/**** SAS Code for MI and Models for DRI energy report ****/
/** Indiana University, Biostatistics Consulting Center **/
/** Last revised 10/13/2022 **/

%let mypath=C:\Users\lgolzar\Indiana University\O365-BCC - Documents\Projects\Allison, David\DRI Energy;
%let mypath=C:\Users\sd3\Indiana University\O365-BCC - Documents\Projects\Allison, David\DRI Energy;

libname cleandf \"mypath.Data\Clean data for analysis\";
%let date=13OCT2022; *Set date of most recent data files to use;

/******************************
*******************************/
/* This section imports the clean SAS data alldata_clean_[date]
These were were cleaned with the syntax file "cleaning data [date].sas".
That syntax combined data from all sources (IOM, IAEA, etc) and removed or
truncated people with invalid PAL <1 or >2.5.
*/
/*******************************/
/* All data. df=data frame*/ *n=8600;
data df;
  set cleandf.alldata_clean_&date. ;
  drop PAL_obs_est PALCAT_obs_est; *Dropped here because needed for clean
   analysis output;
run;

* Clean data should have removed or truncated PAL<1 and PAL>2.5;
proc means data=df;
  var PAL;
run;
proc freq data=df;
  tables PALCAT;
run;

* Quick descriptives;
proc means data=df;
  var TEE age height weight FFM FM BEE BMR_kcal_Schofield PAL PAL_est;
run;
* BEE, and therefore PAL, is available on less than half of the data (3421 of 8054);

*** MI MI MI MI MI MI MI MI MI MI
**Multiple imputation is used to fill in ALL missing data - but especially BEE and PAL;**

* Pctmissing says to perform 20 imputations if 20 percent or more of the data are missing.
  Because we have more than 50% missing on BEE and PAL then 20 imputations are performed;

* Note that we considered bounding PAL to 1 to 2.5, but decided to fix these after;

```sas
proc mi data=df nimpute=pctmissing(min=5 max=20) out=outmi seed=5849975;
  mcmc chain=multiple;
  *We consider bounding PAL to be 1 to 2.5 in the imputation;
    *minimum=0 10.77 151.33 1.80 0.1 263 2.36 46.40 1 99.67 1
    maximum=101 61.70 5555.39 97.81 99.9 3035 215.70 202.50 2.5 3347.66 2.5;
  *var Age BMI TEE FFM Percentile BEE Weight Height PAL BMR_kcal_Schofield
PAL_est;
run;
```

* Note that this doesn't impute for character class;
* Also dummy vars are imputed with decimal levels, but we don't need them for analysis either (but using dummies to help impute other data);
* outmi n = 8600 x 20 = 172,000;

/*Check for PAL<1 or >2.5 after imputation*/
proc means data=outmi;
  var PAL;
run;

/*Calculate PAL categories*/
/* The continuous PAL score was imputed, but need to put them in buckets */
data outmi2; set outmi; *n=172040;
  format PALCAT $10.;
  if .<age<9.0 then do; *3.0<=age<9.0;
    if .<PAL<1 then PALCAT='PAL<1';
    if 1.0=<PAL<1.31 then PALCAT='S';
    if 1.31=<PAL<1.44 then PALCAT='LA';
    if 1.44=<PAL<1.59 then PALCAT='A';
    if 1.59=<PAL<2.5 then PALCAT='VA';
    if 2.5<=PAL then PALCAT='PAL>2.5';
  end;
  if 9.0=<age<14.0 then do;
    if .<PAL<1 then PALCAT='PAL<1';
    if 1.0=<PAL<1.44 then PALCAT='S';
    if 1.44=<PAL<1.60 then PALCAT='LA';
    if 1.60=<PAL<1.77 then PALCAT='A';
    if 1.77=<PAL<2.5 then PALCAT='VA';
    if 2.5<=PAL then PALCAT='PAL>2.5';
  end;
  if 14.0=<age<19.0 then do;
    if .<PAL<1 then PALCAT='PAL<1';
    if 1.0=<PAL<1.57 then PALCAT='S';
    if 1.57=<PAL<1.74 then PALCAT='LA';
if 1.74=<PAL<1.94 then PALCAT='A';
if 1.94=<PAL<2.5 then PALCAT='VA';
    if 2.5<=PAL then PALCAT='PAL>2.5';
end;
if 19.0=<age then do;
    *Note that these are based on percentiles of 19 to 70.99, but 71+ use these too;
        if .<PAL<1 then PALCAT='PAL<1';
        if 1.0=<PAL<1.53 then PALCAT='S';
        if 1.53=<PAL<1.69 then PALCAT='LA';
        if 1.69=<PAL<1.85 then PALCAT='A';
        if 1.85=<PAL<2.5 then PALCAT='VA';
        if 2.5<=PAL then PALCAT='PAL>2.5';
    end;
run;

proc freq data=outmi2;
    tables PALCAT;
run;

* For those imputed PAL<1, truncate them to 1.0 to leave in dataset - per discussion with WG1;
* For those imputed PAL>2.5, drop them from dataset (in that imputation) -per discussion with WG1;
* Truncate at PAL 1 for the ones estimated at below 1;
data outmi_clean; set outmi2;
    if PAL<1 then do; PAL=1; PALCAT="S"; end;
    if PAL>2.5 then delete;
run;
* Reduced from n=172,000 to n=171,946;

proc freq data=outmi_clean;
    table _imputation_/nopercent;
run;
* Max of 8600 per imputation. Most have a couple dropped;
proc means data=outmi_clean;
    var PAL;
run;
proc freq data=outmi_clean;
    tables PALCAT;
run;

* SAVE clean MI analysis data;
data cleandf.outmi_clean;
    set outmi_clean;
run;

/* Save Final MI (unclean) dataset */
* As SAS data;
data "&mypath.\Output\Parameter Estimates\MI_raw_&SYSDATE9..sas7bdat";
   set outmi;
   run;
* As csv data;
proc export data=outmi
   outfile="&mypath.\Output\Parameter Estimates\MI_raw_&SYSDATE9..csv"
   dbms=csv REPLACE;
run;

/* SAVE clean MI dataset */
* As SAS data;
data "&mypath.\Output\Parameter Estimates\MI_clean_&SYSDATE9..sas7bdat";
   set outmi_clean;
   run;
* As csv data;
proc export data=outmi_clean
   outfile="&mypath.\Output\Parameter Estimates\MI_clean_&SYSDATE9..csv"
   dbms=csv REPLACE;
run;

/***********************************************************************************
***************/
***********************************************************************************
************************** MODELS MODELS MODELS
***********************************************************************************

/* If you dont need to rerun the imputation above START HERE and import the imputed
 data we saved.*/
data outmi_clean;
   set cleandf.outmi_clean;
run; *171,946;
/* *Infants, Children (Boys/Girls), Adults (Men/Women), but not Preg/Lact;*/
data allstrata;
   set cleandf.outmi_clean;
   if Strata="Preg/Lac" then delete;
run; *156,666;

/***************************************************************************/

/* Considering STRATA (M/F, Children/Adults/Infants) */

/* First we can check whether we need separate models for each strata - based on
 interactions*/
proc glm data=outmi_clean;
   *by _imputation_;where _imputation_=20;
   class PALCAT sex Age_cat;
   model TEE = sex Age_cat
               Age PALCAT Weight Height PALCAT*Weight PALCAT*Height
               sex*Age sex*PALCAT sex*Weight sex*Height sex*PALCAT*Weight
sex*PALCAT*Height Age_Cat*Age Age_Cat*PALCAT Age_Cat*Weight Age_Cat*Height Age_Cat*PALCAT*Weight Age_Cat*PALCAT*Height /solution;
*output out=predglmi p=pglmi;
run;
quit;
/* This confirms that slopes for weight and height depend on sex.
   and differential slope of weight*PALCAT depends on sex
   And weight and height depends on Age_Cat;
   And weight x PALCAT depends on Age_Cat

/*SUBSET Data into Strata (M/F, Children/Adults/Infants) for models */

/*Adults - Female = Women*/
data dfF; set allstrata;
where Sex="F" & Age_cat="Adults" ;
run;

/*Adults - Male = Men*/
data dfM; set allstrata;
where Sex="M" & Age_cat="Adults" ;
run;

/*3-18 - Girls*/
data dfg; set allstrata;
where Sex="F" & 3<=Age<19 ;
run;

/*3-18 - Boys*/
data dfb; set allstrata;
where Sex="M" & 3<=Age<19 ;
run;

/*0-2 Infants - Girls*/
data dfig; set allstrata;
where Sex="F" & 0<=Age<3 ;
run;

/*0-2 Infants - Boys*/
data dfib; set allstrata;
where Sex="M" & 0<=Age<3 ;
run;

