

Belgian population norms for the EQ-5D-5L, 2013 and 2018

Appendix 2. Comparison of age models for Belgian EQ-5D population norms

2021-06-13

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2013

Mobility

SVY-NS

Fitted model:

$M0 \sim age.ns1 + age.ns2 + age.ns3 + age.ns4 + age.ns5 + age.ns6$

Coefficients:

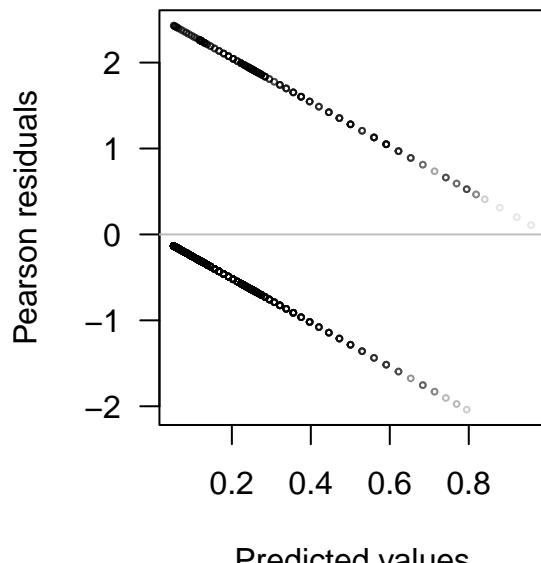
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-2.69480	0.37362	-7.2128	6.575e-13 ***
age.ns1	0.95063	0.39895	2.3828	0.0172295 *
age.ns2	0.47641	0.49282	0.9667	0.3337513
age.ns3	1.60617	0.40640	3.9522	7.884e-05 ***
age.ns4	1.68224	0.34174	4.9225	8.902e-07 ***
age.ns5	3.56853	0.96990	3.6793	0.0002371 ***
age.ns6	6.02832	0.62751	9.6067	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

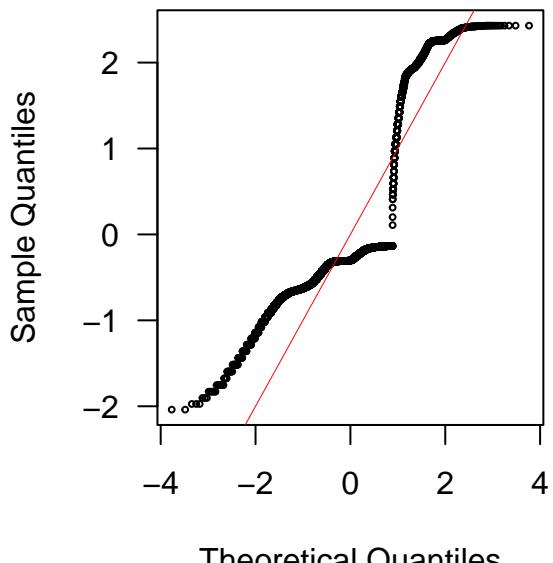
SSD: 799.4

AIC: 5046.2

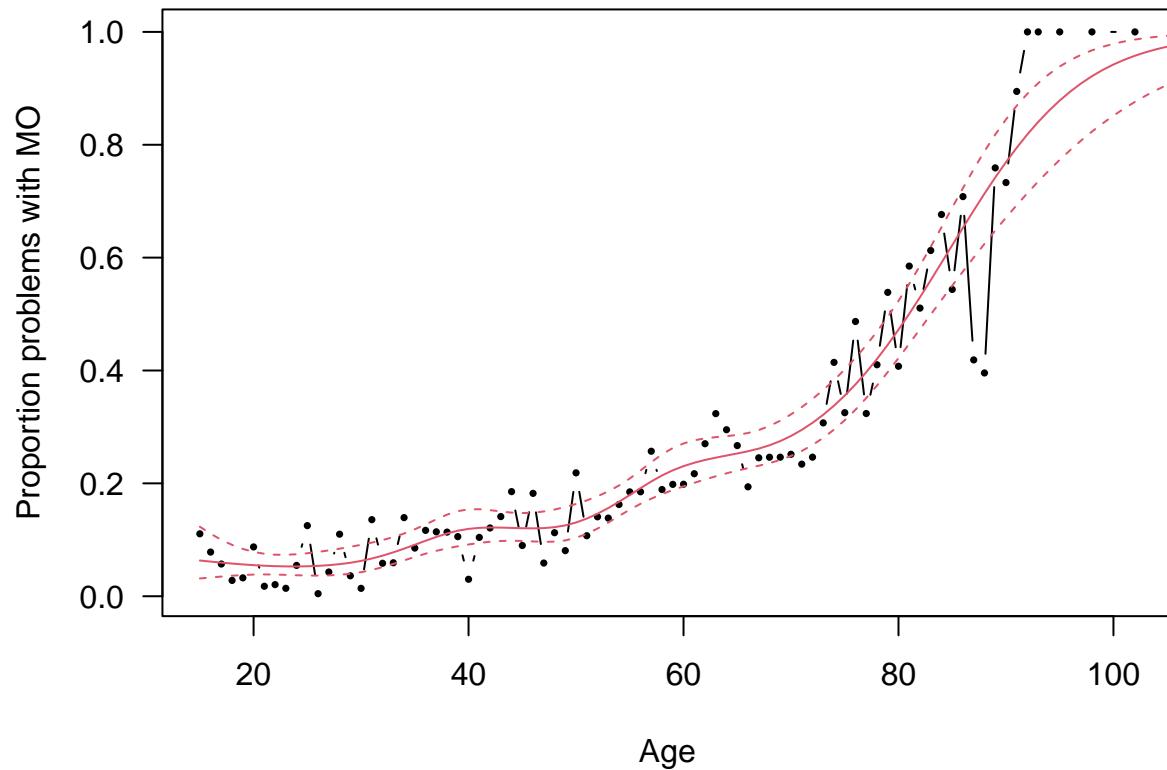
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

Fitted model:
 $M0 \sim I((age/100)^2)$

Coefficients:

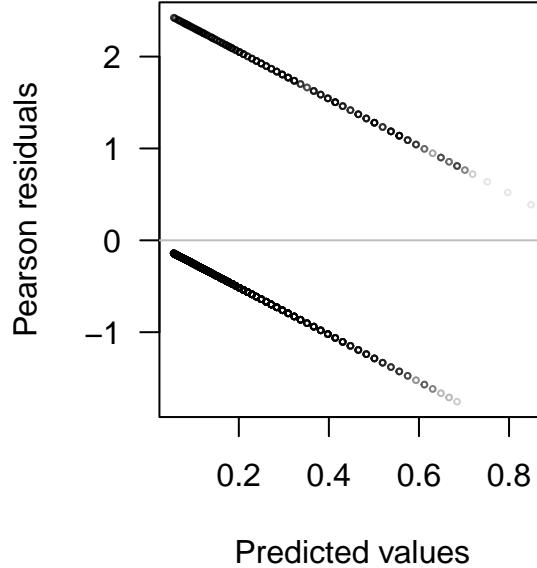
	Estimate	Std. Error	t value	Pr(> t)		
(Intercept)	-2.93548	0.10559	-27.802	< 2.2e-16 ***		
$I((age/100)^2)$	4.48071	0.25306	17.706	< 2.2e-16 ***		

Signif. codes:	0 '***'	0.001 '**'	0.01 '*'	0.05 '.'	0.1 ', '	1

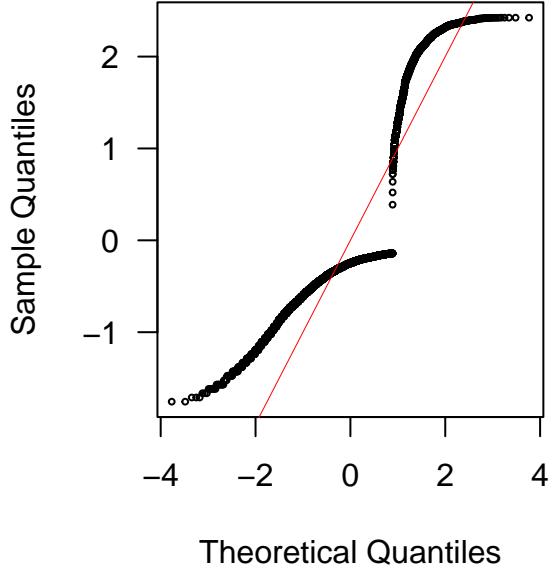
SSD: 800.9

AIC: 5042.0

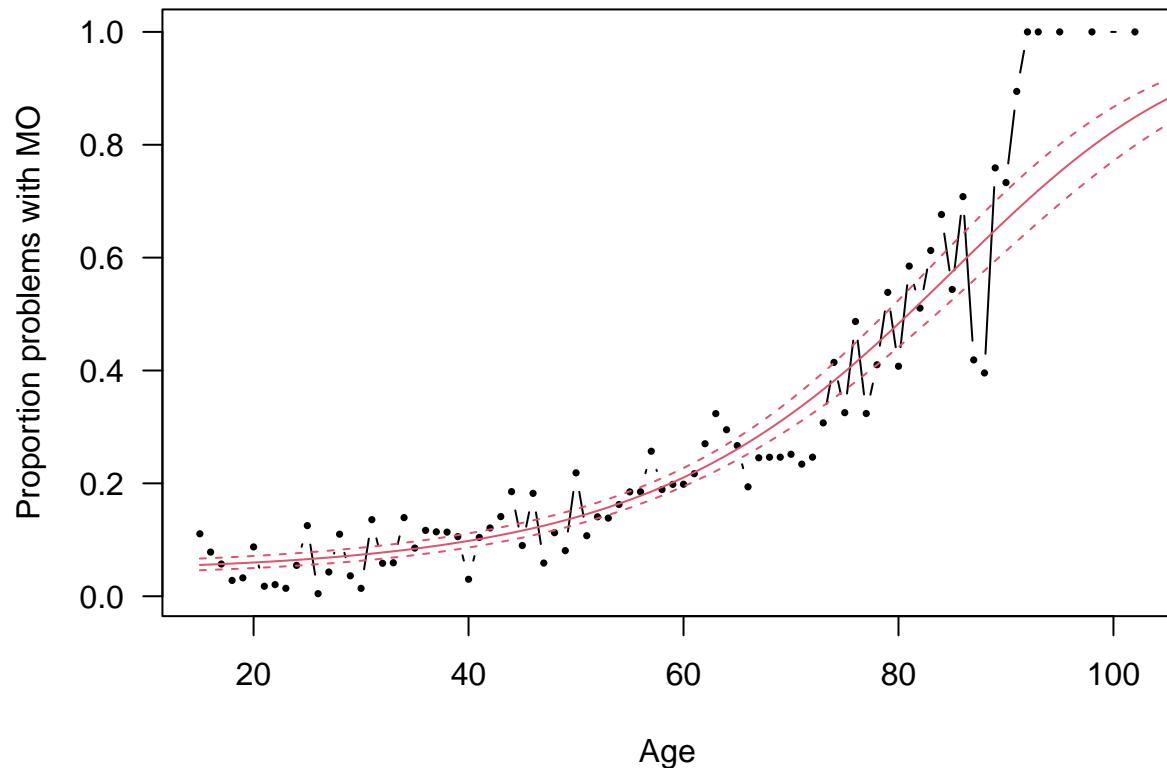
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



GAMM

Fitted model:

$M0 \sim s(\text{age}, \text{bs} = \text{"tp"})$

Random effects:

Groups	Name	Variance	Std.Dev.
Xr	s(age)	256.7	16.02

Coefficients:

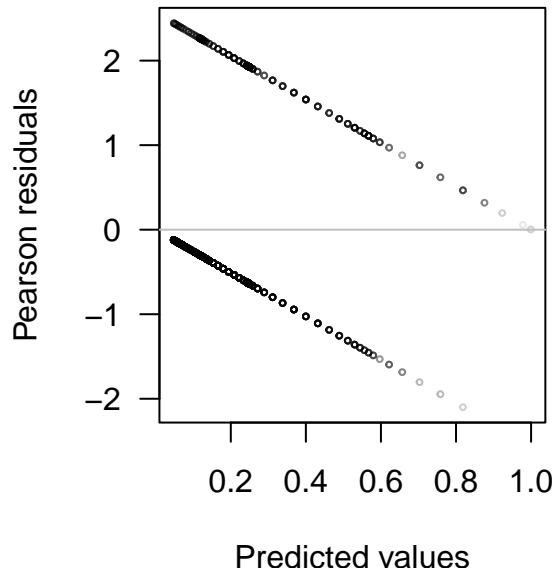
	Estimate	Std. Error	z value	Pr(> z)
X(Intercept)	-1.7113879	0.0012694	-1348.206	< 2.2e-16 ***
Xs(age)Fx1	8.2235855	0.1257836	65.379	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

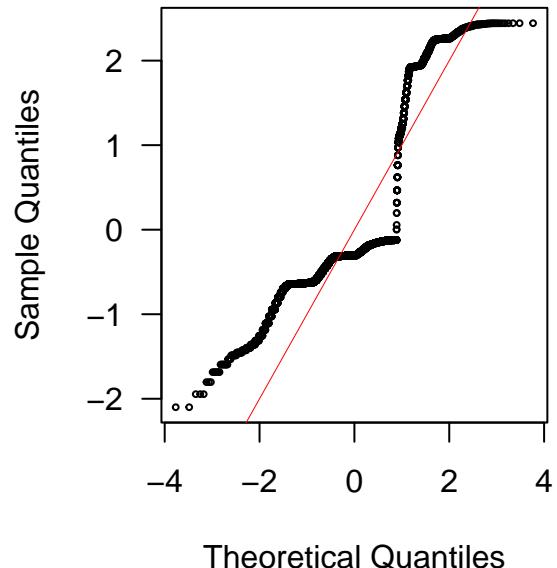
SSD: 799.9

AIC: 5033246.7

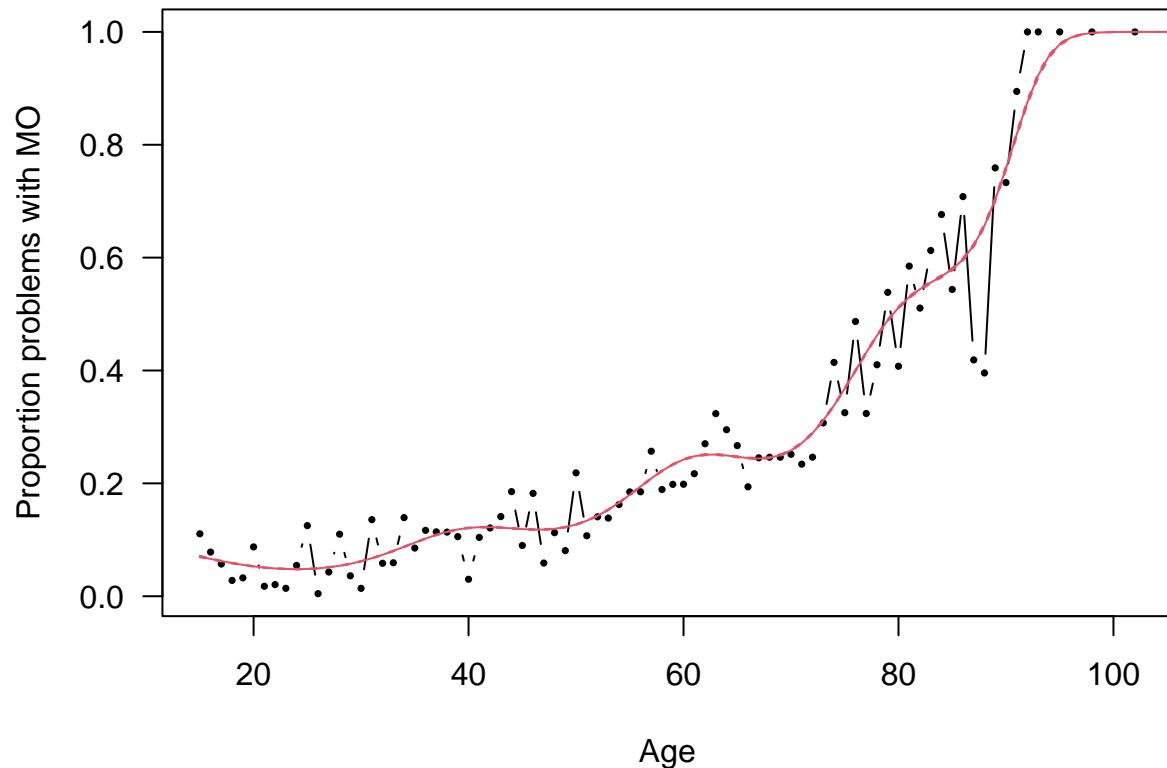
Residuals vs fitted



Normal Q-Q Plot



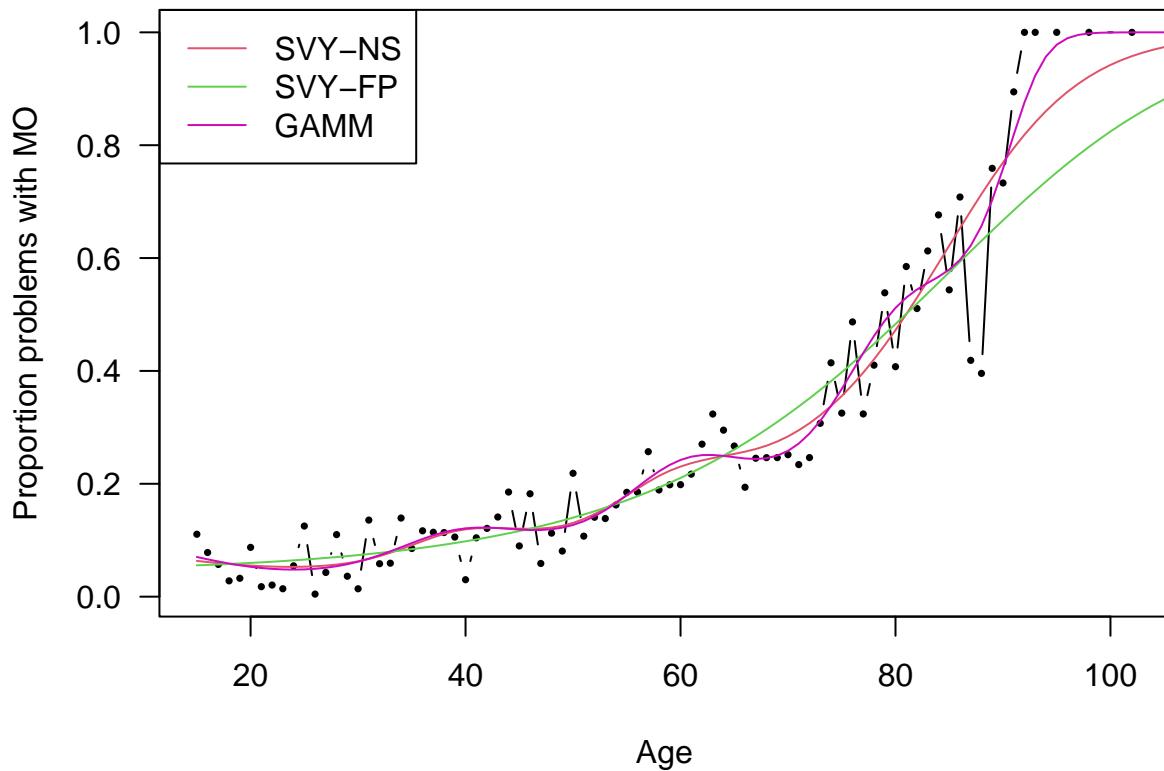
Fitted values with 95% confidence interval



Summary

	SSD	AIC
SVY-NS	799.4	5046.2
SVY-FP	800.9	5042.0
GAMM	799.9	5033246.7

Comparison of fitted values across models



Self-care

SVY-NS

Fitted model:

SC ~ age.ns1 + age.ns2 + age.ns3 + age.ns4

Coefficients:

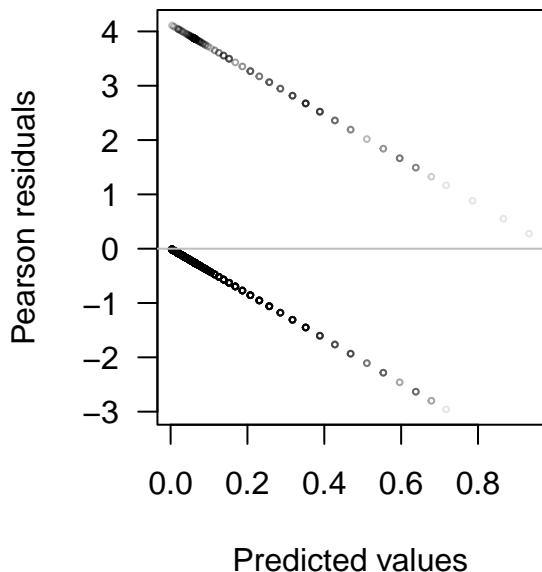
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-5.82438	1.08474	-5.3694	8.369e-08 ***
age.ns1	3.38077	1.01281	3.3380	0.0008518 ***
age.ns2	1.92023	0.68237	2.8141	0.0049167 **
age.ns3	7.47519	2.40824	3.1040	0.0019231 **
age.ns4	7.58325	0.64145	11.8221	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

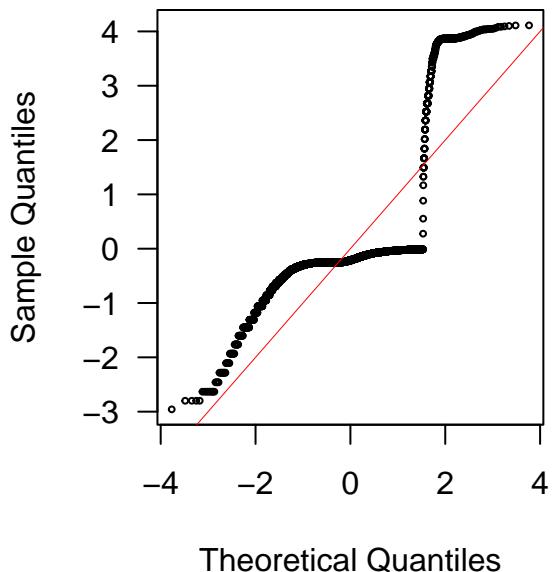
SSD: 324.0

AIC: 2534.0

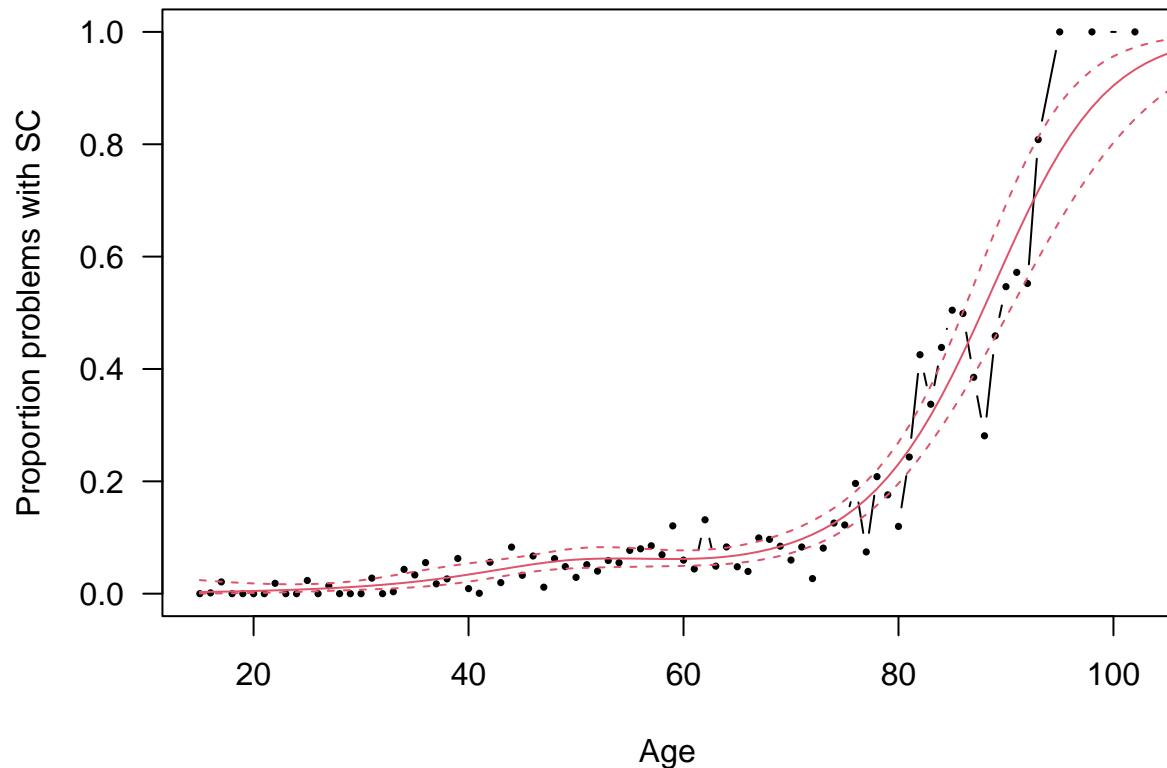
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

Fitted model:

$$SC \sim I((age/100)^{-2}) + I((age/100)^3)$$

Coefficients:

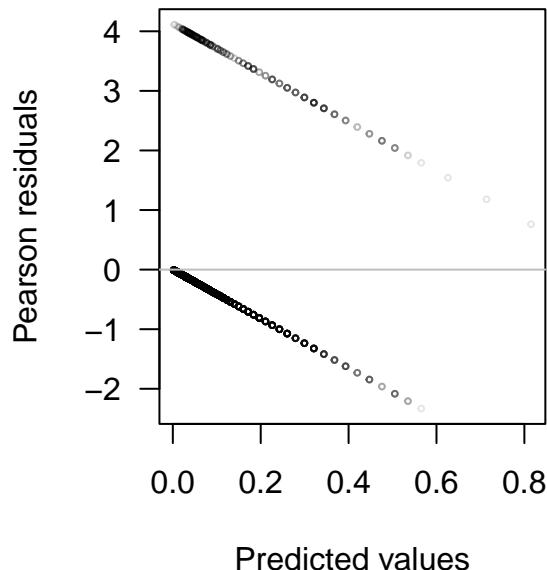
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-3.452666	0.246699	-13.9955	< 2e-16 ***
I((age/100)^{-2})	-0.061820	0.026734	-2.3124	0.02081 *
I((age/100)^3)	4.708435	0.494641	9.5189	< 2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ',' 1

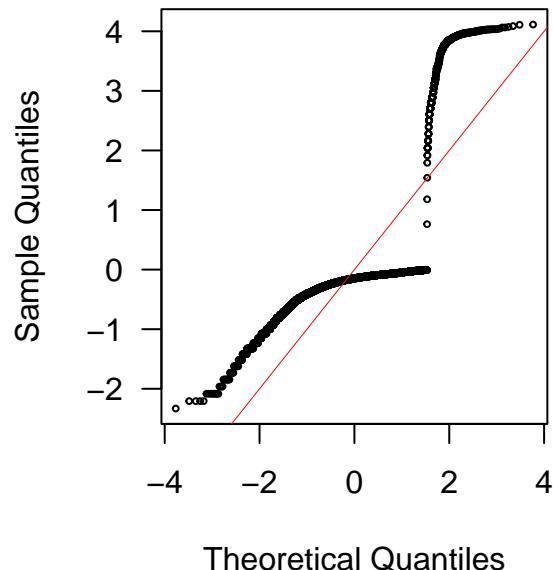
SSD: 324.8

AIC: 2549.9

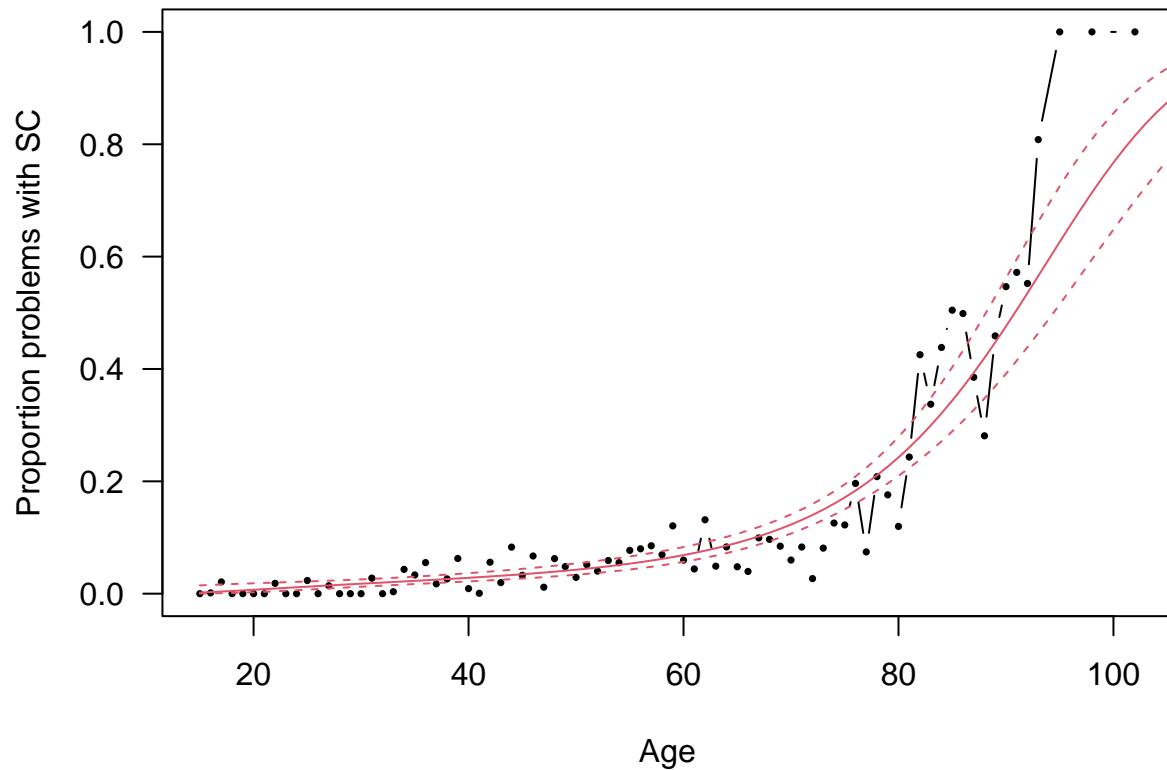
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



GAMM

Fitted model:

SC ~ s(age, bs = "tp")

Random effects:

Groups	Name	Variance	Std.Dev.
Xr	s(age)	92.9	9.639

Coefficients:

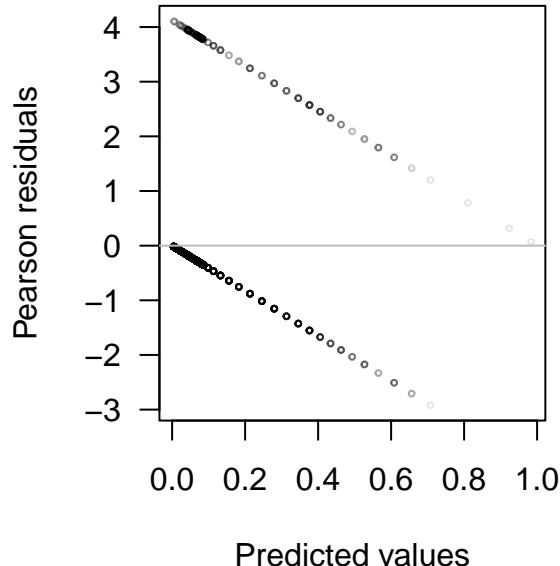
	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-3.1577191	0.0028196	-1119.916	< 2.2e-16 ***
Xs(age)Fx1	3.0023773	0.1003625	29.915	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

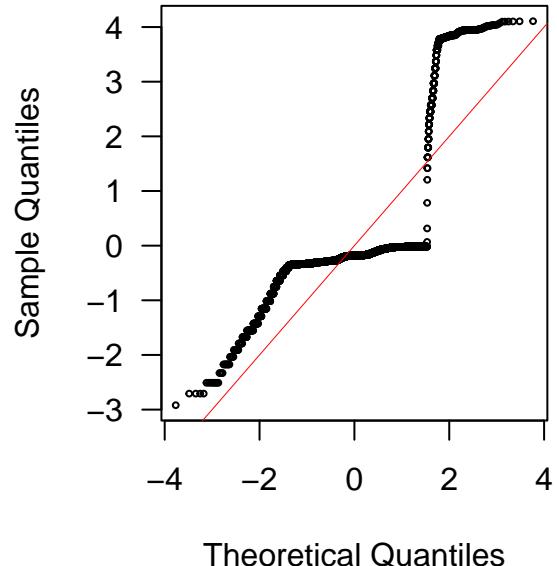
SSD: 323.8

AIC: 2515149.3

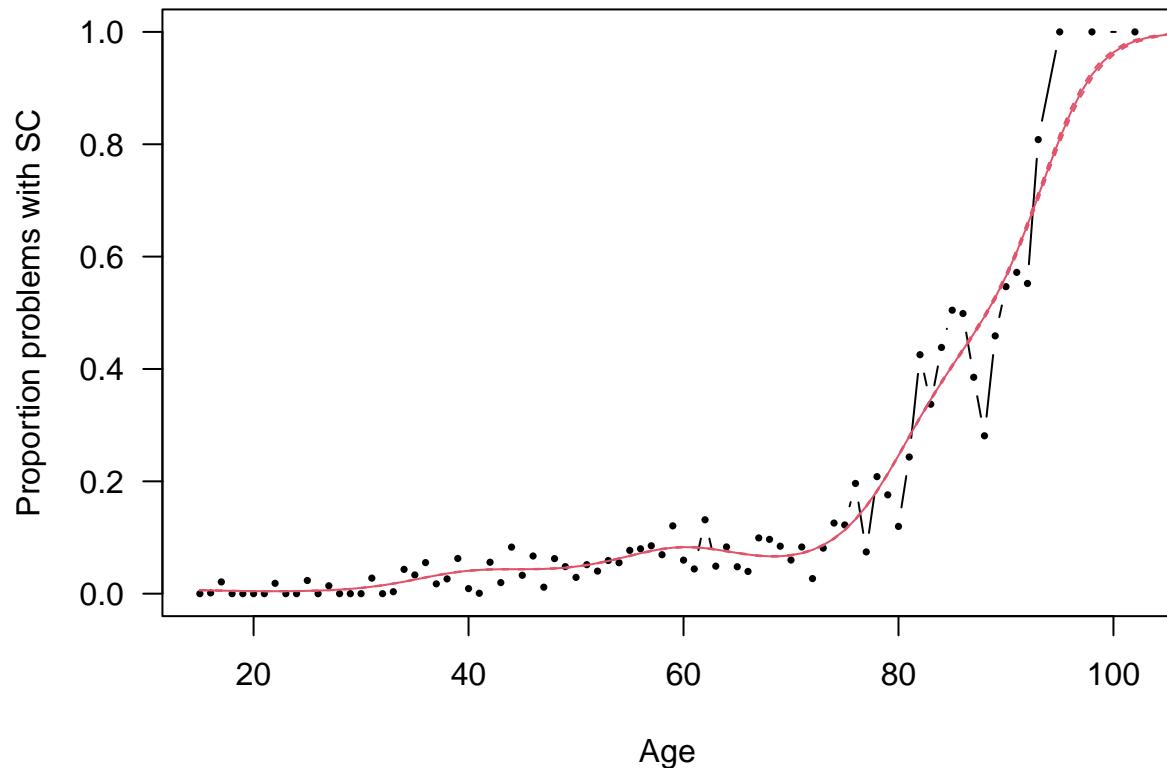
Residuals vs fitted



Normal Q-Q Plot



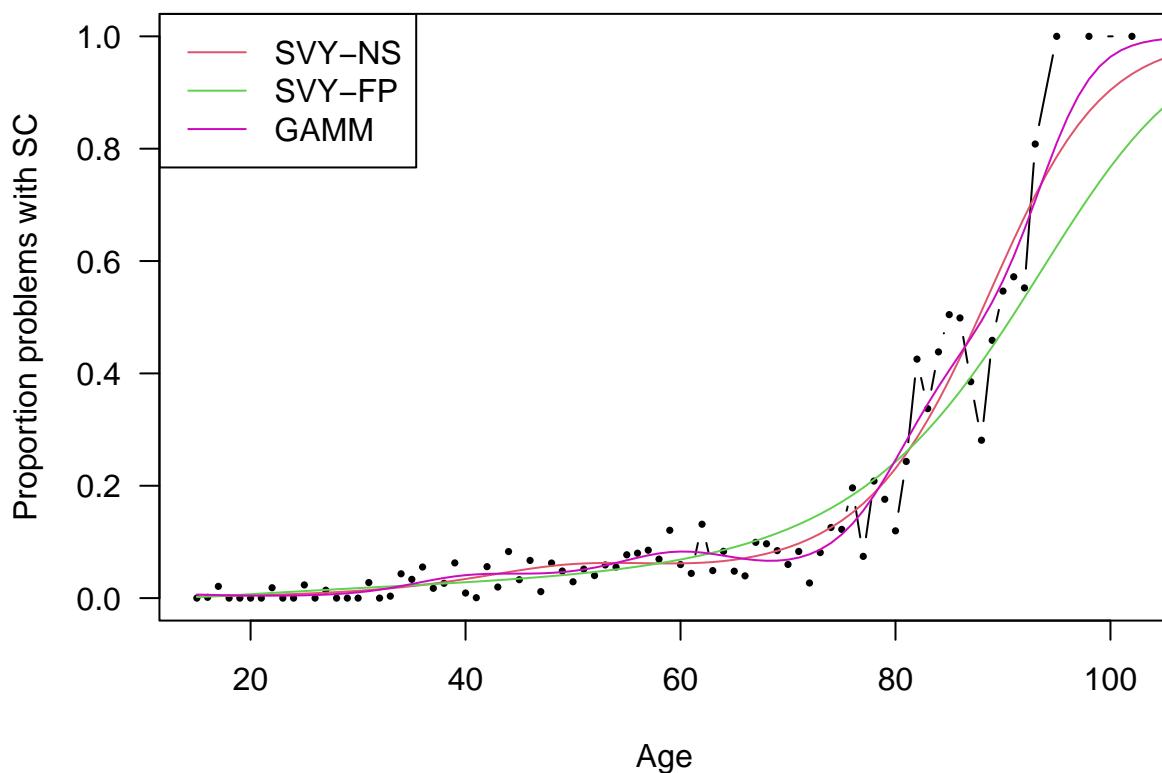
Fitted values with 95% confidence interval



Summary

	SSD	AIC
SVY-NS	324.0	2534.0
SVY-FP	324.8	2549.9
GAMM	323.8	2515149.3

Comparison of fitted values across models



Usual activities

SVY-NS

Fitted model:

DA ~ age.ns1 + age.ns2 + age.ns3 + age.ns4 + age.ns5 + age.ns6

Coefficients:

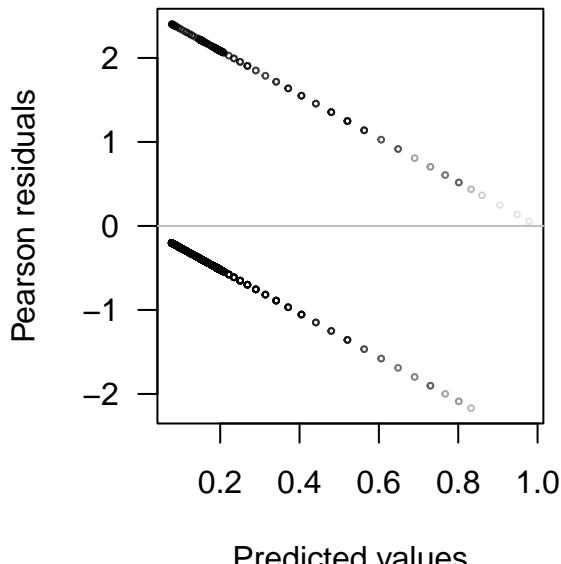
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-2.35062	0.31340	-7.5004	7.860e-14 ***
age.ns1	0.82207	0.33040	2.4881	0.012885 *
age.ns2	0.46842	0.42647	1.0984	0.272111
age.ns3	1.20765	0.34918	3.4585	0.000549 ***
age.ns4	0.35198	0.34503	1.0202	0.307722
age.ns5	3.33311	0.83778	3.9785	7.063e-05 ***
age.ns6	6.31446	0.65645	9.6191	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

