

Obs	knots
1	7.0171
2	7.5647
3	7.8658
4	8.1999
5	8.5202
6	8.8214
7	9.1499
8	9.4812
9	9.8344
10	10.1109
11	10.4367
12	10.7734
13	11.1129
14	11.4908
15	11.8303
16	12.1697
17	12.4983
18	12.8159
19	13.1472
20	13.4812
21	13.7687
22	14.1027
23	14.4285
24	14.7351
25	15.0719
26	15.3895
27	15.7180
28	16.1040
29	16.4189
30	16.7885
31	17.1088
32	17.4648
33	17.7823
34	18.1793
35	18.6092

No modeling of between subject heterogeneity/within subject correlation

The Mixed Procedure

Model Information

Data Set	WORK.FEV2
Dependent Variable	logfev1
Covariance Structure	Banded Toeplitz
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Containment

Dimensions

Covariance Parameters	2
Columns in X	2
Columns in Z	35
Subjects	1
Max Obs Per Subject	1993

Number of Observations

Number of Observations Read	1993
Number of Observations Used	1993
Number of Observations Not Used	0

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0	1	-1632.81105467	
1	5	-2002.16980810	0.00000173
2	1	-2002.17443866	0.00000001

Convergence criteria met.

Covariance Parameter Estimates

Cov Parm	Estimate	Standard Error	Z Value	Pr > Z
Variance	0.000296	0.000182	1.63	0.0514
Residual	0.02106	0.000669	31.50	<.0001

No modeling of between subject heterogeneity/within subject correlation

The Mixed Procedure

Fit Statistics

-2 Res Log Likelihood	-2002.2
AIC (smaller is better)	-1998.2
AICC (smaller is better)	-1998.2
BIC (smaller is better)	-2002.2

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
1	369.36	<.0001

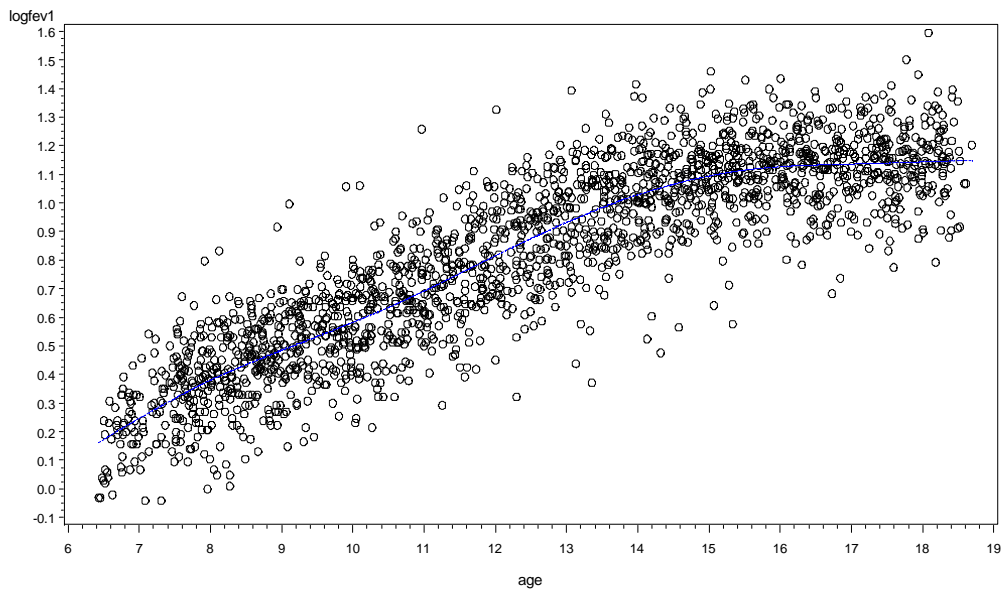
Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > t
Intercept	-0.7885	0.1595	1956	-4.94	<.0001
age	0.1478	0.02197	1956	6.73	<.0001

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	Chi-Square	F Value	Pr > ChiSq	Pr > F
age	1	1956	45.26	45.26	<.0001	<.0001

Fitted curve, Model 1



Model 2: linear spline model
Random subject-specific intercepts

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The Mixed Procedure

Model Information

Data Set	WORK.FEV2
Dependent Variable	logfev1
Covariance Structures	Banded Toeplitz, Variance Components
Subject Effect	id
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Containment

Dimensions

Covariance Parameters	3
Columns in X	2
Columns in Z Per Subject	334
Subjects	1
Max Obs Per Subject	1993

Number of Observations

Number of Observations Read	1993
Number of Observations Used	1993
Number of Observations Not Used	0

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0	1	-1632.81105467	
1	3	-3973.67541838	0.00193614
2	1	-3982.41118617	0.00023908
3	1	-3983.40357600	0.00000502
4	1	-3983.42306115	0.00000000

Convergence criteria met.

