

## Appendix I. Details of the Multiple Regression Analysis

This appendix is a methodological supplement to:

Mason, Michael C. "For youth, prayer is relationship." In *The Sociology of Prayer*, edited by Giuseppe Giordan and Linda Woodhead. Farnham, UK: Ashgate Publishing, Ltd., 2014.

The results of the analysis of the influences on how often people pray are reported and discussed in the published text; the purpose of this appendix is to report the methodological and statistical details.

*The following passage in italics is an excerpt from the text of the published chapter to provide the context of the analysis:*

### ***Influences on frequency of prayer***

#### *Hypothesis 4*

*What influences shape the intensity of the prayer-life of these young people? Specifically, what makes the difference as to whether they will pray only occasionally, or every day (and perhaps several times a day)? ...*

*On the basis of our previous research, we hypothesised that higher frequency of prayer would be explained by:*

- *Age of the respondent*
- *Traditionalism of the Catholic culture in home country;*
- *Parents' frequency of attendance and "enthusiasm for their religion";*
- *Having friends who attend services regularly;*
- *Membership in a church group such as a youth group or prayer group;*
- *Previous religious experiences.*

*This hypothesis was further explored using multiple regression analysis.*

*The dependent variable in the analysis was frequency of prayer. Five cumulative models tested the following sets of independent variables:*

**Table 10 Independent variables in the 5 regression models**

*Model 1 commenced with the religious context items:*

- *Traditionalism of Catholic culture in home country (ConsCathCulture)*
- *mother's church attendance*
- *mother's enthusiasm for her religion*

*Model 2 added peer support elements:*

- *church attendance of friends*
- *membership of a small group in the church*

*Model 3 added two "classic" religious experiences: often experienced as strong, dramatic:*

- *A clear answer to prayer*
- *Being healed by God's power*

*Model 4 added several "experiences of the presence of God", occurring in the context of:*

- *quiet reflection or prayer alone*
- *reading the Bible*
- *personal suffering or sickness*

*Also added at this stage were two often reported responses to an experience of the presence of God, and a measure of how valuable, on reflection, one considered such experiences:*

- *extraordinary joy without any reason*
- *a moment of deeper conviction that God was real; God became more important*
- *evaluating one's experiences of the presence or action of God as highly valuable*

*Model 5 added controls for two demographic factors:*

- *age*
- *gender (female)*

*The following factors became progressively less significant as more variables were controlled in successive models, and were not retained in the final model:*

- *mother's church attendance*
- *Catholic traditionalism of home country*

*The analysis used gender as a routine control variable, but it was not expected that it would be a significant influence on frequency of prayer among young people, and the results confirmed that this was so.*

*Family influence was represented in the final model by mother's 'enthusiasm for her religion', which retained its significance. There was so little variation in mother's church attendance (81% were weekly attenders) that this was a poor predictor and was discarded.*

*The traditionalism of the Catholic culture of one's home country turned out not to have as strong an influence as expected on frequency of prayer; its significance diminished as other predictors were added.*

*Age retained the significant association with frequency of prayer evident in the bivariate analysis reported above.*

*Peer support for one's religious commitment is always very important for contemporary young adults, and emerged as a major influence on frequency of prayer, as also did membership in a church-related small group.*

Cases with missing data on any of the variables in the analysis were deleted listwise, resulting in a set of 7,628 cases in the final analysis. Given the large sample, it was decided to retain in the model only those variables whose coefficients were significant at  $<.001$ .

Table 11 shows the standardised regression coefficient (Beta) for each variable in models 1-5 and an indicator of the significance level (if less than .05).

