

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

Appendix 4. Comparison of age models for Belgian EQ-5D population norms

2020-12-30

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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:

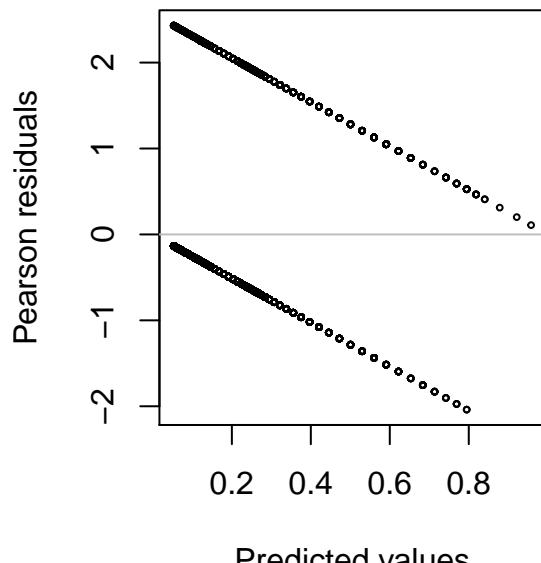
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-2.69480	0.37362	-7.2128	6.575e-13 ***
age.ns1	0.95063	0.39895	2.3828	0.0172295 *
age.ns2	0.47641	0.49282	0.9667	0.3337513
age.ns3	1.60617	0.40640	3.9522	7.884e-05 ***
age.ns4	1.68224	0.34174	4.9225	8.902e-07 ***
age.ns5	3.56853	0.96990	3.6793	0.0002371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

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

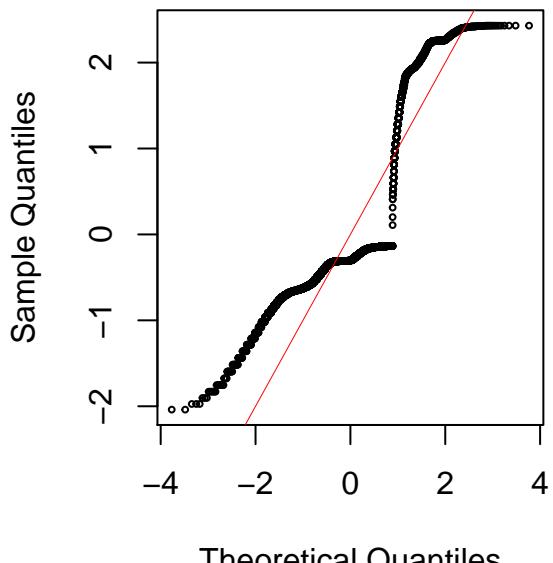
SSD: 799.4

AIC: 5046.2

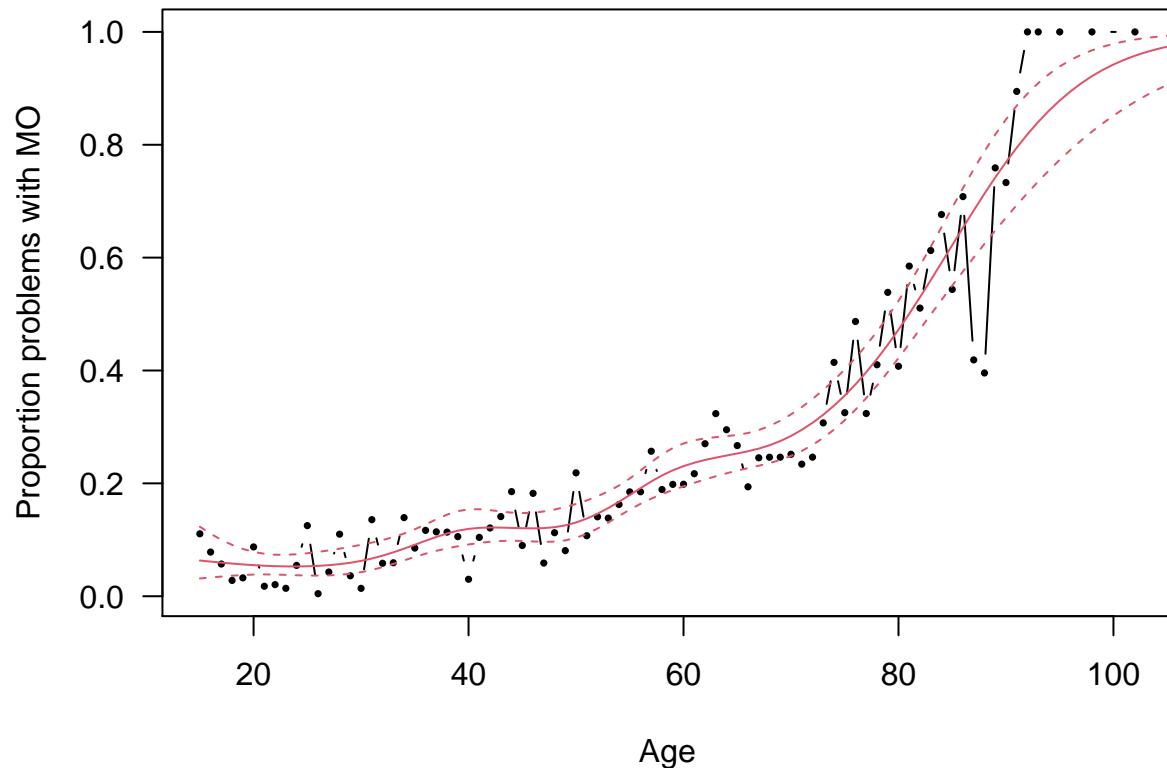
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

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

Coefficients:

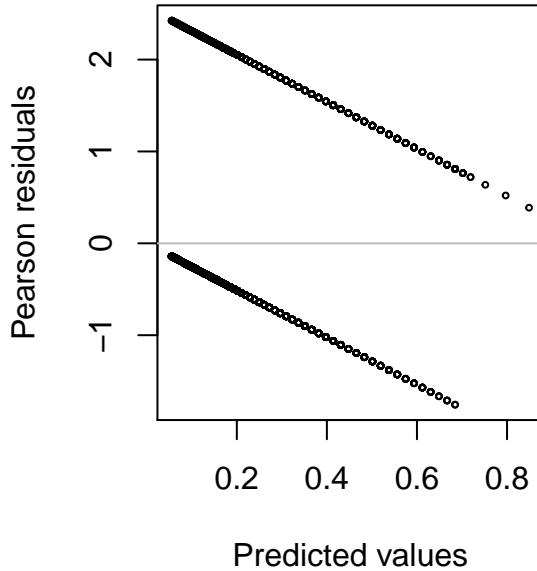
	Estimate	Std. Error	t value	Pr(> t)		
(Intercept)	-2.93548	0.10559	-27.802	< 2.2e-16 ***		
$I((age/100)^2)$	4.48071	0.25306	17.706	< 2.2e-16 ***		

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

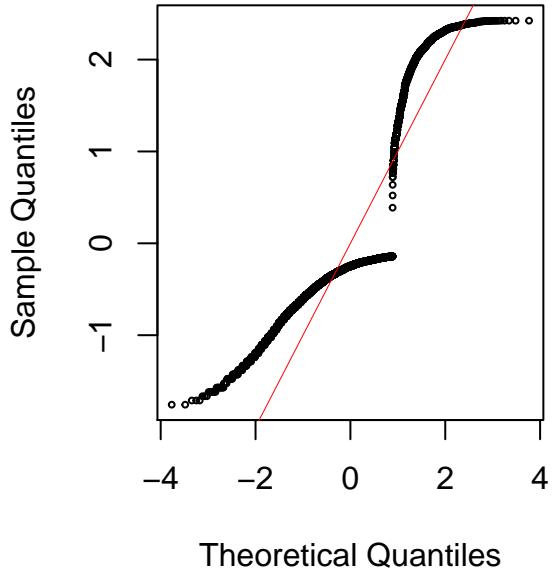
SSD: 800.9

AIC: 5042.0

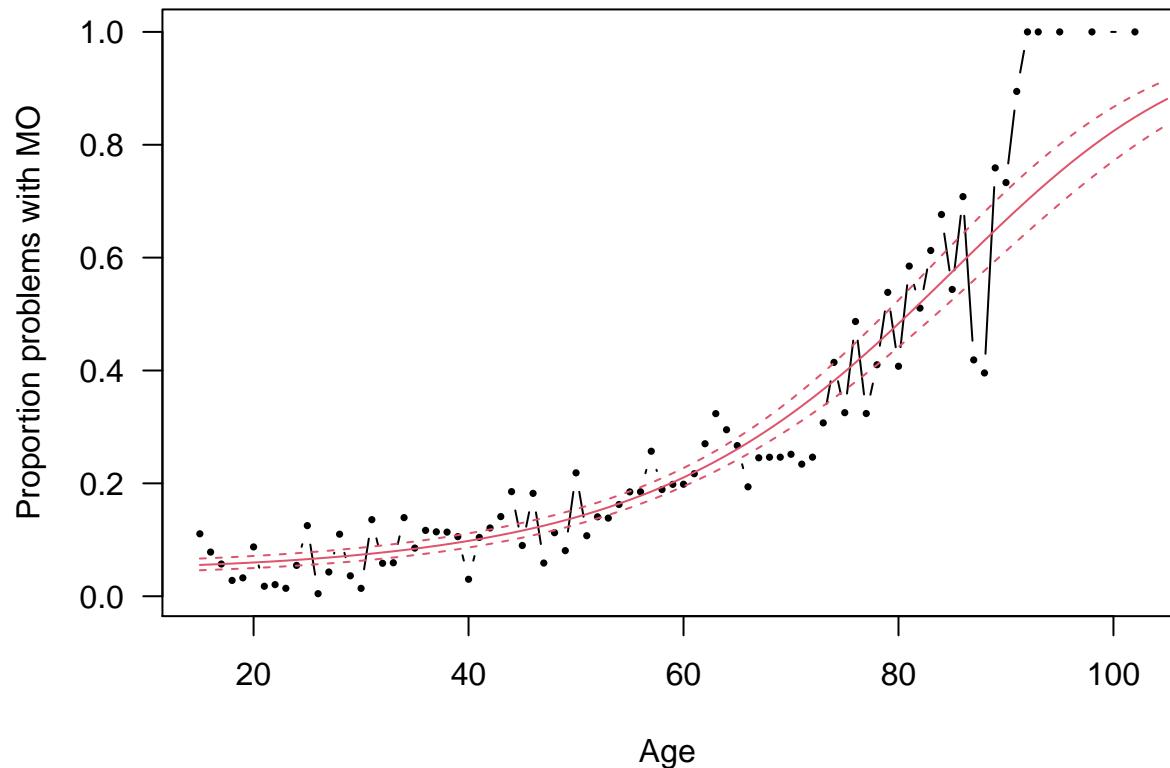
Residuals vs fitted



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:

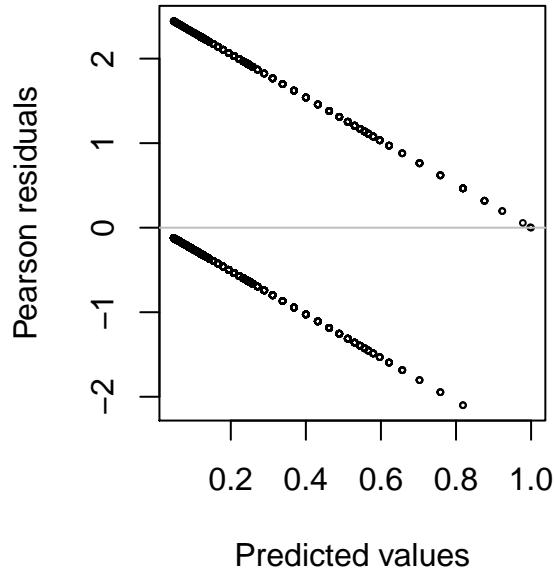
	Estimate	Std. Error	z value	Pr(> z)
X(Intercept)	-1.7113879	0.0012694	-1348.197	< 2.2e-16 ***
Xs(age)Fx1	8.2235840	0.1260221	65.255	< 2.2e-16 ***

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

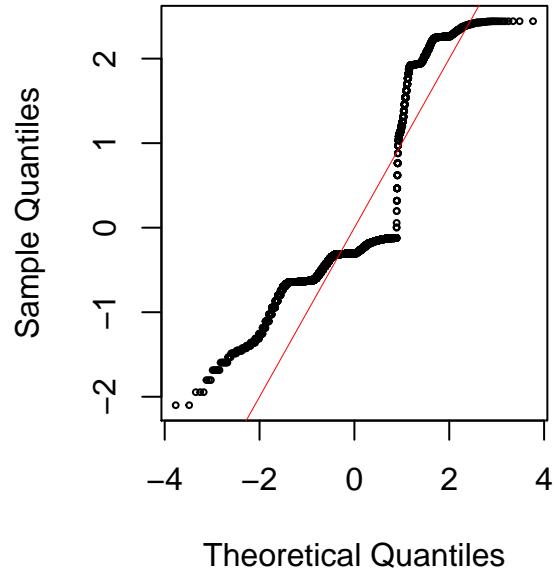
SSD: 799.9

AIC: 5033246.7

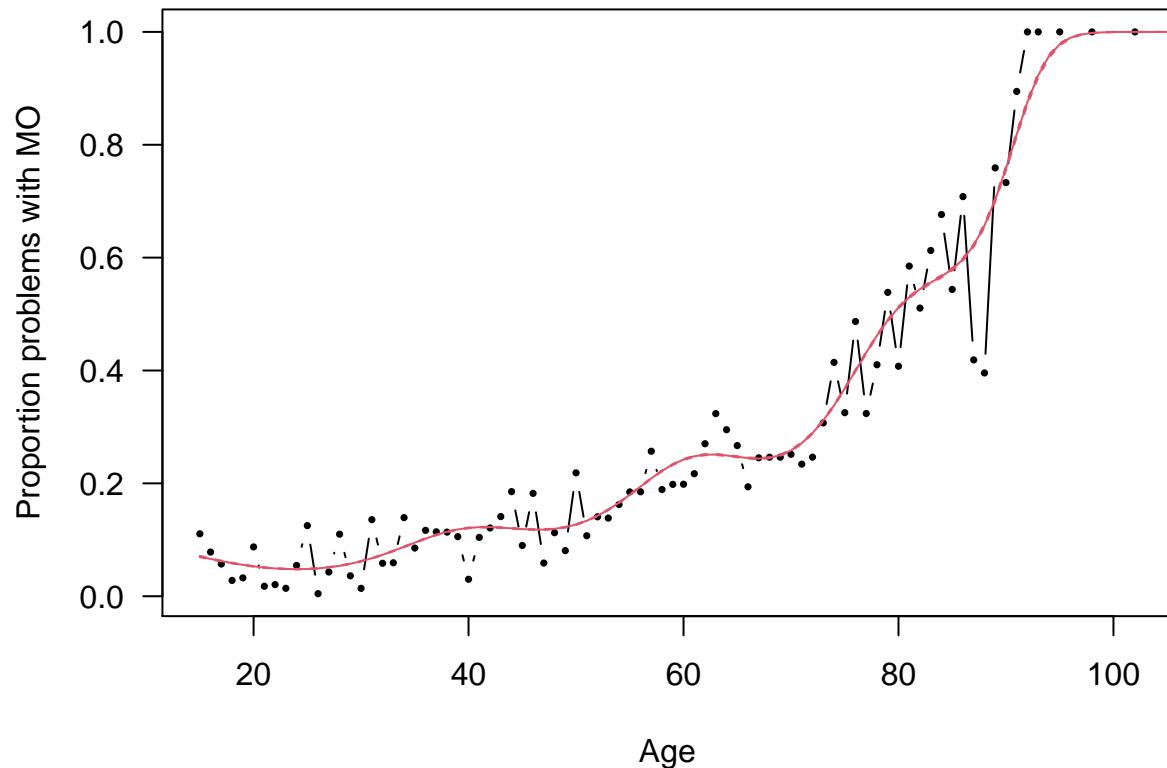
Residuals vs fitted



Normal Q–Q Plot



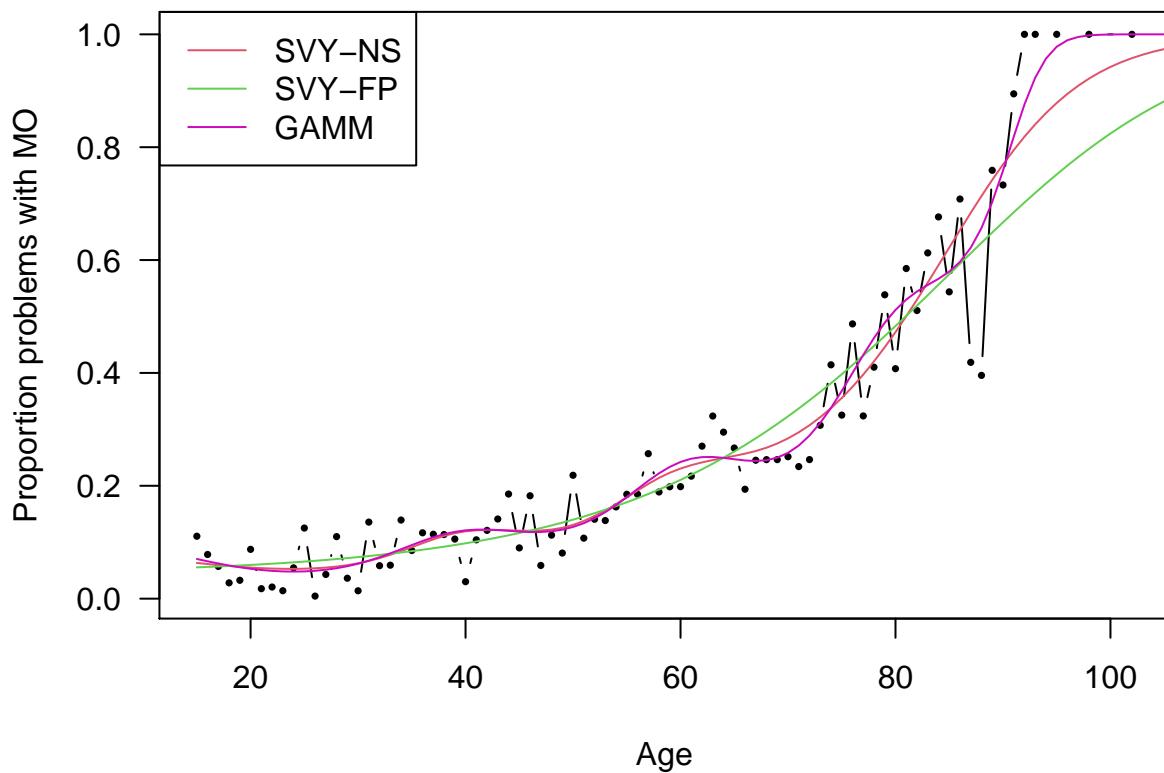
Fitted values with 95% confidence interval



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:

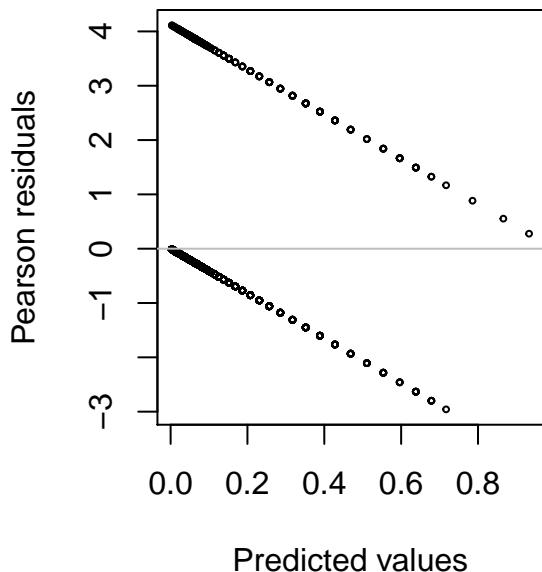
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-5.82438	1.08474	-5.3694	8.369e-08 ***
age.ns1	3.38077	1.01281	3.3380	0.0008518 ***
age.ns2	1.92023	0.68237	2.8141	0.0049167 **
age.ns3	7.47519	2.40824	3.1040	0.0019231 **
age.ns4	7.58325	0.64145	11.8221	< 2.2e-16 ***

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

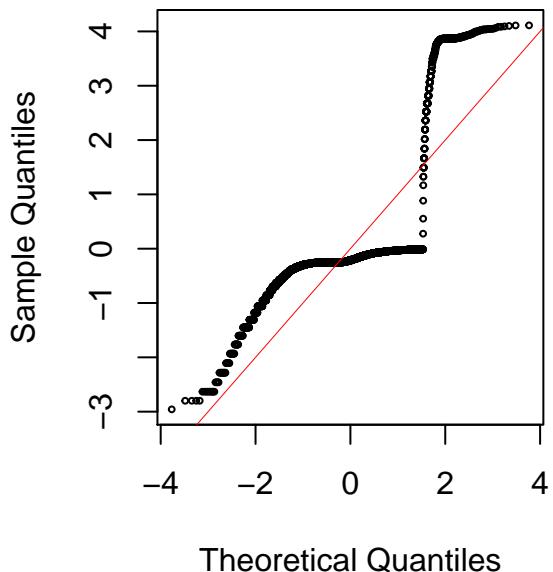
SSD: 324.0

AIC: 2534.0

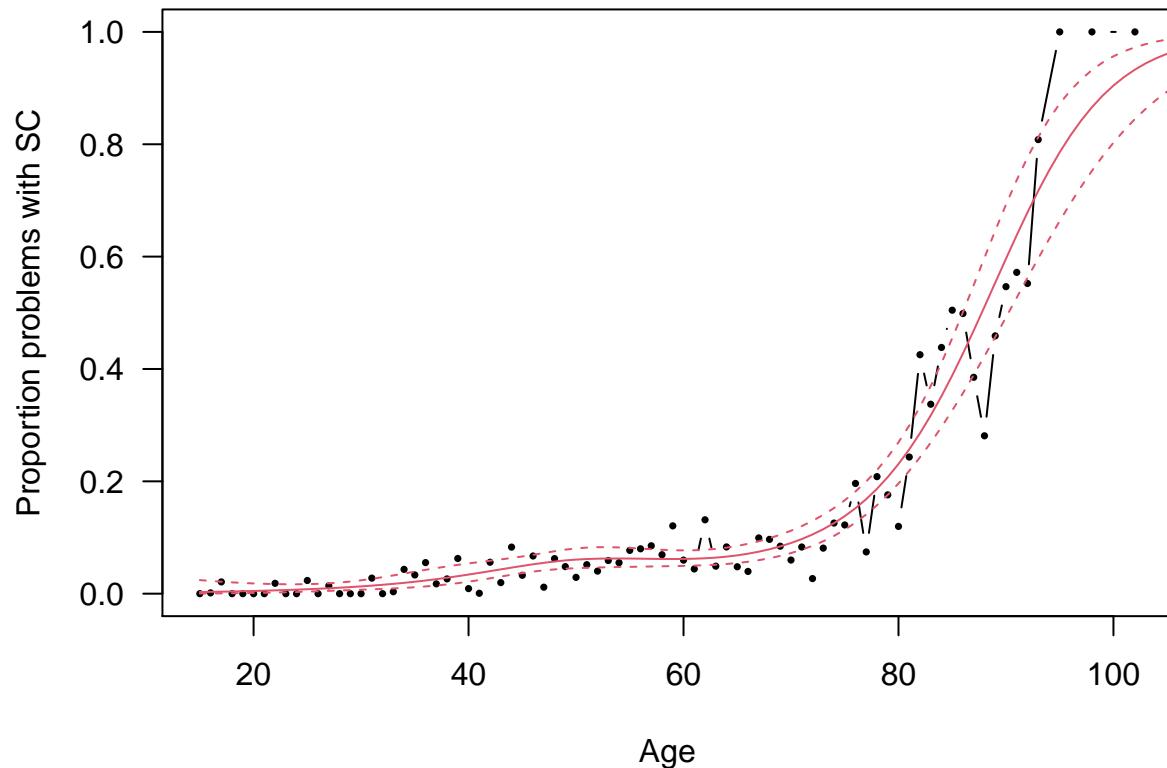
Residuals vs fitted



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:

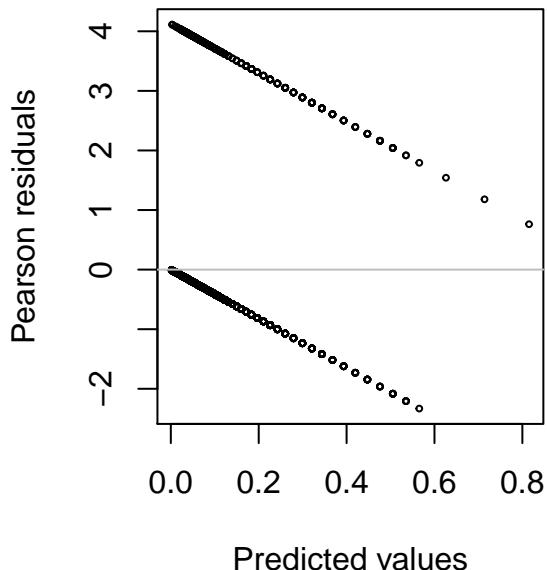
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-3.452666	0.246699	-13.9955	< 2e-16 ***
I((age/100)^{-2})	-0.061820	0.026734	-2.3124	0.02081 *
I((age/100)^3)	4.708435	0.494641	9.5189	< 2e-16 ***

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

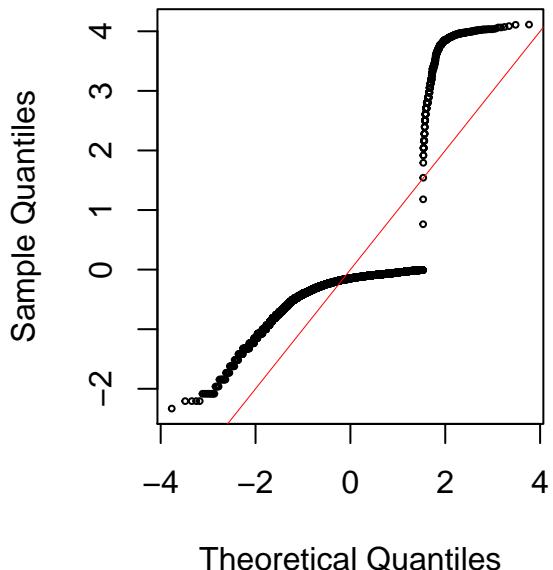
SSD: 324.8

AIC: 2549.9

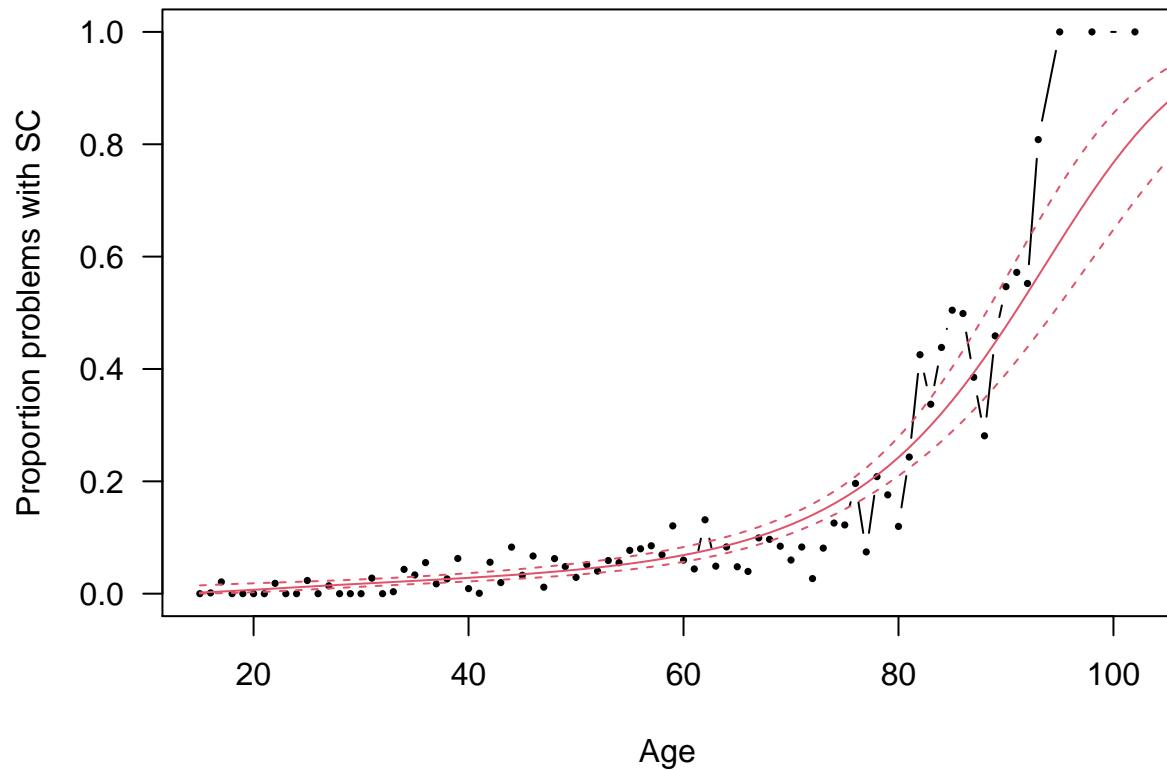
Residuals vs fitted



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:

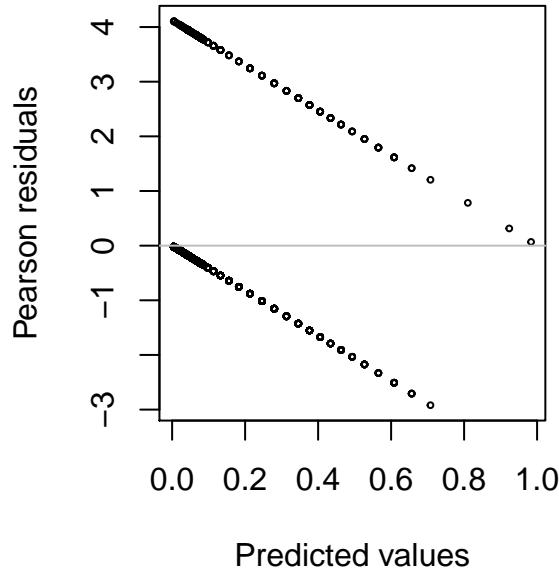
	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-3.1577190	0.0028196	-1119.919	< 2.2e-16 ***
Xs(age)Fx1	3.0023749	0.1003623	29.915	< 2.2e-16 ***

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

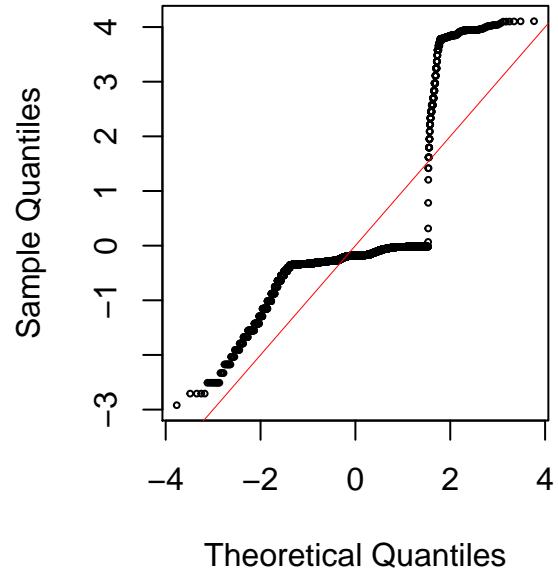
SSD: 323.8

AIC: 2515149.3

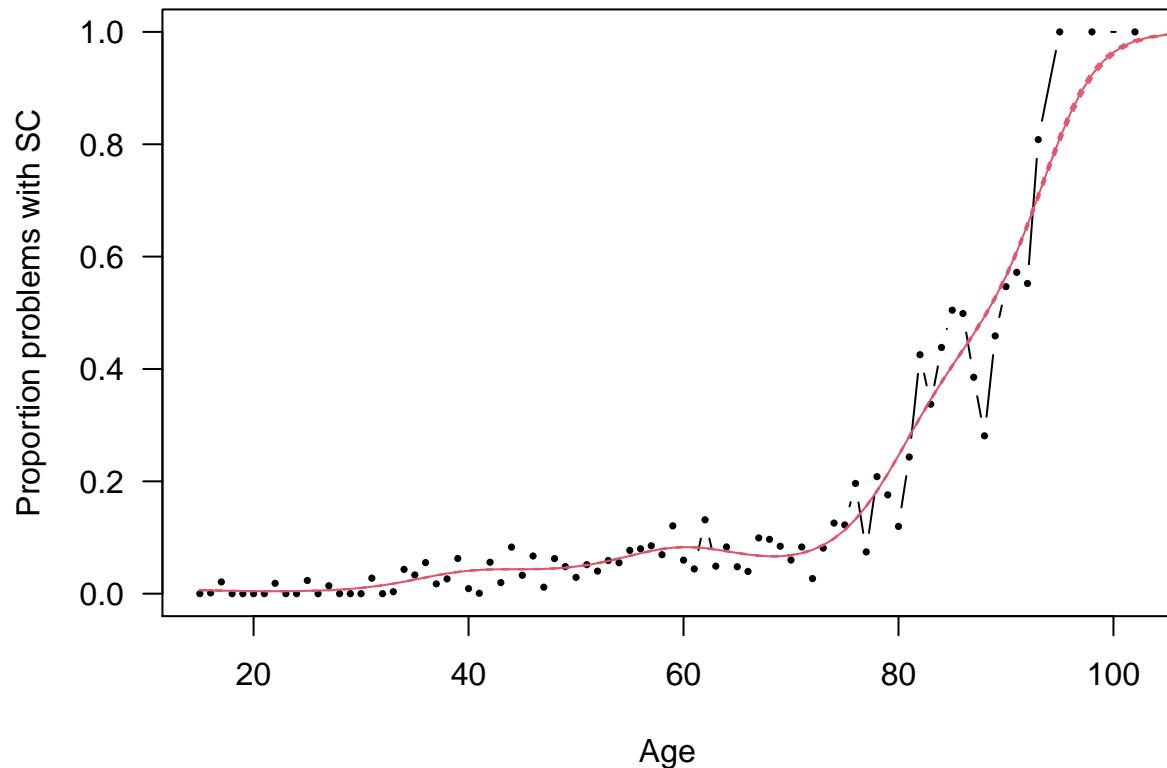
Residuals vs fitted



Normal Q-Q Plot



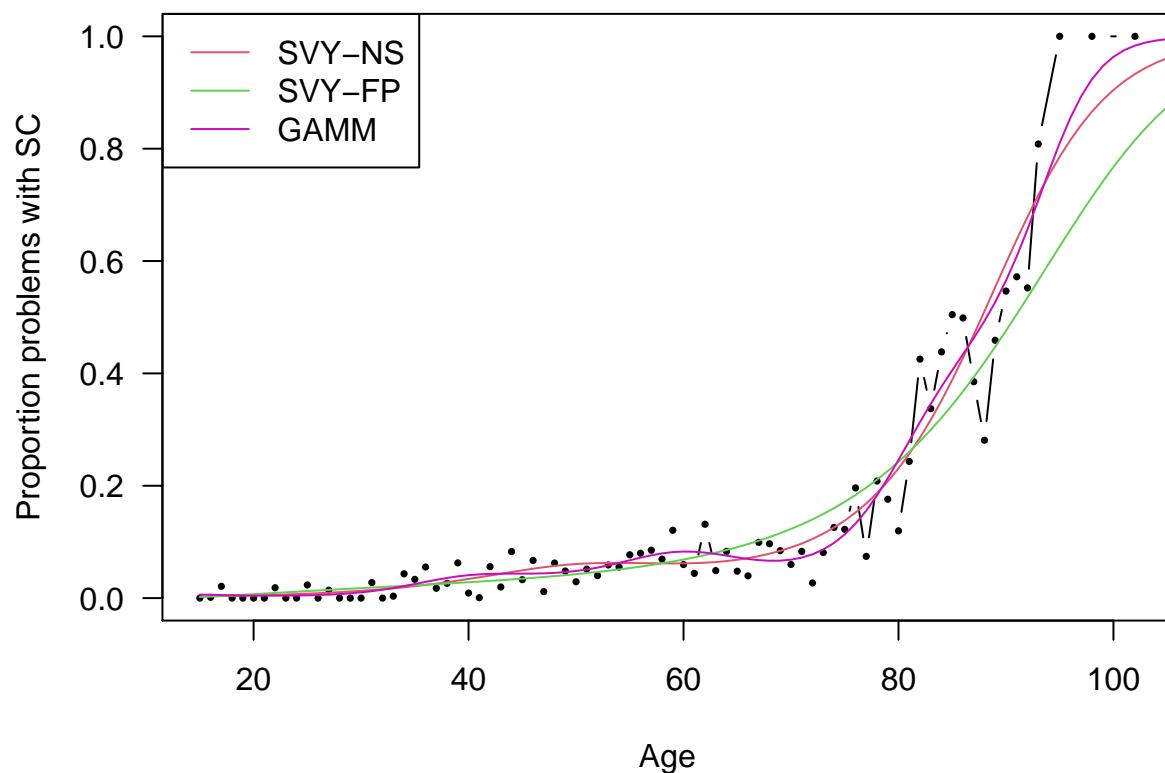
Fitted values with 95% confidence interval



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:

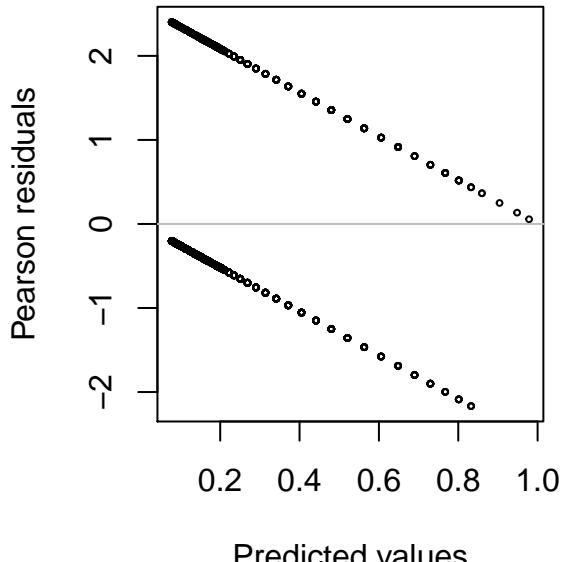
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-2.35064	0.31340	-7.5005	7.859e-14 ***
age.ns1	0.82201	0.33041	2.4879	0.0128925 *
age.ns2	0.46861	0.42646	1.0988	0.2719183
age.ns3	1.20731	0.34917	3.4576	0.0005508 ***
age.ns4	0.35434	0.34493	1.0273	0.3043594
age.ns5	3.33210	0.83775	3.9774	7.095e-05 ***
age.ns6	6.31067	0.65619	9.6171	< 2.2e-16 ***

