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Self- and Teacher-Rated School Adjustment in MZ and DZ Twins

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Abstract. In a Swedish longitudinal twin study, teacher ratings of school adjustment were collected in grades 3 and 6 for approximately 80 pairs of MZ twins, 100 pairs of DZ like-sex twins, and 70 pairs of opposite-sex twins. These same groups of twins then rated their own school adjustment in grades 4 and 6 as seen by the home, the school, their classmates, and themselves.

A comparison of within-pair similarity for the different types of self-ratings tends to show more consistency and a higher concordance for MZ compared to DZ in grade 6 than in grade 4.

The teacher ratings tend to show a larger and more consistent difference between MZ and DZ than the twins' own ratings.

The results reported have certain implications for heritability estimates based on different types of ratings. Ratings by others thus seem to give the highest intraclass correlations, probably due to a certain halo effect. Self ratings, on the other hand, tend to fluctuate more over time at least for children before and at puberty. Also the construction of items seems to influence the magnitude of the correlations.

Key words: Longitudinal study, Self rating, Teacher rating, School behavior, Heredity, Environment

INTRODUCTION

Different types of adjustment measurements have been applied in twin studies to try to assess how much of the adjustment or lack of adjustment can be ascribed to personality factors, thought to be at least partly inherited [9]. In connection with this, one could also discuss whether, in the case of a maladjustment, the individual should change, or the environment [4], or, in an interactionistic perspective, *both* [2].

The method most commonly used to investigate personality and adjustment consists

in the administration of questionnaires either to the twins themselves or to persons in their environment. Very few studies, however, have used both approaches [9].

Cattell [1] calls the two types of data collected L- and Q-data, respectively. L-data denotes observer ratings or measures of behavior, while Q-data denotes self assessment data. Cattell maintains that factors derived from the two types of data "are essentially the same in number and nature" [1: p 326].

Loehlin & Nichols [8] compared self-report data and parental rating data of different personality dimensions and found about the same within-pair correlations for MZ twins (0.50). For DZ twins, however, there was a substantial difference between self-reports and parental ratings, so that self-report data resulted in correlations around 0.30, while parental ratings were much lower and often negative.

Plomin [11] made an overview of different studies using self-report questionnaires and parental ratings for collecting data on personality in twins. Typically, there is a smaller difference between MZ and DZ twins in within-pair similarity for self-report data, while parental ratings give a larger difference between the two groups, mainly due to DZ correlations being lower. Plomin has also looked at what he calls "molar" and "molecular" ratings. By molar ratings he implies an unspecified, general view of twin behavior, while molecular ratings designate situation-specific judgments of behavior data. Typically, within-pair twin correlations tend to be higher for the molecular measures (in the range of 0.70-0.80 for MZ and 0.30-0.50 for DZ).

Personality questionnaires have traditionally been quite generally formulated (eg, Do you regard yourself as happy and carefree?), while adjustment ratings by nature are more situationbound, since adjustment implies a combination of personality and environmental characteristics.

Harris & Rose [3] compared self-descriptions and mother's ratings of personality dimensions in a twin sample, and found that the mothers rated the MZ twins much more similarly than the DZ. The self-descriptions did not confirm this result, however. Harris & Rose thus conclude that "stereotyped parental expectation may seriously confound ratings of personality resemblance in twins". They also suggest that the physical similarity of MZ twins in comparison to DZ twins may inflate the similarity ratings.

The results presented imply that even if you tend to get the same dimensions, when factor-analyzing self-report data and ratings by others, the within-pair correlations for MZ and DZ twins tend to be quite different for the two types of data. Typically, DZ correlations tend to be lower and sometimes MZ correlations are higher, when parents or other people in the environment are rating the twins, thus leading to a larger gap between the two twin categories in within-pair similarity. The conclusions concerning heredity-environment influences drawn from different types of studies are therefore dependent upon the type of data used.

The following, is an attempt to test this assumption on a Swedish longitudinal twin study called the SLU-project.