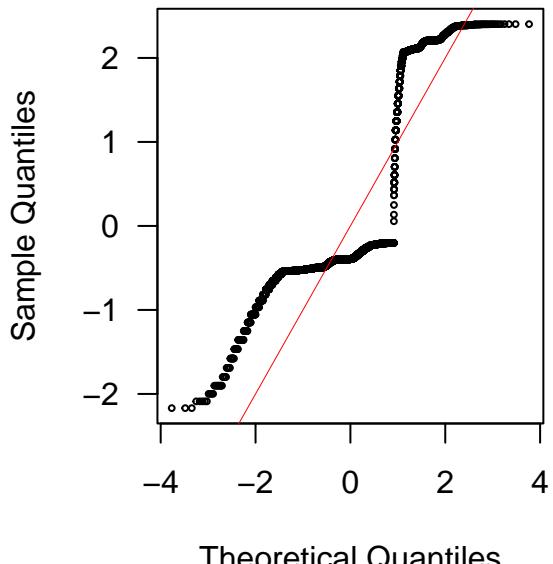
SSD: 833.9

AIC: 5284.4

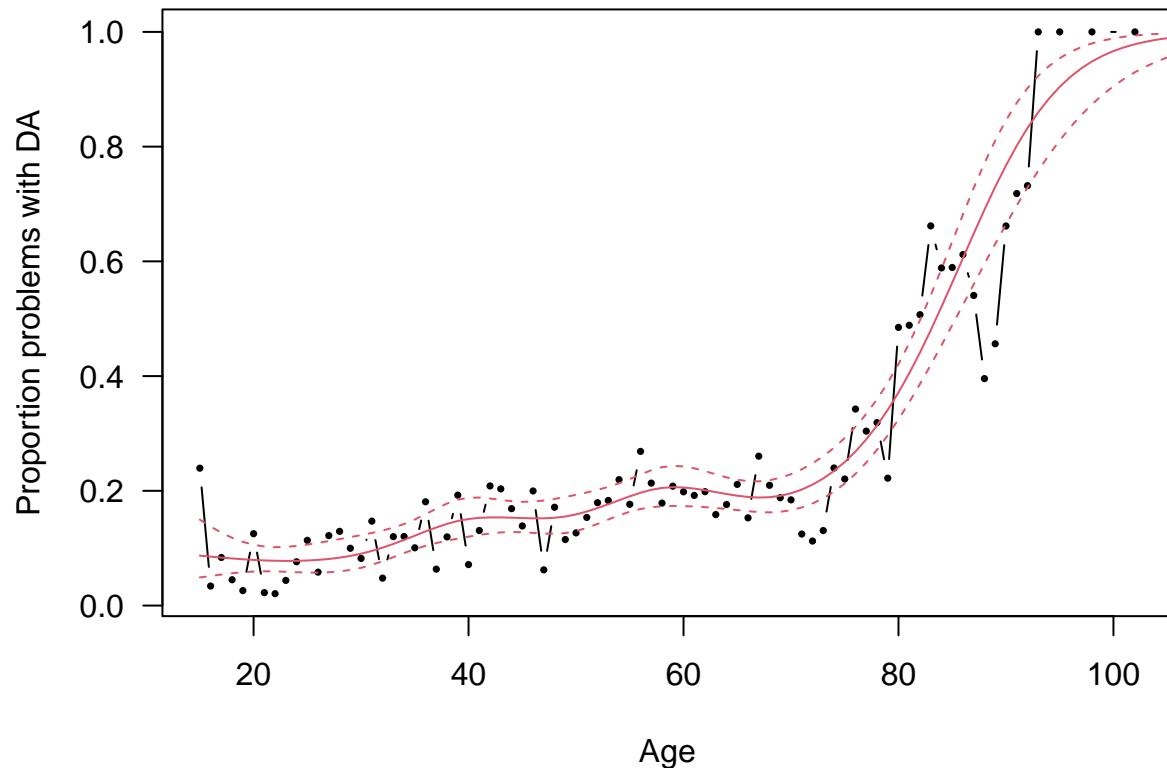
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

Fitted model:
 $DA \sim I((age/100)^2)$

Coefficients:

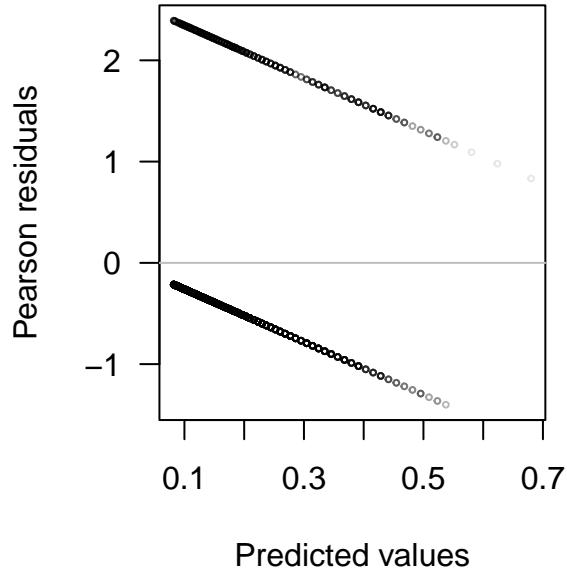
	Estimate	Std. Error	t value	Pr(> t)		
(Intercept)	-2.484336	0.096135	-25.842	< 2.2e-16 ***		
$I((age/100)^2)$	3.112942	0.237290	13.119	< 2.2e-16 ***		

Signif. codes:	0 '***'	0.001 '**'	0.01 '*'	0.05 '.'	0.1 ', '	1

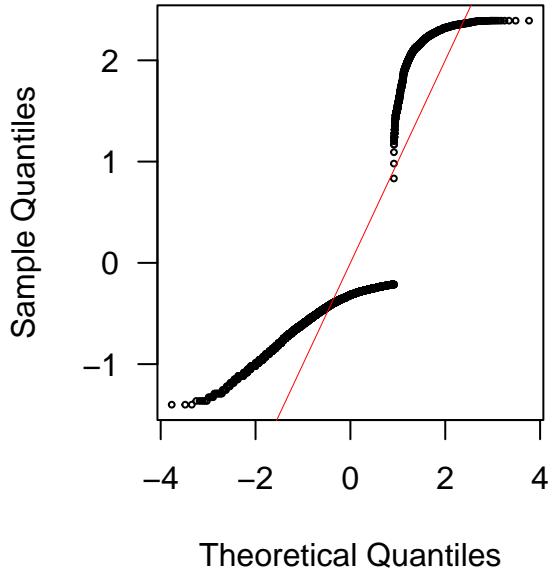
SSD: 838.2

AIC: 5322.8

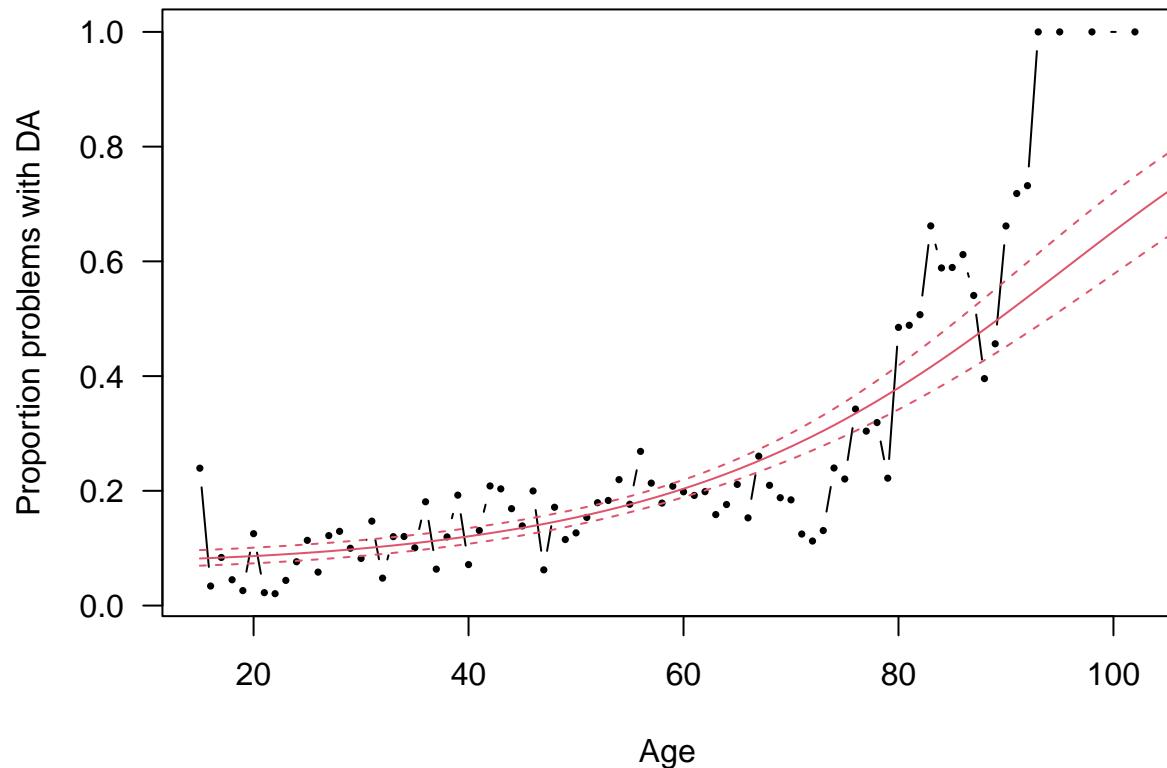
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



GAMM

Fitted model:

```
DA ~ s(age, bs = "tp")
```

Random effects:

Groups	Name	Variance	Std.Dev.
Xr	s(age)	64.36	8.022

Coefficients:

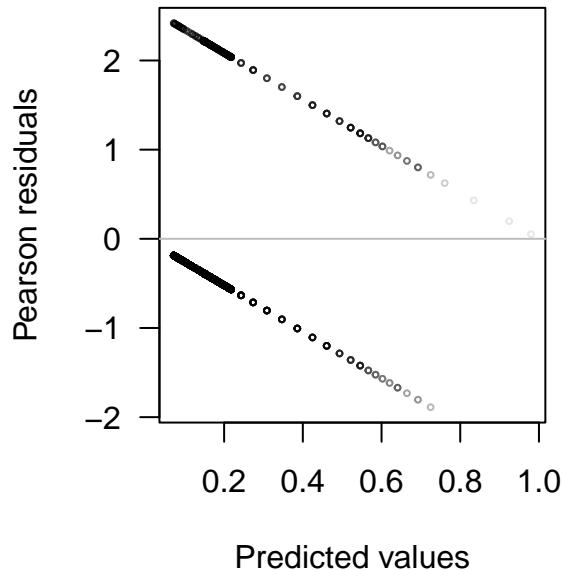
	Estimate	Std. Error	z value	Pr(> z)
X(Intercept)	-1.6442994	0.0011664	-1409.741	< 2.2e-16 ***
Xs(age)Fx1	2.7874328	0.0770719	36.167	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

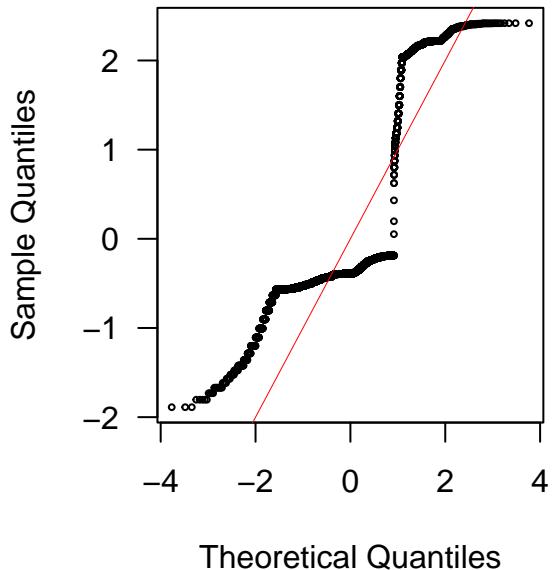
SSD: 832.4

AIC: 5271651.5

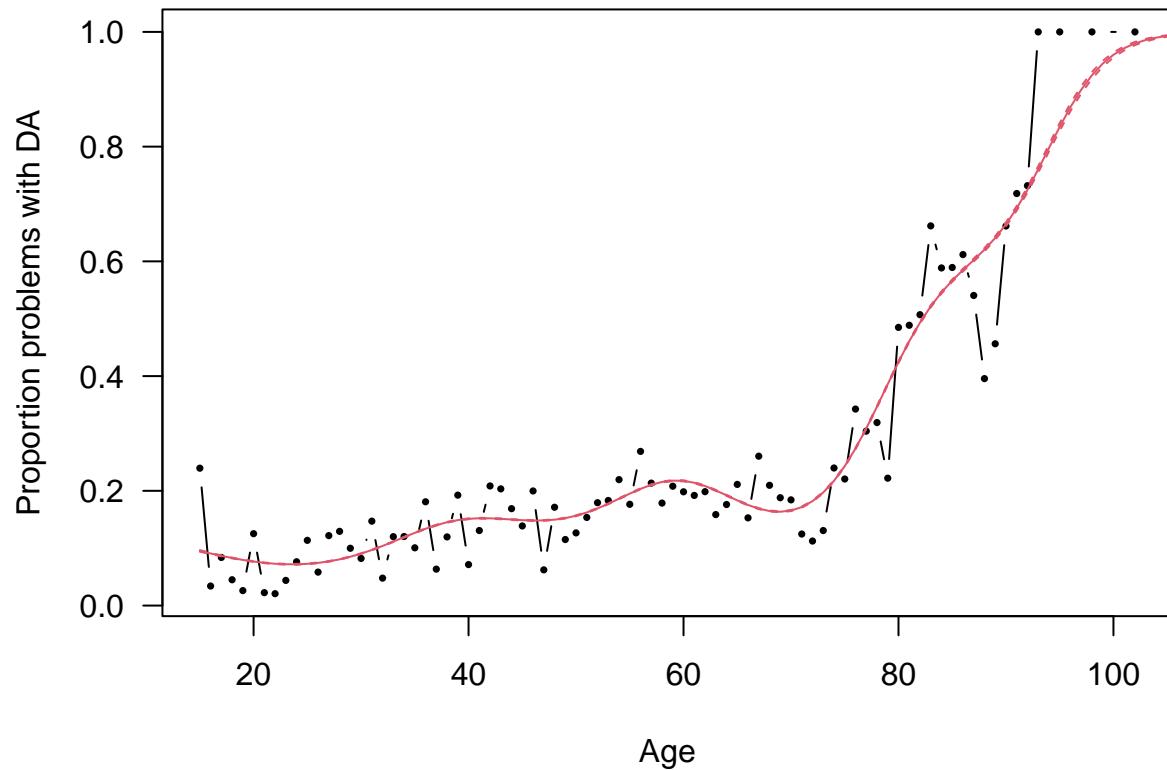
Residuals vs fitted



Normal Q–Q Plot



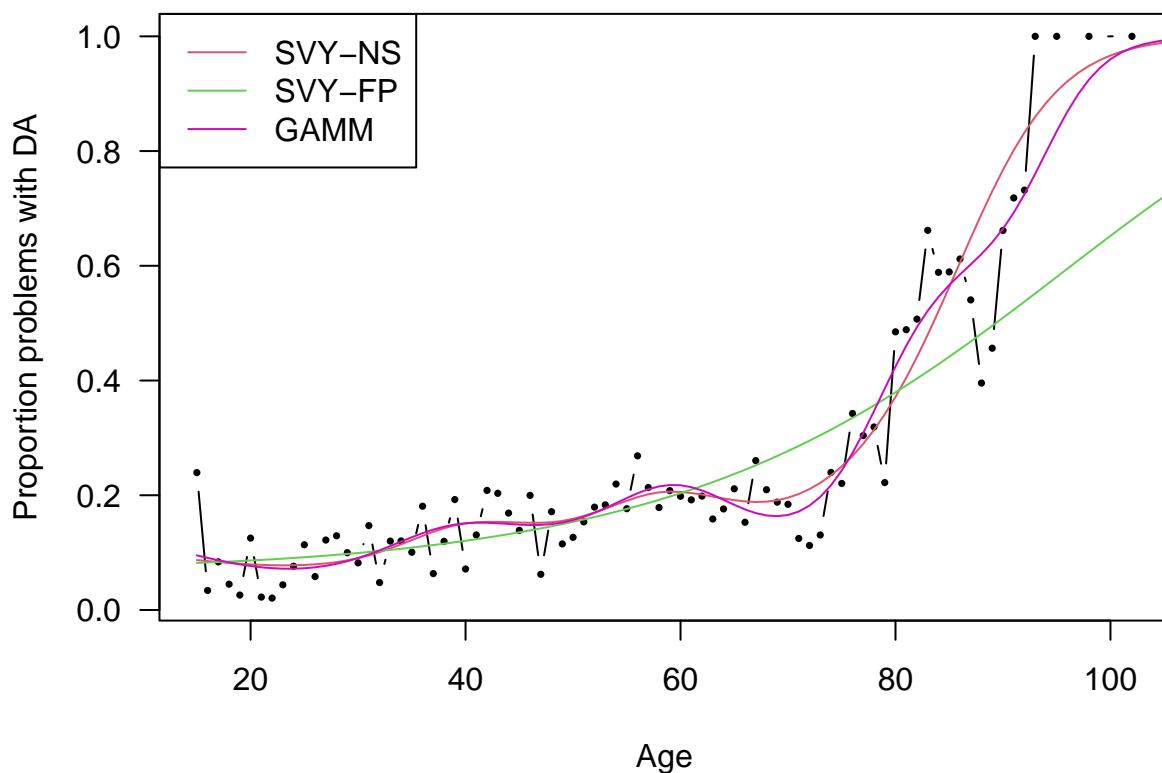
Fitted values with 95% confidence interval



Summary

	SSD	AIC
SVY-NS	833.9	5284.4
SVY-FP	838.2	5322.8
GAMM	832.4	5271651.5

Comparison of fitted values across models



Pain/Discomfort

SVY-NS

Fitted model:

PD ~ age.ns1 + age.ns2

Coefficients:

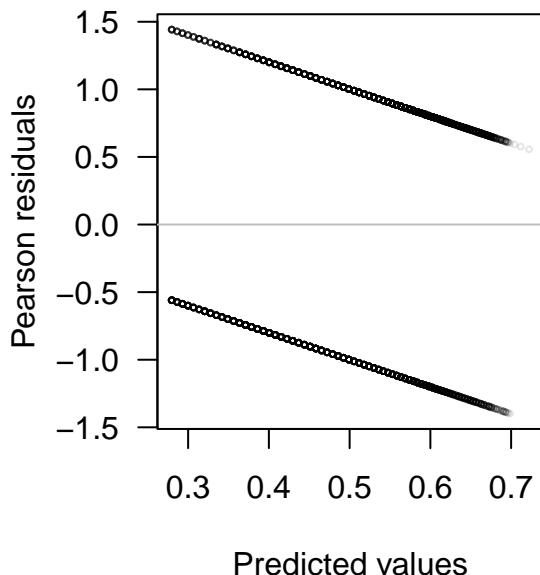
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0.94602	0.11908	-7.9442	2.548e-15 ***
age.ns1	2.53201	0.24255	10.4391	< 2.2e-16 ***
age.ns2	1.37104	0.23632	5.8016	7.101e-09 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

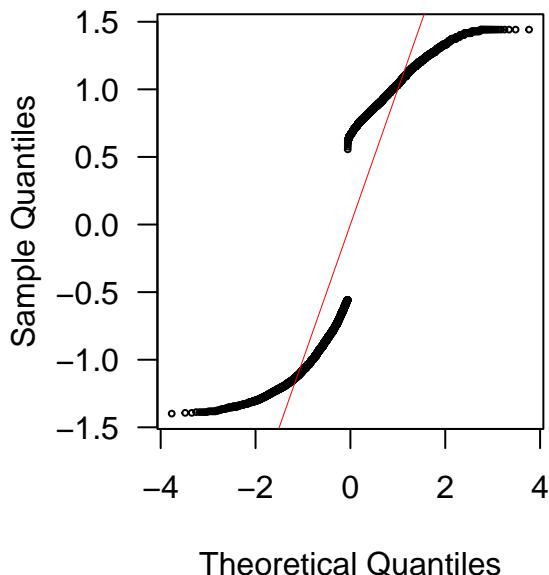
SSD: 1432.4

AIC: 8118.0

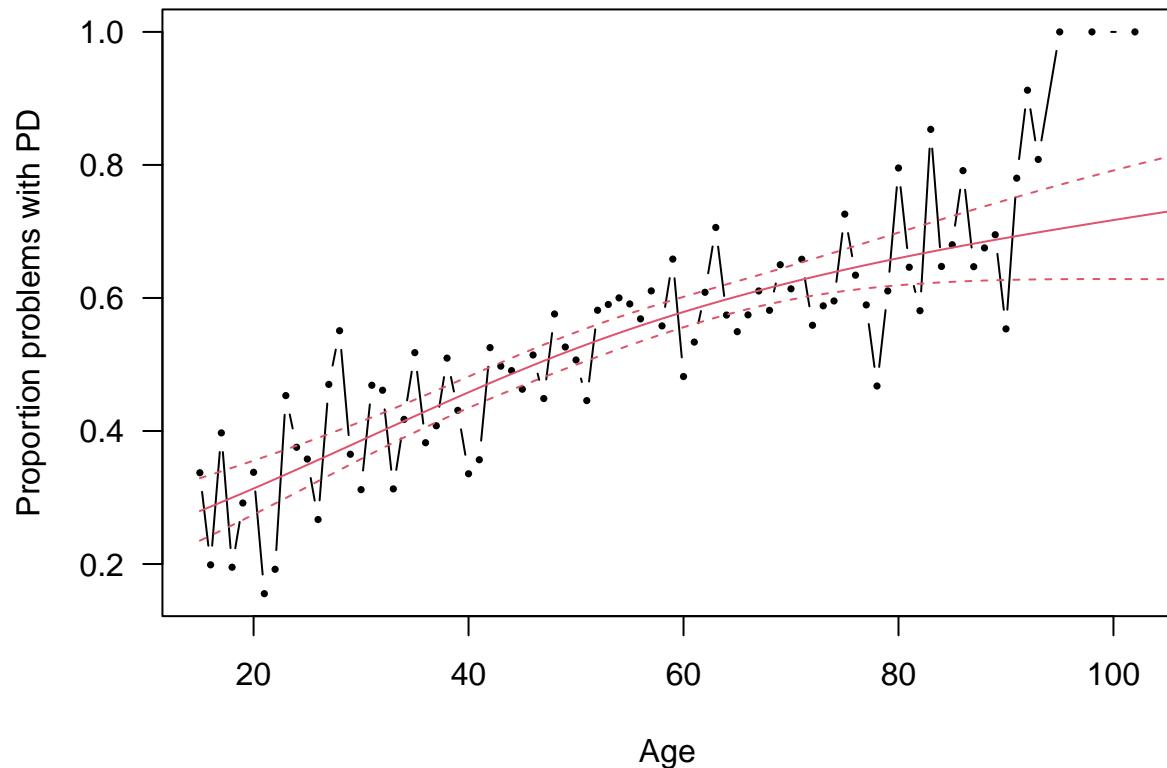
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

Fitted model:
PD ~ I((age/100)^0.5)

Coefficients:

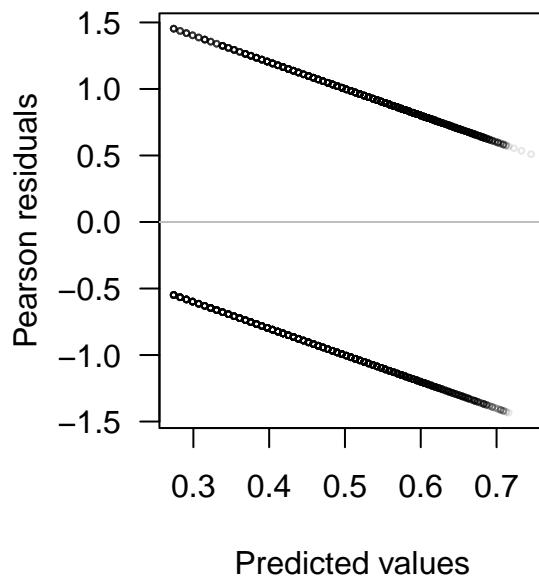
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-2.24851	0.20413	-11.015	< 2.2e-16 ***
I((age/100)^0.5)	3.29072	0.28497	11.548	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

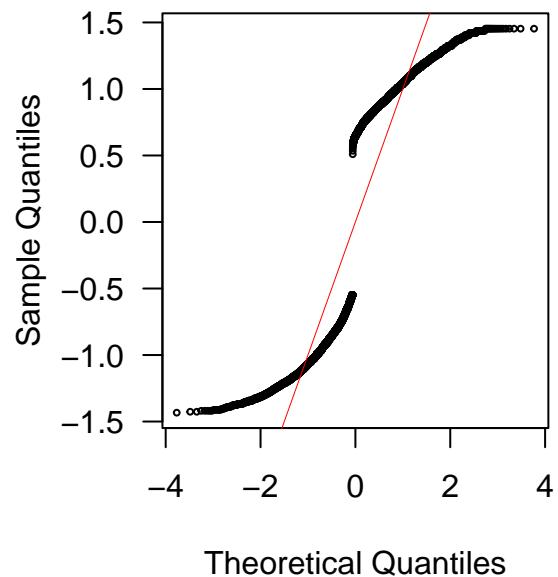
SSD: 1432.9

AIC: 8114.6

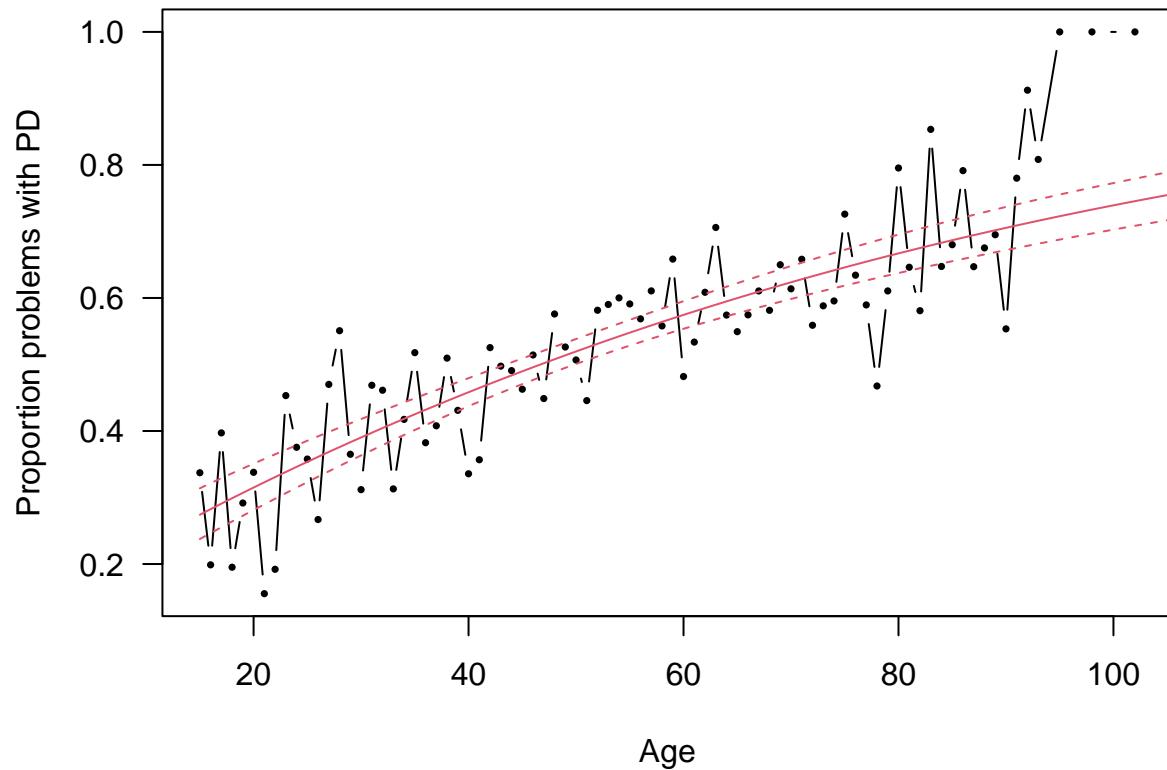
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



GAMM

Fitted model:

PD ~ s(age, bs = "tp")

Random effects:

Groups	Name	Variance	Std.Dev.
Xr	s(age)	8.946	2.991

Coefficients:

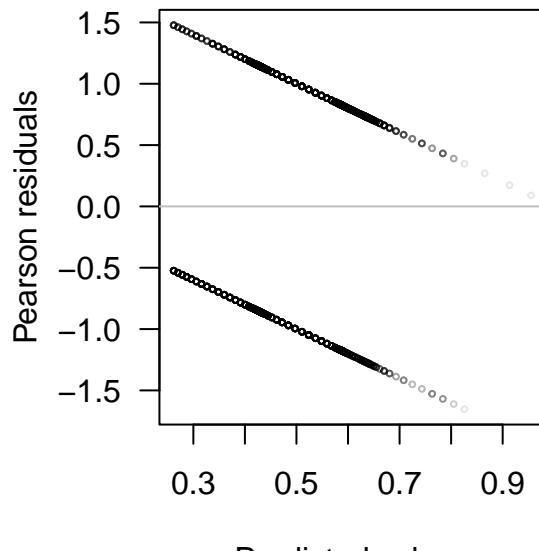
	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	0.01615228	0.00083433	19.360	< 2.2e-16 ***
Xs(age)Fx1	2.00142843	0.06854562	29.198	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

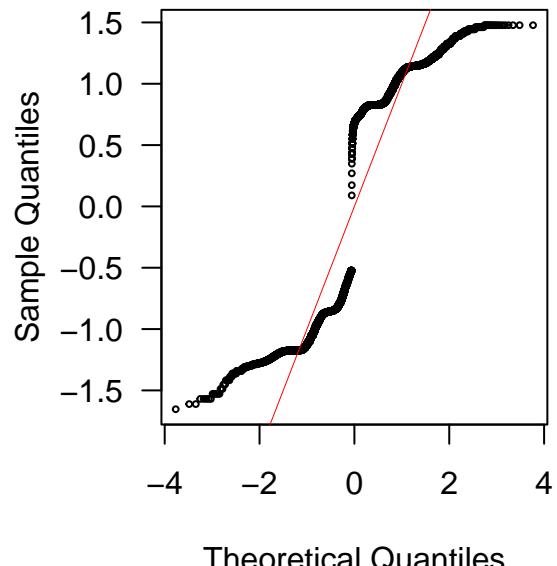
SSD: 1433.4

AIC: 8131849.1

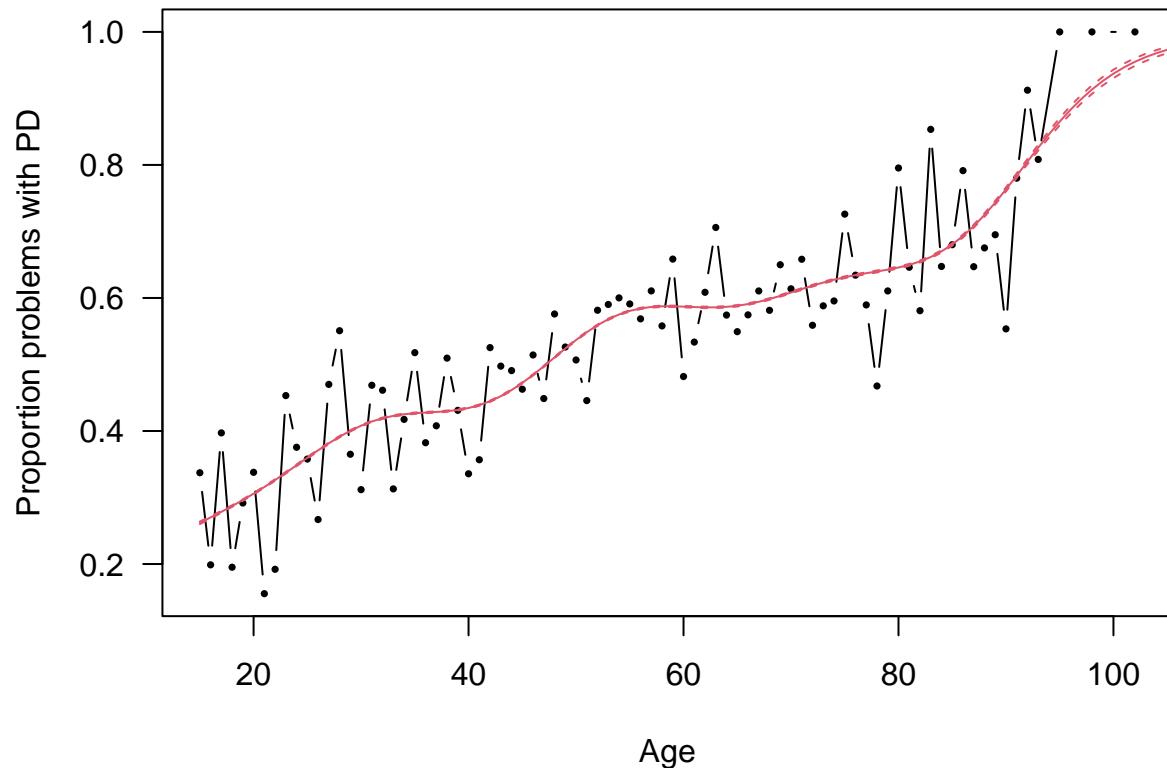
Residuals vs fitted



Normal Q-Q Plot



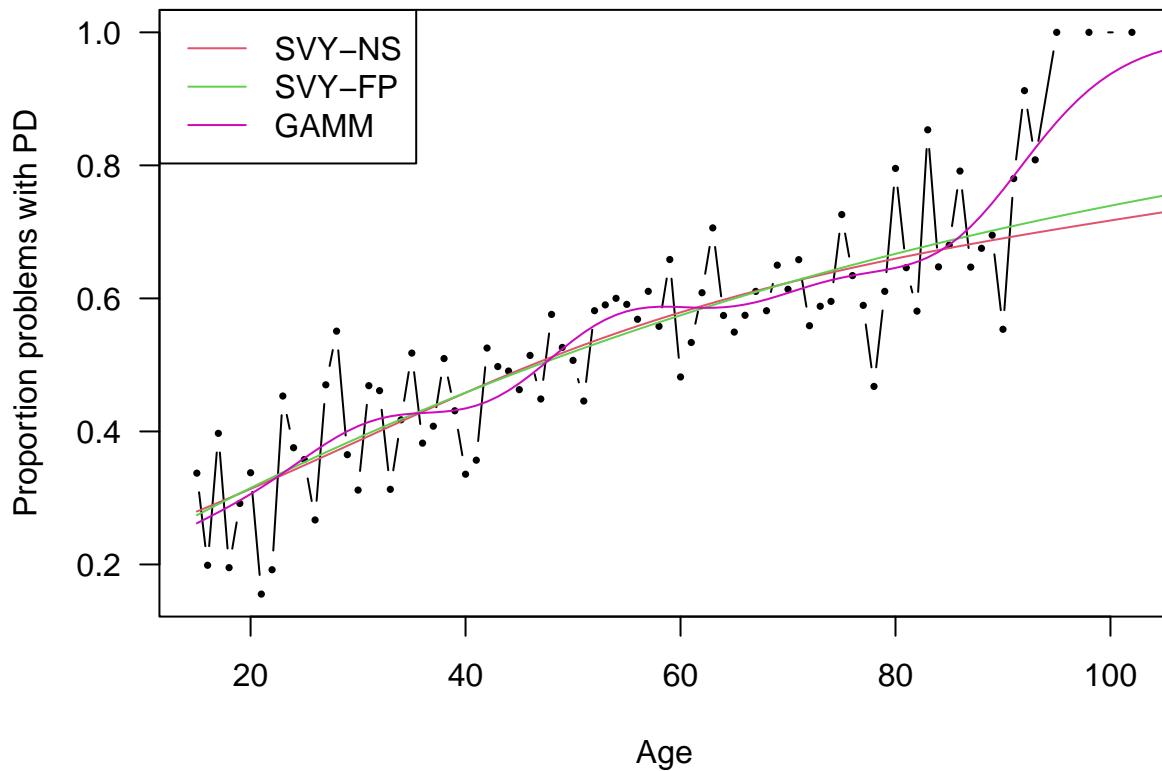
Fitted values with 95% confidence interval



Summary

	SSD	AIC
SVY-NS	1432.4	8118.0
SVY-FP	1432.9	8114.6
GAMM	1433.4	8131849.1

Comparison of fitted values across models



Anxiety/Depression

SVY-NS

Fitted model:

AD ~ age.ns1 + age.ns2

Coefficients:

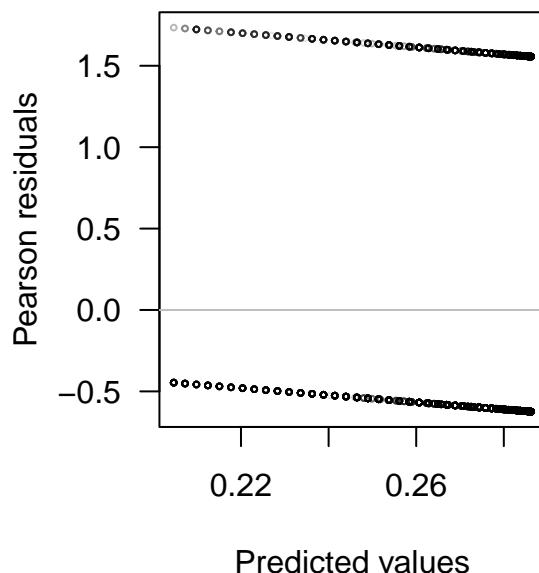
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-1.35751	0.13289	-10.2154	< 2.2e-16 ***
age.ns1	0.73650	0.26833	2.7448	0.006083 **
age.ns2	-0.12503	0.26989	-0.4633	0.643201

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

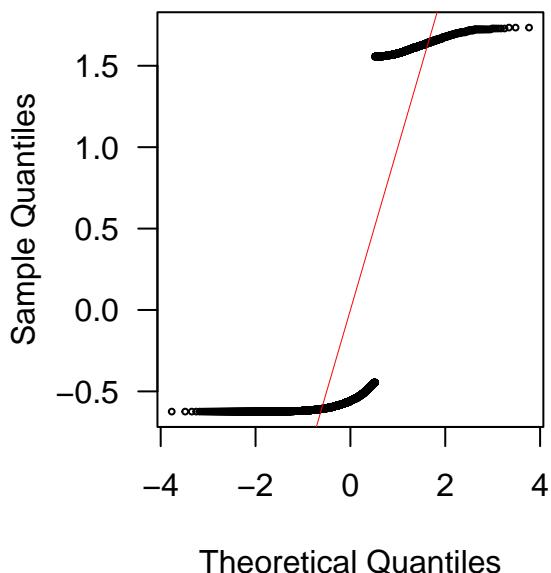
SSD: 1276.6

AIC: 6998.6

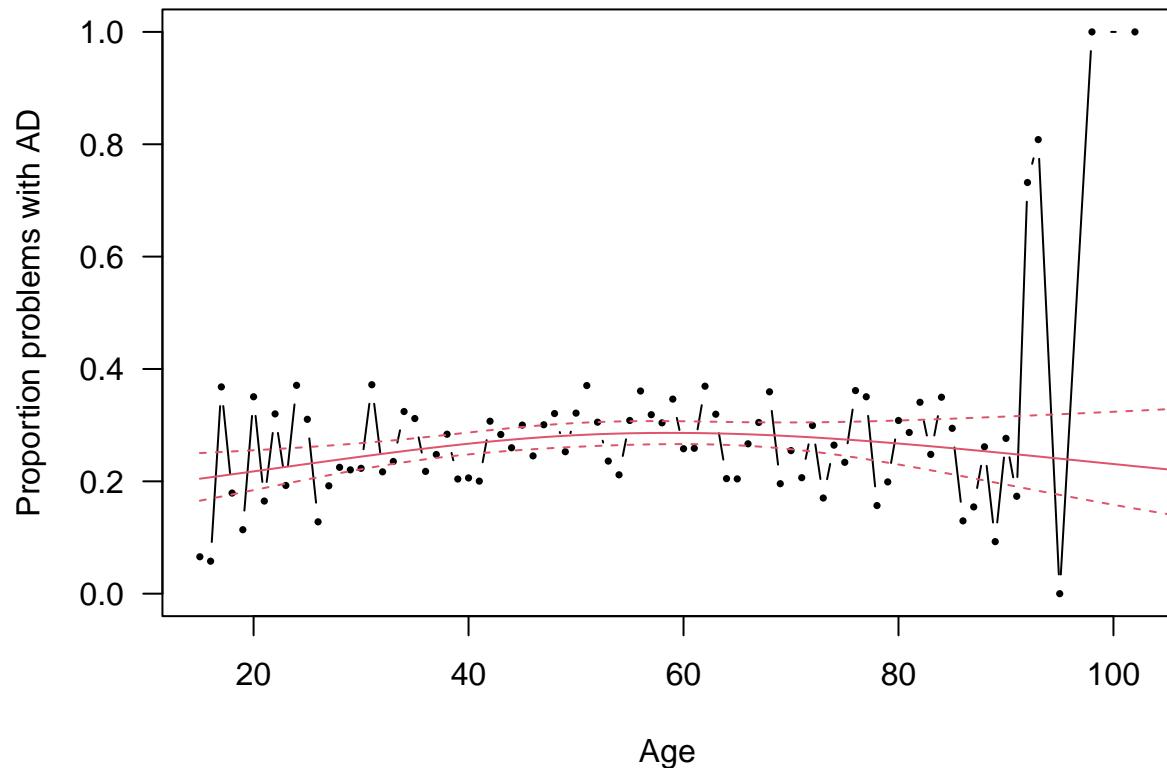
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

Fitted model:
 $AD \sim I((age/100)^{-2})$

Coefficients:

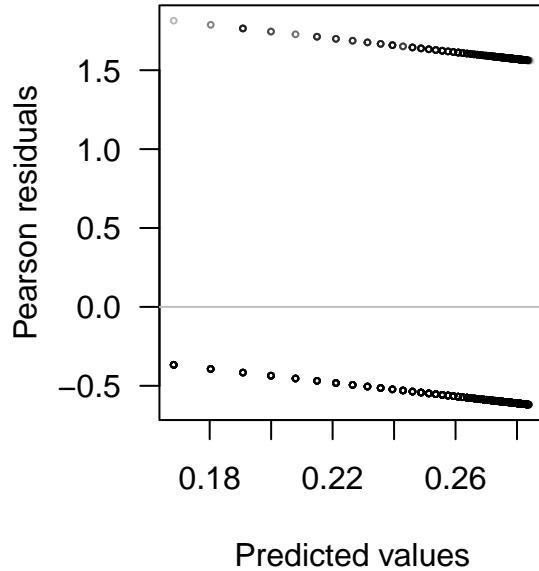
	Estimate	Std. Error	t value	Pr(> t)		
(Intercept)	-0.9069622	0.0519659	-17.4530	< 2.2e-16 ***		
$I((age/100)^{-2})$	-0.0155420	0.0056638	-2.7441	0.006096 **		

