# Religious attendance after elevated depressive symptoms: is selection bias at work?

In an attempt to determine if selection bias could be a reason that religious attendance and depression are related, the predictive value of elevated depressive symptoms for a decrease in future attendance at religious services was examined in a longitudinal panel of 1,319 Dutch adults. Religious attendance was assessed yearly over five years using the single question, "*how often do you attend religious gatherings nowadays*?" Depressive symptoms were assessed four times within the first year using the Depression subscale of the Brief Symptom Inventory. Logistic regression models of change in attendance were created, stratifying by baseline attendance status. Attenders who developed elevated symptoms were more likely to maintain (Relative Risk Ratio =1.65; 95% CI: 1.07 to 2.56) or increase (Relative Risk Ratio =1.82; 95% CI: 1.14 to 2.88) their attendance level as compared to those without elevated symptoms, after controlling for health and demographic covariates. Non-attenders were unlikely to start attending after elevated depressive symptoms. This study provides empirical evidence against selection bias in studies of religion and depression.

2      Religious attendance after elevated depressive symptoms: is selection bias at work?

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9   **Abstract** In an attempt to determine if selection bias could be a reason that religious attendance

10   and depression are related, the predictive value of elevated depressive symptoms for a decrease in

11   future attendance at religious services was examined in a longitudinal panel of 1,319 Dutch

12   adults.  Religious attendance was assessed yearly over five years using the single question, "*how*

13   *often do you attend religious gatherings nowadays*?"  Depressive symptoms were assessed four

14   times within the first year using the Depression subscale of the Brief Symptom Inventory.

15   Logistic regression models of change in attendance were created, stratifying by baseline

16   attendance status. Attenders who developed elevated symptoms were more likely to maintain

17   (Relative Risk Ratio =1.65; 95% CI: 1.07 to 2.56) or increase (Relative Risk Ratio =1.82; 95%

18   CI: 1.14 to 2.88) their attendance level as compared to those without elevated symptoms, after

19   controlling for health and demographic covariates. Non-attenders were unlikely to start attending

20   after elevated depressive symptoms.  This study provides empirical evidence against selection

21   bias in studies of religion and depression.

22   **Keywords:** depression, religious attendance, selection effects

23   **Introduction:**

24        Attendance at religious services is usually reported to be inversely related to depression

25   (Baetz  et al. 2004; Maselko  et al. 2009; Hayward  et al. 2012; Balbuena  et al. 2013). However,

26   as with many findings in the literature on religion, the results have not been consistent, with other

27   studies reporting a null (Schnittker 2001; Ellison and Flannelly 2009; Miller et al. 2012) or

28   curvilinear relationship of attendance and depression (Taylor et al. 2012). This inconsistency has

29   been due in part to the predominance of cross-sectional designs, which cannot establish

30    causation.  Caution is therefore required in inferring causation from cross-sectional studies.  We

31    are aware of only three longitudinal studies examining the relation of depression to subsequent

32    religious attendance. Recently, it was reported (Maselko et al. 2012) that women having an onset

33    of depression prior to age 18 were more likely to stop attending religious services as adults

34    compared to those with adult-onset MDE and those with no lifetime MDE.  Similarly, a

35    longitudinal study (Horowitz and Garber 2003) reported that depressive episodes in grades 7-11

36    predicted lower levels of religious attendance in grade 12.  The latter result is ambiguous because

37    religious attendance in grade 6 also predicted lower odds of depression in grades 7-12, although

38    the effect was just shy of statistical significance. Miller and colleagues (Miller  et al. 2002)

39    followed a cohort of 146 individuals who had an MDE in childhood together with a control group

40    of 123 who had no psychiatric disorder over 11 years.  At follow-up, the rates of religious

41    attendance between groups did not differ by childhood depression status. It is noteworthy that

42    these studies covered the adolescence-to-adult transition period. Late adolescence is generally a

43    time of profound change.   The quest to establish one's identity and career (Arnett 2000) and

44    experimentation with cohabitation, drugs, and alcohol (Thornton et al. 1992; Benda and Corwyn

45    1997; Uecker  et al. 2007) could precipitate internal conflicts with religious doctrine, leading to

46    declines in religious attendance.   In short, the developmental processes occurring during

47    adolescence confounds the relation of depression with religious attendance, in either causal

48    direction.