MATERIALS AND METHODS

The SLU-project started at the Department of Educational Research at the Stockholm School of Education in 1964. Originally, 323 twin pairs were followed through compulsory school from grade 3 to grade 9. A thorough description of the study has been given by Ljung et al [6]. Of the 323 pairs, 94 were classified as MZ and 133 as like-sex DZ, while 96 were unlike-sex pairs. For classifying the like-sex

twin pairs, a morphological diagnosis according to a special schedule was applied. A serological analysis was also made for 71 of the 227 like-sex SLU-pairs. A description of the methods has been given by Ljung et al [7].

Several types of data were collected, such as height and weight measurements and different types of test results [2]. In grades 3 and 6 the teachers of the twins were given a rating scale consisting of 16 items in grade 3 and 11 in grade 6. They were told to rate the twins' behavior at school on a scale from 1 to 4. The types of items included were, eg, "Needs more help than the average", "Is day-dreaming during lessons", or "Is disturbing lessons". A higher rating implied a more school-norm deviant behavior than a lower rating.

In grades 4 and 6 the twins were given a questionnaire called "What others say and you think". The twins were supposed to rate the opinions of themselves given by parents, teachers and class-mates on a 4-grade scale, and also to give their own opinion of themselves. A factor analysis of this questionnaire showed two factors, A and B, appearing for all four types of ratings. Factor A was called "school-norm deviant behavior" and comprised the same type of items given to the teachers, such as, "You are thinking of irrelevant things during lessons". A high score on this scale implies a more school-norm deviant behavior than a low. Factor B is called "adult-norm adjusted behavior" and comprises items such as "You are helping others" or "You are quiet and calm". A high score implies a more adult-norm adjusted behavior than a low score [10].

When comparing within-pair similarity for MZ and DZ twins for the different types of ratings, intraclass correlations (R) have been calculated. A detailed discussion of this method and description of data program used has been given by Ljung [5].

RESULTS

Table 1 gives the within-pair correlations, by sex and zygosity, for the rating of school behavior given by teachers in the classes attended by the twins. The within-pair correlations for MZ twins are very high (around 0.80-0.90) for both boys and girls, while those for DZ like-sex pairs are moderate (around 0.50), and those for opposite-sex pairs low (around 0.30).

Table 2 illustrates the within-pair correlations for the school-norm deviant behavior ratings given by the twins themselves. The correlations have been calculated separately according to their own experience of opinion given at home, at school, and by their class-mates. In accordance to this, they have also given their own views of themselves. These ratings have been collected both in grade 4 and 6.

Within-pair comparison of ratings given by the twins themselves on school-norm deviant behavior are rather inconsistent, especially in grade 4. Maybe it is a too difficult task for 11-year olds to estimate what others think of them. In grade 6 there is more consistency, so that MZ twins think that others rate them more similarly than DZ twins. The correlations of others' opinions in grade 6 also tend to be higher for females than for males. Own ratings in grade 6 show a higher similarity for DZ like-sex twins than for MZ twins. It thus seems as though DZ twins experience their behavior at school as more similar than MZ twins. It is also noticeable that correlations for opposite-sex twins tend to be of the same magnitude as for like-sex twins.

Table 3 finally gives the within-pair correlations for adult-norm adjusted behavior. The ratings given by the twins tend to show larger and more consistent differences in within-pair similarity between MZ and DZ twins in grade 6 compared to grade 4. This is in agreement with the findings for school-norm deviant behavior and may be an effect of the difficulty earlier mentioned, of rating others' opinions in grade 4. Within-pair correlations of own ratings are low for both MZ and DZ twins in grade 6. The correlations for opposite-sex twins tend to be of the same magnitude as for like-sex twins for adult-norm adjusted behavior as well as for school-norm deviant behavior.

