APPENDICES

Appendix A. Detailed Simulations Results Reported in the Supplementary Material for the Biometrics Publication

1 Appendix A: Detailed simulation results reported in the supplementary material for the Biometrics publication

We conducted a simulation study to verify the theoretical results derived in the Biometrics publications for visit processes with reasonable degrees of informativeness and to compare the results using a log link to a more natural logit link, namely

$$\mathrm{P}(R_{it} = 1 \mid b_i) \;=\; 1/[1 + \exp\{-(\mu_{it} + \gamma_{it}^T b_i)\}]. \tag{1}$$

To do so, we simulated data with two different outcome distributions and used a common longitudinal data model, incorporating a subject-specific "time" variable, x_1, a treatment variable, x_2, which is 1 for a treatment group and zero otherwise, and a time by treatment interaction variable, $x_3 = x_1 \times x_2$. We incorporate the random slopes as slopes over time (and so associated with x_1):

$$\begin{aligned} Y_{it} \mid b_i &\sim \text{independent } \mathcal{N}(\mathrm{E}[Y_{it} \mid b_i], \sigma_\epsilon^2) \qquad i = 1, \ldots, m; t = 1, \ldots, n_i \\ \mathrm{E}[Y_{it} \mid b_i] &= (\beta_0 + b_{0i}) + (\beta_1 + b_{1i})x_{1it} + \beta_2 x_{2i} + \beta_3 x_{3it} \qquad (2) \\ b_i &\sim \text{i.i.d. } \mathcal{N}(0, \Sigma_b), \end{aligned}$$

with $\mathrm{var}(b_{0i}) = \sigma_0^2$, $\mathrm{var}(b_{1i}) = \sigma_1^2$, and $\mathrm{cov}(b_{0i}, b_{1i}) = \sigma_{01}$. For this model, the t^{th} row of of Z_i is given by $z_{it}^T = (1 \ x_{1it})$.

The first model was a linear mixed model, (2), with covariances for b_{0i}, b_{1i}, and ϵ_{it} of $\sigma_0^2 = \sigma_1^2 = \sigma_\epsilon^2 = 1, \sigma_{01} = 0$ or 0.5, and fixed effect parameters $\beta_k = k$. Using common random numbers, we simulated informativeness using log link and using the informative visit models given by (6) and (7) of the main report. We simulated 3000 subjects with up to 25 visits per subject, though the number of subjects in any simulation replication was much lower because many subjects have no visits.

We also simulated data from a logistic model, that is a logit link and Bernoulli distribution instead of the normal distribution in (2), again under both a logit and log link informative visit process and using parameters $\beta_0 = -1, \beta_1 = 0.5, \beta_2 = 1, \beta_3 = 0.5, \sigma_0^2 = \sigma_1^2 = 1, \sigma_{01} = 0$ or 0.5, and using 3000 subjects and up to 10 visits.

We simulated data ranging from no “informativeness” to a high degree of informativeness. To determine the upper range of informativeness we aimed to have about a five-fold ratio of $P(R_{it} = 1 \mid b_i)$ as the random effect distribution in (**??**) ranged from its 25^{th} to 75^{th} percentiles. This would lead to more than a 10-fold ratio going from an observation that is one standard deviation below normal compared to an observation that is one standard deviation above normal and more than a 100-fold ratio comparing observations two standard deviations below to two standard deviations above normal.

Our first informative visit model has dependence on the conditional mean of Y:

$$\log P(R_{it} = 1 \mid b_i) = \alpha + \delta \mathrm{E}[Y_{it}|b_i]. \tag{3}$$

Using the outcome model described above, the standard deviation of $\mathrm{E}[Y_{it}|b_i]$ is a little less than 2.5. To achieve the five-fold ratio would require δ of about 0.6. Accordingly we simulated values of δ of $0, 0.25, 0.5,$ and 0.75 and used $\alpha = -5$ for the linear mixed model and $\alpha = -1$ for the Bernoulli outcome model.

