ICPSR 29282

National Survey of Midlife Development in the United States (MIDUS II): Biomarker Project, 2004-2009

Carol D. Ryff
University of Wisconsin-Madison

Teresa Seeman
University of California-Los Angeles

Maxine Weinstein Georgetown University

Sleep Data Documentation

Inter-university Consortium for Political and Social Research P.O. Box 1248 Ann Arbor, Michigan 48106 www.icpsr.umich.edu

Terms of Use

The terms of use for this study can be found at: http://www.icpsr.umich.edu/cocoon/ICPSR/TERMS/29282.xml

Information about Copyrighted Content

Some instruments administered as part of this study may contain in whole or substantially in part contents from copyrighted instruments. Reproductions of the instruments are provided as documentation for the analysis of the data associated with this collection. Restrictions on "fair use" apply to all copyrighted content. More information about the reproduction of copyrighted works by educators and librarians is available from the United States Copyright Office.

NOTICE WARNING CONCERNING COPYRIGHT RESTRICTIONS

The copyright law of the United States (Title 17, United States Code) governs the making of photocopies or other reproductions of copyrighted material. Under certain conditions specified in the law, libraries and archives are authorized to furnish a photocopy or other reproduction. One of these specified conditions is that the photocopy or reproduction is not to be "used for any purpose other than private study, scholarship, or research." If a user makes a request for, or later uses, a photocopy or reproduction for purposes in excess of "fair use," that user may be liable for copyright infringement.

DOCUMENTATION

for

SLEEP DATA

in

MIDUS II BIOMARKER PROJECT (P4)

University of Wisconsin ♦ Institute on Aging July, 2010

INTRODUCTION

This document provides an overview of sleep quality data collected in the MIDUS-II Biomarker Project (P4). It provides comprehensive information regarding methods used to collect sleep data as well as additional information regarding administrative, constructed scales, and computed variables that are available. Information about the construction and usage of these variables is also provided.

Data users are also encouraged to review the Biomarker (P4) Readme Data File Notes. This document provides information about naming conventions, as well as administrative and filter variables included in the data file. It also includes information about how we handled missing values and other issues that arose over the course of the study. For example, there are instances when variables were added or sections of an instrument were expanded for data entry purposes to accommodate additional information provided by the respondent.

This document will be periodically revised and updated as more information is gathered, and researchers continue to work with the MIDUS-II Biomarker data. If there are suggestions or comments, please contact Gayle Love (glove@wisc.edu) or Barry Radler (bradler@wisc.edu).

TABLE OF CONTENTS

SECTION A: (OVERVIEW OF DATA FILE AND COLLECTION PROTOCOLS	A-1
SECTION B:	SURVEY INSTRUMENTS	B-1
I	PITTSBURGH SLEEP QUALITY INVENTORY (PSQ)	B-2
Ī	DAILY SLEEP DIARY	B-4
SECTION C:	ACTIWATCH® DATA COLLECTION AND PROCESSING	C-1
SECTION D:	APPENDICES	D-1
	APPENDIX A: ACTIWATCH® COMPUTATIONS	D-2
	APPENDIX B: ACTIWATCH® DEFINITIONS	D-3

SECTION A

OVERVIEW OF DATA FILE AND COLLECTION PROTOCOLS

OVERVIEW OF DATA FILE AND COLLECTION PROTOCOLS

The Biomarker Project (P4) includes multiple types of sleep data from the following sources:

- Pittsburgh Sleep Quality Inventory (PSQ)
- Daily Sleep Diary
- Actiwatch® Activity Monitor

As described in the "Biomarker Project (P4) Readme Data File Notes", the P4 variable naming convention organizes variables according to the method used for data collection. We have followed this convention with respect to the sleep data, thus analysts using PSQ, Actiwatch®, and Daily Sleep Diary data will need to pull variables from different sections of the data file as indicated below.

The PSQ is implemented at all 3 P4 sites. The Actiwatch® and daily sleep diary are administered only at the UW-Madison (Site 2) location to facilitate linkages with Neuroscience (Project 5) data that are also collected at the same location. The following provides general information and also indicates where additional details can be found.

Pittsburgh Sleep Quality Inventory (PSQ):

A copy of the PSQ appears in Section B. Variable names have been added to the instrument just below the question number or to the right of a "_____" provided for participants to record responses. It is a self-administered questionnaire completed during the clinic visit, or just prior to the visit while the participant was still at home. It is also a standalone instrument thus the variable names begin with their own unique 3 character set "B4S".

This set of variables appears in the data file immediately after the items from the Self-Administered Questionnaire Booklet. Scale construction information appears in the "Documentation of Psychosocial Constructs & Composite Variables".

Daily Sleep Diary:

A copy of the Daily Sleep Diary follows the PSQ in Section B. Variable names are inserted just below question number or to the right of an item. Participants completed the diary at home during the Actiwatch® data collection period (see Section C for more information). The Diary is a standalone instrument, thus, the variable names begin with their own unique 3 character set "B4A".

This set of variables appears in the data file immediately after the biomarker assay data from the blood, urine and saliva samples.

