

Recent Growth
Grade 8/Year 9
Fast Track Project Technical Report
Cynthia Rains
May 9, 2003

Table of Contents

- I. Scale Description
- II. Report Sample
- III. Scaling
- IV. Differences between Groups
- V. Recommendations for Use
- VI. Item and Scale Means and SDs
- VII. Item and Scale Correlations

Appendix

SAS scoring program

Citation

Instrument

Petersen, A.C., Crockett, L., Richards, M. & Boyer, A. (1988). A self-report measure of pubertal status: Reliability, validity, and initial norms. *Journal of Youth and Adolescence*, 17, 117-133.

Reports

Rains, C. (2003). *Recent Growth* (Fast Track Project Technical Report). [On-line]. Available: <http://www.fasttrackproject.org/>

Nix, R.L. (2001). *Recent Growth* (Fast Track Project Technical Report). [On-line]. Available: <http://www.fasttrackproject.org/>

Jones, D. (1998). *Recent Growth* (Fast Track Project Technical Report). Nashville, TN: Vanderbilt University.

Data Sources

Raw: C9S

Scored: RGR9

I. Scale Description

The Recent Growth measure was adapted from the Pubertal Development Scale (Petersen et al., 1988). In year 9 of this study, Recent Growth is a 16-item scale that assesses children's physical development. There are three items – one each about growth spurts, body hair, and skin changes, such as acne – that both boys and girls answered. There are five items – one each about voice changes, facial hair, leg hair, shaving, and depth of voice – that only boys answered, and six items – two about breast development, two about the onset of menstruation, one about leg hair, and one about hip width – that only girls answered. In addition, both boys and girls were asked one final question comparing their development to other boys or girls at their school. Thus, each boy answers a total of 9 questions and each girl answers a total of 10 questions.

Unlike other scales that assess puberty timing through physicians' direct examinations or with the aid of figure drawings or photographs, Recent Growth relies on children's self-reports. In a large, longitudinal study of children from upper-middle income families, the authors of this scale have demonstrated that the pattern of means among items falls in the expected order; there is satisfactory internal consistency in children's responses; there are few instances in which children report being less well-developed in an area than they have reported previously; observer's global ratings of children's development were

reasonably highly correlated with children's responses; and, direct measures of children's peak height velocity showed the appropriate pattern of correlations with children's self-reports.

II. Report Sample

These exploratory analyses were conducted on the first cohort on the high-risk control sample (N = 155) and the normative sample (N = 387, 463 with overlap) from the ninth year of the study. 98 records were missing the complete measure. 30 records were missing from the control sample (5 from Durham, 9 from Nashville, 8 from Pennsylvania, and 8 from Washington) and 84 records were missing from the normative sample (15 from Durham, 30 from Nashville, 20 from Pennsylvania, and 19 from Washington). These numbers may reflect some overlap between the two samples.

In breaking down the numbers by sex, there were a total of 209 females and 254 males in the first cohort for Year 9 of the study. For the males, 60 were missing the complete measure. 24 records were missing from the control sample (4 from Durham, 7 from Nashville, 7 from Pennsylvania, and 6 from Washington) and 48 records were missing from the normative sample (8 from Durham, 17 from Nashville, 11 from Pennsylvania, and 12 from Washington). These numbers may reflect some overlap between the two samples.

For the females, 38 were missing the complete measure. 6 were from the control sample (1 from Durham, 2 from Nashville, 1 from Pennsylvania, and 2 from Washington) and 36 were from the normative sample (7 from Durham, 13 from Nashville, 9 from Pennsylvania, and 7 from Washington). These numbers may reflect some overlap between the two samples. One item for the females showed a higher number of missing responses: 6-Age of Menstruation (87 missing, 39 of whom had indicated on item 5 that menstruation had begun).

