

Section 1: Code for power calculation for the Girls on the Go trial (see parameter values in Table 2, and calculated power in Table 3)

CALCULATION IN R

```
# Load packages
library(swdpwr)

# Design matrix
dataset <-matrix(c(rep(c(0,1,1,1),2), rep(c(0,0,1,1),2),
                  rep(c(0,0,0,1),2)),6,4,byrow=TRUE)
```

SWDPWR

For this example, users need to specify three ICC estimates: $\alpha_0 = \text{wpICC}$, $\alpha_1 = \text{bpICC}$, and $\alpha_2 = \text{intra-individual ICC}$. Please note that the exchangeable correlation structure can be achieved by setting $\alpha_0 = \alpha_1$

In SWDPWR, the time effect is irrelevant for a continuous outcome. However, if no time effect is specified, the time effect term will be excluded from the model, which may lead to over-estimating the power. To be conservative and make it comparable to other packages, we should add a non-zero time effect to ensure the time effect term is included in the model. The treatment effect is $\text{meanresponse_end1} - \text{meanresponse_end0} = 0.39$. The calculations were done both with and without time effects.

```
# No time effects, meanresponse_start = meanresponse_end0
## exchangeable
### alpha0 = alpha1 = wp-ICC; alpha2 = wi-ICC
swdpower(K = 10, design = dataset, family = "gaussian",
         model = "conditional", link = "identity", type = "cohort",
         meanresponse_start = 0, meanresponse_end0 = 0,
         meanresponse_end1 = 0.39, sigma2 = 1, typeIerror = 0.05,
         alpha0 = 0.005, alpha1 = 0.005, alpha2 = 0.65)

## block exchangeable
### alpha0 = wp-ICC, alpha1 = wp-ICC*CAC, alpha2 = wi-ICC
swdpower(K = 10, design = dataset, family = "gaussian",
         model = "conditional", link = "identity",
         type = "cohort", meanresponse_start = 0,
         meanresponse_end0 = 0, meanresponse_end1 = 0.39,
         sigma2 = 1, typeIerror = 0.05, alpha0 = 0.01,
         alpha1 = 0.00223, alpha2 = 0.65)
```

```

# Time effect = 0.1 (e.g., meanresponse_end0 - meanresponse_start = 0.1)
## exchangeable
### alpha0 = alpha1 = wp-ICC; alpha2 = wi-ICC
swdpower(K = 10, design = dataset, family = "gaussian",
         model = "conditional", link = "identity", type = "cohort",
         meanresponse_start = 0, meanresponse_end0 = 0.1,
         meanresponse_end1 = 0.49, sigma2 = 1, typeIerror = 0.05,
         alpha0 = 0.005, alpha1 = 0.005, alpha2 = 0.65)

## block exchangeable
### alpha0 = wp-ICC, alpha1 = wp-ICC*CAC, alpha2 = wi-ICC
swdpower(K = 10, design = dataset, family = "gaussian",
         model = "conditional", link = "identity",
         type = "cohort", meanresponse_start = 0,
         meanresponse_end0 = 0.1, meanresponse_end1 = 0.49,
         sigma2 = 1, typeIerror = 0.05, alpha0 = 0.01,
         alpha1 = 0.00223, alpha2 = 0.65)

```

CALCULATION IN SAS

```

%include "C:\Users\Derek Ouyang\Desktop\CRTFASTGEEPWR.v1.01.sas";
*\replace the path with your local path to the SAS macro;

```

CRTFASTGEEPWR

For this example, users need to specify two ICC estimates: $\alpha_1 = \text{wpICC}$ and $\alpha_2 = \text{bpICC}$. In case of proportional decay, users need to specify $\alpha_0 = \text{wpICC}$ and $r_0 = \text{decaying parameter}$. Please note that the exchangeable correlation structure can be achieved by setting $\alpha_1 = \alpha_2$

```

*\ the intervention effect model type: 1- average intervention effects
model, 2- incremental intervention effects model;
*\the period effect model type: 1- categorical time period model, 2-
continuous time period model;

*\ No Time effect, beta_period_effects is constant;
*\ exchangeable;
%CRTFASTGEEPWR(alpha=0.05, m =%str({2,2,2}), corr_type = 3,
/* alpha1 = alpha2 = wp-ICC; alpha3 = wi-ICC; */

