

GRAPHICALLY CONQUERING THE SF-36: A TOOL FOR ILLUSTRATING SUBSCALE BY GROUP OVER TIME USING SAS/GRAPH® SOFTWARE

David Dorr, Mae Gordon, and the Ocular Hypertension Treatment Study (OHTS) group,
Washington University School of Medicine

ABSTRACT

The widespread adoption of health related quality of life (QoL) surveys to measure patient outcomes in clinical practice as well as research has raised the issue of simple graphical display. Such surveys often have multiple subscales to quantify disparate dimensions in the QoL, including emotional, physical, and others. When this is combined with the need to present longitudinal data for multiple groups, concise and accessible summarization of results becomes difficult. This paper presents a straightforward way to graph subscales by group over time, using one of the most common surveys, the Short Form - 36. The method allows the all eight SF-36 subscales to be presented on a single sheet of paper, and, as we will show, highlights trends and changes both within and between groups.

BACKGROUND

The MOS Short Form - 36 (SF-36) is a Quality of Life (QoL) tool developed to measure the impact of various medical diseases, conditions and the outcome of the treatments on a patient's life. Motivated by the need for a more sensitive tool for measuring patient outcome, the SF-36 evaluates various components of well-being, including mental health, physical health, vitality and the limitations these cause in the patient's life (1,2). Development of a new wave of surveys like the SF-36 gained impetus from a paradigm shift in health care in the United States. This shift focussed on a person's health related QoL, both current and expected, as a measure for the relative effect of various illnesses as well as a metric for gauging the overall effect of treatment, rather than the traditional method of discrete medical outcomes.

The Ocular Hypertension Study (OHTS) is a prospective randomized controlled trial of clinical tests and efficacy measures in patients with ocular hypertension who are thought to be at higher risk for development of glaucoma. The treatment is the use of commercially available intraocular pressure lowering drugs; the major endpoint is development of open angle glaucoma. The SF-36 is used to both compare study participants to the norm of their age-matched peers, and to examine differences between groups. This comparison is made over various time intervals in order to better understand the longitudinal course and effect of the treatment and the endpoint in

those who reach it. Multiple administrations provide a meter for non-pathological fluctuations in quality of life, allowing an increased sensitivity of the SF-36 surveys for whole study trends in QoL.

A difficulty posed by the SF-36 is the graphical illustration is the lack of a single summary index for the survey. Rather, multiple subscales which measure separate dimensions of a patient's quality of life are necessary for analysis and comparison of the overall quality of life. The current situation in OHTS added the necessity of presenting the various subscales (8 scales) by group (2+ groups) over time (up to 4-5 visits). This paper discusses a method to graphically display such a problem with clarity and concision.

METHODS

Since the OHT study is currently ongoing and the results are impounded, data were randomly generated to simulate OHTS results. The basic framework of the data set consisted of (1) the eight SF-36 scored scales (see Step 1, below) with a possible range of 0-100, but constrained in a normal distribution around the norms for US healthy 55-64 year olds; (2) a group variable, consisting of the medication and observation groups; and (3) a visit variable, with a baseline visit, and 4 6-mo follow-ups. In a more general sense, any group and visit structure can be used, with the limitations largely extending from space and legibility constraints.

Our goal was to provide the reader with a visual summary of the results as well as specific numeric values (X, SD) on a single page. To accomplish this, we examined several different classic graphical representations. The first was a bar chart (either horizontal or vertical) with scaled score on the vertical axis and scale by group by time on the horizontal axis or some permutation of the variable order. The difficulties immediately presented with this trial was: (1) illegibility and/or space limitation, (2) difficulty seeing trends, and (3) inability to compare at least one element of the comparison, either between groups or the different scales within groups. Next, we considered a connecting line plot; again, this was difficult to interpret. The difficulty here is also the density of the data, leading to either an oversimplification or a confusing result. The closest we came in SAS/GRAPH was using PROC

GREPLAY to show four graphs presenting four visits simultaneously.

We decided to present the scale as a series of one dimensional comparisons between groups by plotting the group scores as points on a line (0-100). Then, we pushed the second dimension, the vertical, into two dimensions by using a proximal and distal component. The distal was the eight scales; the proximal was the visits requested for that scale. Essentially, this was concatenating the last example into a single graph.