Actiwatch® Activity Monitor:

Details of the Actiwatch® data collection and processing protocol appear in Section C. Actiwatch® data are collected for 7 consecutive days beginning in the morning on the Tuesday after the day the respondent returns home following the GCRC visit. The data collection period ends at the time the respondent wakes up on the following Tuesday. For each respondent, we report data for 7 rest periods, which include 7 sleep periods, and 6 activity periods occurring between the first and last rest/sleep periods. The Actiwatch® variable names begin with "B4W" and include the following measures:

Data collection period start and end date

- For each Rest, Sleep and Active period:
 - Start Date, Day, and Time
 - End Date, Day and Time
 - Total activity counts
 - Average Activity Counts/Minute
 - Maximum Activity Counts
 - % Invalid Activity Counts
 - % Invalid Sleep/Wake Time
 - Wake Time
 - o % Wake Time
 - # Wake Bouts
 - Average Wake Bouts
 - o Sleep Time
 - o % Sleep Time
 - # Sleep Bouts
 - Average Sleep Bouts
- The above information is used to compute the following summary statistics (see Actiwatch® protocol for computation details) for each Sleep period:
 - Sleep Onset Latency (in minutes)
 - o Time Dozing Before Rising (Snooze Time, in minutes)
 - Sleep Efficiency (%)
 - Wake after Sleep Onset (WASO, in minutes)

The data set also includes the administrative variables that can be used to identify cases with missing or imputed data. These variables are described in Section C.

Additional information about Filter variables may be found in the "Biomarker Project (P4) Readme Data File Notes".

SECTION B

SURVEY INSTRUMENTS

Pittsburgh Sleep Quality Inventory (PSQ)

Daily Sleep Diary

S	Site#	
1	D #:	
PITTSBURGH SLEEP QUALITY INVENTORY (PSQ)		

Date	e Completed:[B4ZCOM	PM, B4ZCOMPY]		
indi	following questions relate to cate the most accurate reply stions.	-		
1.)	During the past month, whe	n have you usually gone to b	ed at night?	
	USUAL BED TIM	ME _[B4S1]_: AM or I	PM (Circle One) [B4S1Al	MPM]
2.)	During the past month, how	long (in minutes) has it take	en you to fall asleep at ni	ght?
	NUMBER OF MI	<u>NUTES</u> [B4S2]		
3.)	During the past month, whe	n have you usually gotten up	o in the morning?	
	USUAL GETTIN	G UP TIME _[B4S3]_:	AM or PM (Circle One)	[B4S3AMPM]
4.)	During the <u>past month</u> , how the number of hours you spe		did you get at night (Thi	s may be different than
	HOURS OF SLEE	EP PER NIGHT _[B4S4]		
	each of the remaining questi			f the questions.
[B4	SS5] Very good	Fairly good	Fairly bad	Very bad
6.)	During the past month, how enthusiasm to get things dor	<u>-</u>	een for you to keep up en	ough
	No problem at all	Only a very slight problem	Somewhat of a problem	m A very big problem
	During the past month, how counter") to help you sleep?	v often have you taken medi	cine (prescribed or "over	the
-	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
8.)	During the past month, how eating meals, or engaging in		e staying awake while dr	iving,
	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week

9.) Do you have a bed partner or roommate?

[B4S9]

No bed partner Partner/roommate Partner/roommate in Partner in same bed or roommate in other room room, but not same bed

10.) If you have a roommate or bed partner, ask him or her how often during the past month you have had...

		Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
a.	Loud snoring. [B4S10A]	1	2	3	4
b.	Long pauses between breaths while asleep. [B4S10B]	1	2	3	4
c.	Legs twitching or jerking while sleeping. [B4S10C]	1	2	3	4
d.	Episodes of disorientation or confusion during sleep. [B4S10D]	1	2	3	4
e.	Other restlessness while you sleep. [B4S10E]	1	2	3	4

Please describe:

11.) During the past month, how often have you had trouble sleeping because you...

		Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
a.	Could not get to sleep within 30 minutes. [B4S11A]	1	2	3	4
b.	Woke up in the middle of the night or early in the morning. [B4S11B]	1	2	3	4
c.	Had to get up to use the bathroom. [B4S11C]	1	2	3	4
d.	Could not breathe comfortably. [B4S11D]	1	2	3	4
e.	Coughed and snored. [B4S11E]	1	2	3	4
f.	Felt too cold. [B4S11F]	1	2	3	4
g.	Felt too hot. [B4S11G]	1	2	3	4
h.	Had bad dreams. [B4S11H]	1	2	3	4
i.	Had pain. [B4S11I]	1	2	3	4
j.	Other reason(s). [B4S11J]	1	2	3	4
•	Please Describe:				

Please Describe:

MIDUS BIOMARKER PROJECT: DAILY SLEEP DIARY

ID#	
IU#	

TUESDAY DATE:

BE	FORE BED: (Please complete the following	ng before goi	ng	to :	slee	ep)						
1.	How alert were you today? (circle a numbe	er): most ale	rt	1 :	2 3	3 4	4 5	not al	ert at	all [B4	AD11]	
2.	How many minutes of moderate or vigorou	ıs exercise di	d y	ou	ge	t to	da	y?		B4AD	12]	
3.	Did you nap today? Yes No If yes, spe	ecify length o	f tiı	me:	:			(minute	es) [E	34AD13]] [B4AD13	S]
4.	How many caffeinated drinks did you have (Note: 1 mug of coffee or cup of tea, 1					_#	of (drinks	[B4A[D14]		
5.	How many alcoholic drinks did you have to (Note: 1 bottle beer or wine cooler, 1 g									15]		
	Did you take any medications today that yo (e.g. allergy or cold medicine, pain reli es, record the medication name(s) and dos	evers, etc.)					·	-		_	_	
	WEDN	ESDAY MOI	RN	INC	}							
UP	ON AWAKENING: (Please complete soon	after waking	j up), W	/aiti	ing	no	more t	han 1	0 minu	ites).	
	Did you take any medication or supplemendes, please record the medication name an											
8.	What time did you go to bed and begin try	ring to go to s	slee	p?		_[B	4Al	D18]	a.m./p	o.m. [B4	IAD18A]	
9.	How long did it take you to get to sleep las	st night? _[B	4A[D19]_	(m	inu	tes)				
10.	How difficult was it to get to sleep last nig	ht? (circle a	nur	nbe	r) י	ver	у е	asy 1	2 3	4 5 v	ery difficu	ılt
11.	How many times did you wake last night [B4AD111]	(after falling a	asle	еер	bu	ıt b	efo	re your	final	awakeı	ning)?	_
12.	Did you wake up because of noises, light [B4AD112]	s, or some of	he	r ad	ctivi	ity?	•	es N	0			
	If you woke up during the night, did you h [B4AD113]	ave difficulty	ge	ttin	g b	ac	k tc	sleep	? Ye	s No		
	If you woke up during the night, during ho [B4AD114]	ow many of th	nes	e a	wa	ker	nin	gs did y	ou ge	et out o	f bed?	_
15.	What time did you wake up for the day ar [B4AD115] [B4AD115A]	nd not return	to s	slee	ep?	_		:	a.m	n./p.m.		
16.	What time did you get out of bed for the c [B4AD116] [B4AD116A]	lay?:			a.r	ո./լ	o.m	١.				
Ple	ase rate the following: (circle a number)											
17.	How deeply you slept last night:	very deeply	1	2	3	4	5	very li	ghtly	[B14AD)117]	
18.	How well-rested you feel this morning:	well rested	1	2	3	4	5	poorly	reste	e d [B4A	.D118]	
19.	How alert you feel this morning:	very alert	1	2	3	4	5	not ale	ert at a	all [B4A	\D119]	
20.	Overall quality of your sleep last night:	very good	1	2	3	4	5	very p	oor [l	34AD12	20]	

MIDUS BIOMARKER PROJECT: DAILY SLEEP DIARY
WEDNESDAY DATE:
BEFORE BED: (Please complete the following before going to sleep).
1. How alert were you today? (circle a number): most alert 1 2 3 4 5 not alert at all [B4AD21]
2. How many minutes of moderate or vigorous exercise did you get today? [B4AD22]
3. Did you nap today? Yes No If yes, specify length of time: (minutes) [B4AD23] [B4AD23S]
 How many caffeinated drinks did you have today? #of drinks [B4AD24] (Note: 1 mug of coffee or cup of tea, 1 can pop = 1 drink)
5. How many alcoholic drinks did you have today? #of drinks [B4AD25] (Note: 1 bottle beer or wine cooler, 1 glass of wine, 1 shot of liquor = 1 drink)
6. Did you take any medications today that you don't regularly take every day? Yes No [B4AD26] (e.g. allergy or cold medicine, pain relievers, etc.) If yes, record the medication name(s) and dose(s):[B4AD26M]
THURSDAY MORNING
UPON AWAKENING: (Please complete soon after waking up, waiting no more than 10 minutes).
7. Did you take any medication or supplement specifically to help you sleep? Yes No [B4AD27] If yes, please record the medication name and dose:[B4AD27M]
8. What time did you go to bed and begin trying to go to sleep?[B4AD28] a.m./p.m. [B4AD28A]
9. How long did it take you to get to sleep last night? _[B4AD29]_ (minutes)
10. How difficult was it to get to sleep last night? (circle a number) very easy 1 2 3 4 5 very difficult [B4AD210]
11. How many times did you wake last night (after falling asleep but before your final awakening)? [B4AD211]
12. Did you wake up because of noises, lights, or some other activity? Yes No [B4AD212]
13. If you woke up during the night, did you have difficulty getting back to sleep? Yes No [B4AD213]
14. If you woke up during the night, during how many of these awakenings did you get out of bed? [B4AD214]
15. What time did you wake up for the day and not return to sleep?: a.m./p.m. [B4AD215] [B4AD215A]
16. What time did you get out of bed for the day?: a.m./p.m. [B4AD216] [B4AD216A]
Please rate the following: (circle a number) 17. How deeply you slept last night: very deeply 1 2 3 4 5 very lightly [B14AD217]
17. How deeply you slept last hight. Very deeply 1 2 3 4 5 Very lightly [B14AD217]
18. How well-rested you feel this morning: well rested 1 2 3 4 5 poorly rested [B4AD218]

very alert

very good

1 2 3 4 5 not alert at all [B4AD219]

1 2 3 4 5 very poor [B4AD220]

19. How alert you feel this morning:

MIDUS BIOMARKER PROJECT: DAILY SLEEP DIARY ID#
THURSDAY DATE:
BEFORE BED: (Please complete the following before going to sleep).
1. How alert were you today? (circle a number): most alert 1 2 3 4 5 not alert at all [B4AD31]
2. How many minutes of moderate or vigorous exercise did you get today? [B4AD32]
3. Did you nap today? Yes No If yes, specify length of time: (minutes) [B4AD33] [B4AD33
4. How many caffeinated drinks did you have today? #of drinks [B4AD34] (Note: 1 mug of coffee or cup of tea, 1 can pop = 1 drink)
5. How many alcoholic drinks did you have today? #of drinks [B4AD35] (Note: 1 bottle beer or wine cooler, 1 glass of wine, 1 shot of liquor = 1 drink)
6. Did you take any medications today that you don't regularly take every day? Yes No [B4AD36] (e.g. allergy or cold medicine, pain relievers, etc.) If yes, record the medication name(s) and dose(s):[B4AD36M]
FRIDAY MORNING UPON AWAKENING: (Please complete soon after waking up, waiting no more than 10 minutes).
7. Did you take any medication or supplement specifically to help you sleep? Yes No [B4AD37] If yes, please record the medication name and dose:[B4AD37M]
8. What time did you go to bed and begin trying to go to sleep?[B4AD38] a.m./p.m. [B4AD38A]
9. How long did it take you to get to sleep last night? _[B4AD39]_ (minutes)
10. How difficult was it to get to sleep last night? (circle a number) very easy 1 2 3 4 5 very diffic [B4AD310]
11. How many times did you wake last night (after falling asleep but before your final awakening)? [B4AD311]
12. Did you wake up because of noises, lights, or some other activity? Yes No [B4AD312]
13. If you woke up during the night, did you have difficulty getting back to sleep? Yes No [B4AD313]
14. If you woke up during the night, during how many of these awakenings did you get out of bed? [B4AD314]
15. What time did you wake up for the day and not return to sleep?: a.m./p.m. [B4AD315] [B4AD315A]
16. What time did you get out of bed for the day?: a.m./p.m. [B4AD316] [B4AD316A]
Please rate the following: (circle a number) 17. How deeply you slept last night: very deeply 1 2 3 4 5 very lightly [B14AD317]