49        Selection effects might work in two ways to confound the relation of depression with

50    subsequent religious attendance.  First, depressed individuals may withdraw from public worship

51    as part of the overall social disengagement that occurs in depression (Maselko et al. 2012).  An

52    fMRI study reported that depressed patients showed lower activation of the amygdala, indicating

53    lower satisfaction, when presented with happy faces (Derntl et al. 2011).   Hence, participating in

54    social activities, including church, is less satisfying for depressed individuals.   Secondly,

churchgoers might be less susceptible to depression. A meta-analysis of 94 studies reported a

positive correlation of agreeableness, conscientiousness, and sociability with religious social

investment (Lodi-Smith and Roberts 2007). In summary, theory suggests that depressed

individuals select themselves out of the churchgoing demographic while healthy ones select

themselves into it. These selection effects, if operative, would likely overestimate the protective

value of religion for mental health.

Although these effects support reverse causation, the protective value of religiosity also

has empirical support. Coping with adversity through religion is well-documented in the

literature (Pargament 1997). "Turning to God or religion" as a coping strategy has been reported

in cancer patients (Bussing et al. 2007), newly bereaved individuals (Brown et al. 2004), and new

immigrants (Connor 2009). A study comparing religiosity and spirituality before and after HIV

patients were informed of the diagnosis (Ironson et al. 2006) reported that religiosity (including

attendance) increased after the diagnosis became known. Furthermore, increased religiosity was

associated with greater CD4 preservation, indicating slower HIV progression (Ironson et al.

2006). A US longitudinal study reported that depressed individuals were more likely to seek

religious consolation—defined as searching for meaning in problems and difficulties (Ferraro and

Kelley-Moore 2000). Importantly, even those with no initial religious affiliation sought religious

consolation after depression. This finding seems to support the "no atheists in foxholes"

aphorism. However, adversity or trauma can also cause individuals to turn away from God or

religion (Fontana and Rosenheck 2004; Chen and Koenig 2006). We are not aware of

longitudinal studies reporting changes to religious *attendance* per se (vis-a-vis religiosity broadly

speaking) after a depressive episode aside from the three studies in adolescence (Miller et al.

2002; Horowitz and Garber 2003; Maselko et al. 2012) already mentioned.

In this paper, our main objective was to study whether elevated depressive symptoms

introduce selection bias in a longitudinal follow-up of religious attendance. Our research

80    questions were as follows. First, do religious attenders who develop elevated depressive

81    symptoms subsequently decrease their attendance level? Second, do non-attenders who develop

82    elevated symptoms begin to attend services?

83    **Materials and Methods**

84    *Sample*

85    The data is from the Longitudinal Internet Studies for the Social Sciences (LISS) panel, a

86    random sample of adults living in the Netherlands (Scherpenzeel 2011). The panel of almost

87    8,000 individuals was drawn from the Dutch-speaking population based on a list of addresses

88    provided by Statistics Netherlands. The recruitment strategy is described in more detail

89    elsewhere (Scherpenzeel 2011). LISS is a continuing study in which participants complete online

90    questionnaires monthly on topics including family, economic situation, health, and religion.

91    Waves of religion and depression assessments were not simultaneous, so we used the notation $R_i$

92    and $D_i$ to refer to religion and depression waves, respectively. 7,418 individuals participated in

93    $R_1$, which occurred in early 2008, but a much smaller number (n = 1,804) participated in $D_1$ in

94    December 2007. Those with high or very high depressive symptoms at $D_1$ (n = 419), those that

95    skipped the religious attendance question (n = 66), and those that did not answer the $D_1$ questions

96    (n = 5,614) were not included in our sample of 1,319 individuals. We excluded those with high or

97    very high symptoms because we wanted to establish a baseline attendance level that was not

98    confounded by depression. Figure 1 gives the breakdown of these groups: (a) religious attenders

99    without elevated symptoms, (b) non-attenders without elevated symptoms, and (c) excluded

100   individuals. Our sample ranged in age from 16 to 87, with a 10% trimmed mean of 48.67.