Our second informative visit model, which we used only for the linear mixed model, has dependence directly on the random effects:

$$\log P(R_{it} = 1 \mid b_i) = \mu + \gamma_0 b_{0i} + \gamma_1 b_{1i}. \tag{4}$$

In this model, if $\gamma_0 = \gamma_1 = \gamma$ and if the random effects were uncorrelated then the value of γ giving a five-fold difference would be 0.84. Accordingly, for this model we simulated values of $\gamma_l = 0, 0.5$ or 1, $\sigma_{01} = 0$ or 0.5 and we used $\mu = -4$.

Under each of these scenarios we fit a random intercepts and slopes model (allowing separate variances and a covariance) using maximum likelihood and also fit an independence generalized estimating equations approach (i.e., ordinary least squares fit for the linear mixed model or logistic regression fit for the Bernoulli model). For the simulations under the conditional mean informative model we also included a quadratic term in x_1 to accommodate the functional dependence noted in the main publication. All simulations were conducted in Stata 13.1 (StataCorp, College Station, TX) and used 500 replications.

The tables in this Appendix give the estimated mean values of the parameters and standard errors from the simulations. They are organized first by the outcome simulation process: linear mixed model or logistic mixed model. Within the linear mixed model section they are next organized by the informative visit process: conditional mean or random effects dependence. For the logit link we report on only the conditional mean dependence. Individual tables show the influence of varying the informativeness of the process as well as the effect of the log versus the logit link for the informative visit process for linear mixed models or the estimation method (maximum likelihood versus generalized estimating equations) for the logistic outcome models.

The main report gave limited simulation results for confidence interval coverage in its Table 2. That simulation was for the linear mixed model described above with the logit link outcome dependent visit process and the correlation between the random effects of $\rho = 0$. Coverage was calculated for Wald-based confidence intervals using model based standard errors.

1.1 Linear mixed model for the outcome

1.1.1 Conditional mean informative visit process

Table 1:
Outcome model: linear mixed model
Informative visit model:
$\log(P(R_{it}=1))$ or $\text{logit}(P(R_{it}=1)) = -5 + \delta \text{E}[Y|b]$,
Fitting method: maximum likelihood
Random effects: $\text{corr}(b_{0i}, b_{1i})$=0

Informative Visit Process	Simulated mean parameter estimates (SEs as subscripts)				
δ	β_0 (true=0)	β_1 (true=1)	β_2 (true=2)	β_3 (true=3)	x_1^2 coeff.
log link					
0	$0.001_{0.004}$	$0.985_{0.010}$	$1.995_{0.003}$	$3.004_{0.010}$	$-0.031_{0.035}$
0.25	$0.235_{0.004}$	$0.985_{0.010}$	$1.997_{0.003}$	$3.009_{0.010}$	$0.227_{0.031}$
0.50	$0.442_{0.004}$	$0.987_{0.012}$	$1.953_{0.004}$	$2.975_{0.012}$	$0.529_{0.026}$
0.75	$0.595_{0.004}$	$0.934_{0.012}$	$1.862_{0.004}$	$2.943_{0.013}$	$0.663_{0.017}$
logit link					
0	$0.000_{0.004}$	$0.984_{0.010}$	$1.995_{0.003}$	$3.003_{0.010}$	$-0.027_{0.035}$
0.25	$0.235_{0.004}$	$0.982_{0.010}$	$1.996_{0.003}$	$3.008_{0.010}$	$0.222_{0.031}$
0.50	$0.440_{0.004}$	$0.978_{0.012}$	$1.950_{0.004}$	$2.965_{0.012}$	$0.493_{0.027}$
0.75	$0.600_{0.004}$	$0.912_{0.012}$	$1.859_{0.004}$	$2.929_{0.013}$	$0.543_{0.018}$

Table 2:
Outcome model: linear mixed model
Informative visit model:
$\log(P(R_{it} = 1))$ or $\mathrm{logit}(P(R_{it} = 1)) = -5 + \delta \mathrm{E}[Y|b]$,
Fitting method: GEE (independence working correlation)
Random effects: $\mathrm{corr}(b_{0i}, b_{1i})$=0