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

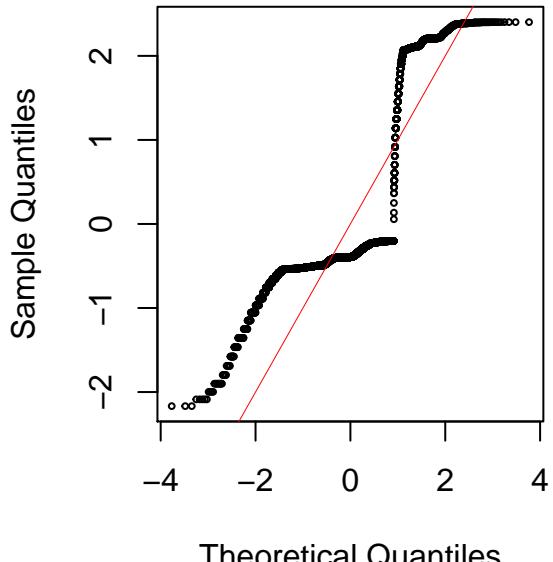
SSD: 834.5

AIC: 5284.8

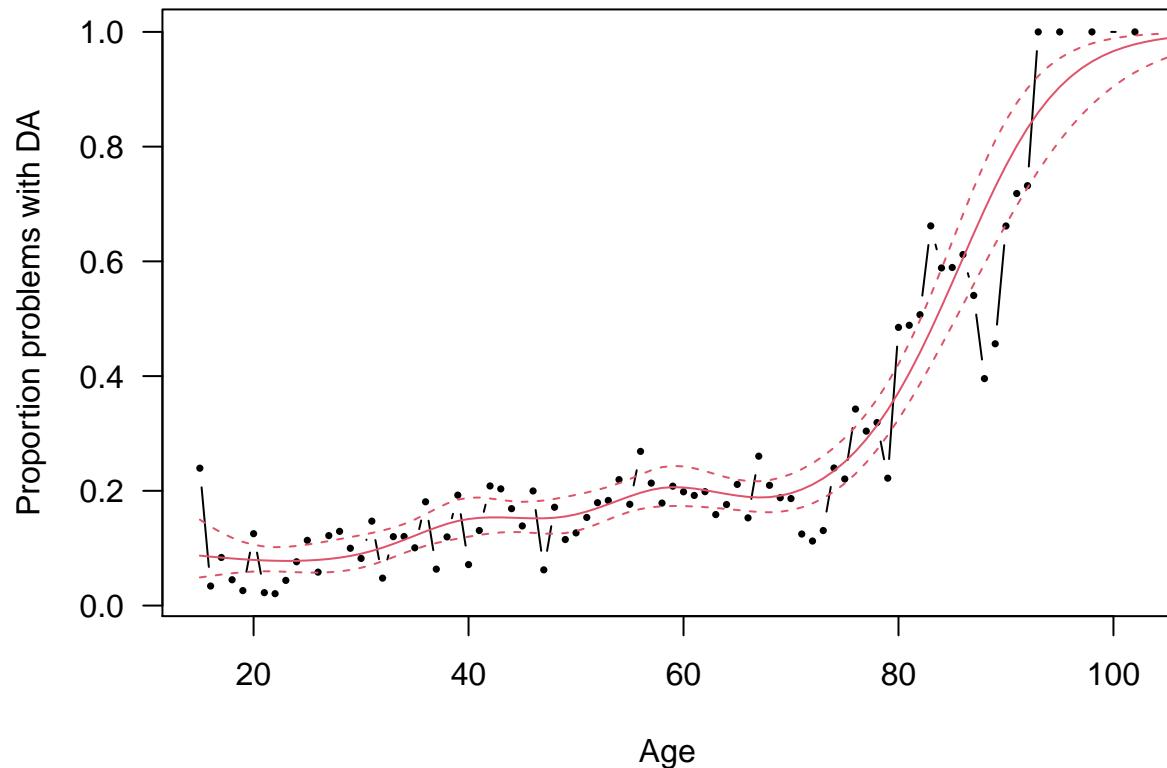
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

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

Coefficients:

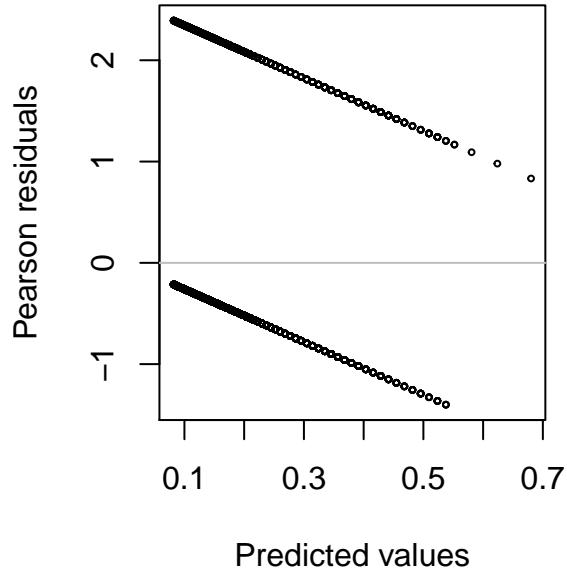
	Estimate	Std. Error	t value	Pr(> t)		
(Intercept)	-2.484383	0.096132	-25.843	< 2.2e-16 ***		
$I((age/100)^2)$	3.113597	0.237277	13.122	< 2.2e-16 ***		

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

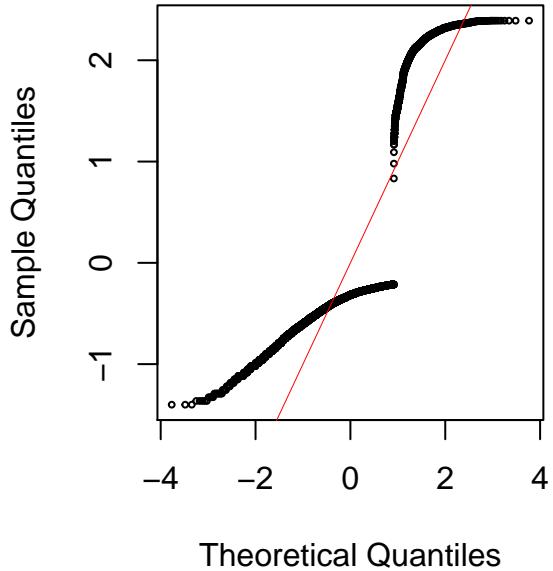
SSD: 838.7

AIC: 5323.1

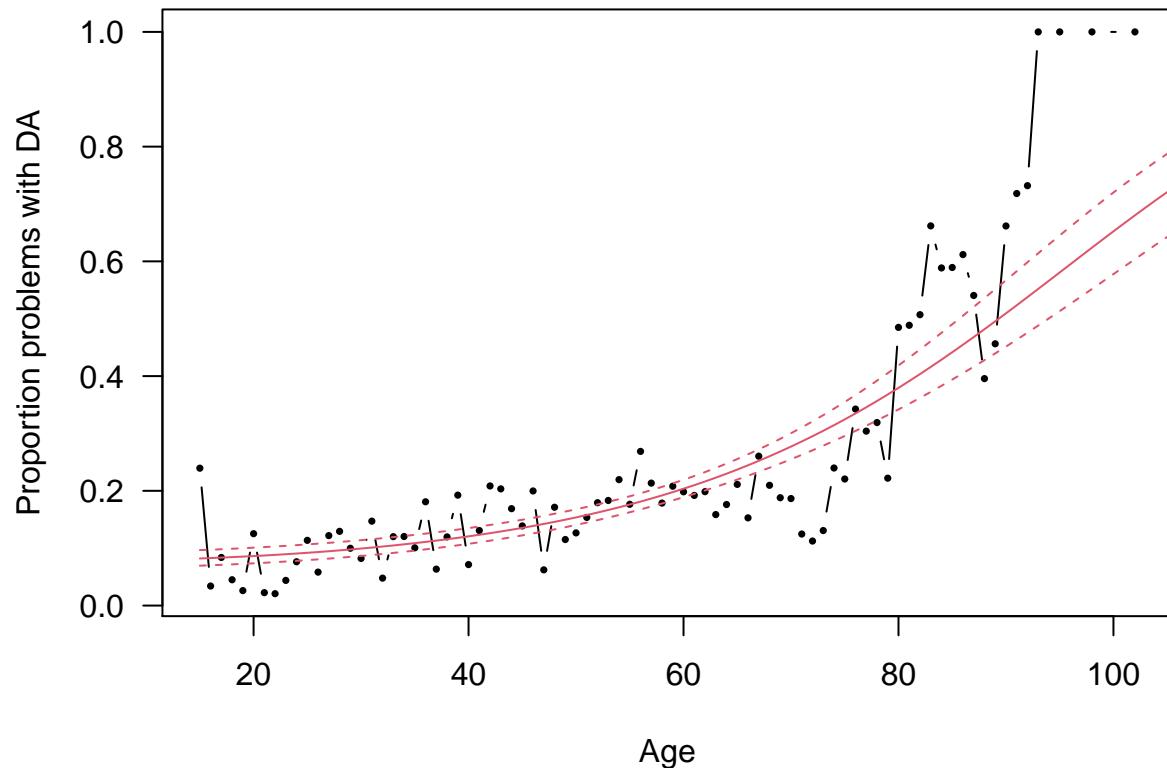
Residuals vs fitted



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)	63.95	7.997

Coefficients:

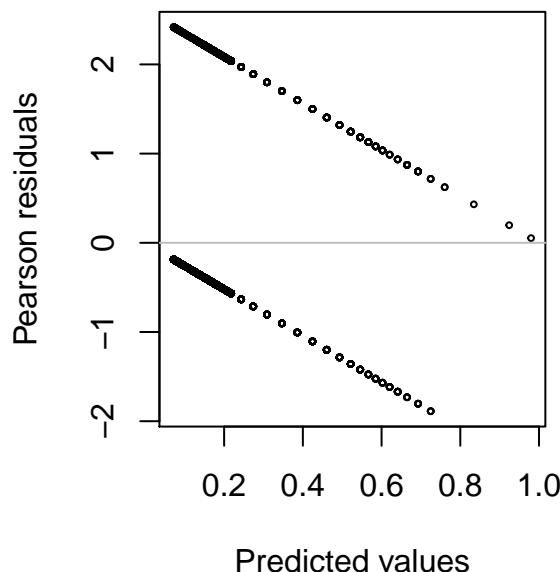
	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-1.6441153	0.0011663	-1409.661	< 2.2e-16 ***
Xs(age)Fx1	2.7767714	0.0769094	36.105	< 2.2e-16 ***

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

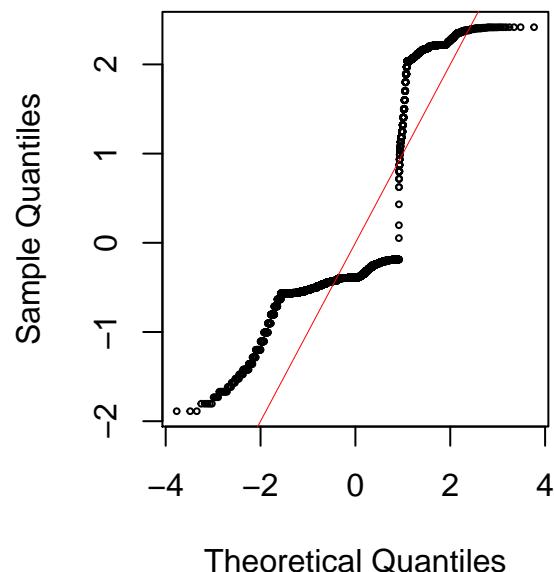
SSD: 833.1

AIC: 5272115.4

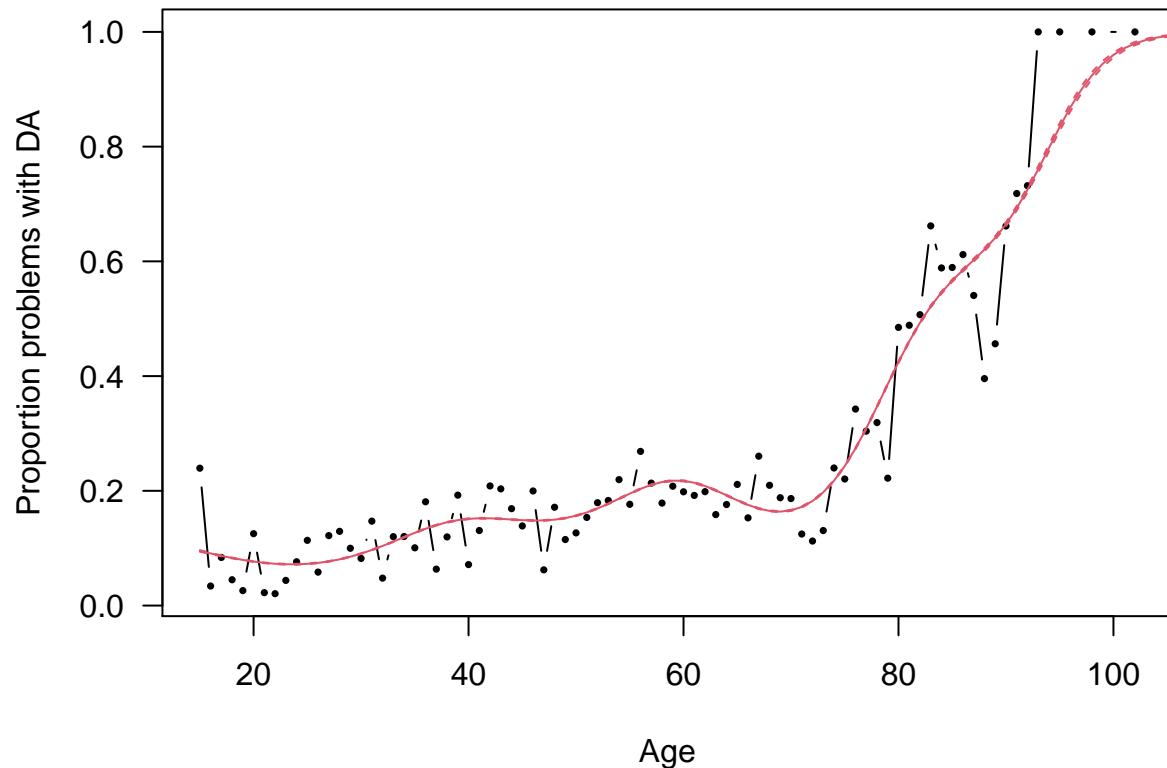
Residuals vs fitted



Normal Q–Q Plot



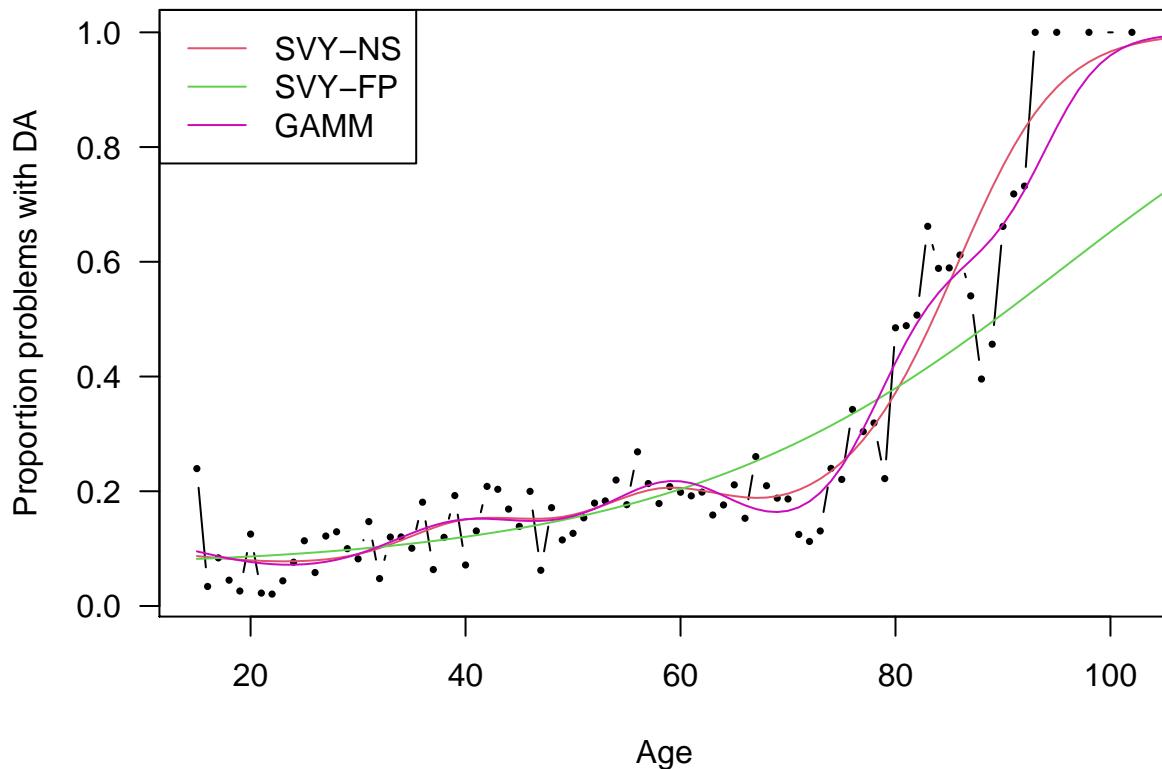
Fitted values with 95% confidence interval



Summary

	SSD	AIC
SVY-NS	834.5	5284.8
SVY-FP	838.7	5323.1
GAMM	833.1	5272115.4

Comparison of fitted values across models



Pain/Discomfort

SVY-NS

Fitted model:

PD ~ age.ns1 + age.ns2

Coefficients:

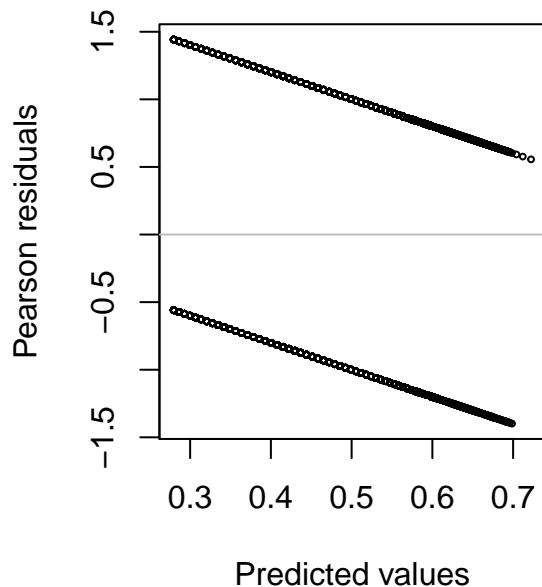
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0.94602	0.11908	-7.9442	2.548e-15 ***
age.ns1	2.53201	0.24255	10.4391	< 2.2e-16 ***
age.ns2	1.37104	0.23632	5.8016	7.101e-09 ***

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

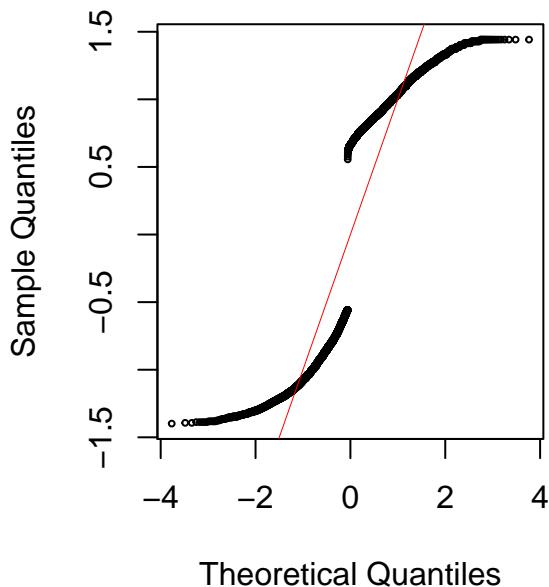
SSD: 1432.4

AIC: 8118.0

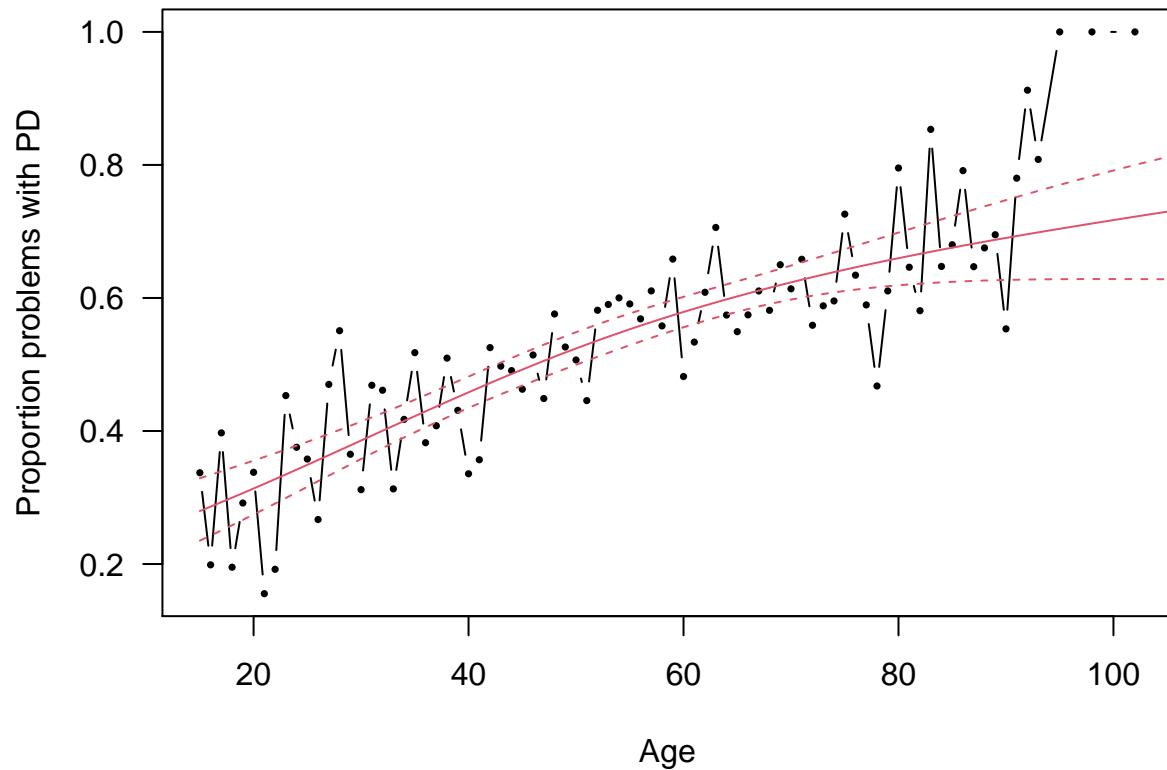
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

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

Coefficients:

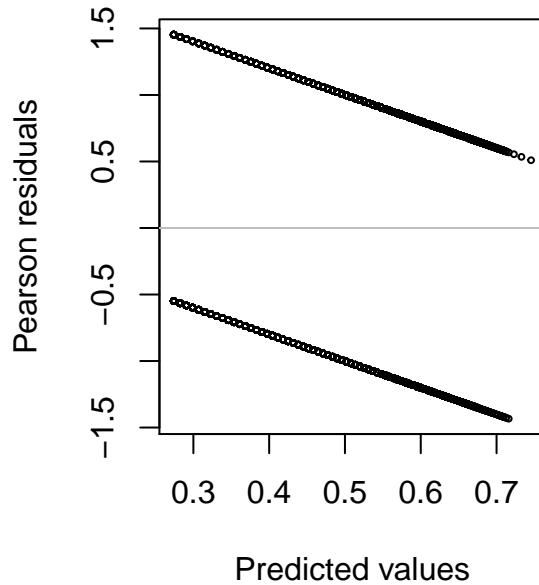
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-2.24851	0.20413	-11.015	< 2.2e-16 ***
I((age/100)^0.5)	3.29072	0.28497	11.548	< 2.2e-16 ***

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

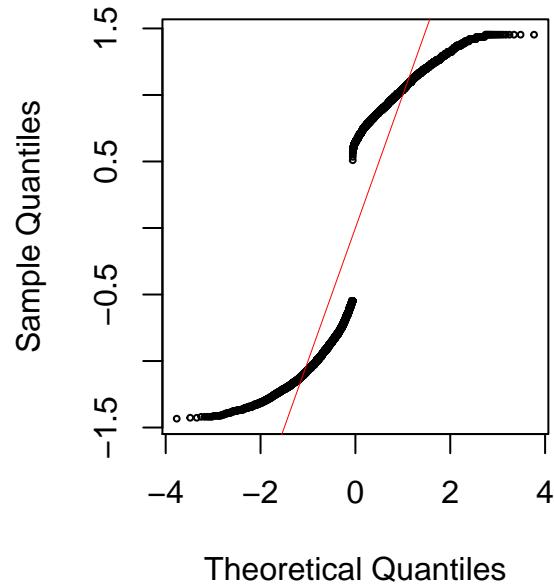
SSD: 1432.9

AIC: 8114.6

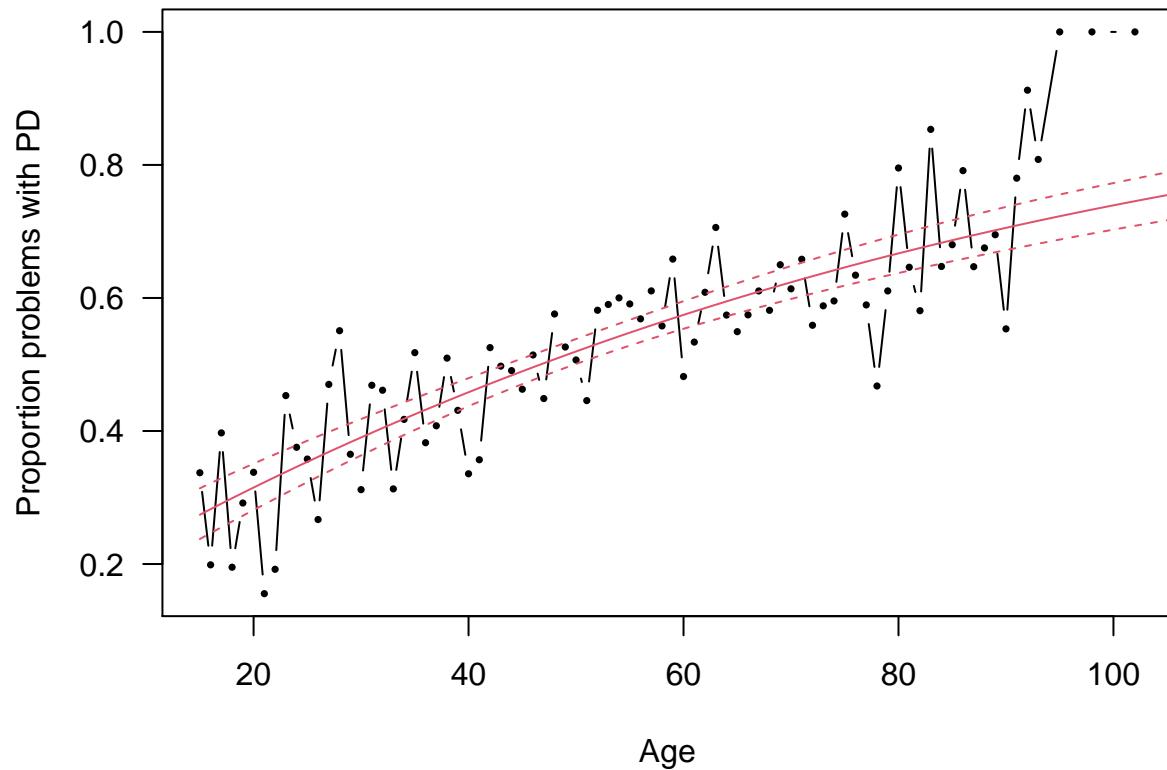
Residuals vs fitted



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:

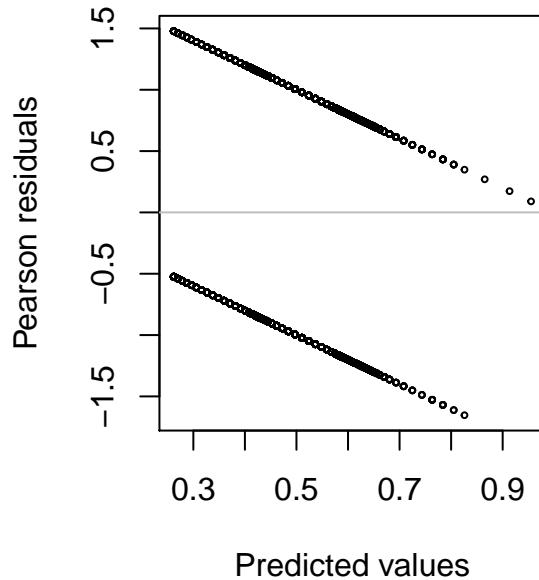
	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	0.01615225	0.00083434	19.359	< 2.2e-16 ***
Xs(age)Fx1	2.00142810	0.06856247	29.191	< 2.2e-16 ***

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

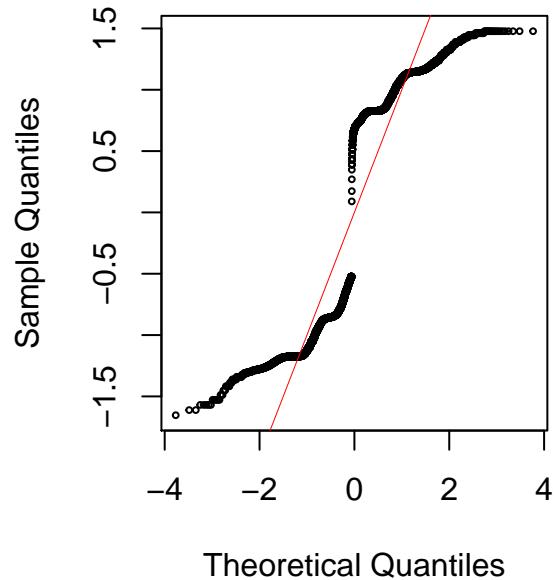
SSD: 1433.4

AIC: 8131849.1

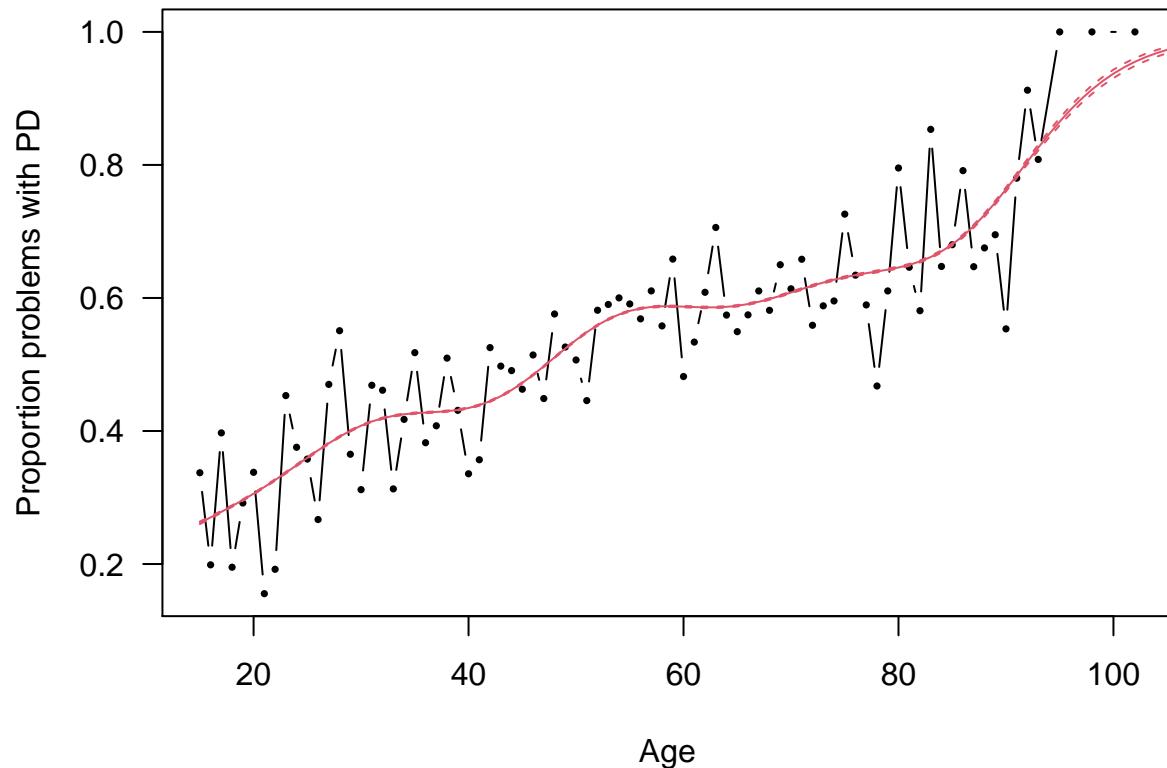
Residuals vs fitted



Normal Q-Q Plot



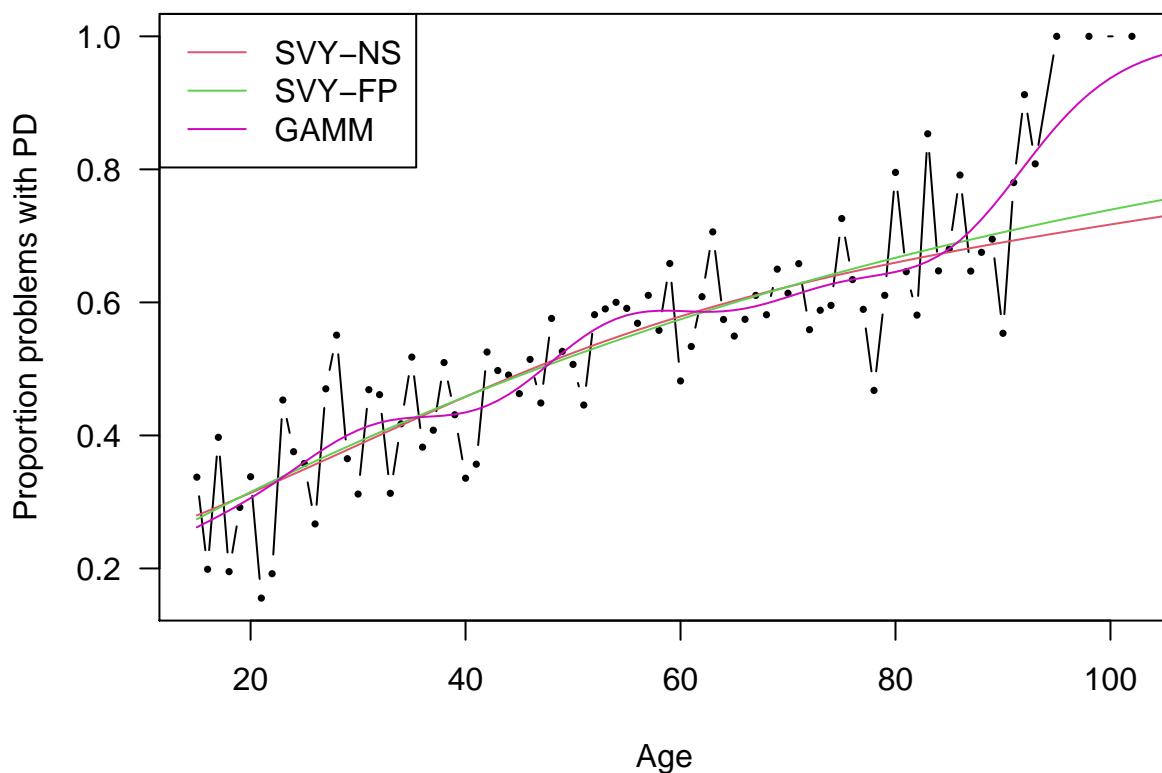
Fitted values with 95% confidence interval



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:

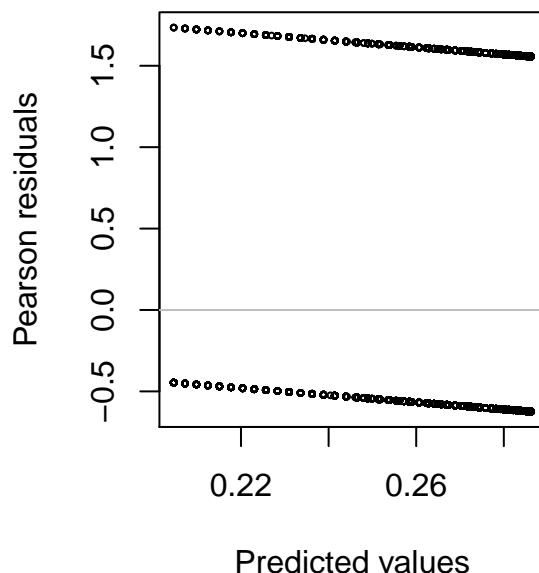
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-1.35751	0.13289	-10.2154	< 2.2e-16 ***
age.ns1	0.73650	0.26833	2.7448	0.006083 **
age.ns2	-0.12503	0.26989	-0.4633	0.643201

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

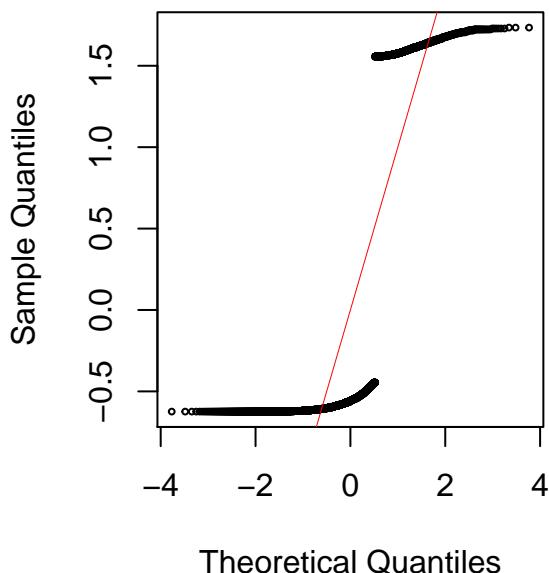
SSD: 1276.6

AIC: 6998.6

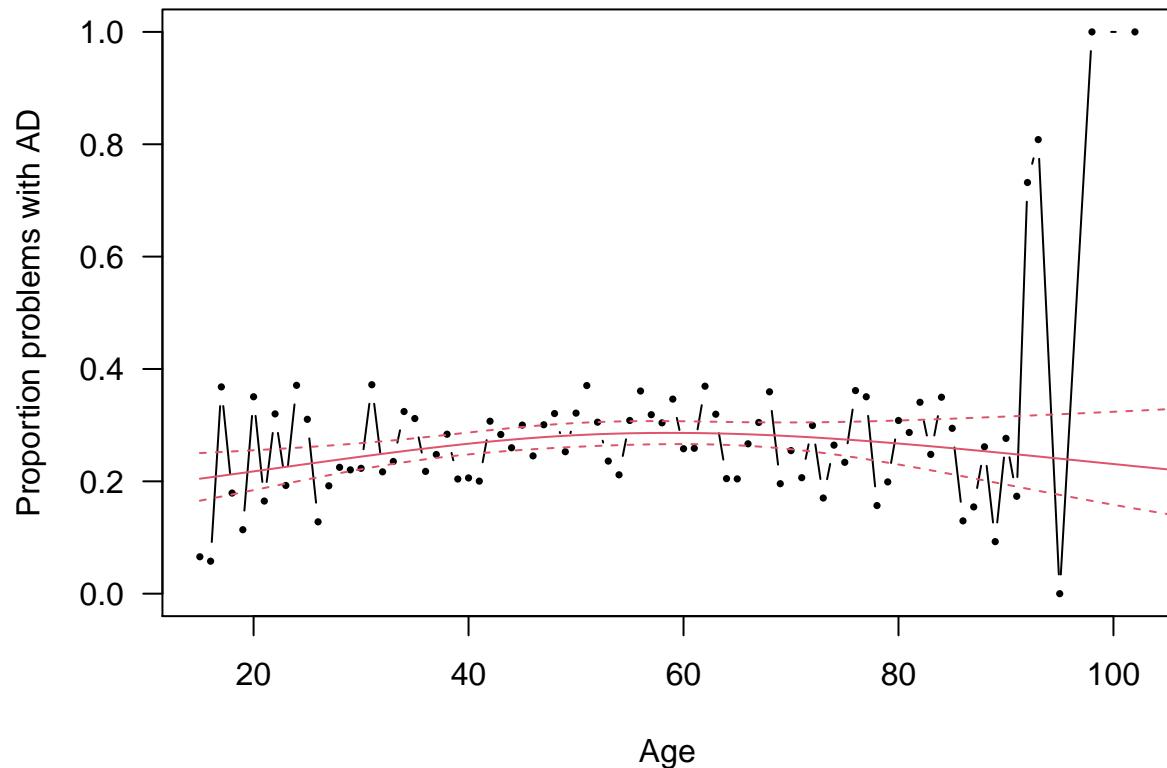
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