Signif. codes:	0 '***'	0.001 '**'	0.01 '*'	0.05 '.'	0.1 ', '	1

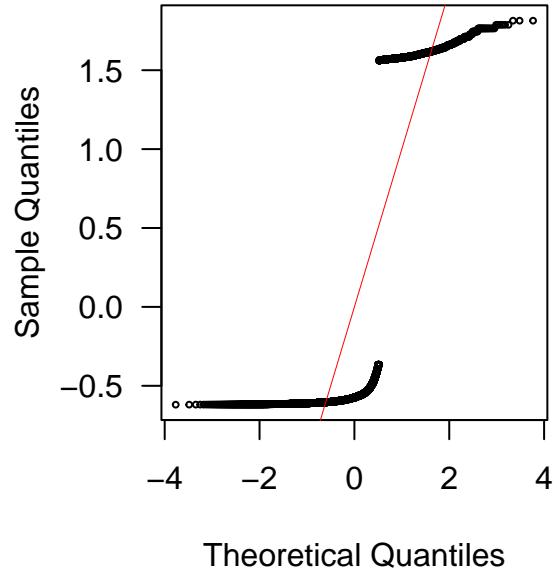
SSD: 1276.0

AIC: 6993.2

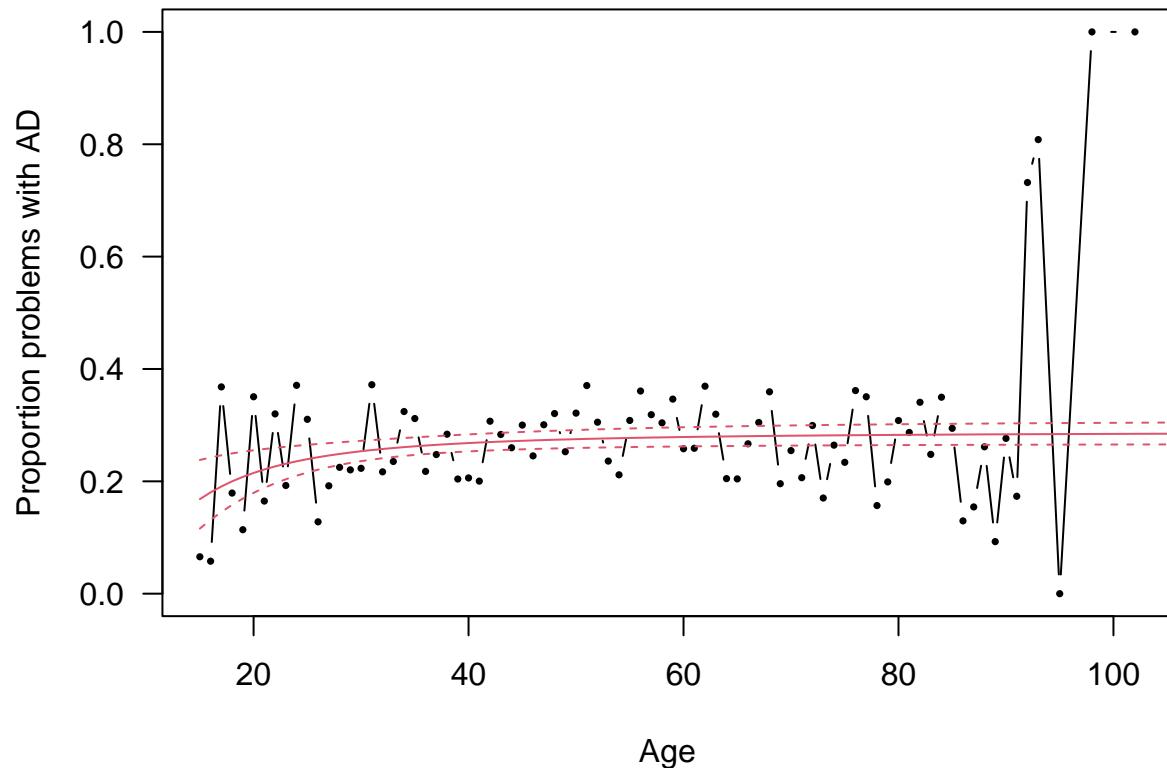
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



GAMM

Fitted model:

```
AD ~ s(age, bs = "tp")
```

Random effects:

Groups	Name	Variance	Std.Dev.
Xr	s(age)	101	10.05

Coefficients:

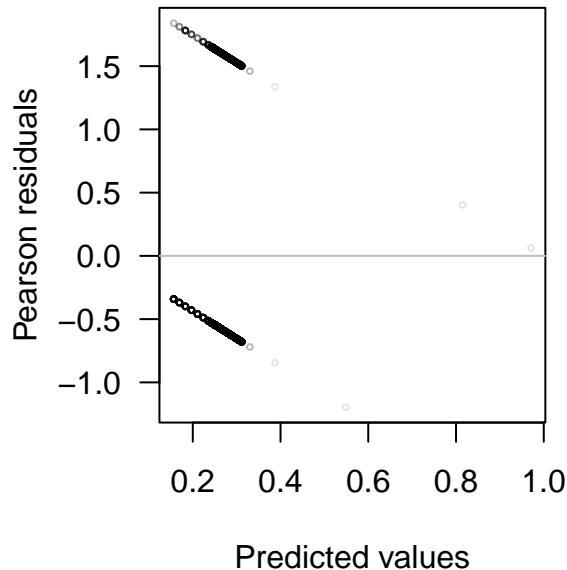
	Estimate	Std. Error	z value	Pr(> z)
X(Intercept)	-1.02192128	0.00092437	-1105.531	< 2.2e-16 ***
Xs(age)Fx1	5.65183496	0.06149669	91.905	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

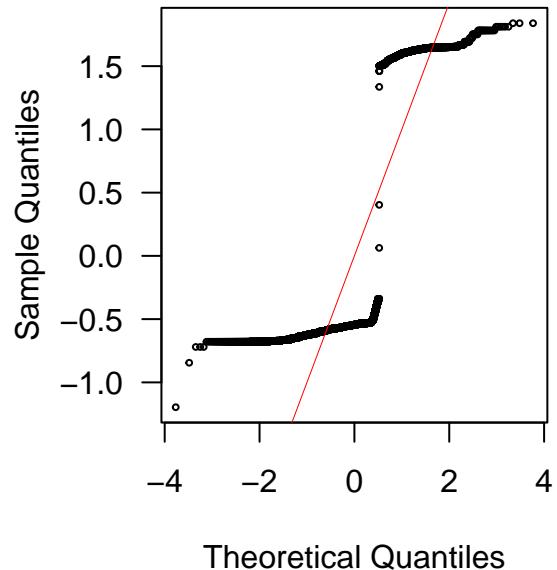
SSD: 1275.4

AIC: 6998709.5

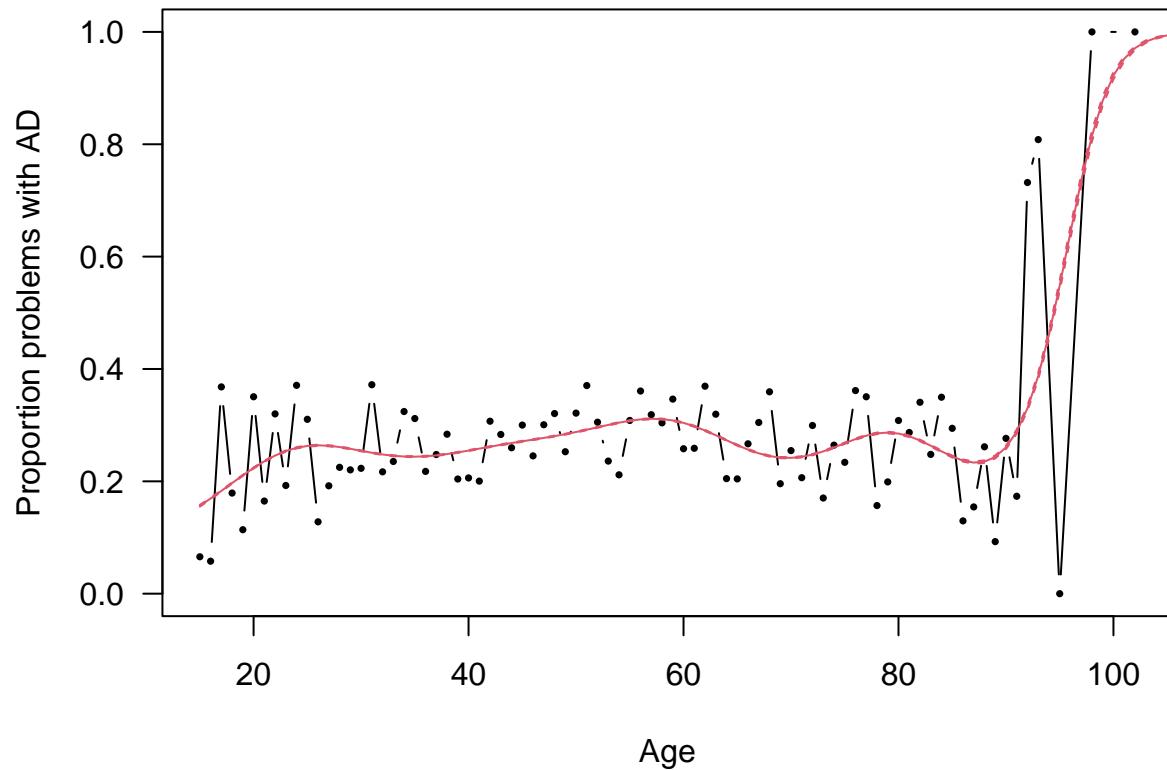
Residuals vs fitted



Normal Q–Q Plot



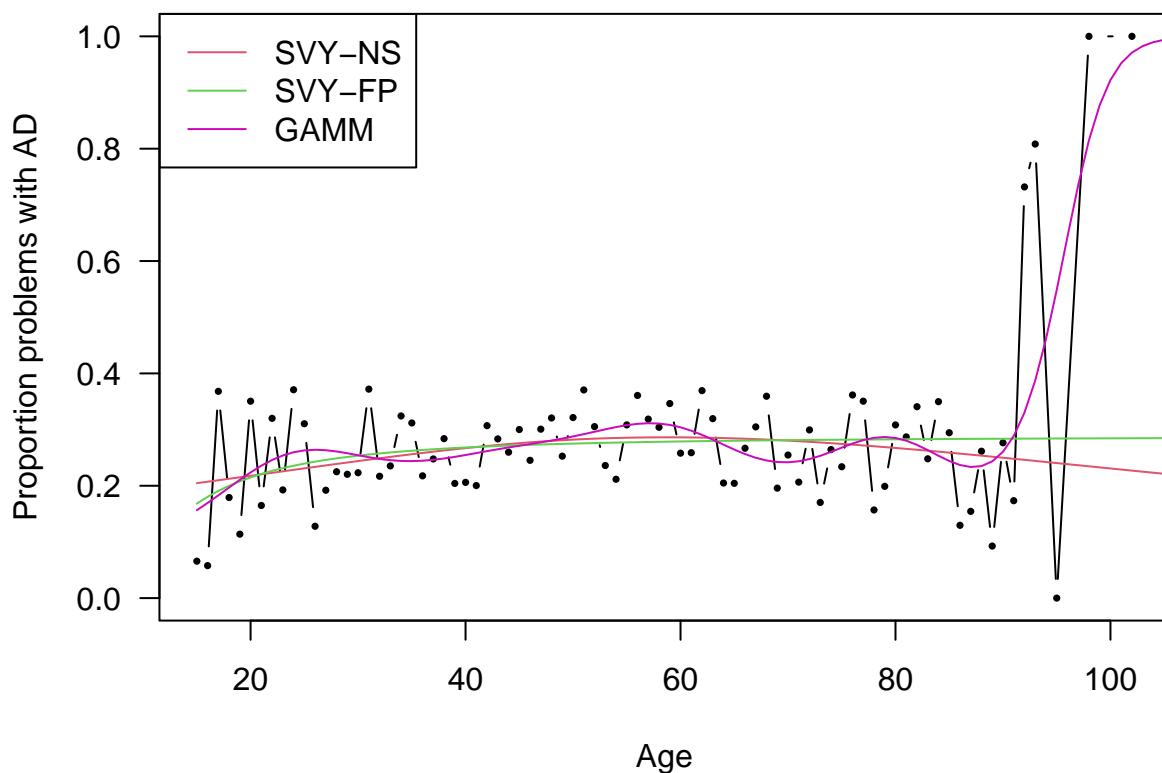
Fitted values with 95% confidence interval



Summary

	SSD	AIC
SVY-NS	1276.6	6998.6
SVY-FP	1276.0	6993.2
GAMM	1275.4	6998709.5

Comparison of fitted values across models



Any problem

SVY-NS

Fitted model:

ANY1 ~ age.ns1

Coefficients:

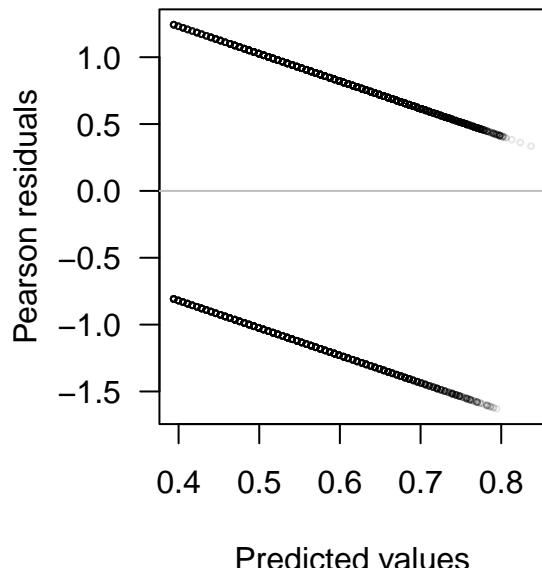
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0.430576	0.081898	-5.2574	1.54e-07 ***
age.ns1	2.577506	0.225782	11.4159	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

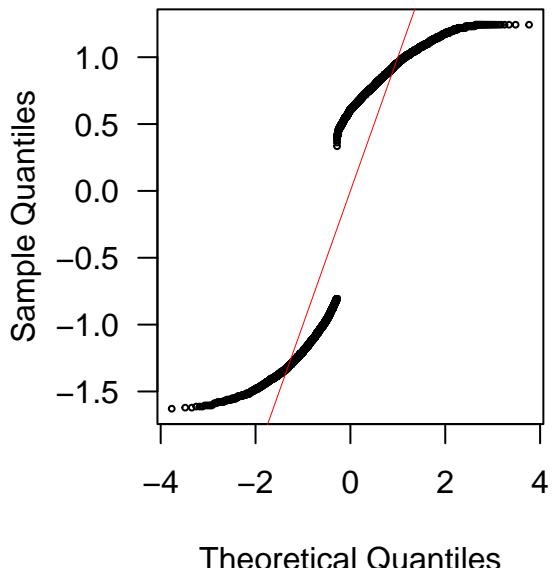
SSD: 1375.6

AIC: 7961.1

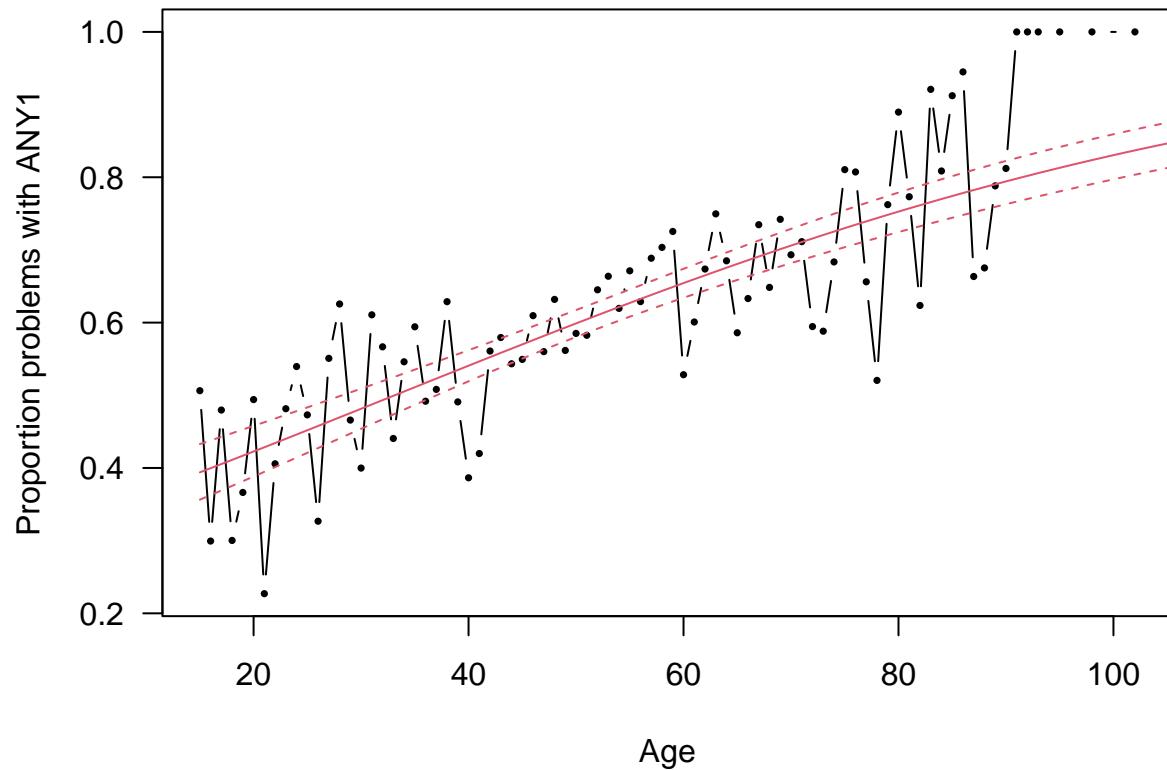
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

Fitted model:
ANY1 ~ I((age/100)^1)

Coefficients:

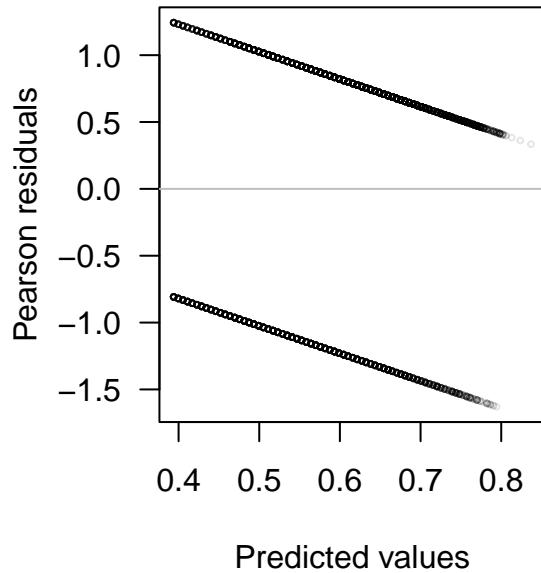
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0.78689	0.11030	-7.134	1.16e-12 ***
I((age/100)^1)	2.37540	0.20808	11.416	< 2.2e-16 ***

Signif. codes:	0 '***'	0.001 '**'	0.01 '*'	0.05 '.'
	0.1 ' '	1		

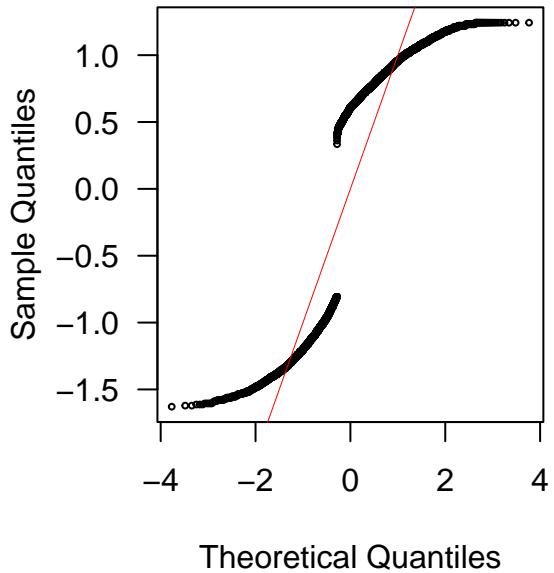
SSD: 1375.6

AIC: 7961.1

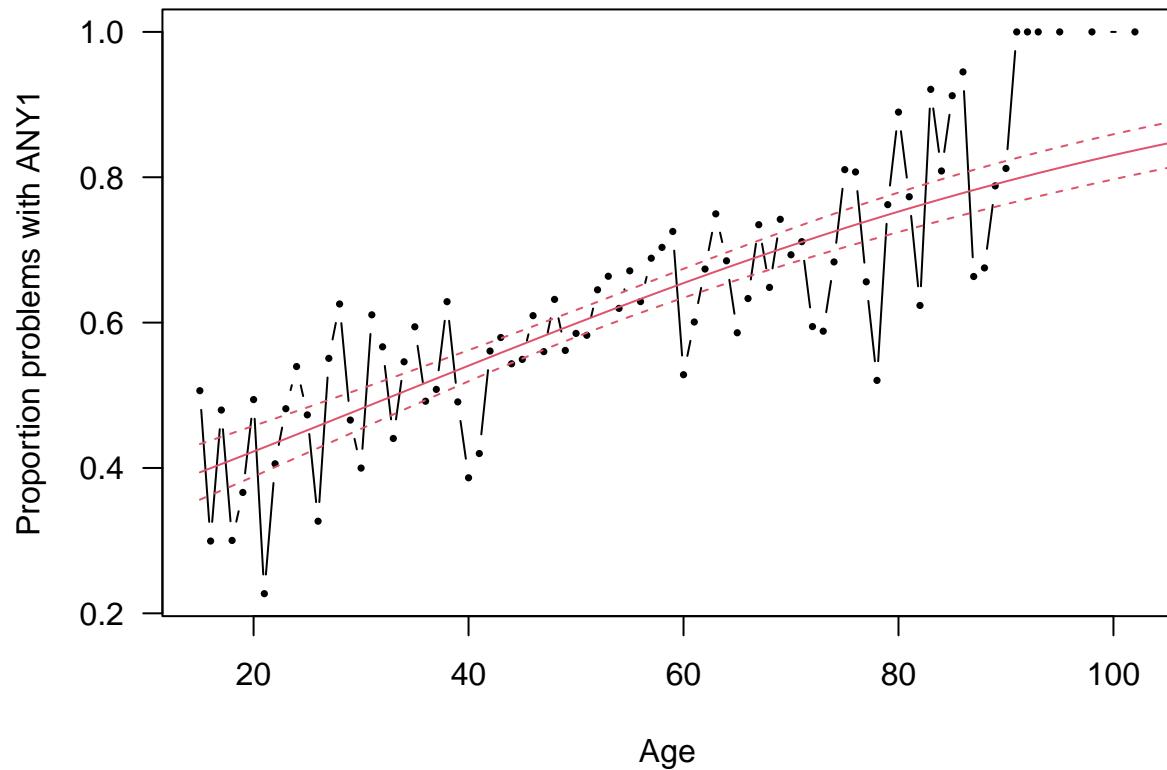
Residuals vs fitted



Normal Q-Q Plot

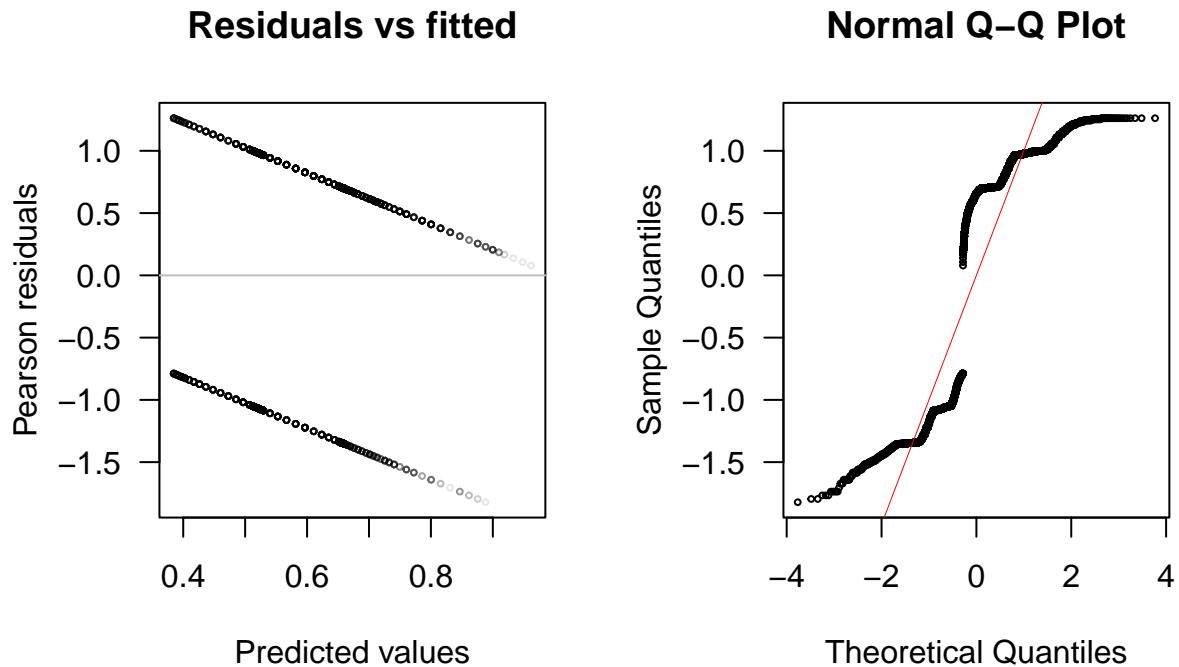


Fitted values with 95% confidence interval

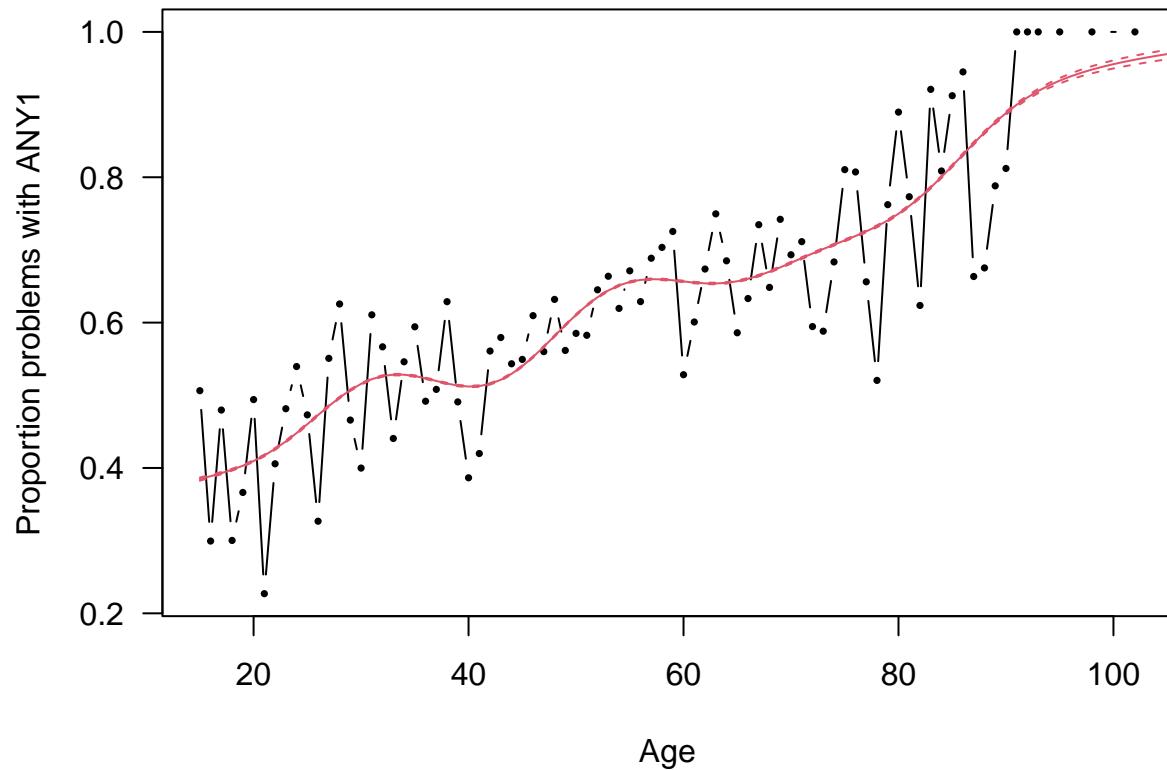


GAMM

```
Fitted model:  
ANY1 ~ s(age, bs = "tp")  
  
Random effects:  
Groups Name Variance Std.Dev.  
Xr      s(age) 10.69    3.27  
  
Coefficients:  
Estimate Std. Error z value Pr(>|z|)  
X(Intercept) 0.38461862 0.00085384 450.455 < 2.2e-16 ***  
Xs(age)Fx1   0.86251919 0.08097049 10.652 < 2.2e-16 ***  
---  
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1  
  
SSD: 1374.5  
AIC: 7970597.9
```



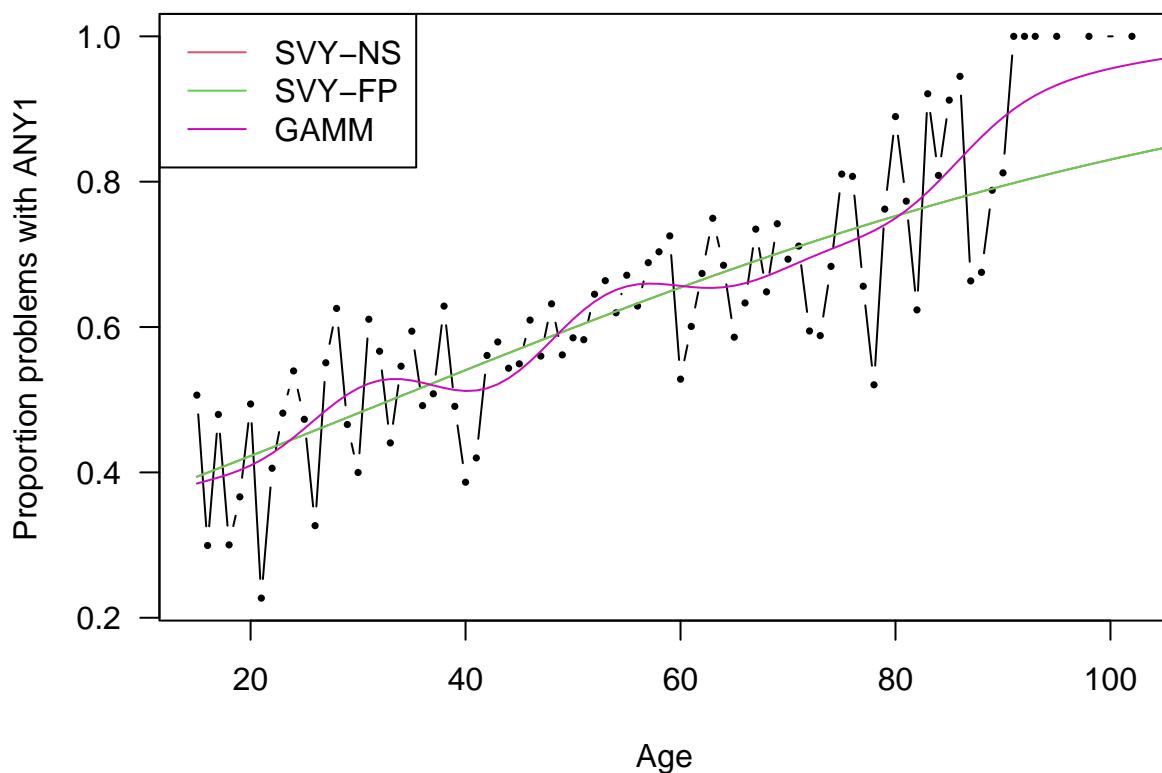
Fitted values with 95% confidence interval



Summary

	SSD	AIC
SVY-NS	1375.6	7961.1
SVY-FP	1375.6	7961.1
GAMM	1374.5	7970597.9

Comparison of fitted values across models



Index value

SVY-NS

Fitted model:

index ~ age.ns1 + age.ns2 + age.ns3 + age.ns4 + age.ns5 + age.ns6

Coefficients:

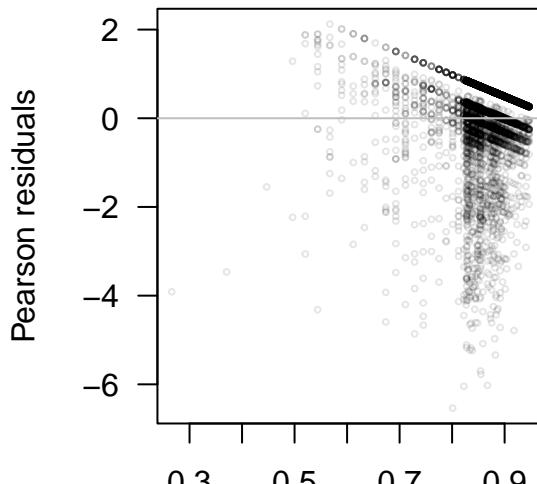
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.9465535	0.0091119	103.8814	< 2.2e-16 ***
age.ns1	-0.0665813	0.0150961	-4.4105	1.060e-05 ***
age.ns2	-0.0701314	0.0195085	-3.5949	0.0003286 ***
age.ns3	-0.1448281	0.0199747	-7.2506	4.995e-13 ***
age.ns4	0.0149393	0.0384487	0.3886	0.6976285
age.ns5	-0.4166466	0.0497870	-8.3686	< 2.2e-16 ***
age.ns6	-0.6618494	0.1016569	-6.5106	8.454e-11 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

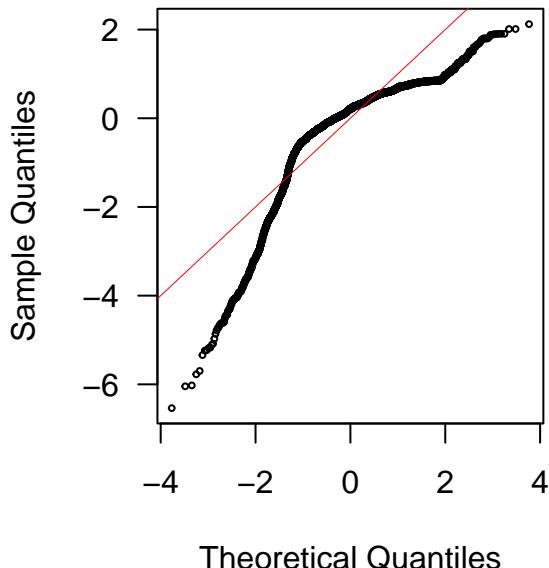
SSD: 235.4

AIC: 226.8

Residuals vs fitted



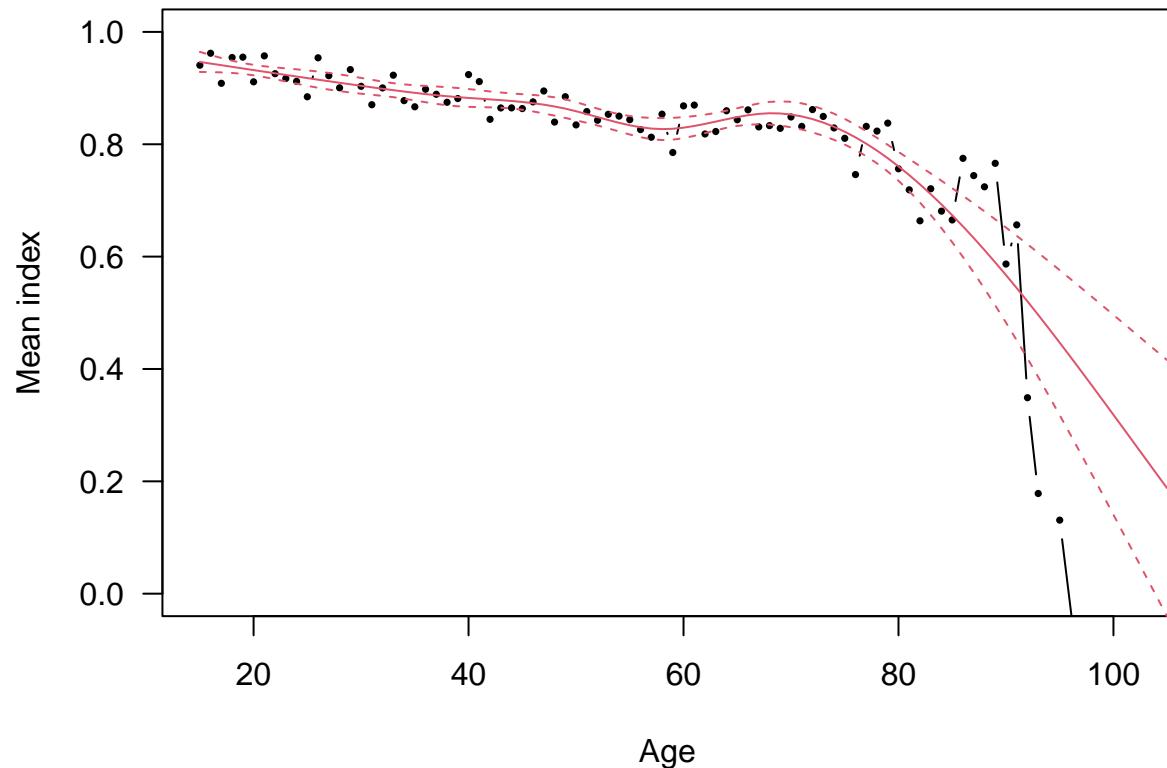
Normal Q-Q Plot



Predicted values

Theoretical Quantiles

Fitted values with 95% confidence interval



SVY-FP

Fitted model:

index ~ I((age/100)^-1) + I((age/100)^3)

Coefficients:

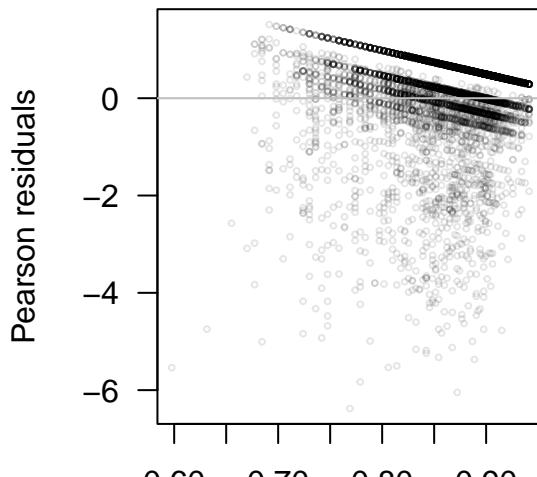
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.8851661	0.0149429	59.2365	< 2.2e-16 ***
I((age/100)^-1)	0.0085584	0.0033981	2.5186	0.01182 *
I((age/100)^3)	-0.2788463	0.0432330	-6.4498	1.259e-10 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

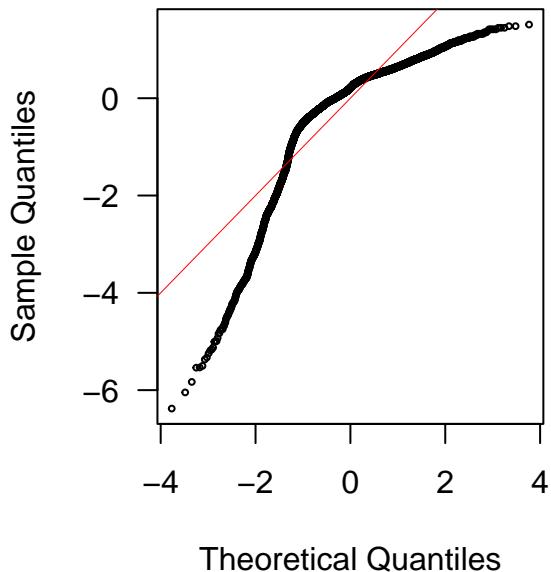
SSD: 236.9

AIC: 229.6

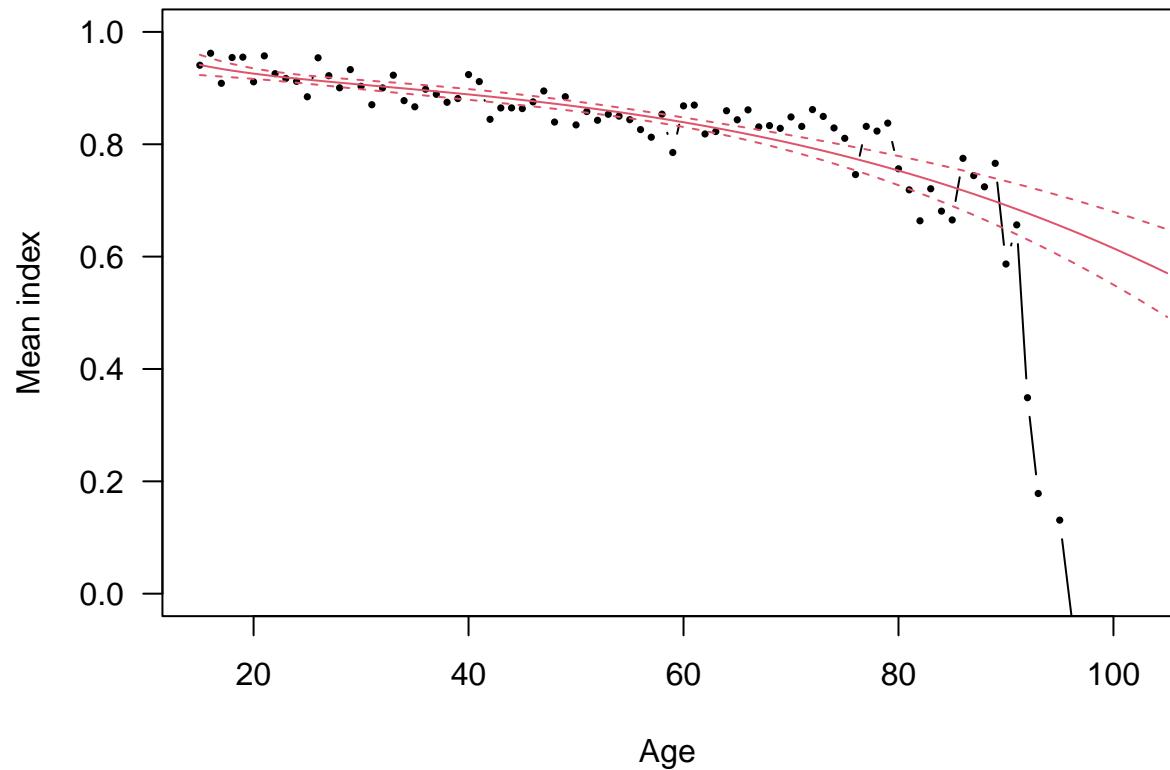
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