/*Pregnant - about n=430 per imputation*/
data dfp; set outmi_clean;
where Pregnant='Yes' or P_stage='NPNL';
run;
```sas
/*Lactating - about n=200 per imputation*/
data dfl; set outmi_clean;
where Lactating='Yes' ;
run;

/** Sensitivity BMI 18.5 to 40 **/
data dff_s; set dfF; where 18.5<=BMI<40; run;
data dfM_s; set dfM; where 18.5<=BMI<40; run;
data dfg_s; set dfg; where 5<=Percentile<95; run;
data dfb_s; set dfb; where 5<=Percentile<95; run;
data dfp_s; set dfp; where 18.5<=BMI<40; run;
data dfl_s; set dfl; where 18.5<=BMI<40; run;

/** Healthy BMI 18.5 to 25 **/
data dff_h; set dfF; where 18.5<=BMI<25; run;
data dfM_h; set dfM; where 18.5<=BMI<25; run;
data dfg_h; set dfg; where 5<=Percentile<85; run;
data dfb_h; set dfb; where 5<=Percentile<85; run;
data dfp_h; set dfp; where 18.5<=BMI<25; run;
data dfl_h; set dfl; where 18.5<=BMI<25; run;

/** Overweight/Obese BMI 25+ **/
data dFF_o; set dfF; where 25<=BMI; run;
data dfM_o; set dfM; where 25<=BMI; run;
data dfg_o; set dfg; where 85<=Percentile; run;
data dfb_o; set dfb; where 85<=Percentile; run;
data dfp_o; set dfp; where 25<=BMI; run;
data dfl_o; set dfl; where 25<=BMI; run;

/** Include subjects for predicted values **/
data dfM; set dfM; keep SID TEE Age PALCAT Weight Height _imputation_ FM FFM; run;
proc sql;
insert into dfM
   set SID = "MaleExtra", TEE = ., Age = 50.25, PALCAT = "A", Weight = 83.10, Height = 175.92, _imputation_=1,FM=.,FFM=.
   set SID = "MaleExtra", TEE = ., Age = 50.25, PALCAT = "A", Weight = 83.10, Height = 175.92, _imputation_=2,FM=.,FFM=.
   set SID = "MaleExtra", TEE = ., Age = 50.25, PALCAT = "A", Weight = 83.10, Height = 175.92, _imputation_=3,FM=.,FFM=.
   set SID = "MaleExtra", TEE = ., Age = 50.25, PALCAT = "A", Weight = 83.10, Height = 175.92, _imputation_=4,FM=.,FFM=.
   set SID = "MaleExtra", TEE = ., Age = 50.25, PALCAT = "A", Weight = 83.10, Height = 175.92, _imputation_=5,FM=.,FFM=.
   set SID = "MaleExtra", TEE = ., Age = 50.25, PALCAT = "A", Weight = 83.10, Height = 175.92, _imputation_=6,FM=.,FFM=.
run;```
83.10, Height = 175.92, _imputation_=7,FM=.,FFM=.
set SID = "MaleExtra", TEE = ., Age = 50.25, PALCAT = "A", Weight =
83.10, Height = 175.92, _imputation_=8,FM=.,FFM=.
set SID = "MaleExtra", TEE = ., Age = 50.25, PALCAT = "A", Weight =
83.10, Height = 175.92, _imputation_=9,FM=.,FFM=.
set SID = "MaleExtra", TEE = ., Age = 50.25, PALCAT = "A", Weight =
83.10, Height = 175.92, _imputation_=10,FM=.,FFM=.
set SID = "MaleExtra", TEE = ., Age = 50.25, PALCAT = "A", Weight =
83.10, Height = 175.92, _imputation_=11,FM=.,FFM=.
set SID = "MaleExtra", TEE = ., Age = 50.25, PALCAT = "A", Weight =
83.10, Height = 175.92, _imputation_=12,FM=.,FFM=.
set SID = "MaleExtra", TEE = ., Age = 50.25, PALCAT = "A", Weight =
83.10, Height = 175.92, _imputation_=13,FM=.,FFM=.
set SID = "MaleExtra", TEE = ., Age = 50.25, PALCAT = "A", Weight =
83.10, Height = 175.92, _imputation_=14,FM=.,FFM=.
set SID = "MaleExtra", TEE = ., Age = 50.25, PALCAT = "A", Weight =
83.10, Height = 175.92, _imputation_=15,FM=.,FFM=.
set SID = "MaleExtra", TEE = ., Age = 50.25, PALCAT = "A", Weight =
83.10, Height = 175.92, _imputation_=16,FM=.,FFM=.
set SID = "MaleExtra", TEE = ., Age = 50.25, PALCAT = "A", Weight =
83.10, Height = 175.92, _imputation_=17,FM=.,FFM=.
set SID = "MaleExtra", TEE = ., Age = 50.25, PALCAT = "A", Weight =
83.10, Height = 175.92, _imputation_=18,FM=.,FFM=.
set SID = "MaleExtra", TEE = ., Age = 50.25, PALCAT = "A", Weight =
83.10, Height = 175.92, _imputation_=19,FM=.,FFM=.
set SID = "MaleExtra", TEE = ., Age = 50.25, PALCAT = "A", Weight =
83.10, Height = 175.92, _imputation_=20,FM=.,FFM=.

set SID = "MaleOver", TEE = ., Age = 50.25, PALCAT = "A", Weight =
99.55, Height = 183.46, _imputation_=1,FM=.,FFM=.
set SID = "MaleOver", TEE = ., Age = 50.25, PALCAT = "A", Weight =
99.55, Height = 183.46, _imputation_=2,FM=.,FFM=.
set SID = "MaleOver", TEE = ., Age = 50.25, PALCAT = "A", Weight =
99.55, Height = 183.46, _imputation_=3,FM=.,FFM=.
set SID = "MaleOver", TEE = ., Age = 50.25, PALCAT = "A", Weight =
99.55, Height = 183.46, _imputation_=4,FM=.,FFM=.
set SID = "MaleOver", TEE = ., Age = 50.25, PALCAT = "A", Weight =
99.55, Height = 183.46, _imputation_=5,FM=.,FFM=.
set SID = "MaleOver", TEE = ., Age = 50.25, PALCAT = "A", Weight =
99.55, Height = 183.46, _imputation_=6,FM=.,FFM=.
set SID = "MaleOver", TEE = ., Age = 50.25, PALCAT = "A", Weight =
99.55, Height = 183.46, _imputation_=7,FM=.,FFM=.
set SID = "MaleOver", TEE = ., Age = 50.25, PALCAT = "A", Weight =
99.55, Height = 183.46, _imputation_=8,FM=.,FFM=.
set SID = "MaleOver", TEE = ., Age = 50.25, PALCAT = "A", Weight =
99.55, Height = 183.46, _imputation_=9,FM=.,FFM=.
set SID = "MaleOver", TEE = ., Age = 50.25, PALCAT = "A", Weight =
99.55, Height = 183.46, _imputation_=10,FM=.,FFM=.
set SID = "MaleOver", TEE = ., Age = 50.25, PALCAT = "A", Weight =
99.55, Height = 183.46, _imputation_=11,FM=.,FFM=. 

data dfF; set dfF; keep SID TEE Age PALCAT Weight Height _imputation_ FM FFM; run; *n= 71676;
proc sql;
  insert into dfF
    set SID = "FemaleExtra", TEE = ., Age = 53.87, PALCAT = "A", Weight = 71.87, Height = 162.34, _imputation_ =1, FM=., FFM=.
    set SID = "FemaleExtra", TEE = ., Age = 53.87, PALCAT = "A", Weight = 71.87, Height = 162.34, _imputation_ =2, FM=., FFM=.
    set SID = "FemaleExtra", TEE = ., Age = 53.87, PALCAT = "A", Weight = 71.87, Height = 162.34, _imputation_ =3, FM=., FFM=.
    set SID = "FemaleExtra", TEE = ., Age = 53.87, PALCAT = "A", Weight = 71.87, Height = 162.34, _imputation_ =4, FM=., FFM=.
    set SID = "FemaleExtra", TEE = ., Age = 53.87, PALCAT = "A", Weight = 71.87, Height = 162.34, _imputation_ =5, FM=., FFM=.
    set SID = "FemaleExtra", TEE = ., Age = 53.87, PALCAT = "A", Weight = 71.87, Height = 162.34, _imputation_ =6, FM=., FFM=.
    set SID = "FemaleExtra", TEE = ., Age = 53.87, PALCAT = "A", Weight = 71.87, Height = 162.34, _imputation_ =7, FM=., FFM=.
    set SID = "FemaleExtra", TEE = ., Age = 53.87, PALCAT = "A", Weight = 71.87, Height = 162.34, _imputation_ =8, FM=., FFM=.
    set SID = "FemaleExtra", TEE = ., Age = 53.87, PALCAT = "A", Weight = 71.87, Height = 162.34, _imputation_ =9, FM=., FFM=.
    set SID = "FemaleExtra", TEE = ., Age = 53.87, PALCAT = "A", Weight = 71.87, Height = 162.34, _imputation_ =10, FM=., FFM=.
    set SID = "FemaleExtra", TEE = ., Age = 53.87, PALCAT = "A", Weight = 71.87, Height = 162.34, _imputation_ =11, FM=., FFM=.
    set SID = "FemaleExtra", TEE = ., Age = 53.87, PALCAT = "A", Weight = 71.87, Height = 162.34, _imputation_ =12, FM=., FFM=.
    set SID = "FemaleExtra", TEE = ., Age = 53.87, PALCAT = "A", Weight = 71.87, Height = 162.34, _imputation_ =13, FM=., FFM=.
<table>
<thead>
<tr>
<th>SID</th>
<th>Age</th>
<th>PALCAT</th>
<th>Weight</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>FemaleExtra</td>
<td>53.87</td>
<td>A</td>
<td>71.87</td>
<td>162.34</td>
</tr>
<tr>
<td>FemaleExtra</td>
<td>53.87</td>
<td>A</td>
<td>71.87</td>
<td>162.34</td>
</tr>
<tr>
<td>FemaleExtra</td>
<td>53.87</td>
<td>A</td>
<td>71.87</td>
<td>162.34</td>
</tr>
<tr>
<td>FemaleExtra</td>
<td>53.87</td>
<td>A</td>
<td>71.87</td>
<td>162.34</td>
</tr>
<tr>
<td>FemaleExtra</td>
<td>53.87</td>
