, such as Alcoholics Anonymous (AA) and other 12-step models. Although not regularly recognized as such, the 12-step models are inherently spiritually grounded, with explicit references to experiencing a “spiritual awakening”⁷² and a connection to a higher power; helping people regain meaning and build better coping mechanisms (through strategies including prayer, meditation, self-reflection, forgiveness, and community building) can potentially build resilience and hope.⁷³ A meta-analysis related to spirituality and AOD use examining 12-step programs by Hai⁵⁵ of 20 randomized clinical trials—which focused specifically on alcohol—found that manualized 12-step treatments were effective in reducing alcohol misuse. Our results also echo the conclusions of the 2020 Cochrane Review of 27 studies that noted that AA and 12-step facilitation counseling outperform other clinical interventions, such as cognitive behavioral therapy, in sustaining 12-month abstinence rates.^{73,74}

Engagement with spiritual practices differs across demographic groups. For example, over half of African American respondents report that spirituality or religion “made all the difference” in their recovery, a rate 2- to 3-fold greater than for White individuals.⁷⁴ Women, who may face unique recovery

challenges due to social, economic, and trauma-related factors, tend to report higher levels of spiritual engagement⁷⁵; when they do access treatment, their success rates are comparable to men.⁷⁶

Implications for Clinicians and Communities

Some research suggests that the educated professional class, which is generally less religiously and spiritually inclined than the overall population, might underestimate the role of spiritual practice in the lives of those they seek to support.⁴ Clinicians and communities can consider identifying and aligning spirituality themes to broaden future efforts in drug use prevention and recovery. Health professionals can consider, for example, asking patients, “Are religion or spirituality important to you in thinking about health and illness or at other times?” and “Do you have, or would you like to have, someone to talk to about religious or spiritual matters?”^{6,77} Although clinicians may not personally relate to spiritual practices, they can acknowledge their value as part of patient-centered care while demonstrating respect for a wide range of individual patient beliefs. Addiction training modules for health professionals could also be expanded to offer this theme.

At the community level, coordination of public health systems and spiritual or religious communities can expand access to resources that can address the chronic stress, social isolation, and loss of meaning proposed to be root causes of “deaths of despair.”⁷⁸ Such partnerships can align outreach programs, education, and counseling services while also adhering to federal funding laws and regulations (eg, Charitable Choice) that assure clients do not participate in faith-based activity unless they choose to do so. Spiritual practices as part of a holistic treatment plan can include faith-based communities, if clients deem that helpful, to bring a sense of meaning and connection. Placing AOD treatment services within spiritual or religious settings (eg, faith-based recovery support services) might be effective. Clinicians might also provide encouragement to participate in religious community for those who already positively identify with a faith tradition. Promotion of other forms of community life can be made available for those who do not identify with a faith tradition^{73,79};

in fact, not encouraging such community participation may potentially neglect an important health resource that supports people in a time of need.

Future Research Directions

Future studies should prioritize, when appropriate and ethical, randomized clinical trials and longitudinal designs to further explore possible causality and mechanisms, as has been done, for example, with 12-step-oriented treatments.⁸⁰ These include examining whether and how spirituality or religion mediates prevention and recovery differently across different drugs (eg, alcohol vs opioids) and populations. Specific investigations can examine whether and how spirituality or religion might moderate the association between psychological stress and drug use through spiritual practices, community support, and/or meaning-making as alternative coping strategies.

Exploring global applicability can also assess if the results of this meta-analysis extend beyond Western (predominantly Christian) contexts. Broader inclusion of diverse religious traditions and secular spiritual practices will enhance generalizability. Future research can address methodological challenges by incorporating standardized spirituality measures and focusing on longitudinal designs.

