

Documentation for Knee Osteoarthritis Substudy Dataset

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KNEE OA SUBSTUDY

1. Design:

In Year 2, knee x-rays and MRIs were done on participants with “qualifying knee pain” (defined through a series of questions, see Appendix IV). Knee MRIs were also done in a random sample of controls without qualifying knee pain recruited in Years 2 and 3. Participants with qualifying knee pain in Year 2 had knee x-rays and most also had knee MRI, depending on eligibility criteria. In Year 3, participants who had knee pain defined through a similar set of questions (see pages 21-22, Year 3 Questionnaire) and who had qualifying knee pain in Year 2 but did not have an x-ray or did not have an MRI, had knee x-rays and/or MRIs in Year 3. To be recruited as a control in Year 3, a participant had to have no qualifying knee pain by the knee pain question criteria in both Year 2 and Year 3. Control participants recruited in Year 2 had knee MRIs but did not have x-rays. Control participants recruited in Year 3 had both x-rays and MRIs.

In summary, the Year 2 knee pain status defined case/control status, and therefore only Year 2 knee pain information is given for baseline knee pain in this dataset; however, the actual MRIs or x-rays may have been done in either Year 2 or Year 3. Enrollment in the Knee OA substudy depended primarily on Year 2 knee pain, but the baseline knee x-rays and MRIs may have been done in either Year 2 or Year 3.

In Year 5, follow-up imaging was obtained whenever possible for those participants who had been chosen as either a case or control in Year 2 or Year 3. If follow-up imaging was not done in Year 5, another attempt was made in Year 6. Only Year 5 knee pain variables are included for follow-up knee pain in this dataset. If the analyst wishes to use knee pain data from another year’s visit, the variables can be merged in from the YxCALC dataset. Note that the YxCALC datasets have one record per participant, with data for both knees on one record, while the LONGKNOA dataset has one record per knee. The analyst must insure that the data is merged correctly, generally by expanding the knee pain data in YxCALC to one record per knee, adding a variable for SIDE, and then merging with LONGKNOA by HABCID and SIDE.

There are variables indicating year of baseline MRI (BLmrivis), year of baseline x-ray (BLxrvis), year of follow-up MRI (FUMrivis), and year of follow-up x-ray (FUxrvis). These variables can be used to determine which annual visit data to use for merging in data from other datasets (e.g., DXA body composition), if the analyst wishes to use the annual visit that was closest to the time of imaging.

The LONGKNOA dataset contains 3044 records (all participants with qualifying knee pain, plus those enrolled as controls).

For both MRI and x-ray results, readings were done in two ways:

- First, many of the baseline images were read independently. These results have the prefix BL1 for the imaging variables.
- Next, follow-up images were read as a pair with their corresponding baseline image. These results have the prefix BL2 for the baseline image in the pair, and prefix FU for the follow-up image of the pair.

It is important for the analyst to note that some baseline images were read twice, some baseline images were only read independently (BL1), and some baseline images were read only as a pair with

their follow-up images (BL2.) If the analyst wishes to include all baseline readings, it is necessary to combine the BL1 variables and the BL2 variables. In general, the BL2 variables are a better choice for a longitudinal analysis. For a cross-sectional analysis, the analyst may wish to use the BL1 variables, with missing variables filled in by BL2 variables when possible.

2. Sample characteristics for participants with knee x-rays :

The Coordinating Center received baseline knee x-rays for 1137 participants; all are now read. The count of participants with baseline knee x-ray readings by race/gender group is:

Cases (N=864):

African-American female	264
African-American male	125
White female	252
White male	223

Controls (N=273)

African-American female	80
African-American male	57
White female	83
White male	53

The coordinating center received follow-up x-rays for 595 participants; all are now read. The count of participants with follow-up x-ray reading by race/gender group is:

Cases (N=586):

African-American female	183
African-American male	84
White female	168
White male	151

Controls (N=9)

African-American female	1
African-American male	4
White female	3
White male	1

3. Sample characteristics for participants with knee MRI:

The total usable baseline knee scans received were 2276 (1145 participants). Readings have been completed. This dataset contains MRI readings for the following numbers of participants by race/gender group:

Cases (N=640)

African-American female	202
African-American male	85
White female	205
White male	148

Controls (N=505)

African-American female	134
African-American male	99
White female	155
White male	117

The total usable follow-up knee scans received were 1162 (581 participants). Readings have been completed. This dataset contains MRI readings for the following numbers of participants by race/gender group:

Cases (N=437)

African-American female	146
African-American male	50
White female	145
White male	96

Controls (N=144)

African-American female	43
African-American male	30
White female	49
White male	22

4. Data sources:

The dataset for this substudy (LONGKNOA.sas7bdat) comes from the knee x-ray tracking form in the Year 2 Clinic Visit Workbook and the Year 2 Home Visit Knee Xray Tracking Form (for participants recruited in Year 2), the Knee X-ray Tracking Form (for participants recruited in Year 3 and for follow-up x-rays), the Year 2 knee pain questions (page 35-36 of the Year 2 Clinic Visit Workbook), the Year 5 knee pain questions (page 15-18 of the Year 5 Clinic Visit Workbook), the Knee X-ray Reading Center database (see variable list, Appendix I), and the Knee MRI Reading Center database (see variable list Appendix II). The tracking variables from the Year 2 and Year 3 Knee X-ray Tracking Forms have been combined and renamed so that the data from both years have the same variable names (see annotated form, Appendix III). Knee pain calculated variables, based on Year 2 pain (baseline) and Year 5 pain (follow-up), have been included. The Year 2 pain questions can be found in Appendix IV; the Calculated Variable Worksheet and SAS code for the knee pain calculated variables can be found in Appendix V. A complete list of variable names can be found in the Proc Contents (Appendix VI and zipped with data file).

5. Dataset structure and contents

LONGKNOA has one record per knee, rather than one record per participant.

Key variables:

HABCID HABC Enrollment ID without the 2-letter prefix
SITE HABC Clinic site: 1=Memphis; 2=Pittsburgh

6. Special Missing Value Codes

SAS allows for stratification of missing values. The following missing values have been assigned:

. = 'Missing Form'
.A = 'A:Not Applicable'
.E = 'E:Special Missing'
.L = 'L:Permanently Lost'
.M = 'M:Missing'
.N = 'N:Not Required'
.T = 'T:Missing Due to Technical Problems'
.U = 'Unacceptable'

Description

. : Missing Form

Used when a value is missing because the entire form has not been entered or the participant does not exist in the database from the corresponding Reading Center.