<td>A</td>
<td>71.87</td>
<td>162.34</td>
</tr>
<tr>
<td>FemaleExtra</td>
<td>53.87</td>
<td>A</td>
<td>71.87</td>
<td>162.34</td>
</tr>
<tr>
<td>FemaleExtra</td>
<td>53.87</td>
<td>A</td>
<td>71.87</td>
<td>162.34</td>
</tr>
<tr>
<td>FemaleExtra</td>
<td>53.87</td>
<td>A</td>
<td>71.87</td>
<td>162.34</td>
</tr>
<tr>
<td>FemaleOver</td>
<td>53.87</td>
<td>A</td>
<td>87.99</td>
<td>169.43</td>
</tr>
<tr>
<td>FemaleOver</td>
<td>53.87</td>
<td>A</td>
<td>87.99</td>
<td>169.43</td>
</tr>
<tr>
<td>FemaleOver</td>
<td>53.87</td>
<td>A</td>
<td>87.99</td>
<td>169.43</td>
</tr>
<tr>
<td>FemaleOver</td>
<td>53.87</td>
<td>A</td>
<td>87.99</td>
<td>169.43</td>
</tr>
<tr>
<td>FemaleOver</td>
<td>53.87</td>
<td>A</td>
<td>87.99</td>
<td>169.43</td>
</tr>
<tr>
<td>FemaleOver</td>
<td>53.87</td>
<td>A</td>
<td>87.99</td>
<td>169.43</td>
</tr>
<tr>
<td>FemaleOver</td>
<td>53.87</td>
<td>A</td>
<td>87.99</td>
<td>169.43</td>
</tr>
<tr>
<td>FemaleOver</td>
<td>53.87</td>
<td>A</td>
<td>87.99</td>
<td>169.43</td>
</tr>
<tr>
<td>FemaleOver</td>
<td>53.87</td>
<td>A</td>
<td>87.99</td>
<td>169.43</td>
</tr>
<tr>
<td>FemaleOver</td>
<td>53.87</td>
<td>A</td>
<td>87.99</td>
<td>169.43</td>
</tr>
</tbody>
</table>
87.99, Height = 169.43, _imputation_=18,FM=.,FFM=.
set SID = "FemaleOver", TEE = ., Age = 53.87, PALCAT = "A", Weight =
87.99, Height = 169.43, _imputation_=19,FM=.,FFM=.
set SID = "FemaleOver", TEE = ., Age = 53.87, PALCAT = "A", Weight =
87.99, Height = 169.43, _imputation_=20,FM=.,FFM=.;
quit;
data dfb; set dfb; keep SID TEE Age PALCAT Weight Height _imputation_ FM FFM; run;
proc sql;
insert into dfb
set SID = "BoyExtra", TEE = ., Age = 8.65, PALCAT = "A", Weight =
37.06, Height = 134.03, _imputation_=1,FM=.,FFM=.
set SID = "BoyExtra", TEE = ., Age = 8.65, PALCAT = "A", Weight =
37.06, Height = 134.03, _imputation_=2,FM=.,FFM=.
set SID = "BoyExtra", TEE = ., Age = 8.65, PALCAT = "A", Weight =
37.06, Height = 134.03, _imputation_=3,FM=.,FFM=.
set SID = "BoyExtra", TEE = ., Age = 8.65, PALCAT = "A", Weight =
37.06, Height = 134.03, _imputation_=4,FM=.,FFM=.
set SID = "BoyExtra", TEE = ., Age = 8.65, PALCAT = "A", Weight =
37.06, Height = 134.03, _imputation_=5,FM=.,FFM=.
set SID = "BoyExtra", TEE = ., Age = 8.65, PALCAT = "A", Weight =
37.06, Height = 134.03, _imputation_=6,FM=.,FFM=.
set SID = "BoyExtra", TEE = ., Age = 8.65, PALCAT = "A", Weight =
37.06, Height = 134.03, _imputation_=7,FM=.,FFM=.
set SID = "BoyExtra", TEE = ., Age = 8.65, PALCAT = "A", Weight =
37.06, Height = 134.03, _imputation_=8,FM=.,FFM=.
set SID = "BoyExtra", TEE = ., Age = 8.65, PALCAT = "A", Weight =
37.06, Height = 134.03, _imputation_=9,FM=.,FFM=.
set SID = "BoyExtra", TEE = ., Age = 8.65, PALCAT = "A", Weight =
37.06, Height = 134.03, _imputation_=10,FM=.,FFM=.
set SID = "BoyExtra", TEE = ., Age = 8.65, PALCAT = "A", Weight =
37.06, Height = 134.03, _imputation_=11,FM=.,FFM=.
set SID = "BoyExtra", TEE = ., Age = 8.65, PALCAT = "A", Weight =
37.06, Height = 134.03, _imputation_=12,FM=.,FFM=.
set SID = "BoyExtra", TEE = ., Age = 8.65, PALCAT = "A", Weight =
37.06, Height = 134.03, _imputation_=13,FM=.,FFM=.
set SID = "BoyExtra", TEE = ., Age = 8.65, PALCAT = "A", Weight =
37.06, Height = 134.03, _imputation_=14,FM=.,FFM=.
set SID = "BoyExtra", TEE = ., Age = 8.65, PALCAT = "A", Weight =
37.06, Height = 134.03, _imputation_=15,FM=.,FFM=.
set SID = "BoyExtra", TEE = ., Age = 8.65, PALCAT = "A", Weight =
37.06, Height = 134.03, _imputation_=16,FM=.,FFM=.
set SID = "BoyExtra", TEE = ., Age = 8.65, PALCAT = "A", Weight =
37.06, Height = 134.03, _imputation_=17,FM=.,FFM=.
set SID = "BoyExtra", TEE = ., Age = 8.65, PALCAT = "A", Weight =
37.06, Height = 134.03, _imputation_=18,FM=.,FFM=.
set SID = "BoyExtra", TEE = ., Age = 8.65, PALCAT = "A", Weight =
37.06, Height = 134.03, _imputation_=19,FM=.,FFM=.
set SID = "BoyExtra", TEE = ., Age = 8.65, PALCAT = "A", Weight =
37.06, Height = 134.03, _imputation_=20,FM=.,FFM=.
data dfg; set dfg; keep SID TEE Age PALCAT Weight Height _imputation_ FM FFM; run;
proc sql;
  insert into dfg
; quit;

37.63, Height = 135.02, _imputation_=2,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=3,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=4,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=5,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=6,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=7,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=8,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=9,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=10,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=11,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=12,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=13,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=14,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=15,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=16,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=17,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=18,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=19,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=20,FM=.,FFM=.

37.63, Height = 135.02, _imputation_=2,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=3,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=4,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=5,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=6,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=7,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=8,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=9,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=10,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=11,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=12,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=13,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=14,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=15,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=16,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=17,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=18,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=19,FM=.,FFM=.
set SID = "GirlExtra", TEE = ., Age = 9.58, PALCAT = "A", Weight =
37.63, Height = 135.02, _imputation_=20,FM=.,FFM=.

57.12, Height = 157.71, _imputation_=1,FM=.,FFM=.
set SID = "GirlOver", TEE = ., Age = 9.58, PALCAT = "A", Weight =
57.12, Height = 157.71, _imputation_=2,FM=.,FFM=.
set SID = "GirlOver", TEE = ., Age = 9.58, PALCAT = "A", Weight =
57.12, Height = 157.71, _imputation_=3,FM=.,FFM=.
set SID = "GirlOver", TEE = ., Age = 9.58, PALCAT = "A", Weight =
57.12, Height = 157.71, _imputation_=4,FM=.,FFM=.
set SID = "GirlOver", TEE = ., Age = 9.58, PALCAT = "A", Weight =
57.12, Height = 157.71, _imputation_=5,FM=.,FFM=.
set SID = "GirlOver", TEE = ., Age = 9.58, PALCAT = "A", Weight =
57.12, Height = 157.71, _imputation_=6,FM=.,FFM=.
data dfib; set dfib; keep SID TEE Age PALCAT Weight Height _imputation_ FM FFM; run;
proc sql;
insert into dfib