- 18. How well-rested you feel this morning: well rested 1 2 3 4 5 poorly rested [B4AD318]
- 19. How alert you feel this morning: very alert 1 2 3 4 5 not alert at all [B4AD319]
- 20. Overall quality of your sleep last night: very good 1 2 3 4 5 very poor [B4AD320]

MIDUS BIOMARKER PROJECT: DAILY SLEEP DIARY	
FRIDAY DATE:	
BEFORE BED: (Please complete the following before going to sleep).	
1. How alert were you today? (circle a number): most alert 1 2 3 4 5 not alert at all [B4AD41]	
2. How many minutes of moderate or vigorous exercise did you get today? [B4AD42]	
3. Did you nap today? Yes No If yes, specify length of time: (minutes) [B4AD43] [B4AD43]	3S]
4. How many caffeinated drinks did you have today? #of drinks [B4AD44] (Note: 1 mug of coffee or cup of tea, 1 can pop = 1 drink)	
5. How many alcoholic drinks did you have today? #of drinks [B4AD45] (Note: 1 bottle beer or wine cooler, 1 glass of wine, 1 shot of liquor = 1 drink)	
6. Did you take any medications today that you don't regularly take every day? Yes No [B4AD46] (e.g. allergy or cold medicine, pain relievers, etc.) If yes, record the medication name(s) and dose(s):[B4AD46M]	
SATURDAY MORNING	
UPON AWAKENING: (Please complete soon after waking up, waiting no more than 10 minutes).	
7. Did you take any medication or supplement specifically to help you sleep? Yes No [B4AD47] If yes, please record the medication name and dose:[B4AD47M]	
8. What time did you go to bed and begin trying to go to sleep?[B4AD48] a.m./p.m. [B4AD48A]	
9. How long did it take you to get to sleep last night? _[B4AD49]_ (minutes)	
10. How difficult was it to get to sleep last night? (circle a number) very easy 1 2 3 4 5 very diffic [B4AD410]	ult
11. How many times did you wake last night (after falling asleep but before your final awakening)?	
12. Did you wake up because of noises, lights, or some other activity? Yes No [B4AD412]	
13. If you woke up during the night, did you have difficulty getting back to sleep? Yes No [B4AD413]	
14. If you woke up during the night, during how many of these awakenings did you get out of bed? [B4AD414]	_
15. What time did you wake up for the day and not return to sleep?: a.m./p.m. [B4AD415] [B4AD415A]	
16. What time did you get out of bed for the day?: a.m./p.m. [B4AD416] [B4AD416A]	
Please rate the following: (circle a number)	
17. How deeply you slept last night: very deeply 1 2 3 4 5 very lightly [B14AD417]	
18. How well-rested you feel this morning: well rested 1 2 3 4 5 poorly rested [B4AD418]	

very alert

very good

1 2 3 4 5 not alert at all [B4AD419]

1 2 3 4 5 very poor [B4AD420]

19. How alert you feel this morning:

	MIDUS BIOMARKER PROJECT: DAILY SLEEP DIARY
SA	TURDAY DATE:
BE	FORE BED: (Please complete the following before going to sleep).
1.	How alert were you today? (circle a number): most alert 1 2 3 4 5 not alert at all [B4AD51]
2.	How many minutes of moderate or vigorous exercise did you get today? [B4AD52]
3.	Did you nap today? Yes No If yes, specify length of time: (minutes) [B4AD53] [B4AD53S]
4.	How many caffeinated drinks did you have today? #of drinks [B4AD54] (Note: 1 mug of coffee or cup of tea, 1 can pop = 1 drink)
5.	How many alcoholic drinks did you have today? #of drinks [B4AD55] (Note: 1 bottle beer or wine cooler, 1 glass of wine, 1 shot of liquor = 1 drink)
	Did you take any medications today that you don't regularly take every day? Yes No [B4AD56] (e.g. allergy or cold medicine, pain relievers, etc.) es, record the medication name(s) and dose(s):[B4AD56M]
	SUNDAY MORNING
UP	ON AWAKENING: (Please complete soon after waking up, waiting no more than 10 minutes).
	Did you take any medication or supplement specifically to help you sleep? Yes No [B4AD57] yes, please record the medication name and dose:[B4AD57M]
8.	What time did you go to bed and begin trying to go to sleep?[B4AD58] a.m./p.m. [B4AD58A]
9.	How long did it take you to get to sleep last night? _[B4AD59]_ (minutes)
10.	How difficult was it to get to sleep last night? (circle a number) very easy 1 2 3 4 5 very difficult [B4AD510]
	How many times did you wake last night (after falling asleep but before your final awakening)? [B4AD511]
	Did you wake up because of noises, lights, or some other activity? Yes No [B4AD512]
13.	If you woke up during the night, did you have difficulty getting back to sleep? Yes No [B4AD513]
14.	If you woke up during the night, during how many of these awakenings did you get out of bed? [B4AD514]
	What time did you wake up for the day and not return to sleep?: a.m./p.m. [B4AD515] [B4AD115A]
16.	What time did you get out of bed for the day?: a.m./p.m. [B4AD516] [B4AD116A]
	ease rate the following: (circle a number)
	How deeply you slept last night: very deeply 1 2 3 4 5 very lightly [B14AD517]
18.	How well-rested you feel this morning: well rested 1 2 3 4 5 poorly rested [B4AD518]

very alert

very good

1 2 3 4 5 not alert at all [B4AD519]