Informative Visit Process	Simulated mean parameter estimates (SEs as subscripts)				
δ	β_0 (true=0)	β_1 (true=1)	β_2 (true=2)	β_3 (true=3)	x_1^2 coeff.
log link					
0	$0.000_{0.004}$	$0.982_{0.010}$	$1.994_{0.003}$	$3.006_{0.010}$	$-0.022_{0.035}$
0.25	$0.251_{0.004}$	$0.986_{0.010}$	$2.004_{0.003}$	$3.014_{0.010}$	$0.234_{0.032}$
0.50	$0.499_{0.004}$	$0.999_{0.012}$	$1.996_{0.004}$	$2.990_{0.012}$	$0.564_{0.028}$
0.75	$0.756_{0.004}$	$0.978_{0.013}$	$1.998_{0.004}$	$3.000_{0.013}$	$0.619_{0.017}$
logit link					
0	$0.000_{0.004}$	$0.981_{0.010}$	$1.994_{0.003}$	$3.005_{0.010}$	$-0.020_{0.035}$
0.25	$0.249_{0.004}$	$0.983_{0.010}$	$2.003_{0.003}$	$3.001_{0.011}$	$0.230_{0.032}$
0.50	$0.494_{0.004}$	$0.981_{0.012}$	$1.989_{0.004}$	$2.973_{0.012}$	$0.508_{0.029}$
0.75	$0.740_{0.004}$	$0.899_{0.013}$	$1.969_{0.004}$	$2.937_{0.013}$	$0.431_{0.020}$

To demonstrate that fitting a quadratic effect in time actually had little effect on the bias results we reproduce the results in Tables 1 and 2 but without the quadratic term. Comparing Table 1 with Table 3 or Table 2 with Table 4 shows no appreciable difference.

Table 3:
Outcome model: linear mixed model
Informative visit model:
$\log(P(R_{it}=1))$ or $\mathrm{logit}(P(R_{it}=1)) = -5 + \delta \mathrm{E}[Y|b]$,
Fitting method: maximum likelihood, no quadratic term
Random effects: $\mathrm{corr}(b_{0i}, b_{1i})$=0

Informative Visit Process	Simulated mean parameter estimates (SEs as subscripts)			
δ	β_0 (true=0)	β_1 (true=1)	β_2 (true=2)	β_3 (true=3)
log link				
0	$-0.006_{0.003}$	$0.987_{0.010}$	$2.001_{0.003}$	$3.016_{0.090}$
0.25	$0.255_{0.003}$	$0.999_{0.010}$	$1.998_{0.003}$	$3.017_{0.010}$
0.50	$0.483_{0.004}$	$1.005_{0.011}$	$1.950_{0.004}$	$3.037_{0.011}$
0.75	$0.639_{0.004}$	$0.979_{0.013}$	$1.857_{0.004}$	$3.055_{0.014}$
logit link				
0	$-0.006_{0.003}$	$0.989_{0.010}$	$2.001_{0.003}$	$3.017_{0.090}$
0.25	$0.253_{0.003}$	$0.996_{0.010}$	$1.998_{0.003}$	$3.015_{0.010}$
0.50	$0.479_{0.004}$	$0.991_{0.011}$	$1.947_{0.004}$	$3.023_{0.011}$
0.75	$0.636_{0.004}$	$0.947_{0.013}$	$1.857_{0.004}$	$3.013_{0.014}$

Table 4:
Outcome model: linear mixed model
Informative visit model:
$\log(P(R_{it} = 1))$ or $\text{logit}(P(R_{it} = 1)) = -5 + \delta \text{E}[Y|b]$,
Fitting method: GEE (independence working correlation), no quadratic term
Random effects: $\text{corr}(b_{0i}, b_{1i})$=0