    set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight = 8.03, Height = 68.46, _imputation_ = 1, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight = 8.03, Height = 68.46, _imputation_ = 2, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight = 8.03, Height = 68.46, _imputation_ = 3, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight = 8.03, Height = 68.46, _imputation_ = 4, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight = 8.03, Height = 68.46, _imputation_ = 5, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight = 8.03, Height = 68.46, _imputation_ = 6, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight = 8.03, Height = 68.46, _imputation_ = 7, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight = 8.03, Height = 68.46, _imputation_ = 8, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight = 8.03, Height = 68.46, _imputation_ = 9, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight = 8.03, Height = 68.46, _imputation_ = 10, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight = 8.03, Height = 68.46, _imputation_ = 11, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight = 8.03, Height = 68.46, _imputation_ = 12, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight = 8.03, Height = 68.46, _imputation_ = 13, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight = 8.03, Height = 68.46, _imputation_ = 14, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight = 8.03, Height = 68.46, _imputation_ = 15, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight = 8.03, Height = 68.46, _imputation_ = 16, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight = 8.03, Height = 68.46, _imputation_ = 17, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight = 8.03, Height = 68.46, _imputation_ = 18, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight = 8.03, Height = 68.46, _imputation_ = 19, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight = 8.03, Height = 68.46, _imputation_ = 20, FM=., FFM=.
; quit;


= 8.03, Height = 68.46, _imputation_=8, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 8.03, Height = 68.46, _imputation_=9, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 8.03, Height = 68.46, _imputation_=10, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 8.03, Height = 68.46, _imputation_=11, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 8.03, Height = 68.46, _imputation_=12, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 8.03, Height = 68.46, _imputation_=13, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 8.03, Height = 68.46, _imputation_=14, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 8.03, Height = 68.46, _imputation_=15, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 8.03, Height = 68.46, _imputation_=16, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 8.03, Height = 68.46, _imputation_=17, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 8.03, Height = 68.46, _imputation_=18, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 8.03, Height = 68.46, _imputation_=19, FM=., FFM=.
set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 8.03, Height = 68.46, _imputation_=20, FM=., FFM=.
 set SID = "BabyBoyExtra", TEE = ., Age = 0.69, PALCAT = "A", Weight

set SID = "BabyBoyOver", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 10.76, Height = 79.06, _imputation_=1, FM=., FFM=.
set SID = "BabyBoyOver", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 10.76, Height = 79.06, _imputation_=2, FM=., FFM=.
set SID = "BabyBoyOver", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 10.76, Height = 79.06, _imputation_=3, FM=., FFM=.
set SID = "BabyBoyOver", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 10.76, Height = 79.06, _imputation_=4, FM=., FFM=.
set SID = "BabyBoyOver", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 10.76, Height = 79.06, _imputation_=5, FM=., FFM=.
set SID = "BabyBoyOver", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 10.76, Height = 79.06, _imputation_=6, FM=., FFM=.
set SID = "BabyBoyOver", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 10.76, Height = 79.06, _imputation_=7, FM=., FFM=.
set SID = "BabyBoyOver", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 10.76, Height = 79.06, _imputation_=8, FM=., FFM=.
set SID = "BabyBoyOver", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 10.76, Height = 79.06, _imputation_=9, FM=., FFM=.
set SID = "BabyBoyOver", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 10.76, Height = 79.06, _imputation_=10, FM=., FFM=.
set SID = "BabyBoyOver", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 10.76, Height = 79.06, _imputation_=11, FM=., FFM=.
set SID = "BabyBoyOver", TEE = ., Age = 0.69, PALCAT = "A", Weight
= 10.76, Height = 79.06, _imputation_=12, FM=., FFM=.
data dfig; set dfig; keep SID TEE Age PALCAT Weight Height _imputation_ FM FFM; run;

proc sql;
   insert into dfig
      set SID = "BabyGirlExtra", TEE = ., Age = 0.72, PALCAT = "A", Weight = 7.81, Height = 68.31, _imputation_=1,FM=.,FFM=.
      set SID = "BabyGirlExtra", TEE = ., Age = 0.72, PALCAT = "A", Weight = 7.81, Height = 68.31, _imputation_=2,FM=.,FFM=.
      set SID = "BabyGirlExtra", TEE = ., Age = 0.72, PALCAT = "A", Weight = 7.81, Height = 68.31, _imputation_=3,FM=.,FFM=.
      set SID = "BabyGirlExtra", TEE = ., Age = 0.72, PALCAT = "A", Weight = 7.81, Height = 68.31, _imputation_=4,FM=.,FFM=.
      set SID = "BabyGirlExtra", TEE = ., Age = 0.72, PALCAT = "A", Weight = 7.81, Height = 68.31, _imputation_=5,FM=.,FFM=.
      set SID = "BabyGirlExtra", TEE = ., Age = 0.72, PALCAT = "A", Weight = 7.81, Height = 68.31, _imputation_=6,FM=.,FFM=.
      set SID = "BabyGirlExtra", TEE = ., Age = 0.72, PALCAT = "A", Weight = 7.81, Height = 68.31, _imputation_=7,FM=.,FFM=.
      set SID = "BabyGirlExtra", TEE = ., Age = 0.72, PALCAT = "A", Weight = 7.81, Height = 68.31, _imputation_=8,FM=.,FFM=.
      set SID = "BabyGirlExtra", TEE = ., Age = 0.72, PALCAT = "A", Weight = 7.81, Height = 68.31, _imputation_=9,FM=.,FFM=.
      set SID = "BabyGirlExtra", TEE = ., Age = 0.72, PALCAT = "A", Weight = 7.81, Height = 68.31, _imputation_=10,FM=.,FFM=.
      set SID = "BabyGirlExtra", TEE = ., Age = 0.72, PALCAT = "A", Weight = 7.81, Height = 68.31, _imputation_=11,FM=.,FFM=.
      set SID = "BabyGirlExtra", TEE = ., Age = 0.72, PALCAT = "A", Weight = 7.81, Height = 68.31, _imputation_=12,FM=.,FFM=.
      set SID = "BabyGirlExtra", TEE = ., Age = 0.72, PALCAT = "A", Weight = 7.81, Height = 68.31, _imputation_=13,FM=.,FFM=.
      set SID = "BabyGirlExtra", TEE = ., Age = 0.72, PALCAT = "A", Weight = 7.81, Height = 68.31, _imputation_=14,FM=.,FFM=.
   quit;

set SID = "BabyGirlExtra", TEE = ., Age = 0.72, PALCAT = "A", Weight = 7.81, Height = 68.31, _imputation_=15, FM=., FFM=.
set SID = "BabyGirlExtra", TEE = ., Age = 0.72, PALCAT = "A", Weight = 7.81, Height = 68.31, _imputation_=16, FM=., FFM=.
set SID = "BabyGirlExtra", TEE = ., Age = 0.72, PALCAT = "A", Weight = 7.81, Height = 68.31, _imputation_=17, FM=., FFM=.
set SID = "BabyGirlExtra", TEE = ., Age = 0.72, PALCAT = "A", Weight = 7.81, Height = 68.31, _imputation_=18, FM=., FFM=.
set SID = "BabyGirlExtra", TEE = ., Age = 0.72, PALCAT = "A", Weight = 7.81, Height = 68.31, _imputation_=19, FM=., FFM=.
set SID = "BabyGirlExtra", TEE = ., Age = 0.72, PALCAT = "A", Weight = 7.81, Height = 68.31, _imputation_=20, FM=., FFM=.