A: Not Applicable

Used when a value is missing but the value is not required (due to simple skip pattern logic)

L: Permanently Lost

Used to flag a tracking variable when a measurement involving a Reading Center was done, but the data either never made it to the Reading Center, or was lost at the Reading Center. Every effort was made to track down these data before they were declared "permanently lost" and the flag assigned.

M:Missing

Used to flag missing values when the value is required (i.e., true missing values).

N:Not Required

Used when a value is missing but the value is not required (not due to simple skip pattern logic). For example, for checkbox variables which are "Check all that apply": each one, individually, is not required. Some variables whose skip pattern logic is non-standard (i.e., the skip pattern involves several variables and forms) also have .N flags when missing, whether or not a response was required due to the skip pattern. In all of these cases, a special cross check was used to edit missing responses.

U:Unacceptable

Used with certain Reading Center data when the data exist but cannot be used. These MRI data when readings could not be used.

7. Dataset index formulation and key variable mapping

LONGKNOA is sorted by HABCID, which is a unique identifier for each participant, and then by SIDE.

8. General strategies for manipulating and merging the data

Because the Health ABC datasets are sorted by Health ABC Enrollment ID, the HABCID variable is most useful for merging with other datasets. **However the analyst should remember that LONGKNOA has two records per participant, so that many-to-one merge problems may occur when the data are merged with other Health ABC datasets.**

9. Known data errors:

None at this time. Five participants had only a usable axial or a usable sky xray, but not both.

Three people who had no value for Y2KPSIGG (by-person case/control status) in a previous dataset, now have non-missing values. These participants were not asked the knee pain questions in Year 2, but were recruited into the study in Year 3. A Question and Answer was created for the situation: When a participant did not have Year 2 pain information; how should the knee MRI and x-ray decision tree be completed? The examiners were instructed to ask the participant if they had had significant knee pain the previous year. In all three cases, the answer was the same as whether they had knee pain in Year 3. The Year 3 questions for these three participants have therefore now been used to create the knee pain variables as well as Y2KPSIGG for these participants.

Analysts note: The interpretation of the knee pain with activity variables is a little different depending on how the question was asked. For most participants in this dataset, the knee pain with activity questions were asked separately for each knee (Year 2 clinic visit workbook form of the questions). For some, however, the activity questions were asked for either knee, and then the participant was asked whether the pain was in the right, left, or both knees (core home visit and Year 3 clinic visit form of the questions). Thus, if the participant responded “both”, the knee pain with activity variables (ACTNUM1, ACTNUM2, Y2KNPAIN, Y2KPACT, Y2KPBD, Y2KPCH, Y2KPFS, Y2KPIN, Y2KPST, Y2KPUP, Y2KPSIG, and Y2WOMAC) will of necessity be identical for the two knees and Y2KPACTN will always be 2 for these participants. To help the analyst, an indicator variable BLOAVIS has been added to indicate whether the knee pain questions that were used to recruit the participant into the substudy and that were used for the knee pain variables came from the Year 2 clinic visit workbook (BLOAVIS=1), the core home visit workbook (BLOAVIS=2) or the Year 3 clinic visit workbook (BLOAVIS=3).

Appendix I

Knee X-ray Reading Center Variable List

Variable Root	Variable Description	Variable Label	Value Label
AP_XDATE	Date X-ray was taken	X-Ray Date	MMDDYY
GRADE	Kellgren-Lawrence grade	K&L Grade	grade 0-4, 0=absent 8=unreadable film 9=missing data or total knee replacement
L_CHON	Sky Lateral Chondrocalcinosis	Sky Lateral Chondroc	
L_JSN	Sky Lateral Pat-Fem Joint Space Narrowing	Sky Lateral Pat-Fem Jnt Sp Nrrwg	
L_OST	Sky Lateral Femur Osteophyte	Sky Lateral Femur Osteophyte	
L_SCL	Sky Lateral Femur Sclerosis	Sky Lateral Femur Sclerosis	
L_SUBLX	Sky Lateral Subluxation	Sky Lateral Subluxation	
LF_CHON	AP Lateral Femur Chondrocalcinosis	AP Lateral Femur Chondroc	
LF_CYST	AP Lateral Femur Cyst	AP Lateral Femur Cyst	
LF_JSN	AP Lateral Joint Space Narrowing	AP Lateral Joint Space Narrwg	
LF_OST	AP Lateral Femur Osteophyte	AP Lateral Femur Osteophyte	
LF_SCLR	AP Lateral Femur Sclerosis	AP Lateral Femur Sclerosis	
LP_OST	Sky Lateral Patella Osteophyte	Sky Lateral Patella Osteophyte	
LP_SCL	Sky Lateral Patella Sclerosis	Sky Lateral Patella Sclerosis	
LT_ATT	AP Lateral Attrition	AP Lateral Attrition	
LT_CYST	AP Lateral Tibia Cyst	AP Lateral Tibia Cyst	
LT_OST	AP Lateral Tibia Osteophyte	AP Lateral Tibia Osteophyte	
LT_SCLR	AP Lateral Tibia Sclerosis	AP Lateral Tibia Sclerosis	
M_CHON	Sky Medial Chondrocalcinosis	Sky Medial Chondroc	
M_JSN	Sky Medial Pat-Fem Joint Space Narrowing	Sky Medial Pat-Fem Jnt Sp Nrrwg	
M_OST	Sky Medial Femur Osteophyte	Sky Medial Femur Osteophyte	
M_SCL	Sky Medial Femur Sclerosis	Sky Medial Femur Sclerosis	
M_SUBLX	Sky Medial Subluxation	Sky Medial Subluxation	
MAL	AP Mal-Alignment	AP Mal-Align	
MF_CHON	AP Medial Femur Chondrocalcinosis	AP Medial Femur Chondroc	