The nature of such a graphic precluded a simple PROC Gplot or other graphic procedure invocation, so we wrote the following code. The macro is flexible, to allow new and other visit dates to be included, as well as easy transition to other, similar outcome measures. In our experience, the transition to at least two different components of the study has been without difficulties.

Step 0: Set-up file / Macro variable definitions

The first of the following programs is the set file entitled 'setsg.sas'. The purpose of the set file is to (1) set graphics options specific for your system, and (2) allow for transition between surveys with relative rapidity. It allows switching by providing the number and names of subscales, changing annotate statistics and group options, and specifying the norms. These functions, although helpful, are largely beyond the scope of this paper. Here, we will focus on implementation for the SF-36 survey. In that case, this file is largely unchanged. The GOPTIONS need to be set for a local system, but a medication and observation group (with means and SD) and appropriate normal is a good example. The Mean and SD statistics can be changed to any PROC MEANS statistic; as well, '%' is an acceptable value.

Once this is set, the 'surveyg.sas' file (text follows the 'setsg.sas' file below) has a series of macro variables whose definitions are listed below.

Variable	DS	BBY	VINO
Meaning	Dataset name	By variable	Number of vis
Example Conditions	WORK.COOL see Step 1	RA_BR f=\$1.	5
Variable	VNAME	TITL	V1-V4
Meaning	Visits	Title for by var	positional
Example Conditions	00 18 24 f=\$2.	By ra_br 200 chars	number
Variable	SIZE	STAT1-2	V1-V4
Meaning	Sizes text	in set	
Example Conditions	.7 0 - 2	mean SD any MEANS	number

Step 1: Data set form

To use the macro as presented, the data must be in the following form:

VAR	VALUE	VISIT	By
variable			
\$1.	0-100	\$2.	
\$1.			

where VAR is a one letter code for the various scales of the survey, ordered appropriately, according to the following coding for the SF-36. This can be changed in the set file.

```
'1'="PHYSICAL"
'2'="ROLE-PHYSICAL"
'3'="BODILY PAIN"
'4'="HEALTH PERCEPT."
'5'="VITALITY"
'6'="SOCIAL FUNCTION"
'7'="ROLE-MH"
'8'="MENTAL HEALTH"
```

Step 2: Normals

Macro %QBS provides the norm mean and standard deviation for each visit. These are set internally by user; in our example, we use the SF-36 published norms for age 55-64. By setting NORM=N in the set file, these are not shown.

Step 3: Set-up variables / Optional annotate

First, the macro completes the dataset by combining the variables VAR and VISIT. Then, an optional annotate is added. In our current example, the annotate provides the mean and standard deviation of each discrete value in the group variable. This requires two vertical columns per value, so it is not recommended for large numbers of different groups. The annotate variables V1-V4 are positional variables. (V1,V2) are the X,Y starting coordinates of the columns. V3 is the distance between the BY variable groupings, and V4 is the distance between the Mean and Standard Deviation columns (or whichever variables are specified in the set file).

Step 4: Graphics set-up and PROC Gplot

Finally, the program sets the run-specific graphics options, e.g. the axes and the legend. In order to have the maximum amount of control over presentation of the visit numbers, the TICK option is used in the vertical axis. This requires iterative %DO loops to account for changing number of visits (see program), but it allows one to left justify the subscales while right justifying the visit names. To enhance this subscale separation effect, vertical reference lines are dynamically generated for the visit lines only.

