/\*

Import the spreadsheet **rugby performance indicators example data.xlsx**;

by double-clicking it in SAS Studio or running this import code, modified for your directory structure:

\*/

FILENAME REFFILE '/folders/myshortcuts/ExternalFiles/Projects/Mixed-model Workshop/Generalized linear models/rugby performance indicators example data.xlsx';

PROC IMPORT DATAFILE=REFFILE

DBMS=XLSX replace

OUT=WORK.IMPORT;

GETNAMES=YES;

RUN;

\*proc print; run;

title "Simple stats";

proc means n nmiss mean std min max maxdec=1 data=import;

var Week--EffectiveRucks;

class Fwd1Bk2;

run;

ods noproctitle;

ods graphics / imagemap=on;

proc sort data=import;

by Fwd1Bk2;

title "Poisson regression with repeated measurement";

proc glimmix data=import plots=StudentPanel(conditional) nobound;

class AthleteID GameID;

model EffectiveRucks=MTPforceStdzd WeekRescaled

/link=log dist=poisson offset=LnTimePlayed;

estimate "Mean" int 1/cl exp alpha=0.1;

estimate "";

estimate "Mean @ Week 1" int 1 WeekRescaled -0.5/cl exp alpha=0.1;

estimate "Mean @ Week 6" int 1 WeekRescaled 0.5/cl exp alpha=0.1;

estimate "Week 6/Week 1" WeekRescaled 1/cl exp alpha=0.1;

estimate "";

estimate "Mean @ -1SD MTPf" int 1 MTPforceStdzd -0.5/cl exp alpha=0.1;

estimate "Mean @ +1SD MTPf" int 1 MTPforceStdzd 0.5/cl exp alpha=0.1;

estimate "MTPf +1SD/-1SD" MTPforceStdzd 1/cl exp alpha=0.1;

random int/subject=AthleteID cl alpha=0.1;

random GameID;

random \_residual\_;

covtest/wald cl(alpha=0.1);

by Fwd1Bk2;

run;

\*run the above again with nobound deleted for the Backs;

title "Poisson regression with repeated measurement";

title2 "MTPforceStdzd removed from the model";

proc glimmix data=import plots=StudentPanel(conditional);

class AthleteID GameID;

model EffectiveRucks=WeekRescaled

/link=log dist=poisson offset=LnTimePlayed;

estimate "Mean" int 1/cl exp alpha=0.1;

estimate "";

estimate "Mean @ Week 1" int 1 WeekRescaled -0.5/cl exp alpha=0.1;

estimate "Mean @ Week 6" int 1 WeekRescaled 0.5/cl exp alpha=0.1;

estimate "Week 6/Week 1" WeekRescaled 1/cl exp alpha=0.1;

/\*

estimate "";

estimate "Mean @ -1SD MTPf" int 1 MTPforceStdzd -0.5/cl exp alpha=0.1;

estimate "Mean @ +1SD MTPf" int 1 MTPforceStdzd 0.5/cl exp alpha=0.1;

estimate "MTPf +1SD/-1SD" MTPforceStdzd 1/cl exp alpha=0.1;

\*/

random int/subject=AthleteID cl alpha=0.1;

random GameID;

random \_residual\_;

covtest/wald cl(alpha=0.1);

by Fwd1Bk2;

run;

title "Poisson regression with repeated measurement";

title2 "with Fwd2Bk2 in a reasonably complete model";

proc glimmix data=import plots=StudentPanel(conditional);

class AthleteID GameID Fwd1Bk2;

model EffectiveRucks=Fwd1Bk2 Fwd1Bk2\*MTPforceStdzd WeekRescaled

/link=log dist=poisson offset=LnTimePlayed;

lsmeans Fwd1Bk2/diff cl alpha=0.1 ilink;

estimate "Mean Fwds&Backs" int 1 Fwd1Bk2 0.5 0.5/cl exp alpha=0.1;

estimate "";

estimate "Mean Backs" int 1 Fwd1Bk2 0 1/cl exp alpha=0.1;

estimate "Mean Fwds" int 1 Fwd1Bk2 1 0/cl exp alpha=0.1;

estimate "Mean Fwds/Backs" Fwd1Bk2 1 -1/cl exp alpha=0.1;

estimate "";

estimate "Mean @ Week 1" int 1 WeekRescaled -0.5/cl exp alpha=0.1;

estimate "Mean @ Week 6" int 1 WeekRescaled 0.5/cl exp alpha=0.1;

estimate "Week 6/Week 1" WeekRescaled 1/cl exp alpha=0.1;

estimate "Backs:";

estimate "Mean @ -1SD MTPf" int 1 Fwd1Bk2 0 1 Fwd1Bk2\*MTPforceStdzd 0 -0.5/cl exp alpha=0.1;

estimate "Mean @ +1SD MTPf" int 1 Fwd1Bk2 0 1 Fwd1Bk2\*MTPforceStdzd 0 0.5/cl exp alpha=0.1;

estimate "MTPf +1SD/-1SD" Fwd1Bk2\*MTPforceStdzd 0 1/cl exp alpha=0.1;

estimate "Fwds:";