Variable Root	Variable Description	Variable Label	Value Label
MF_CYST	AP Medial Femur Cyst	AP Medial Femur Cyst	grade 0-4 , 0=absent 8=unreadable film 9=missing data or total knee replacement
MF_JSN	AP Medial Joint Space Narrowing	AP Medial Joint Space Narrowg	
MF_OST	AP Medial Femur Osteophyte	AP Medial Femur Osteophyte	
MF_SCLR	AP Medial Femur Sclerosis	AP Medial Femur Sclerosis	
MP_OST	Sky Medial Patella Osteophyte	Sky Medial Patella Osteophyte	
MP_SCL	Sky Medial Patella Sclerosis	Sky Medial Patella Sclerosis	
MT_ATT	AP Medial Attrition	AP Medial Attrition	
MT_CYST	AP Medial Tibia Cyst	AP Medial Tibia Cyst	
MT_OST	AP Medial Tibia Osteophyte	AP Medial Tibia Osteophyte	
MT_SCLR	AP Medial Tibia Sclerosis	AP Medial Tibia Sclerosis	
TYPE	AP Mal-Alignment Type	AP Mal-Align Type	0=none 1=valgus 2=varus 0=No 1=Yes
Calculated Variables based on Knee Xray data			
KL2	Indicator for this knee having Kellgren-Lawrence grade ≥ 2	KL ≥ 2 - this knee	0=No 1=Yes
KL2G	Indicator for this participant having at least one knee with Kellgren- Lawrence grade ≥ 2	≥ 1 knee with KL ≥ 2	knees
KL2N	Number of knees with Kellgren-Lawrence grade ≥ 2	# of knees KL ≥ 2	0=No 1=Yes
PFTKL	PF joint OA using BU global grade - this side	PF joint OA using BU global grade - this side	0=No 1=Yes
PFTKLG	Indicator for this participant having at least one knee with PF joint OA using BU global grade	≥ 1 knee with PF joint OA using BU global grade	0=No 1=Yes
PFTKLN	Number of knees with PF joint OA using BU global grade	# of knees with PF joint OA using BU global grade	knees
WHLKNOA	Whole knee OA (based on KL grade ≥ 2 or BU global grade ≥ 2) - this side	Whole knee OA - this side	0=No 1=Yes

Variable Root	Variable Description	Variable Label	Value Label
WHLKNOAG	Whole knee OA (based on KL grade \geq 2 or BU global grade \geq 2) - either side	Whole knee OA - either side	0-2
WHLKNOAN	# of knees with whole knee OA (based on KL grade \geq 2 or BU global grade \geq 2)	# of knees with whole knee OA	0-2
XRAY	X-ray done for this knee	X-ray done for this knee	0=No 1=Yes
XRAYN	Number of knees with x-rays	# of knees with X-ray	

Appendix II

Knee MRI Reading Center Variable List

Variable Root	Variable Description	Variable Label	Value Label
AATTRPL	Attrition Lateral Patella, Axial Scan	Axial Attrition Pat Lat	0=Normal 1=Mild 2=Moderate 3=Severe
AATTRPM	Attrition Medial Patella, Axial Scan	Axial Attrition Pat Med	0=Normal 1=Mild 2=Moderate 3=Severe
ACRTMPL	Cartilage Morphology Lateral Patella, Axial Scan (signal adjusted*)	Axial Cart Morph Pat Lat	0=Normal thickness and signal 1=Abnormal signal only
ACRTMPM	Cartilage Morphology Medial Patella, Axial Scan (signal adjusted*)	Axial Cart Morph Pat Med	2=Solitary focal defect 3=Areas of partial-thickness loss with areas of preserved thickness 4=Diffuse (>75%) partial-thickness loss 5=Areas of full-thickness loss with areas of partial-thickness loss 6=Diffuse (>75%) full-thickness loss
ACRTSPL	Cartilage Signal Lateral Patella, Axial Scan	Axial Cart Sig Pat Lat	0=Normal 1=Increased
ACRTSPM	Cartilage Signal Medial Patella, Axial Scan	Axial Cart Sig Pat Med	0=Normal 1=Increased
AOSTEFLP	Osteophytes Lateral Fem-Patella, Axial Scan Posterior ROI	Axial Osteo Femur Pat Lat	0=None 1=Equivocal 2=Small horizontal spur 3=Moderate horizontal or small curved spur 4=Large horizontal or moderate curved spur 5=Moderate-large curved spur 6=Large, exuberant spur 7=Very large, irregular spur
AOSTEFMP	Osteophytes Posterior Fem-Patella, Axial Scan Medial ROI	Axial Osteo Femur Pat Med	
AOSTEPL	Osteophytes Lateral Patella, Axial Scan	Axial Osteo Pat Lat	
AOSTEPM	Osteophytes Medial Patella, Axial Scan	Axial Osteo Pat Med	

* If morphology score=0 and cartilage signal=1, then score becomes 1; otherwise score=morphology score

Variable Root	Variable Description	Variable Label	Value Label
CMCL	Medial Collateral Ligament, Coronal Scan	Coronal MCL	0=Intact 1=Thickened
CLCL	Lateral Collateral Ligament, Coronal Scan	Coronal LCL	2=Torn
COSTEFLC	Osteophytes Lateral Femur, Coronal Scan Central ROI	Coronal Osteo Femur Lat C	0=None 1=Equivocal 2=Small horizontal spur 3=Moderate horizontal or small curved spur 4=Large horizontal or moderate curved spur 5=Moderate-large curved spur 6=Large, exuberant spur 7=Very large, irregular spur
COSTEFMC	Osteophytes Medial Femur, Coronal Scan Central ROI	Coronal Osteo Femur Med C	
COSTETLC	Osteophytes Lateral Tibia, Coronal Scan Central ROI	Coronal Osteo Tibia Lat C	
COSTETMC	Osteophytes Medial Tibia, Coronal Scan Central ROI	Coronal Osteo Tibia Med C	
MRREADDT	Date MRI read	Date MRI read (RC data)	
MRSCANDT	Date MRI scan taken	Date of MRI scan (trk data)	mm/dd/yy
NSPACL	Anterior Cruciate Ligament, No Specific Plane	No Specific Plane ACL	0=Intact 1=Thickened 2=Torn
NSPCYSTA	MRI:Popliteal/Baker Cyst, No Specific Plane	MRI:No Specific Plane Cyst Pop/Baker	Grade, based on size (0-3)
NSPCYSTB	MRI:Anserine Cyst, No Specific Plane	MRI:No Specific Plane Cyst Anserine	
NSPCYSTC	MRI:Meniscal Cyst, No Specific Plane	MRI:No Specific Plane Cyst Meniscal	
NSPCYSTD	MRI:Patellar Cyst, No Specific Plane	MRI:No Specific Plane Cyst Patr	
NSPCYSTE	MRI:Tibial/Fibula Cyst, No Specific Plane	MRI:No Specific Plane Cyst Tib/Fib	