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
Variance		0.000194	0.000098	1.98	0.0239
Intercept	id	0.01671	0.001479	11.30	<.0001
Residual		0.005029	0.000173	29.05	<.0001

The Mixed Procedure

Fit Statistics

-2 Res Log Likelihood	-3983.4
AIC (smaller is better)	-3977.4
AICC (smaller is better)	-3977.4
BIC (smaller is better)	-3983.4

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > t
Intercept	-0.7390	0.1082	298	-6.83	<.0001
age	0.1395	0.01510	1658	9.23	<.0001

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	Chi-Square	F Value	Pr > ChiSq	Pr > F
age	1	1658	85.26	85.26	<.0001	<.0001

Model 3: linear spline model
 Random subject-specific intercepts and slopes on age

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The Mixed Procedure

Model Information

Data Set	WORK.FEV2
Dependent Variable	logfev1
Covariance Structures	Banded Toeplitz, Unstructured
Subject Effect	id
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Containment

Dimensions

Covariance Parameters	5
Columns in X	2
Columns in Z Per Subject	633
Subjects	1
Max Obs Per Subject	1993

Number of Observations

Number of Observations Read	1993
Number of Observations Used	1993
Number of Observations Not Used	0

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0	1	-1632.81105467	
1	3	-4093.12650703	0.00560832
2	1	-4119.70858596	0.00117948
3	1	-4124.95053729	0.00008200
4	1	-4125.28659519	0.00000063
5	1	-4125.28904948	0.00000000

Convergence criteria met.

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr Z
Variance		0.000188	0.000092	2.04	0.0207
UN(1,1)	id	0.03303	0.003858	8.56	<.0001

Model 3: linear spline model
 Random subject-specific intercepts and slopes on age

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The Mixed Procedure

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr > Z
UN(2,1)	id	-0.00122	0.000210	-5.80	<.0001
UN(2,2)	id	0.000091	0.000014	6.45	<.0001
Residual		0.004050	0.000150	27.09	<.0001

Fit Statistics

-2 Res Log Likelihood	-4125.3
AIC (smaller is better)	-4115.3
AICC (smaller is better)	-4115.3
BIC (smaller is better)	-4125.3

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
4	2492.48	<.0001

Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > t
Intercept	-0.7460	0.1065	298	-7.00	<.0001
age	0.1397	0.01483	251	9.42	<.0001

Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	Chi-Square	F Value	Pr > ChiSq	Pr > F
age	1	251	88.72	88.72	<.0001	<.0001

Model 4: linear spline model

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Random subject-specific intercepts and slopes on age
Plus residual Gaussian spatial covariance structure

The Mixed Procedure

Model Information

Data Set	WORK.FEV2
Dependent Variable	logfev1
Covariance Structures	Banded Toeplitz, Unstructured, Spatial Gaussian
Subject Effects	id, id
Estimation Method	REML
Residual Variance Method	Profile
Fixed Effects SE Method	Model-Based
Degrees of Freedom Method	Containment

Dimensions

Covariance Parameters	6
Columns in X	2
Columns in Z	633
Subjects	1
Max Obs Per Subject	1993

Number of Observations

Number of Observations Read	1993
Number of Observations Used	1993
Number of Observations Not Used	0

Iteration History

Iteration	Evaluations	-2 Res Log Like	Criterion
0	1	-1632.81105467	
1	3	-4280.43023124	0.00155626
2	1	-4287.38056915	0.00010571
3	1	-4287.82714713	0.00000113
4	1	-4287.83167886	0.00000000

Convergence criteria met.

Model 4: linear spline model
 Random subject-specific intercepts and slopes on age
 Plus residual Gaussian spatial covariance structure

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The Mixed Procedure

Covariance Parameter Estimates

Cov Parm	Subject	Estimate	Standard Error	Z Value	Pr Z
Variance		0.000205	0.000103	2.00	0.0230
UN(1,1)	id	0.02770	0.003778	7.33	<.0001
UN(2,1)	id	-0.00083	0.000202	-4.09	<.0001
UN(2,2)	id	0.000060	0.000013	4.41	<.0001
SP(GAU)	id	0.9377	0.02602	36.04	<.0001
Residual		0.004629	0.000202	22.94	<.0001

Fit Statistics

-2 Res Log Likelihood	-4287.8
AIC (smaller is better)	-4275.8
AICC (smaller is better)	-4275.8
BIC (smaller is better)	-4287.8