```

```

alpha1 = 0.005, alpha2 = 0.005 , alpha3=0.65,
df_choice=2, intervention_effect_type=1 , delta = 0.39,
period_effect_type= 1 , beta_period_effects =%str({1,1,1,1}), dist =
"normal",
phi=1,
CP_size_matrix = %str({10 10 10 10,
10 10 10 10,
10 10 10 10}),
DesignPattern = %str({0 1 1 1 ,
0 0 1 1 ,
0 0 0 1 }));

*\ block exchangeable;
%CRTFASTGEEPWR(alpha=0.05, m=%str({2,2,2}), corr_type = 3,
/* alpha1 = bp-ICC, alpha2 = wp-ICC; alpha3 = wi-ICC; */
alpha1 = 0.01, alpha2 = 0.00223 , alpha3=0.65,
df_choice=2, intervention_effect_type=1,
delta = 0.39, period_effect_type= 1,
beta_period_effects =%str({1,1,1,1}), dist = "normal",
phi=1,
CP_size_matrix = %str({10 10 10 10,
10 10 10 10,
10 10 10 10}),
DesignPattern = %str({0 1 1 1 ,
0 0 1 1 ,
0 0 0 1 }));

*\ proportional decay;
%CRTFASTGEEPWR(alpha=0.05, m=%str({2,2,2}), corr_type = 4,
/* alpha0 = wp-ICC; r0 = exponential decay rate(i.e., CAC or IAC); */
alpha0 = 0.025, r0=0.65, df_choice=2,
intervention_effect_type=1, delta = 0.39,
period_effect_type= 1,
beta_period_effects =%str({1,1,1,1}), dist = "normal", phi=1,
CP_size_matrix = %str({10 10 10 10,
10 10 10 10,
10 10 10 10}),
DesignPattern = %str({0 1 1 1 ,
0 0 1 1 ,
0 0 0 1 }));

*\ Time effect = 0.1, period effects equally spaced, the last period -
first period = 0.1;
*\ exchangeable;
%CRTFASTGEEPWR(alpha=0.05, m=%str({2,2,2}), corr_type = 3,
/* alpha1 = alpha2 = wp-ICC; alpha3 = wi-ICC; */

```

```

alpha1 = 0.005, alpha2 = 0.005 , alpha3=0.65,
df_choice=2, intervention_effect_type=1 , delta = 0.39,
period_effect_type= 1 , beta_period_effects
=%str({1.025,1.05,1.075,1.1}), dist = "normal",
phi=1,
CP_size_matrix = %str({10 10 10 10,
    10 10 10 10,
    10 10 10 10}),
DesignPattern = %str({0 1 1 1 ,
    0 0 1 1 ,
    0 0 0 1 }));

*\ block exchangeable;
%CRIFASTGEEPWR(alpha=0.05, m=%str({2,2,2}), corr_type = 3,
/* alpha1 = bp-ICC, alpha2 = wp-ICC; alpha3 = wi-ICC; */
alpha1 = 0.01, alpha2 = 0.00223 , alpha3=0.65,
df_choice=2, intervention_effect_type=1,
delta = 0.39, period_effect_type= 1,
beta_period_effects =%str({1.025,1.05,1.075,1.1}), dist = "normal",
phi=1,
CP_size_matrix = %str({10 10 10 10,
    10 10 10 10,
    10 10 10 10}),
DesignPattern = %str({0 1 1 1 ,
    0 0 1 1 ,
    0 0 0 1 }));

*\ proportional decay;
%CRIFASTGEEPWR(alpha=0.05, m=%str({2,2,2}), corr_type = 4,
/* alpha0 = wp-ICC; r0 = exponential decay rate(i.e., CAC or IAC); */
alpha0 = 0.025, r0=0.65, df_choice=2,
intervention_effect_type=1, delta = 0.39,
period_effect_type= 1,
beta_period_effects =%str({1.025,1.05,1.075,1.1}), dist = "normal",
phi=1,
CP_size_matrix = %str({10 10 10 10,
    10 10 10 10,
    10 10 10 10}),
DesignPattern = %str({0 1 1 1 ,
    0 0 1 1 ,
    0 0 0 1 }));

```

Section 2: Code for power calculation for the Community Expedited Partner Treatment (EPT) trial (see parameter values in Table 4, and calculated power in Table 5)

CALCULATION IN R

```
# Load packages
library(swdpwr)
library(swCRTdesign)

#Design matrix
dataset2 <- matrix(c(rep(c(0,1,1,1,1),6),rep(c(0,0,1,1,1),6),
                    rep(c(0,0,0,1,1),6),rep(c(0,0,0,0,1),4)),
                  22,5,byrow=TRUE)
```