III. Scaling

The scales for scoring the items on the Recent Growth measure vary with the question being asked. A number of the items for this measure are scored on a scale of 1 to 5, with a low score representing less physical development and a high score representing greater physical development. For several questions in year 8 of the study (as in earlier years), 5 is an "I don't know" option; these questions include growth spurt, body hair, skin changes, breast development for girls, and voice changes and facial hair for boys. Note that in later years (9 and 10) the "I don't know" option was dropped from the computer-administered version of the measure and interviewers administering the interview could use the options of "don't know," "refuse to answer," or "not applicable" to clarify a child's responses.

The measure starts out with three general questions for the child about growth in height, body hair, and skin changes. These are the same questions for both boys and girls. After these questions, the questions become sex specific: a male child has 6 additional questions to answer while a female child has 7 additional questions. For males, the topics include how deep their voices are, whether they have hair on their face, whether they have hair on their legs, how often they shave, whether their voice is lower than when they were in grade school, and how their development compares to other boys in their school. For females, the topics include whether their breasts have started to grow, whether they have begun to menstruate, at what age they began to menstruate, whether they have hair on their legs, whether their breasts are bigger than when they were younger, whether their hips are bigger than when they were younger, and how their development compares to other girls in their school.

All of the items were standardized before scale creation, with a mean of 0.0 and standard deviations of 1.0 due to the variety of scales involved for the items. Summing across the items in the instrument by sex then creates one subscale. For females, item 5 (menstruation onset) was reversed before it was standardized. Subjects were given a missing value on any score in which half or more of the items making up the score were missing. If fewer than half were missing, the missing items were replaced with the mean of the non-missing items.

The second scale was created to be able to compare data across the years. For *Puberty Scales*, the items were not standardized but were rescaled for consistency, so that “0” represents less physical development and a “5” represents greater physical development. The items were then summed to create the scales. Again, for females on both of these scores, item 5 (menstruation onset) was reversed before it was rescaled. As with the first score, subjects were given a missing value on any score in which half or more of the items making up the score were missing. If fewer than half were missing, the missing items were replaced with the mean of the non-missing items.

Cronbach’s alphas were calculated for each score by sex and can be seen in the following table:

Subscales	Cronbach’s Alpha	
	Control Sample	Normative Sample
Puberty Scale Standardized for Males (RGR9PB1)	.74	.76
Puberty Scale Standardized for Females (RGR9PB1)	.64	.68
Puberty Scale for Males (RGR9PB2)	.74	.76
Puberty Scale for Females (RGR9PB2)	.64	.66

All of the scales showed an adequate level of internal reliability. The reliabilities are slightly higher for males than for females.

IV. Differences between Groups

A series of t-tests comparing the high-risk control sample and the normative sample (including the overlap) indicated no significant differences for the subscales.

Recent Growth—Subscale for Females

Variable	Normative Sample		Control Sample		DF	t Value	Pr > t
	Mean	Std Dev	Mean	Std Dev			
Puberty Scale Standardized (RGR9PB1)	0.04	0.54	0.04	0.53	169	0.04	0.9659
Puberty Scale (RGR9PB2)	3.36	0.61	3.36	0.63	169	-0.05	0.9629

Recent Growth—Subscale for Males

Variable	Normative Sample		Control Sample		DF	t Value	Pr > t
	Mean	Std Dev	Mean	Std Dev			
Puberty Scale Standardized (RGR9PB1)	-0.05	0.59	-0.08	0.59	192	-0.33	0.7439
Puberty Scale (RGR9PB2)	2.45	0.77	2.40	0.76	192	-0.44	0.6587

Recent Growth—Item for Females

Variable	Normative Sample		Control Sample		DF	t Value	Pr > t
	Mean	Std Dev	Mean	Std Dev			
Age when menstruation started (C9SG6)	11.87	1.39	12.20	0.88	120	1.15	0.2533

V. Recommendations for Use

Analysts should note that the subscale was normally distributed for the normative males and females and for the control males and females.

Analysts should select the subscales that they want to use carefully. If an analysis of gender differences is desired, then analysts should use the first subscale with the standardized items. If an analysis of pubertal growth over a number of years is desired, then analysts should use the second scale with a rescaling of the variables to make the values consistent.