Step 0: Set-up file / Macro variable definitions

Program #1: SETSG.SAS

```
*****
( SETSG.SAS SF-36 TIME SERIES GRAPH )
( ORIGINAL PROGRAM BY DAVID DORR, OHTS )
( AUTHOR'S CONTACT INFORMATION )
( email: daved@wubios.wustl.edu )
( PURPOSE: SUMMARIZE SF-36 OVER MULTIPLE )
( TIME PERIODS BY GROUPS. SAS GRAPH NEEDED.)
*****
( SUBPROGRAM 1: SET FUNCTIONS )
( Currently to be saved in same folder as )
( macro under setsg.sas )
( SET FUNCTIONS: A. System specific )
( Fill in for your system. )
( I've included either the option to save it )
( to a file or not - utilized by commenting )
( out the other commands (see below). )
*****;
GOPTIONS RESET=ALL;
*For unix box example only;
goptions targetdevice=ohp3 dev=imgjpeg
gsfname=out gsfname=replace
rotate=landscape ftext=swissl htext=&sz2.;
filename out "../public_html/surl&sht..jpg";
*goptions targetdevice=ohp3 dev=ohp3
rotate=landscape ftext=swissl htext=&sz2.;
/* *For windows - powerpoint presentation;
goptions targetdevice=cgmmpa device=cgmmpa
gsfname=out gsfname=replace
rotate=landscape ftext=HWCGM001 htext=&sz1.;
filename out "C:\sugi23\fulle&vino..cgm";
*goptions targetdevice=cgmmpa dev=win
rotate=landscape ftext=winansi htext=&sz1.;
*/
*****
( SET FUNCTIONS: B. Graph specific )
( THE FOLLOWING ARE A SERIES OF VARIABLES )
( WHICH NEED TO BE SET FOR EACH NEW GRAPH. )
*****
(Annotate sets: )
( gp0 - An overall group or all group name )
( gp1 - The first group name. )
( gp2 - The second group, as above )
( stat1/2 - First/second column stat )
( possibilities here include: )
( Mean, Std, N, % -> which is a mean. )
( or any other PROC MEANS variable )
( fm - format of first/second column stat )
( * Note: the above fills out all )
( possibilities for the ANNOTATE PROCEDURE - )
( only 4 columns will fit (at least in my )
( experience.) If you have more gps simply )
( turn the macro option ANNO to N. )
*****;
%LET ANNO=Y;
%let gp0= Everybody;
%let gp1= Med; %let gp2= Obs;
%let stat1=Mean; %let stat2=Std;
%let fml= 4.0; %let fm2= 4.1;
*****
( Graphics settings )
( Fill in title, axis statements, etc. )
*****;
title1 j=c h=.2 ' ';
TITLE2 color=blue j=c H=&sz2. "Mean of Eight
SF-36 Scales: Random Numbers N=1000";
```

```
TITLE3 color=blue j=c H=&sz1. "&TITL. / Norms
for US population";
LEGEND1 VALUE=(H=&sz1.) LABEL=(H=&sz2.
'Legend') FRAME;
AXIS1 LABEL=(H=&sz2. 'Percent Yes') WIDTH=3
MINOR=NONE VALUE=(H=&sz1.) LENGTH=40PCT
ORDER=(0 20 40 60 80 100);
SYMBOL1 C=BLACK I=NONE V=DOT H=&sz2. WIDTH=2
CV=BLACK MODE=EXCLUDE;
SYMBOL2 C=GREEN I=NONE V=TRIANGLE H=&sz2.
WIDTH=2 MODE=EXCLUDE;
SYMBOL3 C=PURPLE I=NONE V=SQUARE H=&sz2.
WIDTH=2 LINE=37 MODE=EXCLUDE;
SYMBOL4 C=BLACK I=NONE V=CIRCLE H=&sz2.
WIDTH=3 LINE=4;
SYMBOL5 C=GRAY I=NONE V=DOT H=&sz2. WIDTH=2
CV=GRAY14 MODE=EXCLUDE;
SYMBOL6 C=GRAY I=NONE V=TRIANGLE WIDTH=2
CV=GRAY14 MODE=EXCLUDE;
SYMBOL7 C=GRAY I=NONE V=SQUARE WIDTH=2
LINE=37 CV=GRAY14 MODE=EXCLUDE;
SYMBOL8 C=BLACK I=NONE V=CIRCLE WIDTH=4
LINE=4;
*****
( SET FUNCTIONS SECTION C. Set for some new )
( graphs (i.e. New Survey type or New )
( Population Norms). )
*****
( Norm settings - set for your population. )
( Below is for age 55-64 from the SF-36 )
( manual. NOT USED IF NOR = N. )
( *NOTE: please set the values of valu2 and )
( valu3 to the same as your stat1 and stat2. )
( Notably, pick the mean variable for your )
( stat1 if you use the norms. )
*****;
%LET NOR=Y;
```

```
*****
( New survey - for different surveys, please )
( change the vars 1 to maxvar, where maxvar )
( is the number of subscales in the survey. )
*****;
%LET MAXVAR = 8;
%LET VAR1 =Physical; %LET VAR2=Role-Physical;
%LET VAR3 =Bodily Pain; %LET VAR4=Health
Percept.;
%LET VAR5 =Vitality; %LET VAR6=Social
Function;
%LET VAR7 =Role-MH; %LET VAR8 =Mental Health;
```