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

Coefficients:

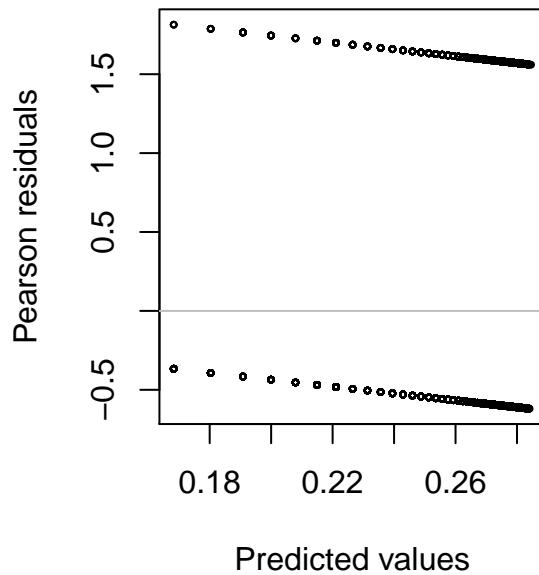
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0.9069622	0.0519659	-17.4530	< 2.2e-16 ***
$I((age/100)^{-2})$	-0.0155420	0.0056638	-2.7441	0.006096 **

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

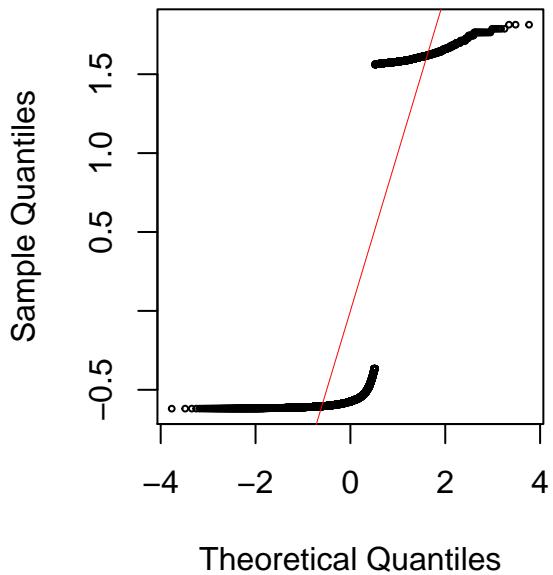
SSD: 1276.0

AIC: 6993.2

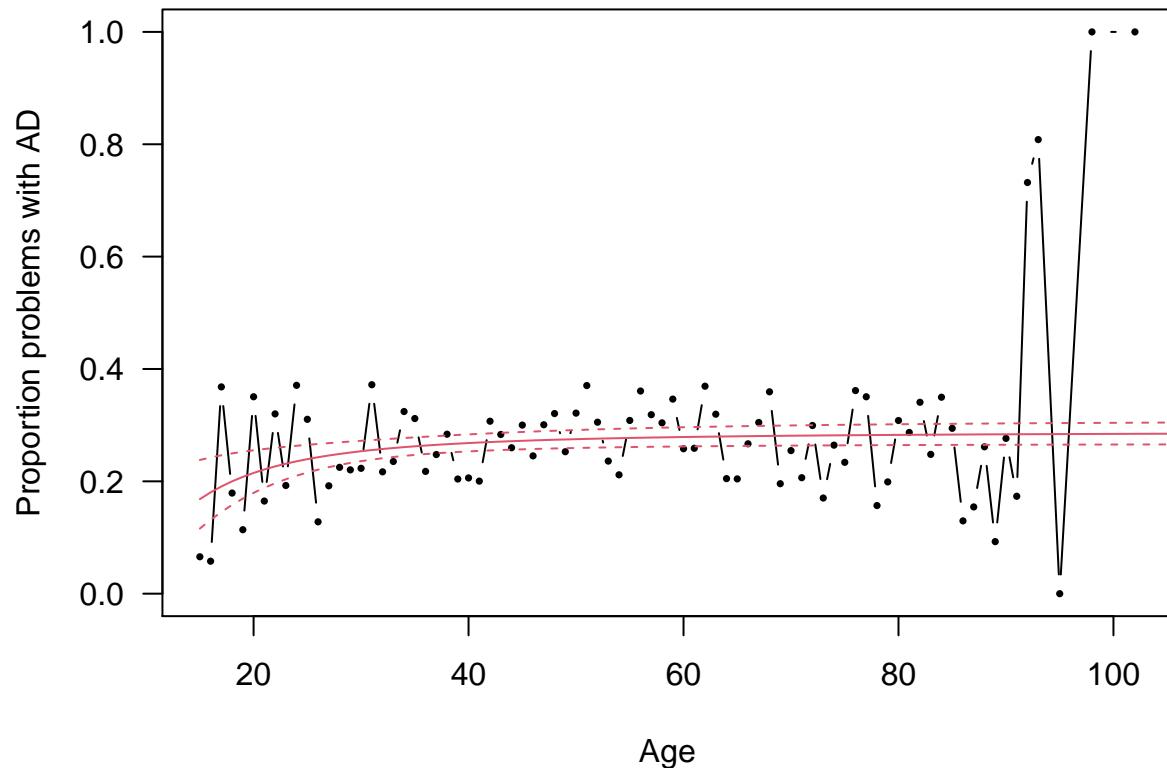
Residuals vs fitted



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:

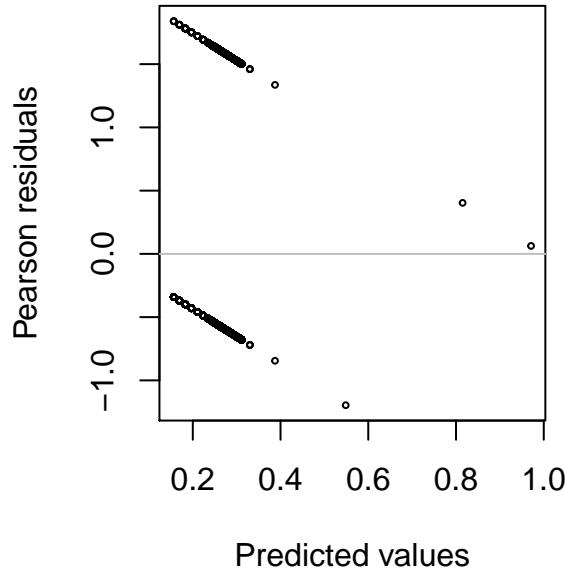
	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-1.02192134	0.00092437	-1105.532	< 2.2e-16 ***
Xs(age)Fx1	5.65183419	0.06136413	92.103	< 2.2e-16 ***

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

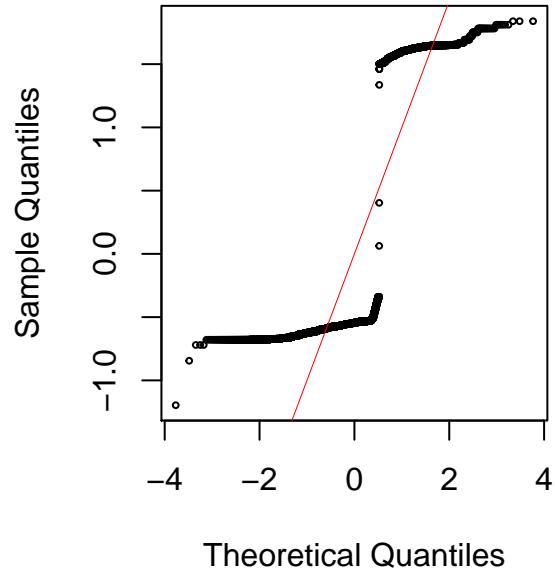
SSD: 1275.4

AIC: 6998709.5

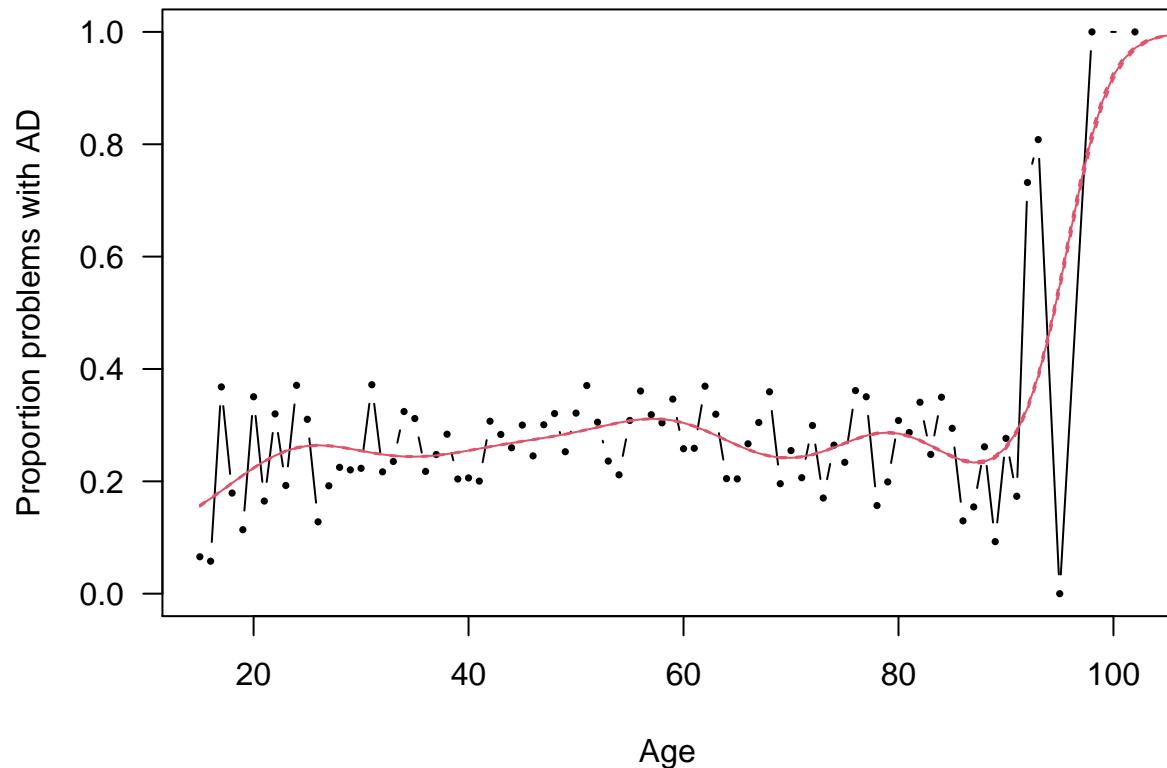
Residuals vs fitted



Normal Q–Q Plot



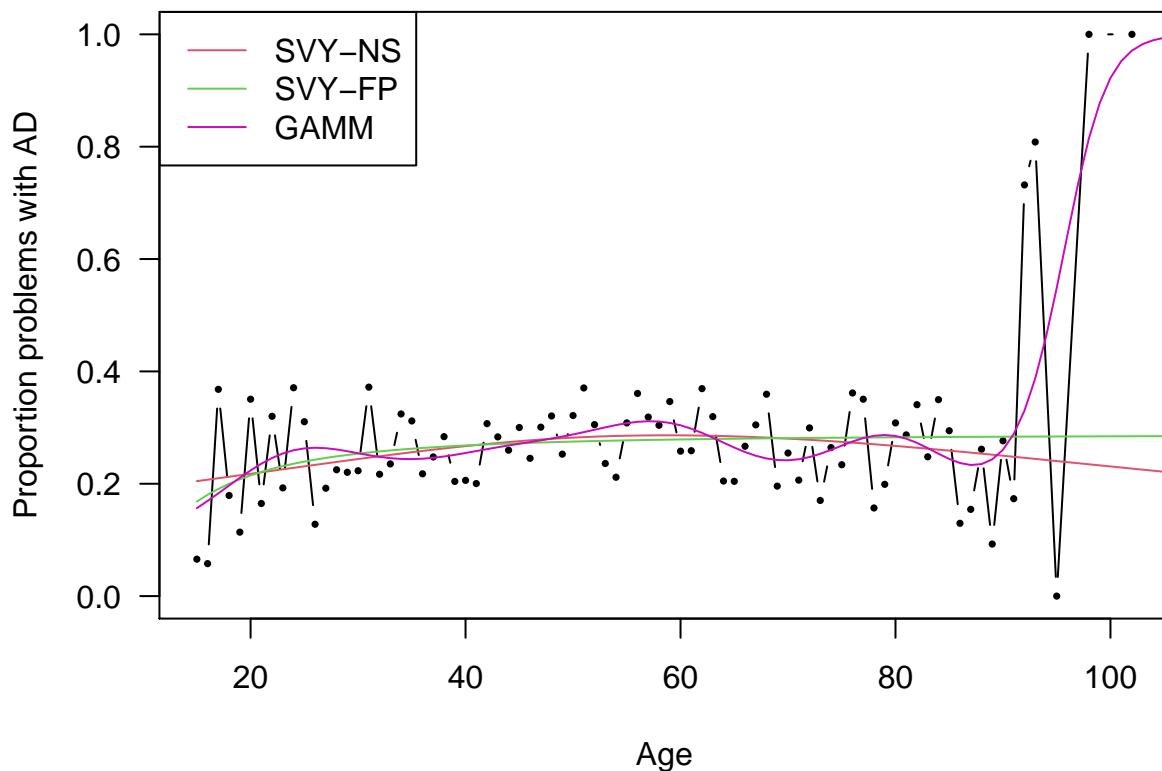
Fitted values with 95% confidence interval



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:

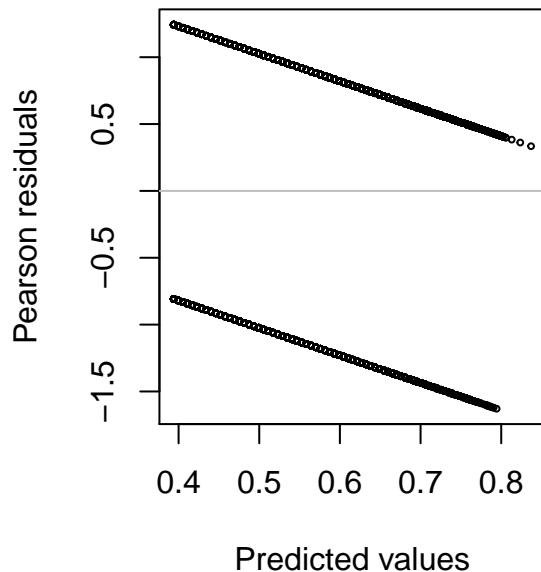
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0.430576	0.081898	-5.2574	1.54e-07 ***
age.ns1	2.577506	0.225782	11.4159	< 2.2e-16 ***

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

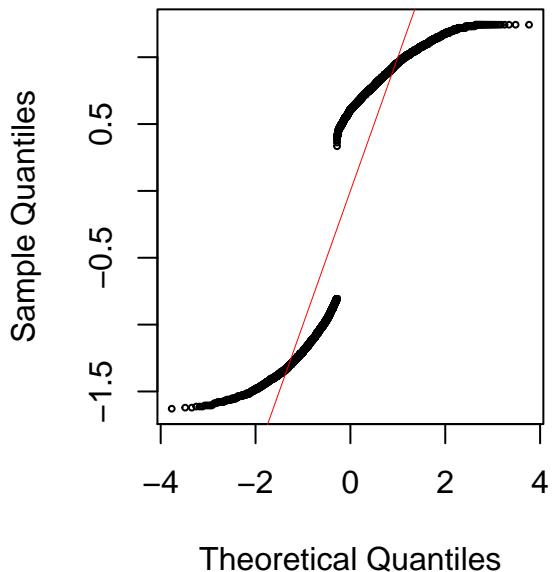
SSD: 1375.6

AIC: 7961.1

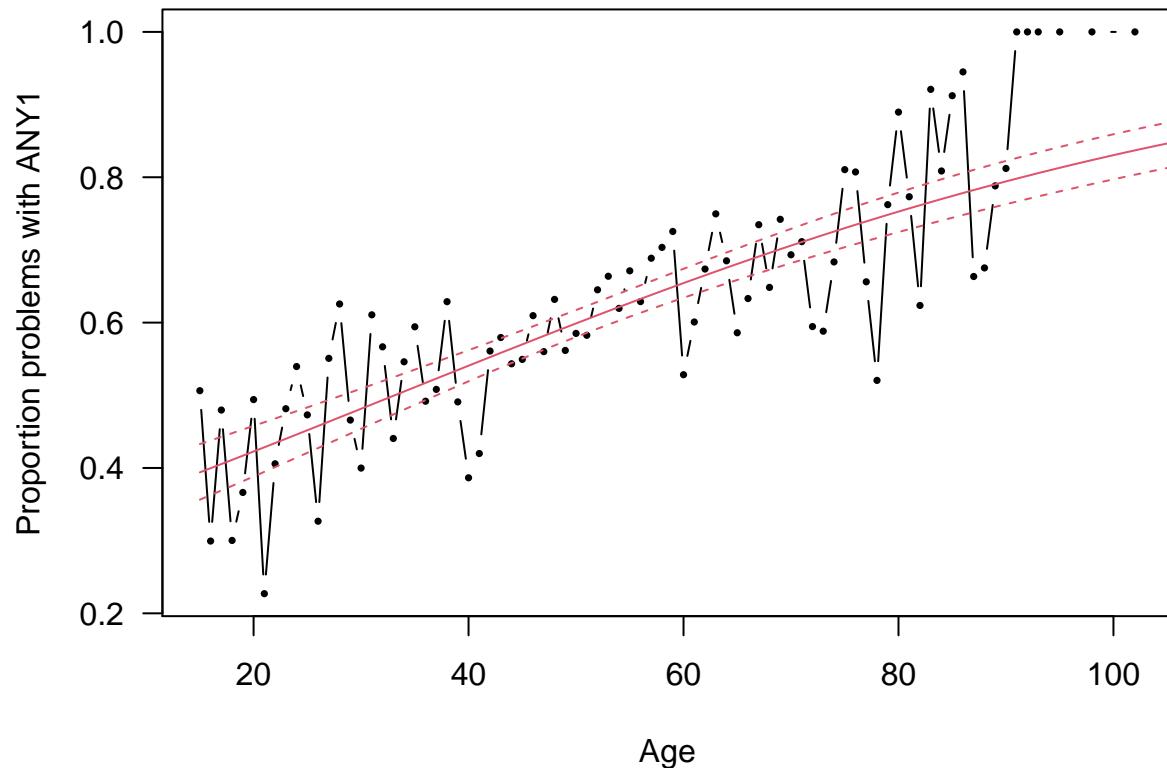
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

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

Coefficients:

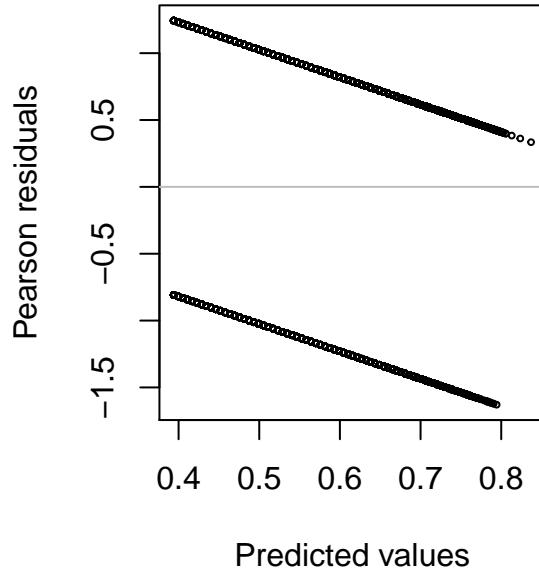
	Estimate	Std. Error	t value	Pr(> t)		
(Intercept)	-0.78689	0.11030	-7.134	1.16e-12 ***		
I((age/100)^1)	2.37540	0.20808	11.416	< 2.2e-16 ***		

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

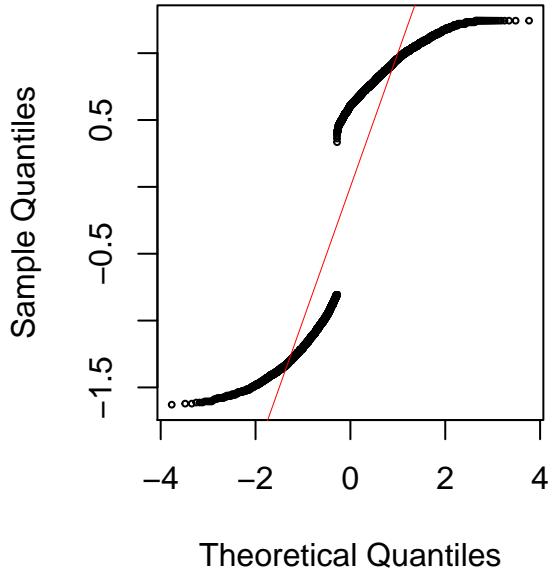
SSD: 1375.6

AIC: 7961.1

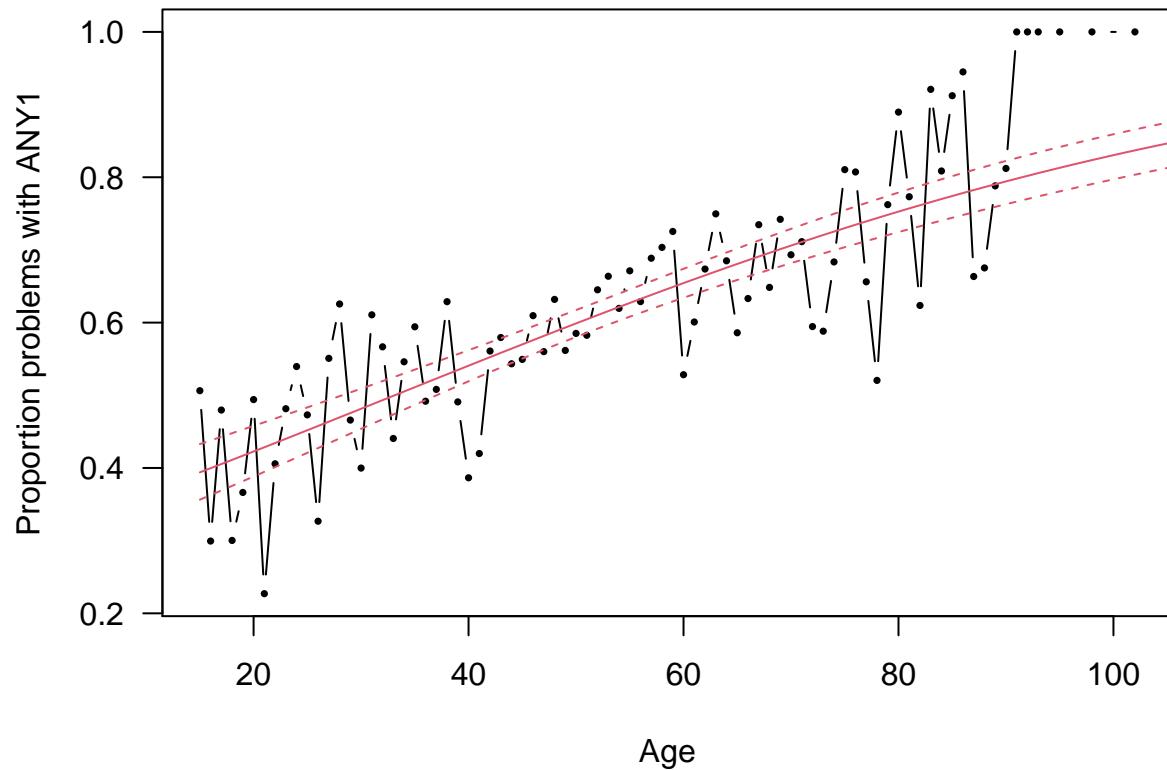
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



GAMM

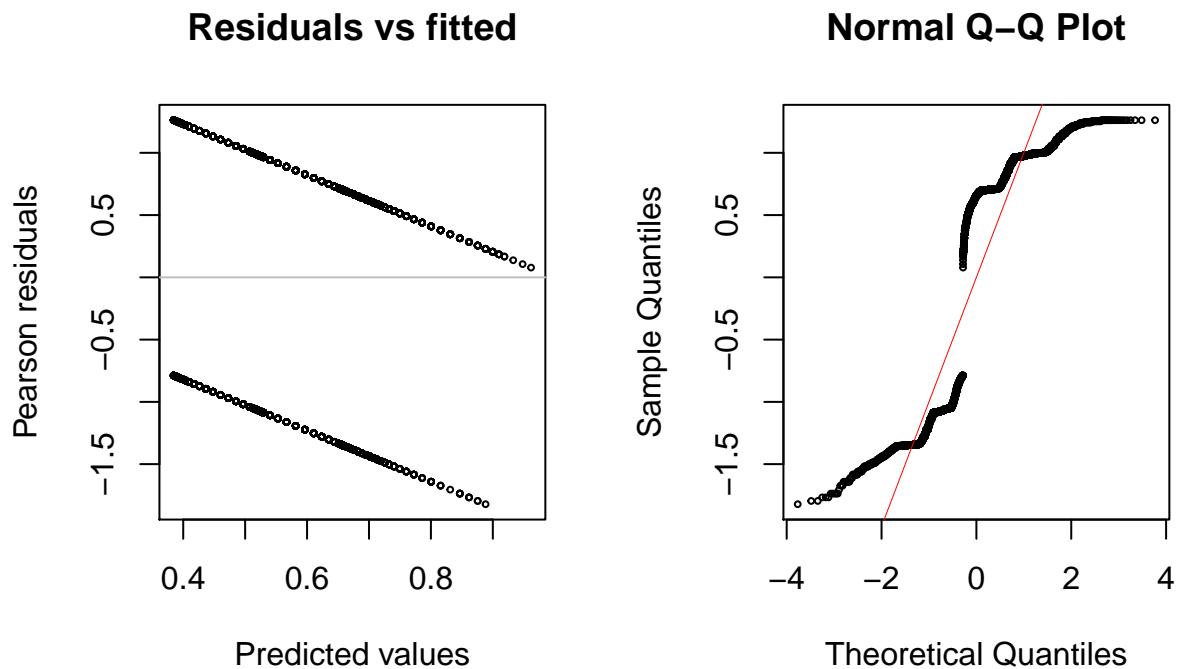
Fitted model:
ANY1 ~ s(age, bs = "tp")

Random effects:
Groups Name Variance Std.Dev.
Xr s(age) 10.69 3.27

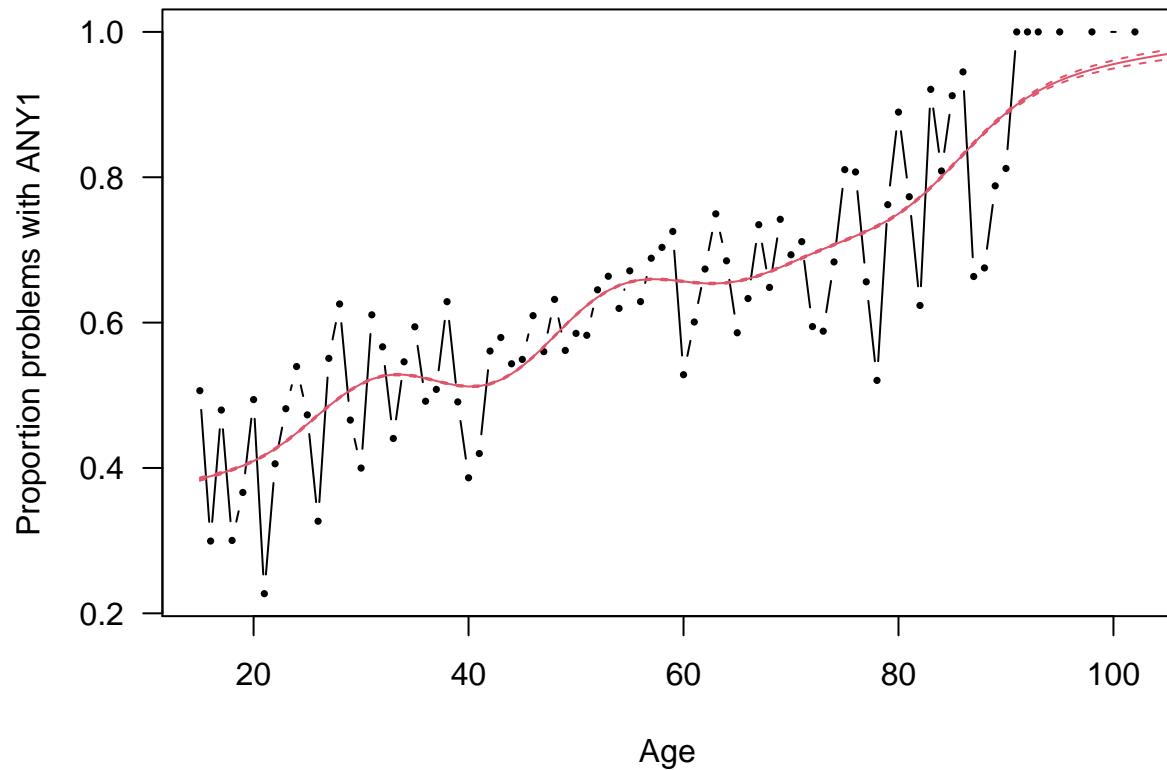
Coefficients:
Estimate Std. Error z value Pr(>|z|)
X(Intercept) 0.38461850 0.00085386 450.447 < 2.2e-16 ***
Xs(age)Fx1 0.86252639 0.08182075 10.542 < 2.2e-16 ***

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

SSD: 1374.5
AIC: 7970597.9



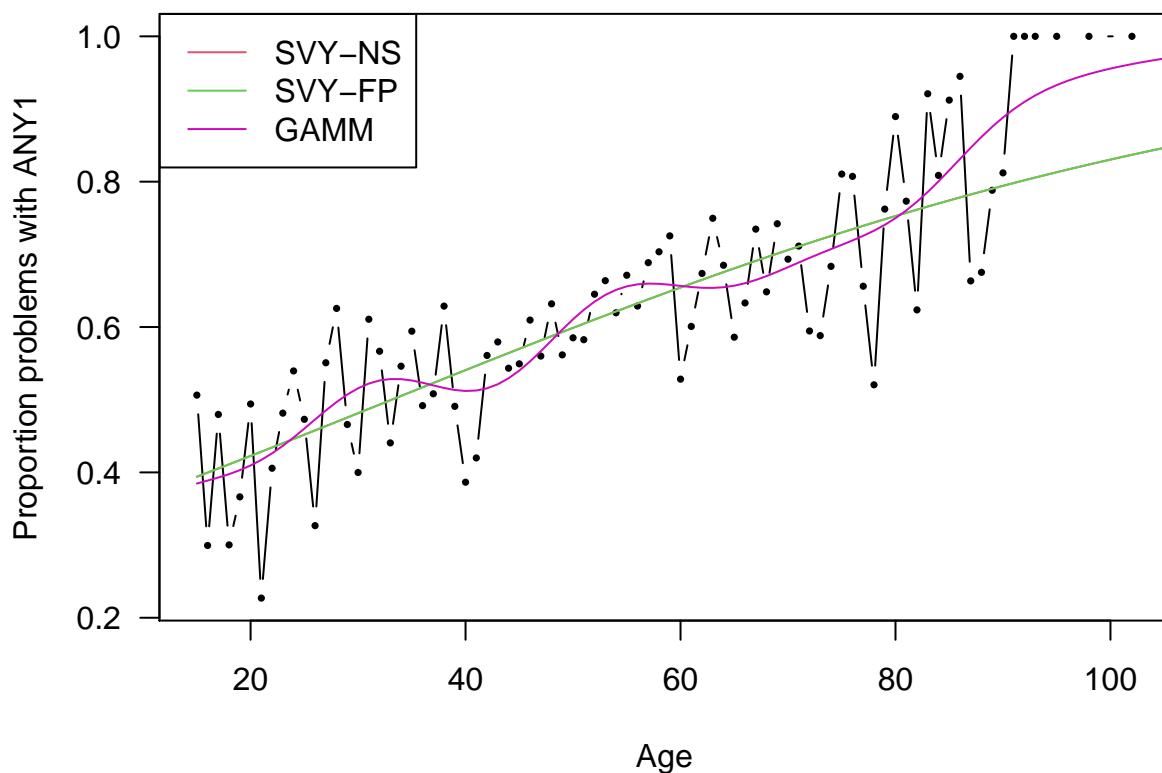
Fitted values with 95% confidence interval



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:

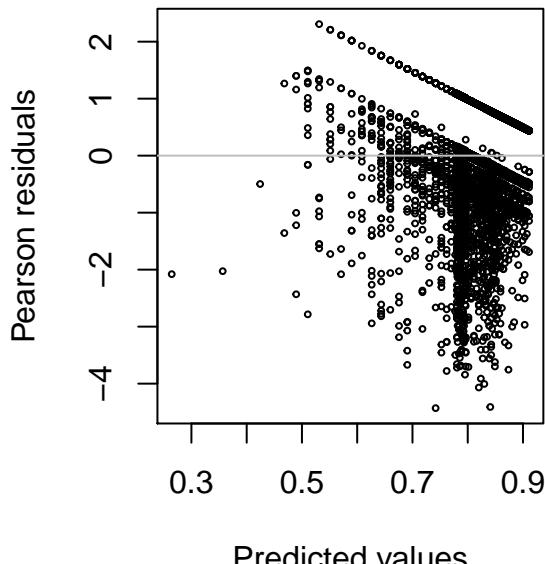
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.910989	0.012592	72.3470	< 2.2e-16 ***
age.ns1	-0.068396	0.018525	-3.6920	0.0002256 ***
age.ns2	-0.085991	0.020853	-4.1237	3.807e-05 ***
age.ns3	-0.150816	0.020119	-7.4963	8.108e-14 ***
age.ns4	-0.024672	0.030693	-0.8038	0.4215473
age.ns5	-0.428883	0.045377	-9.4515	< 2.2e-16 ***
age.ns6	-0.621313	0.073520	-8.4510	< 2.2e-16 ***

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

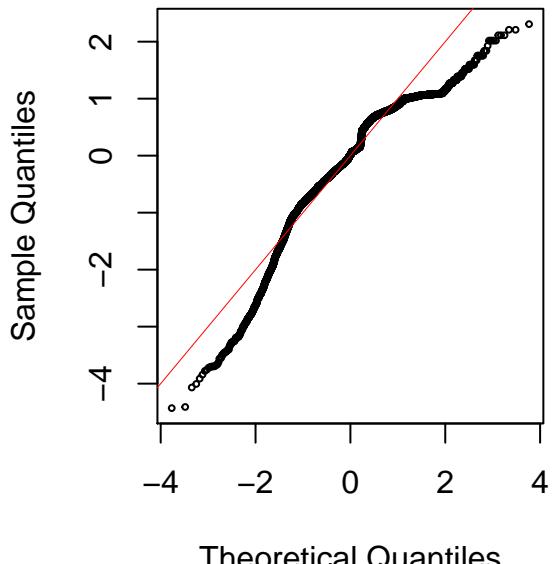
SSD: 230.4

AIC: 225.1

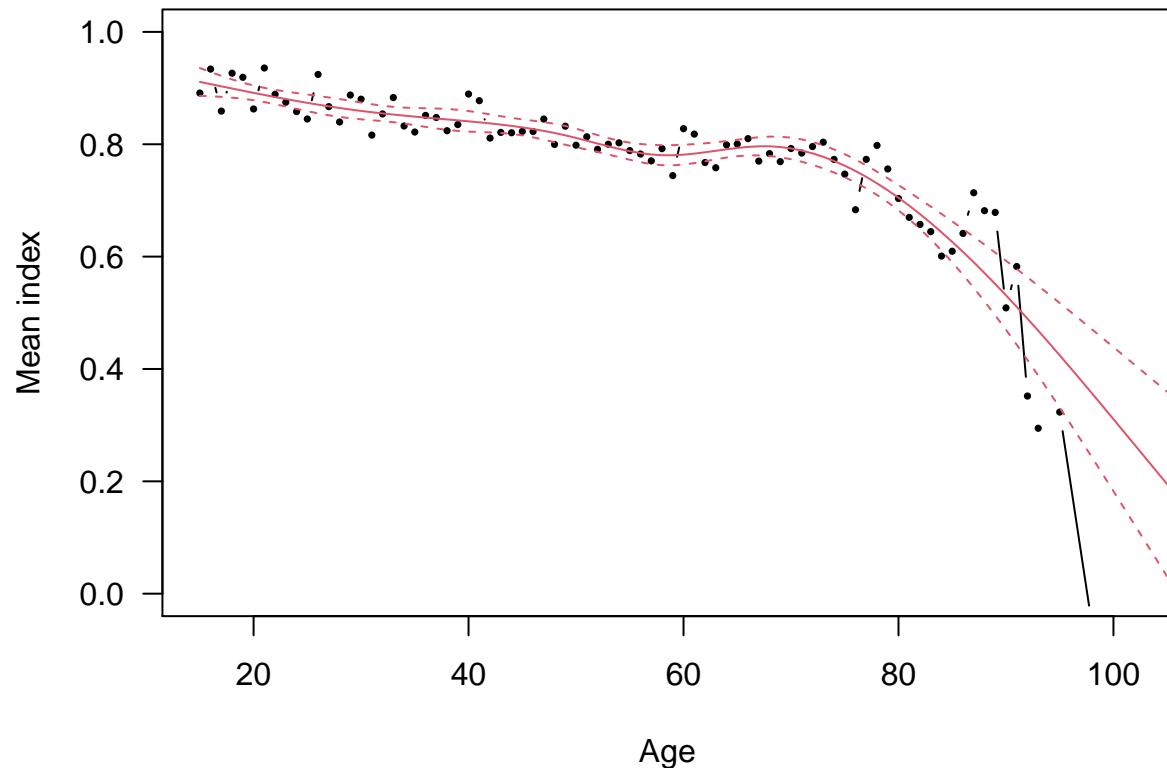
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

Fitted model:

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

Coefficients:

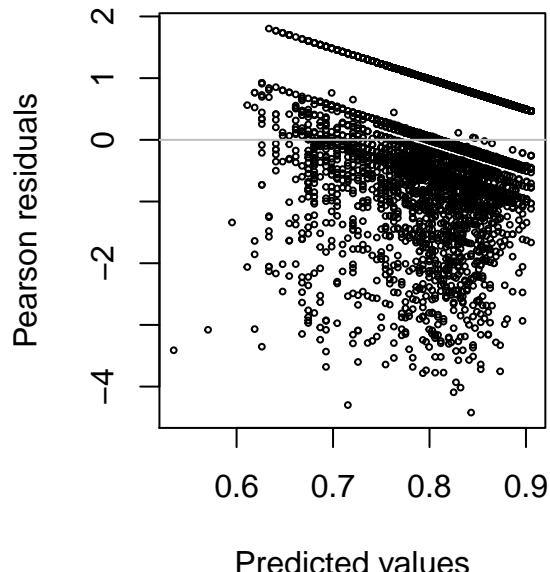
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.8352330	0.0136325	61.2679	< 2.2e-16 ***
I((age/100)^-1)	0.0106544	0.0033367	3.1931	0.001419 **
I((age/100)^3)	-0.2928992	0.0360645	-8.1215	6.144e-16 ***