Variable Root	Variable Description	Variable Label	Value Label
NSPLATA	Lateral Meniscus, No Specific Plane Anterior ROI	No Specific Plane Lat Meniscus Ant	0=Intact 1=Minor radial or parrot-beak tear
NSPLATB	Lateral Meniscus Body, No Specific Plane	No Specific Plane Lat Meniscus Body	2=Nondisplaced tear or prior surgical repair
NSPLATP	Lateral Meniscus, No Specific Plane Posterior ROI	No Specific Plane Lat Meniscus Post	3=Displaced tear, partial maceration or partial resection 4=Complete maceration and destruction or complete resection
NSPLOOSE	Loose Bodies, No Specific Plane	No Specific Plane Loose Bodies	0=None 1=1 loose body 2=2 to 3 loose bodies 3=More than 3 loose bodies
NSPMEDA	Medial Meniscus, No Specific Plane Anterior ROI	No Specific Plane Med Meniscus Ant	0=Intact 1=Minor radial or parrot-beak tear
NSPMEDB	Medial Meniscus Body, No Specific Plane	No Specific Plane Med Meniscus Body	2=Nondisplaced tear or prior surgical repair
NSPMEDP	Medial Meniscus, No Specific Plane Posterior ROI	No Specific Plane Med Meniscus Post	3=Displaced tear, partial maceration or partial resection 4=Complete maceration and destruction or complete resection
NSPPCL	Posterior Cruciate Ligament, No Specific Plane	No Specific Plane PCL	0=Intact 1=Thickened 2=Torn
SATTRFLA	Attrition Lateral Femur, Sagittal Scan Anterior ROI	Sagittal Attrit Femur Lat A	0=Normal
SATTRFLC	Attrition Lateral Femur, Sagittal Scan Central ROI	Sagittal Attrit Femur Lat C	1=Mild; <25% of region
SATTRFLP	Attrition Lateral Femur, Sagittal Scan Posterior ROI	Sagittal Attrit Femur Lat P	2=Moderate; 25% - 50% of region
SATTRFMA	Attrition Medial Femur, Sagittal Scan Anterior ROI	Sagittal Attrit Femur Med A	3=Severe; >50% of region
SATTRFMC	Attrition Medial Femur, Sagittal Scan Central ROI	Sagittal Attrit Femur Med C	
SATTRFMP	Attrition Medial Femur, Sagittal Scan Posterior ROI	Sagittal Attrit Femur Med P	
SATTRTLA	Attrition Lateral Tibia, Sagittal Scan Anterior ROI	Sagittal Attrit Tibia Lat A	

Variable Root	Variable Description	Variable Label	Value Label
SATTRTLC	Attrition Lateral Tibia, Sagittal Scan Central ROI	Sagittal Attrit Tibia Lat C	0=Normal 1=Mild; <25% of region 2=Moderate; 25% - 50% of region 3=Severe; >50% of region
SATTRTLP	Attrition Lateral Tibia, Sagittal Scan Posterior ROI	Sagittal Attrit Tibia Lat P	
SATTRTMA	Attrition Medial Tibia, Sagittal Scan Anterior ROI	Sagittal Attrit Tibia Med A	
SATTRTMC	Attrition Medial Tibia, Sagittal Scan Central ROI	Sagittal Attrit Tibia Med C	
SATTRTMP	Attrition Medial Tibia, Sagittal Scan Posterior ROI	Sagittal Attrit Tibia Med P	
SBONEFLA	Bone Marrow Edema Lateral Femur, Sagittal Scan Anterior ROI	Sag Bone Marrow Edema Femur Lat A	0=Normal 1=Mild; <25% of region 2=Moderate; 25% - 50% of region 3=Severe; >50% of region
SBONEFLC	Bone Marrow Edema Lateral Femur, Sagittal Scan Central ROI	Sag Bone Marrow Edema Femur Lat C	
SBONEFLP	Bone Marrow Edema Lateral Femur, Sagittal Scan Posterior ROI	Sag Bone Marrow Edema Femur Lat P	
SBONEFMA	Bone Marrow Edema Medial Femur, Sagittal Scan Anterior ROI	Sag Bone Marrow Edema Femur Med A	
SBONEFMC	Bone Marrow Edema Medial Femur, Sagittal Scan Central ROI	Sag Bone Marrow Edema Femur Med C	
SBONEFMP	Bone Marrow Edema Medial Femur, Sagittal Scan Posterior ROI	Sag Bone Marrow Edema Femur Med P	
SBONEPL	Bone Marrow Edema Lateral Patella, Sagittal Scan	Sagit Bone Marrow Edema Pat Lat	
SBONEPM	Bone Marrow Edema Medial Patella, Sagittal Scan	Sagit Bone Marrow Edema Pat Med	
SBONETLA	Bone Marrow Edema Lateral Tibia, Sagittal Scan Anterior ROI	Sagit Bone Marrow Edema Tibia Lat A	
SBONETLC	Bone Marrow Edema Lateral Tibia, Sagittal Scan Central ROI	Sagit Bone Marrow Edema Tibia Lat C	
SBONETLP	Bone Marrow Edema Lateral Tibia, Sagittal Scan Posterior ROI	Sagit Bone Marrow Edema Tibia Lat P	