BEOI-NS

```
Fitted mu model:  
xx ~ ns(age, df = 6)  
  
Fitted nu model:  
~ns(age, df = 6)  
  
*****  
Family: c("BEOI", "One Inflated Beta")  
  
Call:  
gamlss(formula = f.mu, nu.formula = f.nu, family = BEOI, data = data.frame(xx = xx,  
    age = hisdesign$variables$age), control = gamlss.control(trace = FALSE))  
  
Fitting method: RS()  
  
-----  
Mu link function: logit  
Mu Coefficients:  
    Estimate Std. Error t value Pr(>|t|)  
(Intercept) 1.88927 0.08411 22.462 < 2e-16 ***  
ns(age, df = 6)1 -0.22914 0.09222 -2.485 0.0130 *  
ns(age, df = 6)2 -0.22830 0.11132 -2.051 0.0403 *  
ns(age, df = 6)3 -0.43287 0.09520 -4.547 5.55e-06 ***  
ns(age, df = 6)4 0.07242 0.09185 0.788 0.4305  
ns(age, df = 6)5 -1.09353 0.20784 -5.261 1.48e-07 ***  
ns(age, df = 6)6 -1.78184 0.16013 -11.128 < 2e-16 ***  
---  
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1  
  
-----  
Sigma link function: log  
Sigma Coefficients:  
    Estimate Std. Error t value Pr(>|t|)  
(Intercept) 2.21986 0.02112 105.1 <2e-16 ***  
---  
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1  
  
-----  
Nu link function: logit  
Nu Coefficients:  
    Estimate Std. Error t value Pr(>|t|)  
(Intercept) 0.5311 0.1385 3.834 0.000127 ***  
ns(age, df = 6)1 -0.7539 0.1608 -4.688 2.81e-06 ***  
ns(age, df = 6)2 -0.9796 0.2050 -4.779 1.80e-06 ***  
ns(age, df = 6)3 -1.3708 0.1784 -7.686 1.76e-14 ***  
ns(age, df = 6)4 -0.9525 0.2355 -4.044 5.32e-05 ***  
ns(age, df = 6)5 -3.1058 0.4126 -7.527 5.93e-14 ***  
ns(age, df = 6)6 -3.4615 0.5697 -6.076 1.31e-09 ***  
---  
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

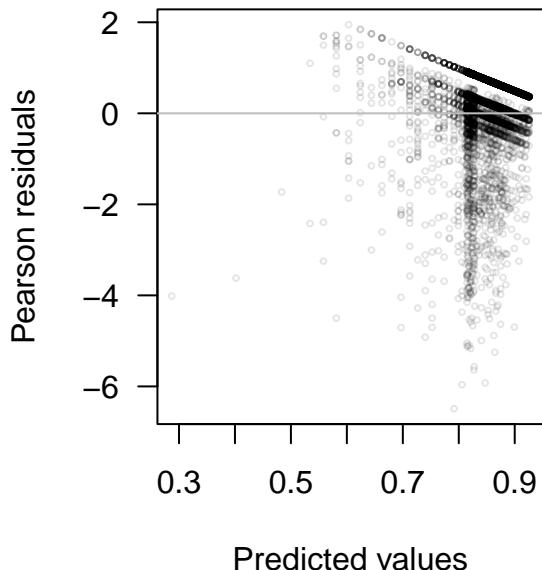
No. of observations in the fit: 6061
 Degrees of Freedom for the fit: 15
 Residual Deg. of Freedom: 6046
 at cycle: 8

Global Deviance: 1209.223
 AIC: 1239.223
 SBC: 1339.867

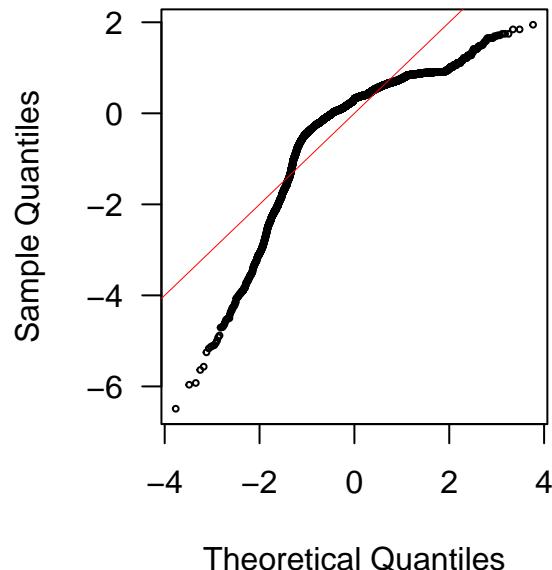
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	1.88926536	0.08410819	22.462322	2.142352e-107
ns(age, df = 6)1	-0.22913983	0.09222492	-2.484576	1.299740e-02
ns(age, df = 6)2	-0.22829932	0.11131533	-2.050924	4.031726e-02
ns(age, df = 6)3	-0.43286514	0.09519974	-4.546915	5.549801e-06
ns(age, df = 6)4	0.07241663	0.09185241	0.788402	4.304925e-01
ns(age, df = 6)5	-1.09353173	0.20784348	-5.261323	1.479386e-07
ns(age, df = 6)6	-1.78183553	0.16012832	-11.127548	1.738117e-28
(Intercept)	2.21985999	0.02111674	105.123239	0.000000e+00
(Intercept)	0.53105268	0.13850645	3.834137	1.272846e-04
ns(age, df = 6)1	-0.75393270	0.16080683	-4.688437	2.813350e-06
ns(age, df = 6)2	-0.97960489	0.20497344	-4.779180	1.801687e-06
ns(age, df = 6)3	-1.37084456	0.17836057	-7.685805	1.762872e-14
ns(age, df = 6)4	-0.95249555	0.23553116	-4.044032	5.319242e-05
ns(age, df = 6)5	-3.10582495	0.41259810	-7.527482	5.928670e-14
ns(age, df = 6)6	-3.46148904	0.56967808	-6.076219	1.305362e-09

SSD: 235
 AIC: 1239.2

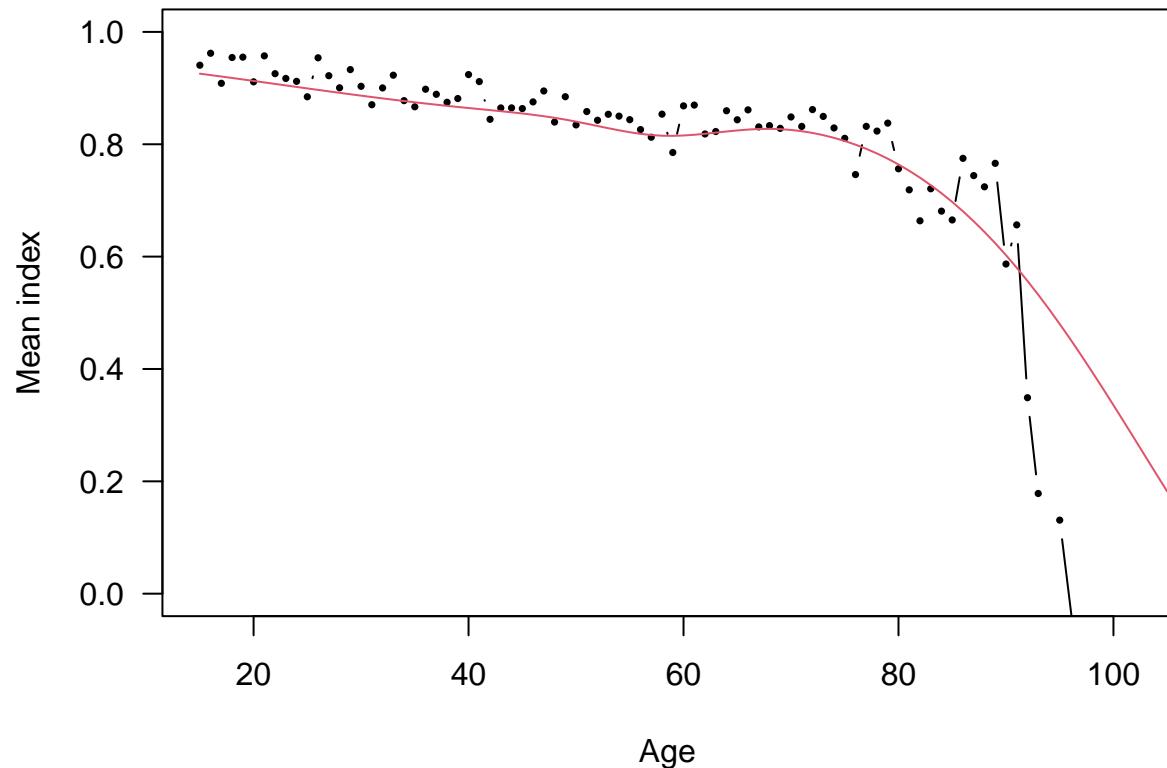
Residuals vs fitted



Normal Q-Q Plot



Fitted values (SE fit not available)



BEOI-FP

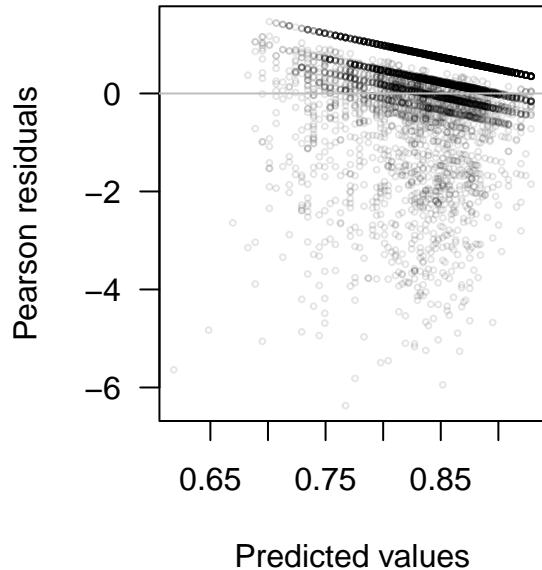
```
Fitted mu model:  
xx ~ I((age/100)^-1) + I((age/100)^3)  
  
Fitted nu model:  
~I((age/100)^-1) + I((age/100)^3)  
  
*****  
Family: c("BEOI", "One Inflated Beta")  
  
Call:  
gamlss(formula = f.mu, nu.formula = f.nu, family = BEOI, data = data.frame(xx = xx,  
    age = hisdesign$variables$age), control = gamlss.control(trace = FALSE))  
  
Fitting method: RS()  
  
-----  
Mu link function: logit  
Mu Coefficients:  
    Estimate Std. Error t value Pr(>|t|)  
(Intercept) 1.67522 0.05678 29.505 < 2e-16 ***  
I((age/100)^-1) 0.02953 0.01760 1.677 0.0935 .  
I((age/100)^3) -0.68279 0.10210 -6.687 2.48e-11 ***  
---  
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ',' 1  
  
-----  
Sigma link function: log  
Sigma Coefficients:  
    Estimate Std. Error t value Pr(>|t|)  
(Intercept) 2.2066 0.0211 104.6 <2e-16 ***  
---  
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ',' 1  
  
-----  
Nu link function: logit  
Nu Coefficients:  
    Estimate Std. Error t value Pr(>|t|)  
(Intercept) -0.6248 0.1168 -5.350 9.11e-08 ***  
I((age/100)^-1) 0.1870 0.0329 5.685 1.37e-08 ***  
I((age/100)^3) -1.8030 0.2620 -6.881 6.55e-12 ***  
---  
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ',' 1  
  
-----  
No. of observations in the fit: 6061  
Degrees of Freedom for the fit: 7  
    Residual Deg. of Freedom: 6054  
        at cycle: 8  
  
Global Deviance: 1259.157  
AIC: 1273.157  
SBC: 1320.125
```

```
*****
          Estimate Std. Error     t value    Pr(>|t|) 
(Intercept)  1.67521534  0.05677706  29.505145 6.755636e-179
I((age/100)^-1) 0.02952753  0.01760242   1.677470 9.350214e-02
I((age/100)^3) -0.68278947  0.10210245  -6.687297 2.476879e-11
(Intercept)  2.20664089  0.02110235  104.568468 0.000000e+00
(Intercept) -0.62478177  0.11677999  -5.350075 9.114290e-08
I((age/100)^-1) 0.18703851  0.03289997   5.685066 1.368609e-08
I((age/100)^3) -1.80297942  0.26203368  -6.880716 6.554486e-12
```

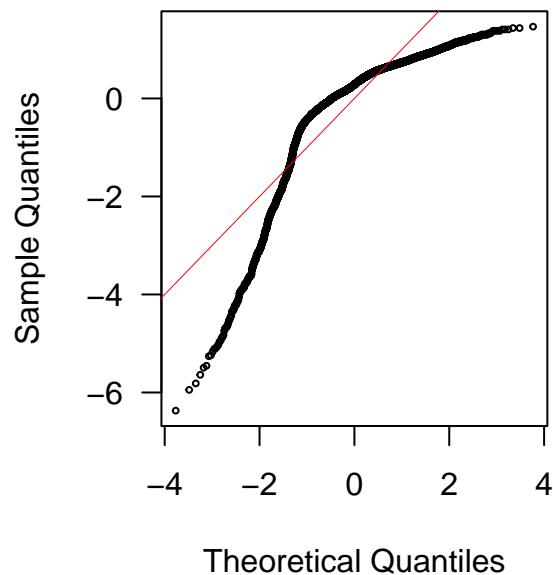
SSD: 237.1

AIC: 1273.2

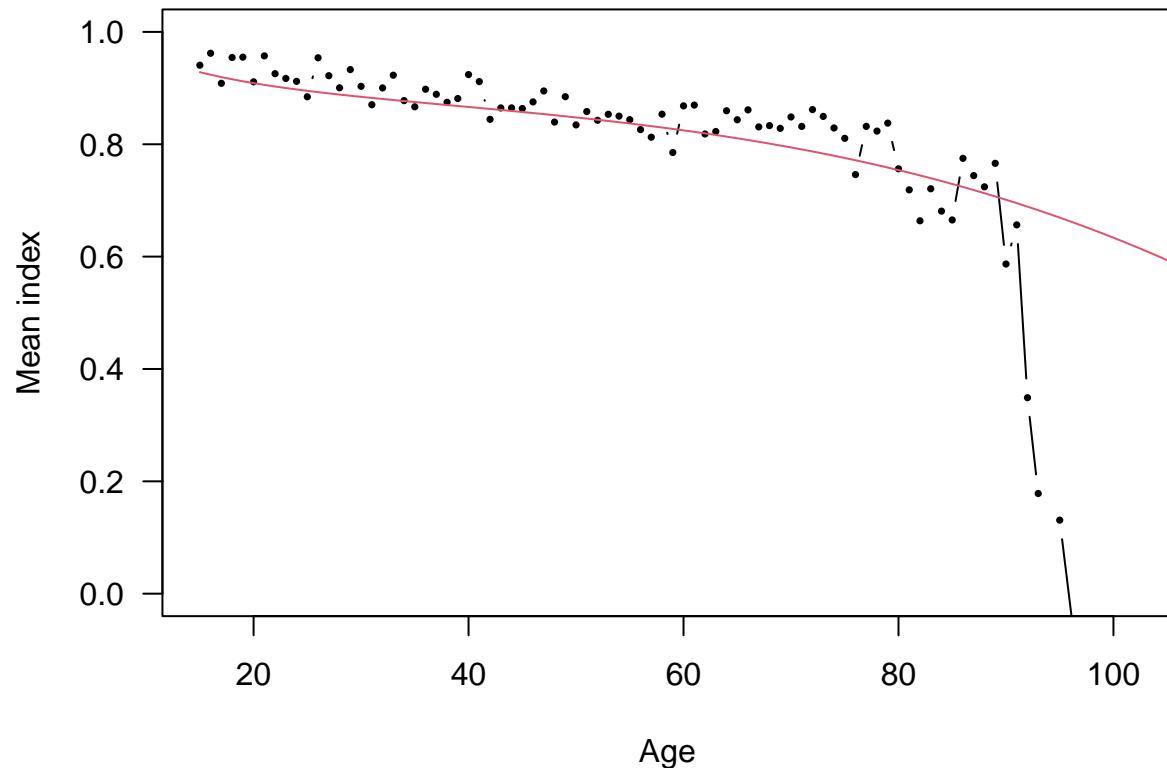
Residuals vs fitted



Normal Q-Q Plot



Fitted values (SE fit not available)



GAMM

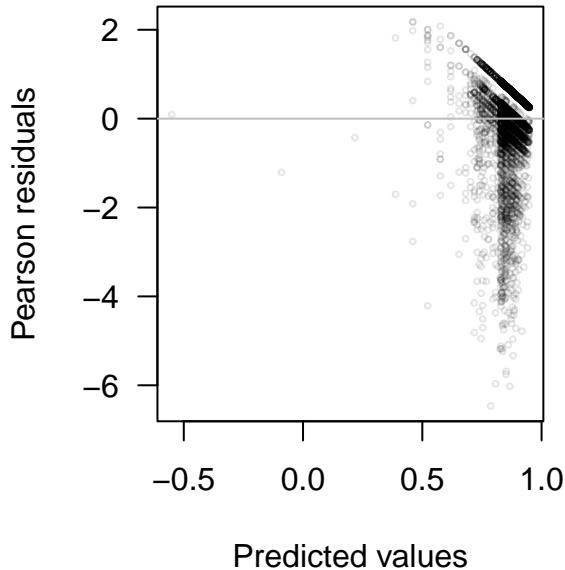
Fitted model:
index ~ s(age, bs = "tp")

Coefficients:

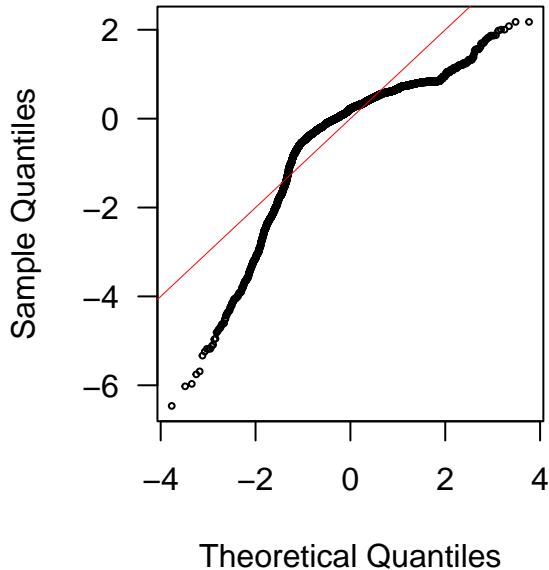
	Estimate	Std. Error	t value
X(Intercept)	0.8593956	0.0024758	347.1144
Xs(age)Fx1	-1.1076961	0.1269367	-8.7264

SSD: 234.0
AIC: -428.8

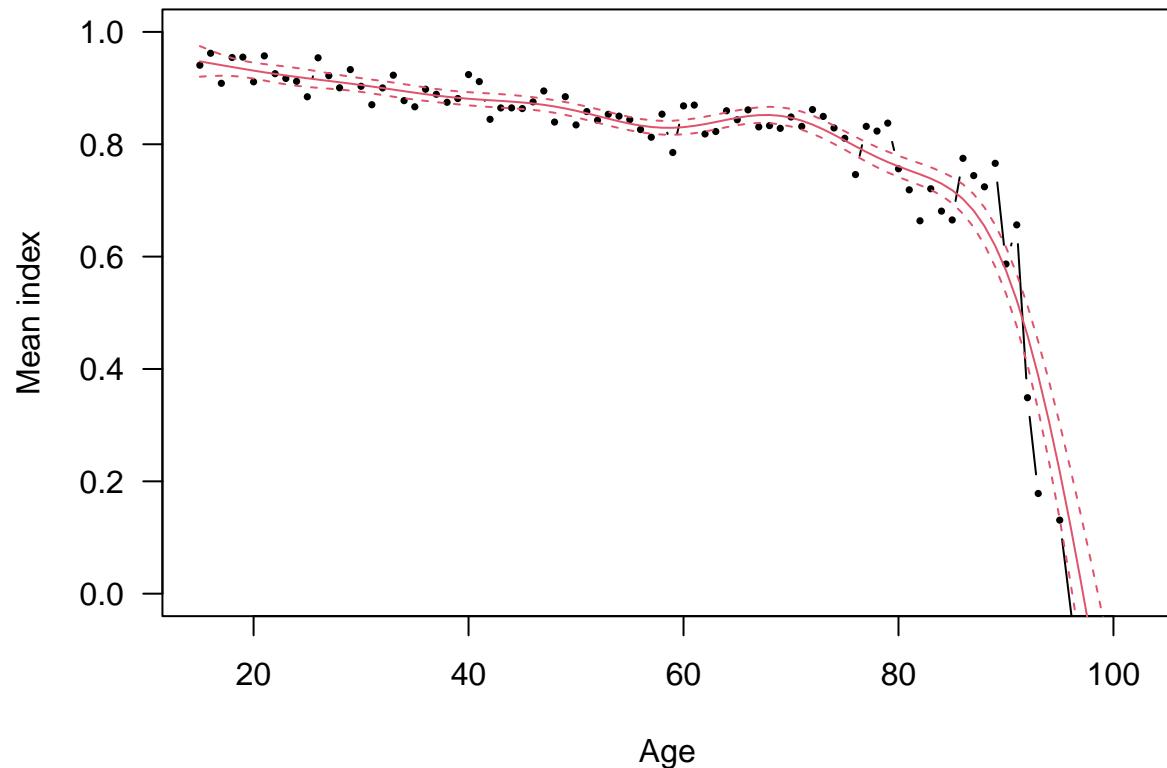
Residuals vs fitted



Normal Q-Q Plot



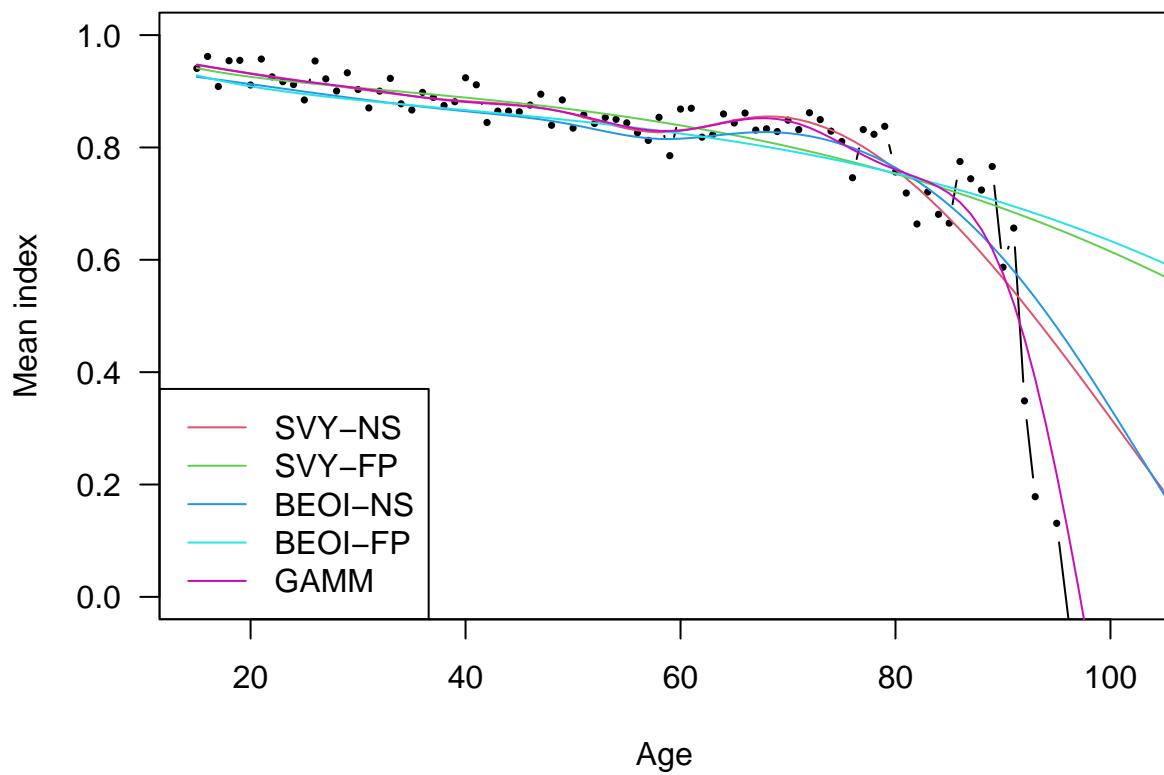
Fitted values with 95% confidence interval



Summary

	SSD	AIC
SVY-NS	235.4	226.8
SVY-FP	236.9	229.6
BEOI-NS	235.0	1239.2
BEOI-FP	237.1	1273.2
GAMM	234.0	-428.8

Comparison of fitted values across models



Visual Analogue Scale

SVY-NS

Fitted model:

VAS ~ age.ns1 + age.ns2 + age.ns3 + age.ns4

Coefficients:

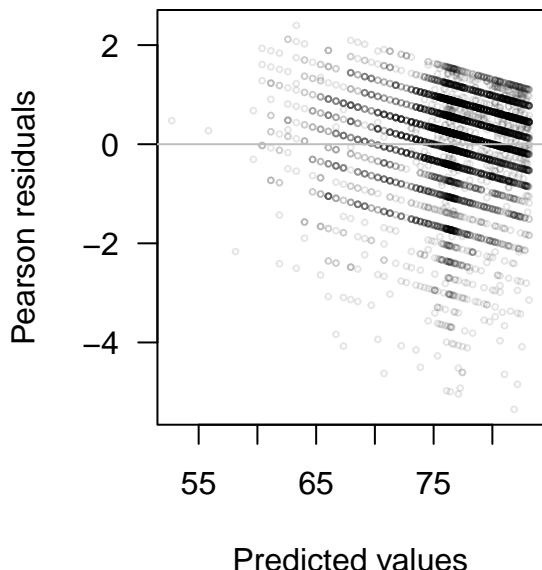
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	83.12334	0.90182	92.1725	< 2.2e-16 ***
age.ns1	-6.90014	1.08807	-6.3416	2.538e-10 ***
age.ns2	-5.65131	1.56479	-3.6115	0.0003083 ***
age.ns3	-22.03728	2.84243	-7.7530	1.142e-14 ***
age.ns4	-29.38050	3.89702	-7.5392	5.867e-14 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

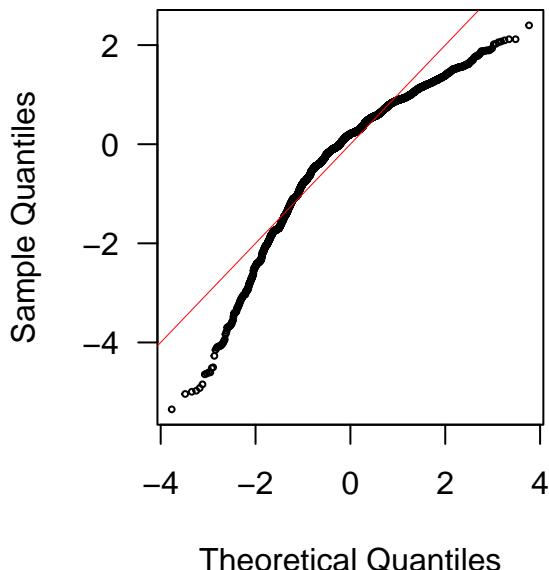
SSD: 1315446.5

AIC: 1314019.8

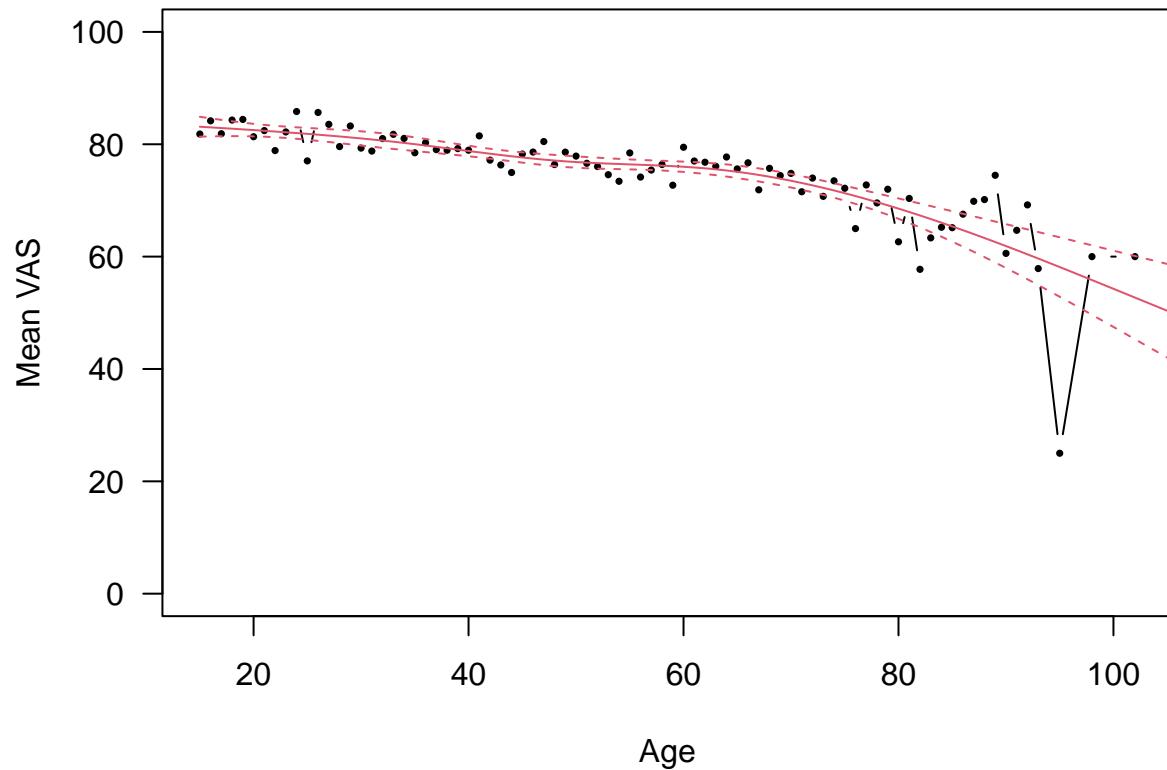
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

Fitted model:
VAS ~ I((age/100)^1)

Coefficients:

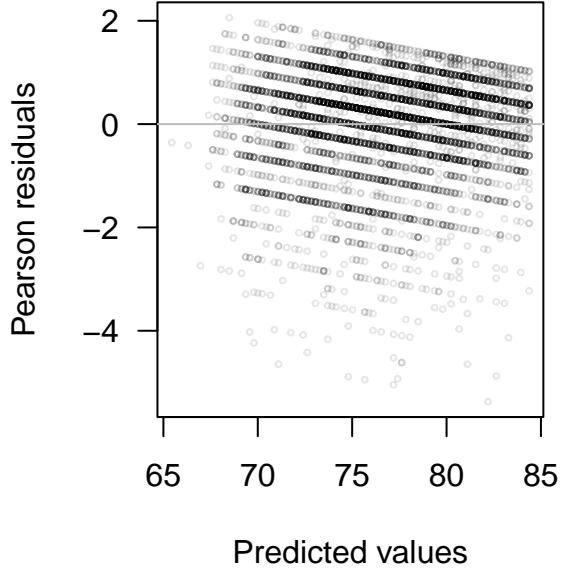
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	87.63492	0.82995	105.590	< 2.2e-16 ***
I((age/100)^1)	-21.75859	1.67214	-13.012	< 2.2e-16 ***

Signif. codes:	0 '***'	0.001 '**'	0.01 '*'	0.05 '.'
	0.1 ' '	1		

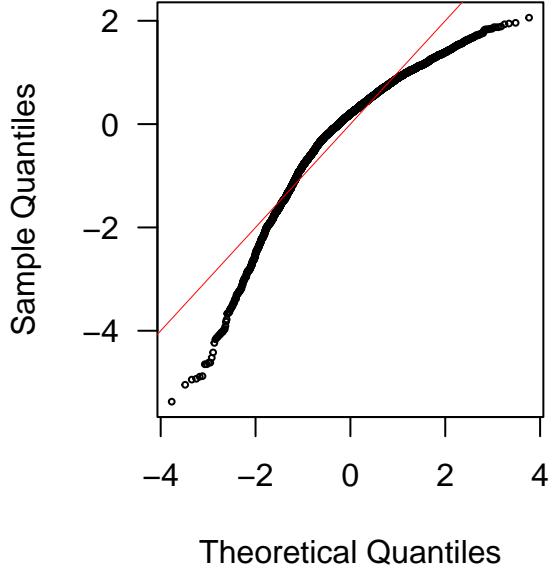
SSD: 1315884.7

AIC: 1319766.9

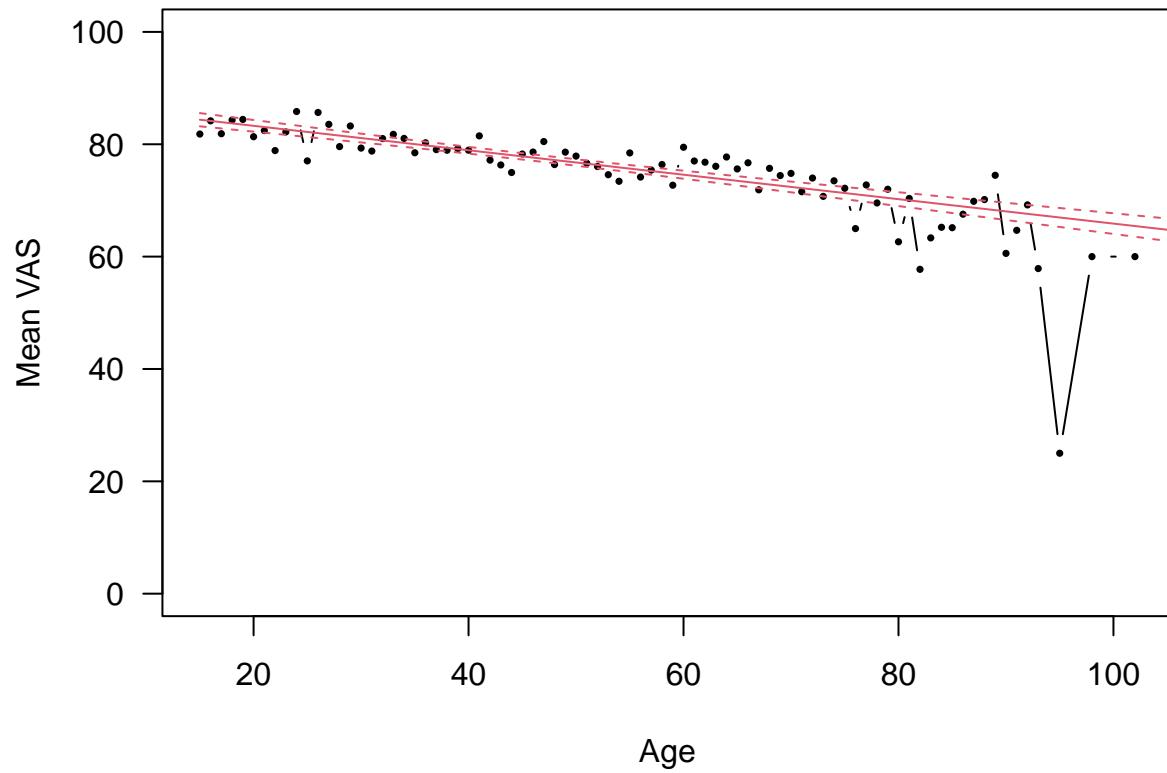
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



BEOI-NS

```
Fitted mu model:  
xx ~ ns(age, df = 4)  
  
Fitted nu model:  
~ns(age, df = 4)  
  
*****  
Family: c("BEOI", "One Inflated Beta")  
  
Call:  
gamlss(formula = f.mu, nu.formula = f.nu, family = BEOI, data = data.frame(xx = xx,  
    age = hisdesign$variables$age), control = gamlss.control(trace = FALSE))  
  
Fitting method: RS()  
  
-----  
Mu link function: logit  
Mu Coefficients:  
    Estimate Std. Error t value Pr(>|t|)  
(Intercept) 1.45690 0.04712 30.918 < 2e-16 ***  
ns(age, df = 4)1 -0.37806 0.05091 -7.426 1.27e-13 ***  
ns(age, df = 4)2 -0.39246 0.05681 -6.908 5.43e-12 ***  
ns(age, df = 4)3 -0.85268 0.11714 -7.279 3.78e-13 ***  
ns(age, df = 4)4 -1.14886 0.11039 -10.407 < 2e-16 ***  
---  
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ',' 1  
  
-----  
Sigma link function: log  
Sigma Coefficients:  
    Estimate Std. Error t value Pr(>|t|)  
(Intercept) 2.03831 0.01689 120.7 <2e-16 ***  
---  
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ',' 1  
  
-----  
Nu link function: logit  
Nu Coefficients:  
    Estimate Std. Error t value Pr(>|t|)  
(Intercept) -2.7324 0.2592 -10.540 < 2e-16 ***  
ns(age, df = 4)1 -1.1097 0.3475 -3.194 0.00141 **  
ns(age, df = 4)2 -1.2615 0.5595 -2.255 0.02418 *  
ns(age, df = 4)3 -2.3379 0.8679 -2.694 0.00708 **  
ns(age, df = 4)4 -2.0733 1.4004 -1.480 0.13880  
---  
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ',' 1  
  
-----  
No. of observations in the fit: 6061  
Degrees of Freedom for the fit: 11  
    Residual Deg. of Freedom: 6050  
        at cycle: 6
```

```

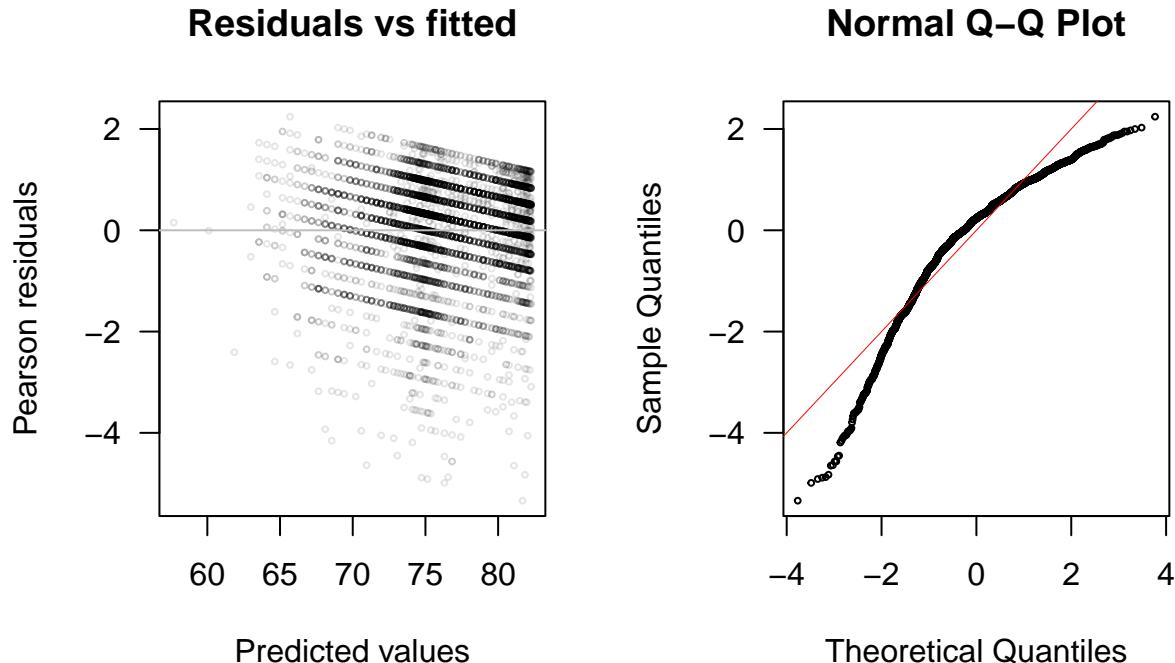
Global Deviance: -5803.945
AIC: -5781.945
SBC: -5708.139
*****

```

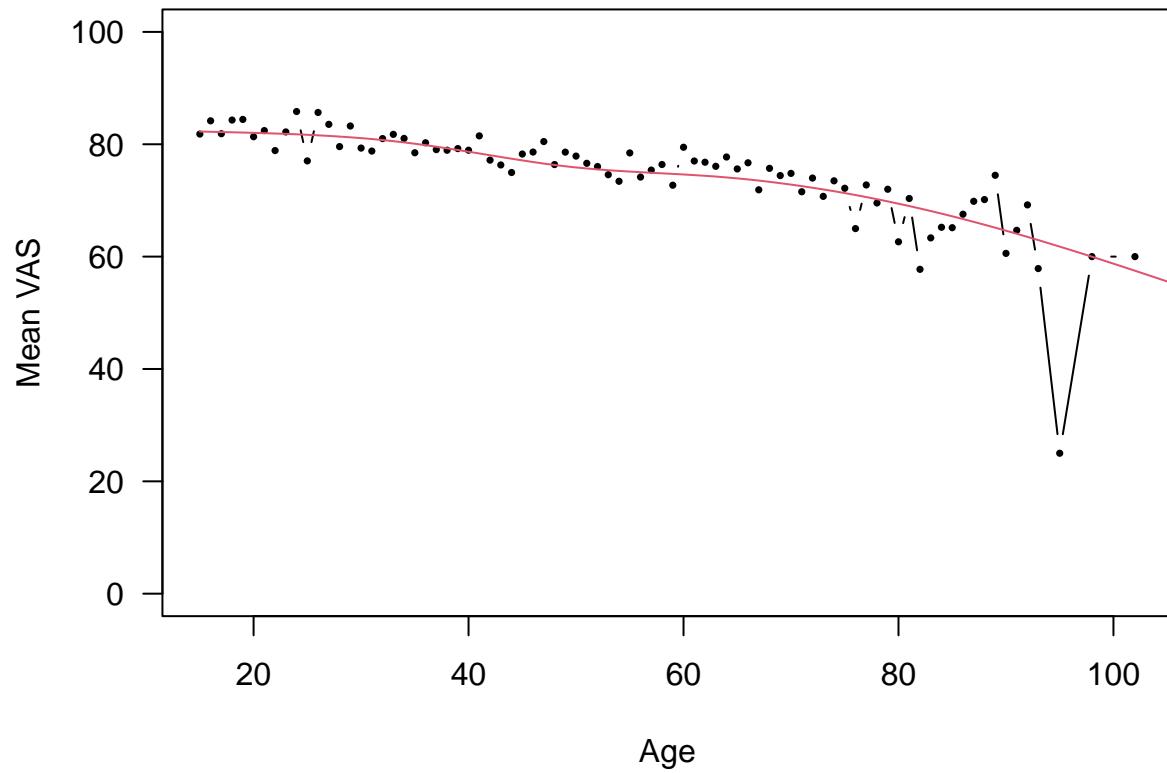
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	1.4568972	0.04712131	30.918011	5.092864e-195
ns(age, df = 4)1	-0.3780616	0.05091041	-7.426016	1.273626e-13
ns(age, df = 4)2	-0.3924615	0.05681455	-6.907764	5.427161e-12
ns(age, df = 4)3	-0.8526752	0.11713640	-7.279336	3.780714e-13
ns(age, df = 4)4	-1.1488551	0.11038791	-10.407435	3.733612e-25
(Intercept)	2.0383067	0.01689336	120.657301	0.000000e+00
(Intercept)	-2.7324146	0.25923190	-10.540426	9.389243e-26
ns(age, df = 4)1	-1.1097006	0.34747752	-3.193590	1.412353e-03
ns(age, df = 4)2	-1.2615447	0.55950569	-2.254749	2.418468e-02
ns(age, df = 4)3	-2.3379460	0.86788399	-2.693846	7.082744e-03
ns(age, df = 4)4	-2.0732648	1.40042251	-1.480457	1.388035e-01

SSD: 1315685

AIC: -5781.9



Fitted values (SE fit not available)



BEOI-FP