Program #2: SURVEYG.SAS

```
*****
( SURVEYG.SAS SF-36 TIME SERIES GRAPH )
( ORIGINAL PROGRAM BY DAVID DORR, OHTS )
( PURPOSE: SUMMARIZE SF-36 OVER MULTIPLE )
( TIME PERIODS BY GROUPS. SAS GRAPH NEEDED.)
*****
( Variable definitions: )
( DS = Dataset name )
( BBY = By variable name )
( of the type 3 = All, 1 = Group1, 2= )
( Group2 )
( ALLVAR _must_ be the name for only 1 )
( group (i.e. BBY = ALLVAR) )
( VINO = Number of time periods )
( VINAME = $2 Names of time periods with)
```

```

( a space between them (i.e. ,00 AA CC,) )
( TITL      = A special title for this graph)
( SIZE      = Relative size based on your )
( use - 1 = screen, .7 for high powered )
( laser print )
( V1-V4     = See paper - relative annotate )
( placement )
*****
( Please see file "setgs.sas" before running)
(for first time. )
*****
libname lala '.';
data mos; set lala.mos;
run;
%MACRO
SURVEYG(DS,BBY,VINO,VINAME,TITL,SIZE,V1,V2,V3
,V4);
%let sz1=&size;
%if "&size"="1" %then %do; %let sz2=1.5;
%end;
%else %if "&size"=".5" %then %do; %let sz2=1;
%end;
%else %if "&size"="1.5" %then %do; %let
sz2=2; %end;
%else %if "&size"=".4" %then %do; %let
sz2=.8; %end;
%else %if "&size"=".7" %then %do; %let
sz2=1.2; %end;
%else %do; %let sz2=3; %end;
%MACRO QL_MN(VI);
Step 1: Data set form
DATA MO&VI.; SET &DS.;
<steps for getting your data into this form deleted>
WHERE VISIT=&VI.;
run;
DATA MO&VI.; SET MO&VI.; KEEP VAR VISIT VALUE
&BBY.; RUN;
%MEND;
*****
* LOAD VISIT NAMES INTO MACRO VARIABLES
*****
DATA BLANK; LENGTH TVAR $30 VS1-VS&VINO. $2
C1 C2 $1;
ARRAY DU{2} $ C1 C2;
ARRAY VI{*} $ VS1-VS&VINO.;
TVAR = "&VINAME."; N=0; J=1;
DO I = 1 TO LENGTH(TVAR);
  TL= SUBSTR(TVAR,I,1);
  IF TL NE ' ' THEN DO;
    DU{J}=TL; IF J=1 THEN J=2;
  ELSE DO;
    J=1; N+1;
    vi{N} = compress(c1||c2);
    flav= compress("vs"||N);
    call symput (flav, vi{N});
  end;
end;
END;
RUN;

%include 'setsg.sas';
Step 3: Set-up variables / Optional annotate
*****
* MUST SET W/ NECESSARY VISIT NUMBERS*
*****
%DO J = 1 %TO &VINO.;
%QL_MN(&VS&J);