Limitations

Limitations include variability in how spirituality was identified across studies. Although the analysis examines the current state of the longitudinal literature making explicit reference to how the terms *religion*, *spirituality*, or *faith* relate

to drug use, the search string used may not be completely sufficient to capture all the articles meeting the expansive clinical definition of spirituality by Puchalski and colleagues.⁴ For example, certain experiences critical to a person's spiritual life (eg, connection to nature), but not explicitly referred to as such, may not have been identified. Also, assessment of how participation in secular communities supports spiritual well-being with respect to drug use was limited. While potential biases in study design and selection bias, along with self-reported measures, unmeasured confounding, and some potential issues of reverse causation could possibly limit interpretations, the sensitivity analyses used and the E-value calculations suggest at least moderate robustness to potential unmeasured confounding and other bias.

Conclusions

In quantifying the significant association of spirituality and protective effects on harmful or hazardous AOD use, this meta-analysis underscores the holistic potential of addressing spirituality, for those desiring to do so, as part of prevention and recovery. Further exploration is needed about how spirituality can represent a greater part of both community-based and clinic-based resources. All efforts must respect the ethical principles of patient autonomy, as well as cultural diversity, cultural humility, and evidence-based practices.⁸¹ Doing so may serve as a way to advance whole person addiction prevention and care for the future.

ARTICLE INFORMATION

Accepted for Publication: November 5, 2025.

Published Online: February 18, 2026.

doi:10.1001/jamapsychiatry.2025.4816

Open Access: This is an open access article distributed under the terms of the [CC-BY-NC-ND License](#), which does not permit alteration or commercial use, including those for text and data mining, AI training, and similar technologies. © 2026 Koh HK et al. *JAMA Psychiatry*.

Author Affiliations: Initiative on Health, Spirituality, and Religion at Harvard University, Department of Health Policy and Management, Harvard T. H. Chan School of Public Health, Boston, Massachusetts (Koh); Human Flourishing Program, Institute for Quantitative Social Science, Harvard University, Cambridge, Massachusetts (Frederick); Initiative on Health, Spirituality, and Religion at Harvard University, Department of Radiation Oncology, Mass General Brigham, Harvard Medical School, Boston, Massachusetts (Balboni); Harvard T. H. Chan School of Public Health, Boston, Massachusetts (O'Reilly); Recovery Research Institute, Massachusetts General Hospital, Harvard Medical School, Boston, Massachusetts (Kelly); Veterans Affairs and Stanford University Medical Centers, Palo Alto, California (Humphreys); Formerly with White House Office of National Drug Control Policy, Washington, DC (Botticelli); Center for Open and Reproducible Science, Stanford Data Science, Quantitative Sciences Unit and Department of Pediatrics, Stanford University

School of Medicine, Stanford, California (Mathur); Initiative on Health, Spirituality, and Religion at Harvard University, Center for Bioethics, Department of Epidemiology, Department of Global Health and Social Medicine, Harvard T. H. Chan School of Public Health, Harvard Medical School, Boston, Massachusetts (Psimopoulos); Institute for Quantitative Social Science, Department of Epidemiology, Harvard T. H. Chan School of Public Health, Harvard University, Boston, Massachusetts (Long); Department of Epidemiology, Harvard T. H. Chan School of Public Health, Boston, Massachusetts (VanderWeele).

Author Contributions: Dr Frederick had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

Concept and design: Koh, Frederick, Balboni, O'Reilly, Humphreys, Botticelli, VanderWeele.

Acquisition, analysis, or interpretation of data: Frederick, Balboni, Kelly, Humphreys, Mathur, Psimopoulos, Long, VanderWeele.

Drafting of the manuscript: Koh, O'Reilly, Mathur, Psimopoulos.

Critical review of the manuscript for important intellectual content: All authors.

Statistical analysis: Koh, Frederick, Mathur, Psimopoulos, VanderWeele.

Administrative, technical, or material support: Balboni, O'Reilly, Botticelli, Long.

Supervision: Koh, Balboni, O'Reilly, Mathur.

Conflict of Interest Disclosures: Dr Frederick reported grants from Templeton Religion Trust

during the conduct of the study. Dr Balboni reported grants from the John Templeton Foundation during the conduct of the study. Dr Humphreys reported personal fees from Indivior PLC outside the submitted work. No other disclosures were reported.