1 2 3 4 5 very poor [B4AD520]

19. How alert you feel this morning:

MIDUS BIOMARKER PROJECT: DAILY SLEEP DIARY

SUNDAY DATE:

BEFORE BED: (Please complete the following before going to sleep).	
1. How alert were you today? (circle a number): most alert 1 2 3 4 5 not alert at all [B4AD61]	ı
2. How many minutes of moderate or vigorous exercise did you get today? [B4AD62]	
3. Did you nap today? Yes No If yes, specify length of time: (minutes) [B4AD63] [B4A	D63S]
4. How many caffeinated drinks did you have today? #of drinks [B4AD64] (Note: 1 mug of coffee or cup of tea, 1 can pop = 1 drink)	
5. How many alcoholic drinks did you have today? #of drinks [B4AD65] (Note: 1 bottle beer or wine cooler, 1 glass of wine, 1 shot of liquor = 1 drink)	
6. Did you take any medications today that you don't regularly take every day? Yes No [B4AD66 (e.g. allergy or cold medicine, pain relievers, etc.) If yes, record the medication name(s) and dose(s):[B4AD66M]	
MONDAY MORNING	
UPON AWAKENING: (Please complete soon after waking up, waiting no more than 10 minutes).	
7. Did you take any medication or supplement specifically to help you sleep? Yes No [B4AD67] If yes, please record the medication name and dose:[B4AD67M]	
8. What time did you go to bed and begin trying to go to sleep?[B4AD68] a.m./p.m. [B4AD68	A]
9. How long did it take you to get to sleep last night? _[B4AD69]_ (minutes)	
10. How difficult was it to get to sleep last night? (circle a number) very easy 1 2 3 4 5 very di [B4AD610]	fficult
11. How many times did you wake last night (after falling asleep but before your final awakening)? [B4AD611]	,
12. Did you wake up because of noises, lights, or some other activity? Yes No [B4AD612]	
13. If you woke up during the night, did you have difficulty getting back to sleep? Yes No [B4AD613]	
14. If you woke up during the night, during how many of these awakenings did you get out of bed' [B4AD614]	<u> </u>
15. What time did you wake up for the day and not return to sleep?: a.m./p.m. [B4AD615] [B4AD615A]	
16. What time did you get out of bed for the day?: a.m./p.m. [B4AD616] [B4AD616A]	
Please rate the following: (circle a number)	
17. How deeply you slept last night: very deeply 1 2 3 4 5 very lightly [B14AD617]	
18. How well-rested you feel this morning: well rested 1 2 3 4 5 poorly rested [B4AD618]	ſ
19. How alert you feel this morning: very alert 1 2 3 4 5 not alert at all [B4AD619]

very good

1 2 3 4 5 very poor [B4AD620]

MIDUS BIOMARKER PROJECT: DAILY SLEEP DIARY
MONDAY DATE:
BEFORE BED: (Please complete the following before going to sleep).
1. How alert were you today? (circle a number): most alert 1 2 3 4 5 not alert at all [B4AD71]
2. How many minutes of moderate or vigorous exercise did you get today? [B4AD72]
3. Did you nap today? Yes No If yes, specify length of time: (minutes) [B4AD73] [B4AD73S
4. How many caffeinated drinks did you have today? #of drinks [B4AD74] (Note: 1 mug of coffee or cup of tea, 1 can pop = 1 drink)
5. How many alcoholic drinks did you have today? #of drinks [B4AD75] (Note: 1 bottle beer or wine cooler, 1 glass of wine, 1 shot of liquor = 1 drink)
6. Did you take any medications today that you don't regularly take every day? Yes No [B4AD76] (e.g. allergy or cold medicine, pain relievers, etc.) If yes, record the medication name(s) and dose(s):[B4AD76M]
TUESDAY MORNING
UPON AWAKENING: (Please complete soon after waking up, waiting no more than 10 minutes).
7. Did you take any medication or supplement specifically to help you sleep? Yes No [B4AD77] If yes, please record the medication name and dose:[B4AD77M]
8. What time did you go to bed and begin trying to go to sleep?[B4AD78] a.m./p.m. [B4AD78A]
9. How long did it take you to get to sleep last night? _[B4AD79]_ (minutes)
10. How difficult was it to get to sleep last night? (circle a number) very easy 1 2 3 4 5 very difficul [B4AD710]
11. How many times did you wake last night (after falling asleep but before your final awakening)? [B4AD711]
12. Did you wake up because of noises, lights, or some other activity? Yes No [B4AD712]
13. If you woke up during the night, did you have difficulty getting back to sleep? Yes No [B4AD713]
14. If you woke up during the night, during how many of these awakenings did you get out of bed? [B4AD714]
15. What time did you wake up for the day and not return to sleep?: a.m./p.m. [B4AD715] [B4AD715A]
16. What time did you get out of bed for the day?: a.m./p.m. [B4AD716] [B4AD716A]

Please rate the following: (circle a number)

17. How deeply you slept last night: very deeply 1 2 3 4 5 very lightly [B14AD717]

18. How well-rested you feel this morning: well rested 1 2 3 4 5 poorly rested [B4AD718]

19. How alert you feel this morning: very alert **1 2 3 4 5 not alert at all** [B4AD719]

20. Overall quality of your sleep last night: very good **1 2 3 4 5 very poor** [B4AD720]

SECTION C

ACTIWATCH® DATA COLLECTION AND PROCESSING

ACTIWATCH® DATA COLLECTION AND PROCESSING

This section describes the protocol for collecting and processing activity data collected via the Actiwatch® system. These data were only collected from individuals who participated in the Biomarker (P4) project at the University of Wisconsin-Madison (Site2).