Null Model Likelihood Ratio Test

DF	Chi-Square	Pr > ChiSq
5	2655.02	<.0001

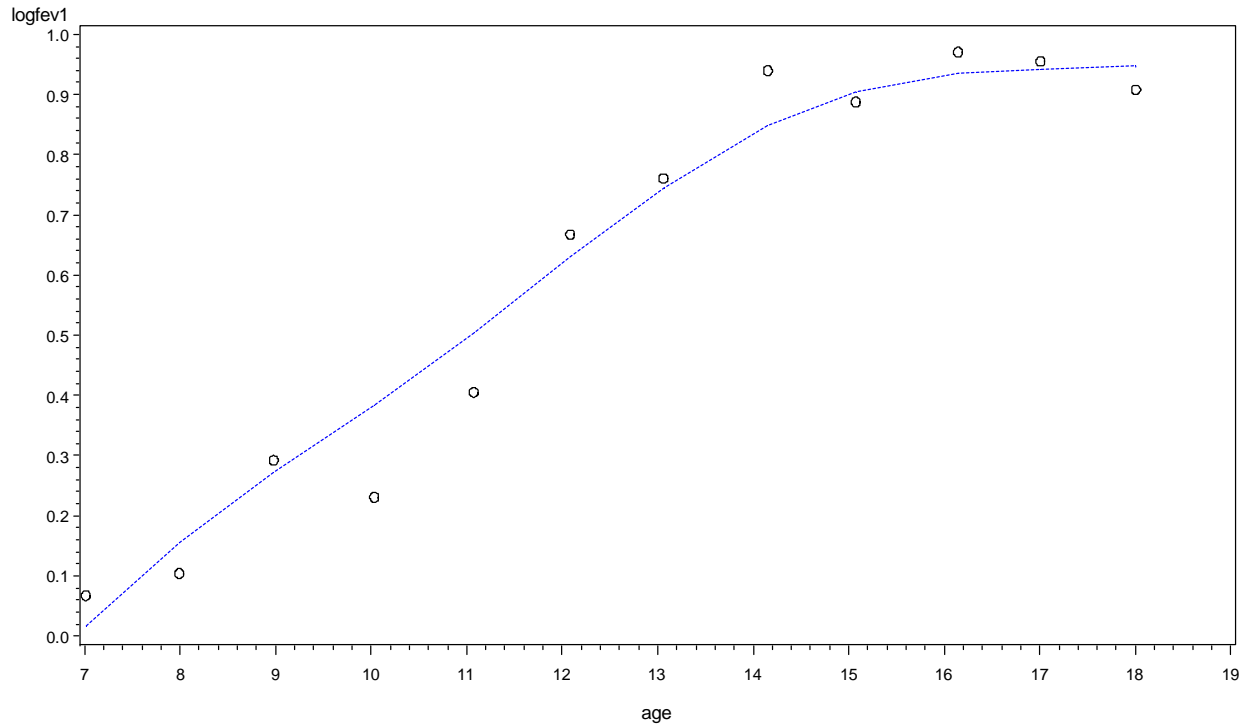
Solution for Fixed Effects

Effect	Estimate	Standard Error	DF	t Value	Pr > t
Intercept	-0.8038	0.1066	298	-7.54	<.0001
age	0.1474	0.01489	251	9.90	<.0001