estimate "Mean @ -1SD MTPf" int 1 Fwd1Bk2 1 0 Fwd1Bk2\*MTPforceStdzd -0.5 0/cl exp alpha=0.1;

estimate "Mean @ +1SD MTPf" int 1 Fwd1Bk2 1 0 Fwd1Bk2\*MTPforceStdzd 0.5 0/cl exp alpha=0.1;

estimate "MTPf +1SD/-1SD" Fwd1Bk2\*MTPforceStdzd 1 0/cl exp alpha=0.1;

estimate "Backs/Fwds:";

estimate "Mean Backs+Fwds reference" int 1 Fwd1Bk2 0.5 0.5

Fwd1Bk2\*MTPforceStdzd -0.5 -0.5/cl exp alpha=0.1;

estimate "blank";

estimate "MTPf +1SD/-1SD" Fwd1Bk2\*MTPforceStdzd -1 1/cl exp alpha=0.1;

random int/subject=AthleteID cl alpha=0.1;

random GameID;

random \_residual\_;

covtest/wald cl(alpha=0.1);

\*by Fwd1Bk2;

run;

title "Logistic regression with repeated measurement";

proc glimmix data=import plots=StudentPanel(conditional) nobound;

class AthleteID GameID;

model EffectiveRucks/TotalRucks=MTPforceStdzd WeekRescaled

/link=logit dist=binomial;

estimate "Mean" int 1/cl exp alpha=0.1;

estimate "";

estimate "Mean @ Week 1" int 1 WeekRescaled -0.5/cl exp alpha=0.1;

estimate "Mean @ Week 6" int 1 WeekRescaled 0.5/cl exp alpha=0.1;

estimate "Week 6/Week 1" WeekRescaled 1/cl exp alpha=0.1;

estimate "";

estimate "Mean @ -1SD MTPf" int 1 MTPforceStdzd -0.5/cl exp alpha=0.1;

estimate "Mean @ +1SD MTPf" int 1 MTPforceStdzd 0.5/cl exp alpha=0.1;

estimate "MTPf +1SD/-1SD" MTPforceStdzd 1/cl exp alpha=0.1;

random int/subject=AthleteID cl alpha=0.1;

random GameID;

random \_residual\_;

covtest/wald cl(alpha=0.1);

by Fwd1Bk2;

run;

title "Logistic regression with repeated measurement";

title2 "with Fwd2Bk2 in a reasonably complete model";

proc glimmix data=import plots=StudentPanel(conditional) nobound;

class AthleteID GameID Fwd1Bk2;

model EffectiveRucks/TotalRucks=Fwd1Bk2 Fwd1Bk2\*MTPforceStdzd WeekRescaled

/link=logit dist=binomial;

lsmeans Fwd1Bk2/diff cl alpha=0.1 ilink;

estimate "Mean Fwds&Backs" int 1 Fwd1Bk2 0.5 0.5/cl exp alpha=0.1;

estimate "";

estimate "Mean Backs" int 1 Fwd1Bk2 0 1/cl exp alpha=0.1;

estimate "Mean Fwds" int 1 Fwd1Bk2 1 0/cl exp alpha=0.1;

estimate "Mean Fwds/Backs" Fwd1Bk2 1 -1/cl exp alpha=0.1;

estimate "";

estimate "Mean @ Week 1" int 1 WeekRescaled -0.5/cl exp alpha=0.1;

estimate "Mean @ Week 6" int 1 WeekRescaled 0.5/cl exp alpha=0.1;

estimate "Week 6/Week 1" WeekRescaled 1/cl exp alpha=0.1;

estimate "Backs:";

estimate "Mean @ -1SD MTPf" int 1 Fwd1Bk2 0 1 Fwd1Bk2\*MTPforceStdzd 0 -0.5/cl exp alpha=0.1;

estimate "Mean @ +1SD MTPf" int 1 Fwd1Bk2 0 1 Fwd1Bk2\*MTPforceStdzd 0 0.5/cl exp alpha=0.1;

estimate "MTPf +1SD/-1SD" Fwd1Bk2\*MTPforceStdzd 0 1/cl exp alpha=0.1;

estimate "Fwds:";

estimate "Mean @ -1SD MTPf" int 1 Fwd1Bk2 1 0 Fwd1Bk2\*MTPforceStdzd -0.5 0/cl exp alpha=0.1;

estimate "Mean @ +1SD MTPf" int 1 Fwd1Bk2 1 0 Fwd1Bk2\*MTPforceStdzd 0.5 0/cl exp alpha=0.1;

estimate "MTPf +1SD/-1SD" Fwd1Bk2\*MTPforceStdzd 1 0/cl exp alpha=0.1;

estimate "Backs/Fwds:";

estimate "Mean Backs+Fwds reference" int 1 Fwd1Bk2 0.5 0.5

Fwd1Bk2\*MTPforceStdzd -0.5 -0.5/cl exp alpha=0.1;

estimate "blank";

estimate "MTPf +1SD/-1SD" Fwd1Bk2\*MTPforceStdzd -1 1/cl exp alpha=0.1;

random int/subject=AthleteID cl alpha=0.1;

random GameID;

random \_residual\_;

covtest/wald cl(alpha=0.1);

\*by Fwd1Bk2;

run;