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Early Influences on the School Social Adjustment of Twins

D.A. Hay, P.J. O'Brien

Department of Genetics and Human Variation, La Trobe University, Bundoora, Victoria, Australia

Abstract. The birth of twins is often accompanied by complications which may affect both twins equally (eg, prematurity) or which may establish differences between the twins (eg, one coming home from hospital first). Parents' ratings of behaviour may reflect and even perpetuate the influence of such variables and it is of interest to see if people less familiar with the twins' history can observe any long-term effects. In the La Trobe Twin Study teachers routinely complete the Bristol Social Adjustment Guide, an assessment of social maladjustment in children aged 5-16 years. Extreme prematurity and problems at delivery were generally associated with the Underreaction syndrome - the child who is unforthcoming, withdrawn and depressed. Withdrawal, depression and maladaptive behaviour to classroom peers were much more common among those twins discharged from hospital after the cotwin. A major mediating factor was that the parents admitted to greatly preferring the one to come home first. These raise questions both about the practice of bringing twins home separately (which occurred in 21% of the cases) and about intervening variables in studies of personality and temperament.

Key words: Social adjustment, School, Prematurity, Twins

INTRODUCTION

Twins create a major dilemma for genetic analyses of behavioural development. In many ways, twins are essential. In adoption studies, the fact that the adoptive and biological parents are adult limit estimates of genetic variation to traits which correspond in both children and adults [7]. Twins are our only way of disrupting the confounding of genetic and environmental ef-

fects in the nuclear family in order to study the genetics of how behaviour develops or of such behaviours as temper tantrums which have no close parallel in adults.

The problem then arises of ensuring that the factors influencing twins' behaviour are representative of the entire population, so that results based on twins can be extrapolated to singletons. Twin-specific effects can operate at two levels, either making *all* twins different from singletons or altering the pattern of differences *within* twin pairs. Examples of the former would be the descriptions [13] of behaviour patterns characteristic of various categories of twins (MZ or DZ, boy or girl) or the identification [4] of early events such as vomiting, vaginal bleeding or morning sickness during the multiple pregnancy which alter parents' later interactional style with the children. Because such influences affect largely the mean scores of both cotwins, they may not matter for genetic analysis, which depends predominantly on the relationships between the scores of cotwins.

Multiple-birth factors which alter the score of one twin relative to the cotwin are another matter. If such factors influence MZ twins differently from DZ twins, there is clear confounding with genetic effects. In the first example of such work [1], the term "role delineation" was applied to the situation where parental needs, background, perceptions, attitudes and feelings, coalesced to distinguish between their MZ twins. The sample was small and the report based on interview data rather than objective measurement, but the results were impressive in showing "reciprocal reinforcement" where the parent reinforced certain behaviours in the child and the child in turn responded to certain specific factors in the personality characteristics of the parents.

The initial impetus to role delineation was postulated to lie in some constitutional difference between the twins, such as one having a major illness. Subsequent work has supported this proposal, although paying little attention to the other aspect of their reciprocal reinforcement hypothesis, namely, the role of parental personality. Such constitutional differences include characteristic birthorder effects identified [5] in mothers' and fathers' ratings of first- and second-born MZ and DZ twins. Other work [8] has indicated the wide variety of ways in which first- and second-born may differ. Such differentiation by parents was as common among MZ as among DZ twins, the distinction between the two type of twins being that birthorder was a more consistent basis for differentiation among MZ twins. The view was offered that parents seek differences between their twins. DZ twins of the opposite sex differ in so many ways that birthorder is of minor importance in this regard, whereas it may be the basis of differentiation in same-sex DZ twins and is frequently so in MZ twins where few other obvious distinctions exist.

Such differences between the twins were not made on the basis of health status, the second-born twins having no more perceived medical problems than the first-born [8]. In analyses of birthweight [15] the same conclusion was reached. Even where weight differences were minute and of no medical significance, parents responded more positively to the heavier twin.