TABLE 1 - Intra-class Correlations (R) for MZ and DZ Twins for Teacher Ratings

	MZ pairs				DZ like-sex pairs				DZ opposite-sex pairs						
	Male		Female		Male		Female		Male		Female				
	R	df	R	df	R	df	R	df	R	df	R	df			
Teacher rating grade 3	0.78	8.23	38/39	0.81	9.62	36/37	0.49	2.91	52/53	0.56	3.55	55/56	0.27	1.73	78/79
Teacher rating grade 6	0.82	10.36	42/43	0.95	42.42	38/39	0.52	3.16	58/59	0.53	3.22	50/51	0.35	2.69	75/76

TABLE 2 - Intra-class Correlations (R) for MZ and DZ Twins for Ratings of School-Norm Deviant Behavior

	MZ pairs				DZ like-sex pairs				DZ opposite-sex pairs						
	Male		Female		Male		Female		Male		Female				
	R	df	R	df	R	df	R	df	R	df	R	df			
At home grade 4	0.38	2.22	38/39	0.55	3.48	39/40	0.02	1.04	51/52	0.53	3.27	53/54	0.37	2.20	71/72
At school grade 4	0.22	1.57	38/39	0.70	5.71	36/37	0.35	2.09	48/49	0.29	1.82	49/50	0.27	1.74	69/70
Class-mates grade 4	0.12	1.28	36/37	0.46	2.73	35/36	0.49	2.88	48/49	0.00	1.00	47/48	0.40	2.32	67/68
Own rating grade 4	0.39	2.26	31/32	-0.01	0.98	33/34	0.10	1.22	49/50	0.11	1.24	45/46	0.11	1.25	59/60
At home grade 6	0.55	3.46	43/44	0.63	4.36	41/42	0.05	1.11	53/54	0.36	2.14	55/56	0.12	1.28	74/75
At school grade 6	0.58	3.78	41/42	0.69	5.34	38/39	0.21	1.53	52/53	0.46	2.67	51/52	0.33	2.00	71/72
Class-mates grade 6	0.54	3.36	40/41	0.57	3.63	35/36	0.06	1.12	52/53	0.33	1.99	51/52	0.32	1.94	69/70
Own rating grade 6	0.23	1.60	38/39	0.45	2.65	37/38	0.23	1.59	44/45	0.43	2.49	51/52	0.15	1.35	66/67

TABLE 3 - Intraclass Correlations (R) for MZ and DZ Twins for Ratings of Adult-Norm Adjusted Behavior

	MZ pairs						DZ like-sex pairs						DZ opposite-sex pairs		
	Male			Female			Male			Female			R	F	df
	R	F	df	R	F	df	R	F	df	R	F	df			
At home grade 4	0.36	2.11	42/43	0.39	2.27	38/39	0.40	2.31	49/50	0.07	1.14	54/55	0.19	1.48	73/74
At school grade 4	0.41	2.41	40/41	0.49	2.91	33/34	0.49	2.93	48/49	0.16	1.37	48/49	0.15	1.36	68/69
Class-mates grade 4	0.23	1.60	39/40	0.23	1.59	33/34	0.47	2.76	47/48	-0.05	0.91	51/52	0.28	1.77	71/72
Own rating grade 4	0.30	1.86	37/38	0.32	1.94	32/33	0.36	2.10	47/48	0.22	1.56	46/47	0.04	1.08	60/61
At home grade 6	0.62	4.24	41/42	0.64	4.50	40/41	0.25	1.66	56/57	0.41	2.41	57/58	0.24	1.64	77/78
At school grade 6	0.34	2.03	40/41	0.43	2.54	39/40	0.15	1.36	55/56	0.32	1.93	54/55	0.24	1.62	74/75
Class-mates grade 6	0.40	2.34	40/41	0.49	2.89	39/40	0.26	1.70	55/56	0.18	1.43	54/55	0.20	1.49	74/75
Own rating grade 6	0.30	1.86	38/39	0.29	1.82	35/36	0.31	1.91	46/47	0.09	1.19	53/54	0.17	1.41	69/70

Figs. 1 and 2 illustrate within-pair correlations for MZ and DZ like-sex twins for school-norm deviant behavior ratings made by the twins in grades 4 and 6 by their teachers in grades 3 and 6. A comparison of within-pair correlations for school-norm deviant behavior made by the twins and by their teachers shows a consistent trend. The teacher ratings correlations tend to be higher especially for MZ twins and the gap between MZ and DZ twins is fairly consistent from grade 3 to 6. For the ratings made by the twins the correlations for MZ and DZ tend to be of the same magnitude and there is no consistent trend for MZ twins to show a higher within-pair similarity than DZ. It could be noticed, however, that the highest correlations found for both MZ and DZ in grade 6 concern teacher opinions.