SWDPWR

```
## time effect = 0, therefore, meanresponse_start = meanresponse_end0
## the effect size is meanresponse_end1 - meanresponse_end0 = -0.014
### exchangeable
### alpha0 = alpha1 = wp-ICC
swdpower(K = 305, design = dataset2, family = "binomial",
         model = "marginal", link = "identity",
         type = "cross-sectional", meanresponse_start = 0.076,
         meanresponse_end0 = 0.076, meanresponse_end1 = 0.062,
         typeError = 0.05, alpha0 = 0.007, alpha1 = 0.007)

## nested exchangeable
### alpha0 = wp-ICC; alpha1 = wp-ICC*CAC
swdpower(K = 305, design = dataset2, family = "binomial",
         model = "marginal", link = "identity",
         type = "cross-sectional", meanresponse_start = 0.076,
         meanresponse_end0 = 0.076, meanresponse_end1 = 0.062,
         typeError = 0.05, alpha0 = 0.007, alpha1 = 0.0035)

## time effect = -0.007, therefore, meanresponse_end0 -
meanresponse_start = -0.007
## the effect size is meanresponse_end1 - meanresponse_end0 = -0.014
### exchangeable
### alpha0 = alpha1 = wp-ICC
swdpower(K = 305, design = dataset2, family = "binomial",
         model = "marginal", link = "identity",
         type = "cross-sectional", meanresponse_start = 0.076,
         meanresponse_end0 = 0.069 , meanresponse_end1 = 0.055 ,
         typeError = 0.05, alpha0 = 0.007, alpha1 = 0.007)
```

```

## nested exchangeable
swdpower(K = 305, design = dataset2, family = "binomial",
         model = "marginal", link = "identity",
         type = "cross-sectional", meanresponse_start = 0.076,
         meanresponse_end0 = 0.069, meanresponse_end1 = 0.055,
         typeError = 0.05, alpha0 = 0.007, alpha1 = 0.0035)

# time effect = -0.014, therefore, meanresponse_end0 -
meanresponse_start = -0.014
## the effect size is meanresponse_end1 - meanresponse_end0 = -0.014
### exchangeable
### alpha0 = alpha1 = wp-ICC
swdpower(K = 305, design = dataset2, family = "binomial",
         model = "marginal", link = "identity",
         type = "cross-sectional", meanresponse_start = 0.076,
         meanresponse_end0 = 0.062, meanresponse_end1 = 0.048,
         typeError = 0.05, alpha0 = 0.007, alpha1 = 0.007)

## nested exchangeable
### alpha0 = wp-ICC; alpha1 = wp-ICC*CAC
swdpower(K = 305, design = dataset2, family = "binomial",
         model = "marginal", link = "identity",
         type = "cross-sectional", meanresponse_start = 0.076,
         meanresponse_end0 = 0.062, meanresponse_end1 = 0.048,
         typeError = 0.05, alpha0 = 0.007, alpha1 = 0.0035)

```

SWCRTDESIGN

For this example, users need to specify two ICC estimates: $icc = wpICC$ and CAC . For exchangeable correlation structure, the $CAC = 1$

```

# exchangeable
swPwr(swDsn(c(6,6,6,4)), distn="binomial",
      n=305, mu0=0.076, mu1=0.062, icc=0.007, cac = 1,
      alpha=0.05, retDATA=FALSE)
# nested exchangeable
swPwr(swDsn(c(6,6,6,4)), distn="binomial",
      n=305, mu0=0.076, mu1=0.062, icc=0.007, cac = 0.5,
      alpha=0.05, retDATA=FALSE)

```

CALCULATION IN SAS

```

%include "C:\Users\Derek Ouyang\Desktop\CRTFASTGEEPWR.v1.01.sas";
* \replace the path with your local path to the SAS macro;