Informative Visit Process	Simulated mean parameter estimates (SEs as subscripts)			
δ	β_0 (true=0)	β_1 (true=1)	β_2 (true=2)	β_3 (true=3)
log link				
0	$-0.006_{0.003}$	$0.987_{0.010}$	$2.001_{0.003}$	$3.015_{0.090}$
0.25	$0.272_{0.003}$	$0.997_{0.010}$	$1.996_{0.003}$	$3.020_{0.010}$
0.50	$0.543_{0.004}$	$1.017_{0.011}$	$1.994_{0.004}$	$3.053_{0.011}$
0.75	$0.798_{0.004}$	$1.022_{0.014}$	$1.894_{0.004}$	$3.102_{0.014}$
logit link				
0	$-0.007_{0.003}$	$0.988_{0.010}$	$2.001_{0.003}$	$3.016_{0.090}$
0.25	$0.270_{0.003}$	$0.994_{0.010}$	$1.995_{0.003}$	$3.017_{0.010}$
0.50	$0.534_{0.004}$	$0.995_{0.011}$	$1.987_{0.004}$	$3.029_{0.011}$
0.75	$0.768_{0.004}$	$0.933_{0.014}$	$1.968_{0.004}$	$3.004_{0.014}$

Table 5:
Outcome model: linear mixed model
Informative visit model:
$\log(P(R_{it} = 1))$ or $\mathrm{logit}(P(R_{it} = 1)) = -5 + \delta \mathrm{E}[Y|b]$,
Fitting method: maximum likelihood
Random effects: $\mathrm{corr}(b_{0i}, b_{1i})$=0.5

Informative Visit Process	Simulated mean parameter estimates (SEs as subscripts)				
δ	β_0 (true=0)	β_1 (true=1)	β_2 (true=2)	β_3 (true=3)	x_1^2 coeff.
log link					
0	$0.006_{0.004}$	$0.997_{0.010}$	$1.999_{0.003}$	$2.999_{0.010}$	$-0.050_{0.037}$
0.25	$0.235_{0.004}$	$1.221_{0.010}$	$1.993_{0.003}$	$3.019_{0.011}$	$0.213_{0.032}$
0.50	$0.444_{0.004}$	$1.409_{0.011}$	$1.950_{0.004}$	$2.944_{0.012}$	$0.445_{0.026}$
0.75	$0.597_{0.004}$	$1.498_{0.013}$	$1.844_{0.004}$	$2.803_{0.013}$	$0.472_{0.017}$
logit link					
0	$0.006_{0.004}$	$0.997_{0.010}$	$1.999_{0.003}$	$2.996_{0.010}$	$-0.057_{0.038}$
0.25	$0.233_{0.004}$	$1.216_{0.010}$	$1.993_{0.003}$	$3.022_{0.011}$	$0.213_{0.033}$
0.50	$0.442_{0.004}$	$1.395_{0.011}$	$1.947_{0.004}$	$2.931_{0.012}$	$0.404_{0.026}$
0.75	$0.601_{0.004}$	$1.470_{0.013}$	$1.843_{0.004}$	$2.788_{0.013}$	$0.368_{0.018}$

Table 6:
Outcome model: linear mixed model
Informative visit model:
$\log(P(R_{it}=1))$ or $\text{logit}(P(R_{it}=1)) = -5 + \delta \text{E}[Y|b]$,
Fitting method: GEE (independence working correlation)
Random effects: $\text{corr}(b_{0i}, b_{1i})$=0.5

Informative Visit Process	Simulated mean parameter estimates (SEs as subscripts)				
δ	β_0 (true=0)	β_1 (true=1)	β_2 (true=2)	β_3 (true=3)	x_1^2 coeff.
log link					
0	$0.006_{0.004}$	$0.994_{0.010}$	$2.000_{0.003}$	$2.997_{0.010}$	$-0.055_{0.037}$
0.25	$0.249_{0.004}$	$1.236_{0.010}$	$2.001_{0.003}$	$3.032_{0.011}$	$0.233_{0.033}$
0.50	$0.502_{0.004}$	$1.492_{0.011}$	$2.000_{0.004}$	$3.008_{0.012}$	$0.510_{0.028}$
0.75	$0.779_{0.005}$	$1.701_{0.013}$	$1.992_{0.004}$	$2.989_{0.014}$	$0.344_{0.020}$
logit link					
0	$0.006_{0.004}$	$0.995_{0.010}$	$2.000_{0.003}$	$2.997_{0.010}$	$-0.056_{0.037}$
0.25	$0.247_{0.004}$	$1.234_{0.010}$	$2.000_{0.003}$	$3.030_{0.011}$	$0.220_{0.033}$
0.50	$0.498_{0.005}$	$1.460_{0.011}$	$1.991_{0.004}$	$2.982_{0.012}$	$0.428_{0.029}$
0.75	$0.757_{0.005}$	$1.586_{0.013}$	$1.958_{0.004}$	$2.887_{0.014}$	$0.178_{0.021}$