The problem is compounded further with behaviours such as temperament, often assessed by interviews or questionnaires completed by the parent. Here parental attitudes interact with characteristics of the child and one can never be sure whether one is studying the behaviour of the adult or the child. This problem has largely been addressed by demonstrating consistency across raters or situations [4]. But even where there is convergent validity between parental reports and structured laboratory assessment of the twins' temperament [17], the problem of causation remains. The differential affective bonding and reciprocal reinforcement [11] may still imply that the major shaping of behaviour comes from the parents' perceptions of the child or children.

The present paper examines reporting of twins' behaviour by another significant adult, the teacher, and whether his/her perception of the twins reflects early events of which he/she may often be unaware. The event chosen was the order of coming home from hospital, where three groups can be distinguished: those twins coming home at the same time and those who came home first or second. There are anecdotal reports [1,12] of the effects this routine hospital procedure may have on the second home and, unlike comparisons made by birthorder or birthweight, there is the advantage of a twin control group, namely, those pairs coming home at the same time, to contrast with the ones coming separately.

METHOD

Subjects

The La Trobe Twin Study is a longitudinal survey in Victoria, Australia, of development in twins, their siblings and cousins [8]. Parents of school-age children have routinely been asked to give permission for Bristol Social Adjustment Guide (BSAG) to be completed by the teacher of their children (or teachers, where twins were in separate classes). The present report is based on 166 school-age pairs of twins, 131 (or 79%) of whom came home from hospital at the same time after the delivery and 35 sets where one was released before the other. Of these 35 sets, 20 came home within the same week and 15 more than a week apart. At the time the BSAG was completed, the age of the 332 children ranged from 5 to 15 years with a mean of 9.4 years.

Assessment

With the approval of the parents and the school principal, the class teacher completed the BSAG. The BSAG is a syndrome checklist, involving the cumulative totals of index items along two major dimensions of classroom behaviour, Under-reaction and Over-reaction [16]. Table 1 describes the syndromes within each dimension together with the category of Neurological disorder common to both dimension. Twin data from the BSAG have been analysed previously [9] in terms of a factor analysis and an identification of specific items which distinguish twins from singletons. In both cases, the major emphasis was on social behaviour, eg, the major factor concerned cooperation with the teacher and those items distinguishing twins and singletons concerned interactions with the teacher and with other children. In order to compare twins with the original norms [16] and with more recent norms from Victorian school children [2], the data here are presented in terms of the dimensions in Table 1.

RESULTS

Twin-Singleton Differences

Table 2 compared the twin data with the two main normative sample of single-born children on the five categories of scores (as the BSAG is a checklist of symptoms the ideal score is zero). These were no differences on the Under-reaction syndrome, but on the Over-reaction there were significantly more twins outwith the stable category as compared with the data of Bell [2]. (Since these constitute a recent sample from the same Australian state, they are a more realistic comparison than even the 1970 UK revision by the author of the BSAG [16]).

Table 1. Dimensions of the Bristol Social Adjustment Guide [from Stott 1980]

UNDER-REACTION	OVER-REACTION
Core Syndromes	Core Syndromes
Unforthcomingness [fears new tasks, strange situations]	Inconsequence [attention seeker, guesser, acts without thinking]
Withdrawal [resists affection and attachments]	Hostility [provocative acts and sullen avoidance]
Depression [lack of normal response to stimuli]	
Associated Groupings	Associated Groupings
Non-syndromic underreaction [items not in one of the above categories but confirming whichever is present]	Peer-Maladaptive ness [domineering, hostile and aggressive attitudes to age peers]
NEUROLOGICAL	
[Neurological or temperamental impairment]	

Pooling the Maladjusted and Severe maladjusted to achieve adequate numbers, $\chi^2_3 = 10.41$ ($P < 0.02$). Across the various syndromes of the Over-reaction dimension, this distinction is consistent with reports in twins of distractibility [8,10], problems with peer-relationships [10,11] and attention-seeking behaviour [13]. Such behaviour patterns develop early in twins: immature play and social behaviour are evident at 2 1/4-4 years and relate closely to the language delays characteristic of many twins [11,14].