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

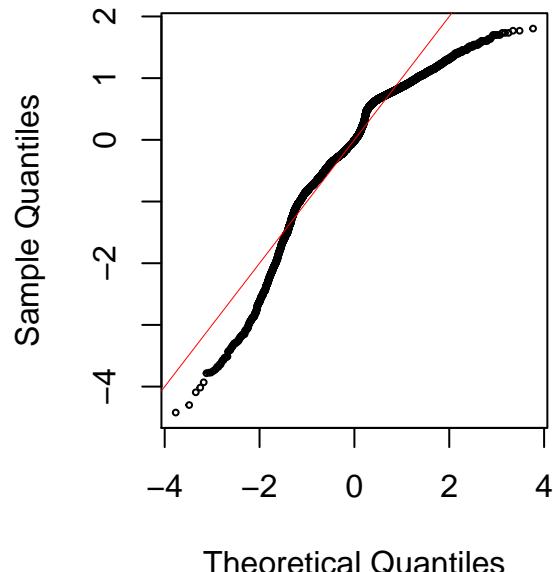
SSD: 231.6

AIC: 226.9

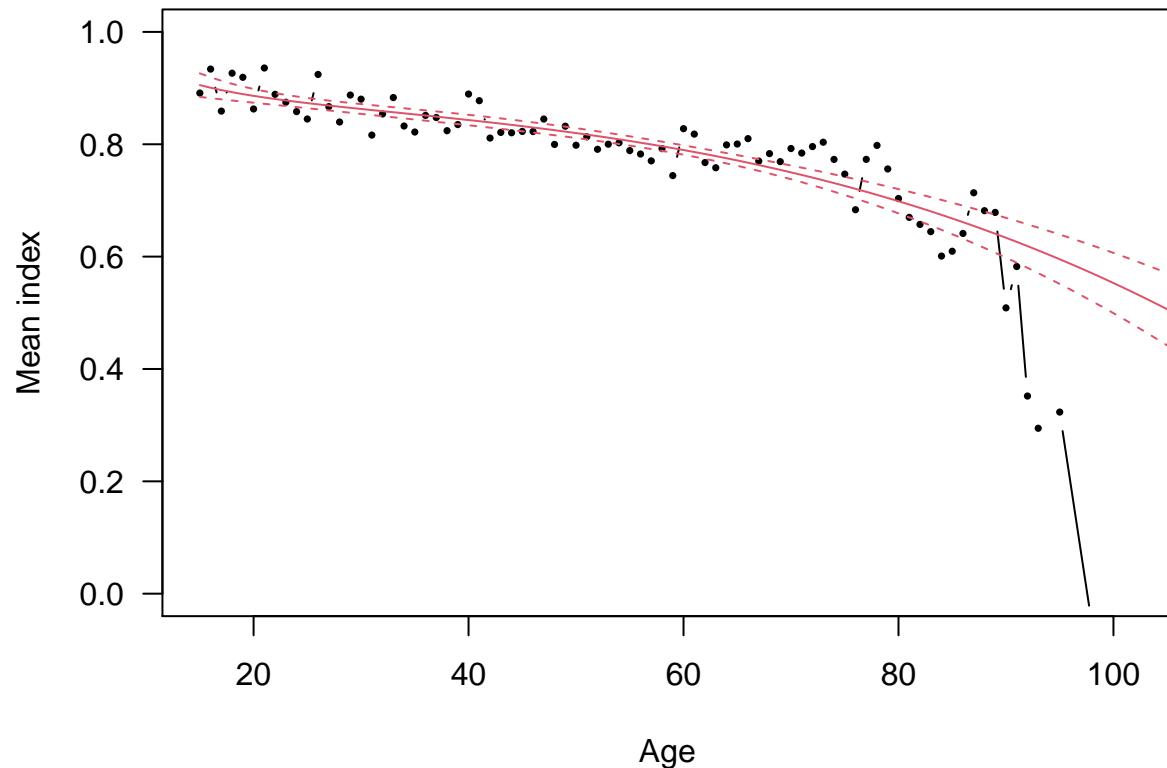
Residuals vs fitted



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) 1.17462 0.06846 17.158 < 2e-16 ***  
ns(age, df = 6)1 -0.19115 0.07524 -2.541 0.0111 *  
ns(age, df = 6)2 -0.22378 0.09096 -2.460 0.0139 *  
ns(age, df = 6)3 -0.36755 0.07783 -4.722 2.38e-06 ***  
ns(age, df = 6)4 0.02760 0.07625 0.362 0.7174  
ns(age, df = 6)5 -1.07906 0.17015 -6.342 2.43e-10 ***  
ns(age, df = 6)6 -1.71847 0.13715 -12.530 < 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) 2.38318 0.02198 108.4 <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: 5

Global Deviance: 2958.636
 AIC: 2988.636
 SBC: 3089.28

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

(Intercept) 1.17461844 0.06845895 17.1579979 1.797040e-64  

ns(age, df = 6)1 -0.19114826 0.07523750 -2.5405981 1.109107e-02  

ns(age, df = 6)2 -0.22377548 0.09095556 -2.4602728 1.391088e-02  

ns(age, df = 6)3 -0.36755279 0.07783294 -4.7223294 2.384151e-06  

ns(age, df = 6)4 0.02760195 0.07625458 0.3619711 7.173863e-01  

ns(age, df = 6)5 -1.07905760 0.17014952 -6.3418197 2.434773e-10  

ns(age, df = 6)6 -1.71847429 0.13714758 -12.5301100 1.407590e-35  

(Intercept) 2.38317510 0.02197522 108.4483088 0.000000e+00  

(Intercept) 0.53105268 0.13850645 3.8341368 1.272846e-04  

ns(age, df = 6)1 -0.75393270 0.16080683 -4.6884372 2.813350e-06  

ns(age, df = 6)2 -0.97960489 0.20497344 -4.7791795 1.801687e-06  

ns(age, df = 6)3 -1.37084456 0.17836057 -7.6858051 1.762872e-14  

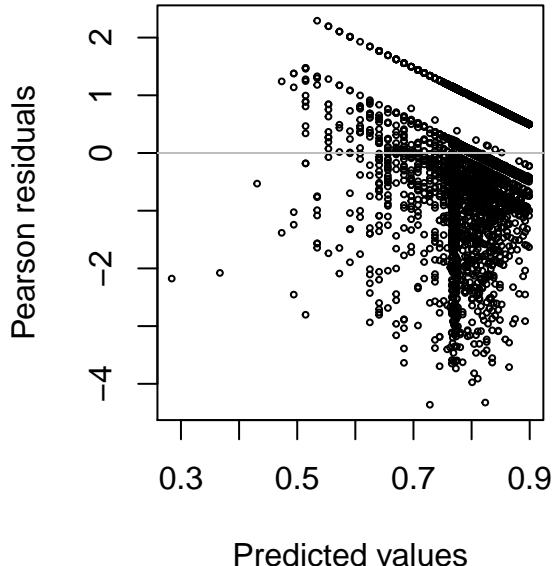
ns(age, df = 6)4 -0.95249555 0.23553116 -4.0440321 5.319242e-05  

ns(age, df = 6)5 -3.10582495 0.41259810 -7.5274824 5.928670e-14  

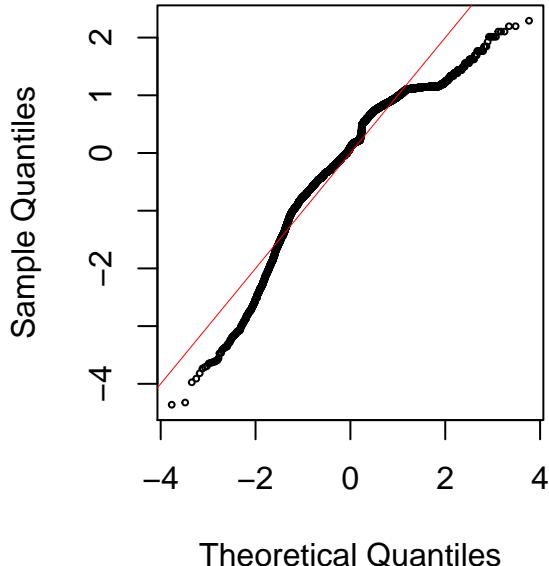
ns(age, df = 6)6 -3.46148904 0.56967808 -6.0762195 1.305362e-09
```

SSD: 229.9
 AIC: 2988.6

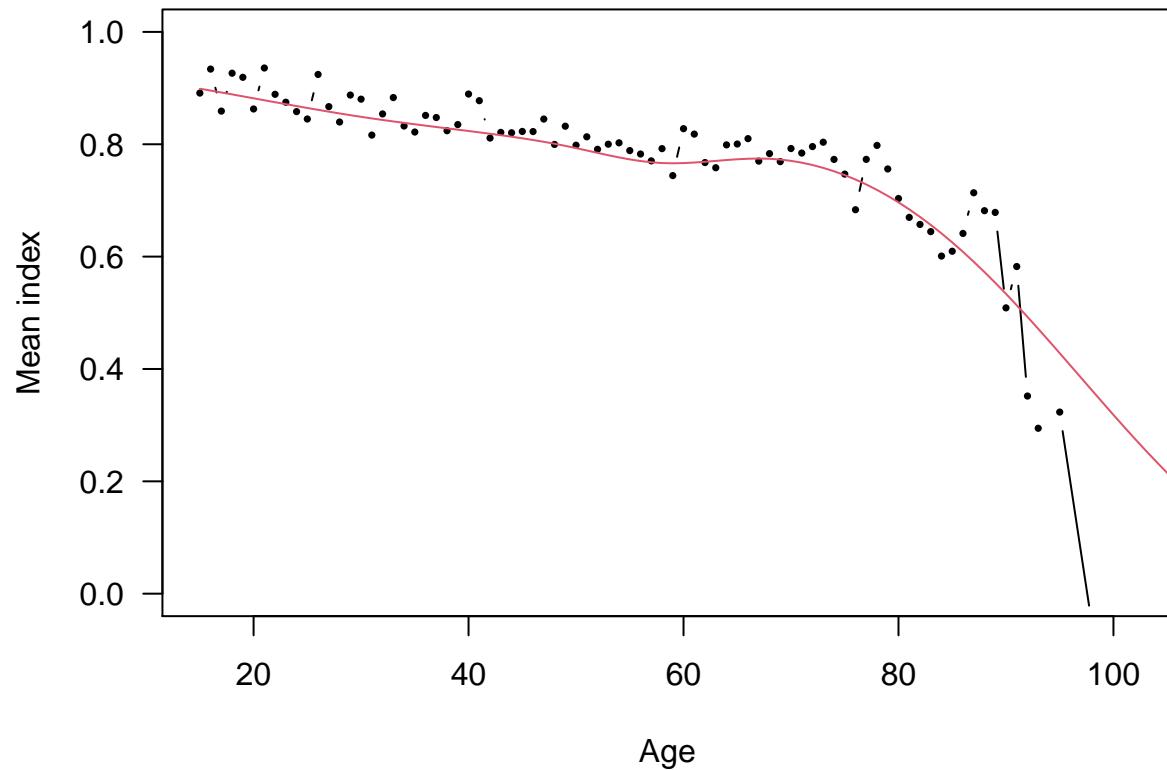
Residuals vs fitted



Normal Q-Q Plot



Fitted values (SE fit not available)



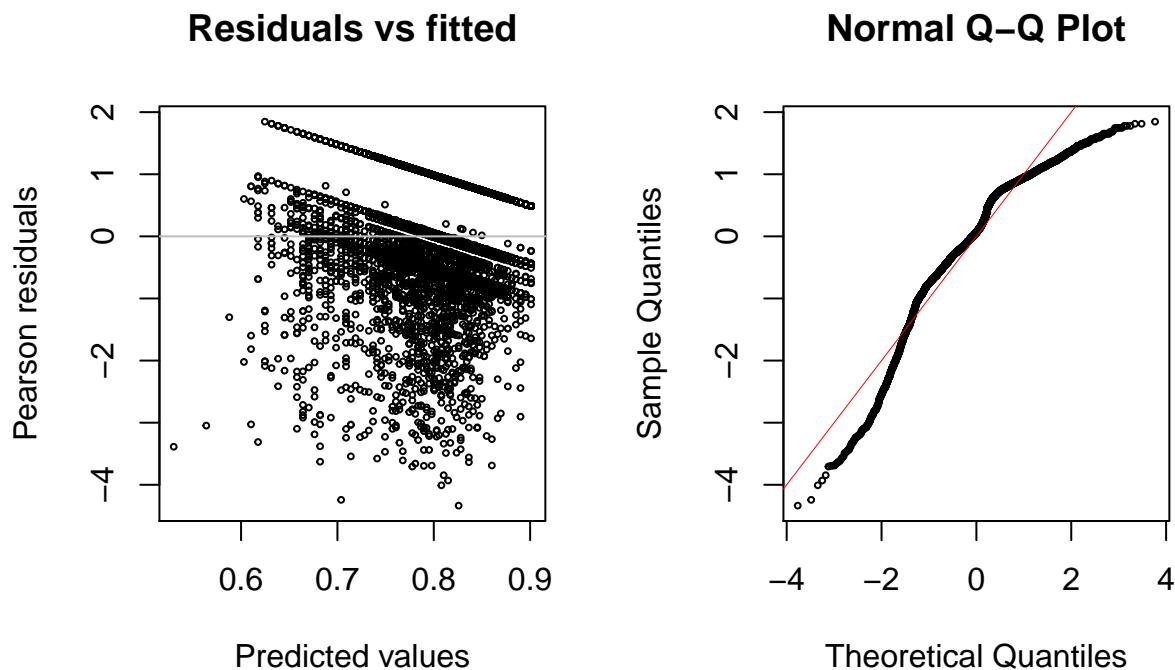
BEOI-FP

```
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) 1.03133 0.04666 22.102 <2e-16 ***  
I((age/100)^-1) 0.01526 0.01441 1.059 0.29  
I((age/100)^3) -0.77514 0.08463 -9.159 <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) 2.36718 0.02196 107.8 <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: 5  
  
Global Deviance: 3023.653  
AIC: 3037.653  
SBC: 3084.62
```

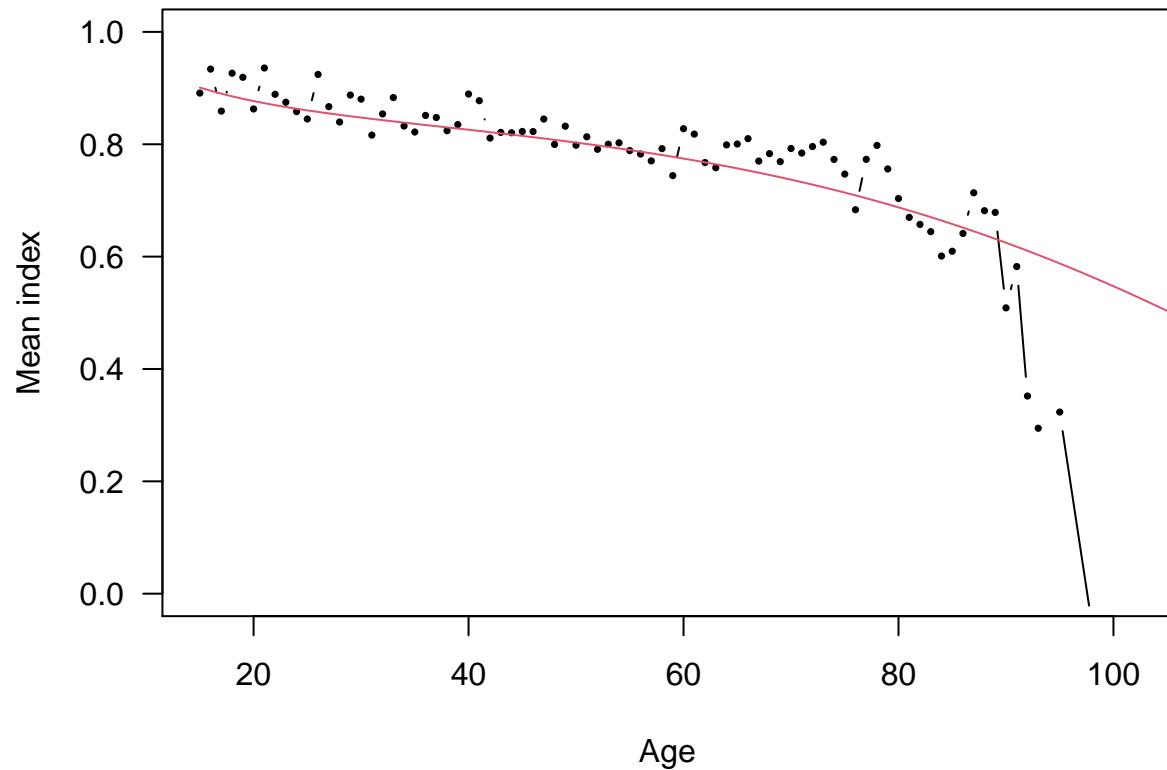
```
*****
Estimate Std. Error t value Pr(>|t|)
(Intercept) 1.0313267 0.04666185 22.102139 3.598382e-104
I((age/100)^-1) 0.0152567 0.01440876 1.058849 2.897109e-01
I((age/100)^3) -0.7751372 0.08463390 -9.158709 7.051201e-20
(Intercept) 2.3671835 0.02195973 107.796559 0.000000e+00
(Intercept) -0.6247818 0.11677999 -5.350075 9.114290e-08
I((age/100)^-1) 0.1870385 0.03289997 5.685066 1.368609e-08
I((age/100)^3) -1.8029794 0.26203368 -6.880716 6.554486e-12
```

SSD: 231.3

AIC: 3037.7



Fitted values (SE fit not available)



GAMM

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

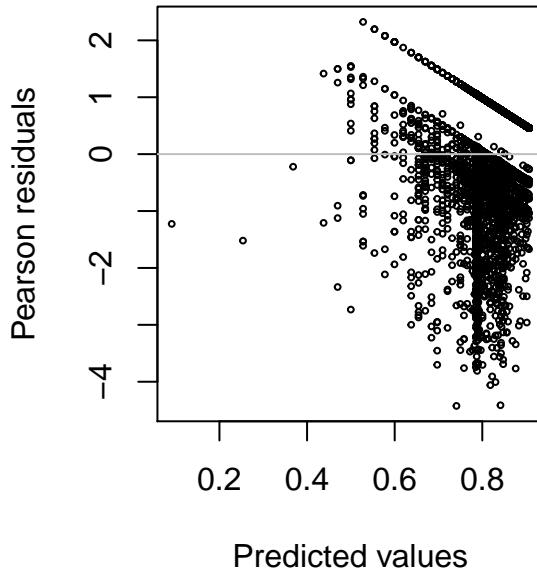
Coefficients:

	Estimate	Std. Error	t value
X(Intercept)	0.812070	0.002477	327.8451
Xs(age)Fx1	-0.399720	0.082837	-4.8254

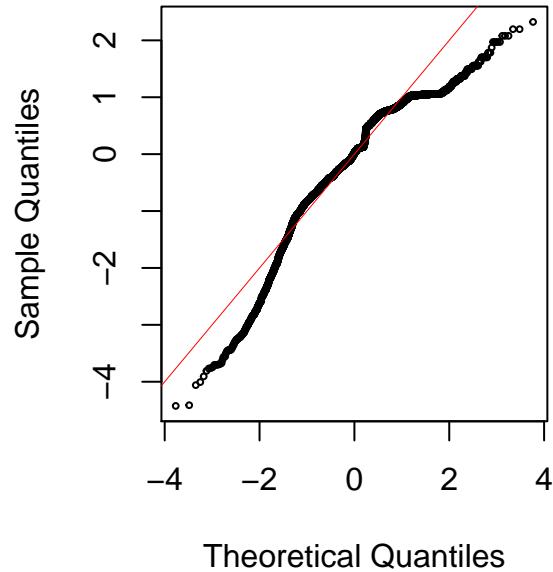
SSD: 230.1

AIC: -439.4

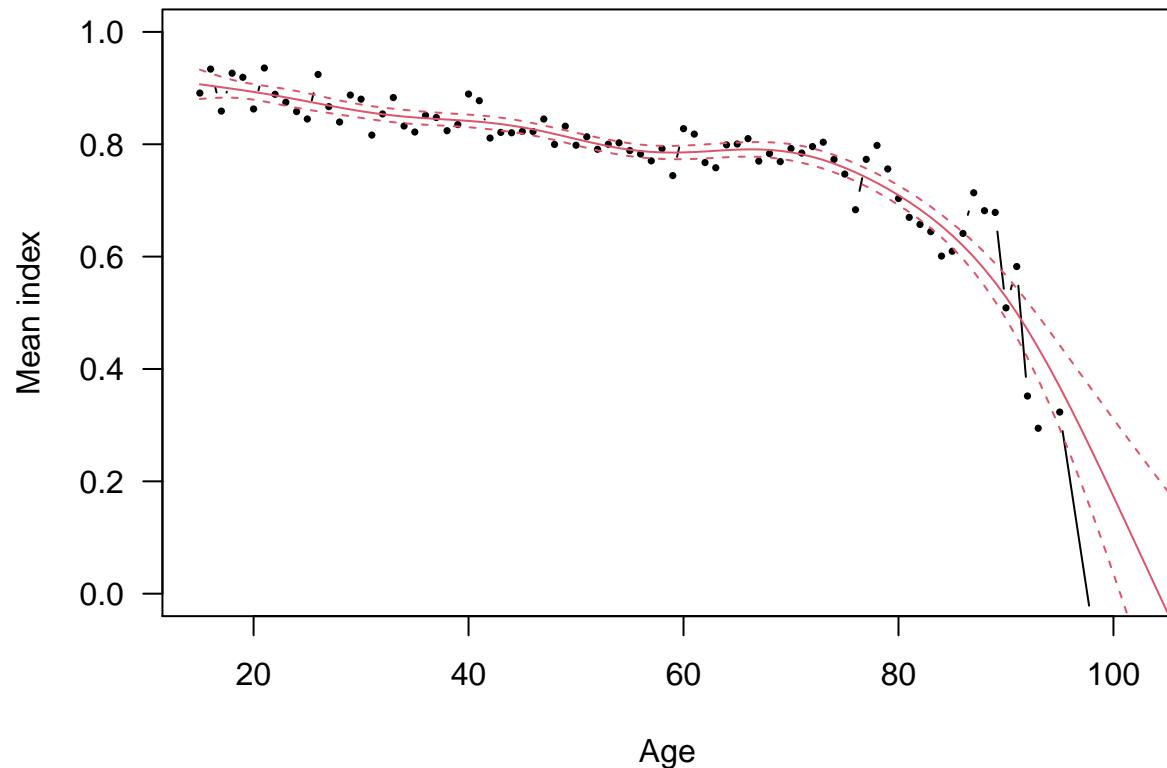
Residuals vs fitted



Normal Q-Q Plot



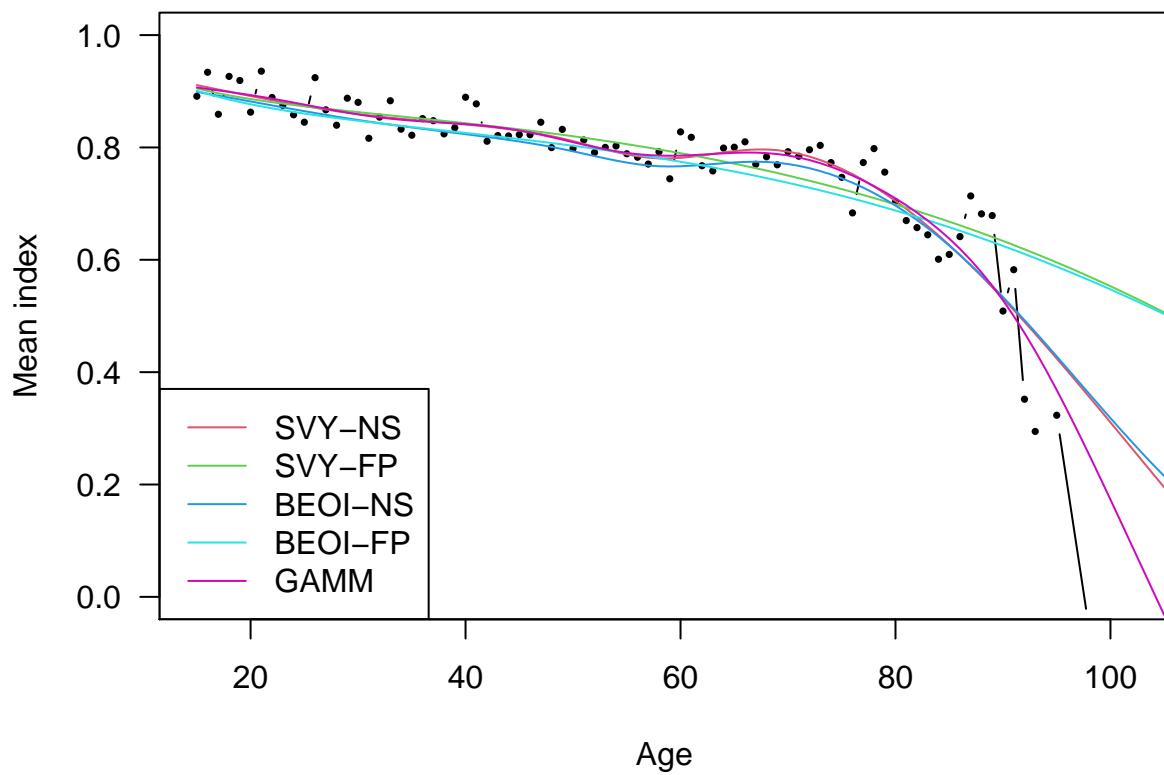
Fitted values with 95% confidence interval



Summary

	SSD	AIC
SVY-NS	230.4	225.1
SVY-FP	231.6	226.9
BEOI-NS	229.9	2988.6
BEOI-FP	231.3	3037.7
GAMM	230.1	-439.4

Comparison of fitted values across models



Visual Analogue Scale

SVY-NS

Fitted model:

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

Coefficients:

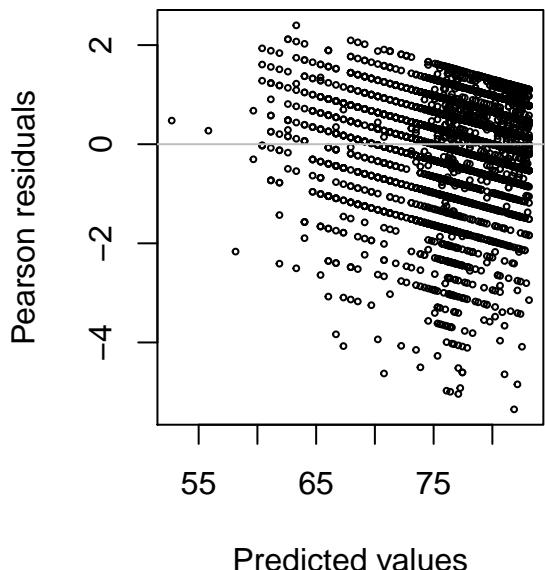
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	83.1233	0.9021	92.1446	< 2.2e-16 ***
age.ns1	-6.9001	1.0879	-6.3427	2.521e-10 ***
age.ns2	-5.6513	1.5628	-3.6160	0.000303 ***
age.ns3	-22.0373	2.8441	-7.7486	1.182e-14 ***
age.ns4	-29.3805	3.8969	-7.5394	5.858e-14 ***

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

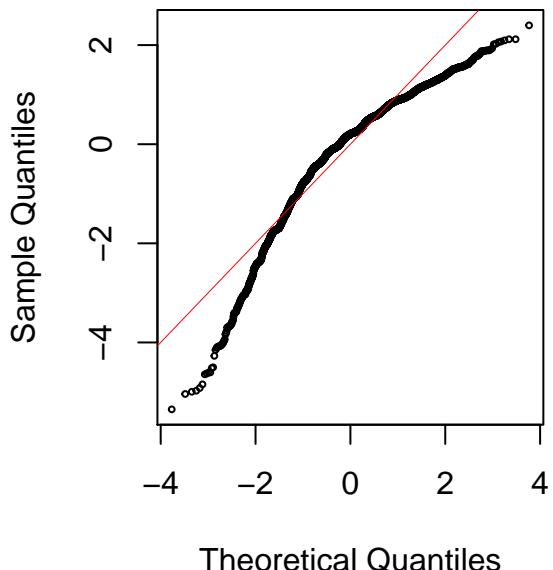
SSD: 1315446.5

AIC: 1314022.0

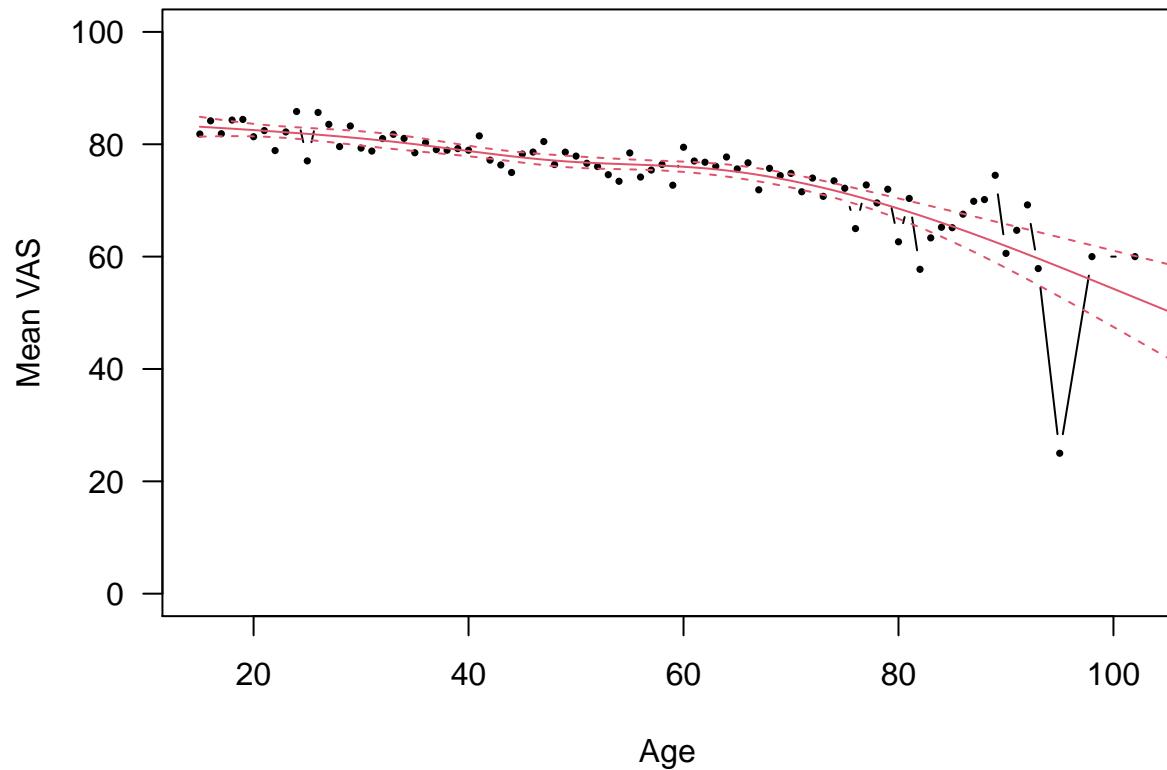
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

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

Coefficients:

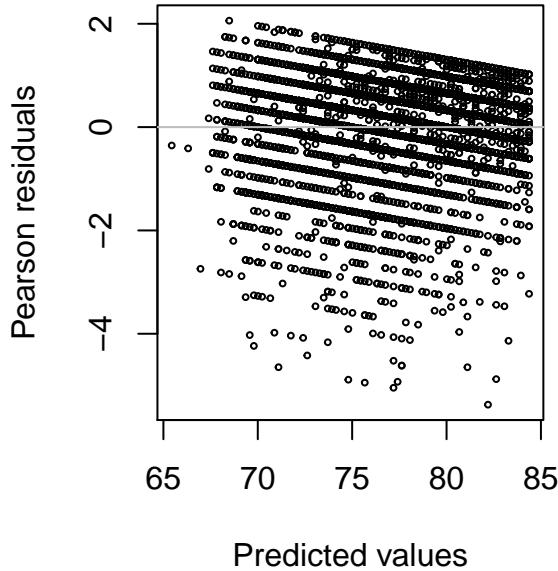
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	87.63492	0.83097	105.461	< 2.2e-16 ***
I((age/100)^1)	-21.75859	1.67237	-13.011	< 2.2e-16 ***

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

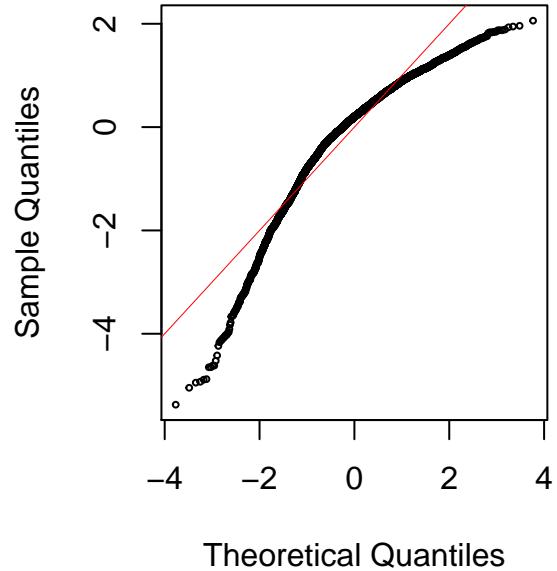
SSD: 1315884.7

AIC: 1319767.2

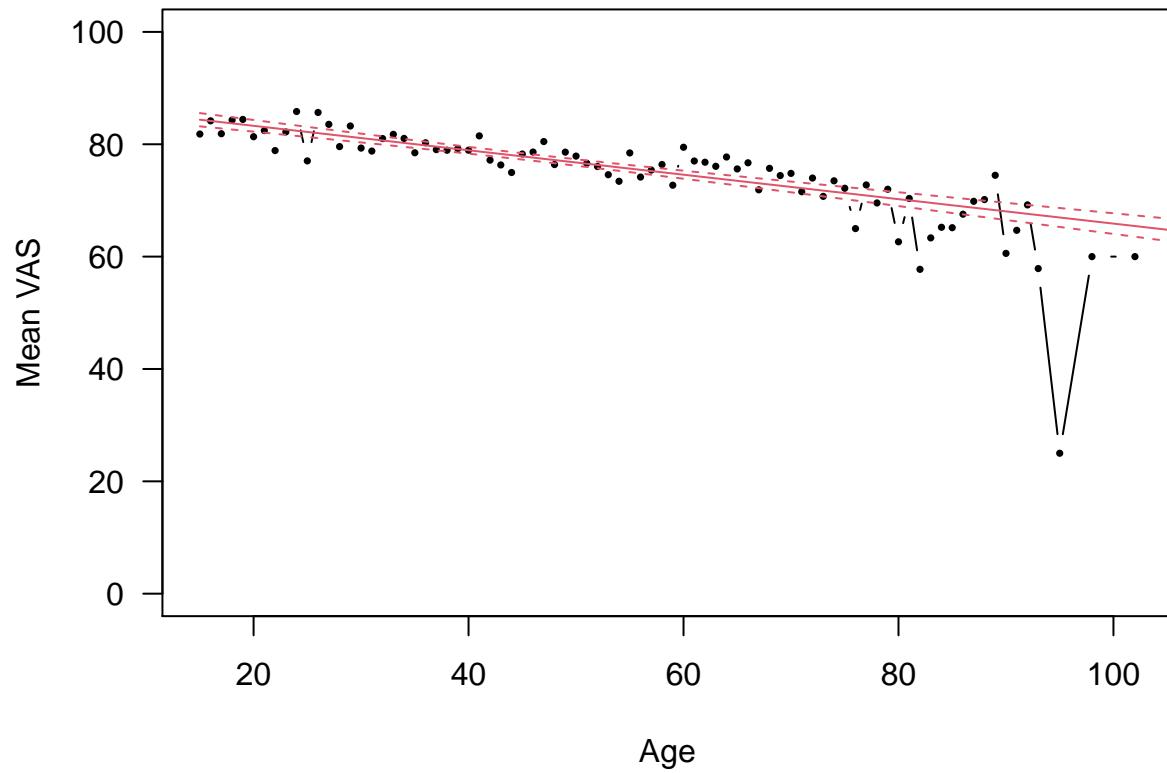
Residuals vs fitted



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
*****

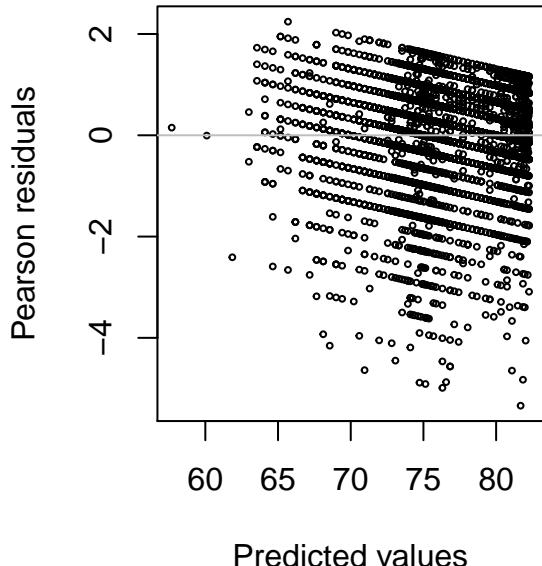
```