Overview

Biomarker subjects who completed a General Clinical Research Center (GCRC) visit at site 2 (UW) were invited to participate in a 7 day sleep study. The protocol required that participants wear the Mini Mitter Actiwatch®-64 activity monitor, continuously, for 7 consecutive days and also complete a paper and pencil Daily Sleep Diary over the same time period.

At the end of the GCRC visit, the participant received a postage paid envelope containing the daily sleep diary, a pre-programmed Actiwatch®, along with a cover letter and instructions for wearing the watch, completing the daily diary, and then returning the materials at the end of the collection period. Participants also received a reminder call the day before the sleep data collection period began. More specific details about collecting and processing the diary and watch data are provided separately below.

Daily Sleep Diary (self-report)

- A. <u>Data Collection</u>: The Daily Sleep Diary is a 7 page self-administered questionnaire (see Section B above) that includes two sets of questions:
 - a. Before Bed the participant was asked to complete this section before going to sleep. The items assess:
 - Alertness through the day
 - Exercise
 - Napping
 - Consumption of caffeinated and alcoholic beverages
 - Use of medications that are not regularly taken every day.
 - b. Upon Awakening the participant was asked to complete this section soon after waking up, waiting no more than 10 minutes. The items assess:
 - Use of medications or supplements to help sleep
 - Time to bed
 - Time to fall asleep
 - Difficulty falling asleep
 - Wakefulness during the night (4 items)
 - Time awoke for the day and did not return to sleep
 - Time out of bed for the day
 - Overall quality of sleep (4 items)

The date for each day of data collection was written on the form before it was given to the participant.

B. Data Processing:

a. As a standalone instrument, the Daily Sleep Diary was reviewed by designated staff prior and then data entered using the SPSS Data Entry double entry blind verification system.

- b. Data were then cleaned (i.e. checked for inconsistencies or other errors and corrected as needed) according to standardized procedures.
- c. The times recorded at Questions 8 (What time did you go to bed and begin trying to go to sleep?) and 15 (What time did you wake up for the day and not return to sleep?) were extracted from the cleaned data file and used to mark Rest and Exclusion intervals in the Actiwatch® (see below).

Actiwatch®-64

- A. <u>Data Collection</u>: The Actiwatch®-64 collects data via a built-in motion sensor that can be programmed to detect the number of movements in a specified time interval beginning at a specified date and time. Data collection proceeds as follows:
 - a. Staff programmed each watch to:
 - Begin collecting data at 7:00 a.m. on the Tuesday after the day the respondent returns home following their GCRC visit.
 - Detect the number of movements per epoch (30 second intervals).

See Appendix A & B (Section D) for more information about how sleep statistics were computed using activity counts per epoch as well as definitions of key terms.

- b. Participants were instructed to:
 - Put the Actiwatch® on when they wake up on the designated day
 - Begin completing the Daily Sleep Diary before going to bed on that day. They also received a reminder phone call the day before the data collection period began.
- c. The data collection period ended at the time the respondent woke up on the following Tuesday, one week later.

Data was downloaded from the Actiwatch® and stored in the Actiwatch® database for processing upon receipt in the project office.

Note: The Actiwatch® has an event marker button on the side that users can push to indicate when they go to bed and when they wake up for the day. The Actiware software (version 4) available when data collection began in July 2004 could not take advantage of that feature, but Actiware 5, released in September 2005 does. Beginning in the fall 2005, participants were instructed to push the event marker button right before going to sleep and at rising. Compliance with this instruction varies quite a bit from participant to participant.

B. <u>Data Processing</u>: In Actiware Software

The Actiware 5 software is used to generate summary statistics about a respondent's sleep. To compute these statistics, the program requires that intervals demarking rest and exclusion periods be specified for each day in the study period.

- a. <u>Marking Intervals:</u> We defined these intervals using information from the Daily Sleep Diary as follows:
 - Rest Interval: Time spent in bed on a given day as reported by the respondent:
 - Start date & time The date recorded at the top of the page for a given day in the collection period and the response to Question 8 for that day. (What time did you go to bed and begin trying to go to sleep?)

- End date & time The date recorded at the top of the page for the next day along with Question 15 for the current day. (What time did you wake up for the day and not return to sleep?)
- Exclusion Periods: These are activity periods the program should exclude when generating summary statistics.
 - Front End Exclusion period extends from the programmed start time (7:00 a.m. on the first day of the collection period) to beginning of the first rest period (Time to bed - Day 1, Q8).
 - Back End Exclusion period extends from the end of the last rest period (Awake Time – Day 7 Q15) to the time that staff end the data collection period by transferring data to the Actiwatch® database. This period may be several days in length.
- b. Data Cleaning: Sometimes respondents provided incomplete information (forgot to put the watch on, took it off too early etc), or had experiences during the data collection period (e.g. travel to a different time zone, worked an extra shift, etc.) which made it difficult to mark Rest and Exclusion periods. Problematic cases were flagged for review and intervals were marked, or deleted, as appropriate according to the following guidelines. These guidelines were also used to create the administrative filter variables described at the end of Section A above that allow users to identify cases with missing or imputed data:

Note: Across the following:

"time" = the time specified at Q8 and/or Q15 on a given day in the Daily Sleep Diary.