Variable Root	Variable Description	Variable Label	Value Label
SBONETMA	Bone Marrow Edema Medial Tibia, Sagittal Scan Anterior ROI	Sagit Bone Marrow Edema Tibia Med A	0=Normal 1=Mild; <25% of region 2=Moderate; 25% - 50% of region 3=Severe; >50% of region
SBONETMC	Bone Marrow Edema Medial Tibia, Sagittal Scan Central ROI	Sagit Bone Marrow Edema Tibia Med C	
SBONETMP	Bone Marrow Edema Medial Tibia, Sagittal Scan Posterior ROI	Sagit Bone Marrow Edema Tibia Med P	
SBONETS	Bone Marrow Edema Superior Tibia, Sagittal Scan	Sagit Bone Marrow Edema Tibia S	
SCRTMFLA	Cartilage Morphology Lateral Femur, Sagittal Scan Anterior ROI (signal adjusted*)	Sagit Cartilage Morph Femur Lat A	0=Normal thickness and signal 1=Abnormal signal only 2=Solitary focal defect 3=Areas of partial- thickness loss with areas of preserved thickness 4=Diffuse (>75%) partial- thickness loss 5=Areas of full-thickness loss with areas of partial-thickness loss 6=Diffuse (>75%) full- thickness loss
SCRTMFLC	Cartilage Morphology Lateral Femur, Sagittal Scan Central ROI (signal adjusted*)	Sagit Cartilage Morph Femur Lat C	
SCRTMFLP	Cartilage Morphology Lateral Femur, Sagittal Scan Posterior ROI (signal adjusted*)	Sagit Cartilage Morph Femur Lat P	
SCRTMFMA	Cartilage Morphology Medial Femur, Sagittal Scan Anterior ROI (signal adjusted*)	Sagit Cartilage Morph Femur Med A	
SCRTMFMC	Cartilage Morphology Medial Femur, Sagittal Scan Central ROI (signal adjusted*)	Sagit Cartilage Morph Femur Med C	
SCRTMFMP	Cartilage Morphology Medial Femur, Sagittal Scan Posterior ROI (signal adjusted*)	Sagit Cartilage Morph Femur Med P	
SCRTMTLA	Cartilage Morphology Lateral Tibia, Sagittal Scan Anterior ROI (signal adjusted*)	Sagit Cartilage Morph Tibia Lat A	
SCRTMTLC	Cartilage Morphology Lateral Tibia, Sagittal Scan Central ROI (signal adjusted*)	Sagit Cartilage Morph Tibia Lat C	

Variable Root	Variable Description	Variable Label	Value Label
SCRTMTLP	Cartilage Morphology Lateral Tibia, Sagittal Scan Posterior ROI (signal adjusted*)	Sagit Cartilage Morph Tibia Lat P	0=Normal thickness and signal 1=Abnormal signal only 2=Solitary focal defect 3=Areas of partial- thickness loss with areas of preserved thickness 4=Diffuse (>75%) partial- thickness loss 5=Areas of full-thickness loss with areas of partial-thickness loss 6=Diffuse (>75%) full- thickness loss
SCRTMTMA	Cartilage Morphology Medial Tibia, Sagittal Scan Anterior ROI (signal adjusted*)	Sagit Cartilage Morph Tibia Med A	
SCRTMTMC	Cartilage Morphology Medial Tibia, Sagittal Scan Central ROI (signal adjusted*)	Sagit Cartilage Morph Tibia Med C	
SCRTMTMP	Cartilage Morphology Medial Tibia, Sagittal Scan Posterior ROI (signal adjusted*)	Sagit Cartilage Morph Tibia Med P	
SCRTSFLA	Cartilage Signal Lateral Femur, Sagittal Scan Anterior ROI	Sagit Cartilage Signal Femur Lat A	0=Normal 1=Increased
SCRTSFLC	Cartilage Signal Lateral Femur, Sagittal Scan Central ROI	Sagit Cartilage Signal Femur Lat C	
SCRTSFLP	Cartilage Signal Lateral Femur, Sagittal Scan Posterior ROI	Sagit Cartilage Signal Femur Lat P	
SCRTSFMA	Cartilage Signal Medial Femur, Sagittal Scan Anterior ROI	Sagit Cartilage Signal Femur Med A	
SCRTSFMC	Cartilage Signal Medial Femur, Sagittal Scan Central ROI	Sagit Cartilage Signal Femur Med C	
SCRTSFMP	Cartilage Signal Medial Femur, Sagittal Scan Posterior ROI	Sagit Cartilage Signal Femur Med P	
SCRTSTLA	Cartilage Signal Lateral Tibia, Sagittal Scan Anterior ROI	Sagit Cartilage Signal Tibia Lat A	
SCRTSTLC	Cartilage Signal Lateral Tibia, Sagittal Scan Central ROI	Sagit Cartilage Signal Tibia Lat C	
SCRTSTLP	Cartilage Signal Lateral Tibia, Sagittal Scan Posterior ROI	Sagit Cartilage Signal Tibia Lat P	

Variable Root	Variable Description	Variable Label	Value Label
SCRTSTMA	Cartilage Signal Medial Tibia, Sagittal Scan Anterior ROI	Sagit Cartilage Signal Tibia Med A	0=Normal 1=Increased
SCRTSTMC	Cartilage Signal Medial Tibia, Sagittal Scan Central ROI	Sagit Cartilage Signal Tibia Med C	
SCRTSTMP	Cartilage Signal Medial Tibia, Sagittal Scan Posterior ROI	Sagit Cartilage Signal Tibia Med P	
SCYSTFLA	Cysts Lateral Femur, Sagittal Scan Anterior ROI	Sagit Sub Art Cysts Femur Lat A	0=Normal 1=Mild; <25% of region 2=Moderate; 25% - 50% of region 3=Severe; >50% of region
SCYSTFLC	Cysts Lateral Femur, Sagittal Scan Central ROI	Sagit Sub Art Cysts Femur Lat C	
SCYSTFLP	Cysts Lateral Femur, Sagittal Scan Posterior ROI	Sagit Sub Art Cysts Femur Lat P	
SCYSTFMA	Cysts Medial Femur, Sagittal Scan Anterior ROI	Sagit Sub Art Cysts Femur Med A	
SCYSTFMC	Cysts Medial Femur, Sagittal Scan Central ROI	Sagit Sub Art Cysts Femur Med C	
SCYSTFMP	Cysts Medial Femur, Sagittal Scan Posterior ROI	Sagit Sub Art Cysts Femur Med P	
SCYSTPL	Cysts Lateral Patella, Sagittal Scan	Sagit Sub Art Cysts Pat Lat	
SCYSTPM	Cysts Medial Patella, Sagittal Scan	Sagit Sub Art Cysts Pat Med	
SCYSTTLA	Cysts Lateral Tibia, Sagittal Scan Anterior ROI	Sagit Sub Art Cysts Tibia Lat A	
SCYSTTLC	Cysts Lateral Tibia, Sagittal Scan Central ROI	Sagit Sub Art Cysts Tibia Lat C	
SCYSTTLP	Cysts Lateral Tibia, Sagittal Scan Posterior ROI	Sagit Sub Art Cysts Tibia Lat P	
SCYSTTMA	Cysts Medial Tibia, Sagittal Scan Anterior ROI	Sagit Sub Art Cysts Tibia Med A	
SCYSTTMC	Cysts Medial Tibia, Sagittal Scan Central ROI	Sagit Sub Art Cysts Tibia Med C	
SCYSTTMP	Cysts Medial Tibia, Sagittal Scan Posterior ROI	Sagit Sub Art Cysts Tibia Med P	
SCYSTTS	Cysts Tibia, Sagittal Scan Notch	Sagit Sub Art Cysts Tibia Notch	