	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

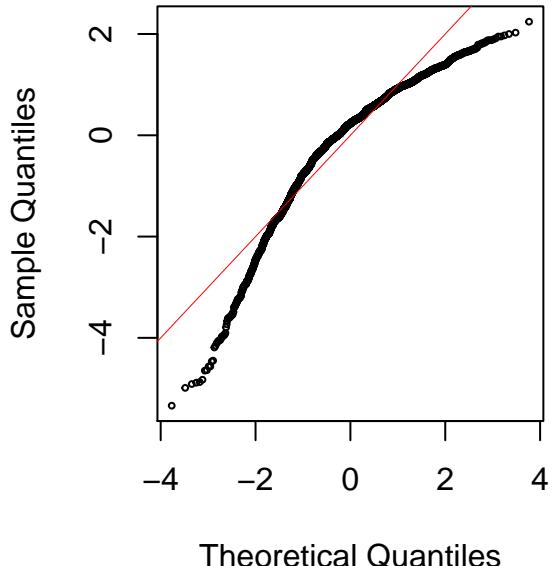
SSD: 1315685

AIC: -5781.9

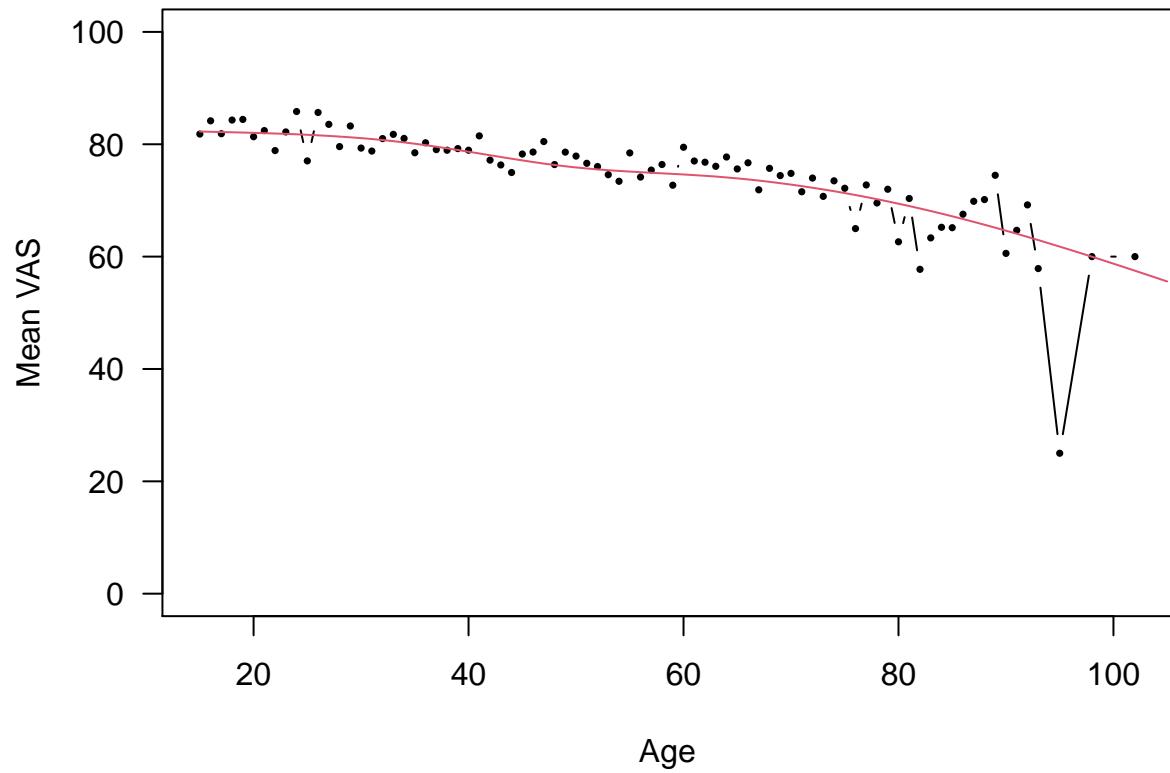
Residuals vs fitted



Normal Q-Q Plot



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  

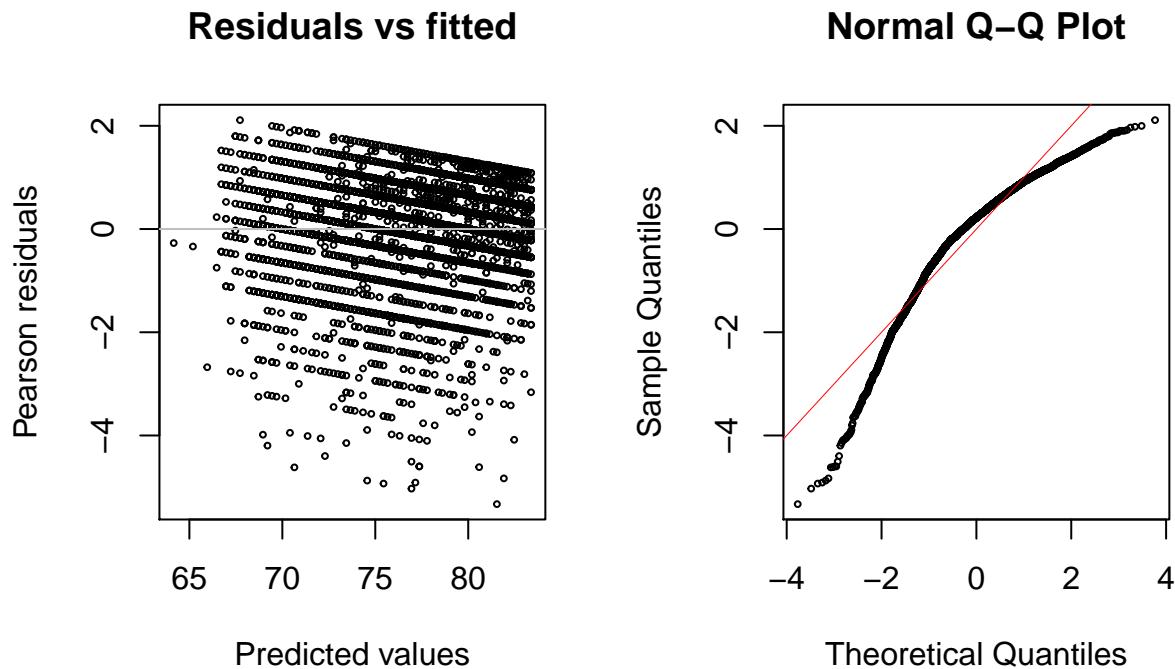
SBC: -5749.052  

*****  

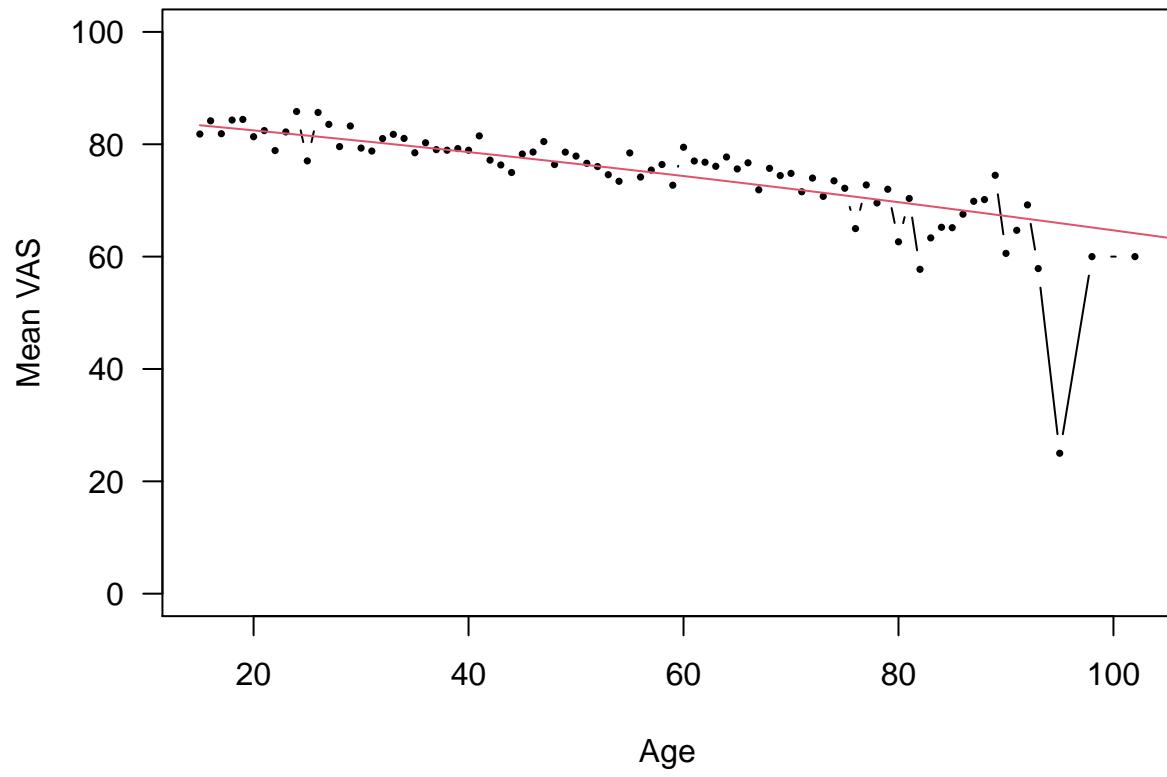
Estimate Std. Error t value Pr(>|t|)
```

```
(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")

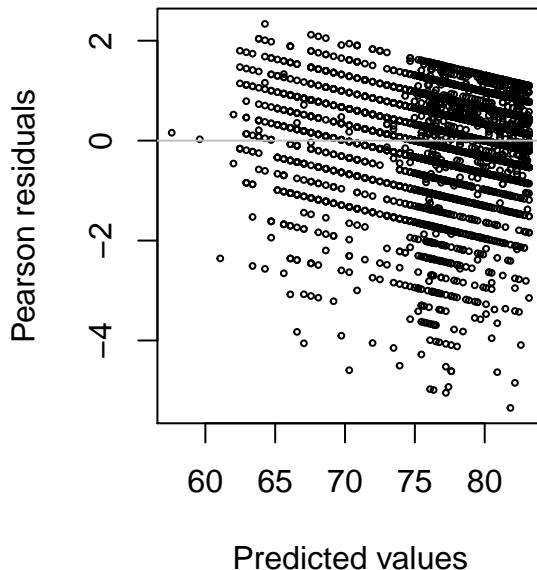
Coefficients:

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

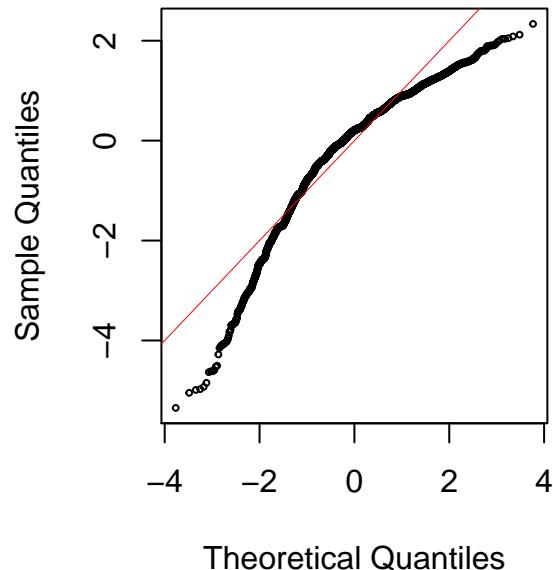
SSD: 1314674.8

AIC: 52101.9

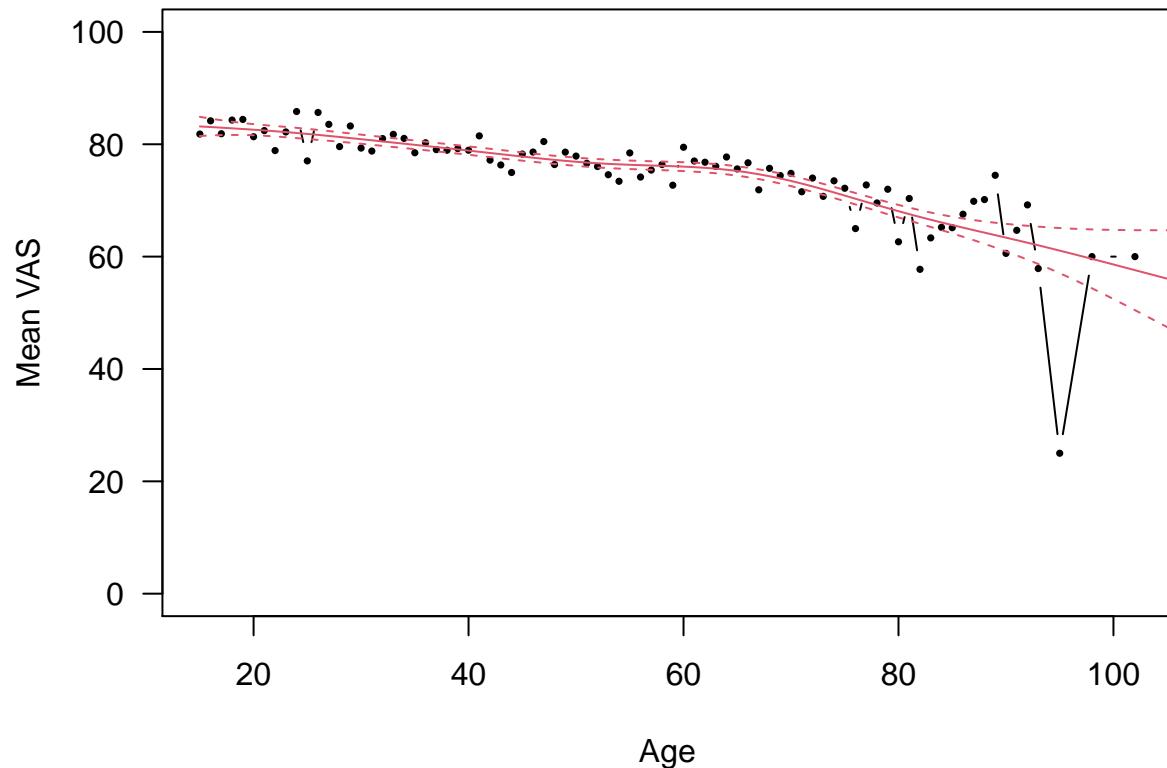
Residuals vs fitted



Normal Q-Q Plot



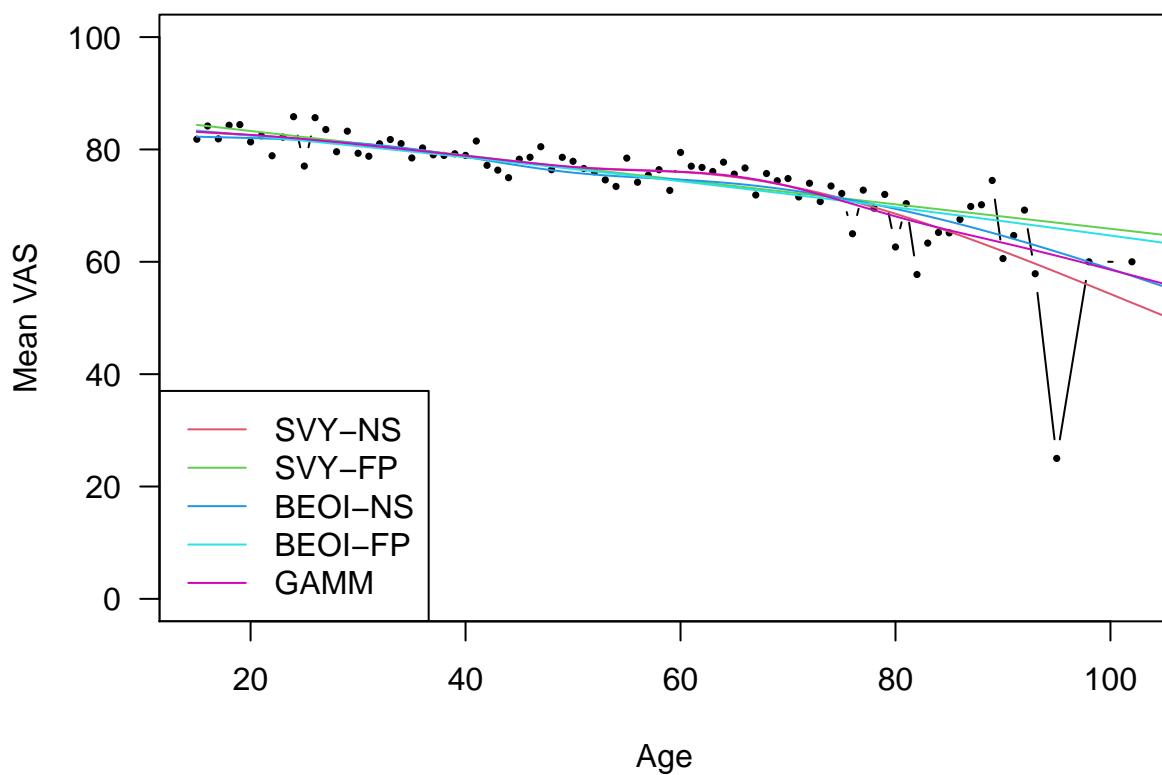
Fitted values with 95% confidence interval



Summary

	SSD	AIC
SVY-NS	1315447	1314022.0
SVY-FP	1315885	1319767.2
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	834.5	1432.4	1276.6	1375.6	230.4	1315447
SVY-FP	800.9	324.8	838.7	1432.9	1276.0	1375.6	231.6	1315885
BEOI-NS	NA	NA	NA	NA	NA	NA	229.9	1315685
BEOI-FP	NA	NA	NA	NA	NA	NA	231.3	1318271
GAMM	799.9	323.8	833.1	1433.4	1275.4	1374.5	230.1	1314675

2018

Mobility

SVY-NS

Fitted model:

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

Coefficients:

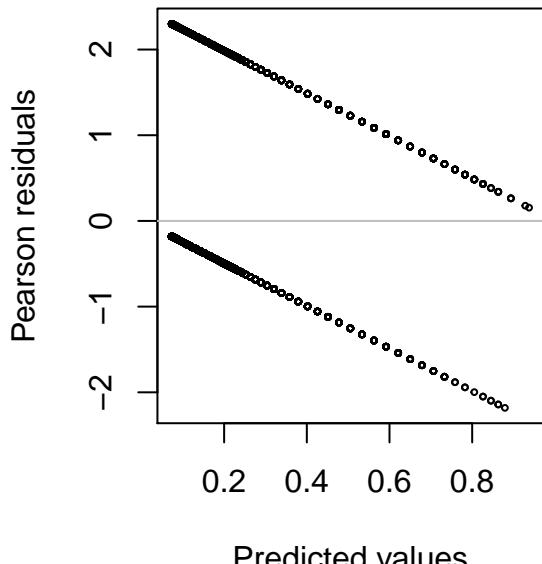
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-2.32016	0.25207	-9.2045	< 2.2e-16 ***
age.ns1	1.06182	0.25997	4.0845	4.489e-05 ***
age.ns2	0.93196	0.24366	3.8249	0.0001325 ***
age.ns3	2.81043	0.56458	4.9779	6.649e-07 ***
age.ns4	5.27473	0.39947	13.2044	< 2.2e-16 ***

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

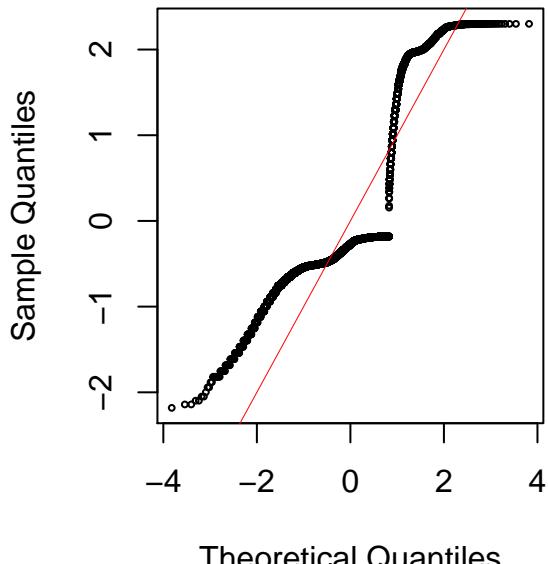
SSD: 1071.6

AIC: 6514.0

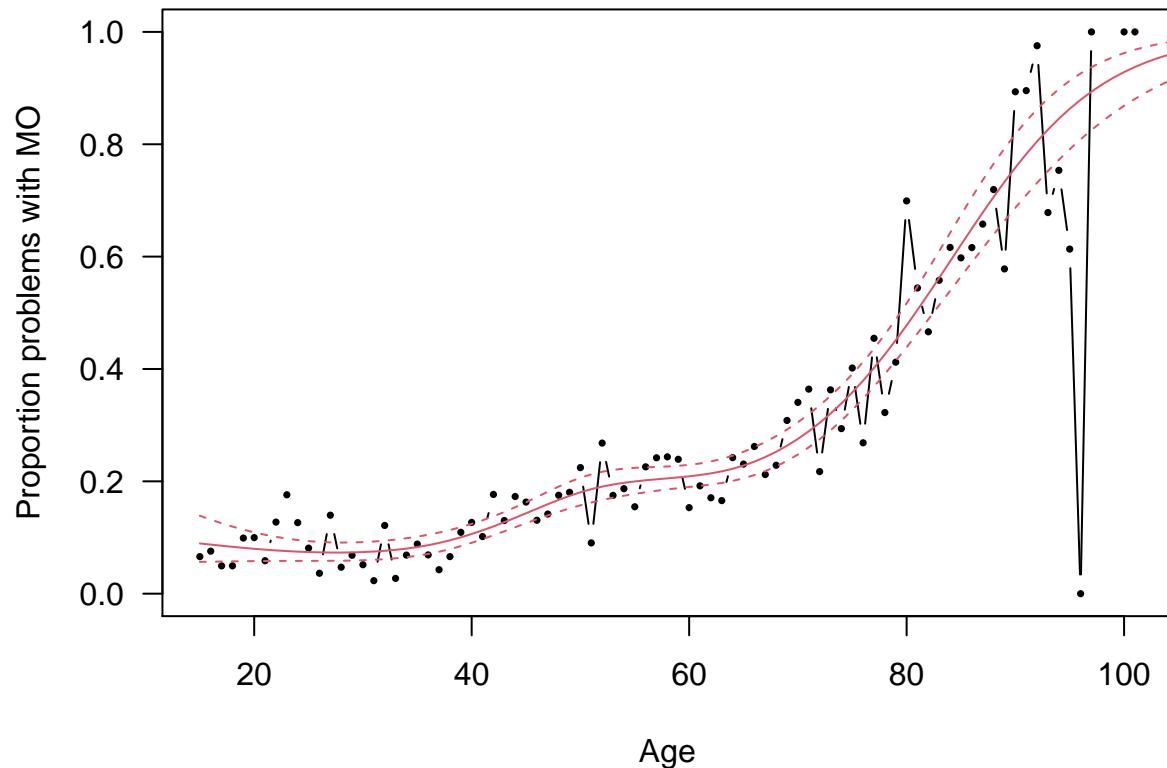
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

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

Coefficients:

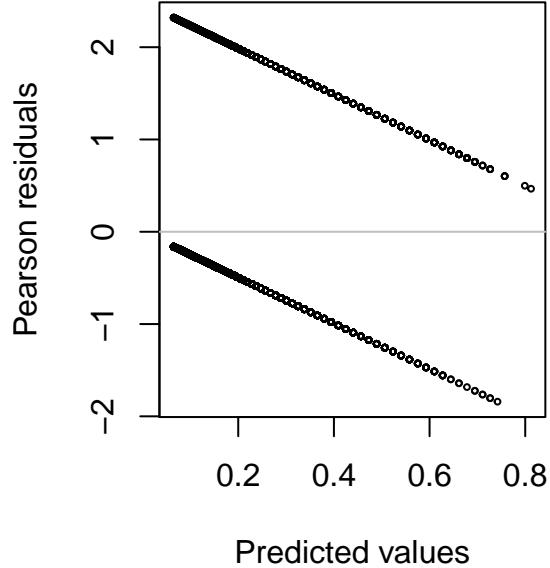
	Estimate	Std. Error	t value	Pr(> t)		
(Intercept)	-2.75732	0.10102	-27.296	< 2.2e-16 ***		
$I((age/100)^2)$	4.13840	0.22805	18.147	< 2.2e-16 ***		

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

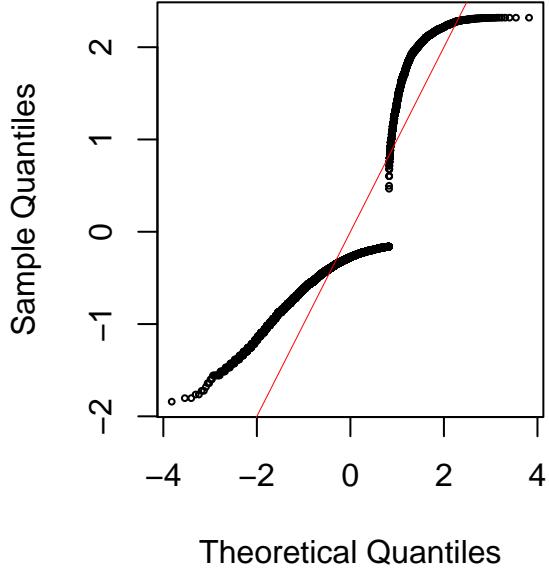
SSD: 1074.8

AIC: 6537.4

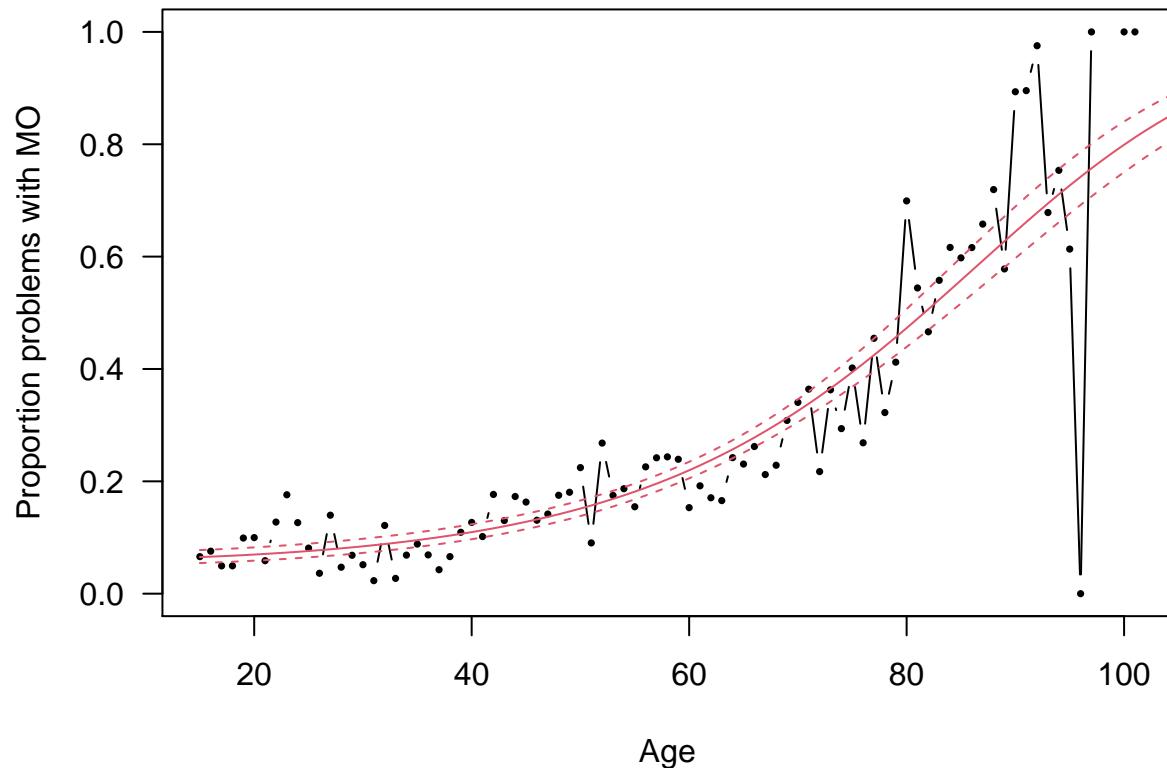
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



GAMM

Fitted model:

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

Random effects:

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

Coefficients:

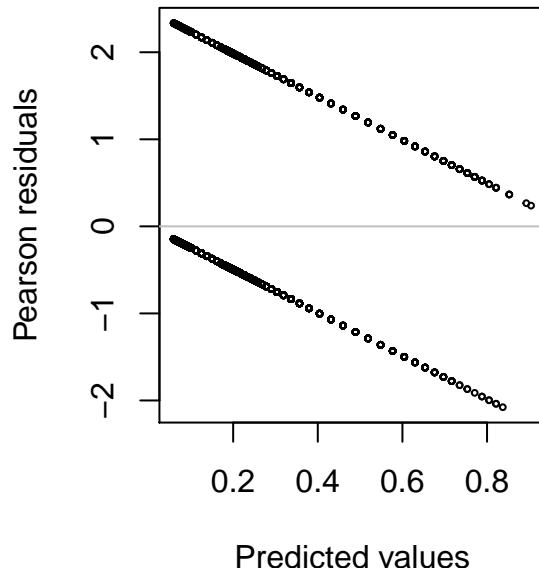
	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-1.5794405	0.0010808	-1461.421	< 2.2e-16 ***
Xs(age)Fx1	2.1477892	0.0567347	37.857	< 2.2e-16 ***

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

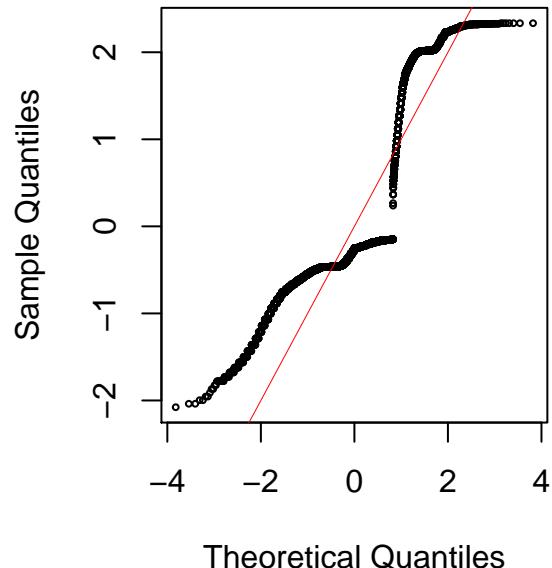
SSD: 1072.9

AIC: 6273231.4

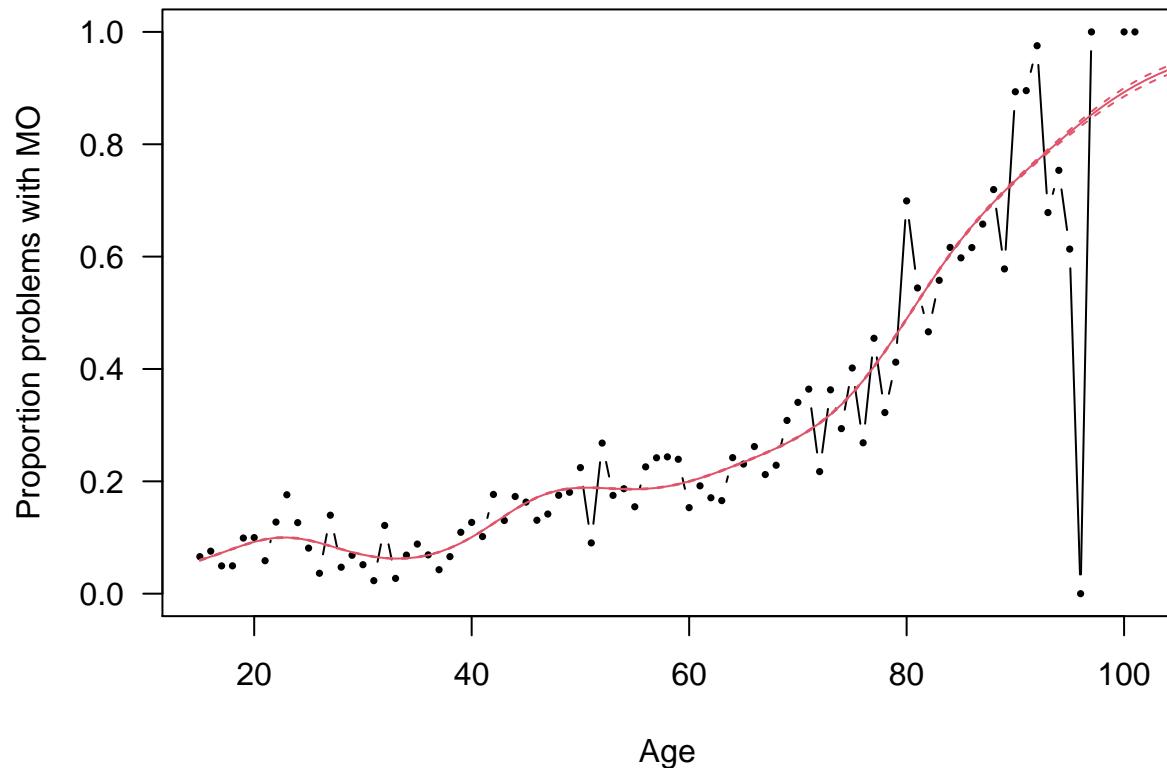
Residuals vs fitted



Normal Q–Q Plot



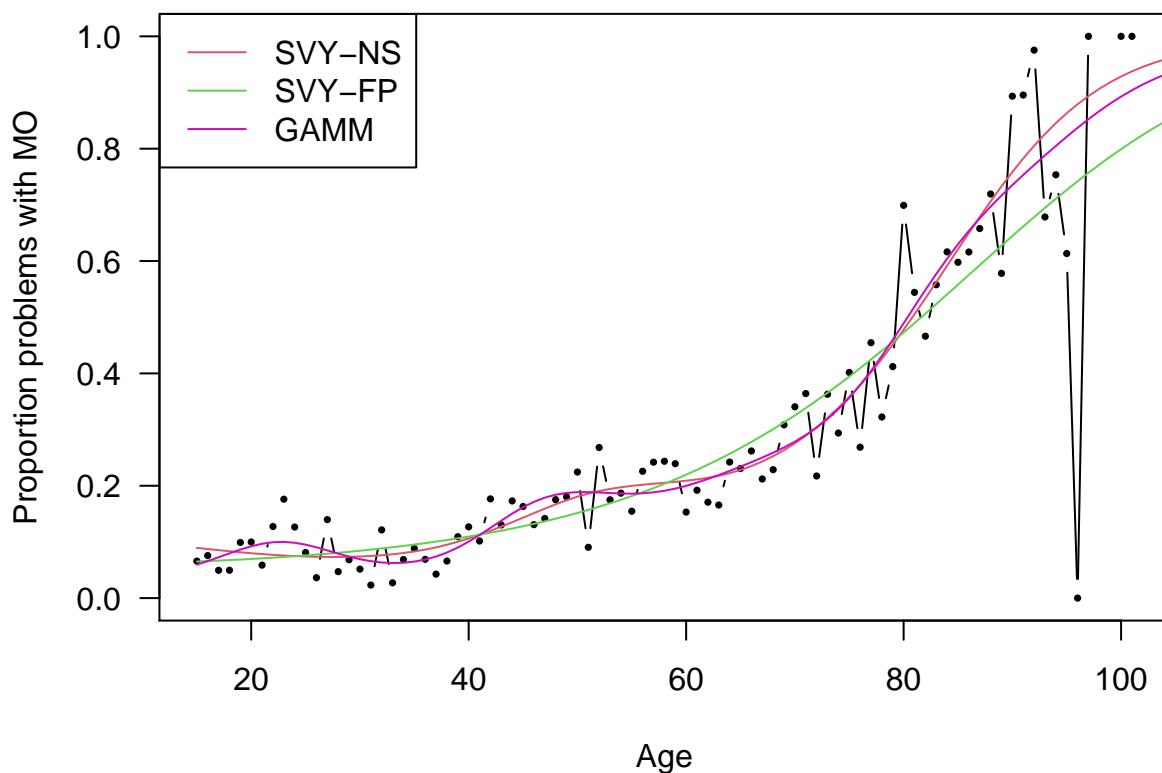
Fitted values with 95% confidence interval



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:

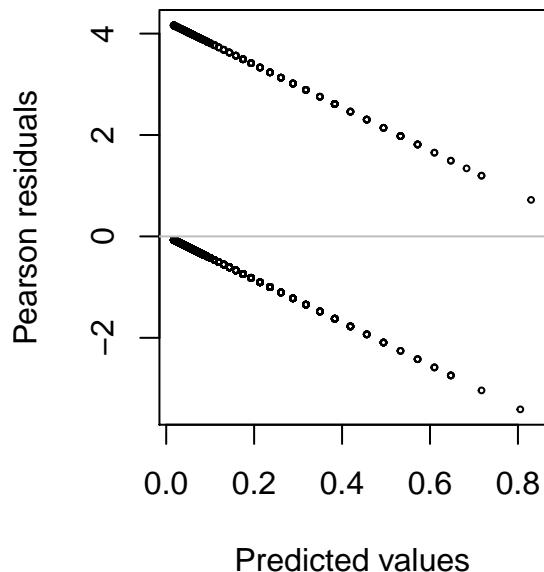
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-3.42103	0.48058	-7.1186	1.249e-12 ***
age.ns1	0.71850	0.51462	1.3962	0.16273
age.ns2	0.59606	0.38420	1.5514	0.12087
age.ns3	2.02226	1.04701	1.9315	0.05348 .
age.ns4	5.56194	0.49722	11.1861	< 2.2e-16 ***

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

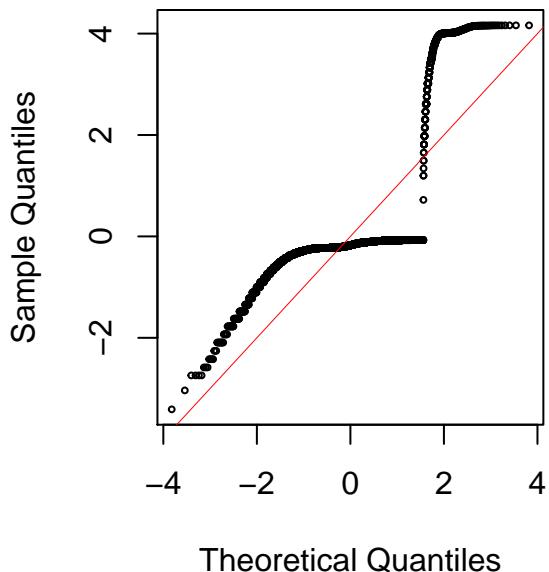
SSD: 381.4

AIC: 2950.2

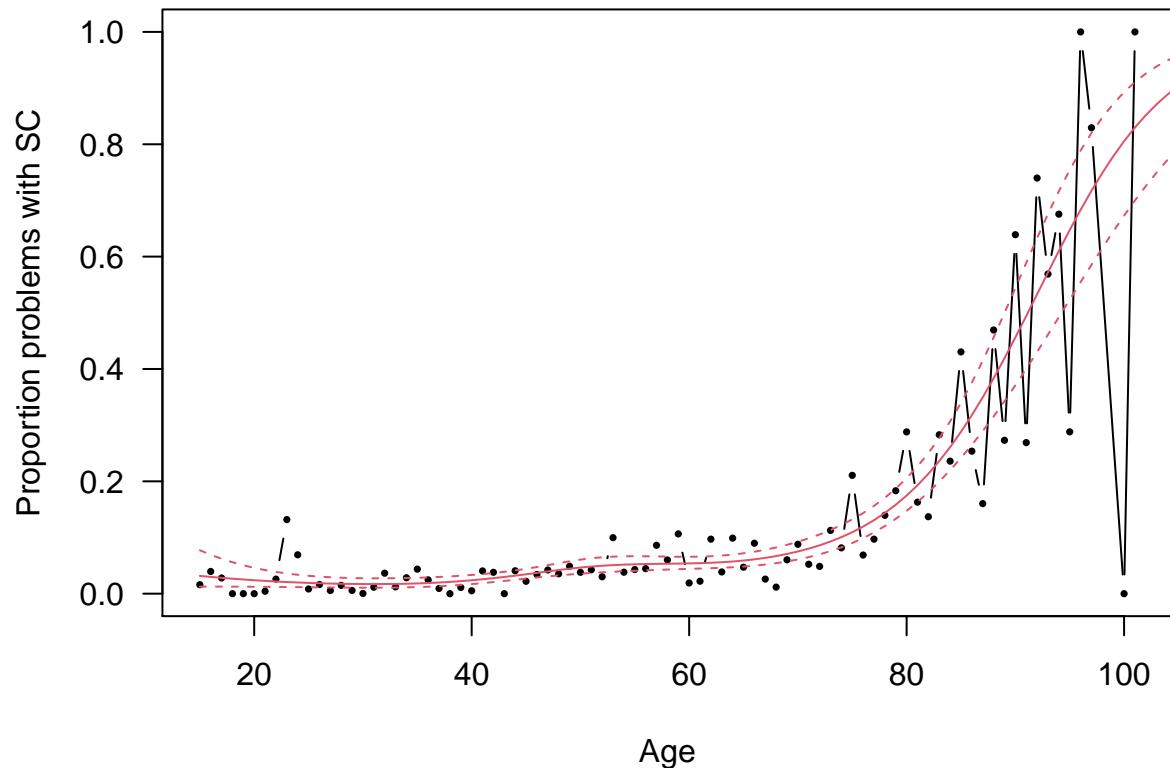
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

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

Coefficients:

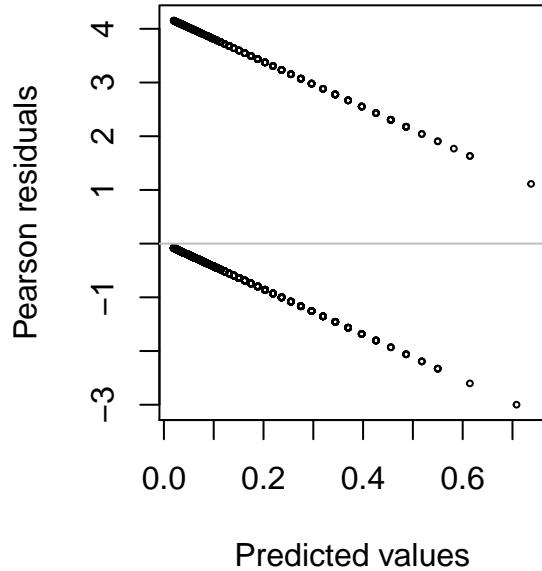
	Estimate	Std. Error	t value	Pr(> t)		
(Intercept)	-3.92289	0.13770	-28.489	< 2.2e-16 ***		
I((age/100)^3)	4.80929	0.34044	14.127	< 2.2e-16 ***		