```

```

%END;
*****
* NORMS: ONLY IF TOGGLE IS SET FOR NORMS.
* ALSO MUST SET W/ NECESSARY VISIT NUMBERS.
* !! IS PLACEHOLDER (SEE GRAPH)
*****
%IF "&NOR." = "Y" %THEN %DO;
Step 2: Normals
%MACRO QBS(VI,BYVAR);
<VAR VISIT VALUE for Normals deleted>
%MEND QBS;
DATA NOR; LENGTH VAR $1 VISIT $30;
%QBS(!!,&BY.);
%DO J = 1 %TO &VINO.;
  *If you only want one dot, please comment
  out next line;
  %QBS(&VS&J,&BY.);
%END;
RUN;
%END;
*****
*LOAD THE VISITS YOU WANT
*****
DATA NEW; SET
%DO J = 1 %TO &VINO.;
MO&VS&J
%END; ;
NVAR=TRIM(VAR) || TRIM(VISIT);
RUN;
%IF "&NOR" NE "Y" %THEN %DO;
DATA UNEW;
DO I = 1 TO 8;
  VAR=PUT(I,$1.); VISIT='!'; VALUE=.;
  RA_BR='1';
  VALALL='3';
  NVAR=TRIM(VAR) || TRIM(VISIT); OUTPUT;
END;
RUN;
DATA NEW; SET NEW UNEW; RUN;
%END;

%IF "&NOR." = "Y" %THEN %DO;
%PUT "YES. NOR IS ON";
DATA NOR; SET NOR;
  NVAR=TRIM(VAR) || TRIM(VISIT);
RUN;
%END;
PROC SORT DATA=NEW; BY &BBY. VISIT NVAR;
%IF "&stat2." = "%" %then %DO; %let
stat4=Mean; %END;
%ELSE %DO; %let stat4=&stat2; %END;
%IF "&stat1." = "%" %then %DO; %let
stat3=Mean; %END;
%ELSE %DO; %let stat3=&stat1; %END;
PROC MEANS DATA=NEW NOPRINT &stat3. &stat4.;
BY &BBY. VISIT NVAR; VAR VALUE;
OUTPUT OUT=NEW2U &stat3.=VALU2 &stat4.=VALU3;
RUN;
%IF "&NOR" = "Y" %then %do;
data new2u; set new2u nor; run;
proc sort data=new2u; by &bbby. visit; run;
%end;

*****
* ANNOTATE FOR RIGHT HAND SIDE COLUMNS OF
* VARS
*****

```

```

%IF "&ANNO." = "Y" %THEN %DO;
DATA ANNO; SET NEW2U; FUNCTION='LABEL'; BY
&BBY. VISIT;
IF FIRST.VISIT THEN ONCE=0; ELSE ONCE=1;
IF ONCE NE 1 THEN ONCE=0;
LENGTH TEXT $20 YC $6;
IF ONCE NE 1 THEN DO;
XSYS='5'; YSYS='5'; POSITION='5';
SIZE=&sz1.;
%IF "&NOR" = "Y" %then %DO;
X=(&V1.); Y=&V2.; TEXT="Norm"; OUTPUT;
X=(&V1. -&V4.); Y=(&V2.-2); TEXT="&stat1.";
OUTPUT;
X=(&V1. +&V4.); Y=(&V2.-2); TEXT="&stat2.";
OUTPUT;
%END;
%IF "&BBY." NE "ALLVAR" %THEN %DO;
X=(&V1.+&V3.); Y=&V2.; TEXT="&gp1.";
OUTPUT;
X=(&V1.+&V3. -&V4.); Y=(&V2.-2);
TEXT="&stat1."; OUTPUT;
X=(&V1.+&V3. +&V4.); Y=(&V2.-2);
TEXT="&stat2."; OUTPUT;
X=(&V1.+(2* &V3.)); Y=(&V2.); TEXT="&gp2.";
OUTPUT;
X=(&V1.+(2* &V3.) -&V4.); Y=(&V2.-2);
TEXT="&stat1."; OUTPUT;
X=(&V1.+(2* &V3.) +&V4.); Y=(&V2.-2);
TEXT="&stat2."; OUTPUT;
%END;
%ELSE %DO;
X=(&V1.+&V3.); Y=&V2.; TEXT="&gp0"; OUTPUT;
X=(&V1.+&V3. -&V4.); Y=(&V2.-2);
TEXT="&stat1."; OUTPUT;
X=(&V1.+&V3. +&V4.); Y=(&V2.-2);
TEXT="&stat2."; OUTPUT;
%END;
ONCE=1;
END;SIZE=&sz1.;
XSYS='5'; YSYS='2'; POSITION='5';
%LET TX=;
YC=NVAR; X=(&V1. + &V3. - &V4.);
TEXT=PUT (VALU2,&fm1.);
IF SUBSTR(&BBY.,1,1)='3' AND VISIT NE '!!!'
THEN DO; OUTPUT; END;
YC=NVAR; X=(&V1. + &V3. + &V4.);
TEXT='('||PUT (VALU3,&fm2.)||')';
IF SUBSTR(&BBY.,1,1)='3' AND VISIT NE '!!!'
THEN DO; OUTPUT; END;
YC=NVAR; X=(&V1. + &V3. - &V4.);
TEXT=PUT (VALU2,&fm1.);
IF SUBSTR(&BBY.,1,1)='1' AND VISIT NE '!!!'
THEN DO; OUTPUT; END;
YC=NVAR; X=(&V1. + &V3. + &V4.);
TEXT='('||PUT (VALU3,&fm2.)||')';
IF SUBSTR(&BBY.,1,1)='1' AND VISIT NE '!!!'
THEN DO; OUTPUT; END;
%IF "&NOR" = "Y" %THEN %DO;
YC=NVAR; X=(&V1. - &V4.);
TEXT=PUT (VALU2,&fm1.);
IF SUBSTR(&BBY.,1,1)='0' AND VISIT = '!!!'
THEN DO; OUTPUT; END;
YC=NVAR; X=(&V1. + &V4.);
TEXT='('||PUT (VALU3,&fm2.)||')';
IF SUBSTR(&BBY.,1,1)='0' AND VISIT = '!!!'
THEN DO; OUTPUT; END;
%END;