There were no sex differences on the Under-reaction dimension, but on the Over-reaction dimension boys had a significantly higher mean score than girls (6.7 vs 3.41, $F_{1,330} = 6.74$, $P = 0.01$), a result found also in the singleborn normative sample [16]. Within Over-reaction, the major sex difference was in the Inconsequence syndrome ($F_{1,330} = 9.72$, $P < 0.002$). That twin boy acted more often on impulse and inappropriately and were distractable, is consistent with earlier results on measures other than the BSAG [8,10,11].

Prematurity and Birth Variables

Given that twins are a high-risk group for medical trauma [3] and there are extensive data relating BSAG scores to prematurity and early hospitalisation [16], it is important to examine the extent to which these early events may contribute to the BSAG scores of the twins. From La Trobe Twins Study records collected since the first children were enrolled in 1978 [8], children were assigned to categories of prematurity, problems at delivery, time between deliveries and birth order.

Table 2. Comparison of BSAG scores between the Bell [2] and Stott [16] singleton samples and the present La Trobe Study (LTS) sample. (Figures refer to the percentages falling into each of the five categories first identified by Stott)

	UNDER-REACTION				OVER-REACTION			
	Range	Bell (N = 551)	Stott (N = 1527)	LTS (N = 332)	Range	Bell	Stott	LTS
1. Stability and near stability	0-2	69.5	61.1	72.4	0-3	75.8	66.1	54.6
2. Mild reaction	3-5	17.2	19.6	17.8	4-7	11.2	13.8	26.8
3. Appreciable reaction	6-8	8.2	9.2	5.6	8-11	6	8.4	15.1
4. Maladjusted reaction	9-14	4.9	8.1	3.5	12-24	7.1	10.5	3.5
5. Severe maladjusted reaction	15+	0.2	1.6	0.7	25+	0.0	0.9	0

The only consistent result was a relationship between prematurity and the Under-reaction dimension ($F_{4,312} = 8.94$, $P < 0.001$). Inspection of the means indicated that only those born at 28 weeks or less were affected, their mean number of problems being 6.25 compared with 1.58 for all less premature twins. These very premature twins had significantly higher scores on all the Under-reaction syndromes, but particularly Unforthcomingness (the child who, for example, "waits to be noticed", "is too shy to ask"). While behavioural disturbance on the BSAG as measured by total score had been associated with prematurity [16], no breakdowns on specific dimensions were reported. However, given that such premature children generally have prolonged stays in hospital, it should be noted that children, not necessarily premature, who had spent at least two weeks in hospital before their second birthday were reported to have higher Unforthcomingness scores [16]. The very premature children had higher Neurological scores which again is a result consistent with existing data on such children [6]. However, this difference from the other twins only approached significance ($F_{4,312} = 2.16$, $P = 0.06$).

None of the other variables relating to birth events had any significant effects except that in a paired comparison of same-sex twins, second-born twins had higher Unforthcomingness scores ($t_{110} = 2.15$, $P = 0.03$). Considering the Unforthcomingness items include such ones as "wants adult interest but cannot put him/herself forward" and "too shy to ask", this result parallels the earlier report [9] where on Sattler's Behavior and Attitude Checklist, there was concern that the results of psychological testing were less valid for the second-born. It was much more difficult for the adult tester to develop any rapport with the second-born.

Order of Leaving Hospital

As part of the La Trobe Twin Study, parents complete a questionnaire "Gestation, birth and the first three months" dealing with events around the birth of their children [8]. Information was extracted firstly on the order in which the twins left hospital and secondly on the mothers' positive feelings for each twin at the time, using the seven items listed in Table 3.

Ranking the responses on each item as +1, 0 or -1 for better, the same or worse than most children and accumulating these over the seven items gave a score ranging from +7 to -7 for mothers' positive or negative perceptions of each twin at this point in their lives.