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

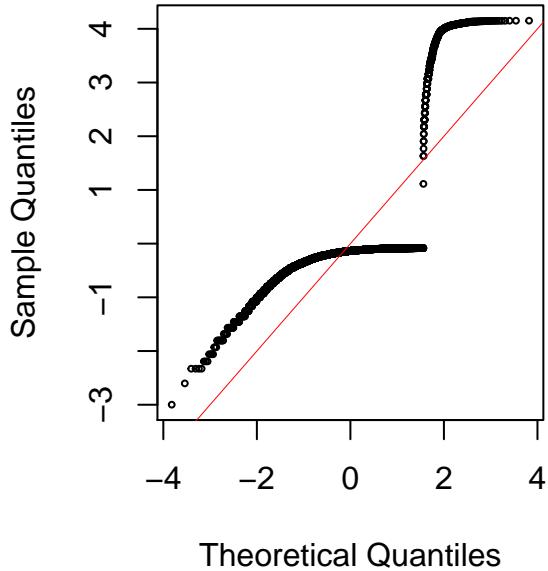
SSD: 382.3

AIC: 2953.1

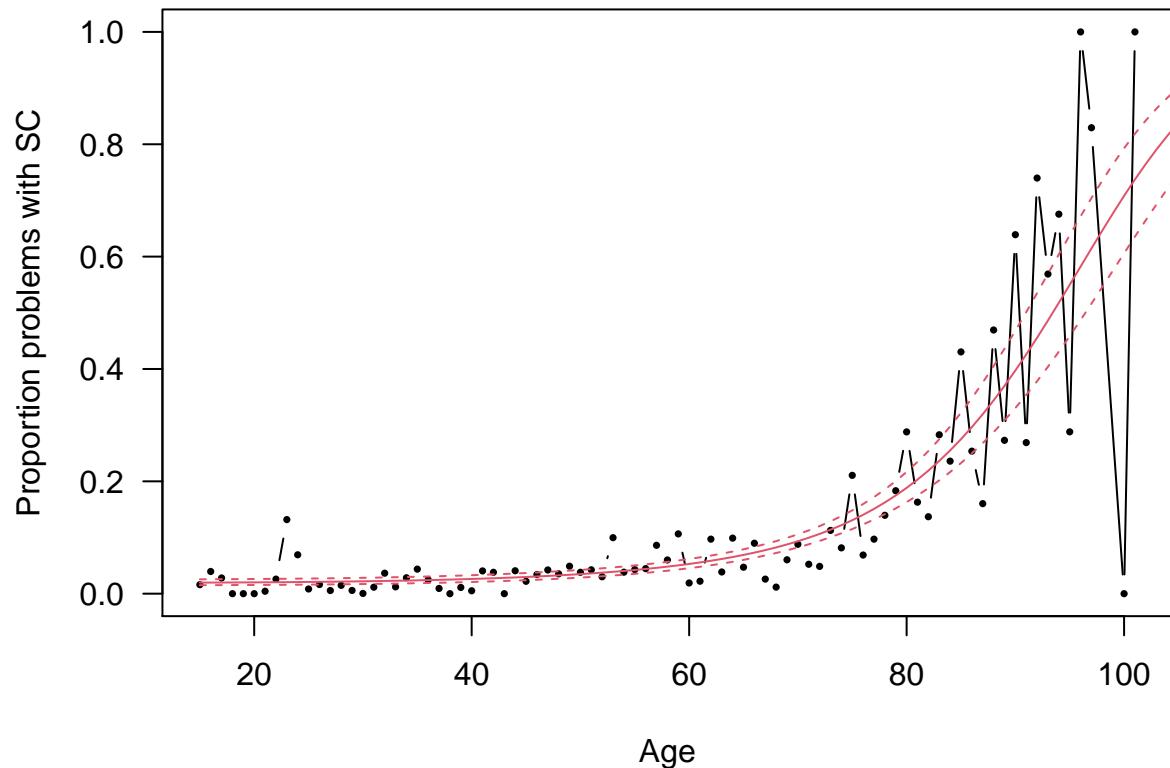
Residuals vs fitted



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:

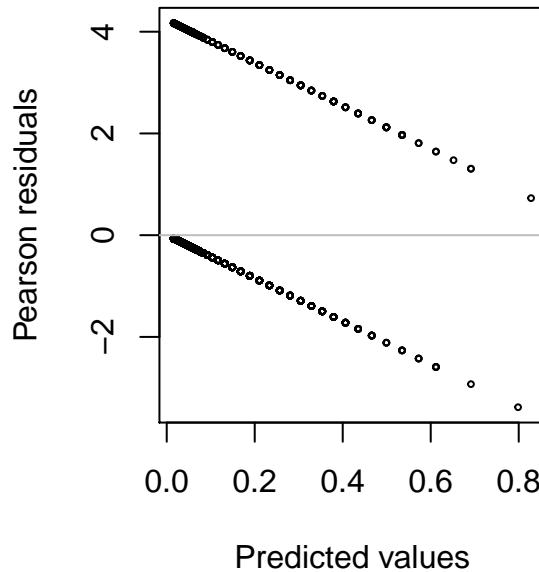
	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-3.0804099	0.0020144	-1529.178	< 2.2e-16 ***
Xs(age)Fx1	2.4849519	0.0606276	40.987	< 2.2e-16 ***

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

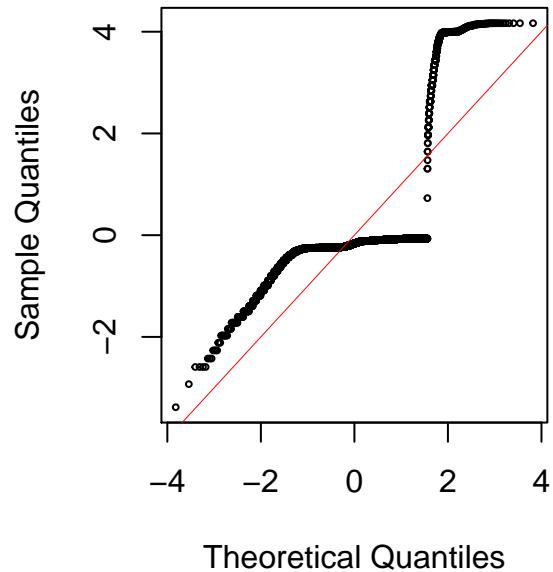
SSD: 381.3

AIC: 2831084.5

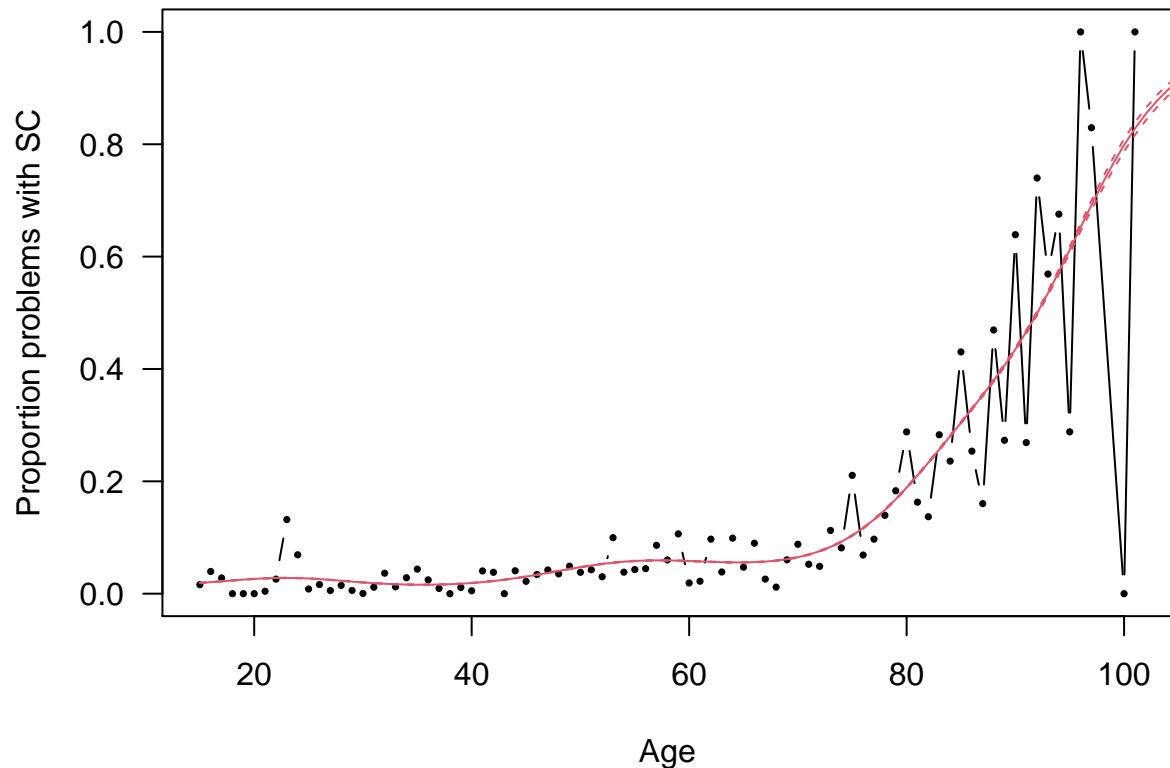
Residuals vs fitted



Normal Q-Q Plot



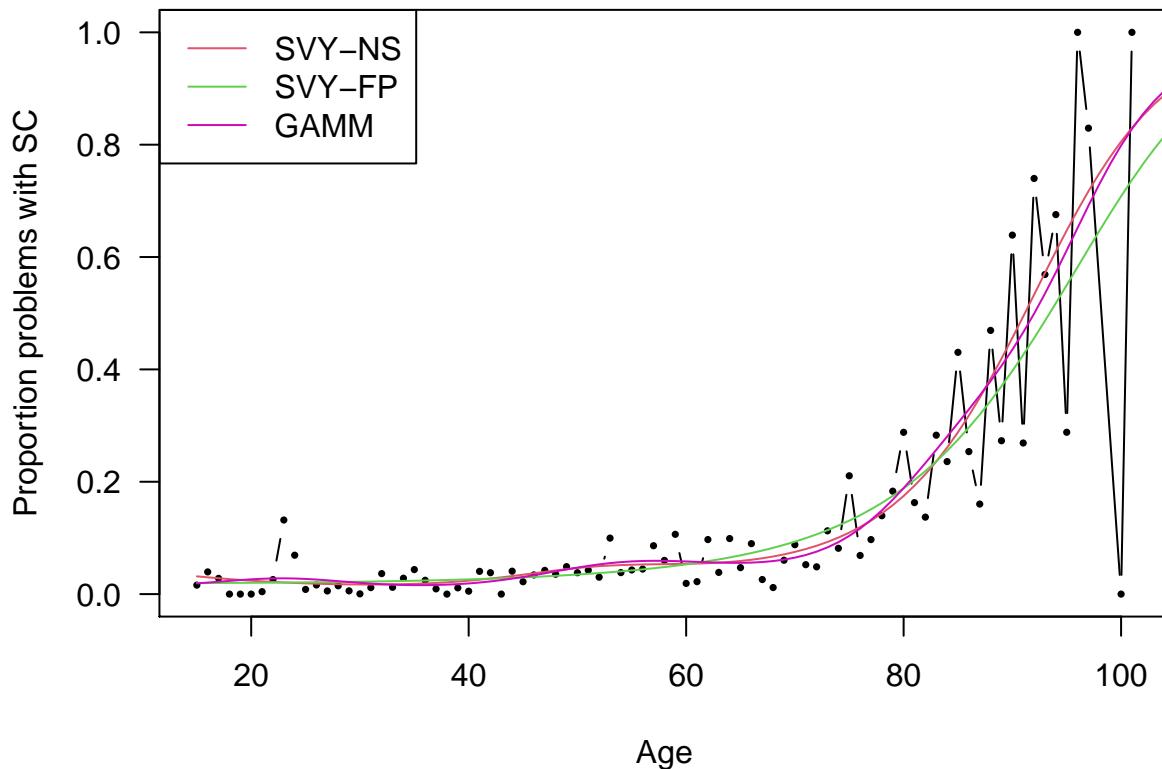
Fitted values with 95% confidence interval



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:

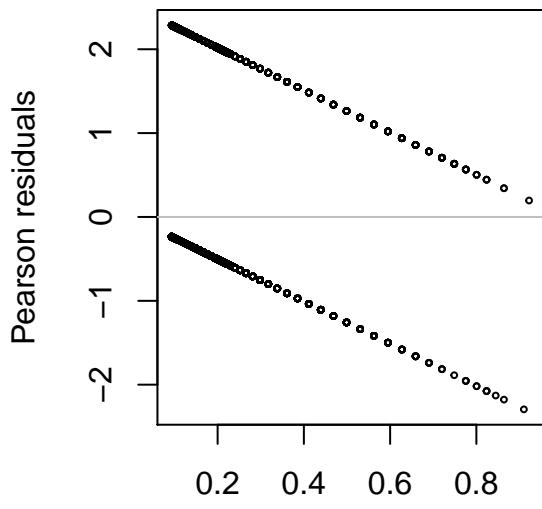
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-2.11704	0.24207	-8.7454	< 2.2e-16 ***
age.ns1	1.20517	0.23978	5.0260	5.186e-07 ***
age.ns2	0.13768	0.23889	0.5763	0.5644
age.ns3	2.32798	0.56400	4.1276	3.727e-05 ***
age.ns4	4.78163	0.38193	12.5197	< 2.2e-16 ***

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

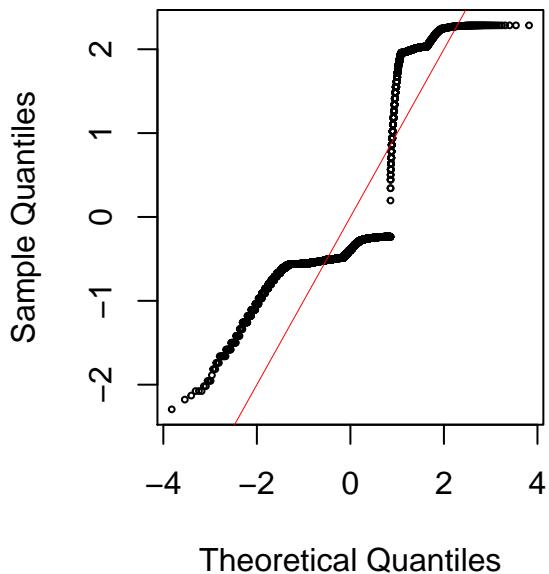
SSD: 1103.6

AIC: 6889.7

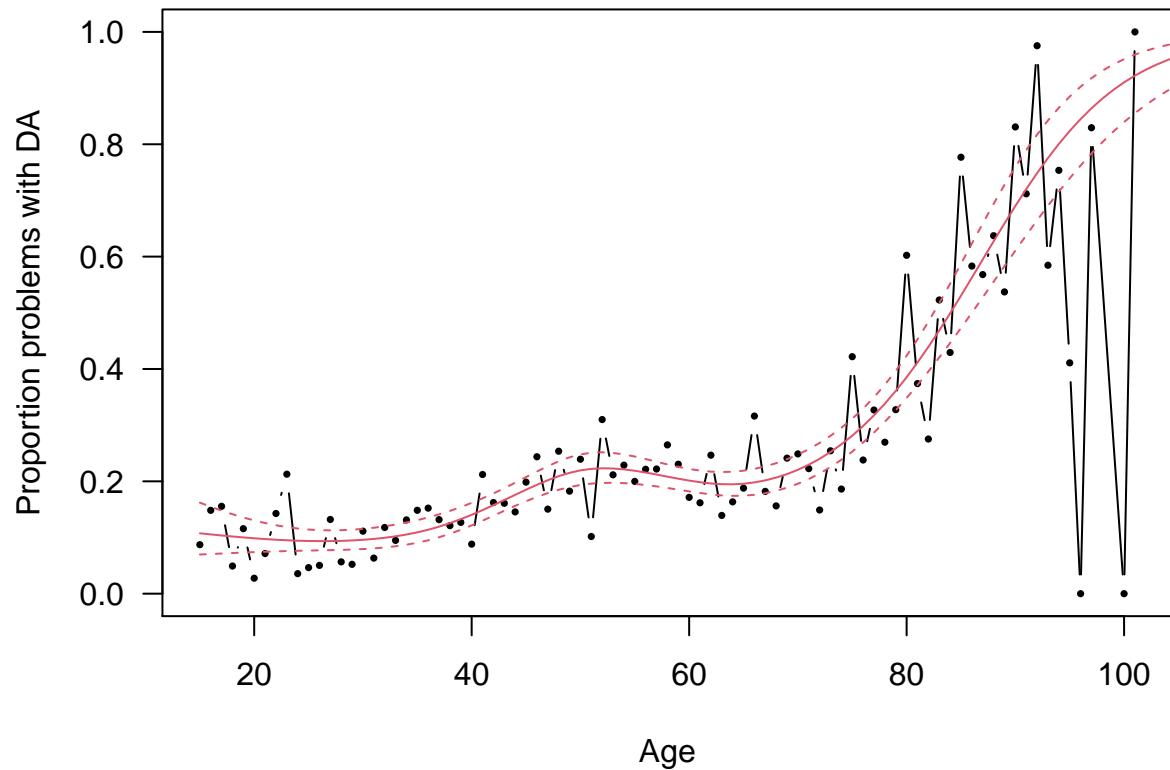
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

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

Coefficients:

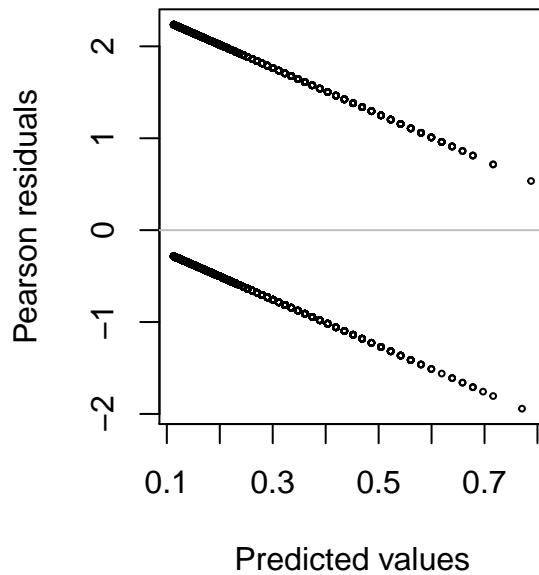
	Estimate	Std. Error	t value	Pr(> t)		
(Intercept)	-2.071121	0.070341	-29.444	< 2.2e-16 ***		
$I((age/100)^3)$	3.283881	0.221560	14.822	< 2.2e-16 ***		

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

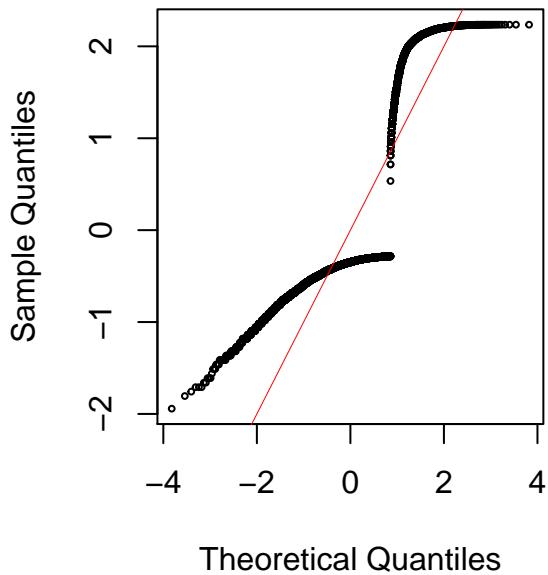
SSD: 1110.1

AIC: 6945.6

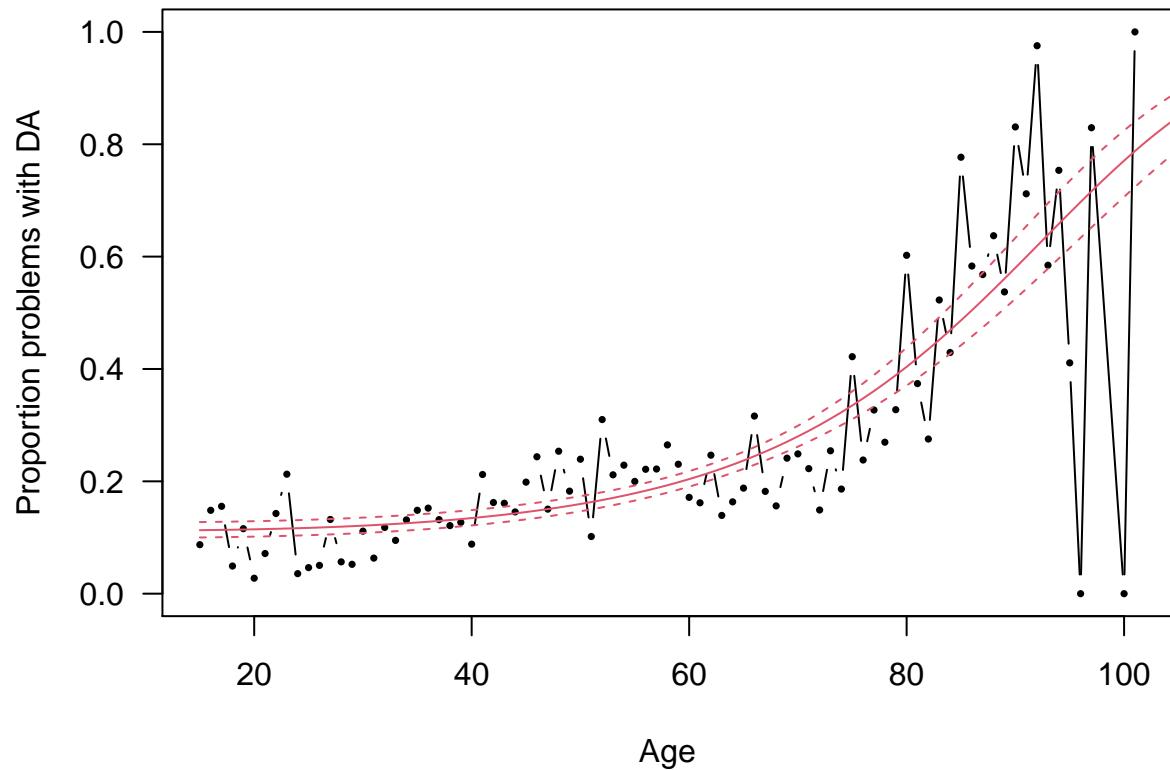
Residuals vs fitted



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:

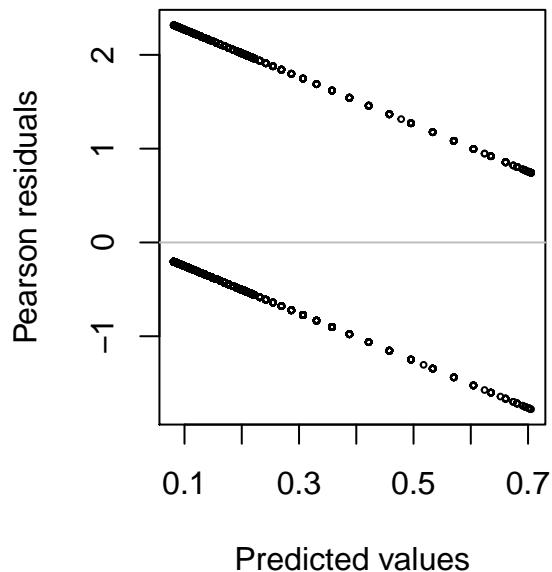
	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-1.4975598	0.0010088	-1484.441	< 2.2e-16 ***
Xs(age)Fx1	-2.1723628	0.0475412	-45.694	< 2.2e-16 ***

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

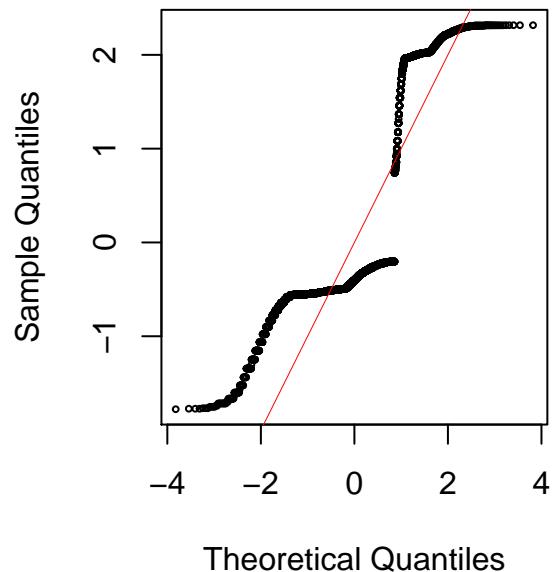
SSD: 1102.4

AIC: 6640776.7

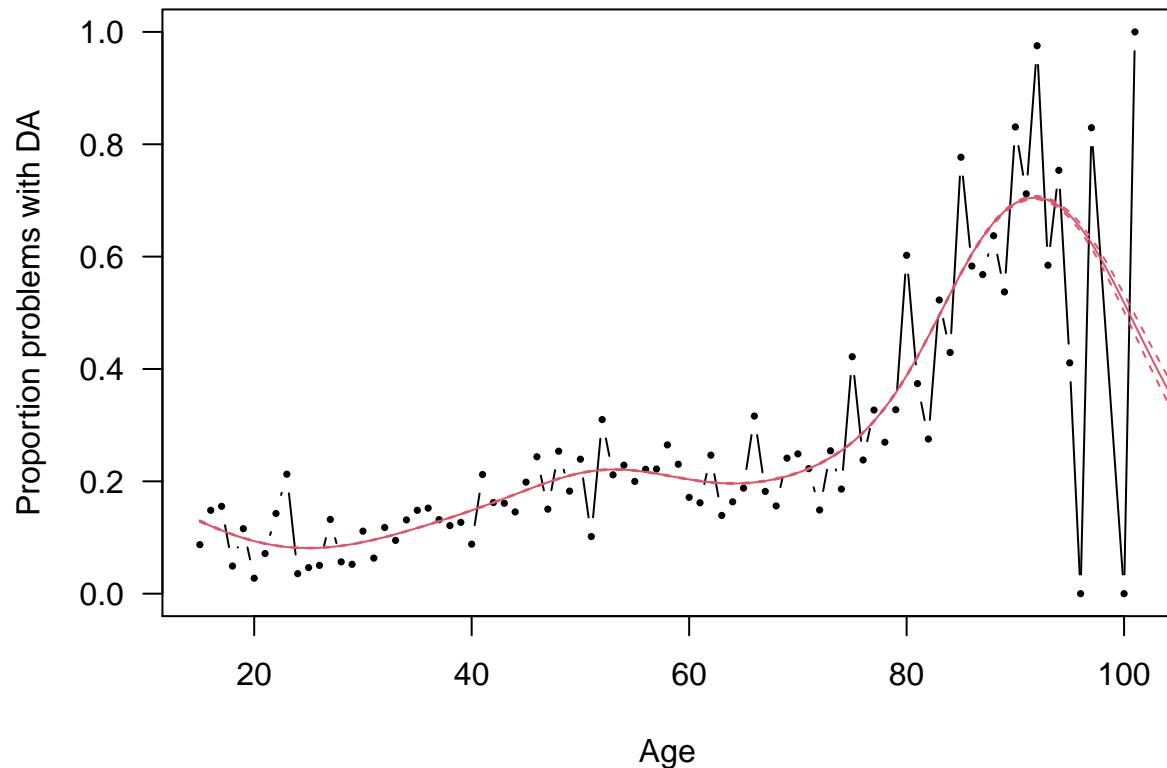
Residuals vs fitted



Normal Q–Q Plot



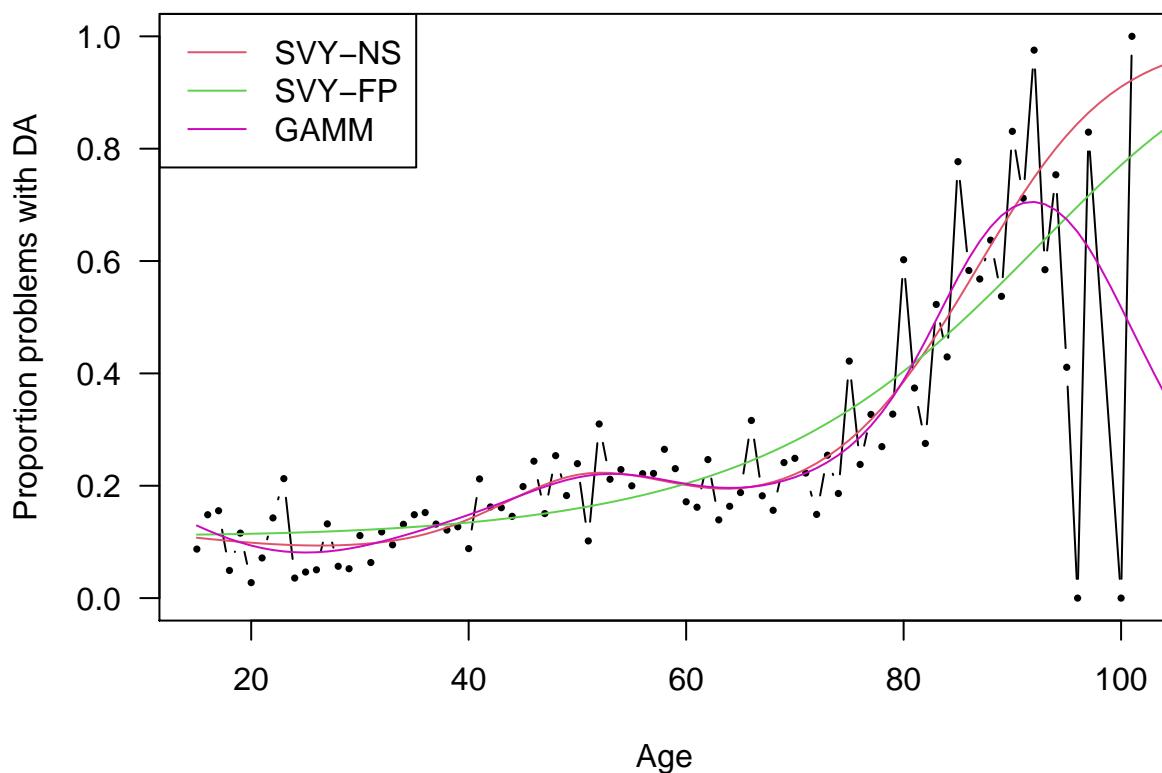
Fitted values with 95% confidence interval



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:

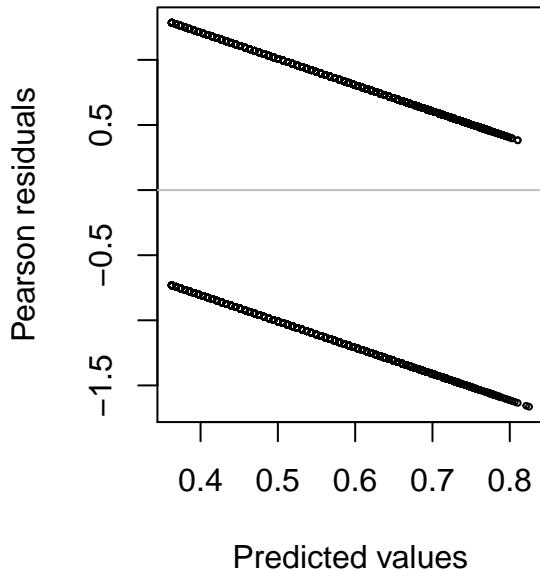
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0.563591	0.074181	-7.5976	3.597e-14 ***
age.ns1	2.636259	0.203003	12.9863	< 2.2e-16 ***

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

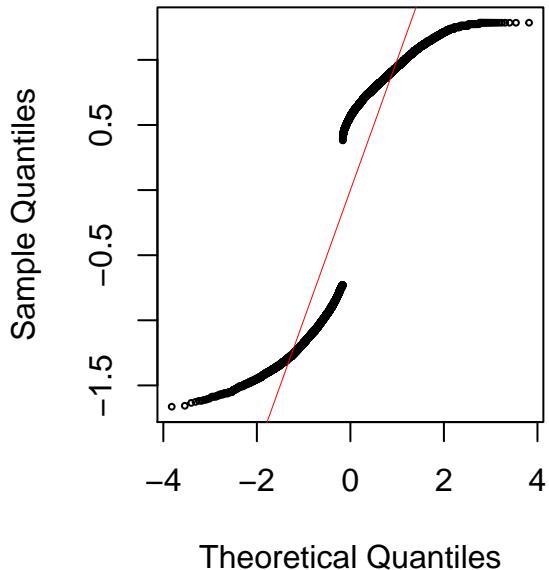
SSD: 1751.7

AIC: 9925.1

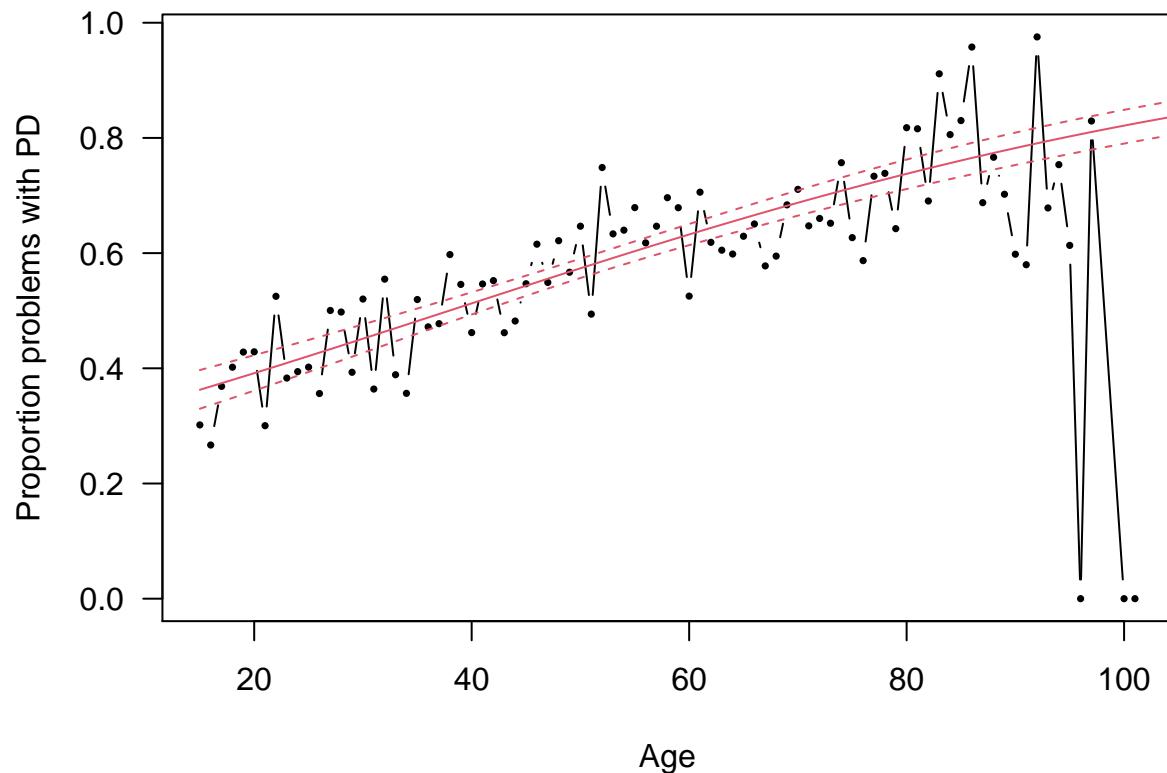
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

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

Coefficients:

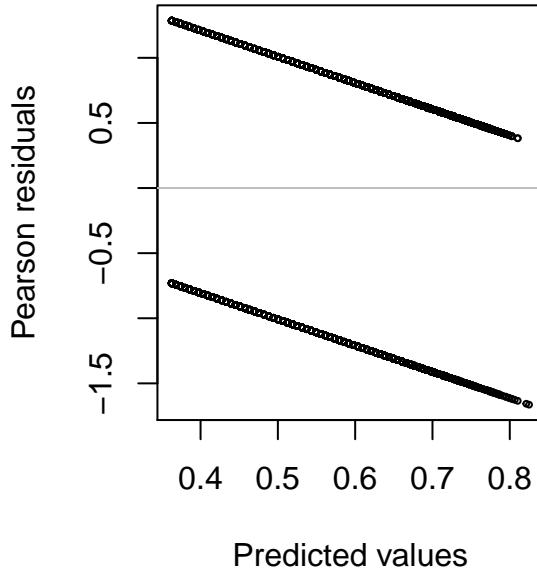
	Estimate	Std. Error	t value	Pr(> t)		
(Intercept)	-0.93226	0.10010	-9.3133	< 2.2e-16 ***		
I((age/100)^1)	2.45780	0.18926	12.9863	< 2.2e-16 ***		

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

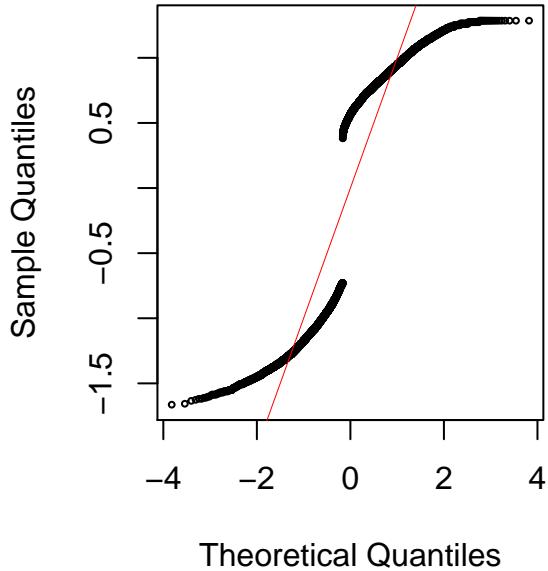
SSD: 1751.7

AIC: 9925.1

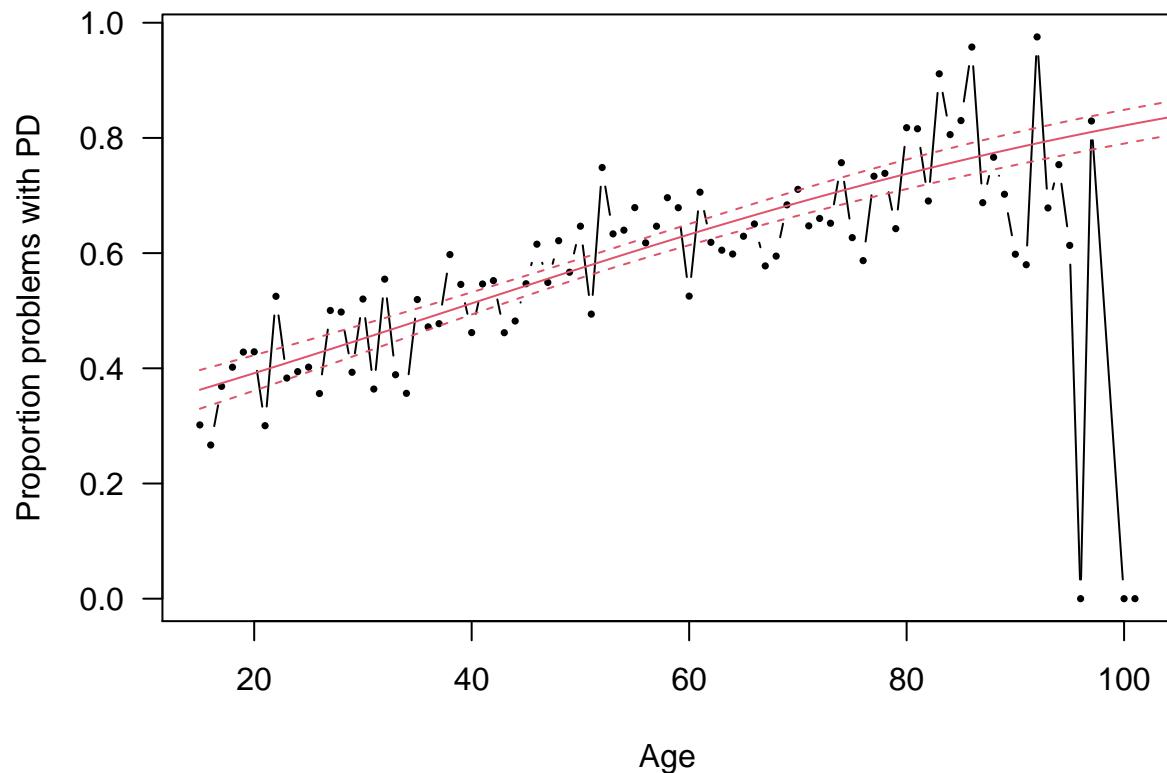
Residuals vs fitted



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:

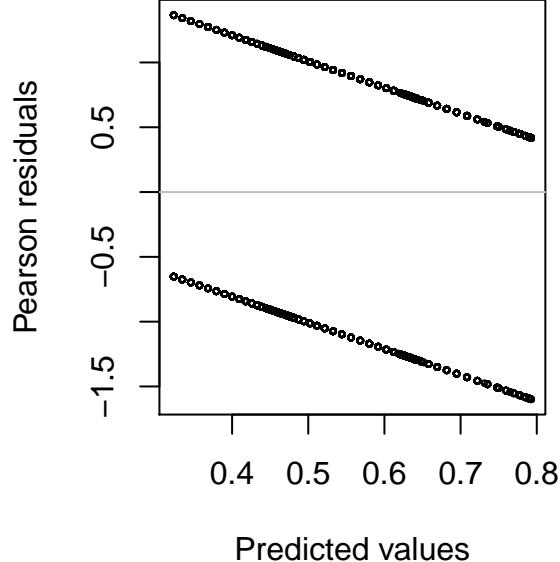
	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	0.3003647	0.0007763	386.919	< 2.2e-16 ***
Xs(age)Fx1	-1.0916135	0.0455302	-23.976	< 2.2e-16 ***

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

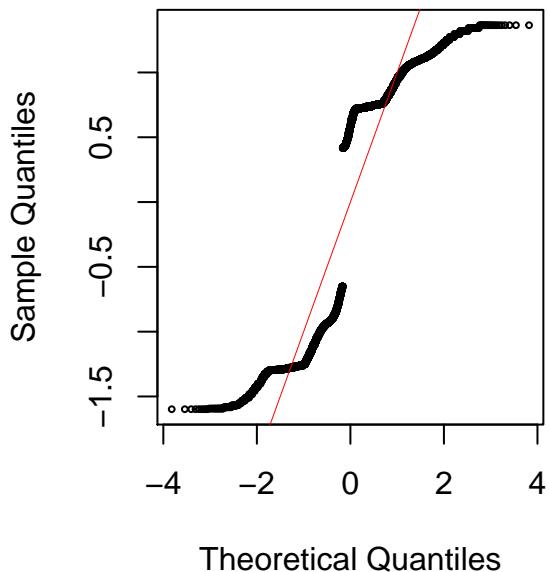
SSD: 1748.1

AIC: 9572558.8

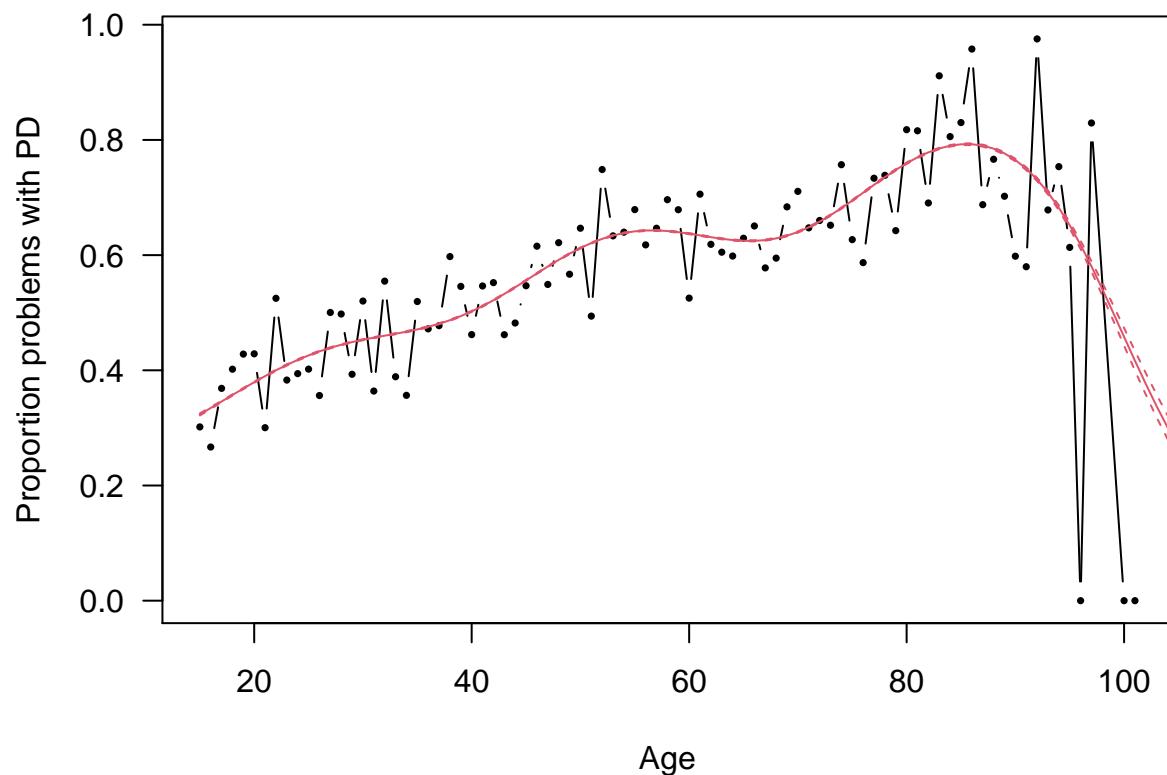
Residuals vs fitted



Normal Q-Q Plot



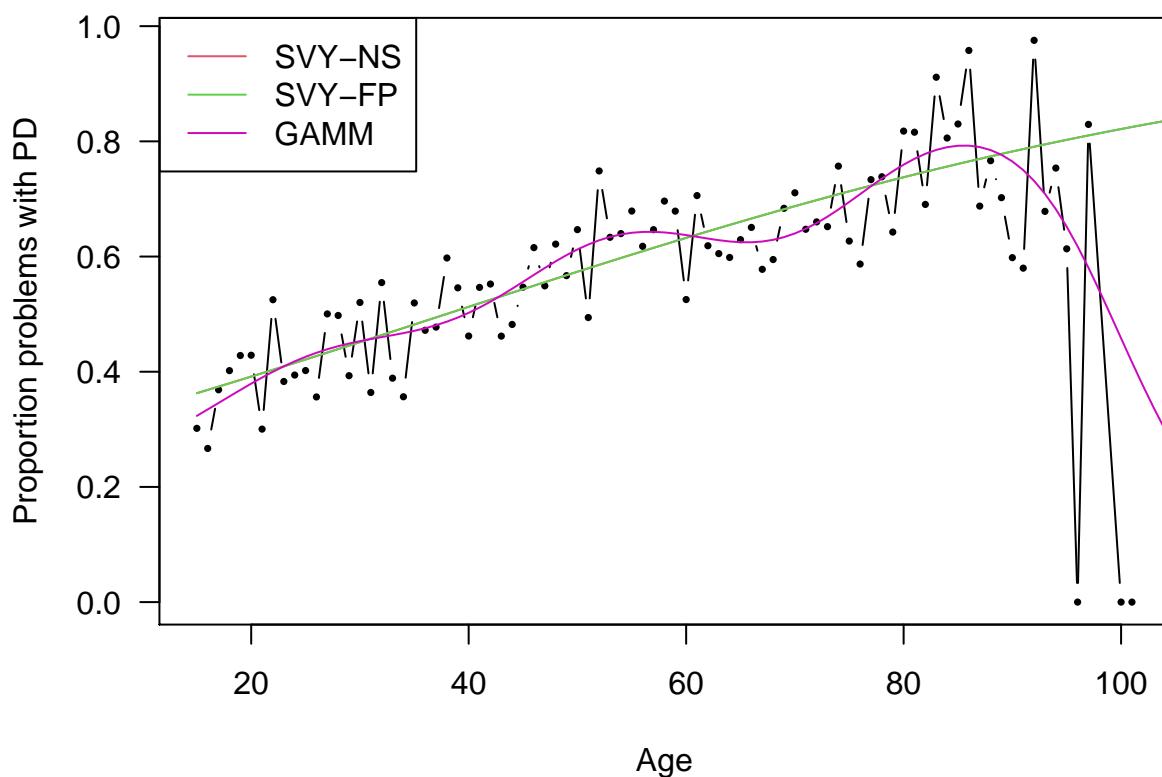
Fitted values with 95% confidence interval



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:

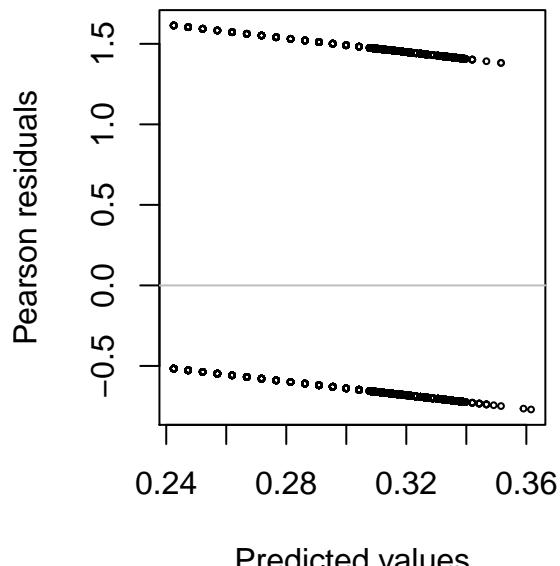
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-1.139025	0.132843	-8.5742	< 2.2e-16 ***
age.ns1	-0.018462	0.157771	-0.1170	0.906850
age.ns2	0.942087	0.347063	2.7145	0.006662 **
age.ns3	0.261631	0.269452	0.9710	0.331610

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

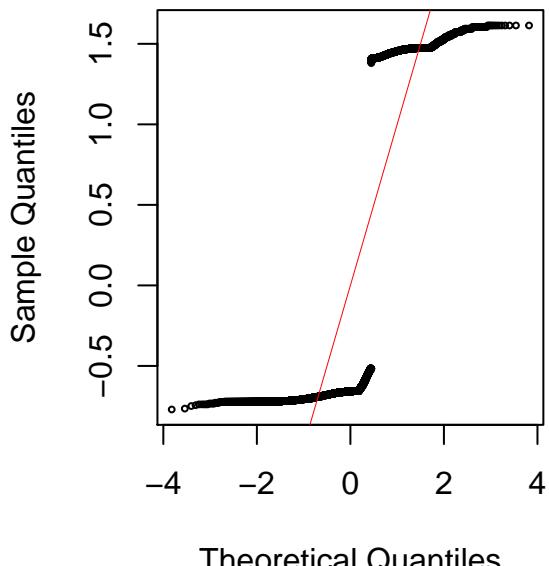
SSD: 1653.7

AIC: 9341.7

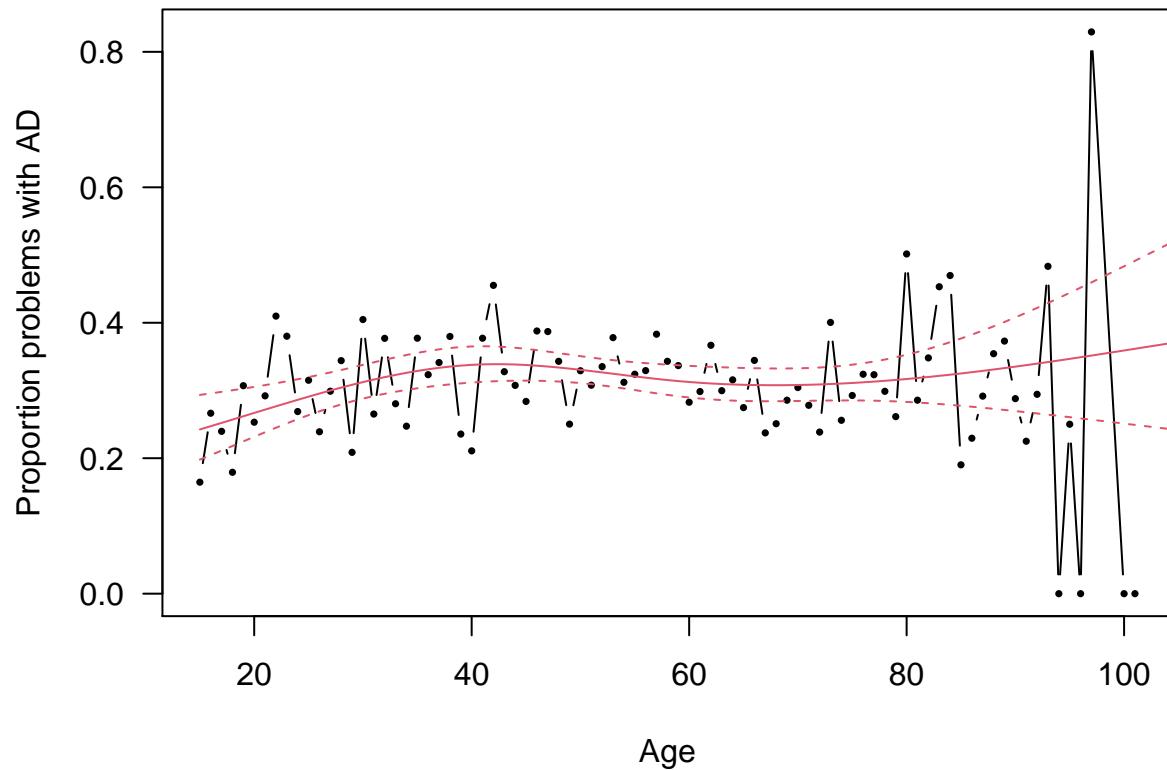
Residuals vs fitted



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:

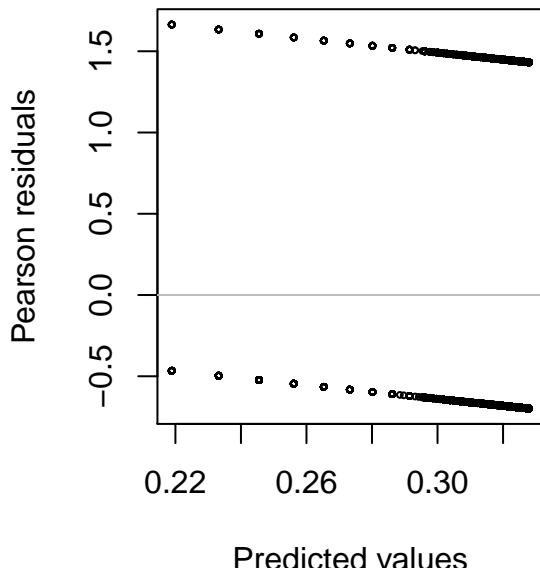
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0.5816537	0.1024593	-5.6769	1.451e-08 ***
$I((age/100)^{-2})$	-0.0153865	0.0054452	-2.8257	0.004737 **
$I((age/100)^2)$	-0.2998498	0.2394718	-1.2521	0.210583

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

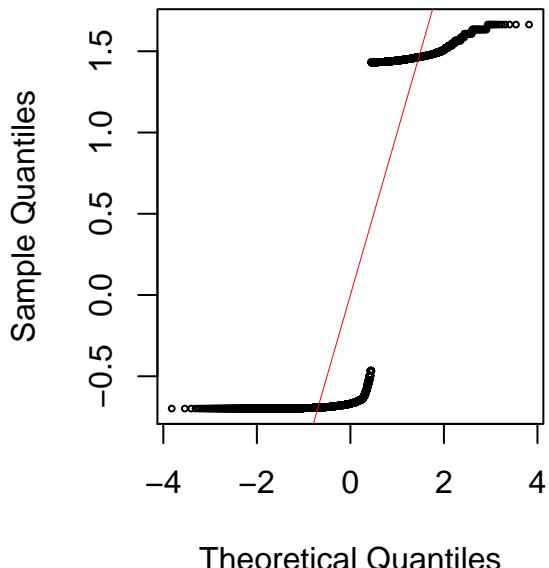
SSD: 1653.0

AIC: 9339.0

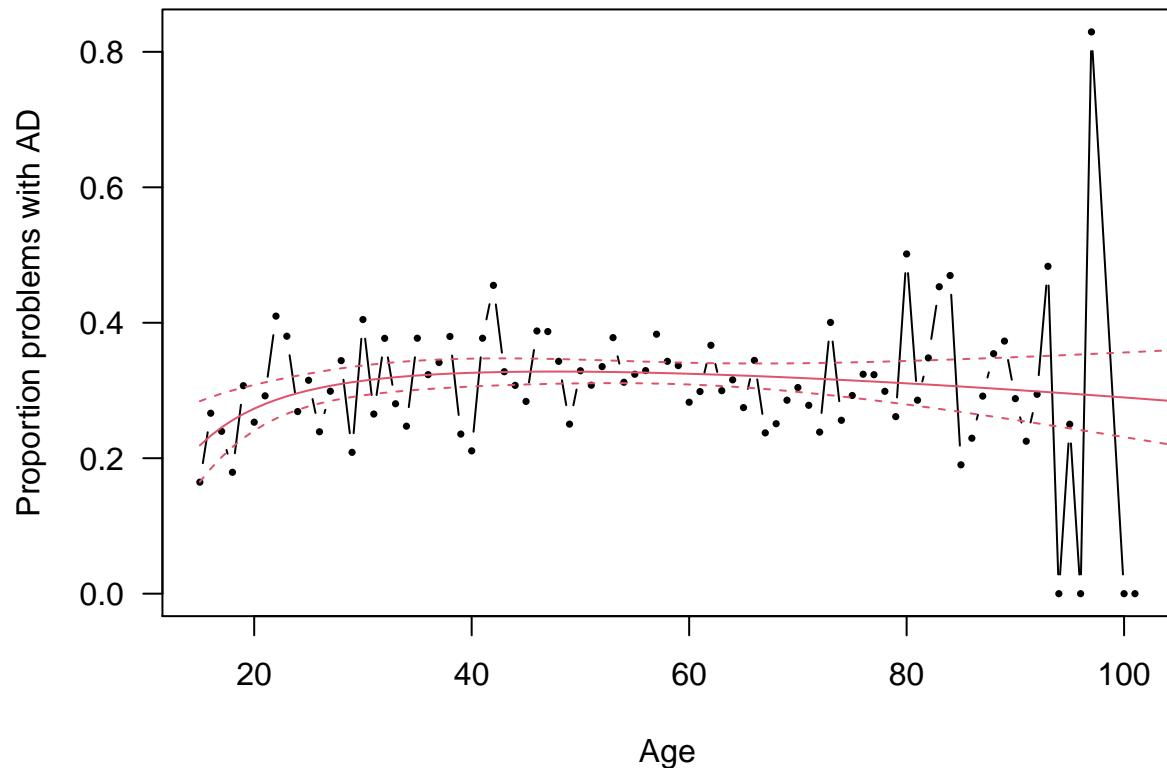
Residuals vs fitted



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:

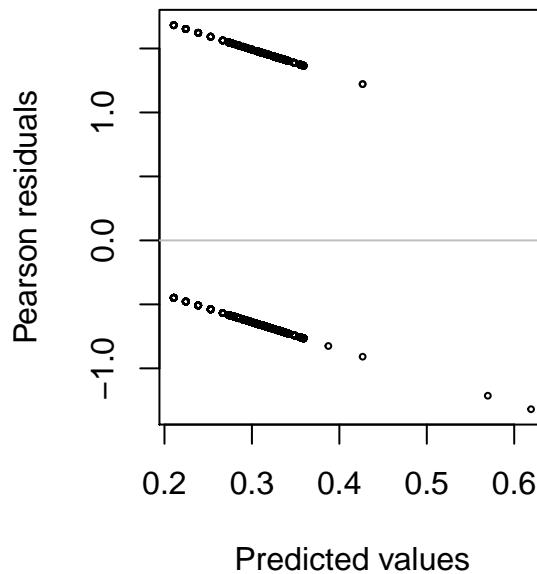
	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	-0.7787904	0.0008045	-968.040	< 2.2e-16 ***
Xs(age)Fx1	2.6488092	0.0450241	58.831	< 2.2e-16 ***

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

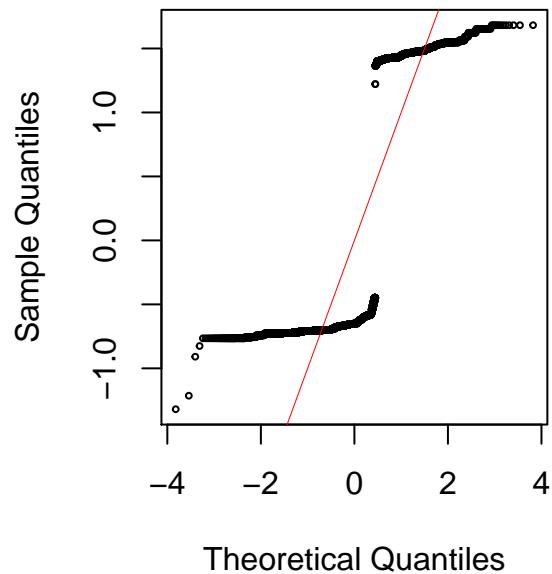
SSD: 1653.9

AIC: 9014544.5

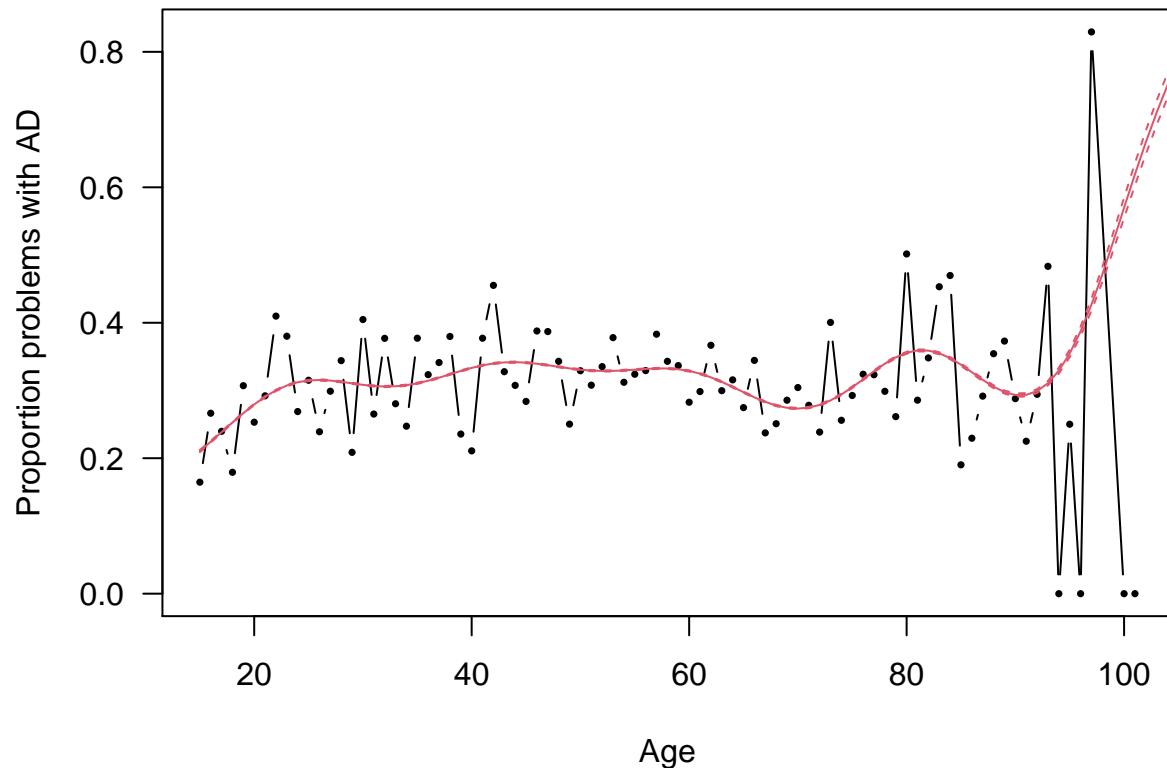
Residuals vs fitted



Normal Q–Q Plot



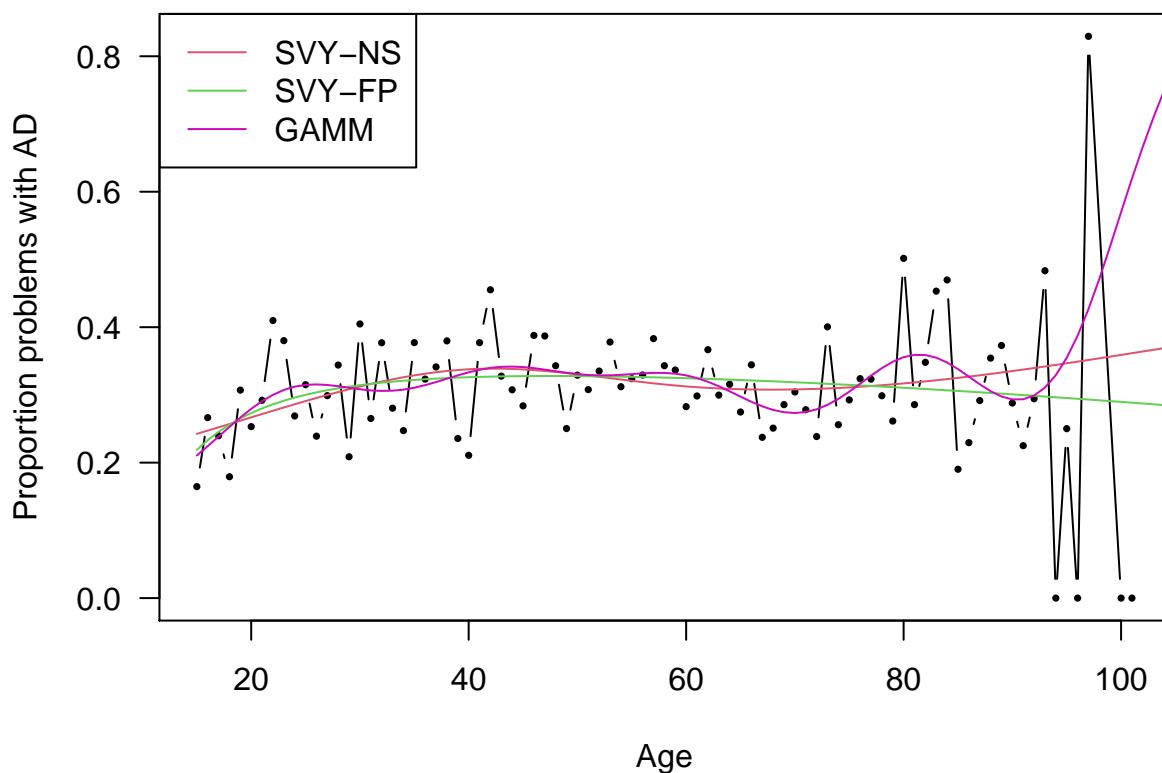
Fitted values with 95% confidence interval



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:

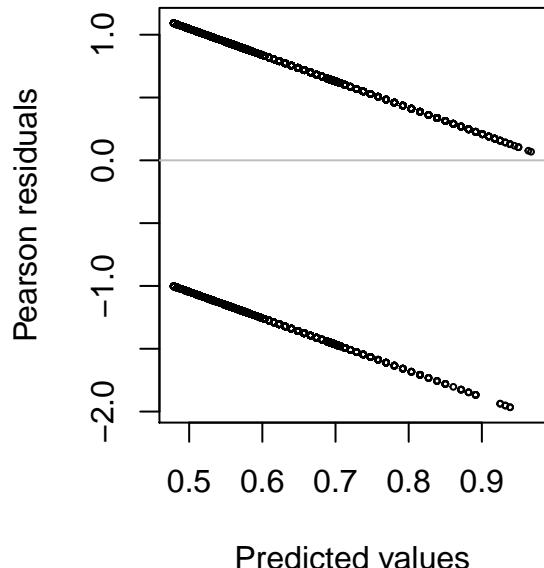
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0.084528	0.150855	-0.5603	0.575285
age.ns1	0.502112	0.174296	2.8808	0.003984 **
age.ns2	1.084685	0.222478	4.8755	1.120e-06 ***
age.ns3	0.424698	0.263525	1.6116	0.107113
age.ns4	2.497622	0.469418	5.3207	1.080e-07 ***
age.ns5	3.307847	0.601799	5.4966	4.069e-08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

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

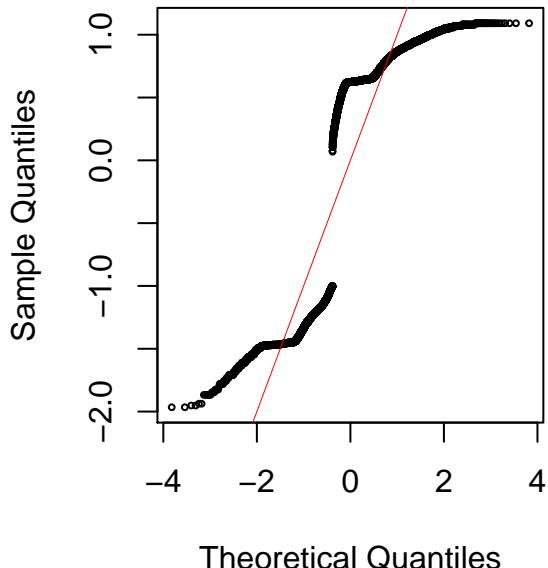
SSD: 1646.2

AIC: 9542.4

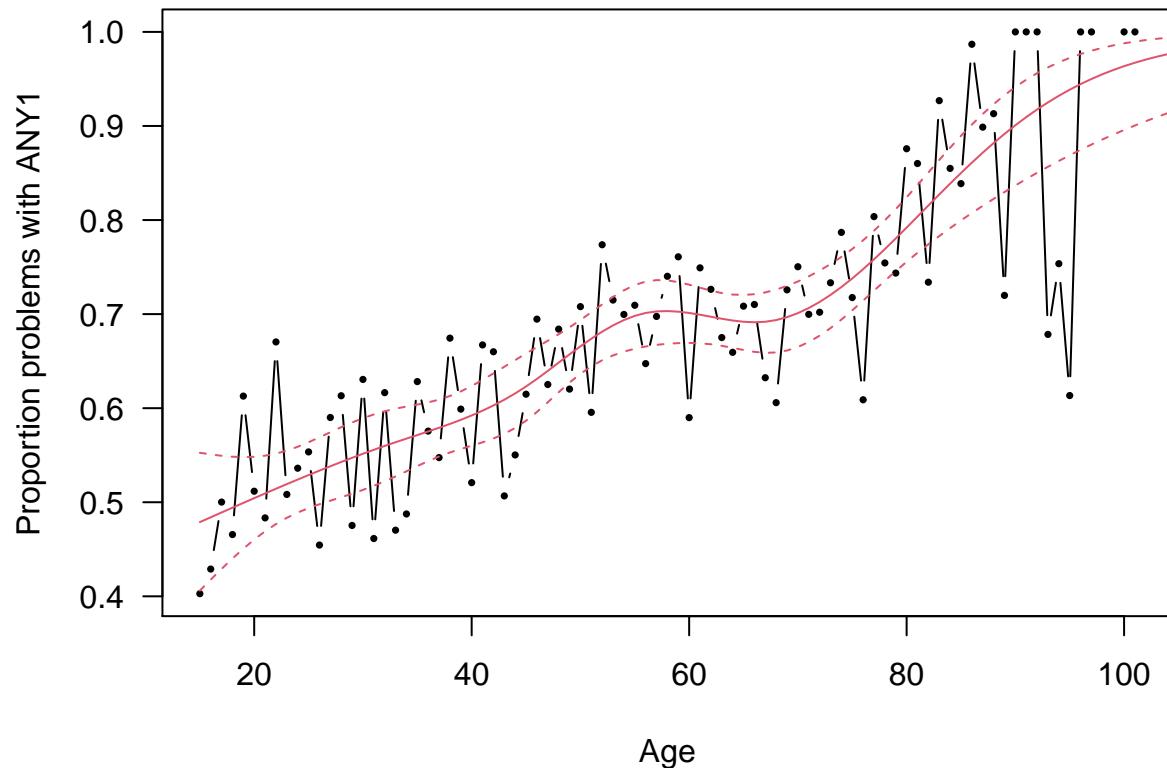
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



SVY-FP

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

Coefficients:

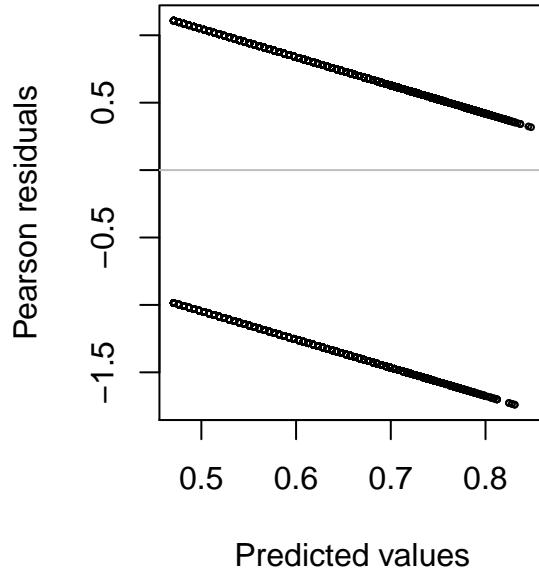
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	-0.437087	0.099454	-4.3949	1.132e-05 ***
I((age/100)^1)	2.135278	0.188408	11.3333	< 2.2e-16 ***

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

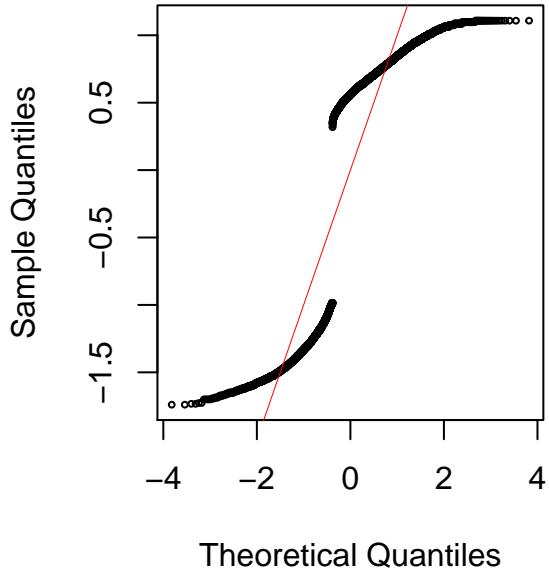
SSD: 1650.1

AIC: 9546.3

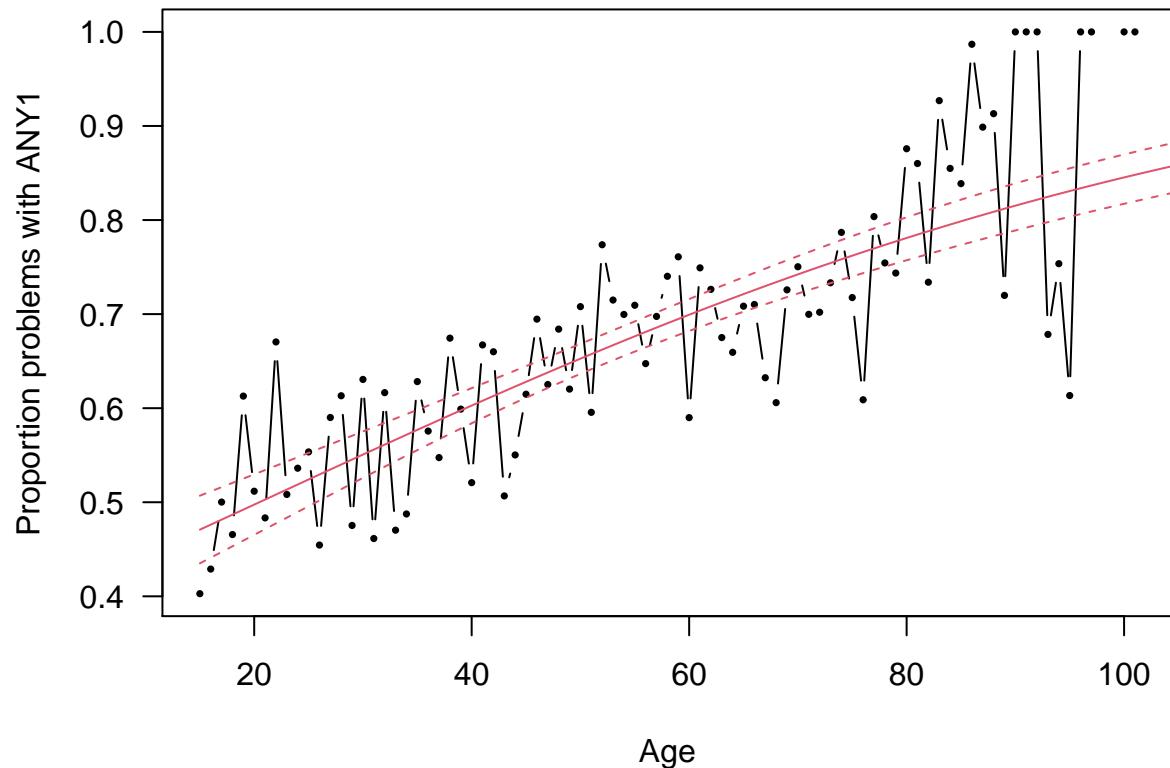
Residuals vs fitted



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:

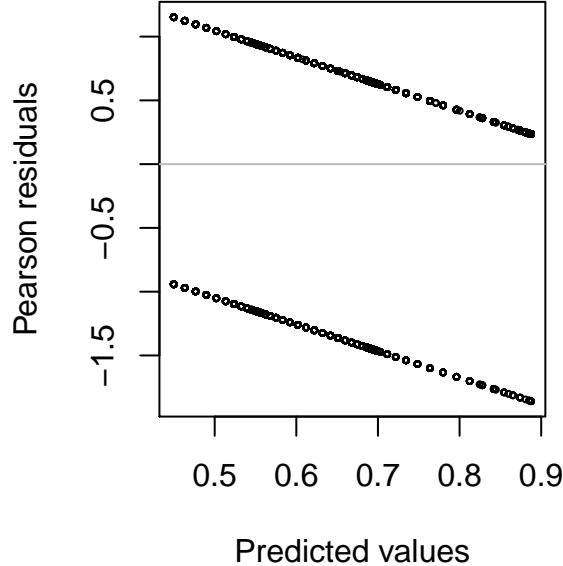
	Estimate	Std. Error	z value	Pr(> z)
X(Intercept)	0.6385132	0.0008102	788.092	< 2.2e-16 ***
Xs(age)Fx1	-1.3446555	0.0519146	-25.901	< 2.2e-16 ***