set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=1, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=2, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=3, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=4, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=5, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=6, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=7, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=8, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=9, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=10, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=11, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=12, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=13, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=14, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=15, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=16, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=17, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=18, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=19, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=20, FM=., FFM=.

set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=21, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=22, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=23, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=24, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=25, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=26, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=27, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=28, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=29, FM=., FFM=.
set SID = "BabyGirlOver", TEE = ., Age = 0.72, PALCAT = "A", Weight = 10.36, Height = 78.81, _imputation_=30, FM=., FFM=. 
data dfp; set dfp; keep SID TEE Age PALCAT Weight Height Weeks _imputation_; run;
proc sql;
insert into dfp
set SID = "PregnantExtra", TEE = ., Age = 29.40, PALCAT = "A",
set SID = "PregnantExtra", TEE = ., Age = 29.40, PALCAT = "A",
set SID = "PregnantExtra", TEE = ., Age = 29.40, PALCAT = "A",
set SID = "PregnantExtra", TEE = ., Age = 29.40, PALCAT = "A",
set SID = "PregnantExtra", TEE = ., Age = 29.40, PALCAT = "A",
set SID = "PregnantExtra", TEE = ., Age = 29.40, PALCAT = "A",
set SID = "PregnantExtra", TEE = ., Age = 29.40, PALCAT = "A",
set SID = "PregnantExtra", TEE = ., Age = 29.40, PALCAT = "A",
set SID = "PregnantExtra", TEE = ., Age = 29.40, PALCAT = "A",
set SID = "PregnantExtra", TEE = ., Age = 29.40, PALCAT = "A",
set SID = "PregnantExtra", TEE = ., Age = 29.40, PALCAT = "A",
set SID = "PregnantExtra", TEE = ., Age = 29.40, PALCAT = "A",
set SID = "PregnantExtra", TEE = ., Age = 29.40, PALCAT = "A",
set SID = "PregnantExtra", TEE = ., Age = 29.40, PALCAT = "A",
set SID = "PregnantExtra", TEE = ., Age = 29.40, PALCAT = "A",
set SID = "PregnantExtra", TEE = ., Age = 29.40, PALCAT = "A",
set SID = "PregnantExtra", TEE = ., Age = 29.40, PALCAT = "A",
set SID = "PregnantExtra", TEE = ., Age = 29.40, PALCAT = "A",
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight = 95.07, Height = 170.72, Weeks=19.86, _imputation_=1
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight = 95.07, Height = 170.72, Weeks=19.86, _imputation_=2
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight = 95.07, Height = 170.72, Weeks=19.86, _imputation_=3
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight = 95.07, Height = 170.72, Weeks=19.86, _imputation_=4
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight = 95.07, Height = 170.72, Weeks=19.86, _imputation_=5
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight = 95.07, Height = 170.72, Weeks=19.86, _imputation_=6
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight = 95.07, Height = 170.72, Weeks=19.86, _imputation_=7
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight = 95.07, Height = 170.72, Weeks=19.86, _imputation_=8
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight = 95.07, Height = 170.72, Weeks=19.86, _imputation_=9
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight = 95.07, Height = 170.72, Weeks=19.86, _imputation_=10
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight = 95.07, Height = 170.72, Weeks=19.86, _imputation_=11
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight = 95.07, Height = 170.72, Weeks=19.86, _imputation_=12
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight = 95.07, Height = 170.72, Weeks=19.86, _imputation_=13
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight = 95.07, Height = 170.72, Weeks=19.86, _imputation_=14
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight = 95.07, Height = 170.72, Weeks=19.86, _imputation_=15
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight = 95.07, Height = 170.72, Weeks=19.86, _imputation_=16
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight = 95.07, Height = 170.72, Weeks=19.86, _imputation_=17
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight = 95.07, Height = 170.72, Weeks=19.86, _imputation_=18
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight = 95.07, Height = 170.72, Weeks=19.86, _imputation_=19
set SID = "PregnantOver", TEE = ., Age = 29.40, PALCAT = "A", Weight = 95.07, Height = 170.72, Weeks=19.86, _imputation_=20;
quit;

/***********************************************************************************
***************/
***********************************************************************************
****************************************** LINEAR REGRESSION
***********************************************************************************
%macro glmint(agecat, cat);

/** linear regression with interaction **/  
proc sort data=df&agecat.; by _imputation_; run;
proc glm data=df&agecat.;  
    by _imputation_; *where _imputation_=20;
    class PALCAT;
    model TEE = Age PALCAT Weight Height PALCAT*Weight  PALCAT*Height /solution;
    *output out=predglm p=pglm;
    estimate 'Sedentary: Intercept' Intercept 1 PALCAT 0 0 1 0 ;
    estimate 'Sedentary: Age' Age 1;
    estimate 'Sedentary: Weight' Weight 1 PALCAT*Weight 0 0 1 0 ;
    estimate 'Sedentary: Height' Height 1 PALCAT*Height 0 0 1 0 ;

    estimate 'Low Active: Intercept' Intercept 1 PALCAT 0 1 0 0 ;
    estimate 'Low Active: Age' Age 1;
    estimate 'Low Active: Weight' Weight 1 PALCAT*Weight 0 1 0 0 ;
    estimate 'Low Active: Height' Height 1 PALCAT*Height 0 1 0 0 ;

    estimate 'Active: Intercept' Intercept 1 PALCAT 1 0 0 0 ;
    estimate 'Active: Age' Age 1;
    estimate 'Active: Weight' Weight 1 PALCAT*Weight 1 0 0 0 ;
    estimate 'Active: Height' Height 1 PALCAT*Height 1 0 0 0 ;

    estimate 'Very Active: Intercept' Intercept 1 PALCAT 0 0 0 1 ;
    estimate 'Very Active: Age' Age 1;
    estimate 'Very Active: Weight' Weight 1 PALCAT*Weight 0 0 0 1 ;
    estimate 'Very Active: Height' Height 1 PALCAT*Height 0 0 0 1 ;

    ods output Estimates=Est_&agecat. ParameterEstimates=Par_&agecat.;
    output out=newdf&agecat. p=predicted UCL=UCL LCL=LCL STDI=STDI;
run;
quit;

/** Pooled results **/  
proc sort data=Est_&agecat.; by Parameter;run;
proc mianalyze data=Est_&agecat.;
    by Parameter;
   modeleffects Estimate ;