Funding/Support: This work was supported by the Templeton Religion Trust (grant 2022-30967) and the Lee Family Fund. Dr Kelly receives funding as part of the Elizabeth R. Spallin Chair in Psychiatry in the Field of Addiction Medicine, Harvard Medical School.

Role of the Funder/Sponsor: The funders had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the manuscript; and decision to submit the manuscript for publication.

Disclaimer: The opinions expressed in this article represent the personal views of the authors and not those of their employers or those of any faculty grant funder. Any reference to a business, product, or service does not represent endorsement.

Data Sharing Statement: See [Supplement 2](#).

REFERENCES

- 2023 National Survey on Drug Use and Health Annual National Report. Substance Abuse and Mental Health Services Administration. Accessed June 19, 2025. <https://www.samhsa.gov/data/report/2023-nsduh-annual-national-report>

2. Alcohol use and your health. Centers for Disease Control and Prevention, US Department of Health and Human Services. Accessed June 19, 2025. <https://www.cdc.gov/alcohol/about-alcohol-use/index.html>
3. Garnett MF, Miniño AM. Drug overdose deaths in the United States, 2003–2023. *NCHS Data Brief*. 2024;(522):1. doi:10.15620/cdc/170565
4. Puchalski CM, Vitillo R, Hull SK, Reller N. Improving the spiritual dimension of whole person care: reaching national and international consensus. *J Palliat Med*. 2014;17(6):642–656. doi:10.1089/jpm.2014.9427
5. Koenig HG. *Spirituality in Patient Care: Why, How, When, and What*. Revised ed. Templeton Foundation Press; 2007.
6. Balboni TA, VanderWeele TJ, Doan-Soares SD, et al. Spirituality in serious illness and health. *JAMA*. 2022;328(2):184–197. doi:10.1001/jama.2022.11086
7. Galanter M, Hansen H, Potenza MN. The role of spirituality in addiction medicine: a position statement from the Spirituality Interest Group of the International Society of Addiction Medicine. *Subst Abuse*. 2021;42(3):269–271. doi:10.1080/08897077.2021.1941514
8. Koenig HK, VanderWeele TJ, Peteet JR. *Handbook of Religion and Health*. 3rd ed. Oxford University Press; 2024. doi:10.1093/oso/9780190088859.001.0001
9. Borenstein M, Hedges LV, Higgins JP, Rothstein HR. *Introduction to Meta-Analysis*. John Wiley & Sons; 2021. doi:10.1002/9781119558378
10. VanderWeele TJ. On a square-root transformation of the odds ratio for a common outcome. *Epidemiology*. 2017;28(6):e58–e60. doi:10.1097/EDE.0000000000000733
11. Flourishing-research/substance-use. GitHub. Accessed July 2, 2025. <https://github.com/flourishing-research/substance-use>
12. Viechtbauer W. Conducting meta-analyses in R with the metafor package. *J Stat Softw*. 2010;36(3):1–48. doi:10.18637/jss.v036.i03
13. Mathur MB, VanderWeele TJ. Sensitivity analysis for publication bias in meta-analyses. *J R Stat Soc Ser C Appl Stat*. 2020;69(5):1091–1119. doi:10.1111/rssc.12440
14. Lee Y, Wang Y. Threshold regression with nonparametric sample splitting. *arXiv*. Preprint posted online May 30, 2019. doi:10.48550/arXiv.1905.13140
15. Mathur MB, VanderWeele TJ. Sensitivity analysis for unmeasured confounding in meta-analyses. *J Am Stat Assoc*. 2020;115(529):163–172. doi:10.1080/01621459.2018.1529598