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

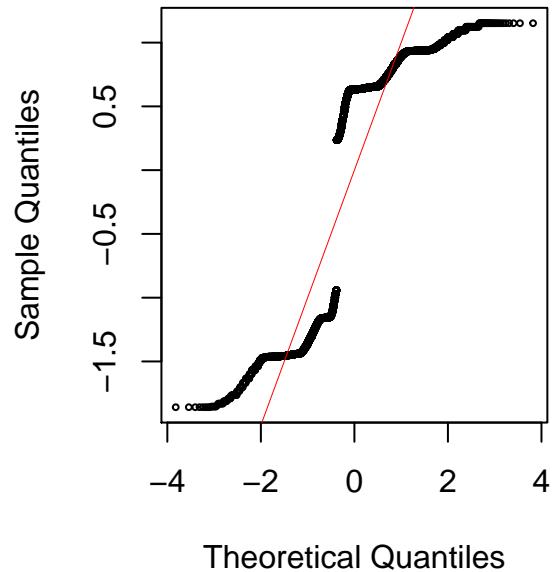
SSD: 1646.3

AIC: 9202060.4

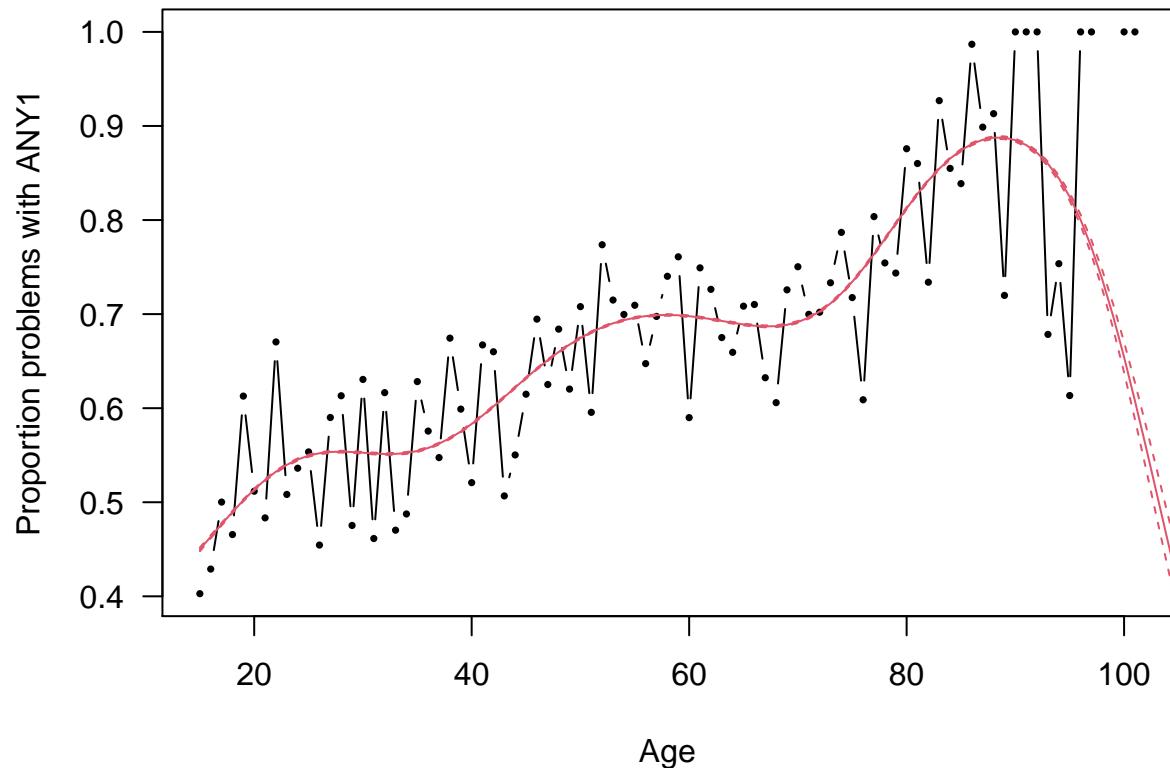
Residuals vs fitted



Normal Q–Q Plot



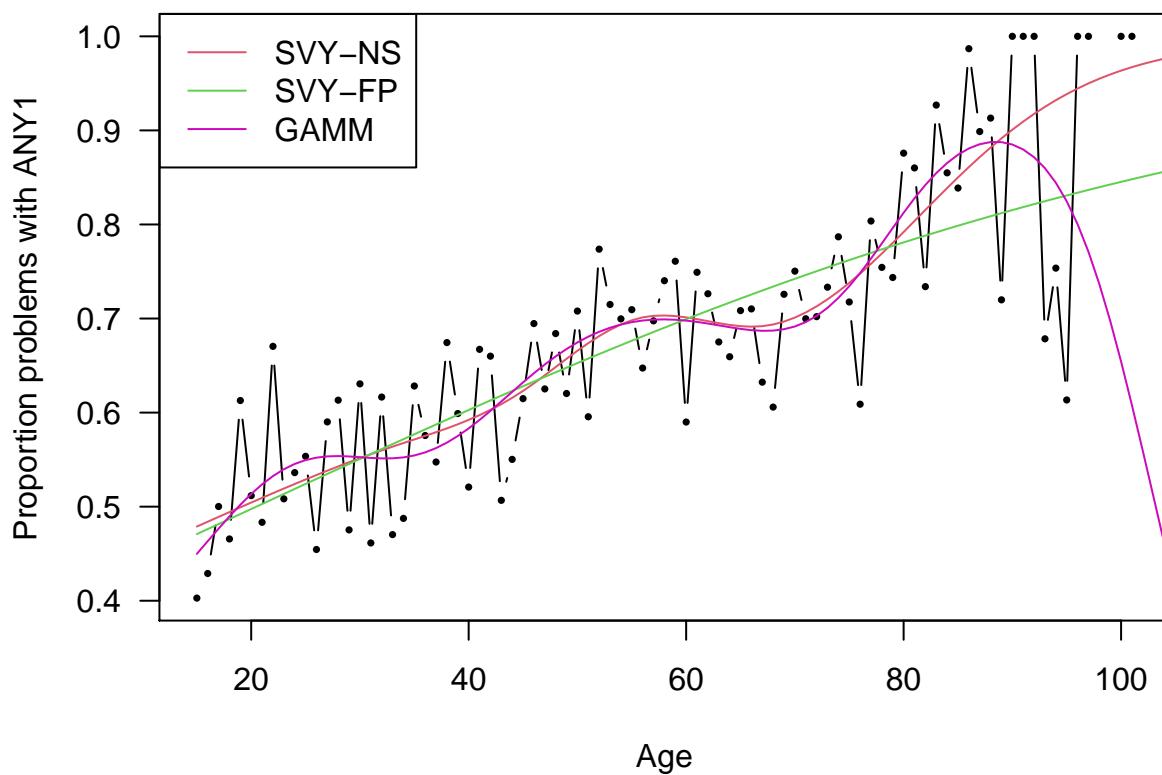
Fitted values with 95% confidence interval



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 + age.ns5
```

Coefficients:

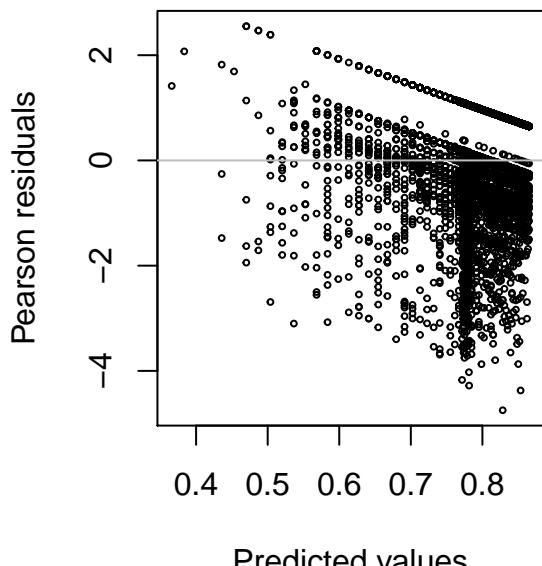
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.865192	0.012938	66.8714	< 2.2e-16 ***
age.ns1	-0.058721	0.015991	-3.6722	0.000243 ***
age.ns2	-0.106673	0.018988	-5.6178	2.042e-08 ***
age.ns3	-0.029069	0.023333	-1.2459	0.212877
age.ns4	-0.320406	0.037915	-8.4506	< 2.2e-16 ***
age.ns5	-0.487923	0.046879	-10.4082	< 2.2e-16 ***

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

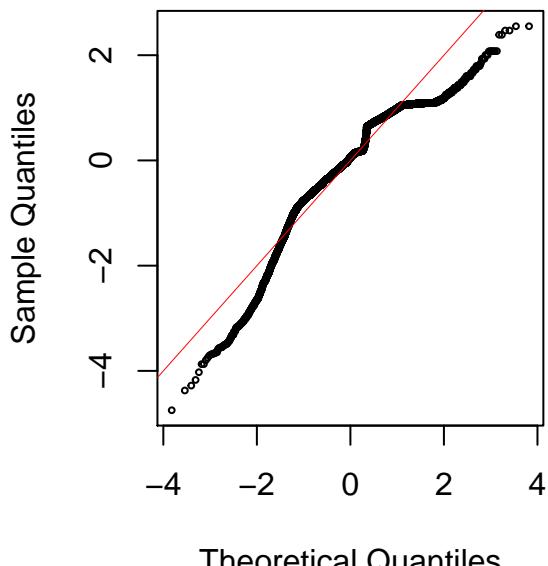
SSD: 301.0

AIC: 297.1

Residuals vs fitted



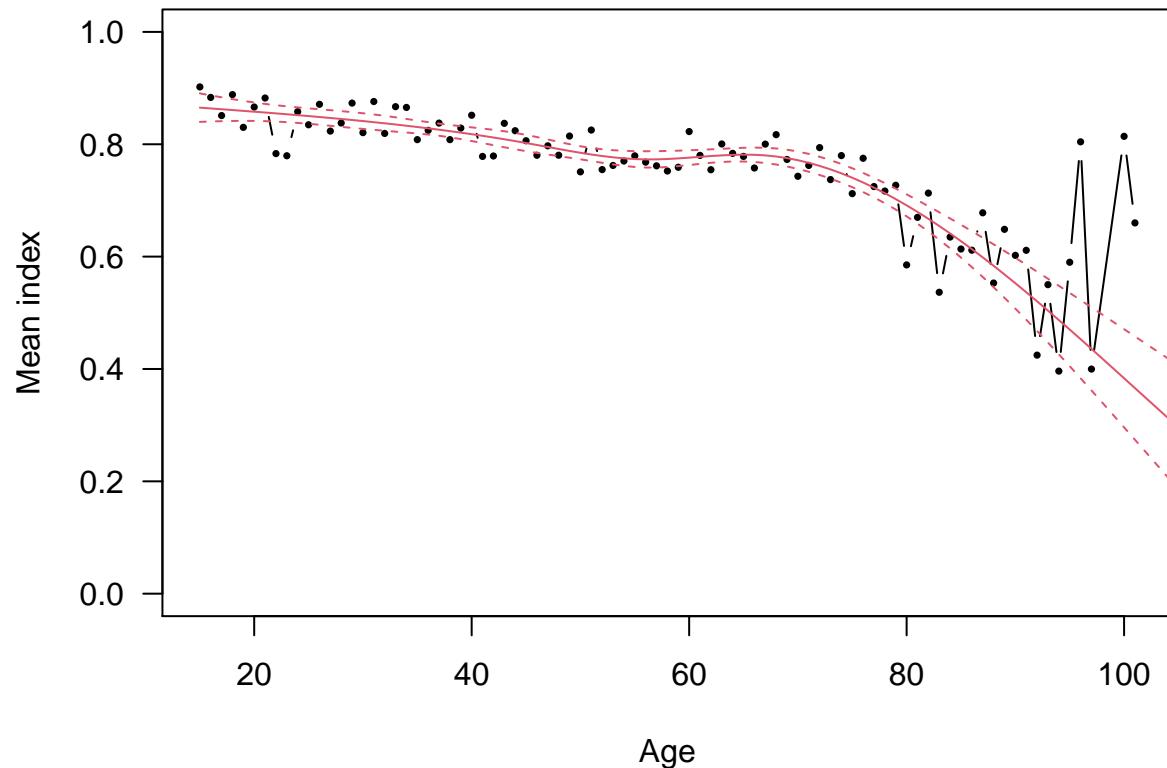
Normal Q-Q Plot



Predicted values

Theoretical Quantiles

Fitted values with 95% confidence interval



SVY-FP

Fitted model:

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

Coefficients:

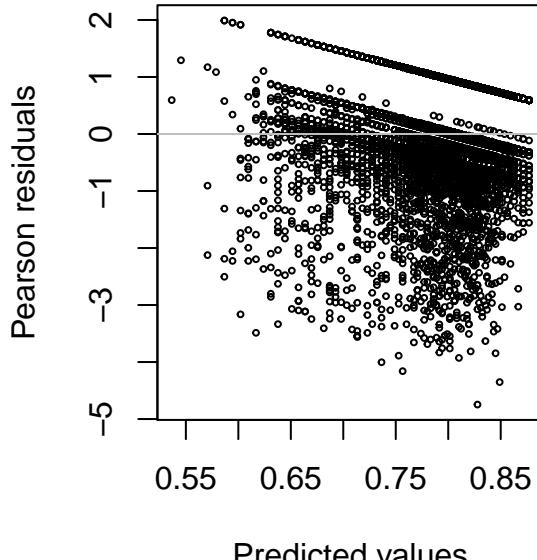
	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	0.83368192	0.00691452	120.570	< 2.2e-16 ***
I((age/100)^-2)	0.00099711	0.00038602	2.583	0.009822 **
I((age/100)^3)	-0.28936354	0.02660301	-10.877	< 2.2e-16 ***

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

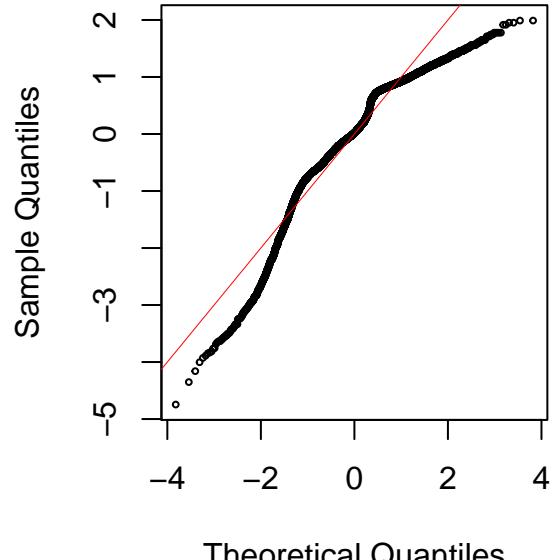
SSD: 302.9

AIC: 299.0

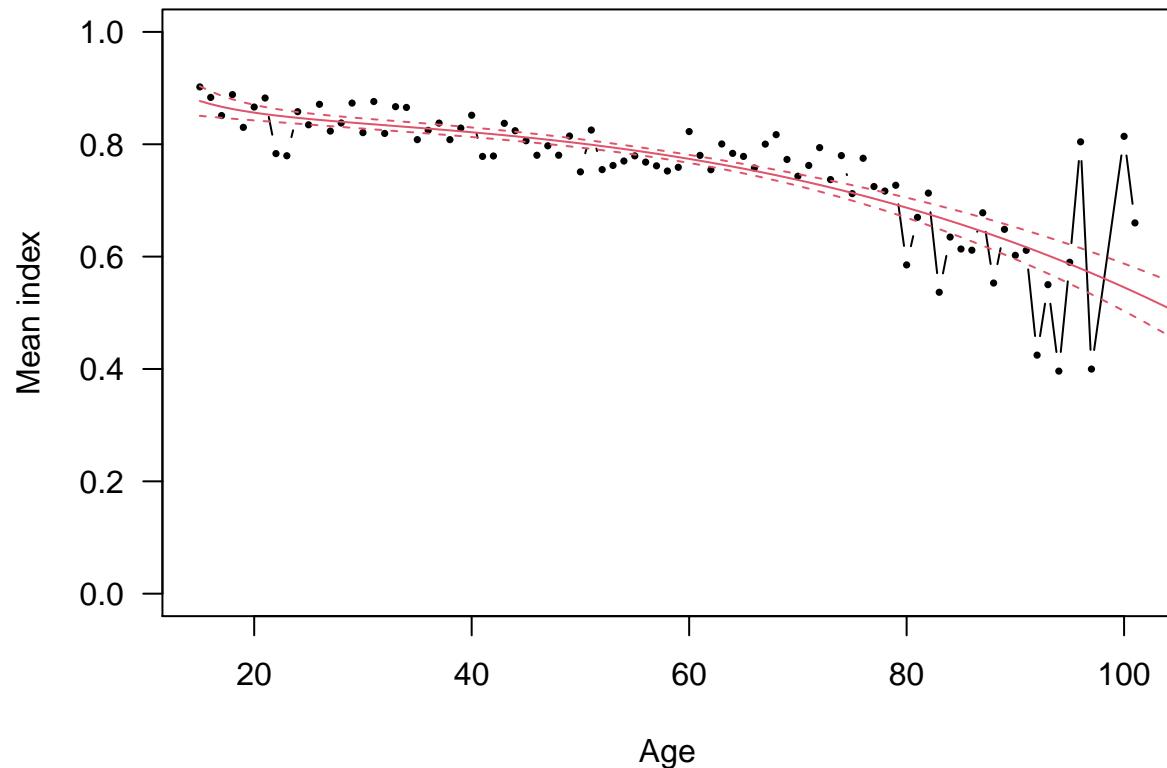
Residuals vs fitted



Normal Q-Q Plot



Fitted values with 95% confidence interval



BEOI-NS

```
Fitted mu model:  
xx ~ ns(age, df = 5)

Fitted nu model:  
~ns(age, df = 5)

*****
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)      | 1.10600  | 0.05247    | 21.078  | < 2e-16 ***  |
| ns(age, df = 5)1 | -0.17567 | 0.05701    | -3.082  | 0.00207 **   |
| ns(age, df = 5)2 | -0.24626 | 0.06641    | -3.708  | 0.00021 ***  |
| ns(age, df = 5)3 | -0.04033 | 0.05897    | -0.684  | 0.49402      |
| ns(age, df = 5)4 | -0.81967 | 0.13297    | -6.164  | 7.44e-10 *** |
| ns(age, df = 5)5 | -1.18521 | 0.09224    | -12.849 | < 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) | 2.32110  | 0.01911    | 121.4   | <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)      | 0.05189  | 0.11187    | 0.464   | 0.64281      |
| ns(age, df = 5)1 | -0.37643 | 0.12955    | -2.906  | 0.00367 **   |
| ns(age, df = 5)2 | -1.11304 | 0.16018    | -6.948  | 4.00e-12 *** |
| ns(age, df = 5)3 | -0.45098 | 0.18227    | -2.474  | 0.01337 *    |
| ns(age, df = 5)4 | -2.45735 | 0.33694    | -7.293  | 3.34e-13 *** |
| ns(age, df = 5)5 | -3.31569 | 0.40549    | -8.177  | 3.39e-16 *** |

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

-----
No. of observations in the fit: 7509  

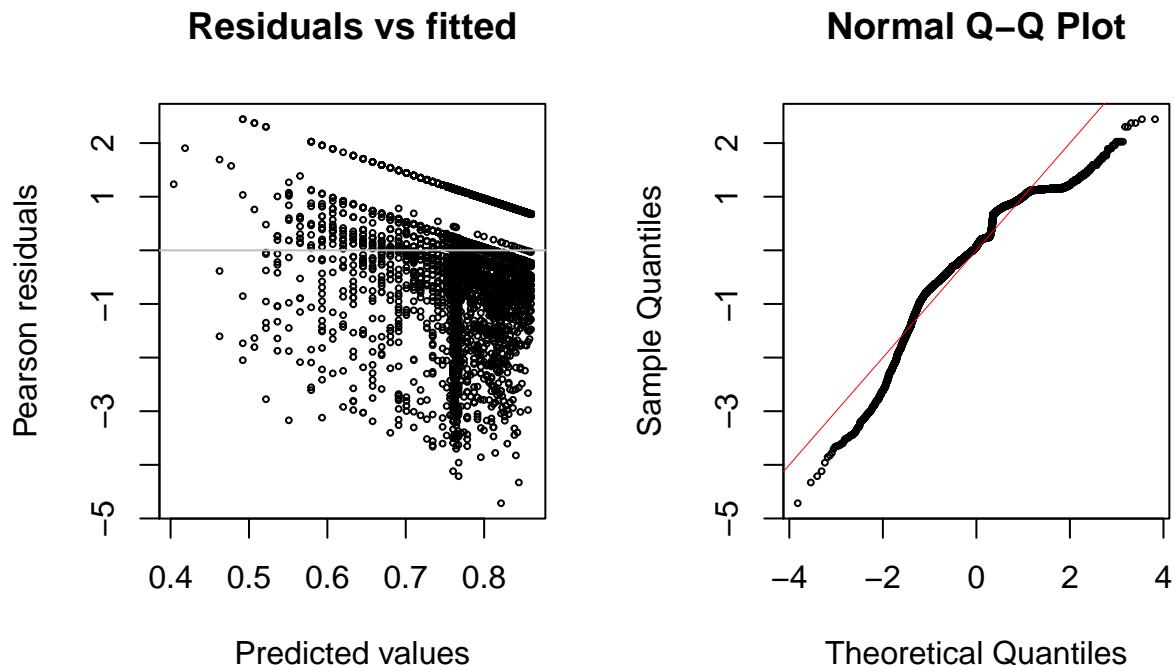
Degrees of Freedom for the fit: 13
```

Residual Deg. of Freedom: 7496
at cycle: 5

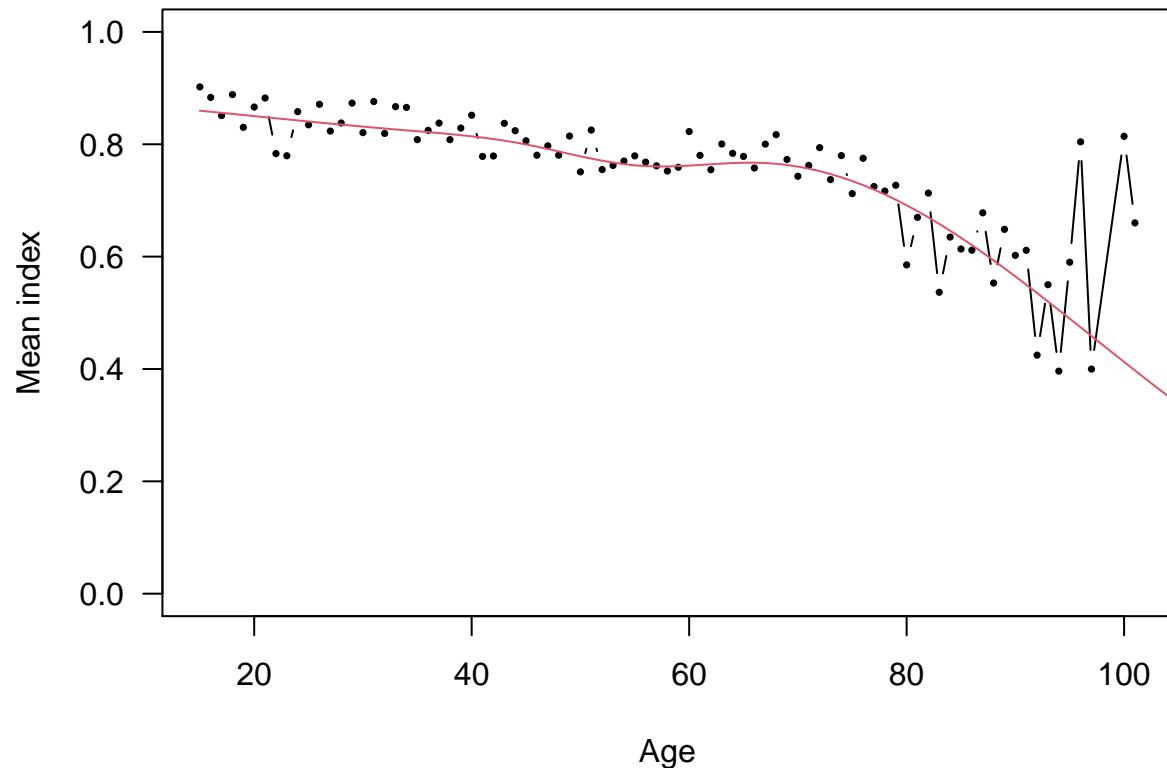
Global Deviance: 3378.5
AIC: 3404.5
SBC: 3494.51

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	1.10599625	0.05247068	21.0783665	7.247012e-96
ns(age, df = 5)1	-0.17567446	0.05700857	-3.0815445	2.066759e-03
ns(age, df = 5)2	-0.24626178	0.06640886	-3.7082671	2.101878e-04
ns(age, df = 5)3	-0.04032962	0.05896534	-0.6839547	4.940249e-01
ns(age, df = 5)4	-0.81967490	0.13297058	-6.1643327	7.444337e-10
ns(age, df = 5)5	-1.18521189	0.09224285	-12.8488218	2.160679e-37
(Intercept)	2.32109905	0.01911251	121.4439931	0.000000e+00
(Intercept)	0.05188524	0.11187278	0.4637879	6.428132e-01
ns(age, df = 5)1	-0.37642974	0.12954745	-2.9057287	3.674703e-03
ns(age, df = 5)2	-1.11304209	0.16018470	-6.9484921	4.001695e-12
ns(age, df = 5)3	-0.45097920	0.18226844	-2.4742583	1.337326e-02
ns(age, df = 5)4	-2.45734605	0.33693942	-7.2931390	3.337695e-13
ns(age, df = 5)5	-3.31569329	0.40549424	-8.1769182	3.391626e-16

SSD: 301.2
AIC: 3404.5



Fitted values (SE fit not available)



BEOI-FP

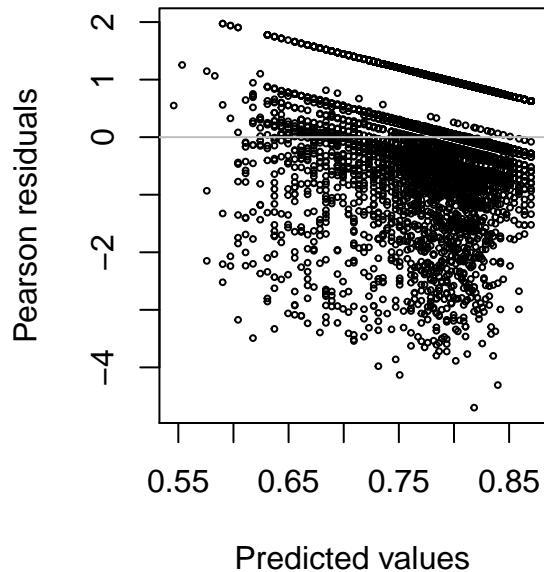
```
Fitted mu model:  
xx ~ I((age/100)^-2) + I((age/100)^3)  
  
Fitted nu model:  
~I((age/100)^-2) + I((age/100)^3)  
  
*****  
Family: c("BEOI", "One Inflated Beta")  
  
Call:  
gamlss(formula = f.mu, nu.formula = f.nu, family = BEOI, data = data.frame(xx = xx,  
    age = hisdesign$variables$age), control = gamlss.control(trace = FALSE))  
  
Fitting method: RS()  
  
-----  
Mu link function: logit  
Mu Coefficients:  
             Estimate Std. Error t value Pr(>|t|)  
(Intercept) 1.025526  0.021653 47.361 <2e-16 ***  
I((age/100)^-2) 0.001373  0.001583  0.867   0.386  
I((age/100)^3) -0.690761  0.061158 -11.295 <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) 2.31262  0.01911   121 <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: 5  
  
Global Deviance: 3439.359  
AIC: 3453.359  
SBC: 3501.826
```

```
*****
              Estimate Std. Error    t value   Pr(>|t|) 
(Intercept)  1.025526314 0.021653336 47.3611239 0.000000e+00
I((age/100)^2) 0.001373487 0.001583381  0.8674396 3.857289e-01
I((age/100)^3) -0.690760950 0.061157923 -11.2947090 2.401987e-29
(Intercept)  2.312622973 0.019105035 121.0478297 0.000000e+00
(Intercept) -0.341694811 0.057227098 -5.9708569 2.467606e-09
I((age/100)^2) 0.012843336 0.003612900  3.5548548 3.805148e-04
I((age/100)^3) -2.187377844 0.200947571 -10.8853162 2.168050e-27
```

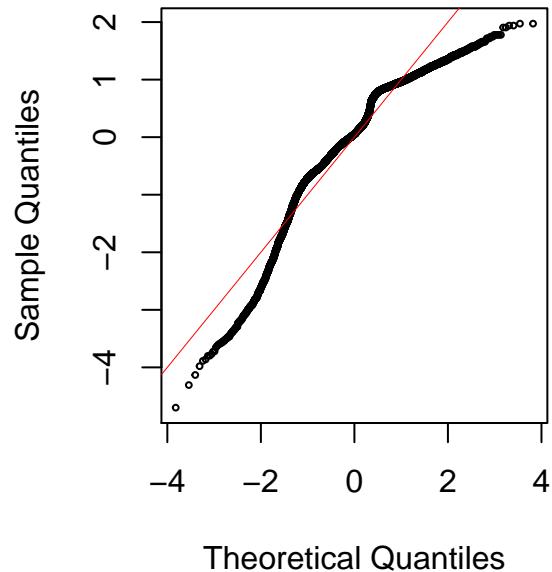
SSD: 303.3

AIC: 3453.4

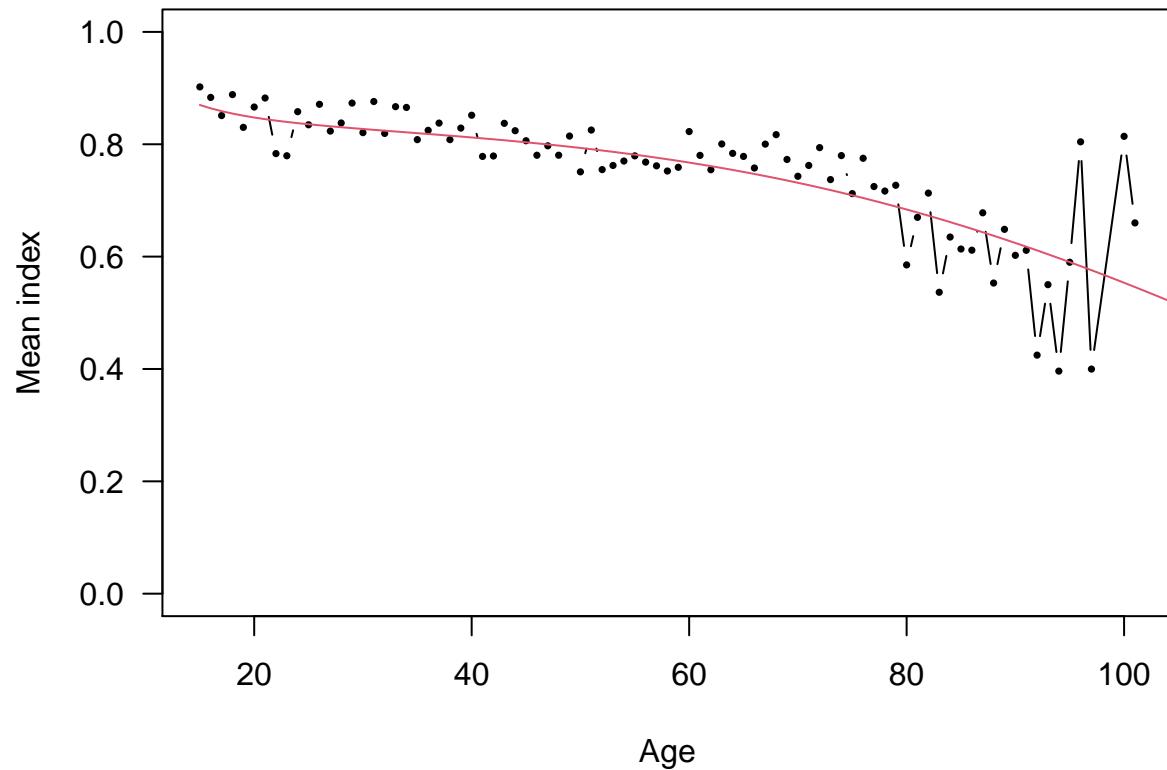
Residuals vs fitted



Normal Q-Q Plot



Fitted values (SE fit not available)



GAMM

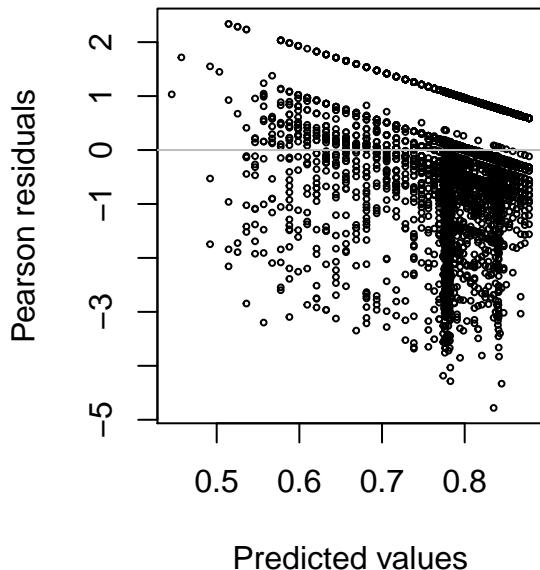
Fitted model:
index ~ s(age, bs = "tp")

Coefficients:

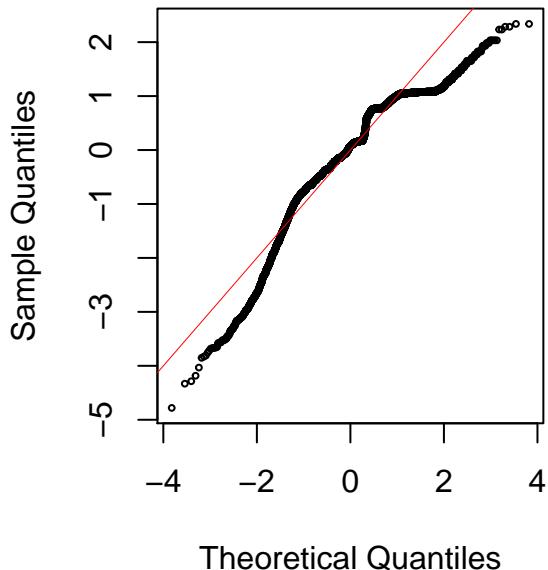
	Estimate	Std. Error	t value
X(Intercept)	0.7894641	0.0023034	342.735
Xs(age)Fx1	-0.1551951	0.0562717	-2.758

SSD: 301.0
AIC: 266.5

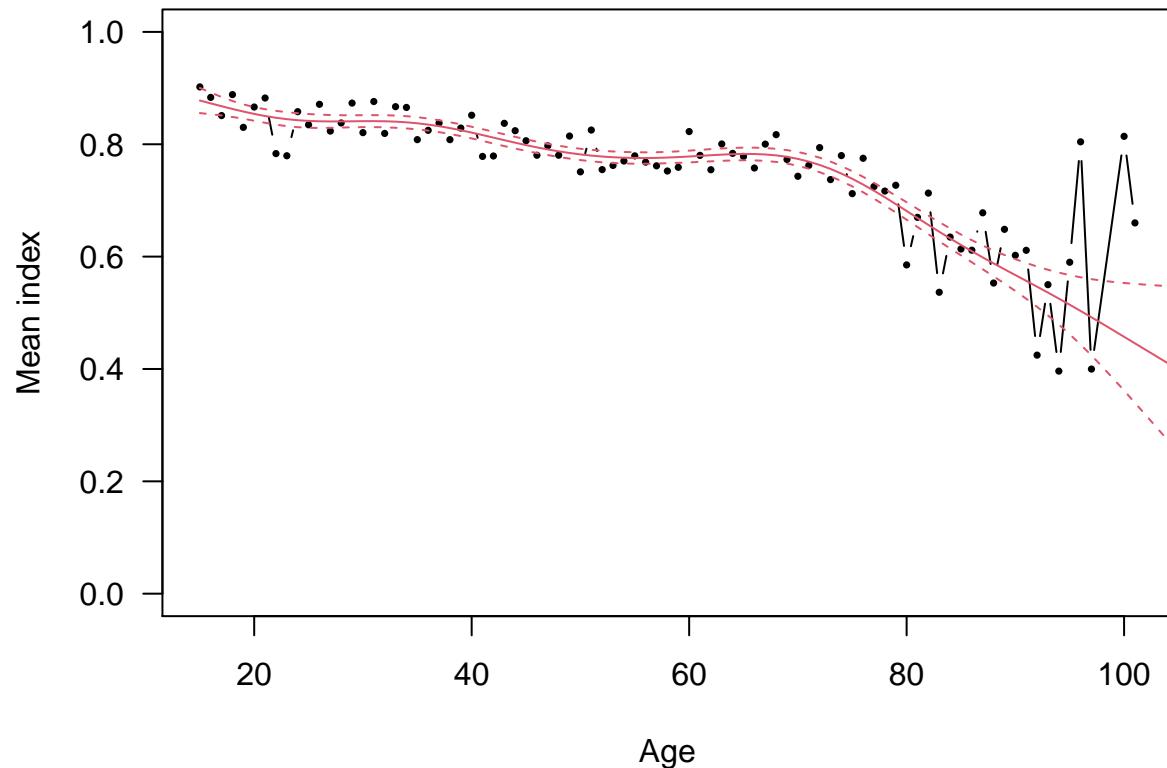
Residuals vs fitted



Normal Q-Q Plot



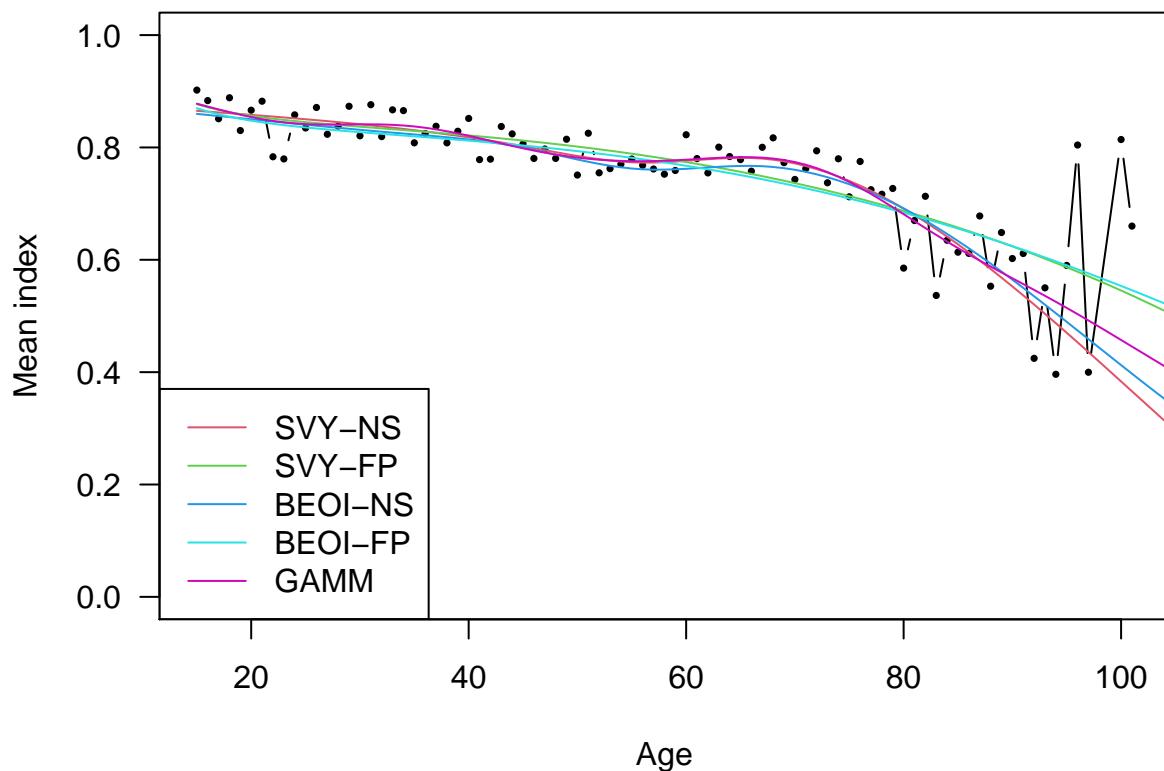
Fitted values with 95% confidence interval



Summary

	SSD	AIC
SVY-NS	301.0	297.1
SVY-FP	302.9	299.0
BEOI-NS	301.2	3404.5
BEOI-FP	303.3	3453.4
GAMM	301.0	266.5

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	301.0
SVY-FP	1074.8	382.3	1110.1	1751.7	1653.0	1650.1	302.9
BEOI-NS	NA	NA	NA	NA	NA	NA	301.2
BEOI-FP	NA	NA	NA	NA	NA	NA	303.3
GAMM	1072.9	381.3	1102.4	1748.1	1653.9	1646.3	301.0