    stderr StdErr;
    ods output ParameterEstimates=Pooled_&agecat.;
run;
proc sort data=Par_&agecat.; by Parameter;run;
proc mianalyze data=Par_&agecat.;
    by Parameter;
    modeleffects Estimate ;
    stderr StdErr;
    ods output ParameterEstimates=ParmPooled_&agecat.;
run;

/** Pooled predicted results **/  

proc sort data=newdf&agecat.; by SID; run;
proc mianalyze data=newdf&agecat.;
   by SID;
   modeleffects predicted;
   stderr STDI;
   ods output ParameterEstimates=S_&agecat.;
run;
/** Identify datasets to merge **/
data Est_&agecat.; set Est_&agecat.; length Category $25; Category=&cat.; run;
data Pooled_&agecat.; set Pooled_&agecat.; length Category $25; Category=&cat.; run;
data ParmPooled_&agecat.; set ParmPooled_&agecat.; length Category $25;
   Category=&cat.; run;
%mend;
%glmint(F, 'Females'); *Adult Women;
%glmint(M, 'Males'); *Adult Men;
%glmint(g, 'Girls');
%glmint(b, 'Boys');
%glmint(F_s, 'Females 18.5-40');
%glmint(M_s, 'Males 18.5-40');
%glmint(g_s, 'Girls 5-95');
%glmint(b_s, 'Boys 5-95');
%glmint(F_h, 'Females 18.5-25');
%glmint(M_h, 'Males 18.5-25');
%glmint(g_h, 'Girls 5-85');
%glmint(b_h, 'Boys 5-85');
%glmint(F_o, 'Females 25+');
%glmint(M_o, 'Males 25+');
%glmint(g_o, 'Girls 85+');
%glmint(b_o, 'Boys 85+');

/*******Include FFFM *********************/
%macro glmffm(agecat, cat);
/** linear regression with interaction **/
proc glm data=df&agecat.;
   by _imputation_; *where _imputation_=20;
   class PALCAT;
   model TEE = Age PALCAT FM FFM Height PALCAT*FM PALCAT*FFM PALCAT*Height
   /solution;
   *output out=predglm p=pglm;
   estimate 'Sedentary: Intercept' Intercept 1 PALCAT 0 0 1 0 ;
   estimate 'Sedentary: Age' Age 1;
   estimate 'Sedentary: FM' FM 1 PALCAT*FM 0 0 1 0 ;
   estimate 'Sedentary: FFM' FFM 1 PALCAT*FFM 0 0 1 0 ;
   estimate 'Sedentary: Height' Height 1 PALCAT*Height 0 0 1 0 ;
%mend;
estimate 'Low Active: Intercept' Intercept 1 PALCAT 0 1 0 0;
estimate 'Low Active: Age' Age 1;
estimate 'Low Active: FM' FM 1 PALCAT*FM 0 1 0 0;
estimate 'Low Active: FFM' FFM 1 PALCAT*FFM 0 1 0 0;
estimate 'Low Active: Height' Height 1 PALCAT*Height 0 1 0 0;
estimate 'Active: Intercept' Intercept 1 PALCAT 1 0 0 0;
estimate 'Active: Age' Age 1;
estimate 'Active: FM' FM 1 PALCAT*FM 1 0 0 0;
estimate 'Active: FFM' FFM 1 PALCAT*FFM 1 0 0 0;
estimate 'Active: Height' Height 1 PALCAT*Height 1 0 0 0;
estimate 'Very Active: Intercept' Intercept 1 PALCAT 0 0 0 1;
estimate 'Very Active: Age' Age 1;
estimate 'Very Active: FM' FM 1 PALCAT*FM 0 0 0 1;
estimate 'Very Active: FFM' FFM 1 PALCAT*FFM 0 0 0 1;
estimate 'Very Active: Height' Height 1 PALCAT*Height 0 0 0 1;

ods output Estimates=Est_&agecat._FFM ParameterEstimates=Par_&agecat._FFM;
output out=newdf&agecat. p=predicted UCL=UCL LCL=LCL STDI=STDI;
run;
quit;
/** Pooled results **/
proc sort data=Est_&agecat._FFM; by Parameter;run;
proc mianalyze data=Est_&agecat._FFM;
  by Parameter;
  modeleffects Estimate ;
  stderr StdErr;
  ods output ParameterEstimates=Pooled_&agecat._FFM;
run;
proc sort data=Par_&agecat._FFM; by Parameter;run;
proc mianalyze data=Par_&agecat._FFM;
  by Parameter;
  modeleffects Estimate ;
  stderr StdErr;
  ods output ParameterEstimates=ParmPooled_&agecat._FFM;
run;
/** Identify datasets to merge **/
data Est_&agecat._FFM; set Est_&agecat._FFM; length Category $25; Category=&cat.; run;
data Pooled_&agecat._FFM; set Pooled_&agecat._FFM; length Category $25;
  Category=&cat.; run;
data ParmPooled_&agecat._FFM; set ParmPooled_&agecat._FFM; length Category $25;
  Category=&cat.; run;
%mend;
%glmffm(F, 'Females FFM'); *Adult Women;
%glmffm(M, 'Males FFM'); *Adult Men;
%glmffm(g, 'Girls FFM');
%glmffm(b, 'Boys FFM');
/*************** Infants ****************/
%macro inf_glmint(sex,mod,cov, cat);
/** linear regression with interaction **/
proc sort data=dfi&sex.; by _imputation_; run;
proc glm data=dfi&sex.;
   by _imputation_; *where _imputation_=20;
   model TEE = &cov. /solution;
   ods output ParameterEstimates=Est_i;
   output out=newdf&mod. p=predicted UCL=UCL LCL=LCL STDI=STDI;
run;
quit;
/** Pooled results **/
proc sort data=Est_i; by Parameter;run;
proc mianalyze data=Est_i;
   by Parameter;
   modeleffects Estimate ;
   stderr StdErr;
   ods output ParameterEstimates=Pooled_&mod.;
run;
/** Pooled predicted results **/
proc sort data=newdf&mod.; by SID;run;
proc mianalyze data=newdf&mod.;
   by SID;
   modeleffects predicted ;
   stderr STDI;
   ods output ParameterEstimates=S_&mod.;
run;
/** Identify datasets to merge **/
data Est_i; set Est_i; length Category $25; Category=&cat.; run;
data Pooled_&mod.; set Pooled_&mod.; length Category $25; Category=&cat.; run;
%mend;

%inf_glmint(g,igW,Weight, 'Inf Girls Weight only');
%inf_glmint(b,ibW,Weight, 'Inf Boys Weight only');

%inf_glmint(g,igAWH,Age Weight Height, 'Inf Girls Age Wt Ht');
%inf_glmint(b,ibAWH,Age Weight Height, 'Inf Boys Age Wt Ht');

%inf_glmint(g,igFFM,Age FM FFM Height, 'Inf Girls Age FM Ht');
%inf_glmint(b,ibFFM,Age FM FFM Height, 'Inf Boys Age FM Ht');

/*************** Pregnant ****************/
%macro pglmint(agecat, cat);
/** linear mixed models with interaction **/
proc sort data=df&agecat.; by _imputation_; run;

proc mixed data=df&agecat.;
   by _imputation_; /*where _imputation_=19;
   class PALCAT SID;
   model TEE = Age Weeks PALCAT Weight Height PALCAT*Weight  PALCAT*Height /solution outp=newdf&agecat.;
   *output out=predglm p=pglm;
   estimate 'Sedentary: Intercept' Intercept 1 PALCAT 0 0 1 0;
   estimate 'Sedentary: Age' Age 1;
   estimate 'Sedentary: Weight' Weight 1 PALCAT*Weight 0 0 1 0;
   estimate 'Sedentary: Height' Height 1 PALCAT*Height 0 0 1 0;
   estimate 'Sedentary: Weeks Preg' Weeks 1;
   estimate 'Low Active: Intercept' Intercept 1 PALCAT 0 1 0 0;
   estimate 'Low Active: Age' Age 1;
   estimate 'Low Active: Weight' Weight 1 PALCAT*Weight 0 1 0 0;
   estimate 'Low Active: Height' Height 1 PALCAT*Height 0 1 0 0;
   estimate 'Low Active: Weeks Preg' Weeks 1;
   estimate 'Active: Intercept' Intercept 1 PALCAT 1 0 0 0;
   estimate 'Active: Age' Age 1;
   estimate 'Active: Weight' Weight 1 PALCAT*Weight 1 0 0 0;
   estimate 'Active: Height' Height 1 PALCAT*Height 1 0 0 0;
   estimate 'Active: Weeks Preg' Weeks 1;
   estimate 'Very Active: Intercept' Intercept 1 PALCAT 0 0 0 1;
   estimate 'Very Active: Age' Age 1;
   estimate 'Very Active: Weight' Weight 1 PALCAT*Weight 0 0 0 1;
   estimate 'Very Active: Height' Height 1 PALCAT*Height 0 0 0 1;
   estimate 'Very Active: Weeks Preg' Weeks 1;
   ods output Estimates=Est_&agecat. SolutionF=Par_&agecat.;
repeated   / SUBJECT = SID;
run;
quit;
/** Pooled results **/
proc sort data=Est_&agecat.; by Label;run;
proc mianalyze data=Est_&agecat.;
   by Label;
   modeleffects Estimate;
   stderr StdErr;
   ods output ParameterEstimates=Pooled_&agecat.;
run;
data Par_&agecat.; Set Par_&agecat.; Parameter=catx(' ',Effect,PALCAT);run;
proc sort data=Par_&agecat.; by Parameter;run;
proc mianalyze data=Par_&agecat.;
   by Parameter;
   modeleffects Estimate;
   stderr StdErr;
   ods output ParameterEstimates=ParmPooled_&agecat.;
run;
/** Pooled predicted results **/
data newdf&agecat.; set newdf&agecat.; /*Rename variables for dfp*/
rename Pred=predicted
    StdErrPred=STDI