Of the 166 sets of twins, 35 left hospital at different times and Table 3 indicates they differ substantially in how they were perceived ($F_{3,328} = 8.26$, $P < 0.001$). While all twins who came home at the same time were rated positively, those who came home first were regarded even more favourably, particularly in contrast to the ones who came home second. Arbitrarily dividing the ones to come home second as to whether they were less or more than a week after the first, it is clear from Table 3 the latter were perceived more negatively.

Table 4 shows that this differential perception of twins based on their order of leaving hospital did not simply reflect their health status, at least as perceived by their mother. Using the same classification of health problems described in [9] and with the singleton and twin data described therein as comparison groups, the ones to leave hospital second were regarded as having no more medical problems than those leaving at the same time (after summing the "serious" and "significant" categories, $\chi^2_3 = 2.19$, NS). These results thus support the more anecdotal reports [12] of families who establish a routine with the first twin home and find it very difficult to relate to the one released later from hospital.

These data are based on parental reports which were often retrospective. This approach has been justified elsewhere [8] in that it is what the parents think happened to their children

Table 3. Order of twins leaving hospital and preferences by mother at the time (see text for details)

QUESTIONS ASKED	
Compared with most children is the twin:	easier to manage less demanding of attention less fussy healthier more active and alert more responsive to you more responsive to others
Mean Preference scores (out of seven on the questions above)	
Entire group	1.96 [332]
Left hospital at same time	2.04 [262]
First to come home	3.40 [35]
Home within one week of first	0.50 [20]
Home more than one week after first	-1.15 [15]

Table 4. Problems perceived by mothers at the birth

	Twins and the order of leaving hospital			
	Singletons (N = 292)	At the same time (N = 433)	First out (N = 35)	Second out (N = 35)
PERCENTAGE WITH				
No physical problem	59.6	39.7	51.5	36.4
Slight problem (eg, eye infection)	8.9	12.0	6.1	12.1
Transient problem (eg, jaundice)	27.0	30.5	30.3	34.4
Serious problem (eg, need for major transfusion)	3.1	10.9	9.1	9.1
Significant problem (eg, prolonged difficulty in breathing)	1.4	6.9	3.3	6.1

rather than what actually happened which is more likely to influence their behaviour and their perceptions. An alternative and more powerful empirical justification of this approach is to see whether people outside the family also perceive the consequences of such reported parental attitudes. Table 5 summarises the analyses of variance of teachers' assessment on the BSAG. These results are even more striking given that teachers would be unlikely to know of such early events as the order of leaving hospital and that 47% of the twins were separated so that different teachers were often reporting on cotwins.

The three BSAG syndromes in Table 5 showing significant effects clearly indicate an interaction. Except for the Depression syndrome, it is not just being the one to leave hospital second or the one who is preferred less by the parent, but rather the combination of these where the teacher reports withdrawal (eg, being aloof from people), depression (eg, being listless and apathetic) and peer-maladaptiveness (eg, disturbing others' games, being a bad loser and creating a fuss when they could not get their own way). An alternative way of viewing the interaction would be to ask what is it about particular parents which lead them to respond to such early events as the order of leaving hospital by creating a pattern of differential and long-lasting expectations between their twins. This approach is being explored using more of the questionnaire data on demographic status and prenatal and perinatal events.

Table 5. Summary of mean squares from analysis of variance of the effects on three syndromes in the Bristol Social Adjustment Scale (BSAG) of the variables described in Table 3.

	d.f.	Withdrawal	Depression	Peer-maladaptiveness
Leave hospital	3	0.234	0.866**	0.601
Parental preference	14	0.058	2.277***	0.350
Leave × preference	42	0.404***	0.834*	0.929*
Error	272	0.102	0.404	0.542

* $P > 0.05$; ** $P > 0.01$; *** $P > 0.001$.

DISCUSSION

The important point of using the BSAG with twins is that the long-term effects of parental attitudes to the twins can be assessed by other significant individuals in the children's lives, often ignorant as to early events which shaped parental perceptions.