"event marker time" = the time flagged when the participant pushed the event marker button.

- If the responses to Q8 and/or Q15 are 'missing' for a given day:
 - Use the event marker times if they are available and appear to be reliable.
 - o Impute the appropriate mean times as follows:
 - i. If data is missing for a weekday, impute the mean using the other weekday values if valid data is available for at least 3 weekdays.
 - ii. If data is missing for a weekend impute the mean using the other day of the weekend.
 - o If event marker times aren't apparent and means cannot be calculated, consult question #2 in the Pittsburgh Sleep Questionnaire (PSQ) and insert the beginning of a missing rest period 'x' numbers of minutes (per PSQ Q2) before the last activity count preceding the sleep period. If the end of the rest period cannot be calculated, we designate the first epoch that has activity as the end of the rest period.
- If the time listed is reported as a range, use the midpoint of the range or the event marker time whichever is more accurate.
- If the time listed differs quite a bit from the watch data, do not adjust.

- Time zone and Daylight Savings Time adjustments:
 - The time zone specified should always be the time zone of residence (e.g. the time zone the respondent lives in). If the respondent travels out of this time zone during the watch period then:
 - i. Times in the diary should correspond to the time zone of residence.
 - ii. Rest intervals in the Actiwatch® file should be marked to correspond to the time zone of residence.
 - If the data collection period includes the Daylight Savings Time transition date, adjust the times as appropriate to match the approximate sleep period.
- If data collection doesn't start on a Tuesday,
 - The Daily Sleep Diary data will be adjusted so that order of the days is consistent with the rest of the data.
- c. The above criteria were subsequently used to create the following filter variables which identify cases with missing or imputed values, as well as those affected by issues such as Time Zone changes or Daylight Savings Time adjustments.
 - B4AWAVL categorical variable indicating whether daily sleep diary and/or Actiwatch® data are available for a given case.
 - B4AWIMPU dichotomous Yes/No variable indicating whether there is missing data in the Daily Sleep Diary which required that rest intervals be marked by using imputed values.
 - B4AWMARK dichotomous Yes/No variable indicating whether there is a discrepancy between the daily sleep diary (self-reported) and Actiwatch® data that required rest intervals be marked by using imputed values.
 - B4AWDAYS indicates the number of days of sleep data available for a given respondent. All participants are expected to have 7 days of sleep data.
 - B4AWPART dichotomous Yes/No variable indicating whether there is there is partial watch data. A case is flagged as having partial data if the respondent did not wear the watch for the full 7 days of the collection period because they: 1) took it off for a few hours, 2) forgot to put it on until a day or two into the collection period, 3) or took it off a day or two early.
 - B4AWIDIO dichotomous Yes/No variable indicating whether or not the respondent had an idiosyncratic sleep pattern. Sometimes this is due to the respondents work schedule, but may be due to an illness (self or family member), or traveling.
 - B4AWTMZN –dichotomous Yes/No variable indicating whether or not the respondent traveled and slept outside their usual time zone during the data collection period or if the watch data collection period include a Daylight Savings Time change.
 - B4AWLAG indicates the number of days between the date the GCRC visit was completed and the date the watch data collection began.
- d. <u>Generating Summary Statistics</u>: The Actiware 5 software has the capacity to generate a variety of statistics about sleep and activity. Currently we generate the following:
 - Sleep Onset Latency (in minutes)

- Time Dozing Before Rising (Snooze Time, in minutes)
- Sleep Efficiency (%)
- Wake after Sleep Onset (WASO, in minutes)

Definitions of these terms and details about computation can be found in the Section D (Appendices) at the end of this document.

SECTION D

APPENDICES

Appendix A: Actiwatch® Computations

Appendix B: Actiwatch® Definitions

APPENDIX A: ACTIWATCH® COMPUTATIONS

The following information is taken from the Actiware® Software Version 5.0 manual.

Sleep/Wake Analysis:

Actiware scores all epochs as either sleep or wake. Whether a particular epoch is scored as wake or sleep is determined by comparing activity counts for the epoch in question and those immediately surrounding it to a threshold value (Wake Threshold Value) set by the researcher. If the number of counts exceeds that threshold, the epoch is scored as wake. If it falls below, or is equal to, the threshold, the epoch is scored as sleep.

Sleep = Total Activity Counts <= Wake Threshold Value Wake = Total Activity Counts > Wake Threshold Value

MIDUS uses a 30 second sampling epoch.

Calculating Total Activity Counts:

Actiware calculates total activity counts based on the sampling epoch. For instance, assume a 1-minute sampling epoch and the following activity values on and surrounding the time 12:00.

Time	Corresponding
	Activity Data
11:58	100
11:59	42
12:00	20
12:01	13
12:02	67

The total activity value for the 12:00 epoch would be: 100 * (1/25) + 42 * (1/5) + 20 + 13 * (1/5) + 67 * (1/25) = 37.68.

If this value is less than or equal to the wake threshold value (next paragraph), then the epoch would be scored as sleep.

The total number of activity counts calculated above is compared to the wake threshold value selected by the researcher. These thresholds are listed in the table below.

Wake Threshold Values

Wake Threshold Selection	Wake Threshold Value
Low	20
Medium*	40
High	80
Automatic	Computed automatically based on activity data
Custom	User-selectable value

^{*}MIDUS Wake Threshold value used for all cases.

APPENDIX B: ACTIWATCH® DEFINITIONS

The following information is taken from the Actiware® Software Version 5.0 manual.

Start Time

The time at the start of the given Rest, Active, Sleep, Custom, or Daily Interval (the start of the first epoch in the given interval).

End Time

The time at the end of the given Rest, Active, Sleep, Custom, or Daily Interval (the end of the last epoch in the given interval).