```

```

YC=NVAR; X=(&V1. + (2 * &V3.) - &V4.);
TEXT=PUT (VALU2,&fm1.);
IF SUBSTR(&BBY.,1,1)='2' AND VISIT NE '!!!'
THEN DO; OUTPUT; END;
YC=NVAR; X=(&V1. + (2 * &V3.) + &V4.);
TEXT='('||PUT (VALU3,&fm2.)||')';
IF SUBSTR(&BBY.,1,1)='2' AND VISIT NE '!!!'
THEN DO; OUTPUT; END;
PUT TEXT;
IF TEXT='.' THEN DELETE;
RUN;
%END;

```

Step 4: Graphics set-up and PROC Gplot

```

AXIS2
LABEL=(H=&sz1. " ") WIDTH=1
OFFSET=(0PCT,4PCT)
VALUE=(H=&sz1.
%LET CNT=0;

%DO I = 1 %TO &maxvar.;
%LET CNT=%EVAL(&CNT. +1);
TICK=&CNT. J=C COLOR=BLACK "&VAR&I"
%put &cnt. &VAR&I;
%DO J = 1 %TO &VINO.;
%LET CNT=%EVAL(&CNT. +1);
TICK=&CNT. J=R COLOR=BLACK "&VS&J"
%put &cnt. &VS&J;
%END;
%END; );

```

```

PROC Gplot DATA=NEW2U
%IF "&ANNO" = "Y" %THEN %DO;
ANNOTATE=ANNO
%END; ;
%IF "&stat3" = "Mean" %then %do;
PLOT NVAR*VALU2=&BBY.
%end;
%IF "&stat4" = "Mean" %then %do;
PLOT NVAR*VALU3=&BBY.
%end;
/
VAXIS=AXIS2 HAXIS=AXIS1
VREF=
%DO LP1 = 1 %TO &maxvar.;
%DO LP2 = 1 %TO &VINO.;
"&LP1&VS&LP2"
%END; %END;
VREVERSE LEGEND=LEGEND1;
FORMAT &BBY $g2p.;
RUN;
QUIT;
%DO J = 1 %TO &VINO.;
DATA MO&VS&J; X=1; RUN;
%END;
%MEND SURVEYG;

```

```

%SURVEYG(MOS,RA_BR,2,00 12,By Rand
Group,1,74,98,9,2.2);

```

RESULTS

The resulting graphs are shown in Figures 1 and 2. In this case, we attempted to focus on clarity, simplicity, and ease of trend recognition for a historically complex graphic. We believe this

presentation's simplicity facilitates analysis while still providing hard data.

The overall effectiveness of the graphic is left to the viewer. In our synthetic data, we have added multiple such trends of varying effect size and proportion. An excellent test of our methodology is to attempt to identify and characterise these trends. The answers are given in the following reference (3).