16. Strawbridge WJ, Shema SJ, Cohen RD, Kaplan GA. Religious attendance increases survival by improving and maintaining good health behaviors, mental health, and social relationships. *Ann Behav Med*. 2001;23(1):68–74. doi:10.1207/S15324796ABM2301_10
17. Whooley MA, Boyd AL, Gardin JM, Williams DR. Religious involvement and cigarette smoking in young adults: the CARDIA study (Coronary Artery Risk Development in Young Adults) study (. *Arch Intern Med*. 2002;162(14):1604–1610. doi:10.1001/archinte.162.14.1604
18. Regnerus MD, Elder GH. Religion and vulnerability among low-risk adolescents. *Soc Sci Res*. 2003;32(4):633–658. doi:10.1016/S0049-089X(03)00027-9
19. Wills TA, Yaeger AM, Sandy JM. Buffering effect of religiosity for adolescent substance use. *Psychol Addict Behav*. 2003;17(1):24–31. doi:10.1037/0893-164X.17.1.24
20. van den Bree MB, Whitmer MD, Pickworth WB. Predictors of smoking development in a population-based sample of adolescents: a prospective study. *J Adolesc Health*. 2004;35(3):172–181. doi:10.1016/j.jadohealth.2003.09.021
21. van den Bree MB, Pickworth WB. Risk factors predicting changes in marijuana involvement in teenagers. *Arch Gen Psychiatry*. 2005;62(3):311–319. doi:10.1001/archpsyc.62.3.311
22. Jeynes WH. Adolescent religious commitment and their consumption of marijuana, cocaine, and alcohol. *J Health Soc Policy*. 2006;21(4):1–20. doi:10.1300/J045v21n04_01
23. Nonnemaker J, McNeely CA, Blum RW. Public and private domains of religiosity and adolescent smoking transitions. *Soc Sci Med*. 2006;62(12):3084–3095. doi:10.1016/j.socscimed.2005.11.052
24. Adamczyk A, Palmer I. Religion and initiation into marijuana use: the deterring role of religious friends. *J Drug Issues*. 2008;38(3):717–742. doi:10.1177/002204260803800304
25. Benjamins MR, Buck AC. Religion: a sociocultural predictor of health behaviors in Mexico. *J Aging Health*. 2008;20(3):290–305. doi:10.1177/0898264308315429
26. Hill TD, McCullough ME. Religious involvement and the intoxication trajectories of low-income urban women. *J Drug Issues*. 2008;38(3):847–862. doi:10.1177/002204260803800309
27. Jang SJ, Bader CD, Johnson BR. The cumulative advantage of religiosity in preventing drug use. *J Drug Issues*. 2008;38(3):771–798. doi:10.1177/002204260803800306
28. Chu DC, Sung HE. Racial differences in desistance from substance abuse: the impact of religious involvement on recovery. *Int J Offender Ther Comp Criminol*. 2009;53(6):696–716. doi:10.1177/0306624X08320207
29. Yong HH, Hamann SL, Borland R, Fong GT, Omar M; ITC-SEA project team. Adult smokers' perception of the role of religion and religious leadership on smoking and association with quitting: a comparison between Thai Buddhists and Malaysian Muslims. *Soc Sci Med*. 2009;69(7):1025–1031. doi:10.1016/j.socscimed.2009.07.042
30. Good M, Willoughby T. Evaluating the direction of effects in the relationship between religious versus non-religious activities, academic success, and substance use. *J Youth Adolesc*. 2011;40(6):680–693. doi:10.1007/s10964-010-9581-y
31. Adamczyk A, Felson J. The effect of religion-supported programs on health-related behaviors in adolescence. *Rev Relig Res*. 2012;54:469–497. doi:10.1007/s13644-012-0079-9
32. Chu DC. The links between religiosity, childhood sexual abuse, and subsequent marijuana use: an empirical inquiry of a sample of female college students. *Int J Offender Ther Comp Criminol*. 2012;56(6):937–954. doi:10.1177/0306624X11413560