1.1.2 Random effects informative visit process

Table 7:
Outcome model: linear mixed model
Informative visit model:
$\log(P(R_{it}=1))$ or $\text{logit}(P(R_{it}=1)) = -5 + \gamma_0 b_0 + \gamma_1 b_1$,
Fitting method: maximum likelihood
Random effects: corr(b_{0i}, b_{1i})=0

Info Visit Process		Simulated mean parameter estimates (SEs as subscripts)			
γ_0	γ_1	β_0 (true=0)	β_1 (true=1)	β_2 (true=2)	β_3 (true=3)
log link					
0	0	$0.010_{0.005}$	$0.986_{0.009}$	$1.985_{0.007}$	$3.010_{0.012}$
0.5	0	$0.435_{0.005}$	$0.957_{0.008}$	$2.006_{0.006}$	$2.997_{0.011}$
1	0	$0.824_{0.005}$	$0.901_{0.008}$	$1.989_{0.006}$	$3.008_{0.011}$
0	0.5	$-0.053_{0.005}$	$1.526_{0.008}$	$2.000_{0.007}$	$3.000_{0.012}$
0.5	0.5	$0.360_{0.005}$	$1.493_{0.008}$	$1.998_{0.007}$	$3.002_{0.012}$
1	0.5	$0.734_{0.005}$	$1.418_{0.008}$	$1.997_{0.007}$	$3.001_{0.011}$
0	1	$-0.128_{0.005}$	$2.026_{0.008}$	$2.005_{0.007}$	$2.996_{0.011}$
0.5	1	$0.267_{0.005}$	$1.978_{0.009}$	$2.001_{0.007}$	$2.999_{0.008}$
1	1	$0.638_{0.005}$	$1.884_{0.008}$	$1.995_{0.007}$	$3.006_{0.011}$
logit link					
0	0	$0.010_{0.005}$	$0.986_{0.009}$	$1.985_{0.007}$	$3.011_{0.012}$
0.5	0	$0.428_{0.005}$	$0.959_{0.008}$	$2.006_{0.006}$	$2.995_{0.011}$
1	0	$0.810_{0.005}$	$0.909_{0.008}$	$1.989_{0.006}$	$3.009_{0.011}$
0	0.5	$-0.052_{0.005}$	$1.515_{0.008}$	$2.001_{0.007}$	$2.999_{0.012}$
0.5	0.5	$0.358_{0.005}$	$1.479_{0.008}$	$1.998_{0.007}$	$3.003_{0.012}$
1	0.5	$0.727_{0.005}$	$1.407_{0.008}$	$1.995_{0.007}$	$3.006_{0.011}$
0	1	$-0.117_{0.005}$	$1.994_{0.009}$	$2.003_{0.007}$	$3.004_{0.011}$
0.5	1	$0.273_{0.005}$	$1.948_{0.009}$	$2.000_{0.007}$	$2.997_{0.011}$
1	1	$0.637_{0.005}$	$1.861_{0.008}$	$1.995_{0.007}$	$3.004_{0.011}$

Table 8:
Outcome model: linear mixed model
Informative visit model:
$\log(P(R_{it}=1))$ or $\text{logit}(P(R_{it}=1)) = -5 + \gamma_0 b_0 + \gamma_1 b_1$,
Fitting method: GEE (independence working correlation)
Random effects: corr(b_{0i}, b_{1i})=0