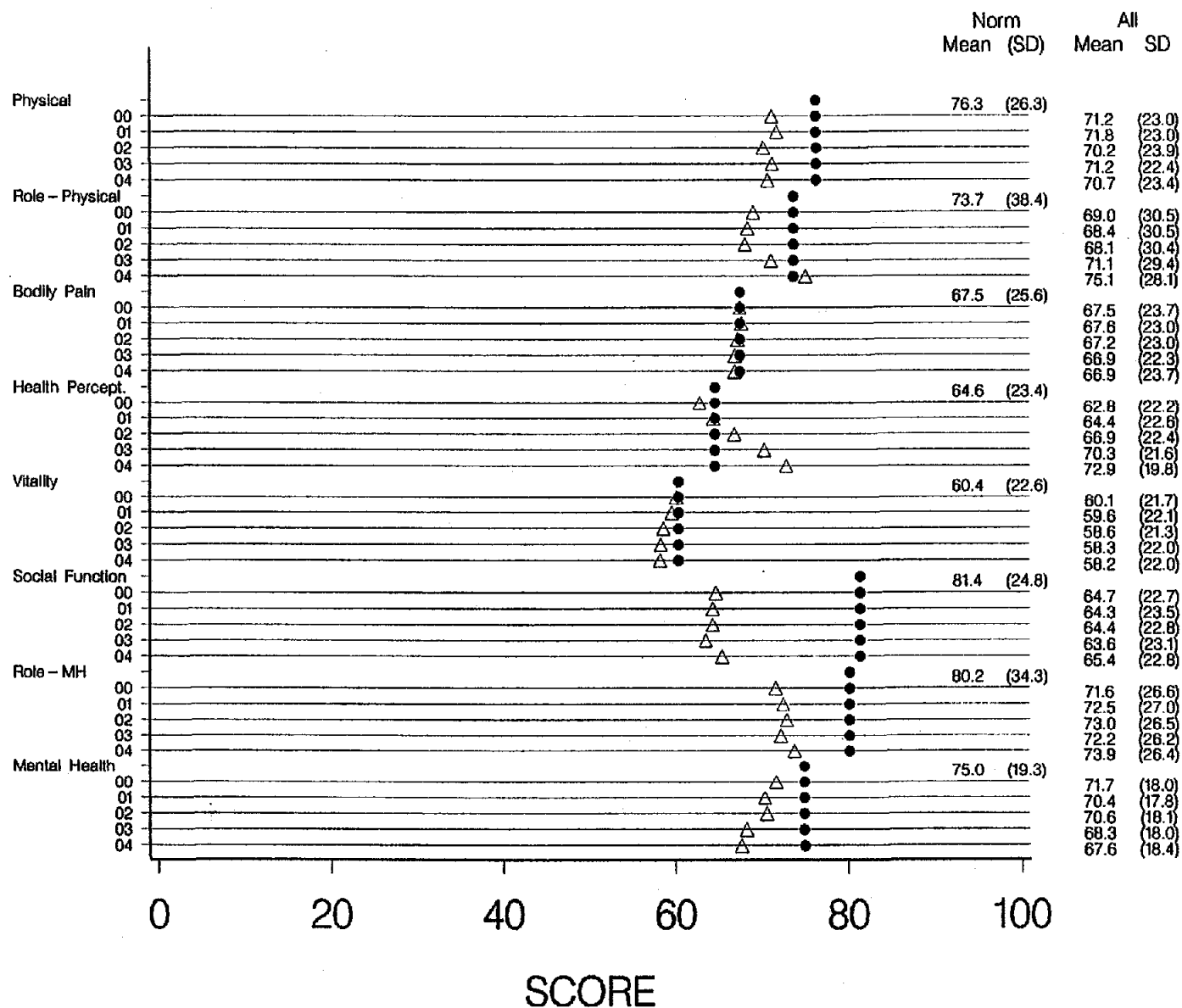
These programs are in the public domain. For a copy of the complete programs, please contact the lead author.