Variable Root	Variable Description	Variable Label	Value Label
SIDE	Side (which knee)	Side	R=Right L=Left
SOSTEFLA	Osteophytes Lateral Femur, Sagittal Scan Anterior ROI	Sagit Osteo Femur Lat A	0=None 1=Equivocal 2=Small horizontal spur 3=Moderate horizontal or small curved spur 4=Large horizontal or moderate curved spur 5=Moderate-large curved spur 6=Large, exuberant spur 7=Very large, irregular spur
SOSTEFMA	Osteophytes Medial Femur, Sagittal Scan Anterior ROI	Sagit Osteo Femur Med A	
SOSTEPI	Osteophytes Inferior Patella, Sagittal Scan	Sagit Osteo Pat Inf	
SOSTEPS	Osteophytes Superior Patella, Sagittal Scan	Sagit Osteo Pat Sup	
SOSTETLA	Osteophytes Lateral Tibia, Sagittal Scan Anterior ROI	Sagit Osteo Tibia Lat A	
SOSTETLP	Osteophytes Lateral Tibia, Sagittal Scan Posterior ROI	Sagit Osteo Tibia Lat P	
SOSTETMA	Osteophytes Medial Tibia, Sagittal Scan Anterior ROI	Sagit Osteo Tibia Med A	
SOSTETMP	Osteophytes Medial Tibia, Sagittal Scan Posterior ROI	Sagit Osteo Tibia Med P	
SYNOV	Synovitis/Effusion, Sagittal Scan	Sagit Synovitis/Effusion	0=Normal 1=<33% of maximum distension 2=33%-66% of maximum distension 3=>66% of maximum distension
Summary Variables			
ATRFPJ	Attrition Of Bone-Patellar Femoral Joint	Attrition Of Bone-FPJ	0-12
ATRLFTJ	Summary Attrition Of Bone Score-Lateral Femoral Tibial Joint	Attrition Of Bone-Lateral FTJ	0-15
ATRMFTJ	Summary Attrition Of Bone Score-Medial Femoral Tibial Joint	Attrition Of Bone-Medial FTJ	0-15
BMEFPJ	Summary Bone Marrow Edema Score-Patellar Femoral Joint	Bone Marrow Edema-FPJ	0-12
BMELFTJ	Summary Bone Marrow Edema Score-Lateral Femoral Tibial Joint	Bone Marrow Edema-Lateral FTJ	0-15
BMEMFTJ	Summary Bone Marrow Edema Score-Medial Femoral Tibial Joint	Bone Marrow Edema-Medial FTJ	0-15
Variable Root	Variable Description	Variable Label	Value Label

CRTFPJ	Summary Cartilage Score-Patellar Femoral Joint (signal adjusted*)	Cartilage-FPJ	0-28
CRTLFTJ	Summary Cartilage Score-Lateral Femoral Tibial Joint (signal adjusted*)	Cartilage-Lateral FTJ	0-35
CRTMFTJ	Summary Cartilage Score-Medial Femoral Tibial Joint (signal adjusted*)	Cartilage-Medial FTJ	0-35
CYSFPJ	Summary Subarticular Cyst Score-Patellar Femoral Joint	Subarticular Cysts-FPJ	0-12
CYSLFTJ	Summary Subarticular Cyst Score-Lateral Femoral Tibial Joint	Subarticular Cysts-Lateral FTJ	0-15
CYSMPTJ	Summary Subarticular Cysts Score-Medial Femoral Tibial Joint	Subarticular Cysts-Medial FTJ	0-15
MENLFTJ	Summary Meniscus Score-Lateral Femoral Tibial Joint (NSPLATA+NSPLATB+NSPLATP)	Menisci-Lateral FTJ	0-12
MENMFTJ	Summary Meniscus Score-Medial Femoral Tibial Joint (NSPMEDA+NSPMEDB+NSPMEDP)	Menisci-Medial FTJ	0-12
MENMGRAD	Medial Menisci Grade based on anterior, posterior, and body scores	Medial Menisci Grade	1=At least one 1, but no score > 1 2=2 in only one segment 3=2 in more than one segment 4=3 in one or more segments 5=4 in only one segment 6=4 in more than one segment
MENLGRAD	Lateral Menisci Grade based on anterior, posterior, and body scores	Lateral Menisci Grade	
OSTFPJ	Summary Osteophyte Score-Patellar Femoral Joint	Osteophytes-FPJ	0-42
OSTLFTJ	Summary Osteophyte Score-Lateral Femoral Tibial Joint	Osteophytes-Lateral FTJ	0-35
OSTMFTJ	Summary Osteophyte Score-Medial Femoral Tibial Joint	Osteophytes-Medial FTJ	0-35

Variable Root	Variable Description	Variable Label	Value Label
ATTR	Sum of Bone Attrition Scores	Total Attrition Of Bone Score	0-42
BMEDEMA	Sum of Bone Marrow Edema Scores	Total Bone Marrow Edema Score	0-45
CARTILAG	Sum of Cartilage Scores	Total Cartilage Score	0-110
MENISCI	Total Menisci Score (MENMFTJ+MENLFTJ)	Total Menisci Score	0-24
MENTGRAD	Total Menisci Grade based on lateral and medial anterior, posterior, and body scores	Total Menisci Grade	1=At least one 1, but no score > 1 2=2 in only one segment 3=2 in more than one segment 4=3 in one or more segments 5=4 in only one segment 6=4 in more than one segment
OSTEOPH	Sum of Osteophyte Scores	Total Osteophyte Score	0-112
SUBCYSTS	Sum of Subarticular Cysts Scores	Total Subarticular Cysts Score	0-45
TOTAL	Total Overall Score	Total Overall Score (CARTILAG+OSTEOPH+BMEDEMA+SUBCYSTS+ATTR+SYNOV+MENISCI)	0-381