Info Visit Process		Simulated mean parameter estimates (SEs as subscripts)			
γ_0	γ_1	β_0 (true=0)	β_1 (true=1)	β_2 (true=2)	β_3 (true=3)
log link					
0	0	$0.013_{0.005}$	$0.981_{0.009}$	$1.983_{0.007}$	$3.014_{0.012}$
0.5	0	$0.499_{0.005}$	$0.998_{0.009}$	$2.006_{0.007}$	$2.998_{0.013}$
1	0	$1.004_{0.005}$	$0.997_{0.009}$	$1.986_{0.007}$	$3.016_{0.012}$
0	0.5	$0.003_{0.005}$	$1.496_{0.009}$	$2.001_{0.007}$	$2.997_{0.012}$
0.5	0.5	$0.499_{0.005}$	$1.498_{0.009}$	$1.998_{0.007}$	$3.008_{0.013}$
1	0.5	$0.991_{0.005}$	$1.504_{0.009}$	$1.996_{0.008}$	$3.005_{0.012}$
0	1	$0.008_{0.005}$	$1.986_{0.009}$	$1.996_{0.007}$	$3.017_{0.012}$
0.5	1	$0.498_{0.005}$	$2.008_{0.010}$	$2.002_{0.008}$	$2.994_{0.013}$
1	1	$0.984_{0.006}$	$1.973_{0.008}$	$1.991_{0.008}$	$3.022_{0.012}$
logit link					
0	0	$0.012_{0.005}$	$0.982_{0.009}$	$1.983_{0.007}$	$3.015_{0.012}$
0.5	0	$0.488_{0.005}$	$0.996_{0.009}$	$2.006_{0.007}$	$2.997_{0.013}$
1	0	$0.962_{0.005}$	$0.999_{0.009}$	$1.985_{0.007}$	$3.017_{0.012}$
0	0.5	$0.003_{0.005}$	$1.485_{0.009}$	$2.001_{0.007}$	$2.996_{0.013}$
0.5	0.5	$0.487_{0.005}$	$1.480_{0.009}$	$1.997_{0.007}$	$3.009_{0.013}$
1	0.5	$0.944_{0.005}$	$1.477_{0.009}$	$1.994_{0.008}$	$3.010_{0.012}$
0	1	$0.008_{0.005}$	$1.945_{0.009}$	$1.997_{0.007}$	$3.016_{0.013}$
0.5	1	$0.474_{0.005}$	$1.957_{0.010}$	$2.000_{0.008}$	$2.998_{0.013}$
1	1	$0.920_{0.005}$	$1.914_{0.009}$	$1.991_{0.008}$	$3.019_{0.013}$

Table 9:
Outcome model: linear mixed model
Informative visit model:
$\log(P(R_{it}=1))$ or $\text{logit}(P(R_{it}=1)) = -5 + \gamma_0 b_0 + \gamma_1 b_1$,
Fitting method: maximum likelihood
Random effects: $\text{corr}(b_{0i}, b_{1i})$=0.5