Table 11 Standardised regression coefficients and significance level

Variable	Model 1	Model 2	Model 3	Model 4	Model 5a	Model 5b
ConsCathCulture	.203‡	.115‡	.072‡	.042‡	.026*	
Mother's church attendance	.029 *	.009	.008	.029*	.032§	
Mother's enthusiasm for religion	.114‡	.112‡	.079‡	.063‡	.059‡	.074‡
Friends go to church regularly		.192‡	.148‡	.104‡	.099‡	.109‡
Regularly take part in a church group		.177‡	.138‡	.087‡	.088‡	.093‡
A clear answer to prayer			.204‡	.112‡	.109‡	.102‡
Being healed by God's power			.179‡	.070‡	.071‡	.078‡
Quiet reflection or prayer alone				.086‡	.085‡	.097‡
Reading the Bible				.084‡	.078‡	.074‡
Personal suffering or sickness				.051‡	.043‡	.044‡
Extraordinary joy without any clear reason				.051‡	.051‡	.056‡
Deeper conviction that God was real				.060‡	.060‡	.065‡
These experiences were highly valuable				.207‡	.193‡	.188‡
AGE					.097‡	.102‡
SEX					.020	
Adjusted R squared of model	.064	.140	.238	.325	.333	.341

Significance level is indicated as follows if less than .05: \* = <.05; § = <.01 ‡ = <.001

Fuller detail of coefficients and standard errors of estimate for models 1-5a are shown in Table 12 at the end of this Appendix.

The change in R square across models 1-5a is shown in Tables 11a and 11b; the ANOVA shows that in each case, the increase in R square was significant at <.001.

Table 11a Model Summary: Models 1-5a

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.254	.064	.064	1.277	.064	157.067	3	6855	.000
2	.375	.141	.140	1.224	.077	305.840	2	6853	.000
3	.489	.239	.238	1.152	.098	440.774	2	6851	.000
4	.571	.326	.325	1.085	.087	148.026	6	6845	.000
5a	.579	.335	.333	1.078	.008	43.020	2	6843	.000

**Table 11b Tests of significance of change across models 1-5a: ANOVA<sup>f</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	768.965	3	256.322	157.067	.000 <sup>a</sup>
	Residual	11187.340	6855	1.632		
	Total	11956.305	6858			
2	Regression	1685.656	5	337.131	224.957	.000 <sup>b</sup>
	Residual	10270.650	6853	1.499		
	Total	11956.305	6858			
3	Regression	2856.515	7	408.074	307.241	.000 <sup>c</sup>
	Residual	9099.790	6851	1.328		
	Total	11956.305	6858			
4	Regression	3901.593	13	300.123	255.059	.000 <sup>d</sup>
	Residual	8054.712	6845	1.177		
	Total	11956.305	6858			
5a	Regression	4001.607	15	266.774	229.501	.000 <sup>e</sup>
	Residual	7954.698	6843	1.162		
	Total	11956.305	6858			

The following variables became less significant as more variables were controlled in successive models. They were not significant at  $<.001$  in the penultimate model 5a, and were not retained in the final model 5b:

- Traditionalism of Catholic culture in home country (ConsCathCulture)
- gender (female)
- mother's church attendance

All but two coefficients were larger in this reduced model, as detailed in Table 13, at the end of this Appendix. The Adjusted R-square increased to .341.

**Table 11c Model Summary: model 5b**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
5b	.585	.342	.341	1.089

The variables retained in the final model (5b) are listed below, in order by the relative weight of their influence on frequency of prayer, from strongest (1) to weakest (12).<sup>1</sup>

- 1 evaluating one's previous religious experiences as 'very valuable'
- 2 church attendance of friends
- 3 age
- 4 clear answer to prayer
- 5 quiet reflection or prayer alone
- 6 membership of a small group in the church
- 7 being healed by God's power
- 8 mother's enthusiasm for her religion
- 9 reading the Bible
- 10 a moment of deeper conviction that God was real; God became more important
- 11 extraordinary joy without any reason
- 12 personal suffering or sickness

As the Adjusted R square shown in Tables 11 and 11c indicates, the predictors together explain thirty-four percent of the variance in the dependent variable, frequency of prayer.

It was anticipated that there could be problems with multicollinearity among the predictors, especially considering that seven of them concerned aspects of religious experience. However, the examination of zero-order Pearson correlation coefficients revealed no closely correlated pairs: only two pairs exceeded  $r = .50$  (.57 and .53). The Tolerance and Variance Inflation Factor for each predictor were measured, and are shown in Table 13. The lowest Tolerance value was 0.67, and the highest VIF was  $< 1.5$  – both well within limits conventionally regarded as indicating that collinearity is low, avoiding the need to remove or combine variables.