```
Fitted mu model:  
xx ~ I((age/100)^1)

Fitted nu model:  
~I((age/100)^1)

*****
Family: c("BEOI", "One Inflated Beta")

Call:  
gamlss(formula = f.mu, nu.formula = f.nu, family = BEOI, data = data.frame(xx = xx,  
    age = hisdesign$variables$age), control = gamlss.control(trace = FALSE))

Fitting method: RS()

-----
Mu link function: logit  

Mu Coefficients:  

Estimate Std. Error t value Pr(>|t|)  

(Intercept) 1.70494 0.02885 59.09 <2e-16 ***  

I((age/100)^1) -1.10956 0.05368 -20.67 <2e-16 ***  

---  

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

-----
Sigma link function: log  

Sigma Coefficients:  

Estimate Std. Error t value Pr(>|t|)  

(Intercept) 2.03652 0.01689 120.6 <2e-16 ***  

---  

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

-----
Nu link function: logit  

Nu Coefficients:  

Estimate Std. Error t value Pr(>|t|)  

(Intercept) -2.3485 0.2085 -11.266 < 2e-16 ***  

I((age/100)^1) -2.7606 0.4706 -5.866 4.71e-09 ***  

---  

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

-----
No. of observations in the fit: 6061  

Degrees of Freedom for the fit: 5  

    Residual Deg. of Freedom: 6056  

        at cycle: 6

Global Deviance: -5792.6  

AIC: -5782.6  

SBC: -5749.052  

*****  

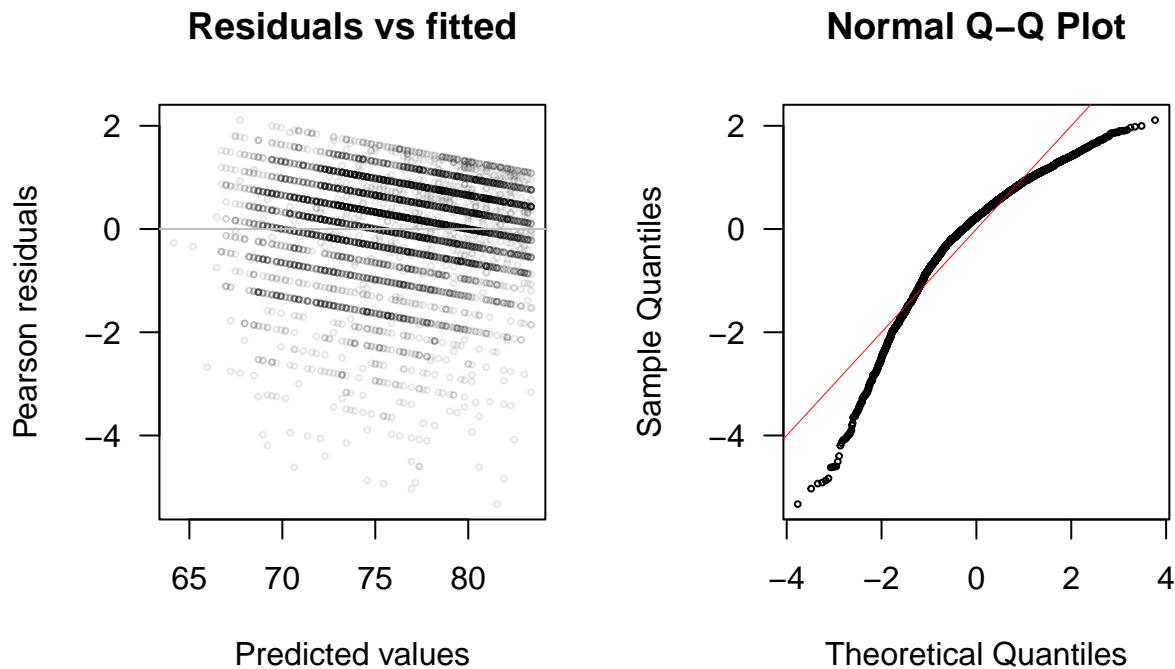
Estimate Std. Error t value Pr(>|t|)
```

```

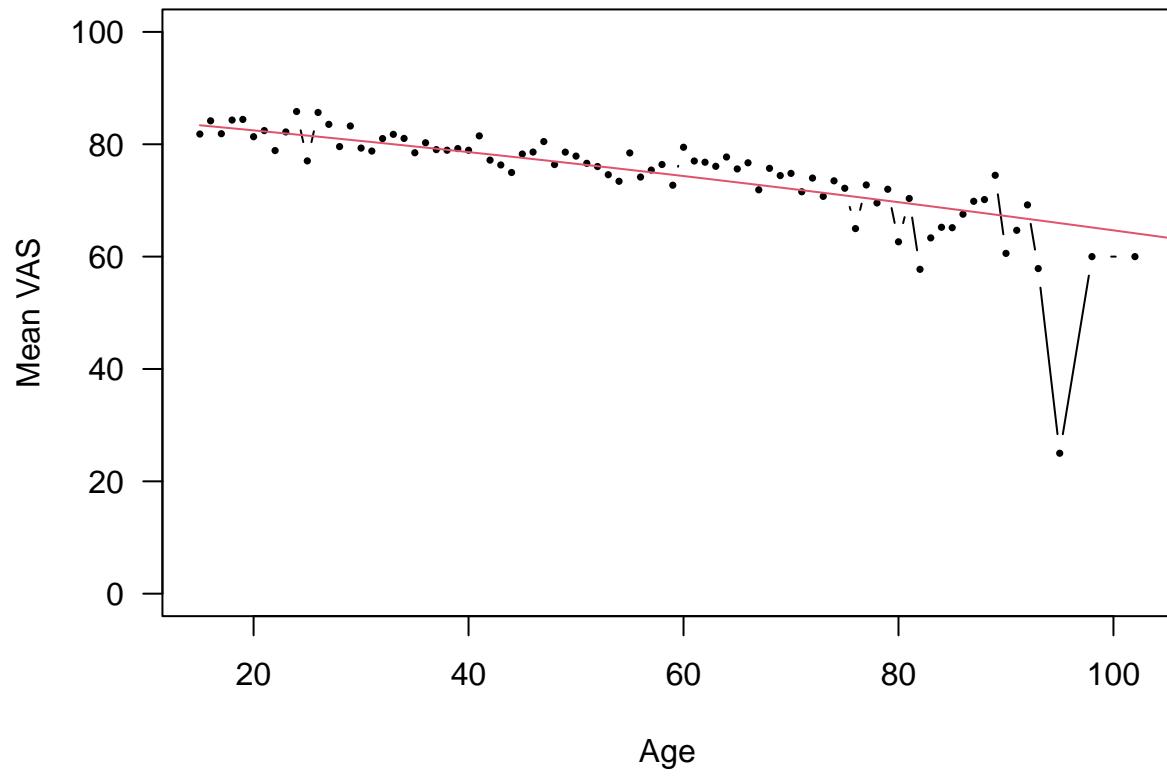
(Intercept)      1.704943  0.02885494  59.086716  0.000000e+00
I((age/100)^1) -1.109560  0.05368359 -20.668505  9.161736e-92
(Intercept)      2.036518  0.01689147 120.564863  0.000000e+00
(Intercept)     -2.348453  0.20845480 -11.266004  3.758855e-29
I((age/100)^1) -2.760565  0.47062248 -5.865774  4.706506e-09

```

SSD: 1318271
AIC: -5782.6



Fitted values (SE fit not available)



GAMM

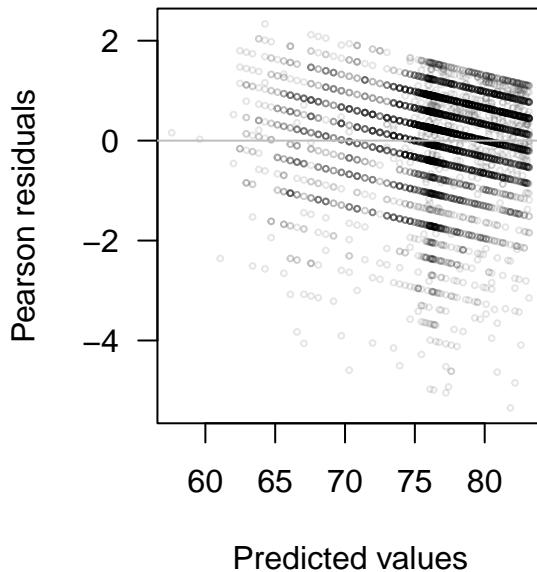
Fitted model:
VAS ~ s(age, bs = "tp")

Coefficients:

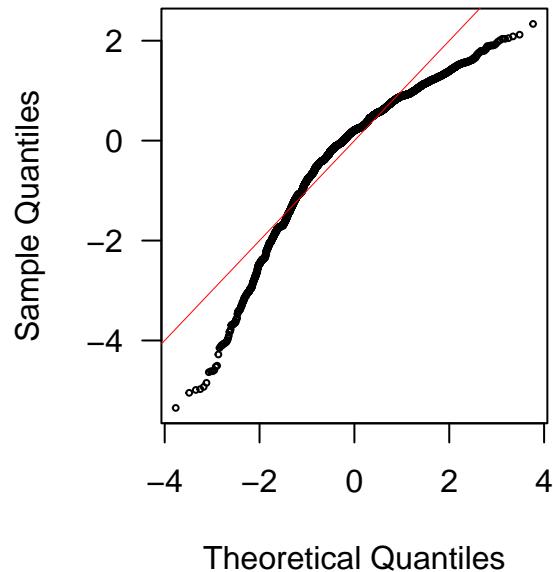
	Estimate	Std. Error	t value
X(Intercept)	76.99544	0.18931	406.7107
Xs(age)Fx1	-5.64199	2.82477	-1.9973

SSD: 1314674.8
AIC: 52101.9

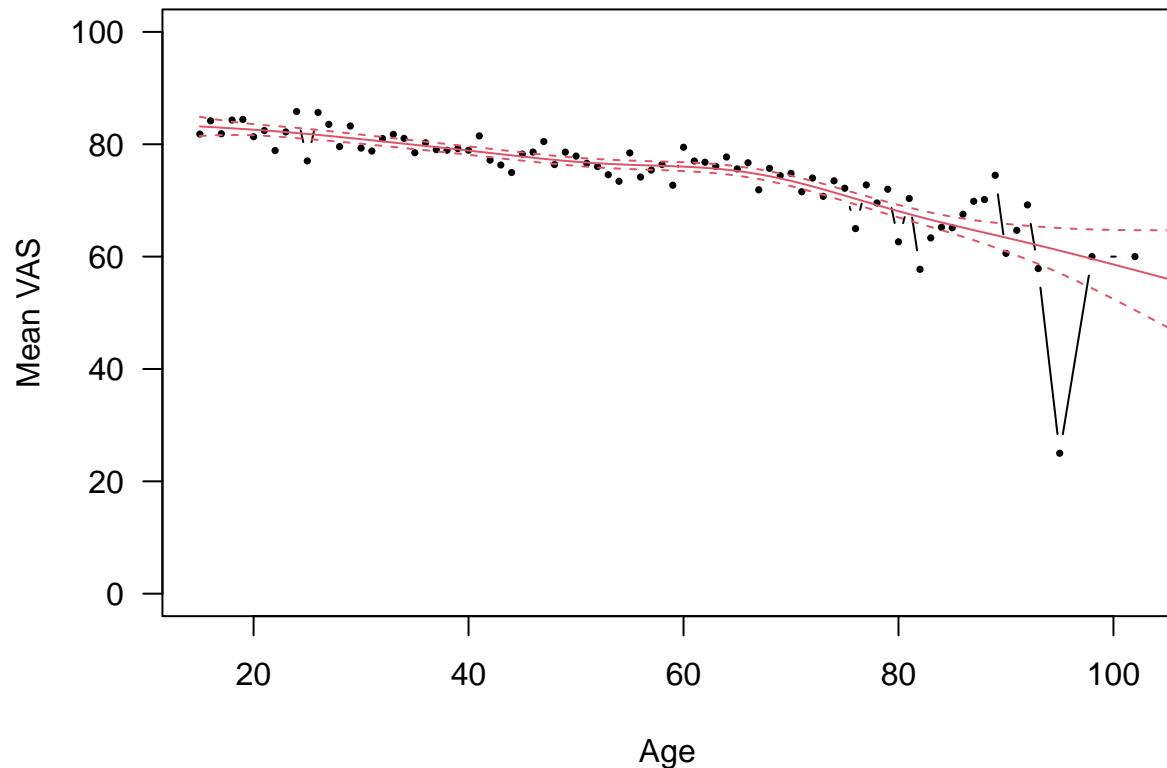
Residuals vs fitted



Normal Q-Q Plot



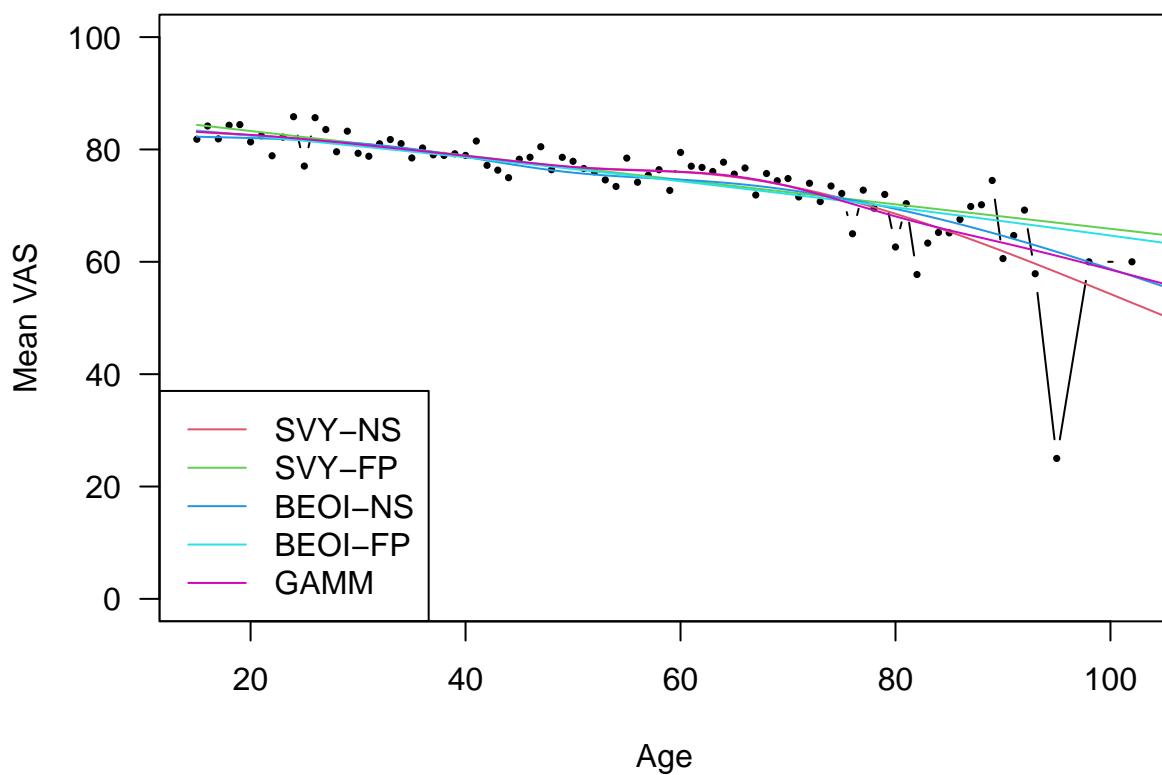
Fitted values with 95% confidence interval



Summary

	SSD	AIC
SVY-NS	1315447	1314019.8
SVY-FP	1315885	1319766.9
BEOI-NS	1315685	-5781.9
BEOI-FP	1318271	-5782.6
GAMM	1314675	52101.9

Comparison of fitted values across models



Summary table

	MO	SC	UA	PD	AD	ANY	INDEX	VAS
SVY-NS	799.4	324.0	833.9	1432.4	1276.6	1375.6	235.4	1315447
SVY-FP	800.9	324.8	838.2	1432.9	1276.0	1375.6	236.9	1315885
BEOI-NS	NA	NA	NA	NA	NA	NA	235.0	1315685
BEOI-FP	NA	NA	NA	NA	NA	NA	237.1	1318271
GAMM	799.9	323.8	832.4	1433.4	1275.4	1374.5	234.0	1314675

2018

Mobility

SVY-NS

Fitted model:

$MO \sim age.ns1 + age.ns2 + age.ns3 + age.ns4$

Coefficients:

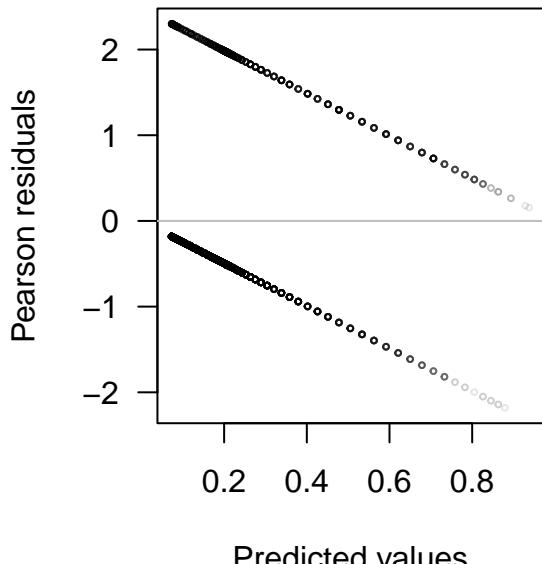
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-2.32016	0.25207	-9.2045	< 2.2e-16 ***
age.ns1	1.06182	0.25997	4.0845	4.489e-05 ***
age.ns2	0.93196	0.24366	3.8249	0.0001325 ***
age.ns3	2.81043	0.56458	4.9779	6.649e-07 ***
age.ns4	5.27473	0.39947	13.2044	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

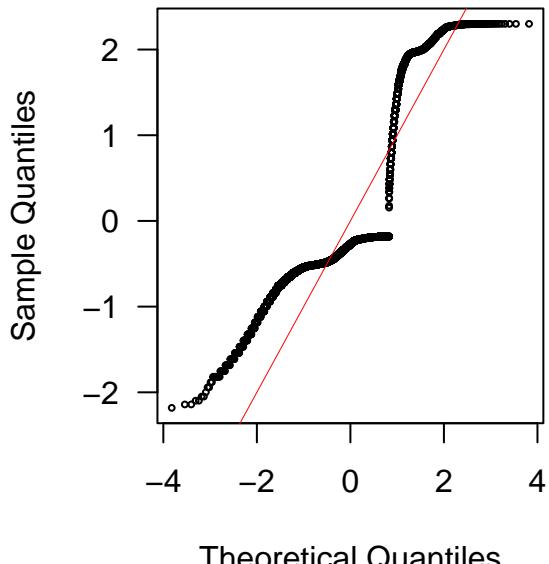
SSD: 1071.6

AIC: 6514.0

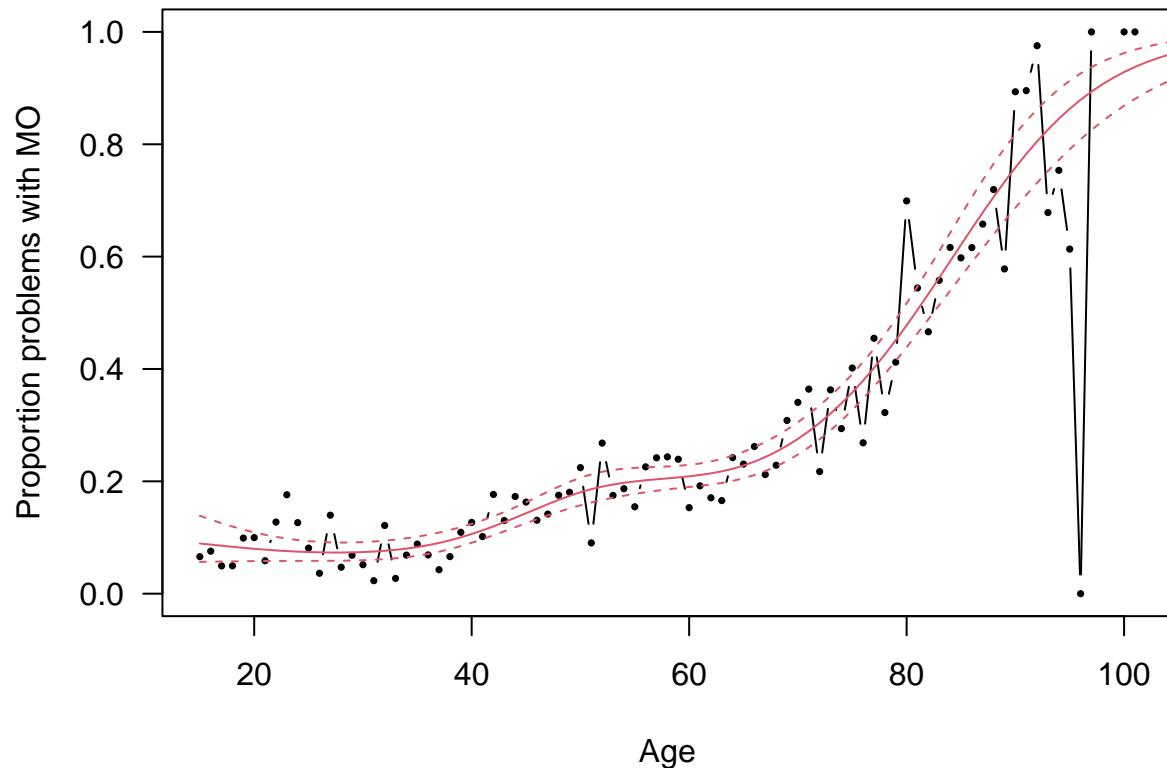
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

Fitted model:
 $M0 \sim I((age/100)^2)$

Coefficients:

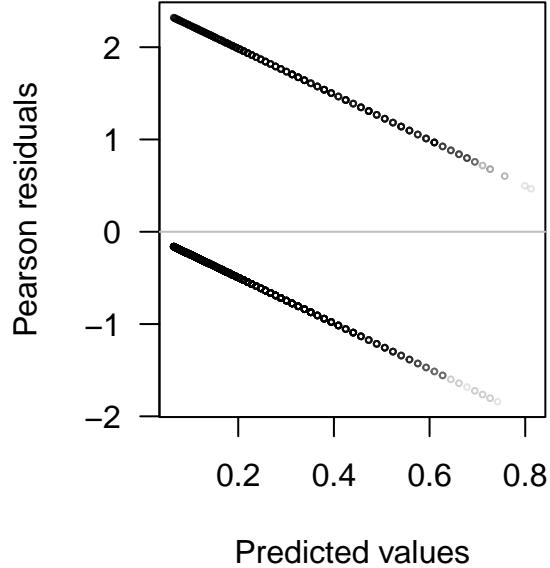
	Estimate	Std. Error	t value	Pr(> t)		
(Intercept)	-2.75732	0.10102	-27.296	< 2.2e-16 ***		
$I((age/100)^2)$	4.13840	0.22805	18.147	< 2.2e-16 ***		

Signif. codes:	0 '***'	0.001 '**'	0.01 '*'	0.05 '.'	0.1 ', '	1

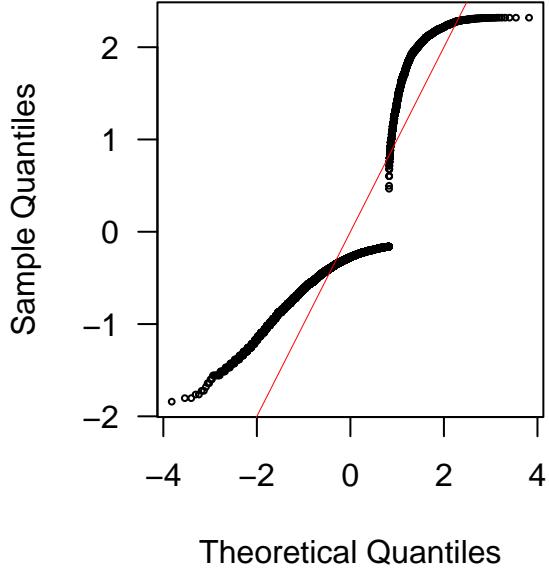
SSD: 1074.8

AIC: 6537.4

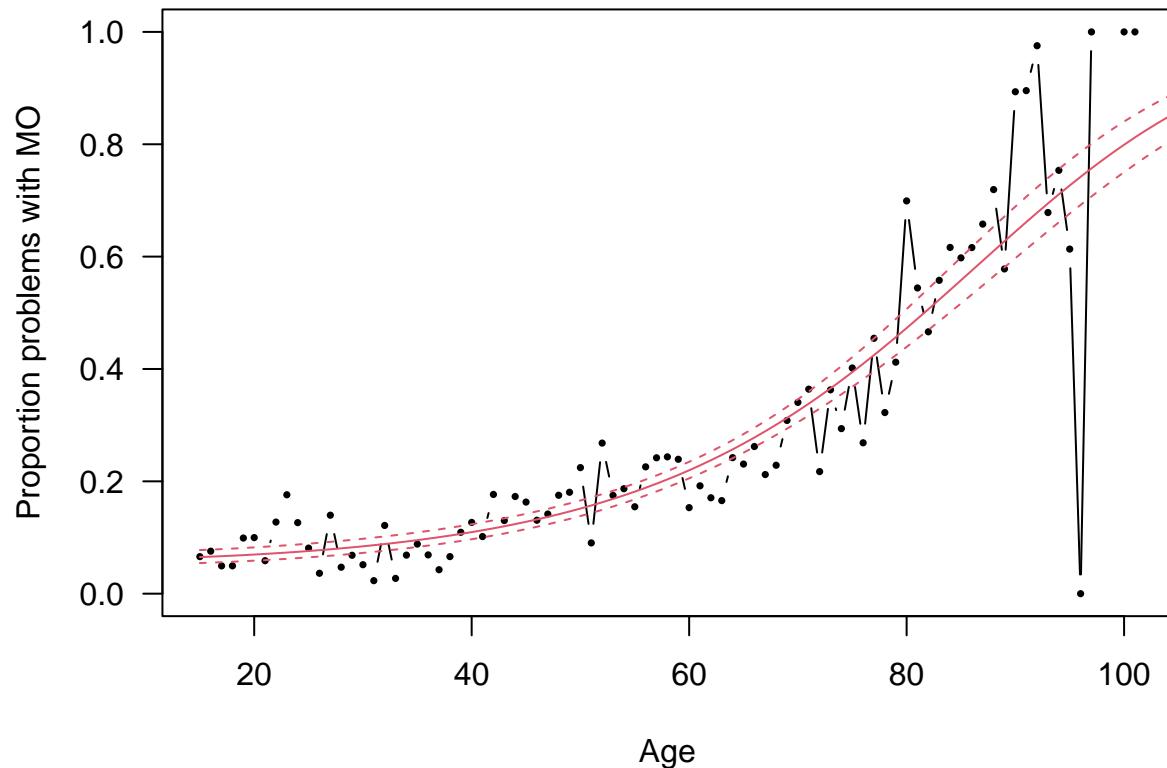
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



GAMM

Fitted model:

```
MO ~ s(age, bs = "tp")
```

Random effects:

Groups	Name	Variance	Std.Dev.
Xr	s(age)	36.59	6.049

Coefficients:

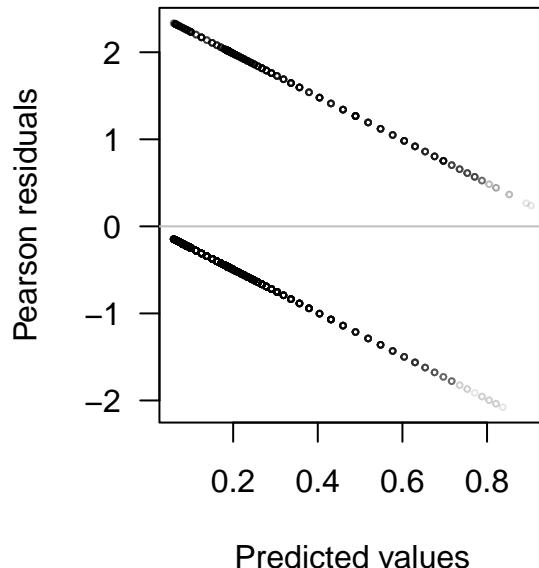
	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-1.5794405	0.0010808	-1461.421	< 2.2e-16 ***
Xs(age)Fx1	2.1477892	0.0567347	37.857	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

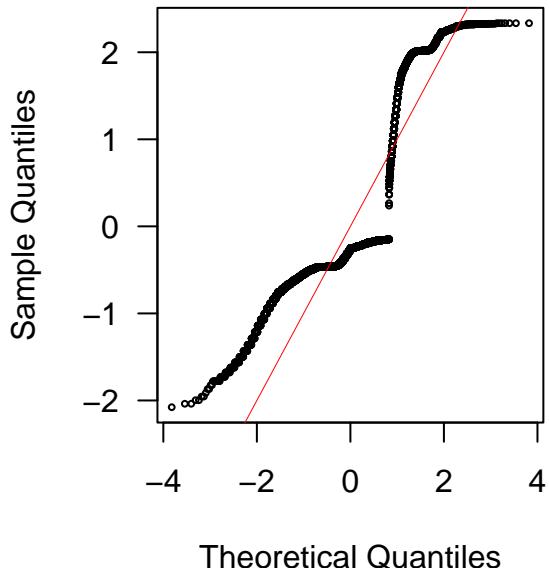
SSD: 1072.9

AIC: 6273231.4

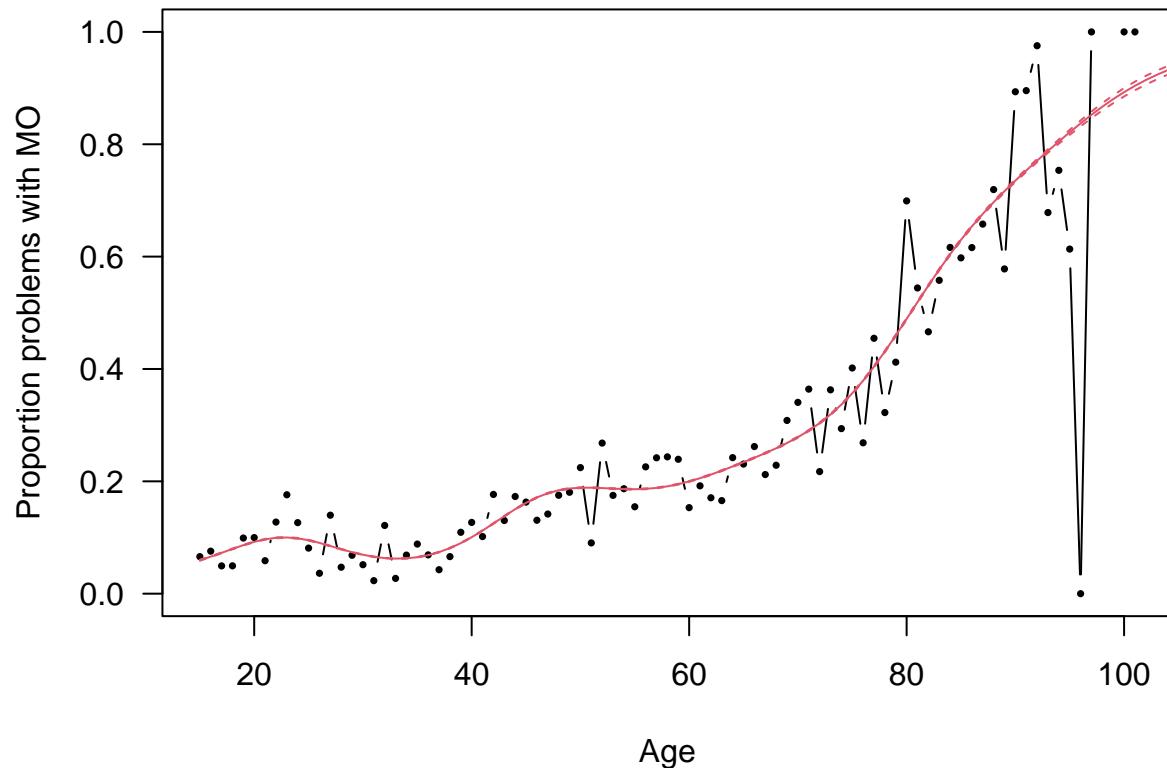
Residuals vs fitted



Normal Q–Q Plot



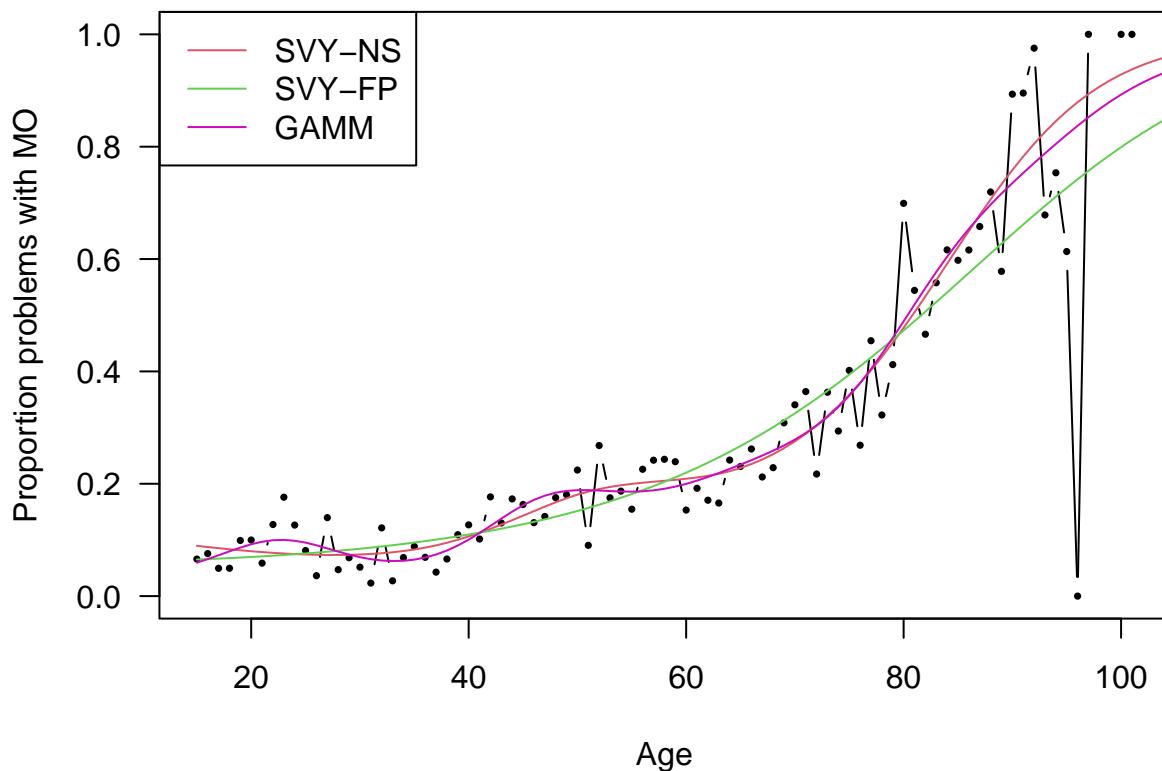
Fitted values with 95% confidence interval



Summary

	SSD	AIC
SVY-NS	1071.6	6514.0
SVY-FP	1074.8	6537.4
GAMM	1072.9	6273231.4

Comparison of fitted values across models



Self-care

SVY-NS

Fitted model:

SC ~ age.ns1 + age.ns2 + age.ns3 + age.ns4

Coefficients:

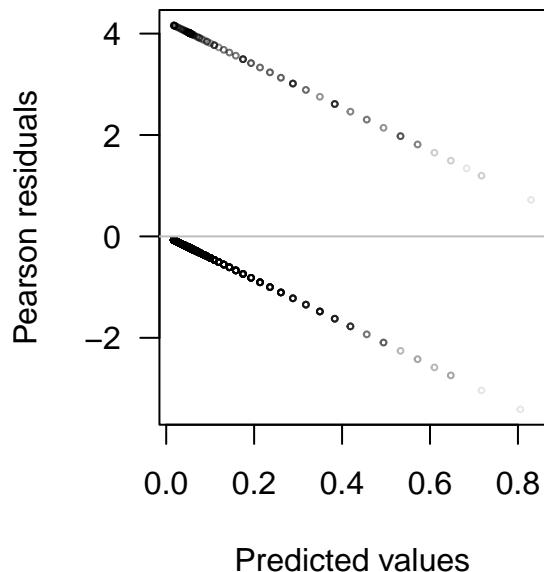
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-3.42103	0.48058	-7.1186	1.249e-12 ***
age.ns1	0.71850	0.51462	1.3962	0.16273
age.ns2	0.59606	0.38420	1.5514	0.12087
age.ns3	2.02226	1.04701	1.9315	0.05348 .
age.ns4	5.56194	0.49722	11.1861	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

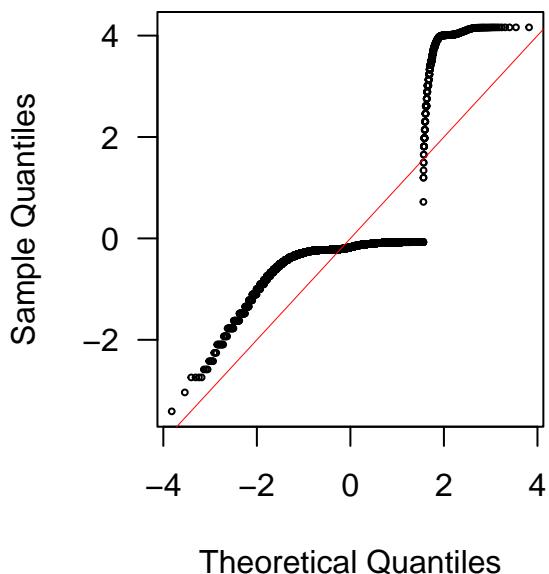
SSD: 381.4

AIC: 2950.2

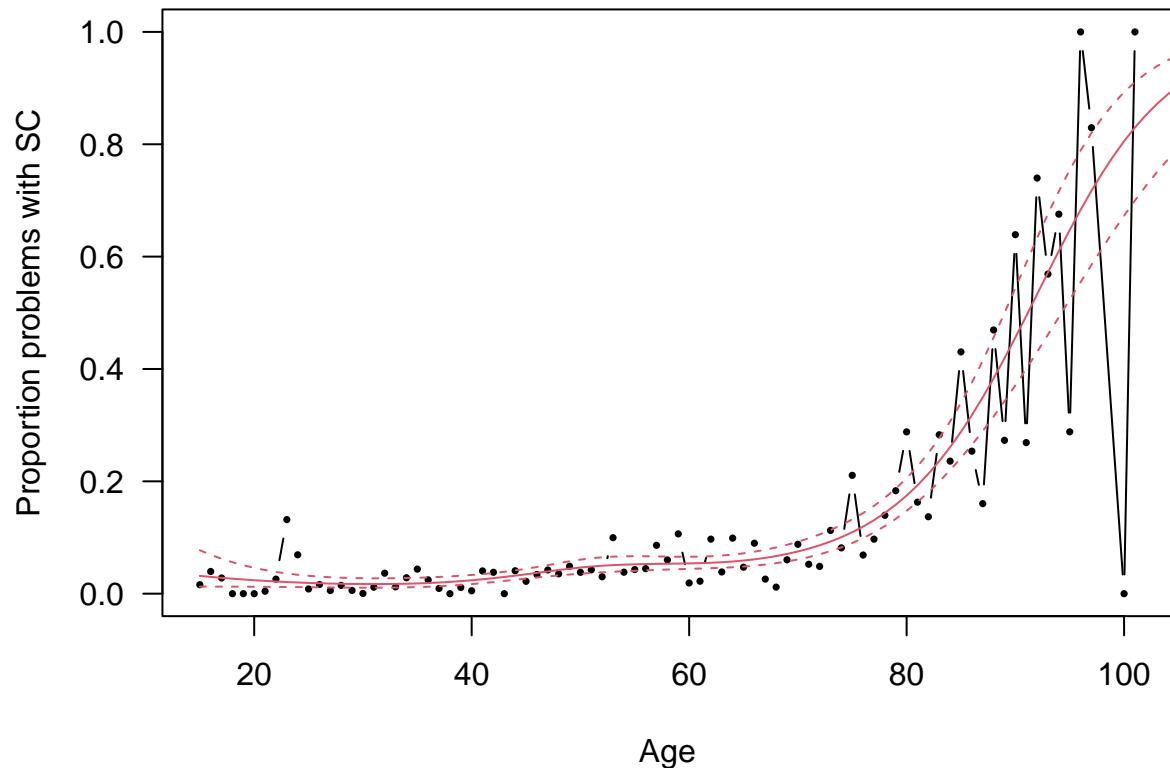
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

Fitted model:
SC ~ I((age/100)^3)

Coefficients:

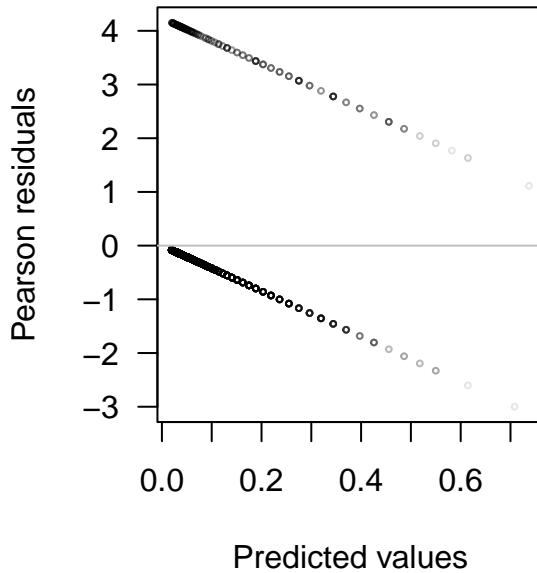
	Estimate	Std. Error	t value	Pr(> t)		
(Intercept)	-3.92289	0.13770	-28.489	< 2.2e-16 ***		
I((age/100)^3)	4.80929	0.34044	14.127	< 2.2e-16 ***		

Signif. codes:	0 '***'	0.001 '**'	0.01 '*'	0.05 '.'	0.1 ', '	1

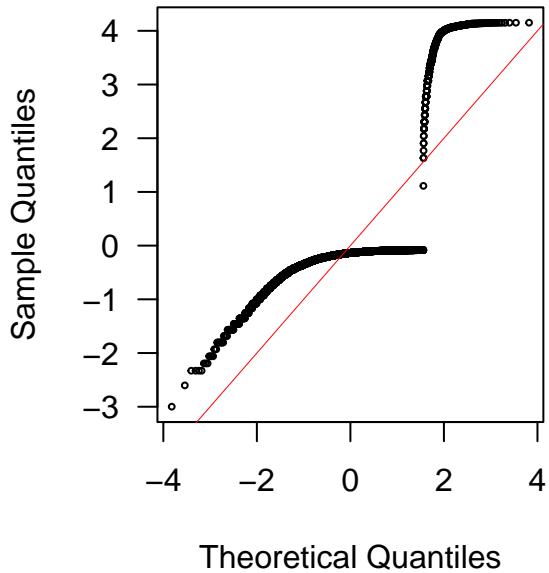
SSD: 382.3

AIC: 2953.1

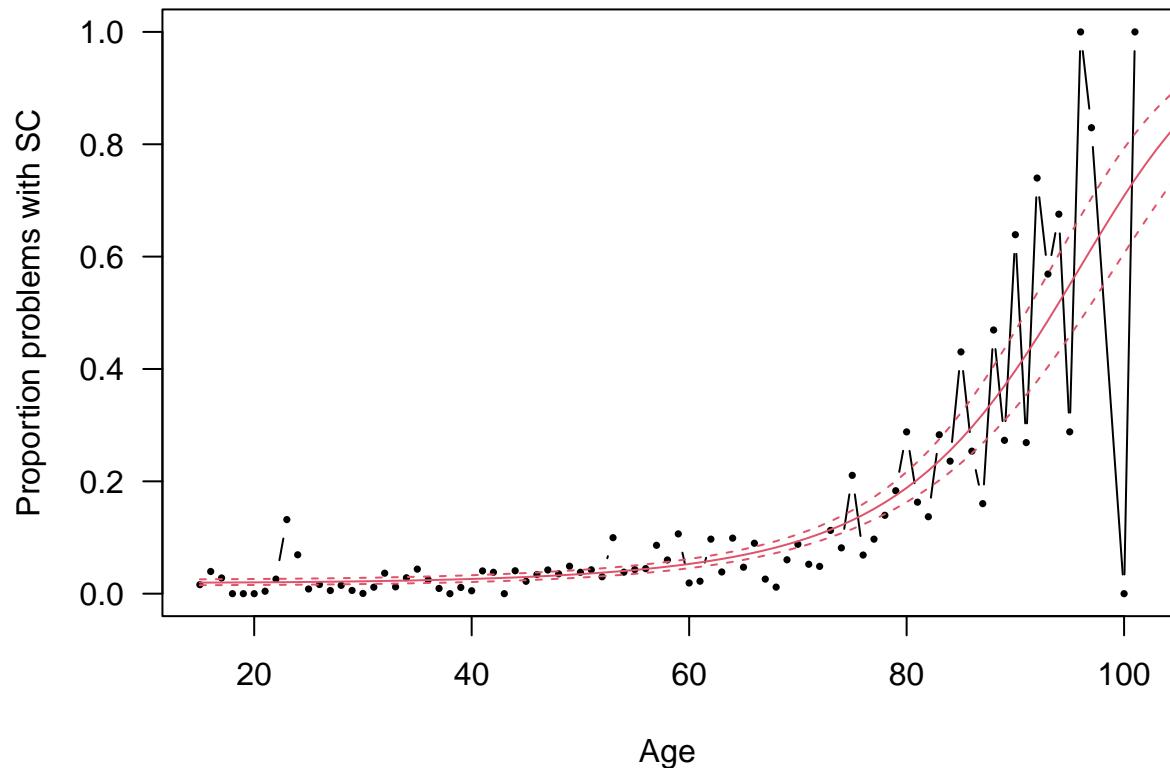
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



GAMM

Fitted model:

SC ~ s(age, bs = "tp")

Random effects:

Groups	Name	Variance	Std.Dev.
Xr	s(age)	29.29	5.412

Coefficients:

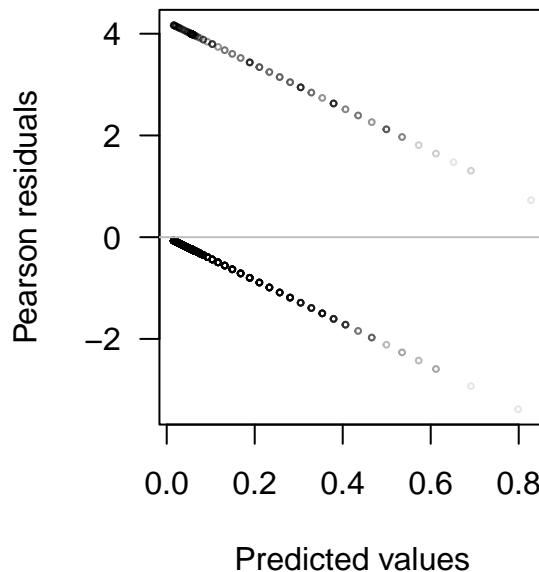
	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-3.0804099	0.0020144	-1529.178	< 2.2e-16 ***
Xs(age)Fx1	2.4849519	0.0606276	40.987	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

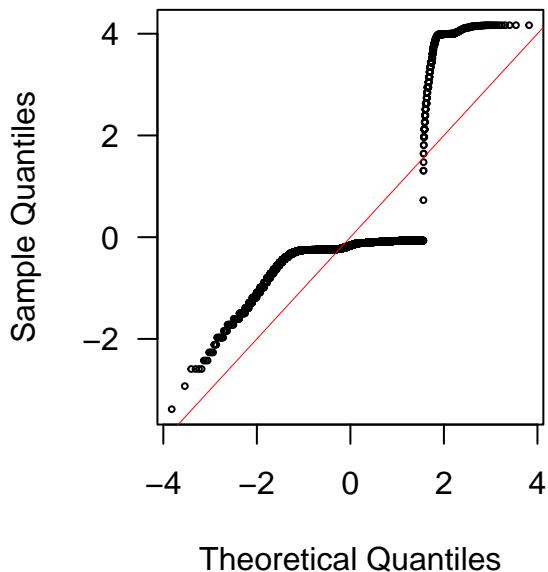
SSD: 381.3

AIC: 2831084.5

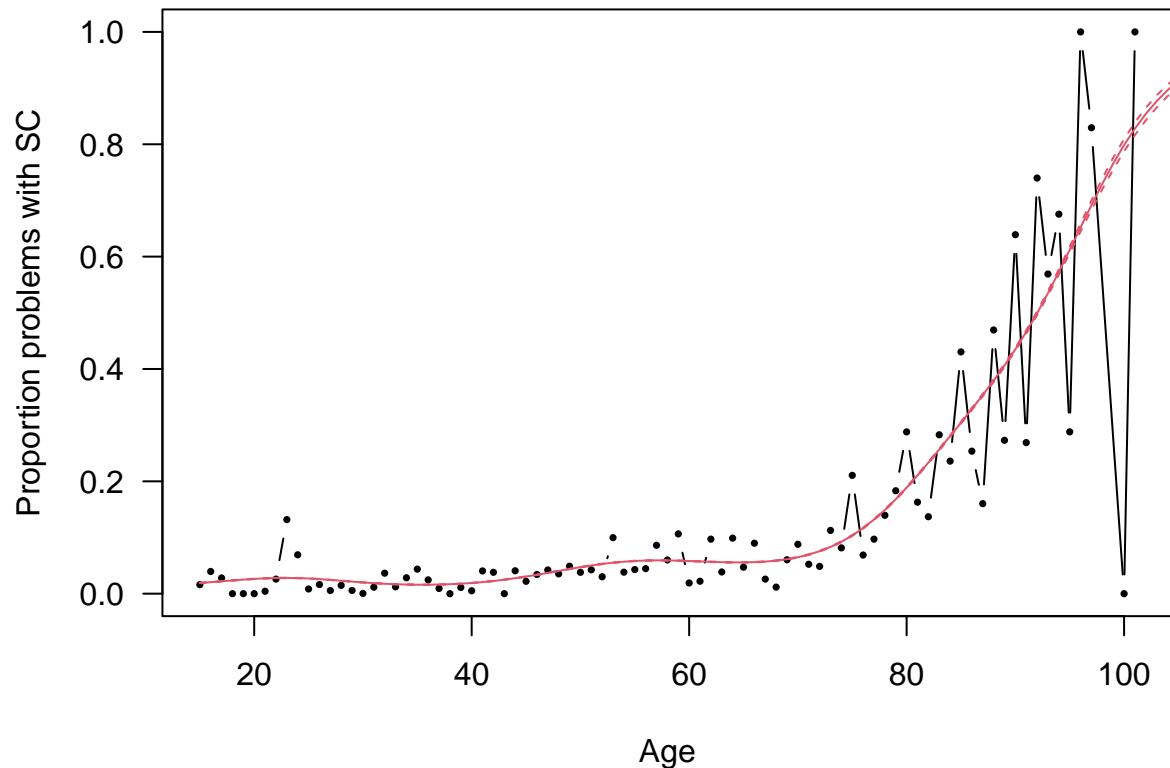
Residuals vs fitted



Normal Q–Q Plot



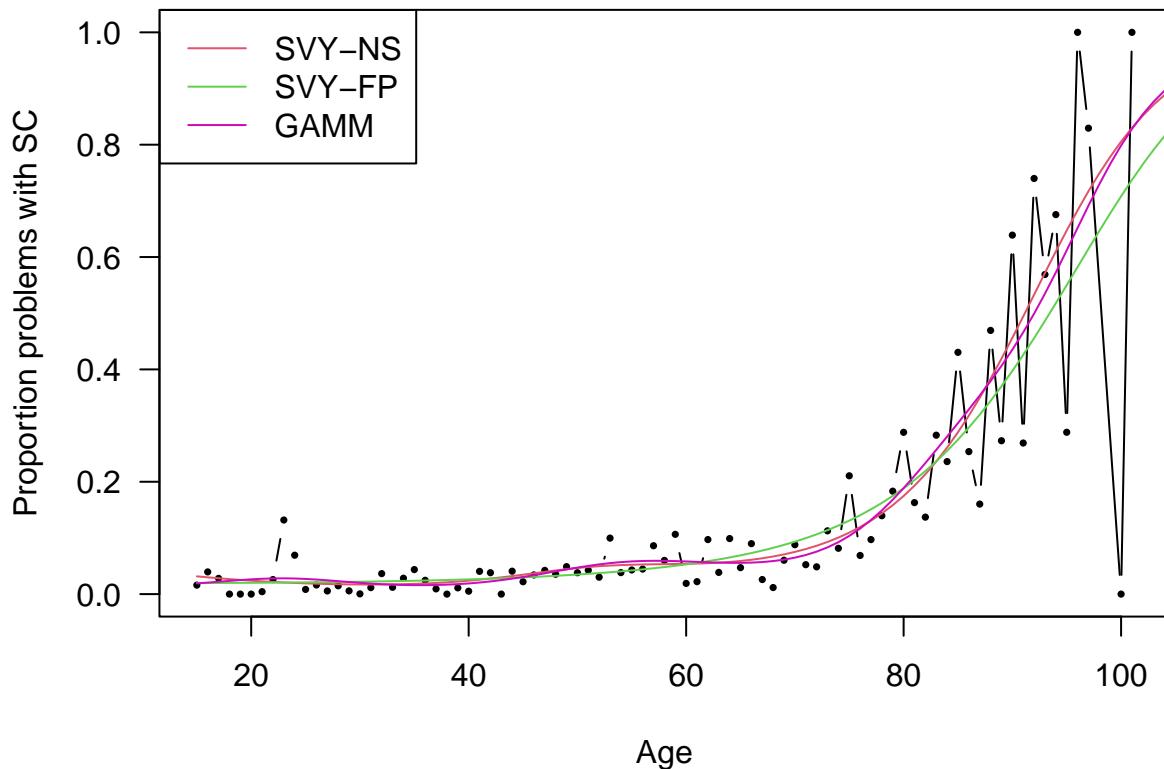
Fitted values with 95% confidence interval



Summary

	SSD	AIC
SVY-NS	381.4	2950.2
SVY-FP	382.3	2953.1
GAMM	381.3	2831084.5

Comparison of fitted values across models



Usual activities

SVY-NS

Fitted model:

DA ~ age.ns1 + age.ns2 + age.ns3 + age.ns4

Coefficients:

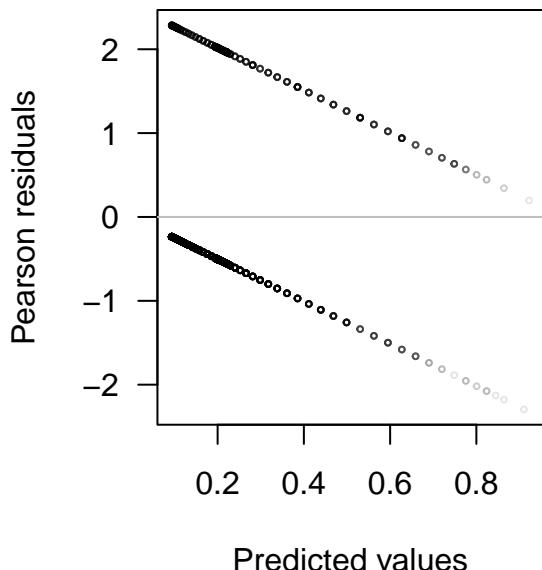
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-2.11704	0.24207	-8.7454	< 2.2e-16 ***
age.ns1	1.20517	0.23978	5.0260	5.186e-07 ***
age.ns2	0.13768	0.23889	0.5763	0.5644
age.ns3	2.32798	0.56400	4.1276	3.727e-05 ***
age.ns4	4.78163	0.38193	12.5197	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

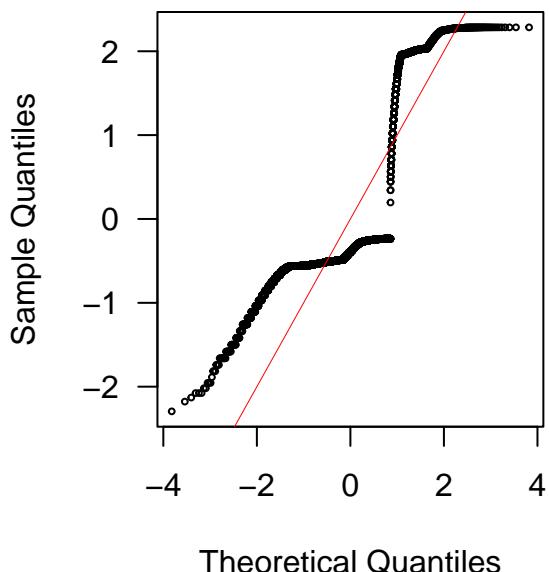
SSD: 1103.6

AIC: 6889.7

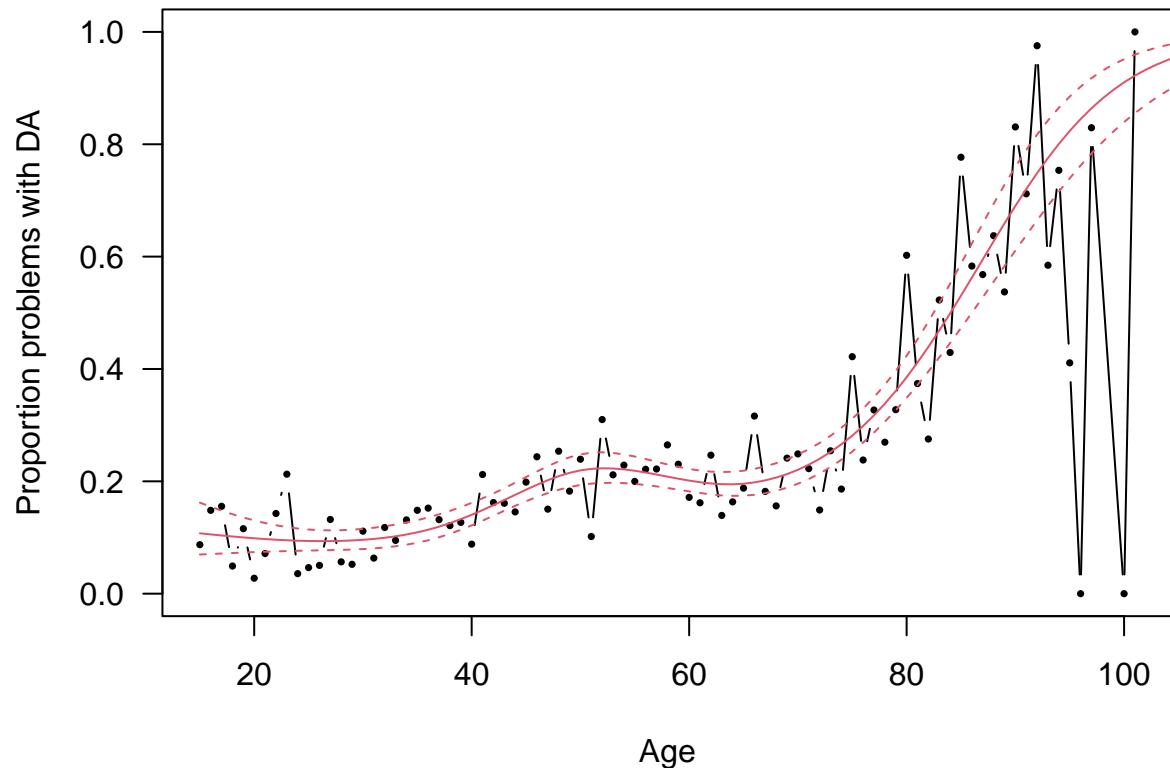
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

Fitted model:
 $DA \sim I((age/100)^3)$

Coefficients:

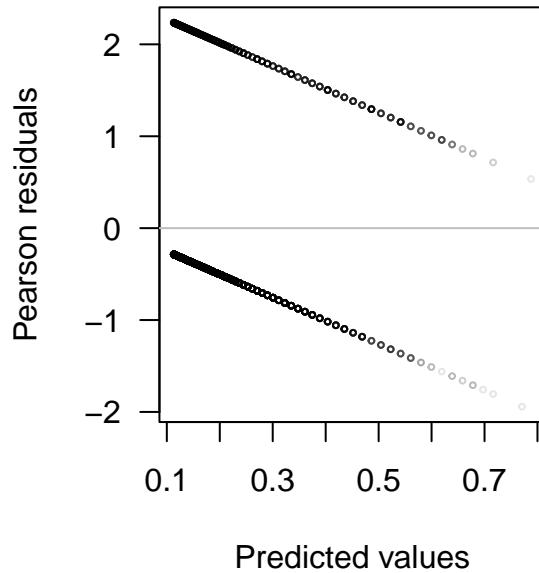
	Estimate	Std. Error	t value	Pr(> t)		
(Intercept)	-2.071121	0.070341	-29.444	< 2.2e-16 ***		
$I((age/100)^3)$	3.283881	0.221560	14.822	< 2.2e-16 ***		

Signif. codes:	0 '***'	0.001 '**'	0.01 '*'	0.05 '.'	0.1 ', '	1

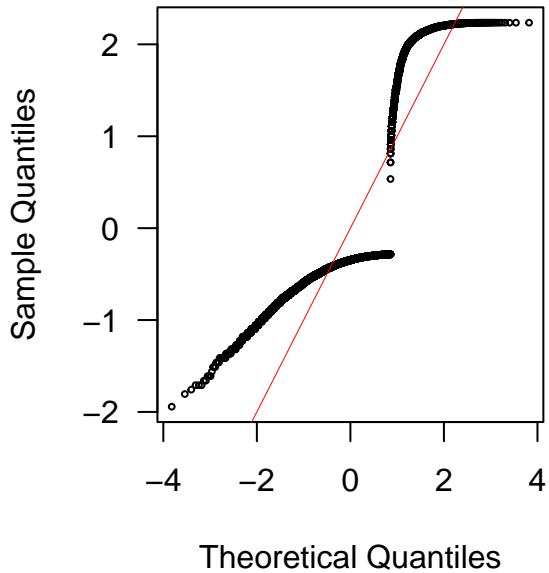
SSD: 1110.1

AIC: 6945.6

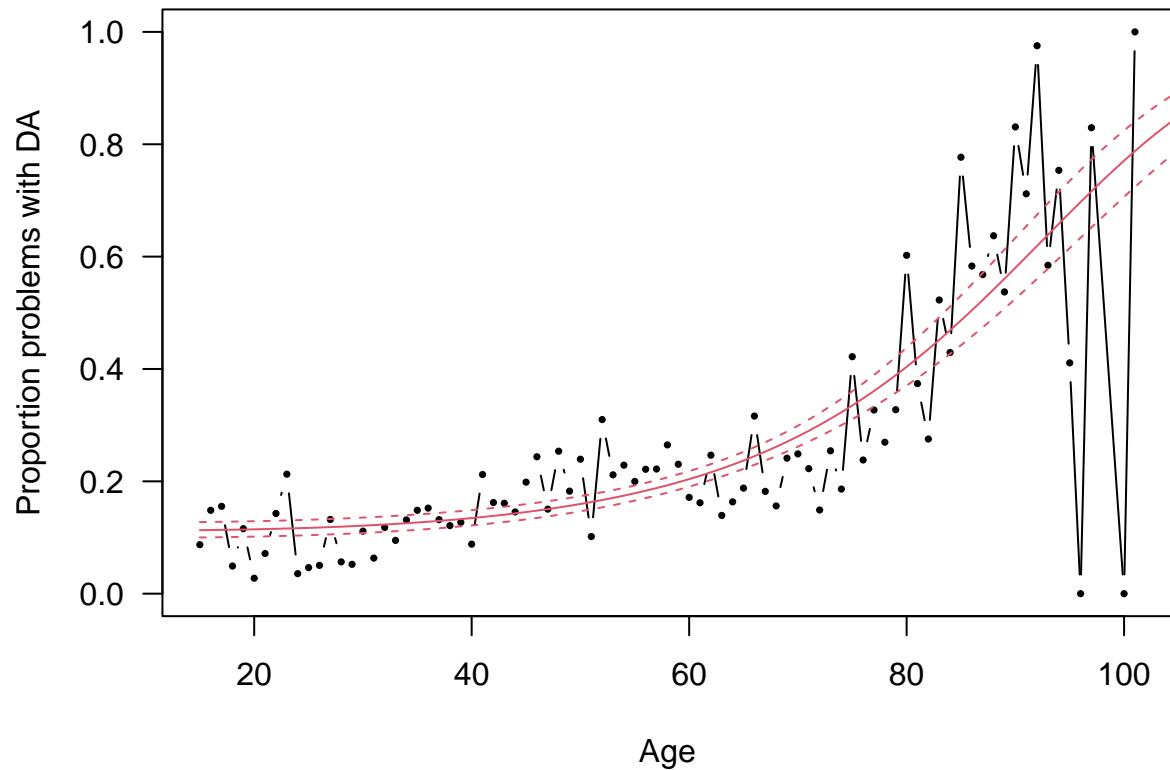
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



GAMM

Fitted model:

DA ~ s(age, bs = "tp")

Random effects:

Groups	Name	Variance	Std.Dev.
Xr	s(age)	36.59	6.049

Coefficients:

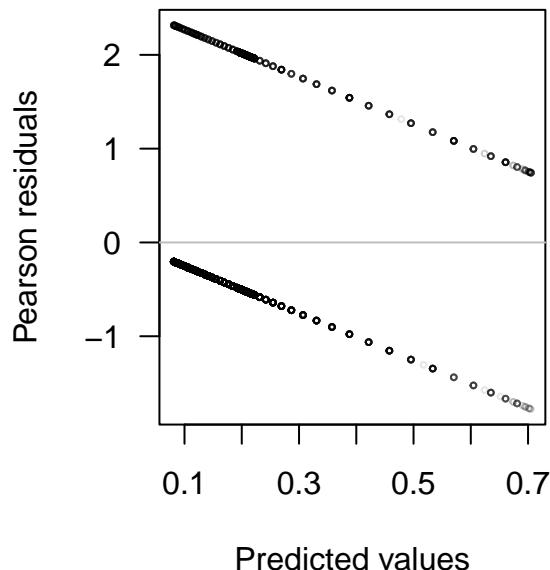
	Estimate	Std. Error	z value	Pr(> z)
X(Intercept)	-1.4975598	0.0010088	-1484.441	< 2.2e-16 ***
Xs(age)Fx1	-2.1723628	0.0475412	-45.694	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

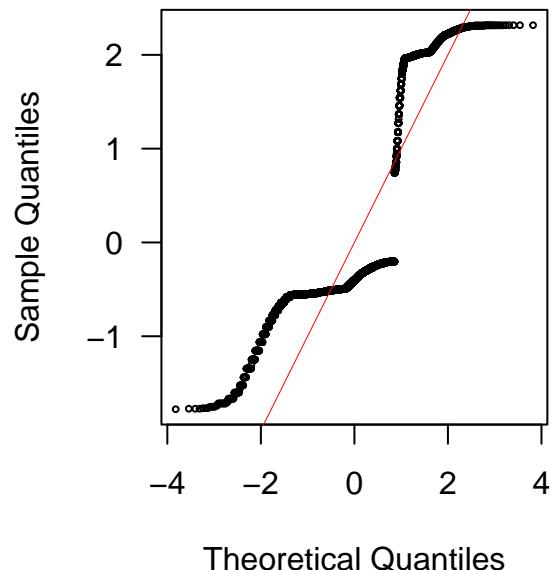
SSD: 1102.4

AIC: 6640776.7

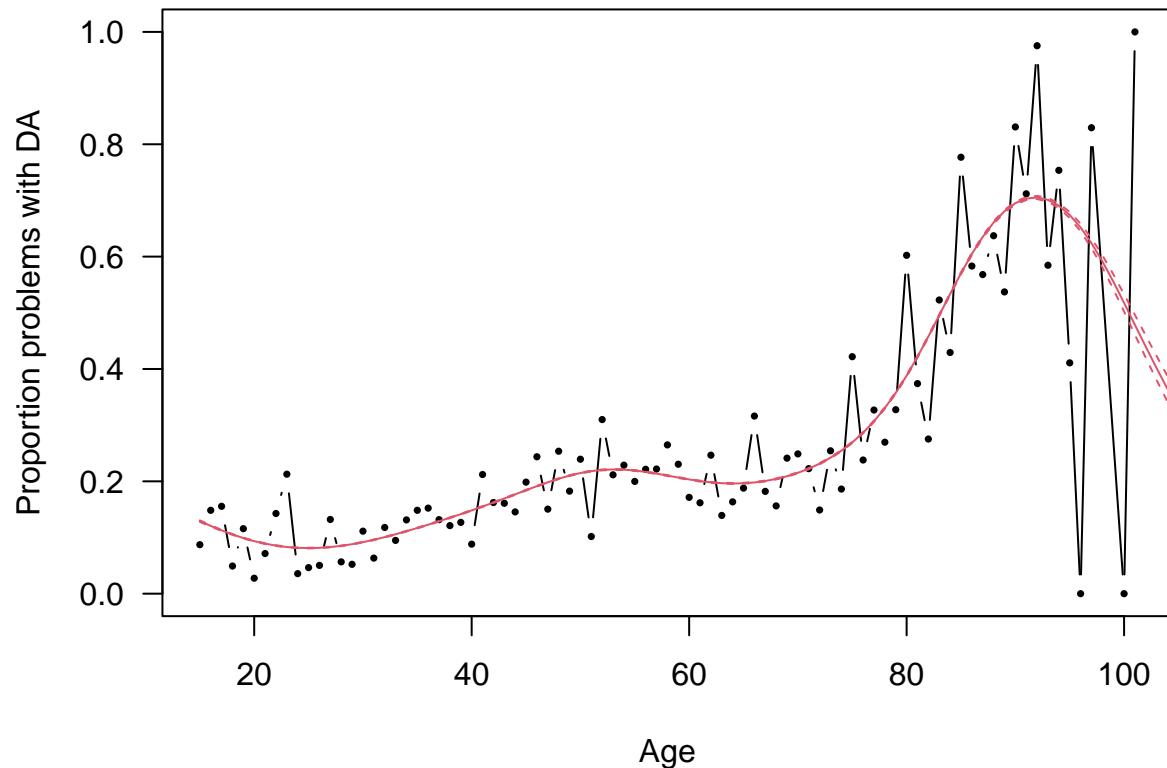
Residuals vs fitted



Normal Q-Q Plot



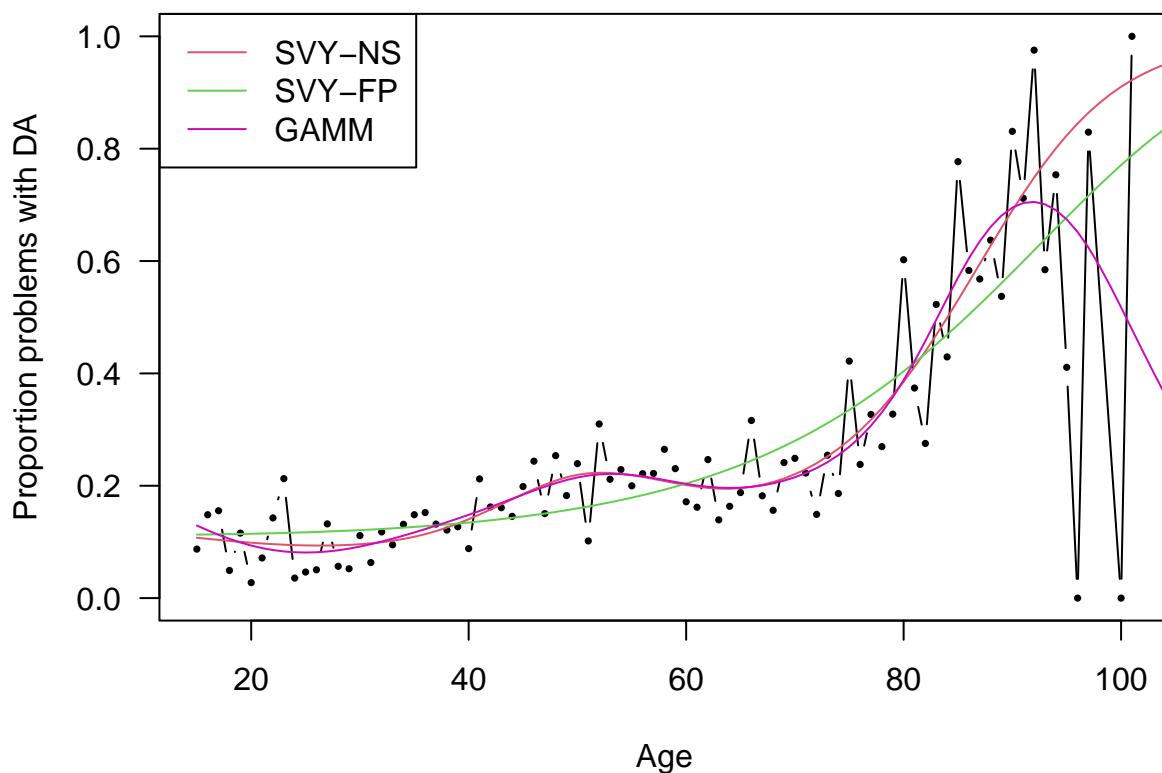
Fitted values with 95% confidence interval



Summary

	SSD	AIC
SVY-NS	1103.6	6889.7
SVY-FP	1110.1	6945.6
GAMM	1102.4	6640776.7

Comparison of fitted values across models



Pain/Discomfort

SVY-NS

Fitted model:

PD ~ age.ns1

Coefficients:

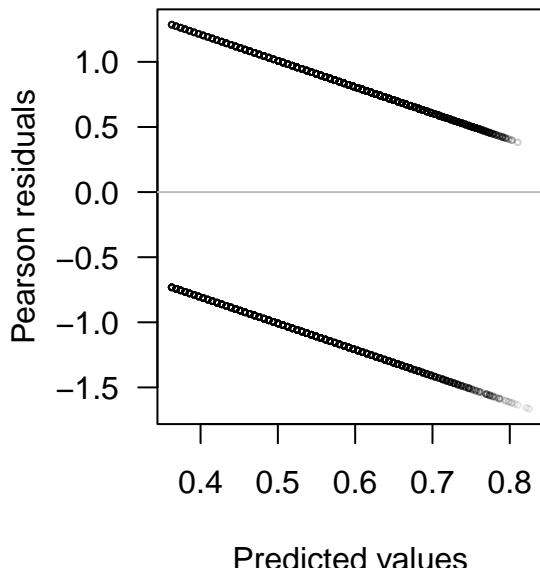
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0.563591	0.074181	-7.5976	3.597e-14 ***
age.ns1	2.636259	0.203003	12.9863	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

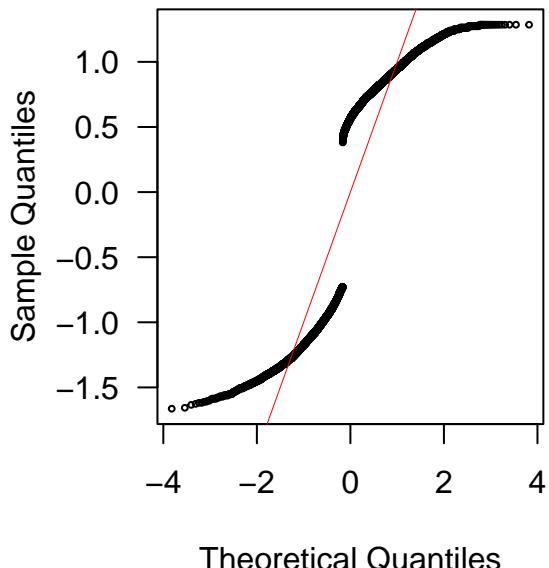
SSD: 1751.7

AIC: 9925.1

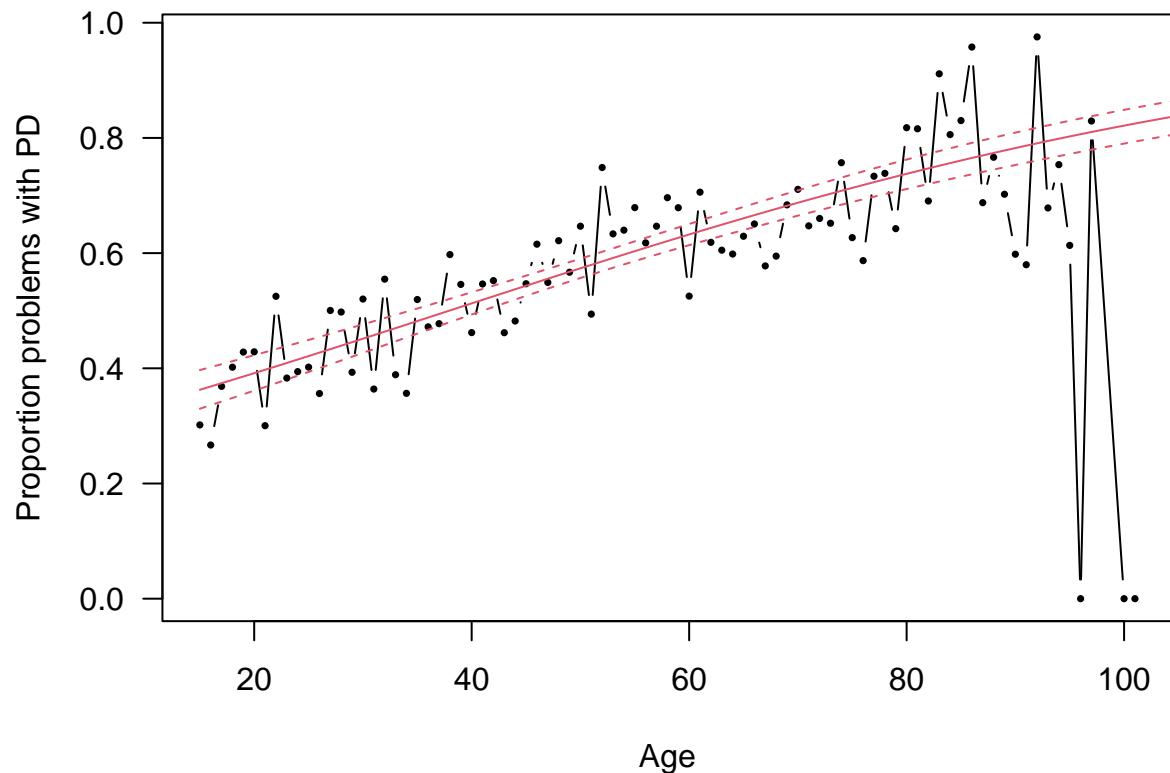
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

Fitted model:
PD ~ I((age/100)^1)

Coefficients:

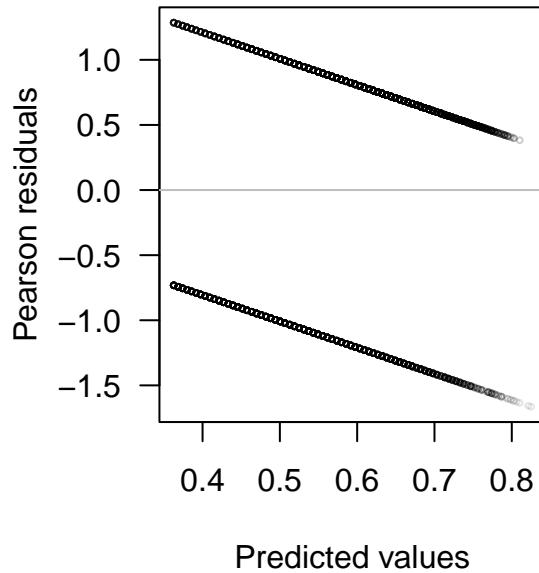
	Estimate	Std. Error	t value	Pr(> t)		
(Intercept)	-0.93226	0.10010	-9.3133	< 2.2e-16 ***		
I((age/100)^1)	2.45780	0.18926	12.9863	< 2.2e-16 ***		

Signif. codes:	0 '***'	0.001 '**'	0.01 '*'	0.05 '.'	0.1 ' '	1

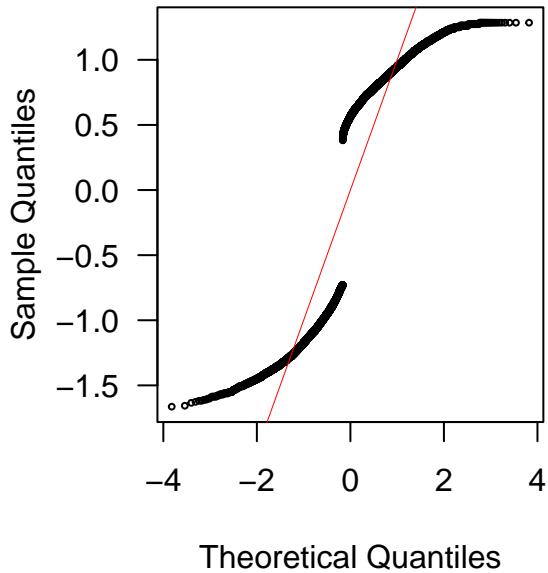
SSD: 1751.7

AIC: 9925.1

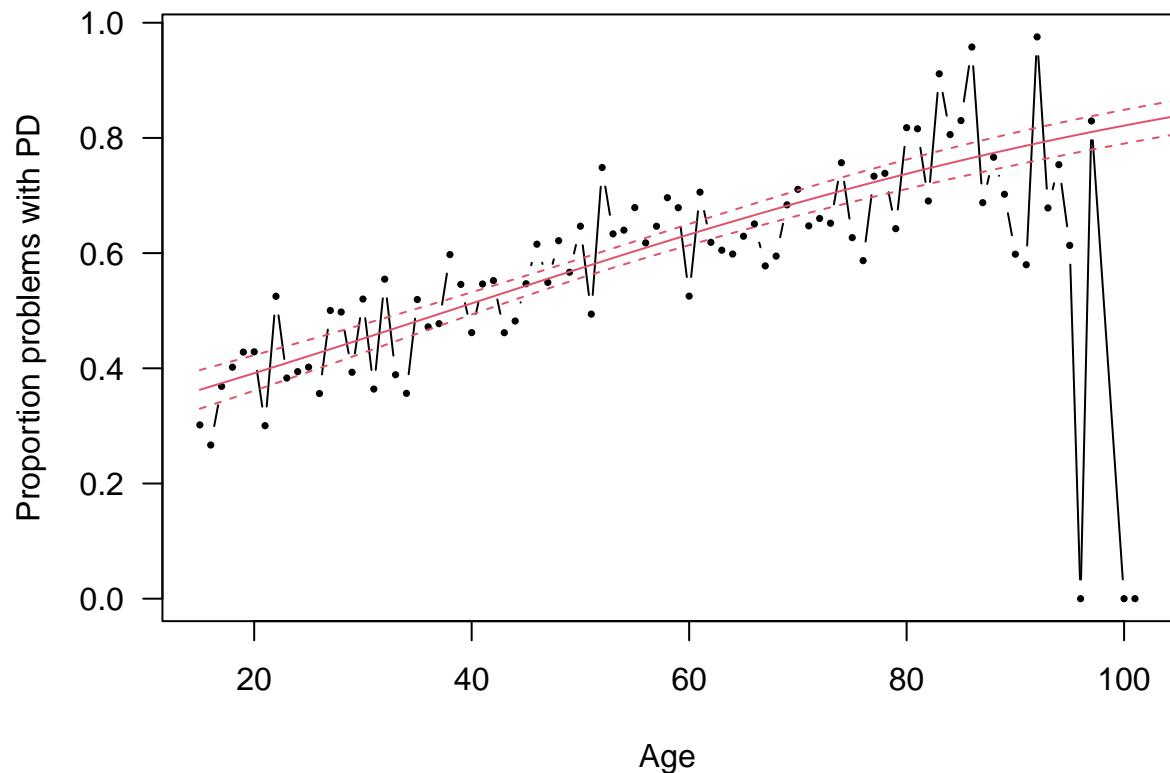
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



GAMM

Fitted model:

PD ~ s(age, bs = "tp")

Random effects:

Groups	Name	Variance	Std.Dev.
Xr	s(age)	14.68	3.831

Coefficients:

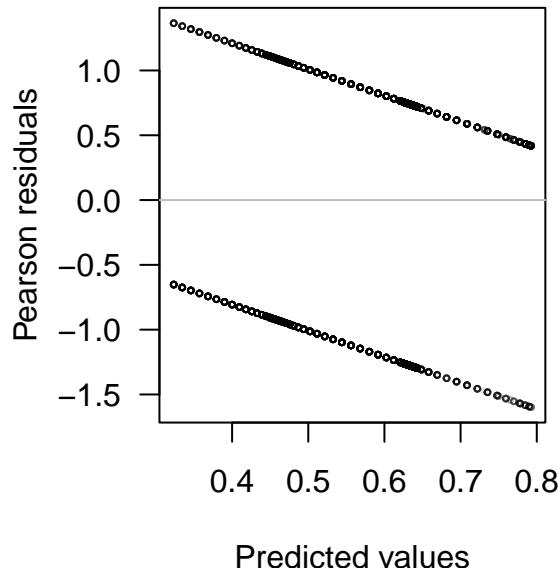