Info Visit Process		Simulated mean parameter estimates (SEs as subscripts)			
γ_0	γ_1	β_0 (true=0)	β_1 (true=1)	β_2 (true=2)	β_3 (true=3)
log link					
0	0	$0.004_{0.005}$	$0.997_{0.009}$	$1.999_{0.007}$	$3.000_{0.013}$
0.5	0	$0.408_{0.005}$	$1.202_{0.009}$	$2.000_{0.007}$	$3.007_{0.012}$
1	0	$0.772_{0.005}$	$1.348_{0.008}$	$2.002_{0.006}$	$2.981_{0.011}$
0	0.5	$0.158_{0.005}$	$1.490_{0.009}$	$2.004_{0.007}$	$3.011_{0.012}$
0.5	0.5	$0.539_{0.005}$	$1.661_{0.008}$	$1.995_{0.006}$	$3.009_{0.012}$
1	0.5	$0.863_{0.005}$	$1.779_{0.008}$	$2.004_{0.006}$	$3.000_{0.011}$
0	1	$0.281_{0.005}$	$1.963_{0.009}$	$1.997_{0.007}$	$2.997_{0.012}$
0.5	1	$0.622_{0.005}$	$2.087_{0.009}$	$1.993_{0.007}$	$3.001_{0.011}$
1	1	$0.935_{0.005}$	$2.160_{0.008}$	$2.001_{0.007}$	$3.004_{0.012}$
logit link					
0	0	$0.002_{0.005}$	$0.999_{0.009}$	$2.002_{0.007}$	$2.995_{0.013}$
0.5	0	$0.403_{0.005}$	$1.197_{0.009}$	$1.997_{0.007}$	$3.012_{0.012}$
1	0	$0.761_{0.005}$	$1.347_{0.008}$	$2.002_{0.007}$	$2.981_{0.011}$
0	0.5	$0.156_{0.005}$	$1.482_{0.009}$	$2.002_{0.007}$	$3.012_{0.012}$
0.5	0.5	$0.533_{0.005}$	$1.648_{0.008}$	$1.994_{0.006}$	$3.012_{0.012}$
1	0.5	$0.853_{0.005}$	$1.774_{0.009}$	$2006_{0.006}$	$2.995_{0.012}$
0	1	$0.283_{0.005}$	$1.941_{0.009}$	$1.999_{0.007}$	$2.994_{0.012}$
0.5	1	$0.622_{0.005}$	$2.062_{0.009}$	$1.991_{0.007}$	$3.004_{0.012}$
1	1	$0.934_{0.005}$	$2.137_{0.009}$	$2.002_{0.007}$	$3.005_{0.012}$

Table 10:
Outcome model: linear mixed model
Informative visit model:
$\log(P(R_{it}=1))$ or $\text{logit}(P(R_{it}=1)) = -5 + \gamma_0 b_0 + \gamma_1 b_1$,
Fitting method: GEE (independence working correlation)
Random effects: $\text{corr}(b_{0i}, b_{1i})$=0.5

Info Visit Process		Simulated mean parameter estimates (SEs as subscripts)			
γ_0	γ_1	β_0 (true=0)	β_1 (true=1)	β_2 (true=2)	β_3 (true=3)
log link					
0	0	$0.006_{0.005}$	$0.993_{0.009}$	$1.999_{0.007}$	$2.998_{0.014}$
0.5	0	$0.497_{0.006}$	$1.252_{0.010}$	$1.995_{0.007}$	$3.018_{0.013}$
1	0	$0.996_{0.005}$	$1.508_{0.009}$	$2.002_{0.008}$	$2.971_{0.013}$
0	0.5	$0.248_{0.005}$	$1.490_{0.010}$	$2.005_{0.007}$	$3.011_{0.014}$
0.5	0.5	$0.756_{0.005}$	$1.745_{0.009}$	$1.995_{0.007}$	$3.001_{0.014}$
1	0.5	$1.245_{0.006}$	$1.978_{0.009}$	$1.997_{0.008}$	$3.000_{0.013}$
0	1	$0.506_{0.006}$	$1.994_{0.010}$	$1.997_{0.008}$	$2.997_{0.014}$
0.5	1	$0.995_{0.006}$	$2.231_{0.010}$	$1.987_{0.008}$	$3.008_{0.014}$
1	1	$1.426_{0.006}$	$2.43`_{0.010}$	$2.000_{0.009}$	$3.004_{0.014}$
logit link					
0	0	$0.005_{0.005}$	$0.995_{0.009}$	$2.000_{0.007}$	$2.995_{0.014}$
0.5	0	$0.487_{0.006}$	$1.244_{0.010}$	$1.994_{0.008}$	$3.019_{0.014}$
1	0	$0.957_{0.005}$	$1.484_{0.010}$	$1.999_{0.007}$	$2.976_{0.013}$
0	0.5	$0.242_{0.005}$	$1.478_{0.010}$	$2.005_{0.007}$	$3.011_{0.014}$
0.5	0.5	$0.729_{0.005}$	$1.719_{0.009}$	$1.996_{0.007}$	$3.001_{0.014}$
1	0.5	$1.168_{0.005}$	$1.922_{0.010}$	$2.000_{0.008}$	$2.997_{0.014}$
0	1	$0.487_{0.006}$	$1.954_{0.010}$	$1.999_{0.008}$	$2.995_{0.014}$
0.5	1	$0.935_{0.006}$	$2.159_{0.010}$	$1.988_{0.008}$	$3.009_{0.014}$
1	1	$1.327_{0.006}$	$2.319_{0.011}$	$1.998_{0.008}$	$3.010_{0.015}$