Figs. 3 and 4 illustrate the within-pair correlations for ratings of adult-norm adjusted behavior and for male and female like-sex pairs separately. The same trend observed for ratings of school-norm deviant behavior can be seen for adult-norm adjusted behavior with fairly low correlations for all types of ratings and for both MZ and DZ. There is, however, a trend for this factor as well to give a larger difference between MZ and DZ correlations in grade 6 compared to grade 4.

Fig. 5 gives the within-pair correlations for opposite-sex twins for school-norm deviant behavior ratings made by the twins and their teachers as well as for ratings of adult-norm adjusted behavior. The teacher ratings show approximately the same concordance as the ratings made by the twins. Evidently, the teachers do not consider the twins' school behavior to be more similar than the twins themselves do. This is in contrast at least to the ratings of MZ twins presented in Figs. 1 and 2. From Fig. 5 it can also be seen that the correlations tend to be lower and more consistent than for MZ and DZ like-sex twins. It can also be seen that the ratings of school-norm deviant and adult-norm adjusted behavior tend to give correlations of the same magnitude in grade 6 for the opposite-sex twins.

DISCUSSION

Two types of questionnaire data on school adjustment behavior for MZ and DZ twins have been presented. One type, called L-data by Cattell [1], has been collected from the teachers of the classes attended by the twins. The other type, called Q-data [1], has been given by the twins themselves concerning their own behavior. The twins have also been told to try and differentiate between how they think that people at home, at school, and classmates, rate their behavior. The same two factors, school-norm deviant and adult-norm adjusted behavior, fall out in all the four different types of ratings, eg, at home, at school, classmates, and own opinion. The within-pair correlations calculated for the different rating dimensions tend to fluctuate a great deal in grade 4. This might be an effect of the difficulty in younger children to form impressions of other people's views. In grade 6 the correlations of MZ ratings of others' opinions tend to be somewhat higher than for DZ. This is true for both school-norm deviant and adult-norm adjusted behavior. The rating of own opinion tends to give a somewhat different impression, since DZ twins rate themselves more similarly than MZ twins. This could very well be due to the need for MZ twins to differentiate themselves from each other and stress their own identity particularly at puberty.

It is also noteworthy that the ratings given by the teachers show a higher and more consistent similarity within twin pairs. The difference between the twin categories is also