```

CRTFASTGEEPWR

```
*\ the intervention effect model type: 1- average intervention effects model, 2- incremental intervention effects model;
*\the period effect model type: 1- categorical time period model, 2- continuous time period model;
```

```
*\no time effect. The beta_period_effects are constant;
*\exchangeable correlation structure;
```

```
%CRTFASTGEEPWR(alpha=0.05, m =%str({6,6,6,4}), corr_type = 1,
/* alpha1 = alpha2 = wp-ICC*/
alpha1 = 0.007, alpha2 = 0.007 ,
intervention_effect_type=1, delta = -0.014, df_choice=2,
period_effect_type= 1,
beta_period_effects =%str({0.076,0.076,0.076,0.076,0.076}),
DIST = "binary", link = "identity", phi=1,
CP_size_matrix = %str({305 305 305 305 305,
                        305 305 305 305 305,
                        305 305 305 305 305,
                        305 305 305 305 305}),
DesignPattern = %str({0 1 1 1 1,
                      0 0 1 1 1,
                      0 0 0 1 1,
                      0 0 0 0 1}));
```

```
*\nested exchangeable;
```

```
%CRTFASTGEEPWR(alpha=0.05, m =%str({6,6,6,4}), corr_type = 1,
/* alpha1 = wp-ICC; alpha2 = bp-ICC*/
alpha1 = 0.007, alpha2 = 0.0035 ,
intervention_effect_type=1, delta = -0.014, df_choice=2,
period_effect_type= 1,
beta_period_effects =%str({0.076,0.076,0.076,0.076,0.076}),
DIST = "binary", link = "identity", phi=1,
CP_size_matrix = %str({305 305 305 305 305,
                        305 305 305 305 305,
                        305 305 305 305 305,
                        305 305 305 305 305}),
DesignPattern = %str({0 1 1 1 1,
                      0 0 1 1 1,
                      0 0 0 1 1,
                      0 0 0 0 1}));
```

```
*\exponential decay;
```

```

%CRTFASTGEEPWR(alpha=0.05, m=%str({6,6,6,4}), corr_type = 2,
/* alpha0 = wp-ICC; r0 = decay parameter (e.g., CAC)*/
alpha0 = 0.007, r0 = 0.7,
intervention_effect_type=1, delta = -0.014, df_choice=2,
period_effect_type= 1,
beta_period_effects=%str({0.076,0.076,0.076,0.076,0.076}),
DIST = "binary", link = "identity", phi=1,
CP_size_matrix = %str({305 305 305 305 305,
                        305 305 305 305 305,
                        305 305 305 305 305,
                        305 305 305 305 305}),
DesignPattern = %str({0 1 1 1 1,
                      0 0 1 1 1,
                      0 0 0 1 1,
                      0 0 0 0 1}));

*\time effect = -0.007. The beta_period_effects are equally spaced,
the last - the first = -0.007;
*\exchangeable;
%CRTFASTGEEPWR(alpha=0.05, m=%str({6,6,6,4}), corr_type = 1,
/* alpha1 = alpha2 = wp-ICC*/
alpha1 = 0.007, alpha2 = 0.007 ,
intervention_effect_type=1, delta = -0.014,
df_choice=2, period_effect_type= 1,
beta_period_effects=%str({0.076,0.07425,0.0725,0.07075,0.069}),
DIST = "binary", link = "identity", phi=1,
CP_size_matrix = %str({305 305 305 305 305,
                        305 305 305 305 305,
                        305 305 305 305 305,
                        305 305 305 305 305}),
DesignPattern = %str({0 1 1 1 1,
                      0 0 1 1 1,
                      0 0 0 1 1,
                      0 0 0 0 1}));

*\nested exchangeable;
%CRTFASTGEEPWR(alpha=0.05, m=%str({6,6,6,4}), corr_type = 1,
/* alpha1 = wp-ICC; alpha2 = bp-ICC*/
alpha1 = 0.007, alpha2 = 0.0035 ,
intervention_effect_type=1, delta = -0.014, df_choice=2,
period_effect_type= 1,
beta_period_effects=%str({0.076,0.07425,0.0725,0.07075, 0.069}),
DIST = "binary", link = "identity", phi=1,
CP_size_matrix = %str({305 305 305 305 305,
                        305 305 305 305 305,
                        305 305 305 305 305,
                        305 305 305 305 305}),

```



```

DesignPattern = %str({0 1 1 1 1,
                      0 0 1 1 1,
                      0 0 0 1 1,
                      0 0 0 0 1}));

*\ED;
%CRIFASTGEEPWR(alpha=0.05, m=%str({6,6,6,4}), corr_type = 2,
/* alpha0 = wp-ICC; r0 = decay parameter (e.g., CAC)*/
alpha0 = 0.007, r0 = 0.7 ,
intervention_effect_type=1, delta = -0.014, df_choice=2,
period_effect_type= 1,
beta_period_effects =%str({0.076,0.07425,0.0725,0.07075,0.069}),
DIST = "binary", link = "identity", phi=1,
CP_size_matrix = %str({305 305 305 305 305,
                       305 305 305 305 305,
                       305 305 305 305 305,
                       305 305 305 305 305}),
DesignPattern = %str({0 1 1 1 1,
                      0 0 1 1 1,
                      0 0 0 1 1,
                      0 0 0 0 1}));

*\time effect = 0.014. The beta_period_effects are equally spaced, the
last - the first = -0.014;
*\exchangeable;
%CRIFASTGEEPWR(alpha=0.05, m=%str({6,6,6,4}), corr_type = 1,
/* alpha1 = alpha2 = wp-ICC*/
alpha1 = 0.007, alpha2 = 0.007,
intervention_effect_type=1, delta = -0.014, df_choice=2,
period_effect_type= 1,
beta_period_effects =%str({0.0760,0.0725,0.0690,0.0655,0.0620}),
DIST = "binary", link = "identity", phi=1,
CP_size_matrix = %str({305 305 305 305 305,
                       305 305 305 305 305,
                       305 305 305 305 305,
                       305 305 305 305 305}),
DesignPattern = %str({0 1 1 1 1,
                      0 0 1 1 1,
                      0 0 0 1 1,
                      0 0 0 0 1}));

*\nested exchangeable;
%CRIFASTGEEPWR(alpha=0.05, m=%str({6,6,6,4}), corr_type = 1,
/* alpha1 = wp-ICC; alpha2 = bp-ICC*/
alpha1 = 0.007, alpha2 = 0.0035,
intervention_effect_type=1, delta = -0.014, df_choice=2,
period_effect_type= 1,