1.2 Logistic mixed model for the outcome

1.2.1 Conditional mean informative visit process

Table 11:
Outcome model: logistic mixed model
Informative visit model: $\text{logit}(P(R_{it} = 1)) = -1 + \delta \text{E}[Y|b]$,
Fitting method:
maximum likelihood or GEE (independence working correlation)
Random effects: $\text{corr}(b_{0i}, b_{1i})$=0

Visit Parameter	Simulated mean parameter estimates (SEs as subscripts)				
δ	β_0 (true=-1)	β_1 (true=0.5)	β_2 (true=1)	β_3 (true=0.5)	x_1^2 coeff.
ML					
0	$-1.001_{0.003}$	$0.499_{0.006}$	$1.005_{0.002}$	$0.502_{0.006}$	$-0.002_{0.017}$
0.25	$-0.850_{0.003}$	$0.497_{0.006}$	$0.986_{0.002}$	$0.496_{0.006}$	$0.165_{0.018}$
0.50	$-0.694_{0.003}$	$0.478_{0.006}$	$0.943_{0.002}$	$0.485_{0.007}$	$0.359_{0.018}$
0.75	$-0.529_{0.003}$	$0.461_{0.007}$	$0.887_{0.002}$	$0.461_{0.007}$	$0.439_{0.018}$
GEE					
0	$-0.843_{0.002}$	$0.404_{0.004}$	$0.837_{0.002}$	$0.402_{0.004}$	$0.081_{0.014}$
0.25	$-0.676_{0.002}$	$0.397_{0.005}$	$0.824_{0.002}$	$0.402_{0.004}$	$0.183_{0.015}$
0.50	$-0.514_{0.002}$	$0.383_{0.005}$	$0.794_{0.002}$	$0.390_{0.005}$	$0.303_{0.015}$
0.75	$-0.355_{0.003}$	$0.364_{0.006}$	$0.756_{0.002}$	$0.368_{0.005}$	$0.332_{0.014}$

Table 12:
Outcome model: logistic mixed model
Informative visit model: $\text{logit}(P(R_{it} = 1)) = -1 + \delta\text{E}[Y|b]$,
Fitting method:
maximum likelihood or GEE (independence working correlation)
Random effects: $\text{corr}(b_{0i}, b_{1i})$=0.5

Visit Parameter	Simulated mean parameter estimates (SEs as subscripts)				
δ	β_0 (true=-1)	β_1 (true=0.5)	β_2 (true=1)	β_3 (true=0.5)	x_1^2 coeff.
ML					
0	$-1.003_{0.003}$	$0.511_{0.006}$	$1.004_{0.002}$	$0.496_{0.006}$	$0.013_{0.017}$
0.25	$-0.851_{0.003}$	$0.642_{0.006}$	$0.980_{0.002}$	$0.477_{0.006}$	$0.192_{0.017}$
0.50	$-0.687_{0.003}$	$0.783_{0.007}$	$0.940_{0.002}$	$0.418_{0.006}$	$0.268_{0.019}$
0.75	$-0.536_{0.003}$	$0.877_{0.007}$	$0.889_{0.003}$	$0.344_{0.007}$	$0.354_{0.019}$
GEE					
0	$-0.845_{0.002}$	$0.527_{0.004}$	$0.836_{0.002}$	$0.290_{0.004}$	$0.006_{0.014}$
0.25	$-0.678_{0.002}$	$0.650_{0.005}$	$0.817_{0.002}$	$0.272_{0.005}$	$0.106_{0.015}$
0.50	$-0.510_{0.002}$	$0.756_{0.005}$	$0.792_{0.002}$	$0.240_{0.005}$	$0.130_{0.016}$
0.75	$-0.358_{0.003}$	$0.823_{0.005}$	$0.756_{0.002}$	$0.189_{0.005}$	$0.159_{0.015}$