	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	0.3003647	0.0007763	386.919	< 2.2e-16 ***
Xs(age)Fx1	-1.0916135	0.0455302	-23.976	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

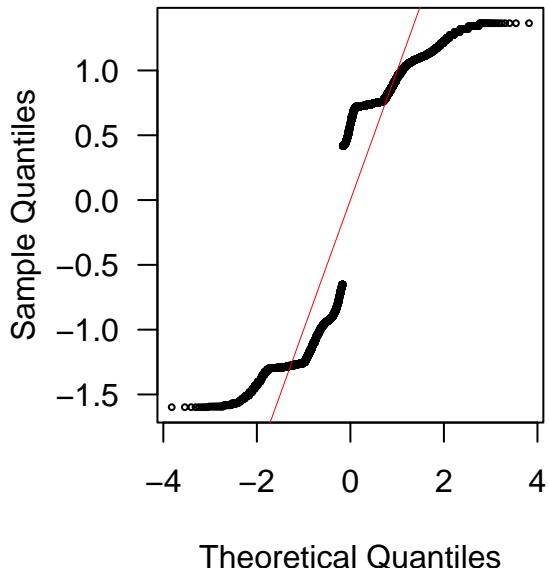
SSD: 1748.1

AIC: 9572558.8

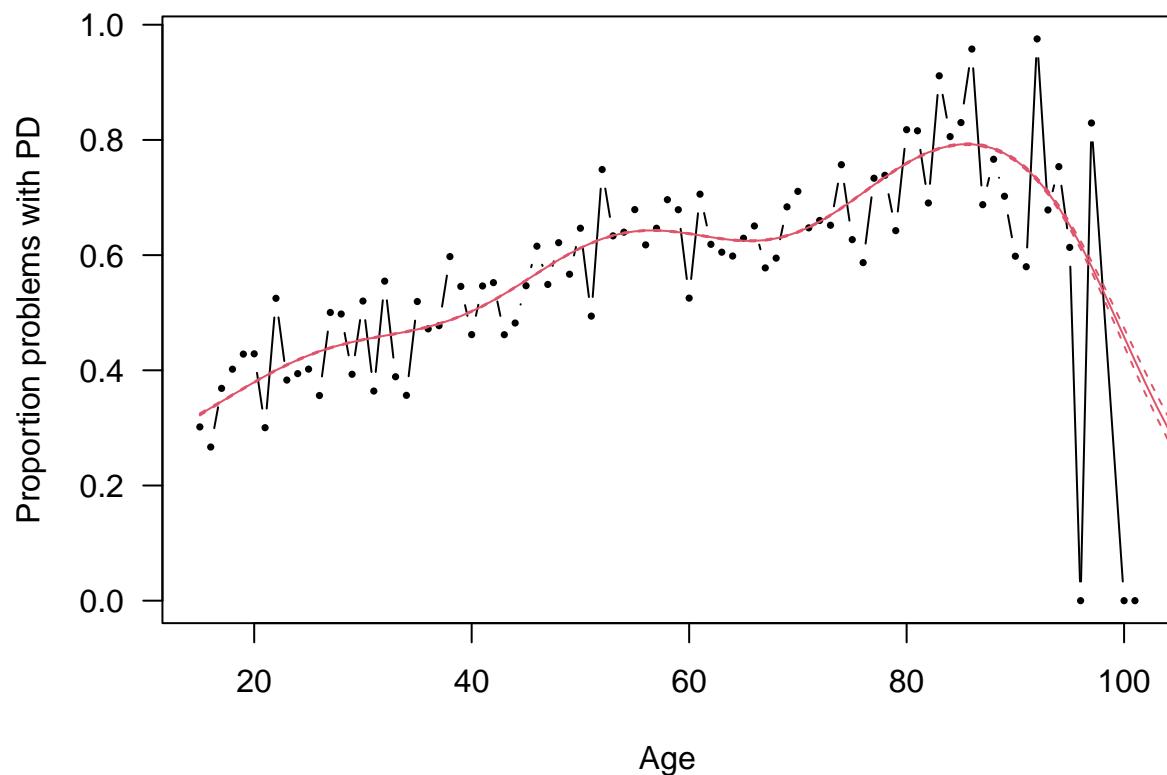
Residuals vs fitted



Normal Q-Q Plot



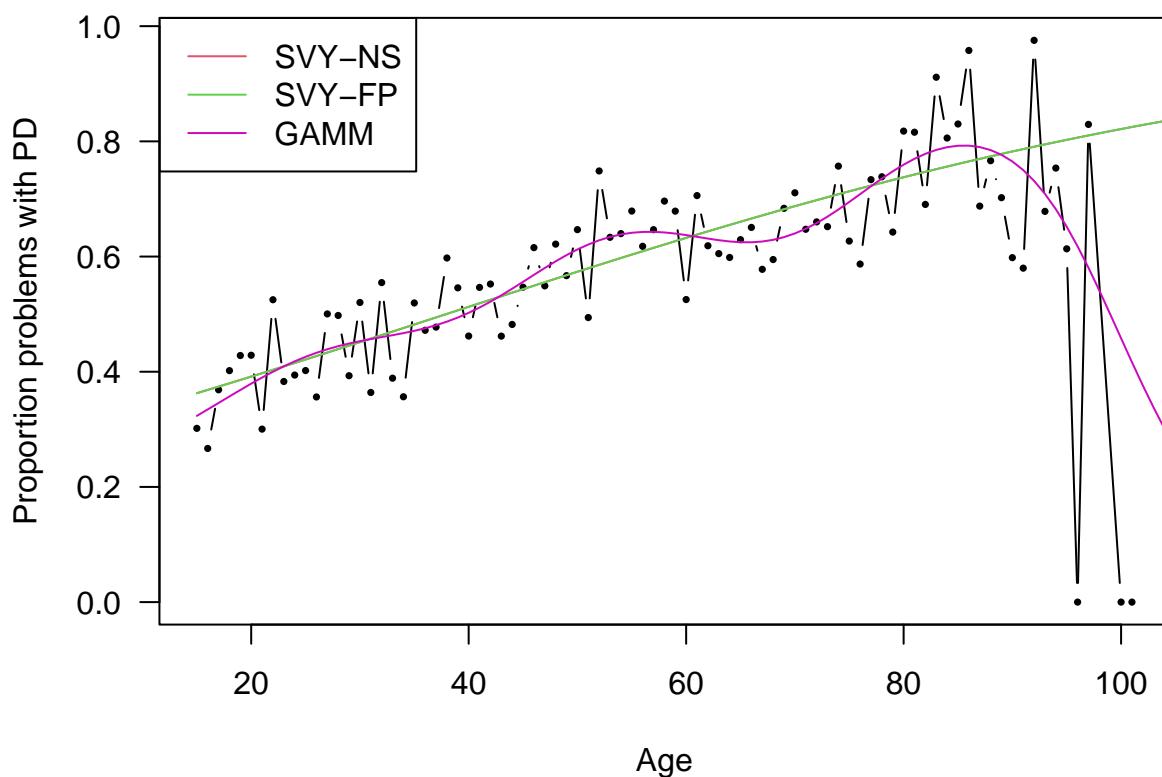
Fitted values with 95% confidence interval



Summary

	SSD	AIC
SVY-NS	1751.7	9925.1
SVY-FP	1751.7	9925.1
GAMM	1748.1	9572558.8

Comparison of fitted values across models



Anxiety/Depression

SVY-NS

Fitted model:

AD ~ age.ns1 + age.ns2 + age.ns3

Coefficients:

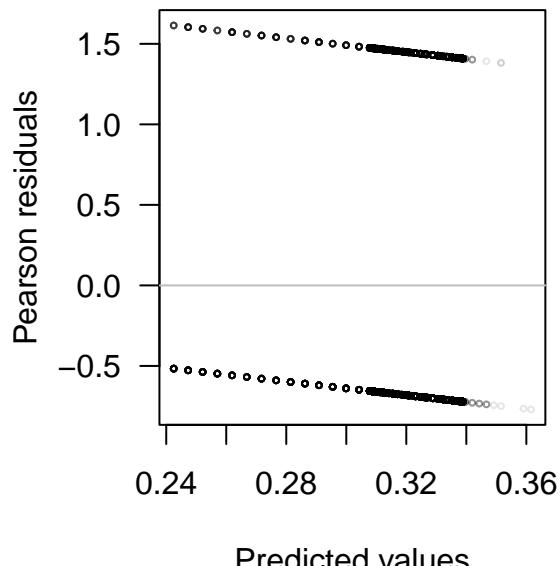
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-1.139025	0.132843	-8.5742	< 2.2e-16 ***
age.ns1	-0.018462	0.157771	-0.1170	0.906850
age.ns2	0.942087	0.347063	2.7145	0.006662 **
age.ns3	0.261631	0.269452	0.9710	0.331610

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

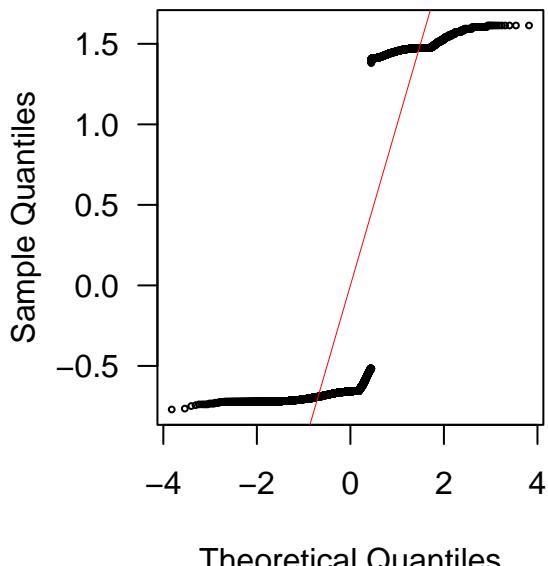
SSD: 1653.7

AIC: 9341.7

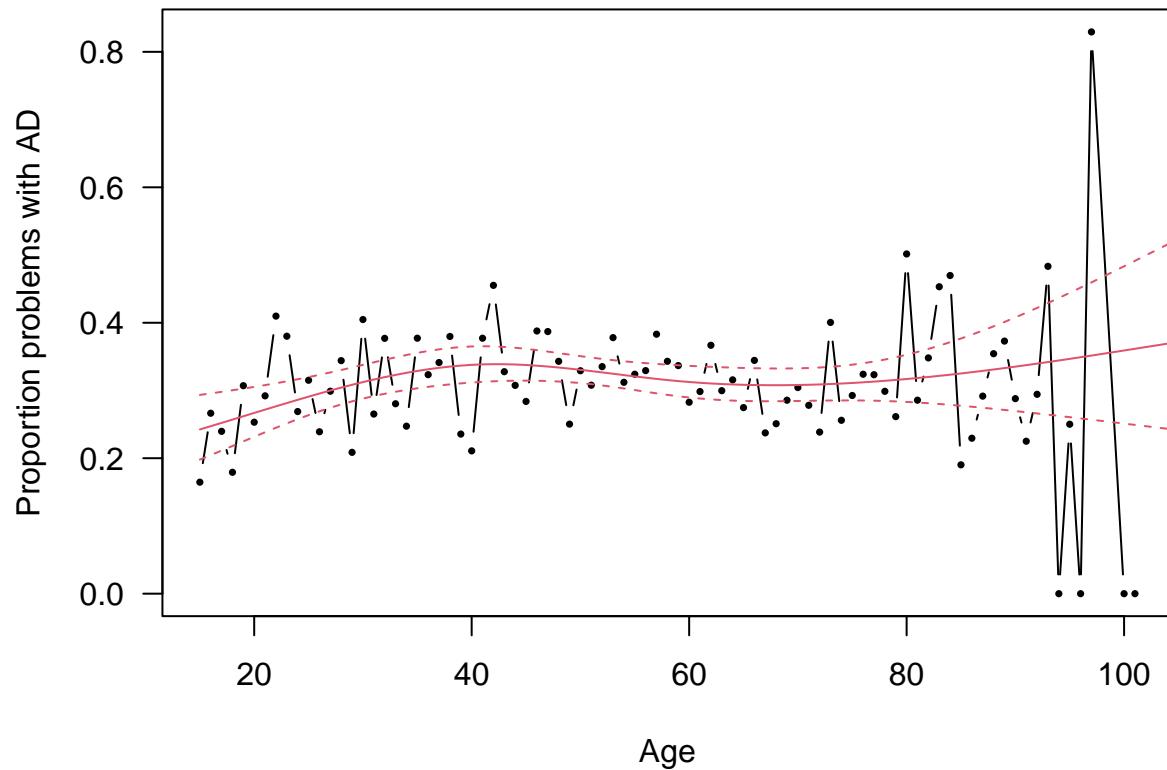
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

Fitted model:

$$AD \sim I((age/100)^{-2}) + I((age/100)^2)$$

Coefficients:

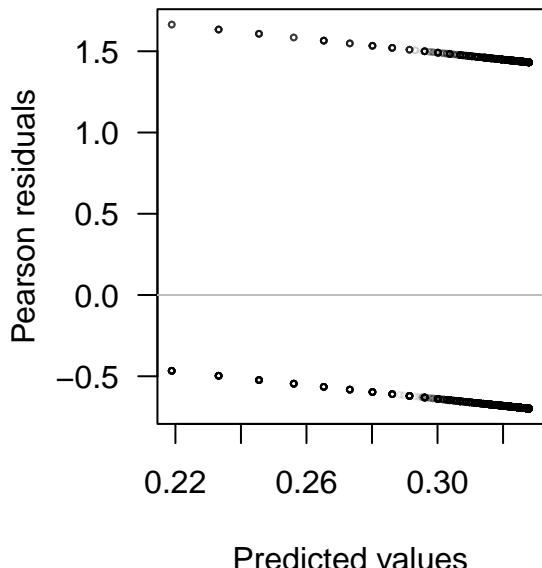
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0.5816537	0.1024593	-5.6769	1.451e-08 ***
$I((age/100)^{-2})$	-0.0153865	0.0054452	-2.8257	0.004737 **
$I((age/100)^2)$	-0.2998498	0.2394718	-1.2521	0.210583

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

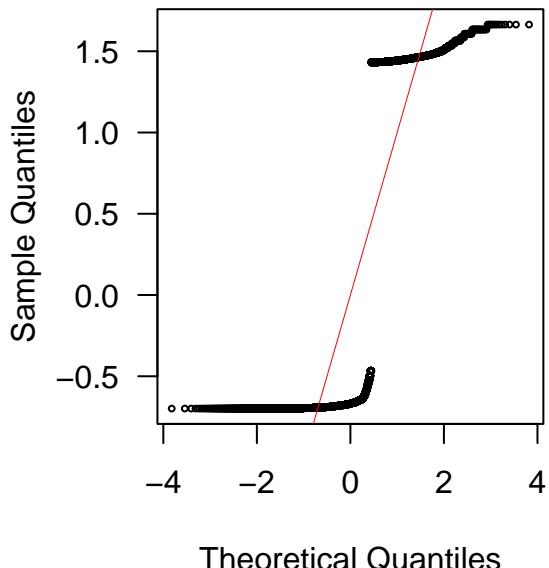
SSD: 1653.0

AIC: 9339.0

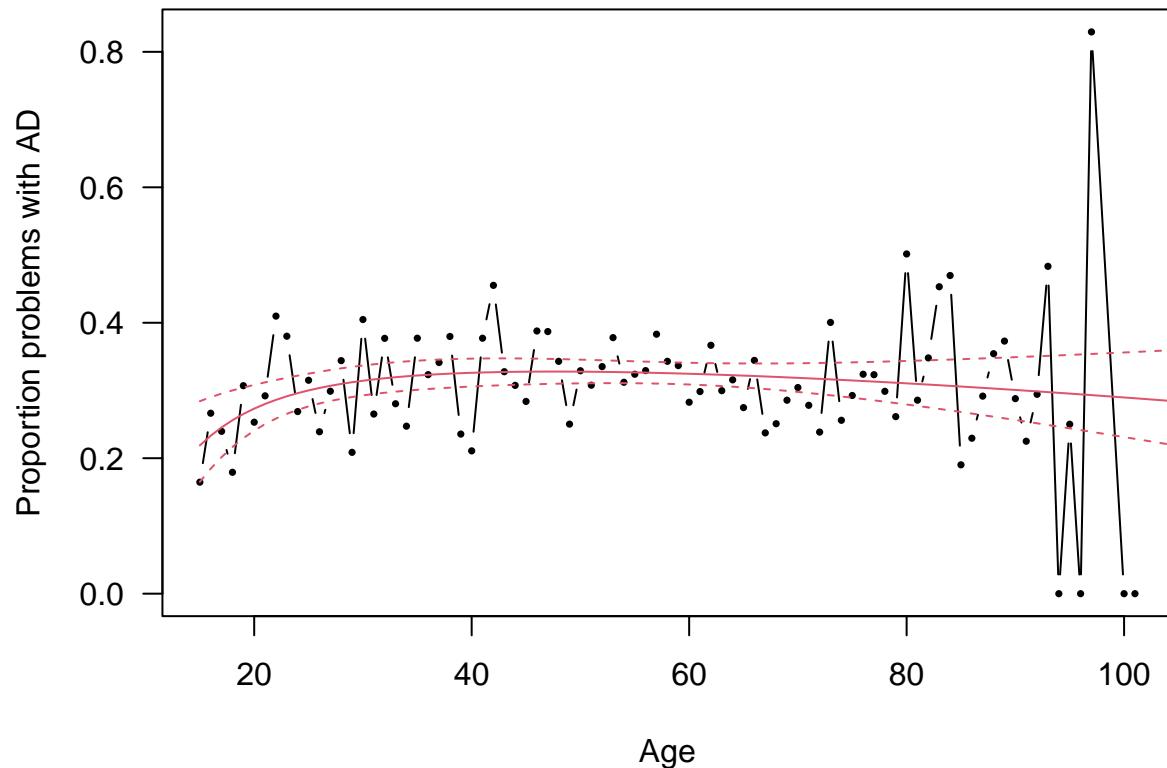
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



GAMM

Fitted model:

AD ~ s(age, bs = "tp")

Random effects:

Groups	Name	Variance	Std.Dev.
Xr	s(age)	34.28	5.855

Coefficients:

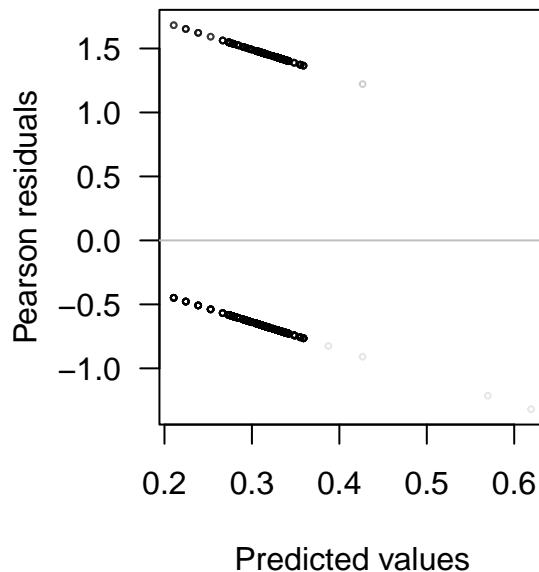
	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-0.7787904	0.0008045	-968.040	< 2.2e-16 ***
Xs(age)Fx1	2.6488092	0.0450241	58.831	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

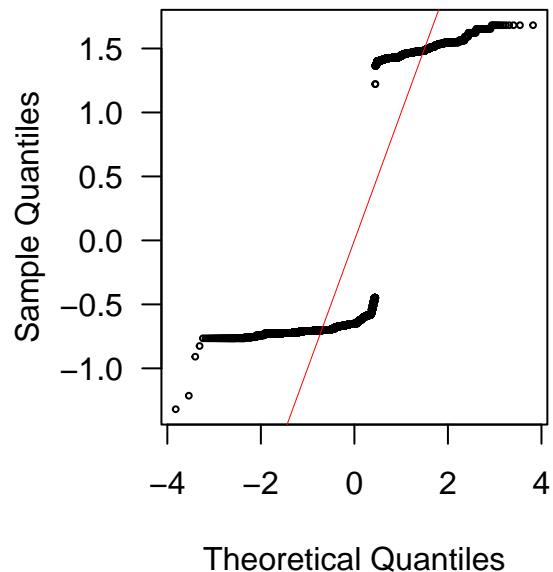
SSD: 1653.9

AIC: 9014544.5

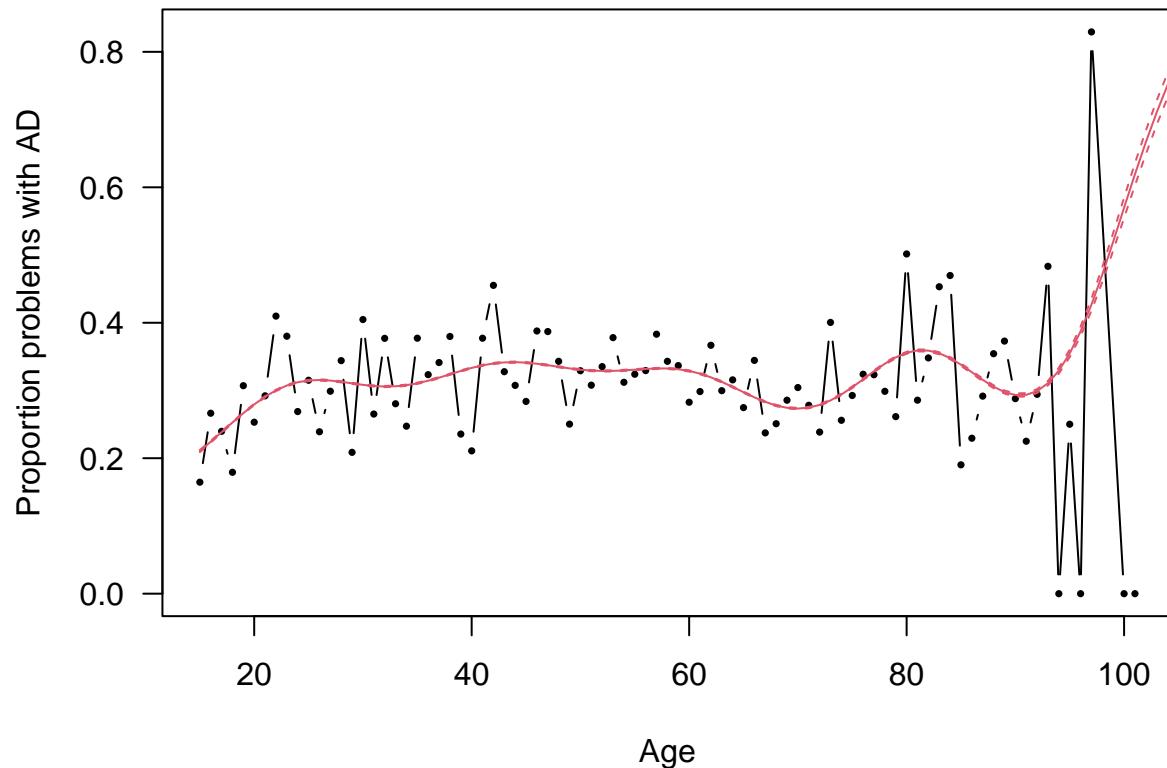
Residuals vs fitted



Normal Q–Q Plot



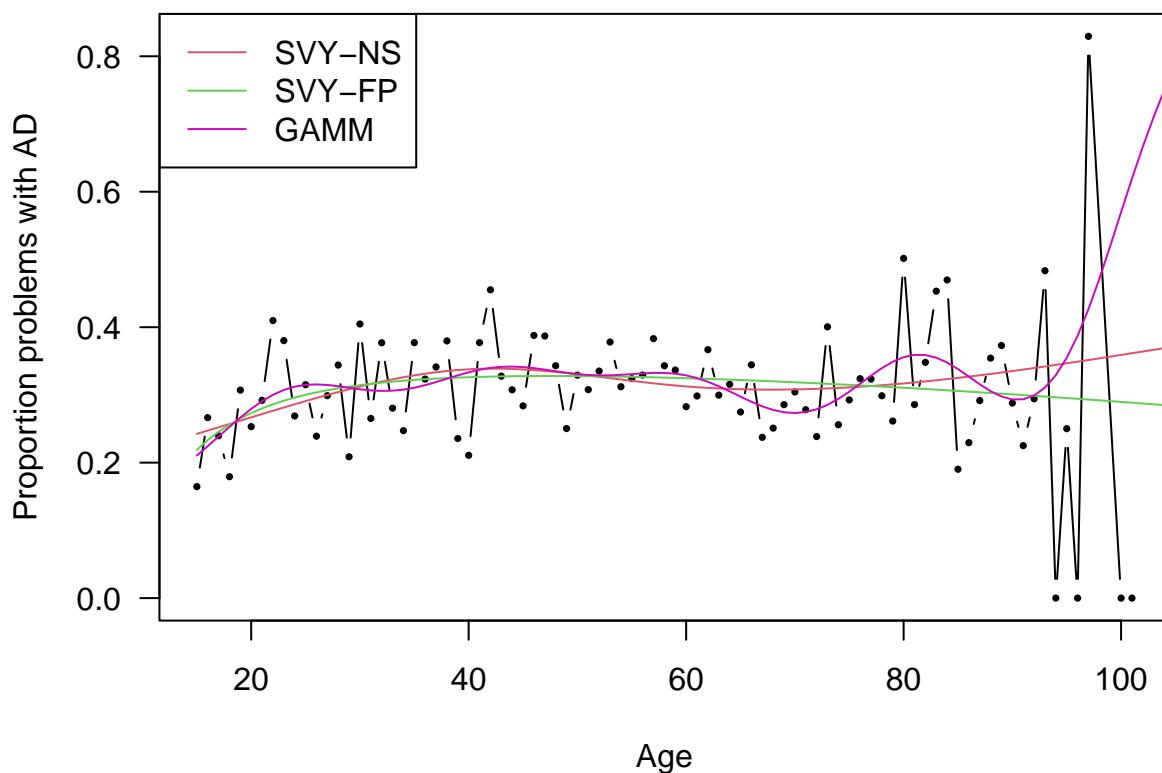
Fitted values with 95% confidence interval



Summary

	SSD	AIC
SVY-NS	1653.7	9341.7
SVY-FP	1653.0	9339.0
GAMM	1653.9	9014544.5

Comparison of fitted values across models



Any problem

SVY-NS

Fitted model:

ANY1 ~ age.ns1 + age.ns2 + age.ns3 + age.ns4 + age.ns5

Coefficients:

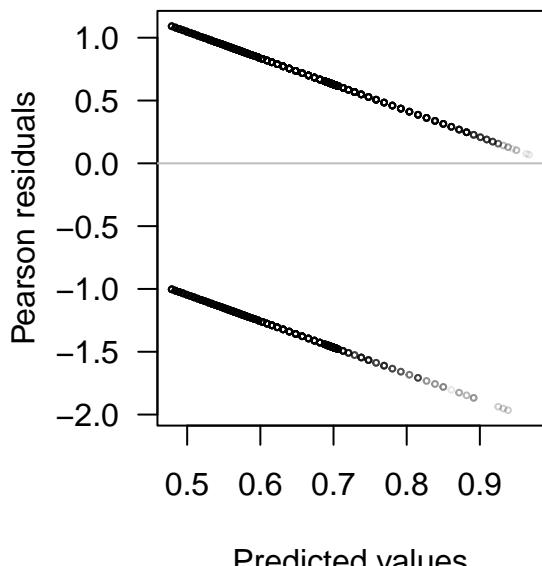
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0.084528	0.150855	-0.5603	0.575285
age.ns1	0.502112	0.174296	2.8808	0.003984 **
age.ns2	1.084685	0.222478	4.8755	1.120e-06 ***
age.ns3	0.424698	0.263525	1.6116	0.107113
age.ns4	2.497622	0.469418	5.3207	1.080e-07 ***
age.ns5	3.307847	0.601799	5.4966	4.069e-08 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

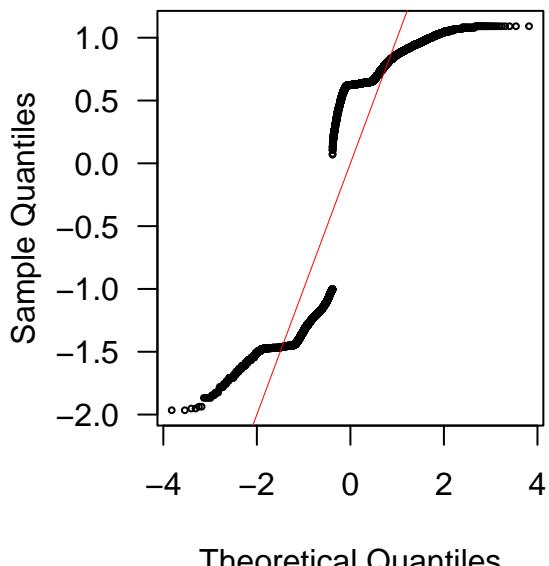
SSD: 1646.2

AIC: 9542.4

Residuals vs fitted



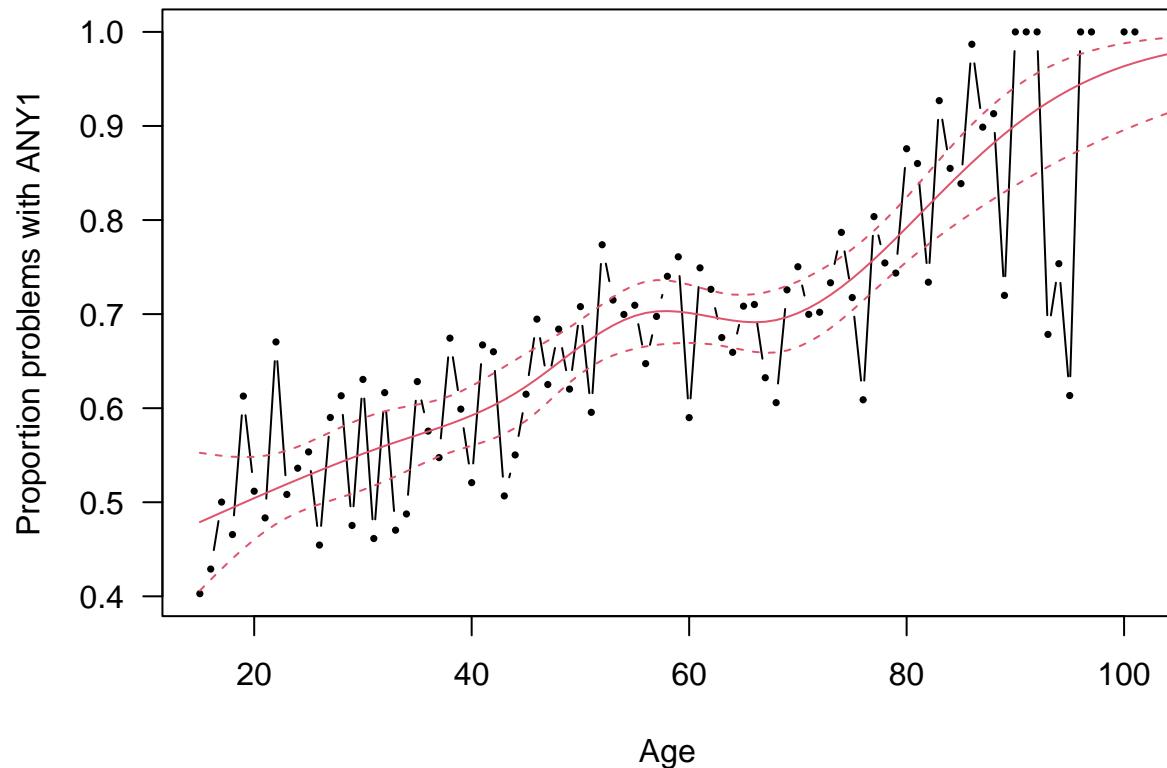
Normal Q-Q Plot



Predicted values

Theoretical Quantiles

Fitted values with 95% confidence interval



SVY-FP

Fitted model:
ANY1 ~ I((age/100)^1)

Coefficients:

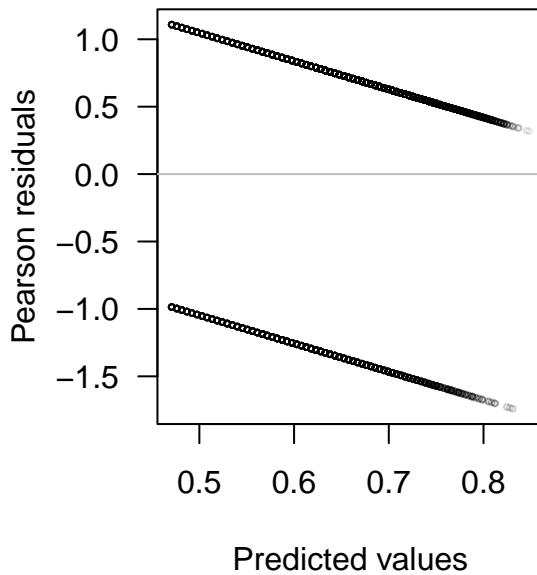
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0.437087	0.099454	-4.3949	1.132e-05 ***
I((age/100)^1)	2.135278	0.188408	11.3333	< 2.2e-16 ***

Signif. codes:	0 '***'	0.001 '**'	0.01 '*'	0.05 '.'
	0.1 ' '	1		

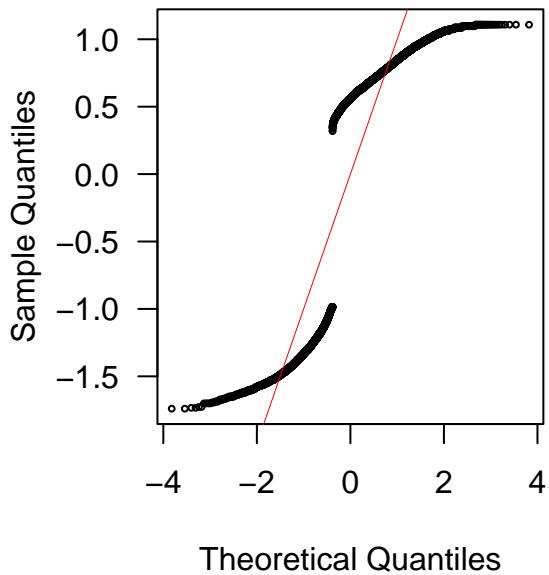
SSD: 1650.1

AIC: 9546.3

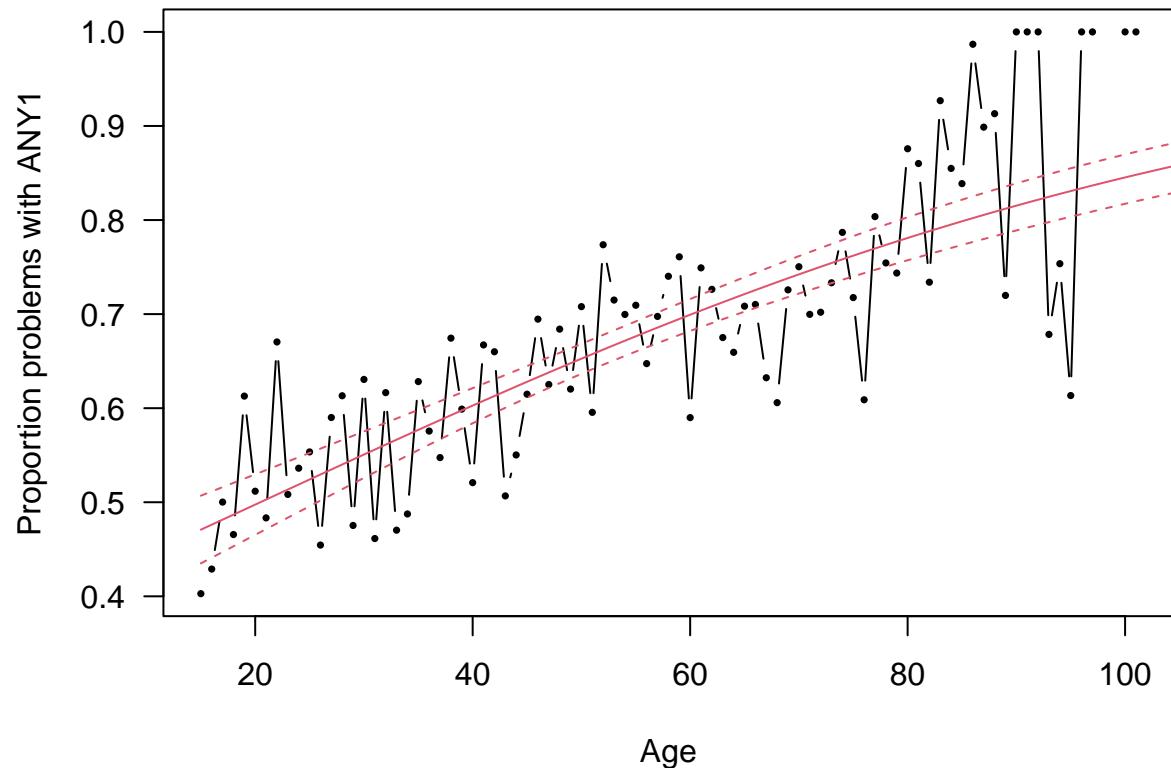
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



GAMM

Fitted model:
ANY1 ~ s(age, bs = "tp")

Random effects:

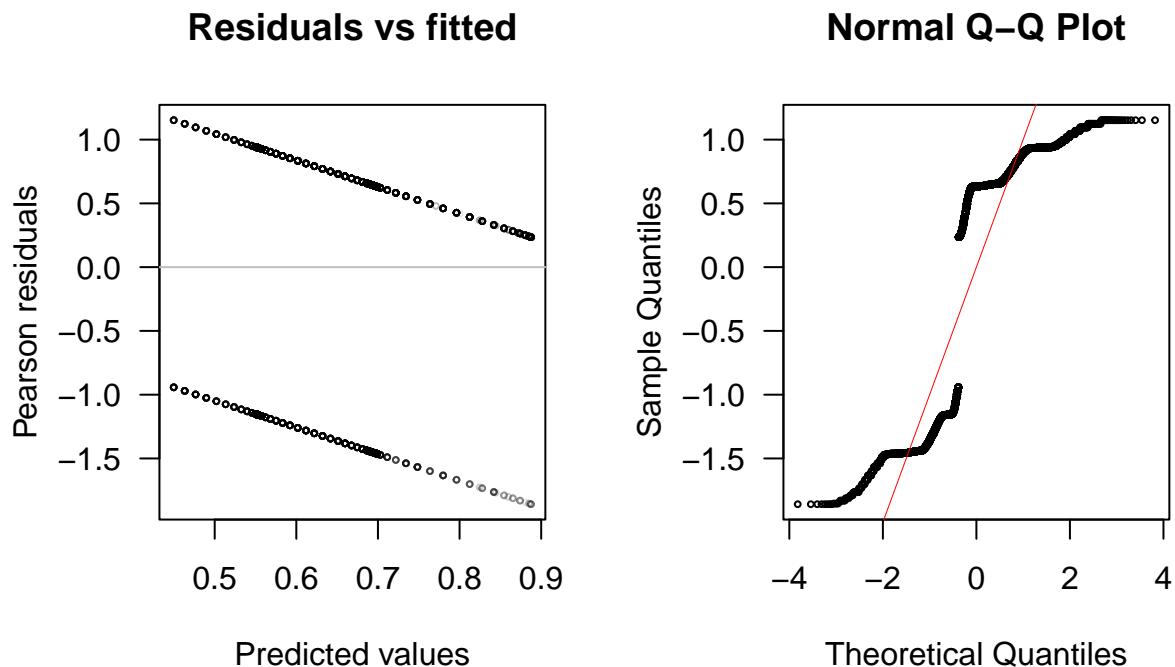
Groups	Name	Variance	Std.Dev.
Xr	s(age)	26.89	5.186

Coefficients:

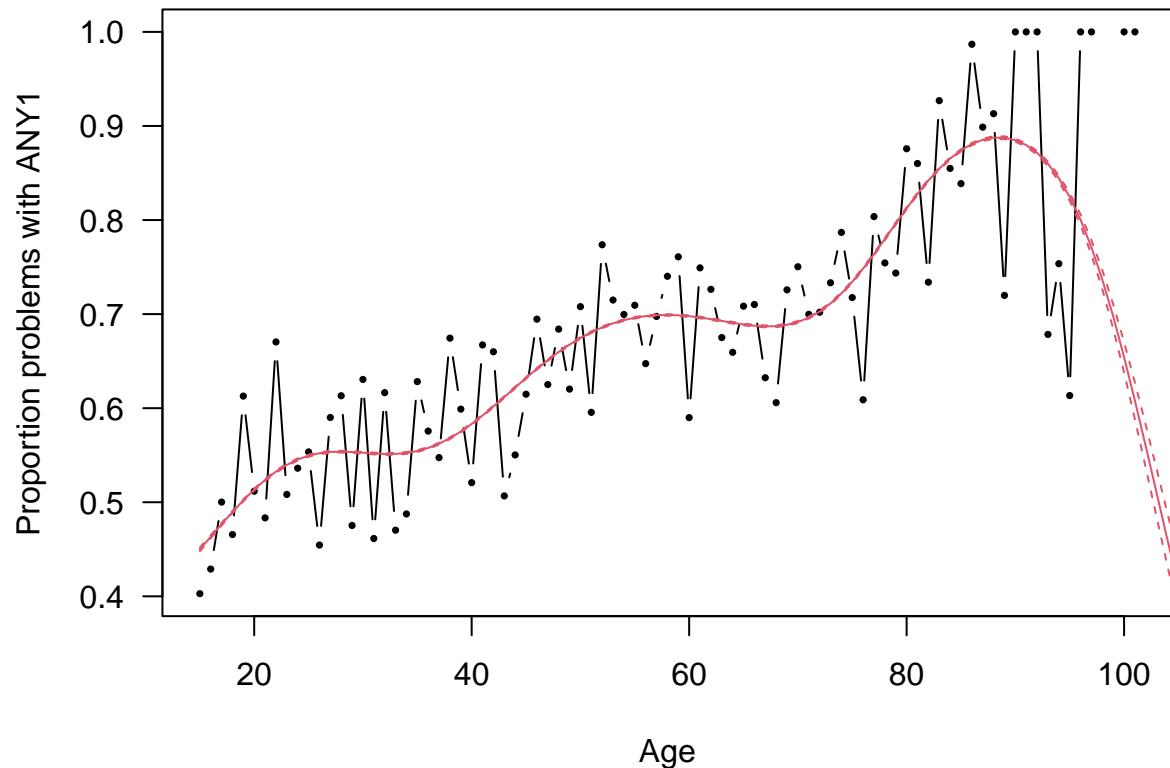
	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	0.6385132	0.0008102	788.092	< 2.2e-16 ***
Xs(age)Fx1	-1.3446555	0.0519146	-25.901	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

SSD: 1646.3
AIC: 9202060.4



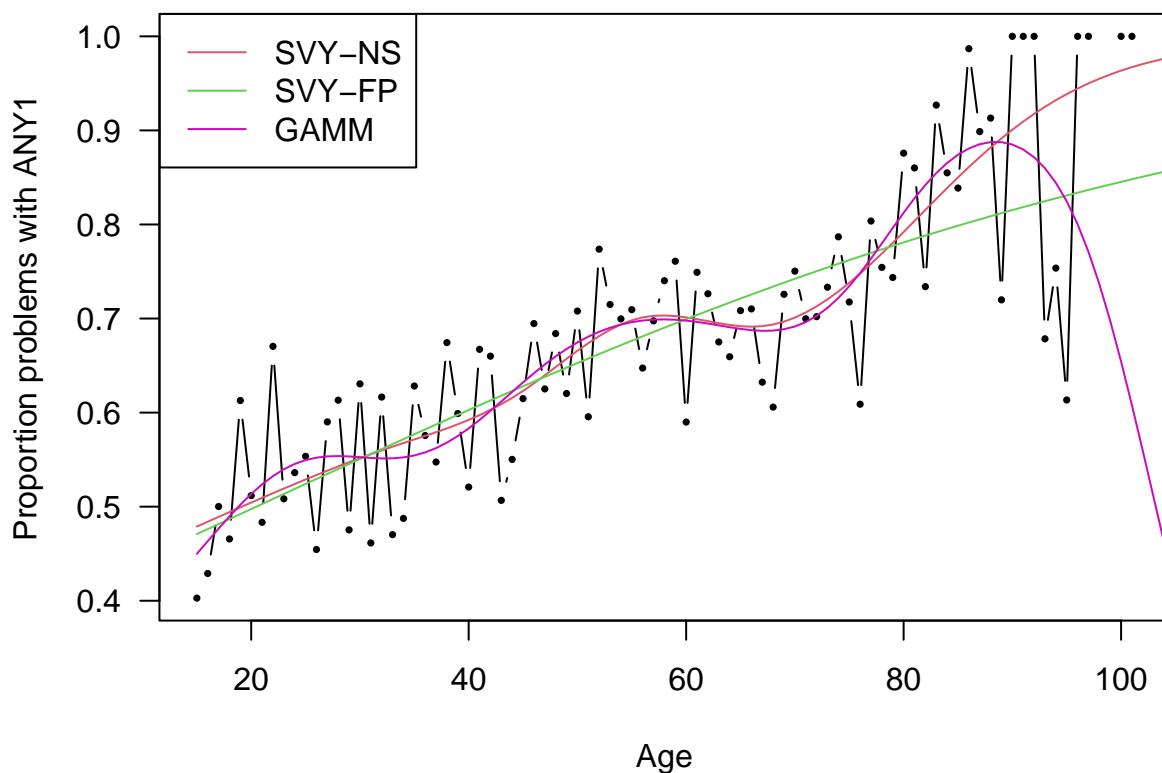
Fitted values with 95% confidence interval



Summary

	SSD	AIC
SVY-NS	1646.2	9542.4
SVY-FP	1650.1	9546.3
GAMM	1646.3	9202060.4

Comparison of fitted values across models



Index value

SVY-NS

Fitted model:

index ~ age.ns1 + age.ns2 + age.ns3 + age.ns4

Coefficients:

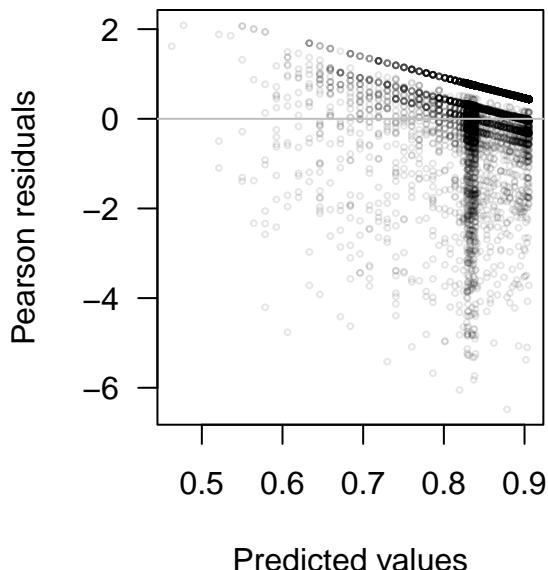
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.905624	0.011048	81.9698	< 2.2e-16 ***
age.ns1	-0.099637	0.013535	-7.3614	2.125e-13 ***
age.ns2	-0.011227	0.019237	-0.5836	0.5595
age.ns3	-0.263974	0.031948	-8.2627	< 2.2e-16 ***
age.ns4	-0.441688	0.046650	-9.4682	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

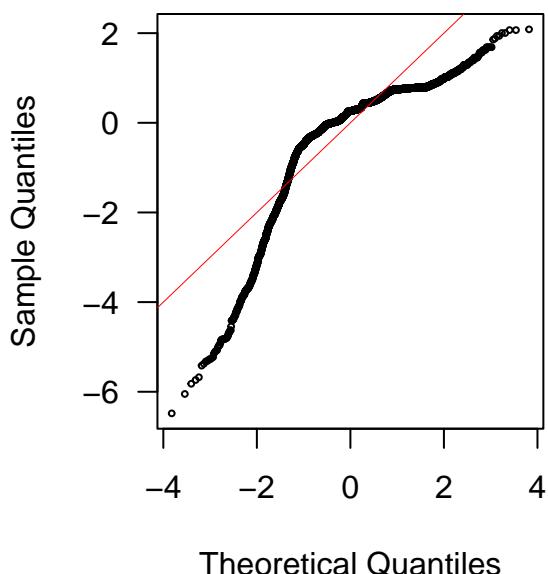
SSD: 334.6

AIC: 325.3

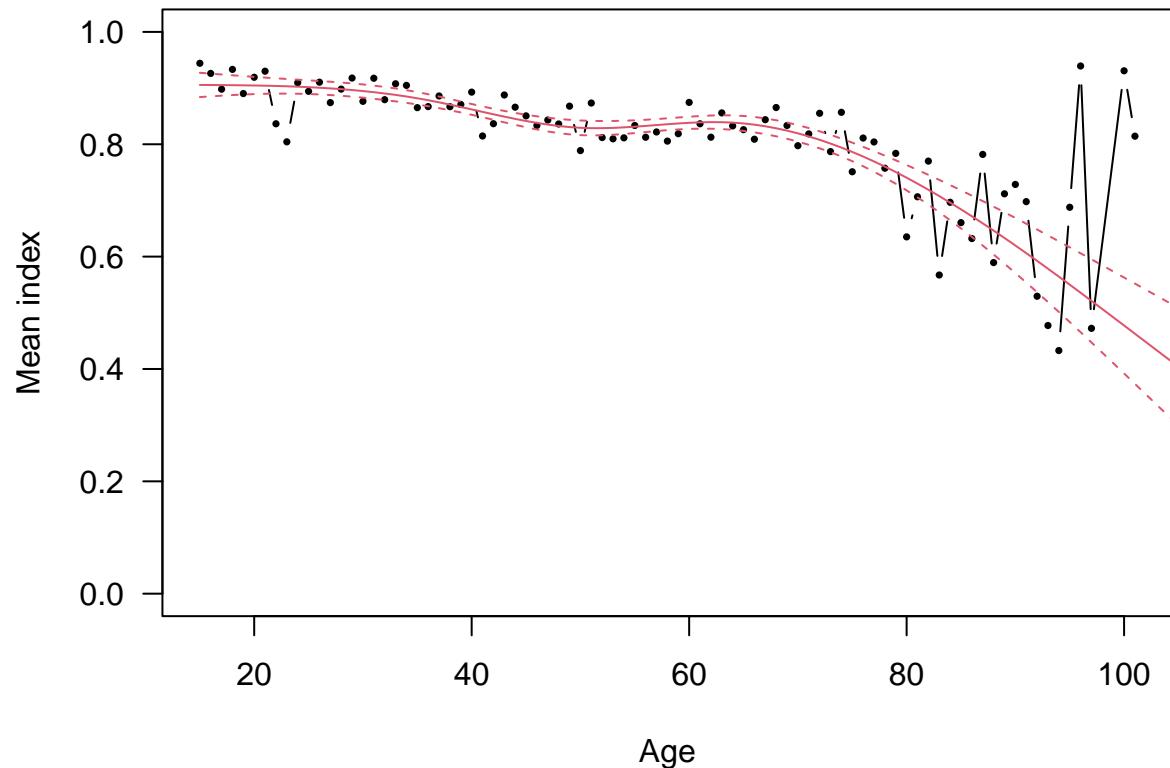
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

Fitted model:

index ~ I((age/100)^-2) + I((age/100)^3)

Coefficients:

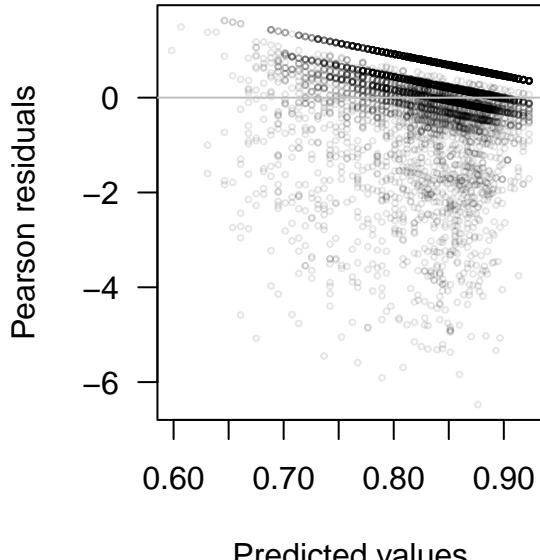
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.88223332	0.00708266	124.5624	< 2.2e-16 ***
I((age/100)^-2)	0.00093719	0.00034627	2.7066	0.006822 **
I((age/100)^3)	-0.27646895	0.03005324	-9.1993	< 2.2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

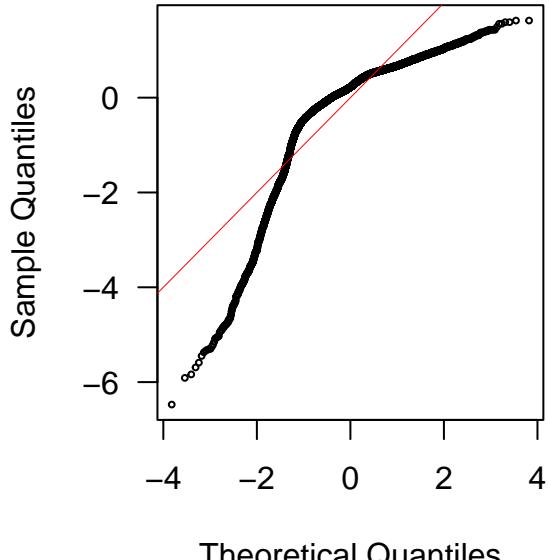
SSD: 336.3

AIC: 327.4

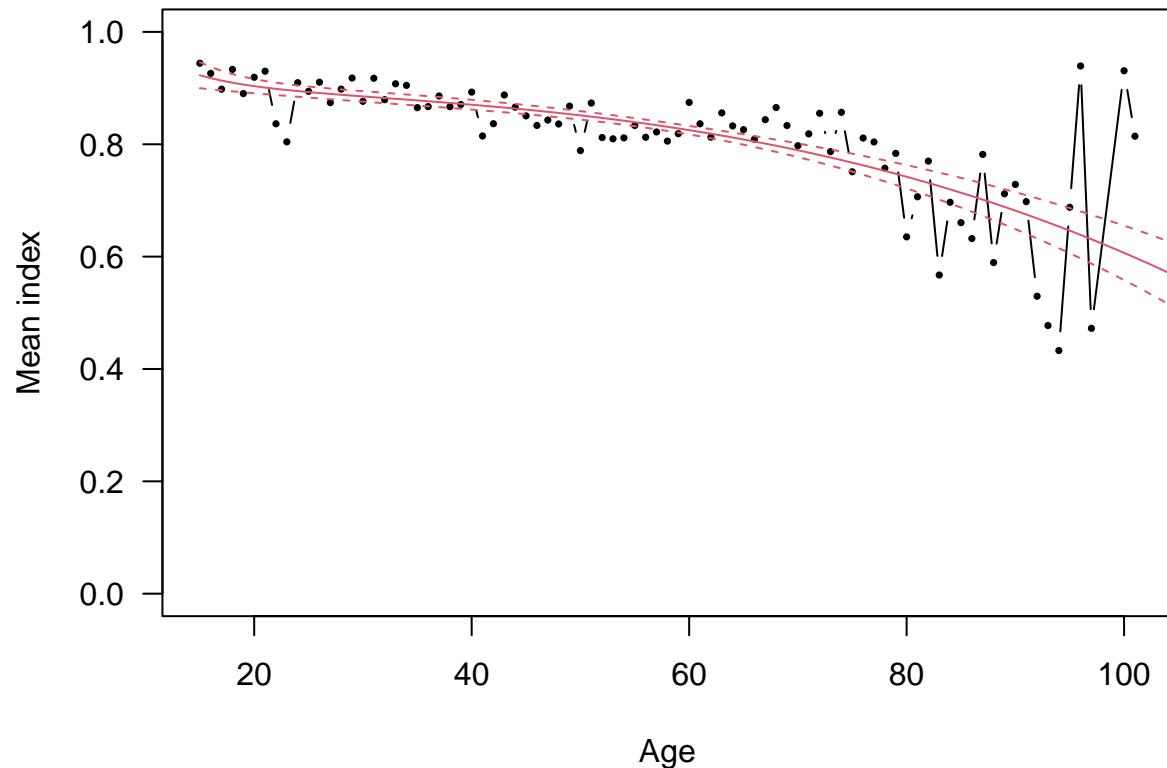
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



BEOI-NS