101   (Insert Figure 1 around here)

102   In the sample, 715 individuals did not attend services and 604 attended services at $R_1$.

103   (Explained in Measures section below.) The characteristics of these groups are described in Table

104   1. Depression and religious attendance levels of these two groups—non-attenders and attenders

105 —were measured prospectively over the next four years. Our main analytic strategy was to

106 compare the proportion of individuals that changed their attendance level, stratified by baseline

107 attendance. Aside from $D_1$, depression was assessed another three times in 2008 ($D_2$ to $D_4$). $D_2$ to

108 $D_4$ preceded four waves of attendance assessment ($R_2$ to $R_5$), as indicated in Figure 1. Note that

109 while the depression waves covered a mere 9 months, the religion waves covered 4 years. The

110 change in attendance level was indexed to $R_1$ attendance.

111

112 (Insert Table 1 around here)

113 *Measures*

114      Religious attendance was assessed with the single question, "*Aside from special*

115 *occasions such as weddings and funerals, how often do you attend religious gatherings*

116 *nowadays?*" This was answered on a 7-point Likert scale coded as *1 = everyday, 2 = more than*

117 *once a week, 3 = once a week, 4 = at least once a month, 5 = only on special religious days, 6 =*

118 *less often*, and *7 = never*. We reverse coded the scale for ease of interpretation—i.e., larger

119 number indicated higher attendance. Among attenders, we used a dichotomous attendance

120 variable for decreased (coded 0) and same/increased (coded 1) and a categorical version:

121 decreased, unchanged, and increased attendance. These categories were formed by subtracting

122 the $R_1$ attendance level from a given follow-up assessment. For non-attenders in $R_1$, a

123 dichotomous variable with unchanged (coded 0) and increased (coded 1) was used.

124      Our substantive predictor was assessed using the Depression subscale of the Brief

125 Symptom Inventory (Derogatis 1975). The subscale consists of 6 items rated on a 5-point scale

126 from "Not at all" to "Extremely". The BSI is itself a short version of the SCL-90 (Derogatis and

127 Melisaratos 1983). BSI Depression had an internal reliability ranging from 0.70 to 0.92 in four

128 different studies (Derogatis and Melisaratos 1983; Boulet and Boss 1991; Kellett et al. 2003;

129 Johnson et al. 2008) and correlated with the Beck Depression Inventory, $r = .71$ and $r = .77$, in

130 two other studies (Stukenberg et al. 1990; Prinz et al. 2013). Two studies validated BSI

131 Depression against either DSM-III or DSM-IV-TR major depression (Stukenberg et al. 1990;

132 Johnson et al. 2008). ROC analyses reported area under the curve as 0.83 in community dwelling

133 older adults, but a more modest 0.65 among psychiatric inpatients.

134     For copyright reasons, the LISS dataset only provided the normative category of each

135 respondent and not the responses to individual questions. These normative categories of BSI

136 depression were: *1 = below average, 2 = average, 3 = above average, 4 = high*, and *5 = very*

137 *high*. We dichotomized them into low (below average to above average) and elevated (high to

138 very high). The cut-off was chosen because it resulted in a better approximation of the

139 prevalence of depression in the Netherlands (Bijl et al. 1998) compared to alternative cut-offs.

140 *Covariates*

141     We controlled for possible confounders including chronic conditions, income, marital

142 status, age, and gender. Chronic conditions were assessed with the single question, "*Do you*

143 *suffer from any kind of long-standing disease, affliction or handicap, or do you suffer from the*

144 *consequences of an accident?*" Income was assessed using a monthly personal gross income

145 with five categories: 0-500, 501-1500, 1501-2500, 2501-3500, and 3501 and higher Euros per

146 month. Marital status was used as an index of social support and was categorized into 1=

147 Married; 2=Separated/Divorced/Widowed; 3= Not Married. All covariates were measured

148 between December 2007 and April 2008.

149 *Statistical analysis*

150     We first compared demographic characteristics of attenders, non-attenders, and excluded

151 participants.  To examine whether elevated depressive symptoms predicted subsequent decreased

152 attendance, we crosstabulated dichotomized attendance with level of symptoms among attenders,

153 for each religion follow-up year.  Chi-square tests of association were performed.  To examine

154 change longitudinally and control for confounders, we created a multinomial logistic regression

155 model among attenders.  Relative risk ratios of maintaining or increasing attendance over

156 decreasing attendance were calculated.

157      To examine if non-attenders start attending services after elevated depression, a binary

158 logistic regression model was created with change in attendance (0 = no change; 1 = attended) as

159 dependent variable. We entered the covariates in all regression models to control for confounding

160 and robust standard errors were calculated to account for correlated errors in repeated

161 observations.