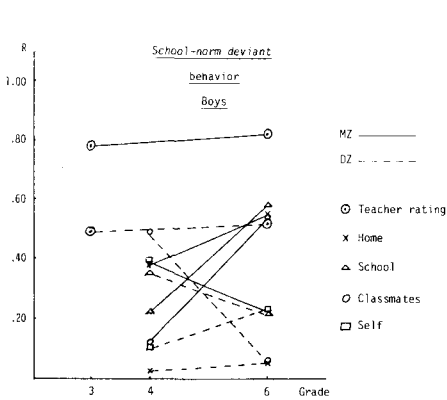


Fig. 1

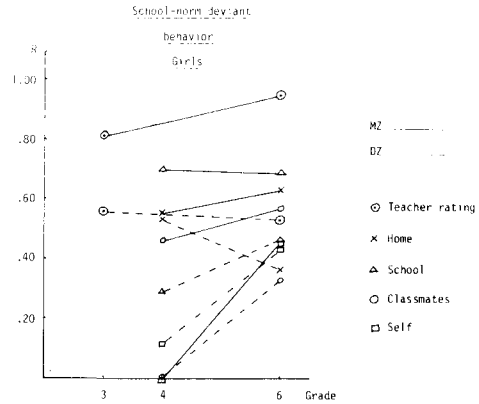


Fig. 2

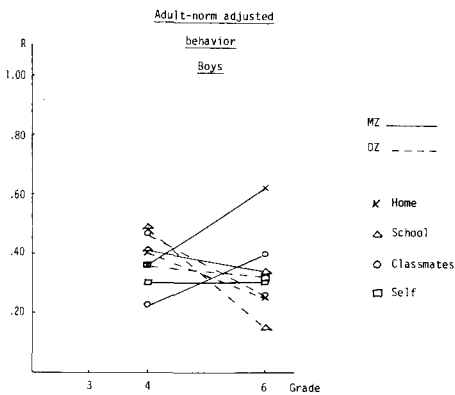


Fig. 3

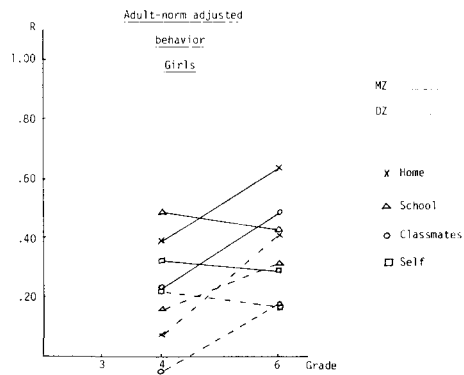


Fig. 4

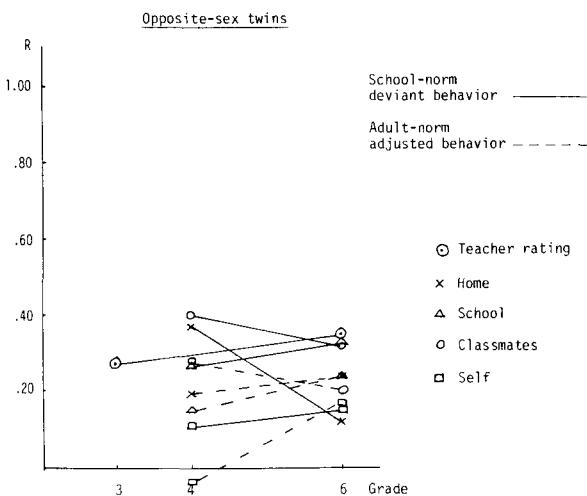


Fig. 5

Fig. 1 - Intraclass correlations (R) for MZ and DZ like-sex twins for school-norm deviant behavior ratings made by the twins and their teachers. **Boys.**

Fig. 2 - Intraclass correlations (R) for MZ and DZ like-sex twins for school-norm deviant behavior ratings made by the twins and their teachers. **Girls.**

Fig. 3 - Intraclass correlations (R) for MZ and DZ like-sex twins for adult-norm adjusted behavior ratings. **Boys.**

Fig. 4 - Intraclass correlations (R) for MZ and DZ like-sex twins for adult-norm adjusted behavior ratings. **Girls.**

Fig. 5 - Intraclass correlations (R) for MZ and DZ opposite-sex twins for school-norm deviant behavior ratings made by the twins and their teachers and for self-ratings of adult-norm adjusted behavior.

larger than for self ratings and of the same magnitude in both grade 3 and 6. This is in agreement with earlier studies showing higher correlations and larger differences between twin categories for observer ratings compared to self ratings [3,8,11]. The observation made by Plomin that situation-specific (molecular) ratings tend to give higher correlations than general (molar) ratings also seem to be applicable in this study, since the teacher ratings of specific situations at school and the twins' ratings of the impression of their own behavior at school tend to give the highest within-pair correlations.

The tendency for opposite-sex twin correlations to be somewhere in between the male and female DZ correlations has been found in other studies [2] and is understandable considering that the pairs include one member of each sex.

The results reported have certain implications for heritability estimates based on different types of ratings. Observer ratings thus seem to give the highest intraclass correlations, probably due to a certain halo effect. Self ratings, on the other hand, tend to fluctuate more over time at least for children before and at puberty. For MZ twins, it is also necessary to consider the need for differentiation and identity formation at least at puberty. The construction of the questionnaire will also probably influence the results so that more situation-specific (molecular) questions will give higher and more consistent correlations, while more general (molar) formulations will be more difficult to answer and therefore lower the concordance.

In conducting research on twin samples using questionnaire data it should thus be remembered that both (1) the specificity of questions, and (2) whether self report or observer ratings are used, will surely influence the magnitude of within-pair correlations and the difference found between twin categories.

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