The residuals were approximately normally distributed<sup>2</sup>, and the Durbin-Watson statistic was 1.929, indicating that there was no evidence of serial correlation (autocorrelation) among the error terms.<sup>3</sup>

Evidently the various questions on religious experience tap distinct dimensions within this complex area.

The substantive meaning of these results is discussed more fully in the published text of the chapter.

The question naturally occurs: do (prior) religious experiences influence a person towards praying more frequently, or is the causality in the reverse direction: frequent prayer tends to dispose the person towards experiencing events of this type? The empirical evidence available here does not point decisively in either direction. It is always difficult to clearly determine causality in complex human actions. When we find a strong and statistically significant association between a dependent variable and a factor clearly prior in time, which

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<sup>1</sup> The order is derived from the magnitude of the standardised regression coefficients (beta) in the final model 5b. All of these coefficients were statistically significant at  $p < .001$ .

<sup>2</sup> The distribution was slightly leptokurtic and negatively skewed.

<sup>3</sup> The value of  $d$  always lies between 0 and 4. If the Durbin-Watson statistic is substantially less than 2, there is evidence of positive serial correlation (Gujarati, Damodar N.; Porter, Dawn C. (2009). *Basic Econometrics* (5th ed.). Boston: McGraw-Hill Irwin, p. 469).

is maintained after controlling for all potentially confounding variables, we have grounds for confidence in attributing causal influence: in the present case, parental religiosity clearly precedes in time the respondent's current pattern of prayer.

It is less certain whether the religious experiences of these respondents are chronologically prior to their taking up a pattern of frequent prayer. Most likely, there is influence in both directions: more frequent and intense prayer provides the most appropriate environment for these different kinds of "encounters with God"; and in turn, such experiences lead the individual into deeper and more constant prayer.

#### **Detailed Tables**

Table 12 Regression Coefficients, Standard errors and Significance for models 1-5a

Table 13 Regression Coefficients, Standard errors and Significance for Model 5b

Table 12 Regression Coefficients, Standard errors and Significance for models 1-5a<sup>a</sup>

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.423	.071		48.232	.000
	ETHNSELFCONS	.556	.032	.203	17.316	.000
	ATTMO Mother's church attendance	.030	.015	.029	2.017	.044
	ENTHUSMOR	.137	.017	.114	8.009	.000
2	(Constant)	2.608	.078		33.510	.000
	ETHNSELFCONS	.316	.033	.115	9.689	.000
	ATTMO Mother's church attendance	.010	.014	.009	.683	.495
	ENTHUSMOR	.134	.016	.112	8.200	.000
	ATTFRND Friends go to church regularly?	.508	.032	.192	15.781	.000
	GRPOTH Regularly take part in prayer group /youth group /other group assoc with church?	.476	.031	.177	15.252	.000
3	(Constant)	2.128	.075		28.338	.000
	ETHNSELFCONS	.196	.031	.072	6.351	.000
	ATTMO Mother's church attendance	.008	.013	.008	.624	.533
	ENTHUSMOR	.095	.015	.079	6.136	.000
	ATTFRND Friends go to church regularly?	.392	.031	.148	12.827	.000
	GRPOTH Regularly take part in prayer group /youth group /other group assoc with church?	.370	.030	.138	12.503	.000
	RX1ANS A clear answer to prayer	.664	.039	.204	16.951	.000
	RX1HEAL Being healed by God's power in body, mind or spirit	.535	.036	.179	14.851	.000