    Lower=LCL
    Upper=UCL;
run;
proc sort data=newdf&agecat.; by SID;run;
proc mianalyze data=newdf&agecat.;
    by SID;
    modeleffects predicted ;
    stderr STDI;
    ods output ParameterEstimates=S_&agecat.;
run;
/** Identify datasets to merge **/
data Est_&agecat.; set Est_&agecat.; length Category $25; Category=&cat.; run;
data Pooled_&agecat.; set Pooled_&agecat.; length Category $25; Category=&cat.; run;
data Pooled_&agecat.; set Pooled_&agecat.; rename Label = Parameter; run;
data ParmPooled_&agecat.; set ParmPooled_&agecat.; length Category $25;
    Category=&cat.; run;
%mend;
%pglmint(p, 'Pregnant');
%pglmint(p_s, 'Pregnant 18.5-40');
%pglmint(p_h, 'Pregnant 18.5-25');
%pglmint(p_o, 'Pregnant 25+');

/******* Merge datasets together **********/
data Pooled_results; set Pooled_F Pooled_M Pooled_p Pooled_g Pooled_b     
Pooled_F_s Pooled_M_s Pooled_p_s
    Pooled_F_h Pooled_M_h Pooled_p_h
    Pooled_F_o Pooled_M_o Pooled_p_o
    Pooled_F_ffm Pooled_M_ffm
    Pooled_igw Pooled_igawh
    Pooled_ibw Pooled_ibawh
Pooled_ibffm; run;
data ParmPooled_results; set ParmPooled_F ParmPooled_M ParmPooled_p ParmPooled_g ParmPooled_b     
    ParmPooled_F_s ParmPooled_M_s
    ParmPooled_p_s ParmPooled_g_s ParmPooled_b_s
ParmPooled_p_h ParmPooled_g_h ParmPooled_b_h ParmPooled_F_h ParmPooled_M_h
ParmPooled_p_o ParmPooled_g_o ParmPooled_b_o ParmPooled_F_o ParmPooled_M_o
ParmPooled_g_ffm ParmPooled_b_ffm; run;

/* SAVE Parameters */

/*Save estimates linear regression with interaction*/
* As SAS data;
data "&mypath.\Output\Parameter Estimates\MI_glmpooled_&SYSDATE9..sas7bdat";
  set Pooled_results;
run;

* As csv data;
proc export data=Pooled_results
  outfile="&mypath.\Output\Parameter Estimates\MI_glmpooled_&SYSDATE9..csv"
  dbms=csv REPLACE;
run;

/*Save parameters linear regression with interaction*/
* As SAS data;
data "&mypath.\Output\Parameter Estimates\MI_glmparmpooled_&SYSDATE9..sas7bdat";
  set ParmPooled_results;
run;

* As csv data;
proc export data=ParmPooled_results
  outfile="&mypath.\Output\Parameter Estimates\MI_glmparmpooled_&SYSDATE9..csv"
  dbms=csv REPLACE;
run;

/******************************************************************************/
/********** Merge predicted datasets together **********/
/******************************************************************************/
data df_new; set S_F (where=(SID='FemaleExtra' OR SID='FemaleOver'))
  S_M (where=(SID='MaleExtra' OR SID='MaleOver'))
  S_g (where=(SID='GirlExtra' OR SID='GirlOver'))
  S_b (where=(SID='BoyExtra' OR SID='BoyOver'))
  S_igAWH (where=(SID='BabyGirlExtra' OR SID='BabyGirlOver'))
  S_ibAWH (where=(SID='BabyBoyExtra' OR SID='BabyBoyOver'))
  S_p (where=(SID='PregnantExtra' OR SID='PregnantOver'))
; run;
/* SAVE dataset */

/* Save new data from predicted values */
* As SAS data;
data "&mypath.\Output\Parameter Estimates\MI_predicted_&SYSDATE9..sas7bdat";
  set df_new;
run;

* As csv data;
proc export data=df_new
  outfile="&mypath.\Output\Parameter Estimates\MI_predicted_&SYSDATE9..csv"
  dbms=csv REPLACE;
run;

/***********************************************************************************
****************************************/
/**************************** COMPARE SLOPES BTWN HEALTHY vs OVER/OBESE
***********************************************************************************
****************************************/

* To do this we have to fit new models including both Healthy and Overweight/Obese
and test the interactions between them;
* Stephanie is adding this code 8/25/2022;

data outmi_clean; set cleandf.outmi_clean; run;

data allstrata;
  set outmi_clean;
  if 18.5<BMI;
  if Strata="Preg/Lac" then delete;
  if .<BMI<25 then BMIgrp='Healthy <25';
  if BMI>=25 then BMIgrp='Over 25';
run;
/*Adults - Female = Women*/
data dfF; set allstrata;
  where Sex="F" & Age_cat="Adults";
run;
/*Adults - Male = Men*/
data dfM; set allstrata;
  where Sex="M" & Age_cat="Adults";
run;
/*3-18 - Girls*/
data dfg; set allstrata;
  where Sex="F" & 3<=Age<19;
run;
/*3-18 - Boys*/
data dfb; set allstrata;
where Sex="M" & 3<=Age<19;
run;
/*Pregnant - about n=430 per imputation*/
data dfp; set outmi_clean;
where Pregnant='Yes' or P_stage='NPNL';
   if 18.5<BMI<25 then BMIgrp='Healthy <25';
   if BMI>=25 then BMIgrp='Over 25';
run;

/* Just for stepping through code: %let agecat=F; %let cat='Females'; */
%macro glmint(agecat, cat);
/** linear regression with interaction **/
proc sort data=df&agecat.; by _imputation_; run;
proc glm data=df&agecat.;
   by _imputation_; *where _imputation_=1;
   class PALCAT BMIgrp;
   model TEE = Age PALCAT Weight Height PALCAT*Weight  PALCAT*Height
     BMIgrp
     Age*BMIgrp PALCAT*BMIgrp
     Weight*BMIgrp Height*BMIgrp
     PALCAT*Weight*BMIgrp PALCAT*Height*BMIgrp /solution;
*output out=predglm p=pglm;
   *estimate 'Age U v O'  Age*BMIgrp 1 -1;
   *estimate 'Sedentary: Int for H ' Intercept 1 PALCAT 0 0 1 0 BMIgrp 1 0
     PALCAT*BMIgrp 0 0 0 1 0 0 0;
   *estimate 'Sedentary: Int for Ov' Intercept 1 PALCAT 0 0 1 0 BMIgrp 0 1
     PALCAT*BMIgrp 0 0 0 0 1 0 0;
   *estimate 'Sedentary: Age for H ' Age 1;
   estimate 'Sedentary: Wt slope for H' Weight 1 PALCAT*Weight 0 0 1 0
     Weight*BMIgrp 1 0 PALCAT*Weight*BMIgrp 0 0 0 0 1 0 0 0;
   estimate 'Sedentary: Wt slope for O' Weight 1 PALCAT*Weight 0 0 1 0
     Weight*BMIgrp 0 1 PALCAT*Weight*BMIgrp 0 0 0 0 1 0 0 0;
   estimate 'Sedentary: Ht slope for H' Height 1 PALCAT*Height 0 0 1 0
     Height*BMIgrp 1 0 PALCAT*Height*BMIgrp 0 0 0 0 1 0 0 0;
   estimate 'Sedentary: Ht slope for O' Height 1 PALCAT*Height 0 0 1 0
     Height*BMIgrp 0 1 PALCAT*Height*BMIgrp 0 0 0 0 1 0 0 0;
   estimate ' _S: Weight H vs O'  Weight*BMIgrp 1 -1 PALCAT*Weight*BMIgrp 0 0 0
     0 1 -1 0 0;
   estimate ' _S: Height H vs O'  Height*BMIgrp 1 -1 PALCAT*Height*BMIgrp 0 0 0
     0 1 -1 0 0;
   estimate 'Low Active: Wt slope for H' Weight 1 PALCAT*Weight 0 1 0 0
     Weight*BMIgrp 1 0 PALCAT*Weight*BMIgrp 0 0 1 0 0 0 0 0;
   estimate 'Low Active: Wt slope for O' Weight 1 PALCAT*Weight 0 1 0 0
     Weight*BMIgrp 0 1 PALCAT*Weight*BMIgrp 0 0 0 1 0 0 0 0;
   estimate 'Low Active: Ht slope for H' Height 1 PALCAT*Height 0 1 0 0
     Height*BMIgrp 1 0 PALCAT*Height*BMIgrp 0 0 0 0 1 0 0 0;
   estimate 'Low Active: Ht slope for O' Height 1 PALCAT*Height 0 1 0 0
     Height*BMIgrp 0 1 PALCAT*Height*BMIgrp 0 0 0 0 1 0 0 0;
Height*BMIgrp 1 0 PALCAT*Height*BMIgrp 0 0 1 0 0 0 0 0;
estimate 'Low Active: Ht slope for O' Height 1 PALCAT*Height 0 1 0 0
Height*BMIgrp 0 1 PALCAT*Height*BMIgrp 0 0 1 0 0 0 0 0;
estimate ' _LA: Weight H vs O' Weight*BMIgrp 1 -1 PALCAT*Weight*BMIgrp 0 0
1 -1 0 0 0 0;
estimate ' _LA: Height H vs O' Height*BMIgrp 1 -1 PALCAT*Height*BMIgrp 0 0
1 -1 0 0 0 0;
estimate 'Active: Wt slope for H' Weight 1 PALCAT*Weight 1 0 0 0
Weight*BMIgrp 1 0 PALCAT*Weight*BMIgrp 1 0 0 0 0 0 0 0;
estimate 'Active: Wt slope for O' Weight 1 PALCAT*Weight 1 0 0 0
Weight*BMIgrp 0 1 PALCAT*Weight*BMIgrp 0 1 0 0 0 0 0 0;
estimate 'Active: Ht slope for H' Height 1 PALCAT*Height 1 0 0 0
Height*BMIgrp 1 0 PALCAT*Height*BMIgrp 1 0 0 0 0 0 0 0;
estimate 'Active: Ht slope for O' Height 1 PALCAT*Height 1 0 0 0
Height*BMIgrp 0 1 PALCAT*Height*BMIgrp 0 1 0 0 0 0 0 0;