```

```

beta_period_effects =%str({0.0760,0.0725,0.0690,0.0655,0.0620}),
DIST = "binary", link = "identity", phi=1,
CP_size_matrix = %str({305 305 305 305 305,
                      305 305 305 305 305,
                      305 305 305 305 305,
                      305 305 305 305 305}),
DesignPattern = %str({0 1 1 1 1,
                     0 0 1 1 1,
                     0 0 0 1 1,
                     0 0 0 0 1}));

*\ED;
%CRTEFASTGEEPWR(alpha=0.05, m =%str({6,6,6,4}), corr_type = 2,
/* alpha0 = wp-ICC; r0 = decay parameter (e.g., CAC)*/
alpha0 = 0.007, r0 = 0.7,
intervention_effect_type=1, delta = -0.014, df_choice=2,
period_effect_type= 1,
beta_period_effects =%str({0.0760,0.0725,0.0690,0.0655,0.0620}),
DIST = "binary", link = "identity", phi=1,
CP_size_matrix = %str({305 305 305 305 305,
                      305 305 305 305 305,
                      305 305 305 305 305,
                      305 305 305 305 305}),
DesignPattern = %str({0 1 1 1 1,
                     0 0 1 1 1,
                     0 0 0 1 1,
                     0 0 0 0 1}));

```

Section 3: Selected code for power calculation for the Community Expedited Partner Treatment (EPT) trial under logit link (see parameter values in Table 4, and calculated power in Table 5)

CALCULATION IN R

SWDPWR

Let us consider the EPT trial again. For simplicity, we assume there are no time effects while keeping other parameters the same as in Section 2. The effect size should be entered on the log scale and all other parameters should be entered on the proportions scale. Then the power can be calculated as follows:

```
library(swdpwr)

#Design matrix
dataset2 <- matrix(c(rep(c(0,1,1,1,1),6),rep(c(0,0,1,1,1),6),
                    rep(c(0,0,0,1,1),6),rep(c(0,0,0,0,1),4)),
                  22,5,byrow=TRUE)

OR <- (0.062/(1-0.062))/(0.076/(1-0.076))
swdpower(K = 305, design = dataset2, family = "binomial",
         model = "marginal", link = "logit",
         type = "cross-sectional", meanresponse_start = 0.076,
         meanresponse_end0 = 0.076, effectsize_beta = log(OR),
         typeIError = 0.05, alpha0 = 0.007, alpha1 = 0.007)
```

CALCULATION IN SAS (same trial as above)

```
%include "C:\Users\Derek Ouyang\Desktop\CRTFASTGEEPWR.v1.01.sas";
*\replace the path with your local path to the SAS macro;

*\ the intervention effect model type: 1- average intervention effects
model, 2- incremental intervention effects model;
*\the period effect model type: 1- categorical time period model, 2-
continuous time period model;

*\Constant period effect on logit scale:  $\log(0.076/(1-0.076)) = -$ 
2.497979;
%CRTFASTGEEPWR(alpha=0.05, m=%str({6,6,6,4}), corr_type = 1,
/* alpha1 = alpha2 = wp-ICC*/
alpha1 = 0.007, alpha2 = 0.007,
/* delta = log(OR)*/
```

```
intervention_effect_type=1, delta = -0.2186368, df_choice=2,
period_effect_type= 1,
beta_period_effects =%str({-2.497979, -2.497979, -2.497979,
-2.497979, -2.497979}),
DIST = "binary", phi=1,
CP_size_matrix = %str({305 305 305 305 305,
305 305 305 305 305,
305 305 305 305 305,
305 305 305 305 305}),
DesignPattern = %str({0 1 1 1 1,
0 0 1 1 1,
0 0 0 1 1,
0 0 0 0 1}));
```