33. Ulmer JT, Desmond SA, Jang SJ, Johnson BR. Religious involvement and dynamics of marijuana use: initiation, persistence, and desistance. *Deviant Behav*. 2012;33(6):448–468. doi:10.1080/01639625.2011.636653
34. Desmond SA, Ulmer JT, Bader CD. Religion, self control, and substance use. *Deviant Behav*. 2013;34(5):384–406. doi:10.1080/01639625.2012.726170
35. Silins E, Hutchinson D, Swift W, Slade T, Toson B, Rodgers B. Factors associated with variability and stability of cannabis use in young adulthood. *Drug Alcohol Depend*. 2013;133(2):452–458. doi:10.1016/j.drugalcdep.2013.07.003
36. Fletcher J, Kumar S. Religion and risky health behaviors among U S adolescents and adults. *J Econ Behav Organ*. 2014;104:123–140. doi:10.1016/j.jebo.2014.03.018
37. Haug S, Núñez CL, Becker J, Gmel G, Schaub MP. Predictors of onset of cannabis and other drug use in male young adults: results from a longitudinal study. *BMC Public Health*. 2014;14:1202. doi:10.1186/1471-2458-14-1202
38. Hoffmann JP. Religiosity, social networks, moral schemas, and marijuana use: a dynamic dual-process model of culture and behavior. *Soc Forces*. 2014;93(1):181–208. doi:10.1093/sf/sou053
39. Bailey ZD, Slopen N, Albert M, Williams DR. Multidimensional religious involvement and tobacco smoking patterns over 9–10 years: a prospective study of middle-aged adults in the United States. *Soc Sci Med*. 2015;138:128–135. doi:10.1016/j.socscimed.2015.06.006
40. Becker J, Schaub MP, Gmel G, Haug S. Cannabis use and other predictors of the onset of daily cigarette use in young men: what matters most? results from a longitudinal study. *BMC Public Health*. 2015;15:843. doi:10.1186/s12889-015-2194-3
41. Hill MC, Pollock W. Was Hirschi right? a national-level longitudinal examination of religion as a social bond. *Deviant Behav*. 2015;36(10):783–806. doi:10.1080/01639625.2014.977149
42. Kobayashi D, Shimbo T, Takahashi O, Davis RB, Wee CC. The relationship between religiosity and cardiovascular risk factors in Japan: a large-scale cohort study. *J Am Soc Hypertens*. 2015;9(7):553–562. doi:10.1016/j.jash.2015.04.003
43. Tran NT, Najman JM, Hayatbakhsh R. Predictors of maternal drinking trajectories before and after pregnancy: evidence from a longitudinal study. *Aust N Z J Obstet Gynaecol*. 2015;55(2):123–130. doi:10.1111/ajo.12294
44. Mumford EA, Liu W. Social integration and maternal smoking: a longitudinal analysis of a national birth cohort. *Matern Child Health J*. 2016;20(8):1586–1597. doi:10.1007/s10995-016-1958-4
45. Hill TD, Vaghela P, Ellison CG, Rote S. Processes linking religious involvement and telomere length. *Biodemography Soc Biol*. 2017;63(2):167–188. doi:10.1080/19485565.2017.1311204
46. Stansfield R. Drawing on religion in the desistance process: paying attention to race and ethnicity. *Crim Justice Behav*. 2017;44(7):927–945. doi:10.1177/0093854817699438
47. Terry-McElrath YM, O'Malley PM, Johnston LD, Bray BC, Patrick ME, Schulenberg JE. Longitudinal patterns of marijuana use across ages 18–50 in a US national sample: A descriptive examination of predictors and health correlates of repeated measures latent class membership. *Drug Alcohol Depend*. 2017;171:70–83. doi:10.1016/j.drugalcdep.2016.11.021