estimate ' _A: Weight H vs O' Weight*BMIgrp 1 -1 PALCAT*Weight*BMIgrp 1 -1
0 0 0 0 0 0;
estimate ' _A: Height H vs O' Height*BMIgrp 1 -1 PALCAT*Height*BMIgrp 1 -1
0 0 0 0 0 0;
estimate 'Very Active: Wt slope for H' Weight 1 PALCAT*Weight 0 0 0 1
Weight*BMIgrp 1 0 PALCAT*Weight*BMIgrp 0 0 0 0 0 1 0 0;
estimate 'Very Active: Wt slope for O' Weight 1 PALCAT*Weight 0 0 0 1
Weight*BMIgrp 0 1 PALCAT*Weight*BMIgrp 0 0 0 0 0 0 1;
estimate 'Very Active: Ht slope for H' Height 1 PALCAT*Height 0 0 0 1
Height*BMIgrp 1 0 PALCAT*Height*BMIgrp 0 0 0 0 0 1 0 0;
estimate 'Very Active: Ht slope for O' Height 1 PALCAT*Height 0 0 0 1
Height*BMIgrp 0 1 PALCAT*Height*BMIgrp 0 0 0 0 0 0 1;
estimate ' _VA: Weight H vs O' Weight*BMIgrp 1 -1 PALCAT*Weight*BMIgrp 0 0 0
0 0 1 0 1;
estimate ' _VA: Height H vs O' Height*BMIgrp 1 -1 PALCAT*Height*BMIgrp 0 0 0
0 0 1 0 1;
ods output parameterEstimates=PEst_&agecat. Estimates=Est_&agecat.;
run;
quit;
/** Pooled results **/
proc sort data=PEst_&agecat.; by Parameter;run;
proc mianalyze data=PEst_&agecat.(where=(not missing(stderr)));
  by Parameter;
    modeleffects Estimate ;
    stderr StdErr;
    ods output ParameterEstimates=Pooled_PEst&agecat.;
run;
proc sort data=Est_&agecat.; by Parameter;run;
proc mianalyze data=Est_&agecat.(where=(not missing(stderr)));
by Parameter;
modeleffects Estimate;
stderr StdErr;
ods output ParameterEstimates=Pooled_Est&agecat.;
run;
/** Identify datasets to merge **/
data PEst_&agecat.; length Category $12; set PEst_&agecat.; Category=&cat.; run;
data Est_&agecat.; length Category $12; set Est_&agecat.; Category=&cat.; run;
data Pooled_PEst&agecat.; length Category $12; set Pooled_PEst&agecat.; Category=&cat.; run;
data Pooled_Est&agecat.; length Category $12; set Pooled_Est&agecat.; Category=&cat.; run;
%mend;
%glmint(F, 'Females'); *Adult Women;
%glmint(M, 'Males'); *Adult Men;
%glmint(g, 'Girls');
%glmint(b, 'Boys');

/** Pregnant **/
/*/ Just for stepping through code: %let agecat=p; %let cat='Pregnant'; */
%macro glmintp(agecat, cat);
/** linear regression with interaction **/
proc sort data=df&agecat.; by _imputation_; run;
proc mixed data=df&agecat.;
  by _imputation_; *where _imputation_=1;
  class PALCAT BMIgrp SID;
  model TEE = Age PALCAT Weight Height PALCAT*Weight PALCAT*Height
               BMIgrp Weeks Weeks*BMIgrp
               Age*BMIgrp PALCAT*BMIgrp
               Weight*BMIgrp Height*BMIgrp
               PALCAT*Weight*BMIgrp PALCAT*Height*BMIgrp /solution;
  *output out=predglm p=pglm;
  *estimate 'Age U v O' Age*BMIgrp 1 -1;
  *estimate 'Sedentary: Int for H' Intercept 1 PALCAT 0 0 1 0 BMIgrp 1 0
  PALCAT*BMIgrp 0 0 0 1 0 0 0;
  *estimate 'Sedentary: Int for Ov' Intercept 1 PALCAT 0 0 1 0 BMIgrp 0 1
  PALCAT*BMIgrp 0 0 0 0 1 0 0;
  *estimate 'Sedentary: Age for H' Age 1 ;
  estimate 'Sedentary: Wt slope for H' Weight 1 PALCAT*Weight 0 0 1 0
  Weight*BMIgrp 1 0 PALCAT*Weight*BMIgrp 0 0 0 1 0 0 0;
  estimate 'Sedentary: Wt slope for O' Weight 1 PALCAT*Weight 0 0 1 0
  Weight*BMIgrp 0 1 PALCAT*Weight*BMIgrp 0 0 0 0 1 0 0;
  estimate 'Sedentary: Ht slope for H' Height 1 PALCAT*Height 0 0 1 0
  Height*BMIgrp 1 0 PALCAT*Height*BMIgrp 0 0 0 0 1 0 0;
  estimate 'Sedentary: Ht slope for O' Height 1 PALCAT*Height 0 0 1 0
  Height*BMIgrp 0 1 PALCAT*Height*BMIgrp 0 0 0 0 1 0 0;
%end;
estimate ' _S: Weight H vs O'  Weight*BMIgrp 1 -1 PALCAT*Weight*BMIgrp 0 0 0 0 1 -1 0 0;
estimate ' _S: Height H vs O'  Height*BMIgrp 1 -1 PALCAT*Height*BMIgrp 0 0 0 0 0 1 -1 0;

estimate 'Low Active: Wt slope for H' Weight 1 PALCAT*Weight 0 1 0 0 Weight*BMIgrp 1 0 PALCAT*Weight*BMIgrp 0 0 1 0 0 0 0 0;
estimate 'Low Active: Wt slope for O' Weight 1 PALCAT*Weight 0 1 0 0 Weight*BMIgrp 0 1 PALCAT*Weight*BMIgrp 0 0 0 1 0 0 0 0;
estimate 'Low Active: Ht slope for H' Height 1 PALCAT*Height 0 1 0 0 Height*BMIgrp 1 0 PALCAT*Height*BMIgrp 0 0 1 0 0 0 0 0;
estimate 'Low Active: Ht slope for O' Height 1 PALCAT*Height 0 1 0 0 Height*BMIgrp 0 1 PALCAT*Height*BMIgrp 0 0 0 1 0 0 0 0;

estimate ' _LA: Weight H vs O'  Weight*BMIgrp 1 -1 PALCAT*Weight*BMIgrp 0 0 1 -1 0 0 0 0;
estimate ' _LA: Height H vs O'  Height*BMIgrp 1 -1 PALCAT*Height*BMIgrp 0 0 1 -1 0 0 0 0;

estimate 'Active: Wt slope for H' Weight 1 PALCAT*Weight 0 0 0 1 Weight*BMIgrp 1 0 PALCAT*Weight*BMIgrp 1 0 0 0 0 0 0 0;
estimate 'Active: Wt slope for O' Weight 1 PALCAT*Weight 0 0 0 1 Weight*BMIgrp 0 1 PALCAT*Weight*BMIgrp 0 1 0 0 0 0 0 0;
estimate 'Active: Ht slope for H' Height 1 PALCAT*Height 0 0 0 1 Height*BMIgrp 1 0 PALCAT*Height*BMIgrp 1 0 0 0 0 0 0 0;
estimate 'Active: Ht slope for O' Height 1 PALCAT*Height 0 0 0 1 Height*BMIgrp 0 1 PALCAT*Height*BMIgrp 0 1 0 0 0 0 0 0;

estimate ' _A: Weight H vs O'  Weight*BMIgrp 1 -1 PALCAT*Weight*BMIgrp 0 0 0 1 -1 0 0 0 0;
estimate ' _A: Height H vs O'  Height*BMIgrp 1 -1 PALCAT*Height*BMIgrp 0 0 0 1 -1 0 0 0 0;

estimate 'Very Active: Wt slope for H' Weight 1 PALCAT*Weight 0 0 0 1 Weight*BMIgrp 1 0 PALCAT*Weight*BMIgrp 0 0 0 0 1 0 0 0 1;
estimate 'Very Active: Wt slope for O' Weight 1 PALCAT*Weight 0 0 0 1 Weight*BMIgrp 0 1 PALCAT*Weight*BMIgrp 0 0 0 0 0 1 0 0 0 1;
estimate 'Very Active: Ht slope for H' Height 1 PALCAT*Height 0 0 0 1 Height*BMIgrp 1 0 PALCAT*Height*BMIgrp 0 0 0 0 0 1 0 0 0 1;
estimate 'Very Active: Ht slope for O' Height 1 PALCAT*Height 0 0 0 1 Height*BMIgrp 0 1 PALCAT*Height*BMIgrp 0 0 0 0 0 0 1 0 0 0 1;

estimate ' _VA: Weight H vs O'  Weight*BMIgrp 1 -1 PALCAT*Weight*BMIgrp 0 0 0 0 1 -1 0 0 0 1 -1;
estimate ' _VA: Height H vs O'  Height*BMIgrp 1 -1 PALCAT*Height*BMIgrp 0 0 0 0 0 0 1 -1 0 0 0 1 -1;

ods output SolutionF=PEst_&agecat. Estimates=Est_&agecat.;
repeated  / SUBJECT = SID ;
run;
quit;
/** Pooled results **/
data PEst_&agecat.; Set PEst_&agecat.; Parameter=catx(' ',Effect,PALCAT,BMIgrp);run;
data Est_&agecat.; Set Est_&agecat.; Parameter=Label;run;
proc sort data=PEst_&agecat.; by Parameter;run;
proc mianalyze data=PEst_&agecat.(where=(not missing(stderr)));
   by Parameter;
      modeleffects Estimate ;
      stderr StdErr;
      ods output ParameterEstimates=Pooled_PEst&agecat.;
run;
proc sort data=Est_&agecat.; by Parameter;run;
proc mianalyze data=Est_&agecat.(where=(not missing(stderr)));
   by Parameter;
      modeleffects Estimate ;
      stderr StdErr;
      ods output ParameterEstimates=Pooled_Est&agecat.;
run;
/** Identify datasets to merge **/
data PEst_&agecat.; length Category $12; set PEst_&agecat.; Category=&cat.; run;
data Est_&agecat.; length Category $12; set Est_&agecat.; Category=&cat.; run;
data Pooled_PEst&agecat.; length Category $12; set Pooled_PEst&agecat.; Category=&cat.; run;
data Pooled_Est&agecat.; length Category $12; set Pooled_Est&agecat.; Category=&cat.; run;
%mend;
%glmintp(p, 'Pregnant'); *Adult Women;

data Pooled_Estimates;
set Pooled_EstF Pooled_EstM Pooled_Estg Pooled_Estb Pooled_Estp;
run;
proc sort data=Pooled_estimates;
   by Parameter Category;
r
run;
/*Save estimates comparing Healthy vs Overweight/Obese*/
* As SAS data;
data "&mypath.\Output\Parameter Estimates\MI_glmpooled_comps_&SYSDATE9..sas7bdat";
   set Pooled_Estimates;
run;
* As csv data;
proc export data=Pooled_Estimates
outfile="&mypath.\Output\Parameter Estimates\MI_glmthpooled_comps_&SYSDATE9..csv"
dbms=csv REPLACE;
run;