162 *Missing data*

163     Missing values for the covariates at baseline did not differ between attenders and non-

164 attenders. To examine whether our results would be biased by differential attrition between

165 attenders and non-attenders, we performed multiple imputation on our dependent and predictor

166 variables using a set of 20 socio-demographic and psychological variables assessed at baseline.

167 (These variables are available from the authors upon request.)  The imputation procedure was

168 implemented using REALCOM-IMPUTE (Carpenter et al. 2011) software and 10 imputed

169 datasets were generated, which were then analyzed using Stata 12.1.  Our regression models were

170 then repeated using the multiply imputed data.

**Results:**

171

172     Excluded individuals were more likely to be younger, earn €500 or less per month, have

173 lower self-rated health, and be less likely to report chronic conditions compared to attenders and

174 non-attenders.  Religious attenders were more likely to be female, older, and married as

175 compared to non-attenders.  Attenders and non-attenders were similar in self-rated health and in

176 the proportion having chronic conditions.  The chi-square tests in each of the four follow-up

177 waves showed no association between depression status and subsequent decrease in attendance.

178 In post-hoc analysis, we stratified first by gender and then by age category, but used Fisher's

179 exact tests because of lower numbers.   In gender-stratified analysis, no associations were found

180 in each attendance follow-up. In age-stratified analysis, no associations were found in the first

181 two years after depression assessments took place.  In $R_3$, those below 48 years old and with

182 elevated symptoms were less likely to decrease attendance, $P = .02$.  In $R_4$, those above 48 and

183 with elevated symptoms were less likely to decrease attendance, $P = .04$.  (See Table 2.  The

184 tables stratified by gender or age category are available from the authors by request.)

185      (Insert Table 2 around here)

186     In multinomial logistic regression modeling, elevated symptoms predicted maintaining

187 (Relative Risk Ratio = 1.65; 95% CI: 1.07 to 2.56) or increasing (Relative Risk Ratio =1.82; 95%

188 CI: 1.14 to 2.88) baseline attendance levels among attenders.  Among non-attenders, elevated

189 symptoms were unrelated to a subsequent increase in attendance with one exception. In the

190 multiply imputed model, they were less likely to start attending (OR: 0.28, 95% CI: 0.14 to 0.55)

191 than those with low symptoms.

192     (Insert Table 3 and Figure 2 here.)

**Discussion:**

193

194     The main finding in this study is that elevated BSI depression does not cause a subsequent

195 decrease in attendance.  On the contrary, elevated BSI depression predicts same or increased

196   levels of attendance as compared with prior to elevated BSI depression.  None of our results

197   across three analytical strategies showed a decrease in attendance.  Although unstratified analyses

198   did not yield a significant association, gender and age-stratified results indicated an association of

199   continued or increased attendance with elevated symptoms. The longitudinal model among

200   attenders, with covariates controlled for, indicated that elevated symptoms predicted same or

201   increased attendance.  As a secondary finding, non-attenders were not likely to seek recourse in

202   religion by starting to attend services.

203       Our main finding addresses the issue of selection bias in studies of religious attendance

204   and mental health.  To recap, when depressed individuals stop attending services, the apparent

205   protection afforded by attendance would be inflated.  This selection bias would be most

206   pronounced in cross-sectional studies.  In longitudinal epidemiologic studies, bias remains an

207   issue because there might be differential attrition in attendance by depression status.  Since we

208   found that attenders who develop elevated symptoms become less likely to drop out of worship,

209   then they might in effect be overrepresented among churchgoers.  Therefore, the protective effect

210   of religious attendance might in fact be underestimated, contrary to the reverse causation

211   argument.

212       The motive for religious attendance by those with elevated symptoms suggests a different

213   interpretation: attendance confers social benefits. Religious individuals turn to their faith in times

214   of distress as a means of coping (Brown et al. 2004; Ironson et al. 2006; Bussing et al. 2007).