VI. Item and Scale Means and SDs

Recent Growth Items Normative Sample for Females Year 9

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
C9SA1	Growth Spurt	154	2.844	0.810	1.000	4.000
C9SA2	Body Hair	154	3.234	0.613	1.000	4.000
C9SA3	Skin Changes	154	2.812	0.739	1.000	4.000
C9SG4	Breast Development	154	2.961	0.522	1.000	4.000
C9SG5	Menstruation Onset	154	3.844	0.668	1.000	4.000
C9SG6	Age of Menstruation (Years)	108	11.895	1.359	7.667	14.250
C9SG7	Leg Hair	154	3.292	1.204	1.000	5.000
C9SG8	Description of Breast Development	154	3.916	0.800	2.000	5.000
C9SG9	Description of Hip Width	154	3.331	0.922	1.000	5.000
C9SG10	Development compared - other girls	153	3.359	0.950	1.000	5.000

Recent Growth Items Control Sample for Females Year 9

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
C9SA1	Growth Spurt	36	2.972	0.560	2.000	4.000
C9SA2	Body Hair	36	3.278	0.615	2.000	4.000
C9SA3	Skin Changes	36	2.806	0.786	1.000	4.000
C9SG4	Breast Development	36	3.028	0.560	2.000	4.000
C9SG5	Menstruation Onset	36	3.833	0.697	1.000	4.000
C9SG6	Age of Menstruation (Years)	26	12.196	0.880	10.333	14.000
C9SG7	Leg Hair	36	3.250	1.422	1.000	5.000
C9SG8	Description of Breast Development	36	3.944	0.791	2.000	5.000
C9SG9	Description of Hip Width	36	3.250	0.906	1.000	5.000
C9SG10	Development compared - other girls	35	3.143	1.264	1.000	5.000

Recent Growth Subscale Normative Sample for Females Year 9

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
RGR9PB1	Puberty Scale Standardized - w/miss Y9	154	0.036	0.530	-1.677	1.448
RGR9PB2	Puberty Scale - w/miss Y9	154	3.356	0.608	1.435	5.000

Recent Growth Subscale Control Sample for Females Year 9

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
RGR9PB1	Puberty Scale Standardized - w/miss Y9	36	0.044	0.531	-1.355	0.887
RGR9PB2	Puberty Scale - w/miss Y9	36	3.357	0.631	1.806	4.352

Recent Growth Items Normative Sample for Males Year 9

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
C9SA1	Growth Spurt	149	2.658	0.634	1.000	4.000
C9SA2	Body Hair	149	2.919	0.552	1.000	4.000
C9SA3	Skin Changes	149	2.530	0.802	1.000	4.000
C9SB4	Voice Change	149	2.523	0.785	1.000	4.000
C9SB5	Facial Hair	149	2.128	0.765	1.000	4.000
C9SB6	Leg Hair	149	3.443	0.925	1.000	5.000
C9SB7	Shaving	149	1.718	1.139	1.000	5.000
C9SB8	Voice lower?	149	2.953	1.301	1.000	5.000
C9SB9	Development compared - other boys	149	3.128	1.029	1.000	5.000

Recent Growth Items Control Sample for Males Year 9

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
C9SA1	Growth Spurt	89	2.640	0.742	1.000	4.000
C9SA2	Body Hair	88	2.909	0.672	1.000	4.000
C9SA3	Skin Changes	89	2.517	0.755	1.000	4.000
C9SB4	Voice Change	89	2.674	0.850	1.000	4.000
C9SB5	Facial Hair	89	2.225	0.808	1.000	4.000
C9SB6	Leg Hair	88	3.477	0.994	1.000	5.000
C9SB7	Shaving	89	1.753	1.180	1.000	6.000
C9SB8	Voice lower?	89	2.618	1.327	1.000	5.000
C9SB9	Development compared - other boys	89	2.989	1.173	1.000	5.000