The questions raised for developmental behaviour genetics are vital. When one observes consistency of temperament across such situations as the home and the laboratory [18], is it because of consistency within the child or just a consequence of the way in which parental ratings of temperament at home necessarily infringe upon behaviour and perceptions in other contexts? The same question applies to longitudinal assessment - does consistency of rating across time [17] arise because the child is in a developmental pathway, canalised not by biology but by expectations? Twins are especially susceptible to this situation because of the comparisons

which can be made between them. Whether the twins are differentiated on the basis of birth-order [9], birthweight [15] or the order of leaving hospital discussed here, the evaluation of one twin cannot be divorced from the behaviour of the cotwin.

While there is extensive evidence that parents may treat MZ twins more similarly than DZ twins, this is predominantly in response to the greater phenotypic similarity of MZ twins [7]. In an observational study where parent-initiated activities could be distinguished from those elicited by the twins [14], the former generally showed *larger* within-pair variances in MZ than in DZ twins. Most mothers of the MZ twins in that study acknowledged they treated their twins differently, attributing this to the different needs of the children which in turn often reflected early events differentiating them, eg, one suffering respiratory distress at birth.

For genetic analysis, the key issue is whether these events have any parallel in singletons and thus whether or not the results from twins can be extrapolated to the singleborn population. It is significant that some of the major relationships between different measurements of temperament come from twin data [18]. In contrast, analyses [4] in singleton infants of "difficult temperament" indicate remarkably few correlations with either other aspects of infant functioning (as assessed by the parents or by others), parental personality, measures of the home environment or even later behavioural problems in the same children. The concept of "difficult temperament" is probably highly relevant to twins in general and specifically to such "at risk" groups as second born, lower birthweight or second to leave hospital, and would probably correlate with the BSAG syndromes discussed earlier. The finding that in twins BSAG scores relate to being a twin and to birthorder [9] as well as to the order of leaving hospital indicate a long-term effect distinct from that found in singletons [4]. Thus, with the range of variables which can influence a multiple pregnancy [3], the onus must exist for those using twins in genetic studies of temperament and personality to prove that they can produce equivalent data to singletons [7].

One specific problem in genetic analyses of personality has been that of competition where twins, especially DZ pairs, react against each other to produce correlations lower than those observed in full-sibs [7]. In the present report, MZ and DZ twins have not been distinguished (a report on blood typing in relation to parental reporting of zygosity is in preparation). What has never been investigated is why such low correlations occur - is it that all DZ twin pairs show little relationship or is it that some have a high positive correlation and others a negative correlation? In other words, do they all cooperate to some extent or do some cooperate and other compete, the latter being consistent with the present discussion of variables differentiating within twin pairs? In such a case, the very low DZ correlation often observed for temperament or personality [7] has less to do with their genetic dissimilarity relative to MZ twins and more with the fact that DZ twin pairs find different ways of coexisting. The best means of detecting such a mechanism in DZ twins comes not from statistical analyses [7,14] but rather from the anecdotal reports of parents, concerning treatment of their children [1,12,13,14]. While such reports may not be objective, both they and retrospective questionnaires of parental attitudes [8,9] provide a vital perspective on twins in relation to each other.

Finally, these results raise a practical issue in the management of a multiple pregnancy. There have been previous warnings [12] of the extreme situations which may arise if twins are released from hospital at different times. Fortunately, such active rejection of the second twin by the parents is rare, but the possibility arises from the results in Table 5 of a more subtle rejection, also with severe consequences for the children and those adults such as teachers who interact later with them. Much more consideration must be given to the long-term benefits of both twins coming home at once rather than one being released earlier. Otherwise there

may be long-term consequences of the events and attitudes summarised in the following quotation:

"The notion that it is easier to start with one baby alone seems to be ill-founded. It is all the harder to adapt to two babies if a routine with one has already been established. Furthermore if the mother is busy at home with one baby she often finds it difficult to visit the other. She becomes increasingly attached to the one she is with and may find it difficult to accept the second baby" [3, p. 100].

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Correspondence: Dr. David A. Hay, Department of Psychology, La Trobe University, Bundoora, Victoria 3083, Australia.