4	(Constant)	.825	.089		9.264	.000
	ETHNSELFCONS	.116	.029	.042	3.964	.000
	ATTMO Mother's church attendance	.030	.012	.029	2.408	.016
	ENTHUSMOR	.076	.015	.063	5.190	.000
	ATTFRNDS Friends go to church regularly?	.274	.029	.104	9.419	.000
	GRPOTH Regularly take part in prayer group /youth group /other group assoc with church?	.234	.028	.087	8.288	.000
	RX1ANS A clear answer to prayer	.364	.038	.112	9.495	.000
	RX1HEAL Being healed by God's power in body, mind or spirit	.208	.036	.070	5.830	.000
	RX2ALONE Quiet reflection or prayer alone	.397	.053	.086	7.546	.000
	RX2BIBLE Reading the Bible	.257	.036	.084	7.204	.000
	X3SICK Personal suffering or sickness	.169	.036	.051	4.649	.000
	RXEJOY Extraordinary joy without any clear reason	.134	.029	.051	4.646	.000
	RXEGOD A moment of truth, of deeper conviction that God was real / God became more important in my life	.164	.030	.060	5.480	.000
	RX23VAL How valuable do you now think these experiences were?	.372	.022	.207	17.163	.000

5a	(Constant)	.341	.111		3.082	.002
	ETHNSELFCONS	.072	.030	.026	2.413	.016
	ATTMO Mother's church attendance	.033	.012	.032	2.664	.008
	ENTHUSMOR	.071	.015	.059	4.885	.000
	ATTFRND Friends go to church regularly?	.262	.029	.099	9.053	.000
	GRPOTH Regularly take part in prayer group /youth group /other group assoc with church?	.236	.028	.088	8.374	.000
	RX1ANS A clear answer to prayer	.354	.038	.109	9.258	.000
	RX1HEAL Being healed by God's power in body, mind or spirit	.211	.036	.071	5.935	.000
	RX2ALONE Quiet reflection or prayer alone	.394	.052	.085	7.531	.000
	RX2BIBLE Reading the Bible	.239	.036	.078	6.722	.000
	RX3SICK Personal suffering or sickness	.144	.036	.043	3.987	.000
	RXEJOY Extraordinary joy without any clear reason	.134	.029	.051	4.690	.000
	RXEGOD A moment of truth, of deeper conviction that God was real / God became more important in my life	.165	.030	.060	5.519	.000
	RX23VAL How valuable do you now think these experiences were?	.348	.022	.193	16.024	.000
	AGE	.026	.003	.097	9.188	.000
	SEX	.055	.028	.020	1.962	.050

a. Dependent Variable: PRAY How often do you pray just by yourself (not with others or at a religious service)?

**Table 13 Regression Coefficients, Standard errors and Significance for Model 5b<sup>a</sup>**

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	90.0% Confidence Interval for B		Collinearity Statistics	
	B	Std. Error	Beta			Lower Bound	Upper Bound	Tolerance	VIF
	(Constant)	.405	.087				4.664	.000	.262
RX23VAL How valuable these experiences were?	.342	.021	.188	16.176	.000	.307	.377	.673	1.485
RX1ANS Answer to prayer	.335	.037	.102	8.981	.000	.274	.396	.703	1.422
ATTFRND Friends go to church regularly?	.292	.028	.109	10.594	.000	.247	.338	.863	1.158
AGE	.028	.003	.102	10.252	.000	.023	.032	.907	1.103
GRPOTH Regularly take part in group assoc with church?	.254	.028	.093	9.245	.000	.209	.300	.891	1.122
RX2ALONE Quiet reflection or prayer alone	.450	.051	.097	8.861	.000	.366	.533	.753	1.328

RX2BIBLE Reading the Bible	.229	.035	.074	6.589	.000	.172	.286	.714	1.400
RX1HEAL Healed by God's power	.235	.035	.078	6.745	.000	.178	.292	.683	1.464
RXEGOD A moment of truth, of conviction God was real /	.180	.029	.065	6.171	.000	.132	.228	.808	1.238
ENTHUSMOR Mother's enthusiasm for religion	.090	.012	.074	7.697	.000	.071	.110	.975	1.025
RXEJOY Extraordinary joy without any clear reason	.150	.028	.056	5.314	.000	.103	.196	.824	1.213
RX3SICK Personal suffering or sickness	.149	.035	.044	4.206	.000	.091	.207	.827	1.209

- a. Dependent Variable: PRAY How often do you pray just by yourself (not with others or at a religious service)?  
 Multicollinearity test of Model5b: Lowest Tolerance > .67; Highest VIF < 1.5