Recent Growth Subscale Normative Sample for Males Year 9

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
RGR9PB1	Puberty Scale Standardized - w/miss Y9	149	-0.074	0.563	-1.445	1.371
RGR9PB2	Puberty Scale - w/miss Y9	149	2.423	0.735	0.648	4.306

Recent Growth Subscale Control Sample for Males Year 9

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
RGR9PB1	Puberty Scale Standardized - w/miss Y9	89	-0.082	0.586	-1.561	1.136
RGR9PB2	Puberty Scale - w/miss Y9	89	2.402	0.761	0.574	3.981

VII. Item and Scale Correlations

Recent Growth Items Report Sample for Females Year 9

Pearson Correlation Coefficients Prob > r under H0: Rho=0 Number of Observations										
	C9SA1	C9SA2	C9SA3	C9SG4	C9SG5	C9SG6	C9SG7	C9SG8	C9SG9	C9SG10
C9SA1 Growth Spurt	1.00000 0.0008 171	0.25406 0.0008 171	0.11643 0.1294 171	0.40841 <.0001 171	0.14838 0.0528 171	-0.04234 0.6433 122	-0.01358 0.8600 171	0.14072 0.0664 171	0.18242 0.0169 171	0.20985 0.0060 170
C9SA2 Body Hair	0.25406 0.0008 171	1.00000 171	0.29660 <.0001 171	0.31312 <.0001 171	0.17589 0.0214 171	-0.35923 <.0001 122	0.11709 0.1272 171	0.14633 0.0562 171	0.01155 0.8808 171	0.14943 0.0518 170
C9SA3 Skin Changes	0.11643 0.1294 171	0.29660 <.0001 171	1.00000 171	0.29093 0.0001 171	0.11589 0.1312 171	-0.16336 0.0722 122	0.06599 0.3912 171	0.06799 0.3769 171	0.09525 0.2152 171	0.11729 0.1277 170
C9SG4 Breast Development	0.40841 <.0001 171	0.31312 <.0001 171	0.29093 0.0001 171	1.00000 171	0.21917 0.0040 171	-0.30331 0.0007 122	0.03600 0.6402 171	0.39527 <.0001 171	0.28329 0.0002 171	0.32019 <.0001 170
C9SG5 Menstruation Onset	0.14838 0.0528 171	0.17589 0.0214 171	0.11589 0.1312 171	0.21917 0.0040 171	1.00000 171	. .br/>122	0.06512 0.3974 171	0.19308 0.0114 171	0.13913 0.0696 171	0.25862 0.0007 170
C9SG6 Age of Menstruation (Years)	-0.04234 0.6433 122	-0.35923 <.0001 122	-0.16336 0.0722 122	-0.30331 0.0007 122	. .br/>122	1.00000 122	-0.09638 0.2910 122	-0.10235 0.2619 122	-0.26425 0.0033 122	-0.17859 0.0500 121
C9SG7 Leg Hair	-0.01358 0.8600 171	0.11709 0.1272 171	0.06599 0.3912 171	0.03600 0.6402 171	0.06512 0.3974 171	-0.09638 0.2910 122	1.00000 171	0.28017 0.0002 171	0.28995 0.0001 171	0.02274 0.7685 170
C9SG8 Description of Breast Development	0.14072 0.0664 171	0.14633 0.0562 171	0.06799 0.3769 171	0.39527 <.0001 171	0.19308 0.0114 171	-0.10235 0.2619 122	0.28017 0.0002 171	1.00000 171	0.45105 <.0001 171	0.26862 0.0004 170
C9SG9 Description of Hip Width	0.18242 0.0169 171	0.01155 0.8808 171	0.09525 0.2152 171	0.28329 0.0002 171	0.13913 0.0696 171	-0.26425 0.0033 122	0.28995 0.0001 171	0.45105 <.0001 171	1.00000 171	0.32839 <.0001 170
C9SG10 Development compared - other girls	0.20985 0.0060 170	0.14943 0.0518 170	0.11729 0.1277 170	0.32019 <.0001 170	0.25862 0.0007 170	-0.17859 0.0500 121	0.02274 0.7685 170	0.26862 0.0004 170	0.32839 <.0001 170	1.00000 170