Appendix III

Knee X-ray Tracking Form

Appendix IV

Year 2 Knee Pain Questions

Appendix V
Knee Pain Indicator Variables

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Unit (field center, CC, Project Office, Reading Center): Coordinating Center

Analysis Plan Reference Number (if applicable):

Variable Root	Descriptive Title	Detailed Description	How variable is calculated	How to handle missing or special values	Value labels
ACTNUM1*	# Activity => Mild pain - this knee	Number of activities causing mild or greater pain, this knee	Count the number of activity pain variables (Q2&4 p35&36 in the Yr2 clinic visit workbook; Q34 p 16 in Core Home Visit workbook) with a value greater than or equal to 1	Missings and don't knows (8's) treated like 0's unless whole knee pain questionnaire is not answered	0-6
ACTNUM2*	# Activity => Mod pain - this knee	Number of activities causing moderate or greater pain, this knee	Count the number of activity pain variables (Q2&4 p35&36 in the Yr2 clinic visit workbook; Q34 p 16 in Core Home Visit workbook) with a value greater than or equal to 2	Missings and don't knows (8's) treated like 0's unless whole knee pain questionnaire is not answered	0-6
SXOAKL	KL grade >=2 and knee pain - this knee	Knee pain case this knee in combination with K&L grade ≥2 from x-ray reading	=1 if Y2KPSIG=1 and KL2=1; =0 if Y2KPSIG=0 or KL2=0	If KL2 is missing and Y2KPSIG is not 0, then SXOAKL is missing	0=No 1=Yes
SXOAKLG	>=1 knee with pain and KL grade >=2	At least one knee defined as knee pain case with K&L grade ≥2 from x-ray reading	SXOAKLG = max (SXOAKL for each knee)	If SXOAKL is missing for one knee, SXOAKLG=SXOAKL for the other knee; If SXOAKL is missing for both knees, SXOAKLG is missing	0=No 1=Yes

***This variable has different interpretations depending on how the question was asked, see note page 5.2-3**

Variable Root	Descriptive Title	Detailed Description	How variable is calculated	How to handle missing or special values	Value labels
SXOAKLN	# of knees with pain and KL grade ≥ 2	Number of knees defined as knee pain case with K&L grade ≥ 2 from x-ray reading	Sum SXOAKL over person	If SXOAKL is missing for one knee, SXOAKLN=SXOAKL for the other knee; If SXOAKL is missing for both knees, SXOAKLN is missing	0-2
SXOAPF	Pain and PF OA - this knee	Knee pain case this knee in combination with PF joint OA defined by x-ray reading	=1 if Y2KPSIG=1 and PFTKL=1; =0 if Y2KPSIG=0 or PFTKL=0	If PFTKL is missing and Y2KPSIG is not 0, then SXOAPF is missing	0=No 1=Yes
SXOAPFG	≥ 1 knee with pain and PF OA	At least one knee defined as knee pain case with PF joint OA defined by x-ray reading	SXOAPFG = max (SXOAPF for each knee)	If SXOAPF is missing for one knee, SXOAPFG=SXOAPF for the other knee; If SXOAPF is missing for both knees, SXOAPFG is missing	0=No 1=Yes
SXOAPFN	# of knees with pain and PF OA	Number of knees defined as knee pain case with PF joint OA defined by x-ray reading	Sum SXOAPF over person	If SXOAPF is missing for one knee, SXOAPFN=SXOAPF for the other knee; If SXOAPF is missing for both knees, SXOAPFN is missing	0-2
SXOAWLK	Pain and whole knee OA - this knee	Knee pain case this knee in combination with whole knee OA defined by x-ray reading	=1 if Y2KPSIG=1 and WHLKNOA=1; =0 if Y2KPSIG=0 or WHLKNOA=0	If WHLKNOA is missing and Y2KPSIG is not 0, then SXOAWLK is missing	0=No 1=Yes

Variable Root	Descriptive Title	Detailed Description	How variable is calculated	How to handle missing or special values	Value labels
SXOAWLKG	>=1 knee with pain and whole knee OA	At least one knee defined as knee pain case with whole knee OA defined by x-ray reading	SXOAWLKG = max (SXOAWLK for each knee)	If SXOAWLK is missing for one knee, SXOAWLKG=SXOAWLK for the other knee; If SXOAWLK is missing for both knees, SXOAWLKG is missing	0=No 1=Yes
SXOAWLKN	# of knees with pain and whole knee OA	Number of knees defined as knee pain case with whole knee OA defined by x-ray reading	Sum SXOAWLKN over person	If SXOAWLK is missing for one knee, SXOAWLKN=SXOAWLK for the other knee; If SXOAWLK is missing for both knees, SXOAWLKN is missing	0-2
YxKNPAIN*	Classification of knee pain - this knee	Amount of knee pain this knee	=0 if no pain in last 12 months and no pain in last 30 days; =4 if pain most days in past 30 =3 if pain with any activity is moderate, severe, or extreme and neither pain on most days in last year or last 30 days =2 if pain on most days in last year, but not in last month =1 if none of the above is true and participant reports pain in last 12 months or 30 days or mild pain on any activity	Set to 0 if participant does not meet any of these definitions unless none of the knee pain questions were answered, in which case Y2KNPAIN=.	0=No knee pain 1=Mild/infrequent pain 2=Episodic pain 3=Activity pain 4=Frequent pain