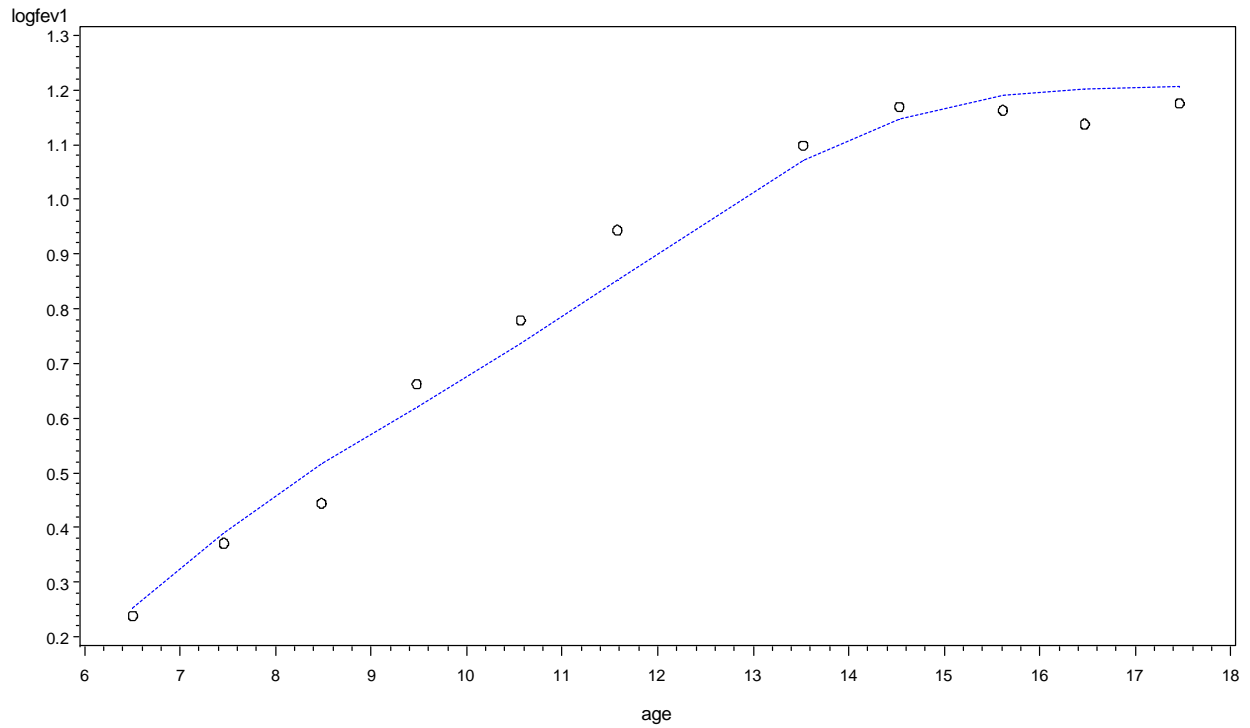
Type 3 Tests of Fixed Effects

Effect	Num DF	Den DF	Chi-Square	F Value	Pr > ChiSq	Pr > F
age	1	251	98.08	98.08	<.0001	<.0001

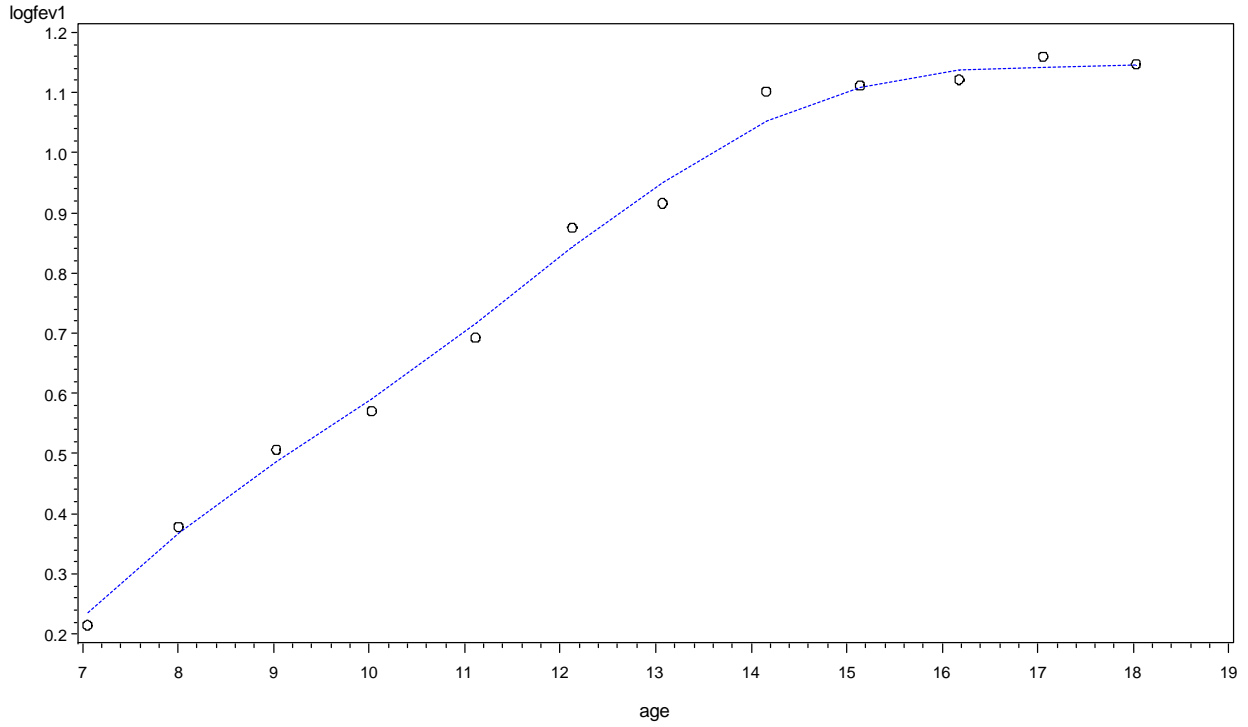
Fitted curves for subject 35, Model 4



Fitted curves for subject 16, Model 4



Fitted curves for subject 18, Model 4



Fitted curves for three subjects, Model 4