Recent Growth Items Report Sample for Males Year 9

Pearson Correlation Coefficients Prob > r under H0: Rho=0 Number of Observations									
	C9SA1	C9SA2	C9SA3	C9SB4	C9SB5	C9SB6	C9SB7	C9SB8	C9SB9
C9SA1 Growth Spurt	1.00000 <.0001 194	0.30706 <.0001 193	0.30911 <.0001 194	0.41886 <.0001 194	0.19551 0.0063 194	0.08107 0.2624 193	0.03209 0.6569 194	0.27103 0.0001 194	0.28083 <.0001 194
C9SA2 Body Hair	0.30706 <.0001 193	1.00000 <.0001 193	0.30142 <.0001 193	0.23801 0.0009 193	0.12730 0.0777 193	0.17530 0.0148 193	0.18433 0.0103 193	0.15450 0.0319 193	0.37012 <.0001 193
C9SA3 Skin Changes	0.30911 <.0001 194	0.30142 <.0001 193	1.00000 <.0001 194	0.40139 <.0001 194	0.37017 <.0001 194	0.32386 <.0001 193	0.27730 <.0001 194	0.33764 <.0001 194	0.27789 <.0001 194
C9SB4 Voice Change	0.41886 <.0001 194	0.23801 0.0009 193	0.40139 <.0001 194	1.00000 <.0001 194	0.49554 <.0001 194	0.22651 0.0015 193	0.13436 0.0618 194	0.39990 <.0001 194	0.33764 <.0001 194
C9SB5 Facial Hair	0.19551 0.0063 194	0.12730 0.0777 193	0.37017 <.0001 194	0.49554 <.0001 194	1.00000 <.0001 194	0.32383 <.0001 193	0.26728 0.0002 194	0.26865 0.0002 194	0.26564 0.0002 194
C9SB6 Leg Hair	0.08107 0.2624 193	0.17530 0.0148 193	0.32386 <.0001 193	0.22651 0.0015 193	0.32383 <.0001 193	1.00000 <.0001 193	0.28134 <.0001 193	0.18769 0.0090 193	0.24886 0.0005 193
C9SB7 Shaving	0.03209 0.6569 194	0.18433 0.0103 193	0.27730 <.0001 194	0.13436 0.0618 194	0.26728 0.0002 194	0.28134 <.0001 193	1.00000 <.0001 194	0.34205 <.0001 194	0.21753 0.0023 194
C9SB8 Voice lower?	0.27103 0.0001 194	0.15450 0.0319 193	0.33764 <.0001 194	0.39990 <.0001 194	0.26865 0.0002 194	0.18769 0.0090 193	0.34205 <.0001 194	1.00000 <.0001 194	0.38543 <.0001 194
C9SB9 Development compared - other boys	0.28083 <.0001 194	0.37012 <.0001 193	0.27789 <.0001 194	0.33764 <.0001 194	0.26564 0.0002 194	0.24886 0.0005 193	0.21753 0.0023 194	0.38543 <.0001 194	1.00000 194

Recent Growth Subscales Report Sample for Females Year 9

Pearson Correlation Coefficients, N = 171 Prob > r under H0: Rho=0		
	RGR9PB1	RGR9PB2
RGR9PB1 Puberty Scale Standardized - w/miss Y9	1.00000	0.99698 <.0001
RGR9PB2 Puberty Scale - w/miss Y9	0.99698 <.0001	1.00000

Recent Growth Subscales Report Sample for Males Year 9

Pearson Correlation Coefficients, N = 194 Prob > r under H0: Rho=0		
	RGR9PB1	RGR9PB2
RGR9PB1 Puberty Scale Standardized - w/miss Y9	1.00000	0.99817 <.0001
RGR9PB2 Puberty Scale - w/miss Y9	0.99817 <.0001	1.00000