Interval Duration

The time elapsed between the Start Time and the End Time of the given interval, in minutes.

Total Activity

The sum of all valid physical activity counts [see Total Invalid Time, below] for all epochs from the Start Time to the End Time of the given interval.

Average Activity Per Minute

The average of all valid physical activity counts for all epochs from the Start Time to the End Time of the given interval divided by the Epoch Length in minutes.

Average Activity Per Epoch

The average of all valid physical activity counts for all epochs from the Start Time to the End Time of the given interval.

Standard Deviation of Activity

The standard deviation of all valid physical activity counts for all epochs from the Start Time to the End Time of the given interval. (The standard deviation is computed with (n - 1) rather than (n) in the denominator of the variance.)

Maximum Activity

The largest of any valid physical activity count for all epochs from the Start Time to the End Time of the given interval.

Total Invalid Time (Activity)

(The total number of epochs between the Start Time and the End Time of the given interval in which the physical activity count was found to exceed the maximum possible value from a properly functioning Actiwatch® [i.e., invalid data due to rare hardware error, communication error, or data corruption] plus the total number of epochs with valid physical activity counts manually excluded from the data set by the practitioner using Actiware) software multiplied by the Epoch Length in minutes (so the Total Invalid Time is in minutes).

Percent Invalid (Activity)

a) The percentage of Total Invalid Time (Activity) [see above] to the Interval Duration [see above]. b) (Total Invalid Time (Activity) divided by Interval Duration) multiplied by 100.

Total Invalid Time (Sleep/Wake)

(The total number of epochs between the Start Time and the End Time of the given interval for

which the sleep/wake scoring algorithm did not have enough data to determine a SLEEP or WAKE score) multiplied by the Epoch Length in minutes (so the Total Invalid Time is in minutes). Note: The insufficient data condition can be caused by invalid or manually excluded physical activity data at the epoch, and/or immediately before the epoch, and/or immediately after the epoch – how much before and after being a function of the Epoch Length.

Percent Invalid (Sleep/Wake)

a) The percentage of Total Invalid Time (Sleep/Wake) [see above] to the Interval Duration [see above]. b) (Total Invalid Time (Sleep/Wake) divided by Interval Duration) multiplied by 100.

Sleep Onset Latency

a) The time elapsed between the Start Time of a given Rest Interval and the following Sleep Start Time, in minutes. b) The time required for the onset of sleep after first attempting to get to sleep (i.e., from the "lights out" time). Calculated using the analysis setting made on Tools > Options > Analysis.

Snooze Time

a) The time elapsed between Sleep End Time and the End Time of a given Rest Interval, in minutes. b) The time elapsed between the end of sleep and the time lights are switched on or the subject gets out of bed.

Sleep Efficiency

a) The percentage of Scored Total Sleep Time [see below] to (Interval Duration [see above] minus Total Invalid Time (Sleep/Wake)), for the given Rest Interval. b) (Scored Total Sleep Time divided by (Interval Duration minus Total Invalid Time (Sleep/Wake)) of the given Rest Interval) multiplied by 100.

Wake after Sleep Onset (WASO)

The total number of epochs between the Start Time and the End Time of the given Sleep Interval scored as WAKE by Actiware software (or manually set as WAKE by the practitioner using Actiware software) multiplied by the Epoch Length in minutes (so the Wake After Sleep Onset is in minutes). Note: Wake After Sleep Onset is identical to Scored Total Wake Time [see below] when the given interval is a Sleep Interval.

Scored Total Wake Time

(The total number of epochs between the Start Time and the End Time of the given interval scored as WAKE by Actiware software [or manually set as WAKE by the practitioner using Actiware software]) multiplied by the Epoch Length in minutes (so the Scored Total Wake Time is in minutes). Note: In order to be scoreable as SLEEP or WAKE, an epoch must have a valid physical activity count [see Total Invalid Time (Sleep/Wake), above], and in addition there must be a sufficient number of epochs before and after the epoch being scored that also have valid physical activity counts.

Percent Wake

a) The percentage of Scored Total Wake Time to (Interval Duration minus Total Invalid Time (Sleep/Wake)), for the given interval. b) (Scored Total Wake Time divided by (Interval Duration minus Total Invalid Time (Sleep/Wake)) multiplied by 100.

Number of Wake Bouts

The total number of continuous blocks, one or more epochs in duration, with each epoch of each block scored as WAKE, between the Start Time and the End Time of the given interval.

Average Duration of Wake Bouts

The Scored Total Wake Time [see above] divided by the Number of Wake Bouts [see above], for the given interval.

Scored Total Sleep Time

(The total number of epochs between the Start Time and the End Time of the given interval scored as SLEEP by Actiware software [or manually set as SLEEP by the practitioner using Actiware software]) multiplied by the Epoch Length in minutes (so the Scored Total Sleep Time is in minutes). Note: In order to be scoreable as SLEEP or WAKE, an epoch must have a valid physical activity count [see Total Invalid Time (Sleep/Wake), above], and in addition there must be a sufficient number of epochs before and after the epoch being scored that also have valid physical activity counts.

Percent Sleep

a) The percentage of Scored Total Sleep Time to (Interval Duration minus Total Invalid Time (Sleep/Wake)), for the given interval. b) (Scored Total Sleep Time divided by (Interval Duration minus Total Invalid Time (Sleep/Wake)) multiplied by 100.

Number of Sleep Bouts

The total number of continuous blocks, one or more epochs in duration, with each epoch of each block scored as SLEEP, between the Start Time and the End Time of the given interval.

Average Duration of Sleep Bouts

The Scored Total Sleep Time [see above] divided by the Number of Sleep Bouts [see above], for the given interval.