215   Religious worship is a source of social support and allows individuals to cope with life-

216   threatening conditions by providing "medicine for the spirit."  A longitudinal study (Li and

217   Ferraro 2005) on depression and volunteering among older adults reported that elevated

218   depression at wave 2 predicted seeking out volunteering opportunities at wave 3.  This was

219   explained as a compensatory mechanism to alleviate negative affect, via social integration.  These

220   older adults had physical health problems in addition to depression and the former were the

221   operative barriers.  Consistent with this finding, Chen and Koenig (Chen and Koenig 2006)

222   reported that in elderly, medically ill individuals, an increased severity of illness predicted a

223   decrease in organizational religiousness.  Importantly, the association was completely mediated

224   by physical activity limitations.  Together with our own results, these suggest that it is not

225   depression *per se* that causes a disengagement from participation in religious service.  In effect,

226   reverse causation and non-random attrition might be more relevant to studies examining religious

227   attendance and physical health.

228        The null association (or negative association in multiply imputed data) of elevated

229   depression with subsequent attendance among non-attenders indicates that non-attenders do not

230   start attending in the face of adversity. Paradoxically, Ferraro and Kelley-Moore (Ferraro and

231   Kelley-Moore 2000) reported that depression, cancer, and chronic conditions lead to consolation-

232   seeking even among those with no religious affiliation.  The two points of view can be reconciled

233   because attendance is not necessary for consolation-seeking.  The need to find meaning in illness

234   is shared by believers and non-believers who may turn to nature, arts, music, and relationships

235   (Burnard 1988). An intriguing study (Farias et al. 2013) reported that rowers about to enter a

236   competition reported greater belief in science as compared with those in a training session.  The

237   authors concluded that affirming one's secular worldview serves a similar function as religious

238   faith in moments of stress or existential anxiety.  Hence, affiliated individuals cope by means of

239   religion while non-attending ones seek support and meaning elsewhere.  It appears that

240   depressive symptoms are not a strong driver of entry into or exit from the churchgoing

241   demographic.  More empirical research is needed to validate this interpretation.

242        Our study has several important limitations.  First, we relied on the depression subscale of

243   the BSI to assess depressive symptoms.  It has been argued that although the global BSI scale is a

244   valid measure of distress, it is not intended to screen for particular psychiatric disorders (Asner-

245   Self et al. 2006).  We set the BSI cut-off for depression at "high" or "very high" but there is no

246   way to tell whether this is in concordance with clinically diagnosed depression. We therefore

247   allow for the possibility that a major depressive episode causes selection bias even though

248   elevated depressive symptoms do not. Secondly, there were no assessments of depression from

249   2009 to 2012—the period during which religious attendance was compared to initial attendance.

250   As such all religious attendance changes were indexed to depression levels in 2008 only. We

251   cannot rule out the possibility that attendance levels after 2008 were related to unmeasured

252   elevated symptoms after 2008. Third, the sample that we worked with was restricted to LISS

253   respondents who responded to both religion and mental health modules and might not be

254   representative of the Dutch national population. Fourth, while we have ruled out sampling bias in

255   terms of attrition in attendance, we could not address whether personality traits such as greater

256   resilience to depression characterized attenders in the first place. Finally, other health-related

257   reasons, including physical disability, might be correlated with depression and could cause

258   selection bias. This is beyond the scope of our study. The major strength of this study was that

259   depression assessments were proximal to those of religion. Our sample also consisted of a small

260   fraction (5%) of late adolescents and is less affected by the well-reported decline in religious

261   attendance in adolescence.

262        Within the limitations of our study, we conclude that elevated depressive symptoms do

263   not cause religiously affiliated individuals to subsequently decrease attendance at religious

264   services.

265   **Acknowledgments:** The authors are grateful to the CentERdata at Tilburg University in the

266   Netherlands for making the data available for use.

267   **Conflicts of Interest:** none

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Characteristics of Included and Excluded Respondents from the Longitudinal Internet Studies for the Social Sciences (LISS), Netherlands

Table 1: Characteristics of Included and Excluded Respondents from the Longitudinal Internet Studies for the Social Sciences (LISS), Netherlands