***This variable has different interpretations depending on how the question was asked, see note page 5.2-3**

Variable	Descriptive Title	Detailed Description	How variable is calculated	How to handle missing or special values	Value labels
YxKP12MO	Knee pain most days past 12 mo - this knee	Knee pain in this knee lasting at least a month during last 12 months	=1 if pain most days in last 12 months is yes; =0 if any pain in last 12 months is no or don't know or pain on most days in last 12 months is no; <u>For ppts with Core Home Visit data only</u> If ZAAJLRB1 in (1,3), then Y2KP12MO=1 for right knee, otherwise=0 If ZAAJLRB1 in (2,3), then Y2KP12MO=1 for left knee, otherwise=0	Missing and Don't Know are treated as No If no knee pain questions answered Y2KP12MO is missing	0=No 1=Yes
YxKP12MG	Knee pain most days past 12 mo – either knee	Knee pain on most days in last year, either knee	Y2KP12MG = max (Y2KP12MO for each knee)	If Y2KP12M) is missing for one knee, Y2KP12MG= Y2KP12MO for the other knee; If Y2KP12MO is missing for both knees, Y2KP12MG is missing	0=No 1=Yes
YxKP12MN	# of knees w/ pain most days past 12 mo	Number of knees with pain on most days in last year	Sum Y2KP12MO over person	If Y2KP12MO is missing for one knee, Y2KP12MN= Y2KP12MO for the other knee; If Y2KP12MO is missing for both knees, Y2KP12MN is missing	0-2
YxKP30DA	Knee pain most days in past 30 - this knee	Knee pain in this knee most days in past 30	Knee pain most days in last 30 days	If none of the knee pain questionnaire is answered, then YKP30DA is missing Otherwise Y2KP30DA=0	0=No 1=Yes

Variable	Descriptive Title	Detailed Description	How variable is calculated	How to handle missing or special values	Value labels
YxKP30DG	Pain most days in past 30 - either knee	Knee pain most days in past 30, either knee	$Y2KP30DG = \max(Y2KP30DA \text{ for each knee})$	If Y2KP30DA is missing for one knee, Y2KP30DG=Y2KP30DA for the other knee; If Y2KP30DA is missing for both knees, Y2KP30DG is missing	0=No 1=Yes
YxKP30DN	# of knees with pain most days in past 30	Number of knees with pain on most days in past 30	Sum Y2KP30DA over person	If Y2KP30DA is missing for one knee, Y2KP30DN=Y2KP30DA for the other knee; If Y2KP30DA is missing for both knees, Y2KP30DN is missing	0-2
YxKPACT*	Knee pain with activity - this knee	Moderate or worse pain with activity in this knee	If any of the following is marked moderate, severe, or extreme (2, 3, or 4): pain in knees during last 30 days when: walking on flat surface, going up or down stairs, at night in bed, standing upright, getting in/out of chair, getting in/out of car	If >2 of variables are missing and CMAJK30≠0 and CMAJK12≠0, then Y2RKPACT is set to missing Otherwise, Y2KPACT=0	0=No 1=Yes
YxKPACTG	Knee pain with activity - either knee	Knee pain with activity in either knee	$Y2KPACTG = \max(Y2KPACT \text{ for each knee})$	If Y2KPACT is missing for one knee, Y2KPACTG=Y2KPACT for the other knee; If Y2KPACT is missing for both knees, Y2KPACTG is missing	0=No 1=Yes

***This variable has different interpretations depending on how the question was asked, see note page 5.2-3**

Variable	Descriptive Title	Detailed Description	How variable is calculated	How to handle missing or special values	Value labels
YxKPACTN	# of knees w/ pain with activity	Number of knees with pain with activity	Sum Y2KPACT over person	If Y2KPACT is missing for one knee, Y2KPACTN=Y2KPACT for the other knee; If Y2KPACT is missing for both knees, Y2KPACTN is missing	0-2
YxKPBD*	Pain at night in bed - this knee	Pain at night in bed - this knee	=B4AJLKBD or B4AJRKBD or ZAAJKBD	For core home visit data only, side is determined by ZAAJLRB2; Don't knows are recoded to No. If all knee pain questions are missing variable is missing	0=None 1=Mild 2=Modera te 3=Severe 4=Extrem e
YxKPCH*	Pain getting in or out of chair - this knee	Pain getting in or out of chair - this knee	=B4AJLKCH or B4AJRKCH or ZAAJKCH		
YxKPFS*	Pain walking on flat surface - this knee	Pain walking on flat surface - this knee	=B4AJLKFS or B4AJRKFS or ZAAJKFS		
YxKPIN*	Pain getting in or out of car - this knee	Pain getting in or out of car - this knee	=B4AJLKN or B4AJRKIN or ZAAJKIN		
YxKPST*	Pain going up or down stairs - this knee	Pain going up or down stairs - this knee	=B4AJLKST or B4AJRKST or ZAAJKST		
YxKPUP*	Pain standing upright - this knee	Pain standing upright - this knee	=B4AJLKUP or B4AJRKUP or ZAAJKUP		

***This variable has different interpretations depending on how the question was asked, see note page 5.2-3**

Variable	Descriptive Title	Detailed Description	How variable is calculated	How to handle missing or special values	Value labels
YxKPSIG	Knee pain case -this knee	This knee meets case definition	If any of the following are marked moderate, severe, or extreme (2, 3, or 4): pain in knee during last 30 days when: walking on flat surface, going up or down stairs, at night in bed, standing upright, getting in/out of chair, getting in/out of car, or if knee pain lasting ≥ 1 month in past 12 months, or knee pain most days in past month then Y2KPSIG=1. Else Y2KPSIG=0	If all of knee pain questionnaire is missing, then Y2KPSIG is missing	0=No 1=Yes
YxKPSIGG	Knee pain case - either knee	Either knee meets case definition	$Y2KPSIGG = \max(Y2KPSIG \text{ for each knee})$	If Y2KPSIG is missing for one knee, Y2KPSIGG=Y2KPSIG for the other knee; If Y2KPSIG is missing for both knees, Y2KPSIGG is missing	0=No 1=Yes
YxKPSIGN	# of knees that are cases	Number of knees that meet case definition	Sum Y2KPSIG over person	If Y2KPSIG is missing for one knee, Y2KPSIGN=Y2KPSIG for the other knee; If Y2KPSIG is missing for both knees, Y2KPSIGN is missing	0-2
YxWOMAC	Activity pain (Likert scale) - this knee	Sum of knee activity pain scores for 6 activities in WOMAC -- this knee	sum of (B4AJLKFS, B4AJLKST, B4AJLKBD, B4AJLKUP, B4AJLKCH, B4AJLKN)	If >2 of variables are missing, then Y2WOMAC is set to Missing, otherwise Y2WOMAC is pro-rated	0-24

Appendix VI

Proc Contents (LONGKNOA)