48. Ahrenfeldt LJ, Möller S, Hvidt NC, Lindahl-Jacobsen R. Religiousness and lifestyle among Europeans in SHARE. *Public Health*. 2018; 165:74-81. doi:10.1016/j.puhe.2018.09.009
49. Burdette AM, Hill TD, Webb NS, Ford JA, Haynes SH. Religious involvement and substance use among urban mothers. *J Sci Study Relig*. 2018; 57(1):156-172. doi:10.1111/jssr.12501
50. Chen Y, VanderWeele TJ. Associations of religious upbringing with subsequent health and well-being from adolescence to young adulthood: an outcome-wide analysis. *Am J Epidemiol*. 2018; 187(11):2355-2364. doi:10.1093/aje/kwy142
51. Nordfjærn T. Religiosity and alcohol use: is religiosity important for abstinence and consumption levels in the second half of life? *Subst Use Misuse*. 2018;53(14):2271-2280. doi:10.1080/10826084.2018.1473431
52. Read UM, Karamanos A, João Silva M, et al. The influence of racism on cigarette smoking: longitudinal study of young people in a British multiethnic cohort. *PLoS One*. 2018;13(1):e0190496. doi:10.1371/journal.pone.0190496
53. Zhang J, Jemmott JB III, Icard LD, et al. Predictors and psychological pathways for binge drinking among South African men. *Psychol Health*. 2018;33(6):810-826. doi:10.1080/08870446.2018.1429613
54. Chen Y, Kim ES, Koh HK, Frazier AL, VanderWeele TJ. Sense of mission and subsequent health and well-being among young adults: an outcome-wide analysis. *Am J Epidemiol*. 2019;188(4):664-673. doi:10.1093/aje/kwz009
55. Hai AH. Are there gender, racial, or religious denominational differences in religiosity's effect on alcohol use and binge drinking among youth in the United States? a propensity score weighting approach. *Subst Use Misuse*. 2019;54(7):1096-1105. doi:10.1080/10826084.2018.1555598
56. Jang SJ. Religiosity, crime, and drug use among juvenile offenders: a latent growth modeling approach. *J Quant Criminol*. 2019;35(1):27-60. doi:10.1007/s10940-017-9369-2
57. Mak HW. Dimensions of religiosity: the effects of attendance at religious services and religious faith on discontinuity in substance use. *J Stud Alcohol Drugs*. 2019;80(3):358-365. doi:10.15288/jsad.2019.80.358
58. Pawlikowski J, Białowolski P, Węziak-Białowolska D, VanderWeele TJ. Religious service attendance, health behaviors and well-being-an outcome-wide longitudinal analysis. *Eur J Public Health*. 2019;29(6):1177-1183. doi:10.1093/eurpub/ckz075
59. Broman CL, Wright MK, Choi SH, Wang YJ. Heavy drug use in young adulthood. *J Subst Use*. 2020;25(6):626-631. doi:10.1080/14659891.2020.1760369
60. Long KNG, Chen Y, Potts M, Hanson J, VanderWeele TJ. Spiritually motivated self-forgiveness and divine forgiveness, and subsequent health and well-being among middle-aged female nurses: an outcome-wide longitudinal approach. *Front Psychol*. 2020;11:1337. doi:10.3389/fpsyg.2020.01337
61. Sartor CE, Hipwell AE, Chung T. Public and private religious involvement and initiation of alcohol, cigarette, and marijuana use in Black and White adolescent girls. *Soc Psychiatry Psychiatr Epidemiol*. 2020;55(4):447-456. doi:10.1007/s00127-020-01830-y
62. Upenieks L, Schafer MH. Religious attendance and physical health in later life: a life course approach. *J Health Soc Behav*. 2020;61(4):486-502. doi:10.1177/0022146520961363
63. Bai Z. Does frequent prayer help reduce alcohol use? heterogeneity in religious contexts and drinking styles. *Ment Health Relig Cult*. 2021;24(2):151-163. doi:10.1080/13674676.2020.1826915
64. Chen Y, Kim ES, VanderWeele TJ. Religious-service attendance and subsequent health and well-being throughout adulthood: evidence from three prospective cohorts. *Int J Epidemiol*. 2021;49(6):2030-2040. doi:10.1093/ije/dyaa120