| Characteristic | (A) Attenders and not initially depressed<br><br>(n = 604) | (B) Non-Attenders and not Initially depressed (n = 715) | (C) Excluded †<br>(n = 6,099) | Pairwise<br><br>Significant differences†† |
|---|---|---|---|---|
| Mean age (sd) | 50.56 (18.09) | 47.15 (16.91) | 44.36 (15.27) | A > B > C |
| Female | 319<br>(52.81%) | 334<br>(46.71%) | 3,267<br>(54.63%) | B < A = C |
| Marital status | | | | |
| Married | 377<br>(62.42%) | 388<br>(54.27%) | 3,639<br>(60.85%) | % married:<br>A = C > B |
| Sep/Divorced/Widowed | 86<br>(14.24%) | 95<br>(13.29%) | 606<br>(10.13%) | |
| Never married | 141<br>(23.34%) | 232<br>(32.45%) | 1,735<br>(29.01%) | |
| Income | | | | |
| 0 to 500 | 62 (10.26%) | 66 (9.23%) | 796<br>(13.05%) | % in lowest bracket: |
| 501 to 1500 Euro | 76 (12.58%) | 63 (8.81%) | 706<br>(11.58%) | A = B < C |
| 1501 to 2500 Euro | 94 (15.56%) | 124 (17.34%) | 906<br>(14.85%) | |
| 2501 to 3500 Euro | 55 (9.11%) | 102 (14.27%) | 679<br>(11.13%) | |
| 3501 Euro and over | 55 (9.11%) | 68 (9.51%) | 560 (9.18%) | |
| Missing | 262 (43.38%) | 292 (40.84%) | 2,452<br>(40.20) | A = B = C |
| Mean Self-rated health (SD) | 3.23 (0.76) | 3.19 (0.75) | 3.13 (0.76) | A = B<br>B = C<br>A > C |

|  |  |  |  |  |
|---|---|---|---|---|
| Has a chronic condition |  |  |  |  |
| *Yes* | 167 (27.65%) | 171 (23.92%) | 1,394 (22.86%) | A = B |
|  |  |  |  | B = C |
|  |  |  |  | A > C |
| *Missing* | 42 (6.95%) | 51 (7.13%) | 986 (16.17%) | A = B < C |

†Exclusion criteria were: (a) Did not respond to mental health module, (b) elevated BSI depression at first depression assessment, (c) Did not respond to religious attendance question
†† Bonferroni-adjusted t-tests for continuous variables and chi-square tests for categorical variables were applied

Elevated BSI Depression vs Decrease in Attendance among Service Attenders at $R_1$ in the Longitudinal Internet Studies for the Social Sciences (LISS), Netherlands

Table 2: Elevated BSI Depression vs Decrease in Attendance among Service Attenders at $R_1$ in the Longitudinal Internet Studies for the Social Sciences (LISS), Netherlands

| | | Elevated Depression | | | |
|---|---|---|---|---|---|
| 2009  Attendance vs Baseline | | No | Yes | $\chi^2$ | p |
| | *Same/higher* | 241 (65%) | 61 (74%) | 2.69 | .10 |
| | *Decreased* | 130 (35%) | 21 (26%) | | |
| 2010 Attendance vs Baseline | | | | | |
| | *Same/higher* | 210 (65%) | 45 (73%) | 1.19 | .27 |
| | *Decreased* | 111 (35%) | 17 (27%) | | |
| 2011 Attendance vs Baseline | | | | | |
| | *Same/higher* | 173 (60%) | 41 (68%) | 1.29 | .26 |
| | *Decreased* | 113 (40%) | 19 (32%) | | |
| 2012 Attendance vs Baseline | | | | | |
| | *Same/higher* | 153 (53%) | 35 (66%) | 2.93 | .09 |
| | *Decreased* | 134 (47%) | 18 (34%) | | |

† If the individual had a norm-referenced score of "high" or "very high" in any of the three assessments in 2008, the individual was assigned to *elevated* and otherwise to *not elevated*.**The tabulation is restricted to those who attended religious services at first religion assessment. Abbreviation: BSI = Brief Symptom Inventory

Logistic Models of Change in Religious Attendance Levels over 5 years from the Longitudinal Internet Studies for the Social Sciences (LISS), Netherlands