```
Fitted mu model:  
xx ~ ns(age, df = 4)  
  
Fitted nu model:  
~ns(age, df = 4)  
  
*****  
Family: c("BEOI", "One Inflated Beta")  
  
Call:  
gamlss(formula = f.mu, nu.formula = f.nu, family = BEOI, data = data.frame(xx = xx,  
    age = hisdesign$variables$age), control = gamlss.control(trace = FALSE))  
  
Fitting method: RS()  
  
-----  
Mu link function: logit  
Mu Coefficients:  
             Estimate Std. Error t value Pr(>|t|)  
(Intercept) 1.79748   0.05885 30.545 < 2e-16 ***  
ns(age, df = 4)1 -0.30298   0.06138 -4.937 8.12e-07 ***  
ns(age, df = 4)2 -0.03150   0.06198 -0.508   0.611  
ns(age, df = 4)3 -0.74092   0.14260 -5.196 2.09e-07 ***  
ns(age, df = 4)4 -1.05989   0.09905 -10.701 < 2e-16 ***  
---  
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1  
  
-----  
Sigma link function: log  
Sigma Coefficients:  
             Estimate Std. Error t value Pr(>|t|)  
(Intercept) 2.12532   0.01832 116 <2e-16 ***  
---  
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1  
  
-----  
Nu link function: logit  
Nu Coefficients:  
             Estimate Std. Error t value Pr(>|t|)  
(Intercept) -0.04934   0.10323 -0.478   0.633  
ns(age, df = 4)1 -0.77180   0.11581 -6.664 2.85e-11 ***  
ns(age, df = 4)2 -0.66084   0.14779 -4.471 7.89e-06 ***  
ns(age, df = 4)3 -1.83961   0.27877 -6.599 4.42e-11 ***  
ns(age, df = 4)4 -2.70149   0.32816 -8.232 < 2e-16 ***  
---  
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1  
  
-----  
No. of observations in the fit: 7509  
Degrees of Freedom for the fit: 11  
    Residual Deg. of Freedom: 7498  
                    at cycle: 8
```

```

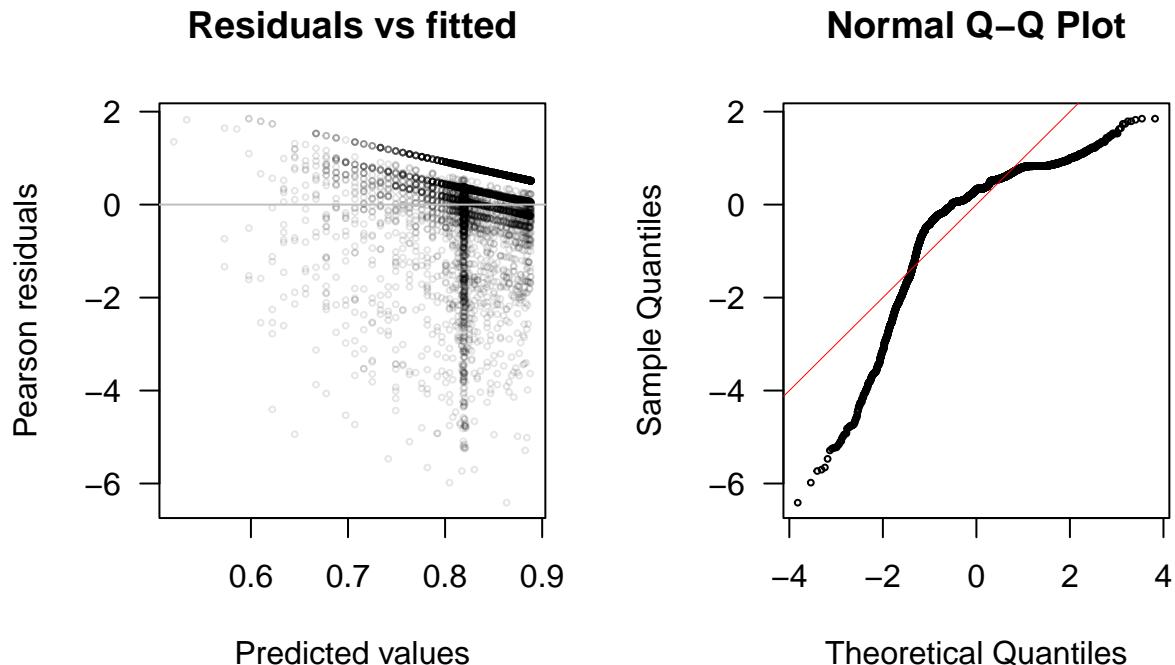
Global Deviance: 1234.685
AIC: 1256.685
SBC: 1332.848
*****

```

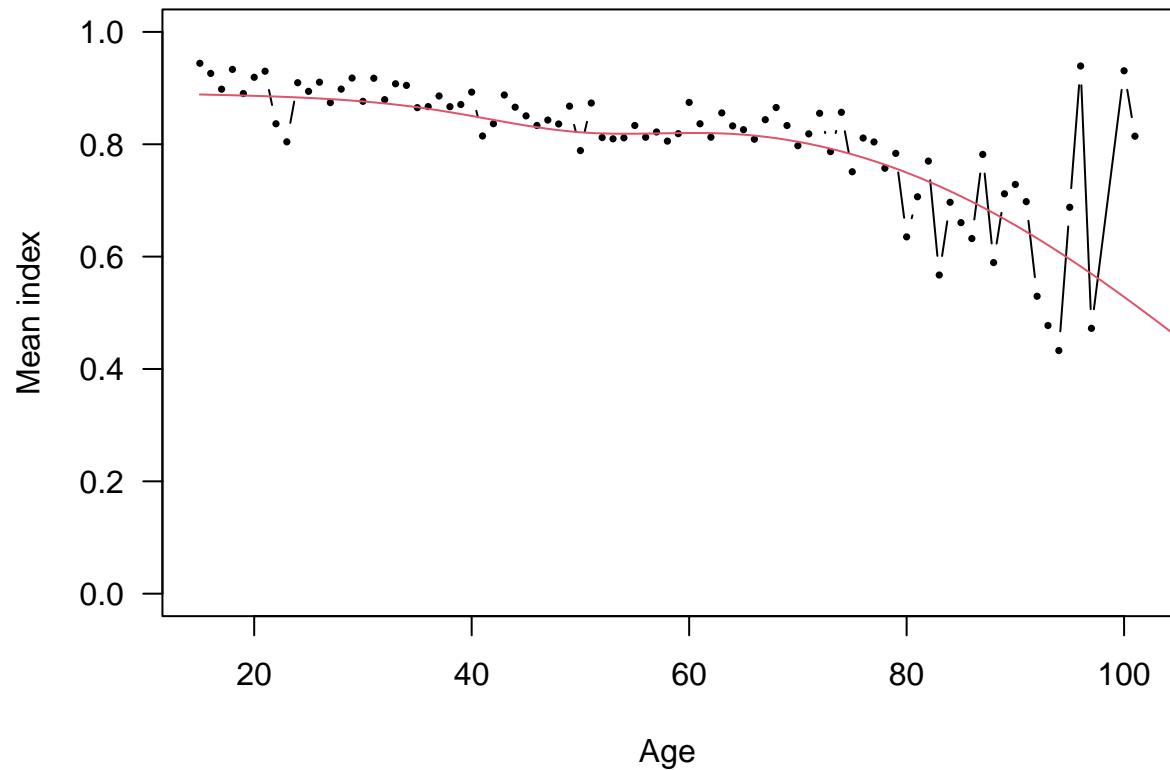
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	1.79747959	0.05884599	30.5454896	3.005254e-193
ns(age, df = 4)1	-0.30298419	0.06137538	-4.9365753	8.122116e-07
ns(age, df = 4)2	-0.03150350	0.06198391	-0.5082529	6.112909e-01
ns(age, df = 4)3	-0.74092196	0.14259851	-5.1958603	2.091415e-07
ns(age, df = 4)4	-1.05989099	0.09904737	-10.7008500	1.565864e-26
(Intercept)	2.12531610	0.01832491	115.9796039	0.000000e+00
(Intercept)	-0.04933697	0.10322795	-0.4779420	6.327054e-01
ns(age, df = 4)1	-0.77179747	0.11581069	-6.6643027	2.847449e-11
ns(age, df = 4)2	-0.66083580	0.14779200	-4.4713908	7.885550e-06
ns(age, df = 4)3	-1.83961171	0.27877392	-6.5989376	4.422782e-11
ns(age, df = 4)4	-2.70148840	0.32815835	-8.2322707	2.148314e-16

SSD: 335.8

AIC: 1256.7



Fitted values (SE fit not available)

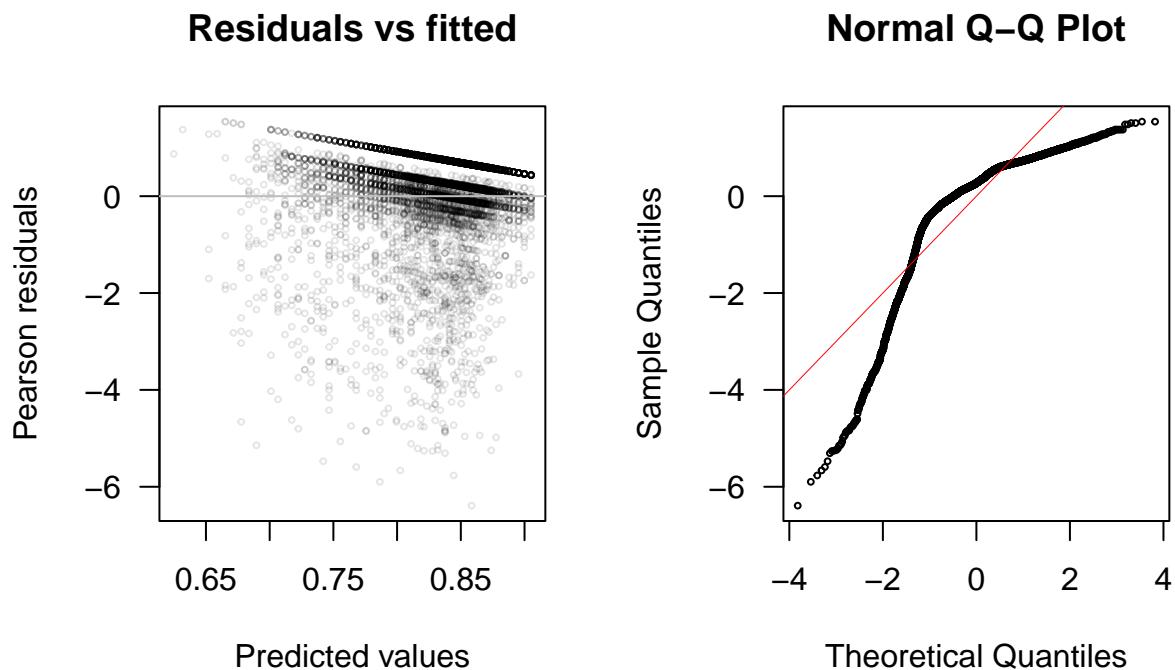


BEOI-FP

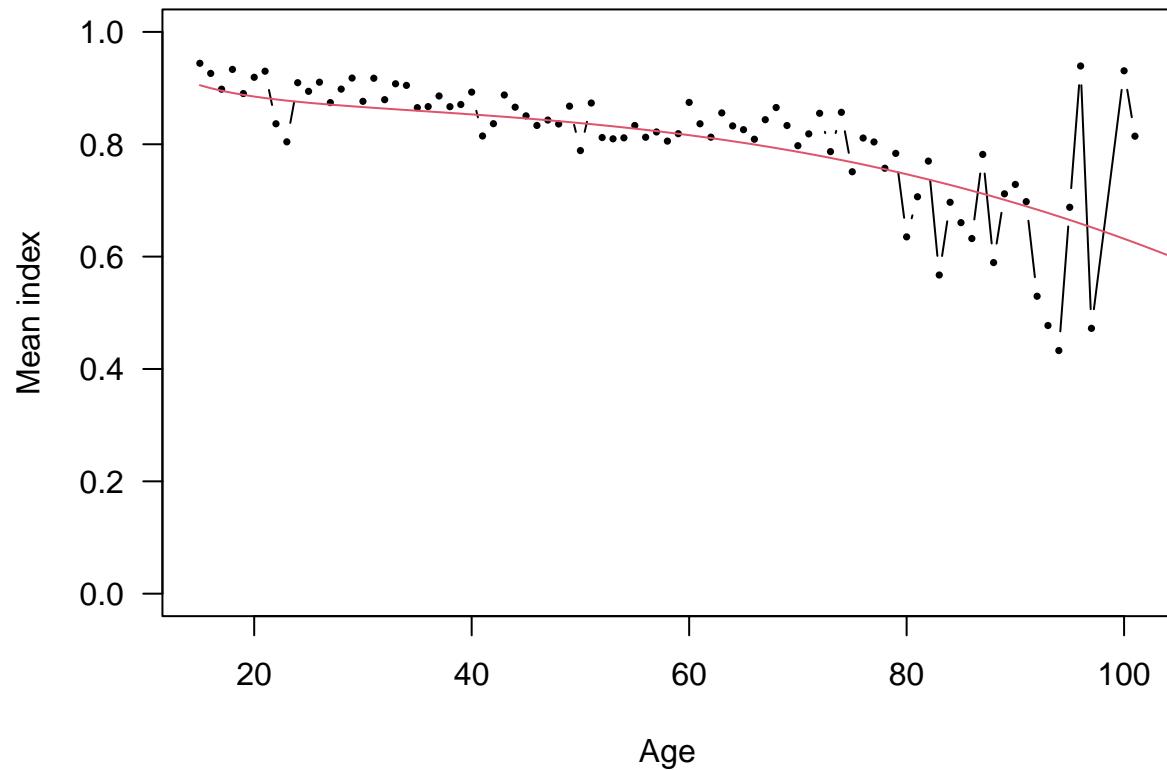
```
Fitted mu model:  
xx ~ I((age/100)^-2) + I((age/100)^3)  
  
Fitted nu model:  
~I((age/100)^-2) + I((age/100)^3)  
  
*****  
Family: c("BEOI", "One Inflated Beta")  
  
Call:  
gamlss(formula = f.mu, nu.formula = f.nu, family = BEOI, data = data.frame(xx = xx,  
    age = hisdesign$variables$age), control = gamlss.control(trace = FALSE))  
  
Fitting method: RS()  
  
-----  
Mu link function: logit  
Mu Coefficients:  
             Estimate Std. Error t value Pr(>|t|)  
(Intercept) 1.677254  0.026379 63.582 <2e-16 ***  
I((age/100)^-2) 0.003268  0.001944  1.681  0.0928 .  
I((age/100)^3) -0.633783  0.074000 -8.565 <2e-16 ***  
---  
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1  
  
-----  
Sigma link function: log  
Sigma Coefficients:  
             Estimate Std. Error t value Pr(>|t|)  
(Intercept) 2.12018   0.01832 115.7 <2e-16 ***  
---  
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1  
  
-----  
Nu link function: logit  
Nu Coefficients:  
             Estimate Std. Error t value Pr(>|t|)  
(Intercept) -0.341695  0.057227 -5.971 2.47e-09 ***  
I((age/100)^-2) 0.012843  0.003613  3.555 0.000381 ***  
I((age/100)^3) -2.187378  0.200948 -10.885 < 2e-16 ***  
---  
Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1  
  
-----  
No. of observations in the fit: 7509  
Degrees of Freedom for the fit: 7  
    Residual Deg. of Freedom: 7502  
        at cycle: 8  
  
Global Deviance: 1269.573  
AIC: 1283.573  
SBC: 1332.04
```

```
*****
              Estimate Std. Error    t value   Pr(>|t|)    
(Intercept)  1.677254461 0.026379224 63.582404 0.000000e+00
I((age/100)^2) 0.003268057 0.001943887  1.681197 9.276634e-02
I((age/100)^3) -0.633782924 0.073999877 -8.564648 1.301609e-17
(Intercept)  2.120178843 0.018319492 115.733495 0.000000e+00
(Intercept) -0.341694811 0.057227098 -5.970857 2.467606e-09
I((age/100)^2) 0.012843336 0.003612900  3.554855 3.805148e-04
I((age/100)^3) -2.187377844 0.200947571 -10.885316 2.168050e-27
```

SSD: 337.6
AIC: 1283.6



Fitted values (SE fit not available)



GAMM

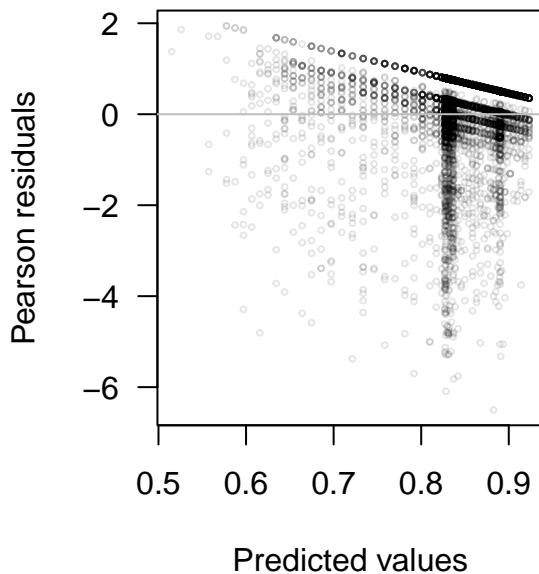
Fitted model:
index ~ s(age, bs = "tp")

Coefficients:

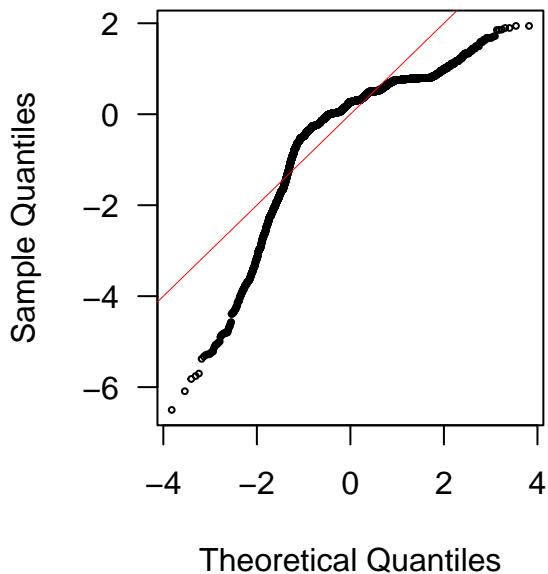
	Estimate	Std. Error	t value
(Intercept)	0.8399036	0.0024104	348.4445
s(age)Fx1	-0.1411122	0.0579226	-2.4362

SSD: 334.3
AIC: 948.1

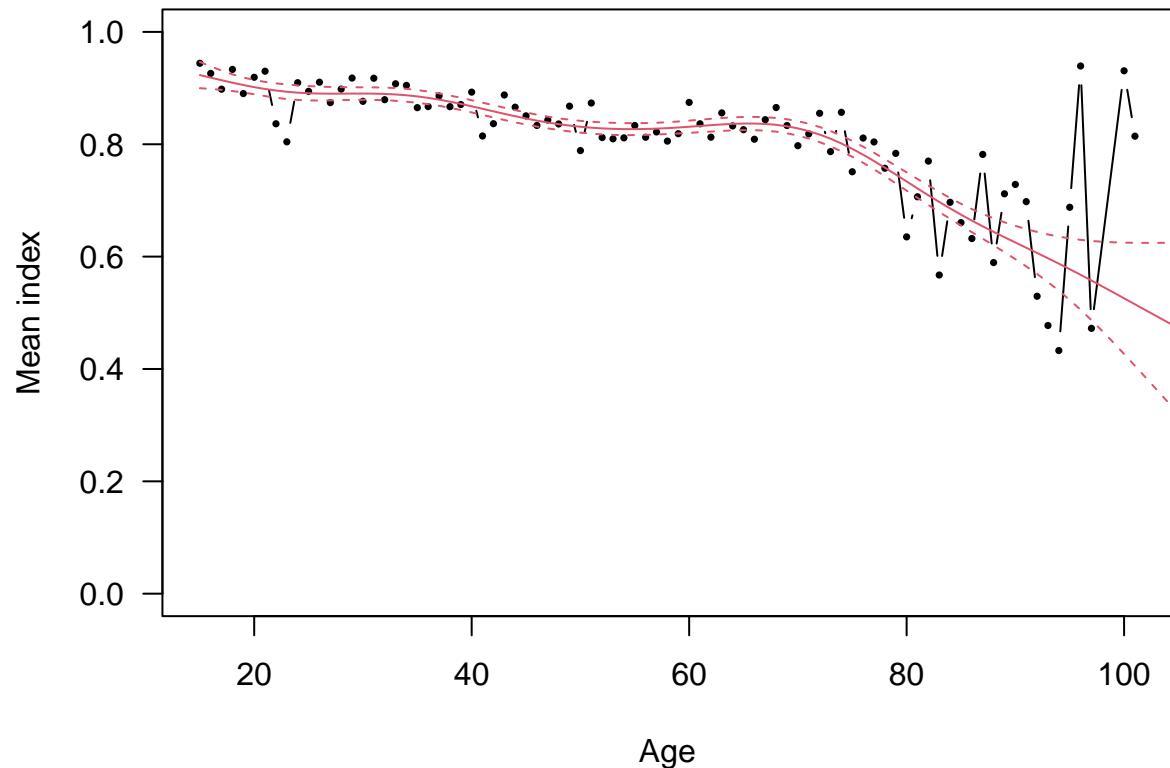
Residuals vs fitted



Normal Q-Q Plot



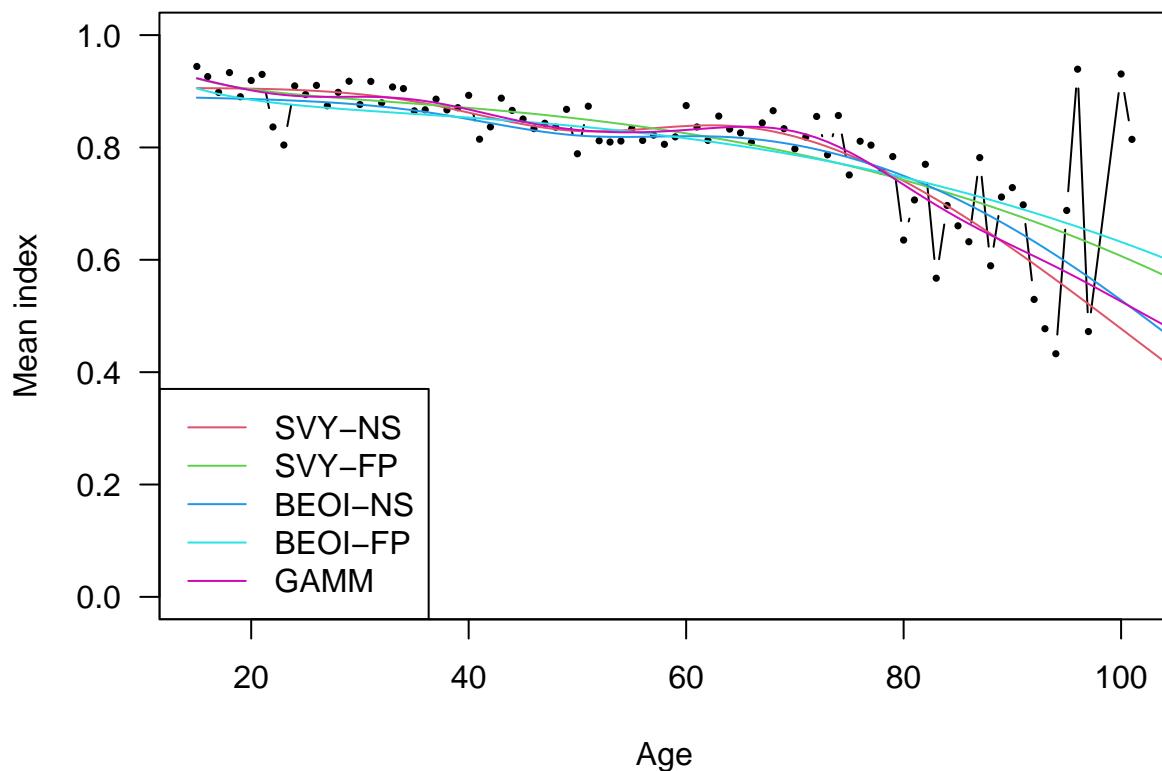
Fitted values with 95% confidence interval



Summary

	SSD	AIC
SVY-NS	334.6	325.3
SVY-FP	336.3	327.4
BEOI-NS	335.8	1256.7
BEOI-FP	337.6	1283.6
GAMM	334.3	948.1

Comparison of fitted values across models



Summary table

	MO	SC	UA	PD	AD	ANY	INDEX
SVY-NS	1071.6	381.4	1103.6	1751.7	1653.7	1646.2	334.6
SVY-FP	1074.8	382.3	1110.1	1751.7	1653.0	1650.1	336.3
BEOI-NS	NA	NA	NA	NA	NA	NA	335.8
BEOI-FP	NA	NA	NA	NA	NA	NA	337.6
GAMM	1072.9	381.3	1102.4	1748.1	1653.9	1646.3	334.3