References

- (1) Stansfeld SA. Roberts R. Foot SP. Assessing the validity of the SF-36 General Health Survey. *Quality of Life Research*. 6(3):217-24, 1997 Apr.
- (2) Anderson RT. Aaronson NK. Wilkin D. Critical review of the international assessments of health-related quality of life. *Quality of Life Research*. 2(6):369-95, 1993 Dec.
- (3) Health Perceptions +3 / visit,
Mental Health -1/visit,
Role Physical 1.8^{Visit}

Mean of Eight SF-36 Scales: Random Numbers N=1000

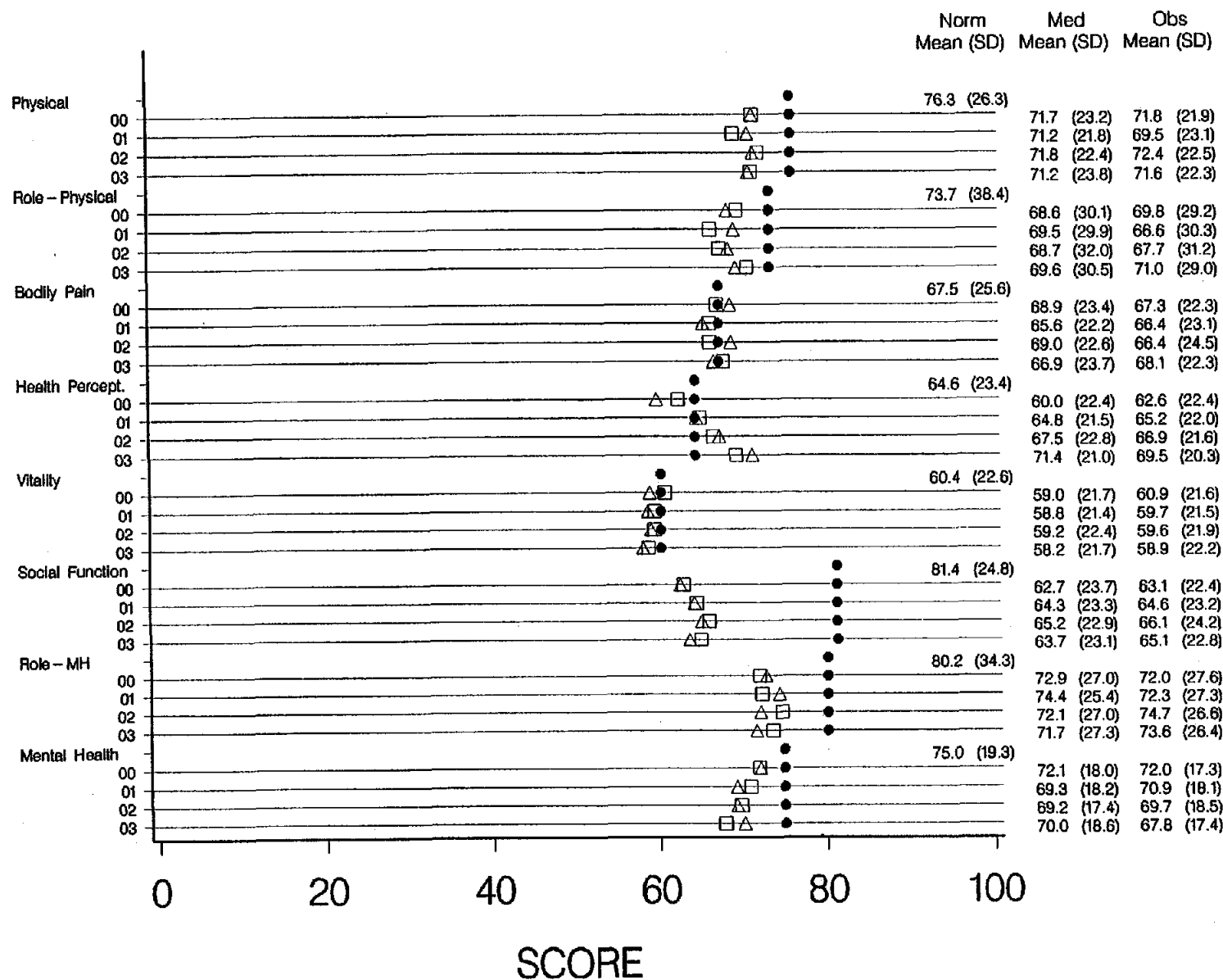
All | Includes normals for US population age 55-64



Legend ● ● ● Norms △ △ △ All

Mean of Eight SF-36 Scales: Random Numbers N=1000

By Rand Group | Includes normals for US population age 55-64



Legend ● ● ● Norms △ △ △ Medication □ □ □ Observation