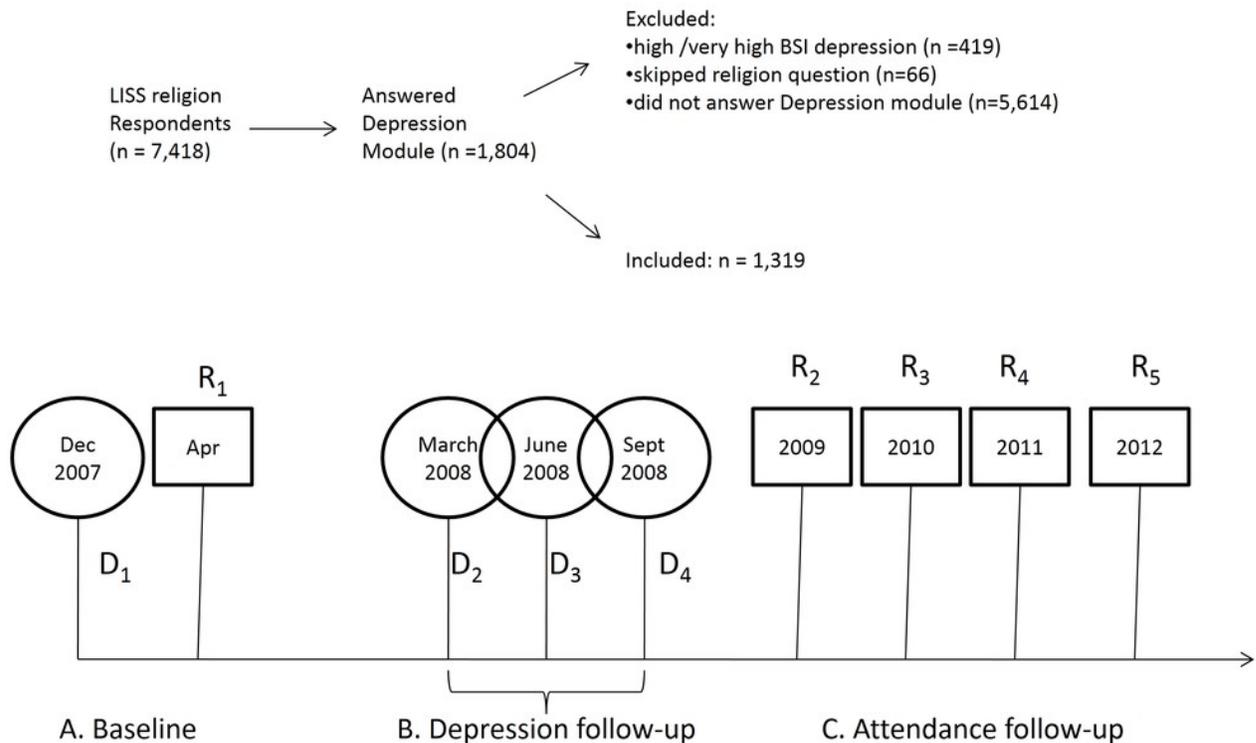
Table 3: Logistic Models of Change in Religious Attendance Levels over 5 years from the Longitudinal Internet Studies for the Social Sciences (LISS), Netherlands

| | **Attenders** | | **Non-attenders** | |
|---|---|---|---|---|
| | Complete cases (n = 544) | Multiply imputed data (10 imputations) | Complete cases (n = 636) | Multiply imputed data (10 imputations) |
| | Relative Risk Ratio (95% CI) | Relative Risk Ratio (95% CI) | Odds ratio (95% CI) | Odds ratio (95% CI) |
| *Outcome:* Decreased Attendance | (Reference Category) | | | |
| *Outcome:* Maintained Attendance | | | (Reference Category) | |
| Elevated Depression | 1.65 (1.07-2.56)* | 1.59 (1.07-2.36)* | N/A | N/A |
| Year | 0.85 (0.78 -0.93)** | 0.88 (0.83-0.95)** | N/A | N/A |
| *Outcome:* Increased Attendance | | | | |
| Elevated Depression | 1.82 (1.14-2.88)* | 1.54 (1.02-2.32)* | 0.93 (0.46-1.85) | 0.28 (0.14-0.55)*** |
| Year | 1.16 (1.07-1.25)*** | 1.14 (1.07-1.22)*** | 1.64 (1.47-1.84)*** | 1.65 (1.45-1.88)*** |

†In these models, the following covariates have been controlled: existing chronic condition, gender, marital status, income, and age. *P* values:  *** = .001, ** = .01, * = .05

# Figure 1

Respondents Breakdown and Assessments Schedule

Top panel: included and excluded individuals from the Longitudinal Internet Studies for the Social Sciences (LISS), Netherlands. Bottom panel: Schedule of assessments. Abbreviations: R = religion, D = Depression; Subscripts are assessment waves; BSI = Brief Symptom Inventory

# Figure 2

Incidence of elevated BSI depression vs probability of future decrease in attendance, BSI = Brief Symptom Inventory ienc