65. Hodge DR, Wu S, Wu Q, Marsiglia FF, Chen W. Religious service attendance typologies and African American substance use: a longitudinal study of the protective effects among young adult men and women. *Soc Psychiatry Psychiatr Epidemiol*. 2021; 56(10):1859-1869. doi:10.1007/s00127-021-02029-5
66. Mintz S, Valido A, Rivas-Koehl M, et al. Supporting sexual minority youth: protective factors of adverse health outcomes and implications for public health. *J Adolesc Health*. 2021;69(6):983-990. doi:10.1016/j.jadohealth.2021.05.021
67. Palm MH, Latendresse SJ, Chung T, Hipwell AE, Sartor CE. Patterns of bi-directional relations across alcohol use, religiosity, and self-control in adolescent girls. *Addict Behav*. 2021;114:106739. doi:10.1016/j.addbeh.2020.106739
68. Rubenstein A, Koenig HG, Marin DB, Sharma V, Harpaz-Rotem I, Pietrzak RH. Religion, spirituality, and risk for incident posttraumatic stress disorder, suicidal ideation, and hazardous drinking in U.S. military veterans: a 7-year, nationally representative, prospective cohort study. *J Affect Disord*. 2021;295:1110-1117. doi:10.1016/j.jad.2021.08.128
69. Shiba K, Cowden RG, Gonzalez N, et al. Associations of online religious participation during COVID-19 lockdown with subsequent health and well-being among UK adults. *Psychol Med*. 2023;53(9):3887-3896. doi:10.1017/S0033291722000551
70. Wu SY, Hodge DR, Wu Q, Marsiglia FF, Chen WT. A longitudinal examination of the relationship between religious service attendance and young adult substance use. *Soc Work Res*. 2022;46(1):65-78. doi:10.1093/swr/svab028
71. Religious "nones" in America: who they are and what they believe. Pew Research Center. Accessed August 14, 2025. <https://www.pewresearch.org/religion/2024/01/24/religious-nones-in-america-who-they-are-and-what-they-believe/>
72. Kelly JF, Greene MC. Toward an enhanced understanding of the psychological mechanisms by which spirituality aids recovery in Alcoholics Anonymous. *Alcohol Treat Q*. 2014;32(2-3):299-318. doi:10.1080/07347324.2014.907015
73. Kelly JF, Eddie D. The role of spirituality and religiousness in aiding recovery from alcohol and other drug problems: an investigation in a national U.S. sample. *Psycholog Relig Spiritual*. 2020;12(1):116-123. doi:10.1037/rel0000295
74. Kaskutas LA, Weisner C, Lee M, Humphreys K. Alcoholics Anonymous affiliation at treatment intake among White and Black Americans. *J Stud Alcohol*. 1999;60(6):810-816. doi:10.15288/jsa.1999.60.810
75. Greenfield SF, Back SE, Lawson K, Brady KT. Substance abuse in women. *Psychiatr Clin North Am*. 2010;33(2):339-355. doi:10.1016/j.psc.2010.01.004
76. Humphreys K, Gifford E. Religion, spirituality and the troublesome use of substances. In: Miller WR, Carroll K, eds. *Rethinking Substance Abuse: What the Science Shows and What We Should Do About It*. Guilford Press; 2006:257-274.
77. Finlay I, Humphreys K. Social prescribing of Alcoholics Anonymous in general practice. *Br J Gen Pract*. 2024;74(744):297-298. doi:10.3399/bjgp24X738549
78. Case A, Deaton A. *Deaths of Despair and the Future of Capitalism*. Princeton University Press; 2020. doi:10.35946/arcr.v40.1.03.
79. Social prescribing. NHS England. Accessed July 2, 2025. <https://www.england.nhs.uk/personalisedcare/social-prescribing/>
80. Kelly JF, Eddie D. The role of spirituality and religiousness in aiding recovery from alcohol and other drug problems: an investigation in a national US sample. *Psycholog Relig Spiritual*. 2020;12(1):116-123. doi:10.1037/rel0000295
81. Gupta A. *Bridges Across Humanity: Different Religions, Similar Teachings*. Rupa Publications India Pvt. Ltd; 2023.