Maturational Timing and the Development of Problem Behavior:
Longitudinal Studies in Adolescence

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Previous research demonstrated a higher risk for problem behaviors among early as compared to late maturing girls. In the present study, the role of maturational timing was assessed within the framework of a developmental model for adolescent problem behavior. Data obtained twice, one year apart, on 62 girls in early adolescence (11 to 12 years of age) and 193 girls in middle adolescence (14 to 15 years of age) were compared. Girls self-reported information on maturational timing, parental support, peer rejection, self-derogation, transgression proneness, and contacts with deviant peers. In both age cohorts, peer rejection was related to more self-derogation, with both related to more contacts with deviant peers, mediated by transgression proneness in middle adolescence. Parental support protected against such contacts and in middle adolescence protected against transgression proneness and self-derogation. In middle adolescence, early maturation led to more contacts with deviant peers but lower self-derogation; similarly, in early adolescence early maturers reported less peer rejection. Thus, the predictions were generally supported except for the surprising result of lower self-derogation among early maturers.

Stimulated by research on the biological changes of puberty, the interplay between biological growth and social development has been a major focus of recent research on adolescence (see Petersen, 1988). The physical changes themselves have generally been less important than the responses to the physical changes of the self and others in the adolescents' social environment. For example, Magnusson and his colleagues (Magnusson, Stattin, & Allen, 1986) found a higher preva-

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lence of problem behaviors such as alcohol consumption among early-maturing girls. The authors inferred that the girls adopted these behaviors in the course of socializing with older male adolescents for whom alcohol consumption was part of their normal, age-appropriate conduct. Thus, problem behavior among faster-developing girls may not indicate deviant attitudes; rather, it may simply represent the attempt to match their behavior and their appearance regardless of chronological age (Silbereisen & Kastner, 1987). A temporary increase in problem behavior may be the cost of coping with the difficult and sometimes disturbing experience of this developmental mismatch.

Other researchers have found effects of maturational timing on psychological functioning as well (see Petersen & Taylor, 1980, for a review). Petersen and Crockett (1985) reported improved psychological adjustment for late maturing boys and girls. With body image, Tobin-Richards, Boxer, and Petersen (1983) found the most negative effects for early maturing girls and positive effects for early maturing boys. Similarly, Simmons, Blyth, Van Cleave, and Bush (1979) found better body images and higher self-esteem for late maturing girls; among boys, however, more positive effects on functioning were typical for early maturers. Thus, early maturation seems to have less positive developmental outcomes for adolescent girls than for adolescent boys.

According to Simmons, Blyth, and McKinney (1983), negative outcomes depend on whether maturational timing puts the adolescent in a deviant status relative to the peer group. As a consequence of more advanced appearance and experiences, early maturing girls may suffer from rejection by their peers. Because it undermines the development of intimacy (see Sullivan, 1953), peer rejection is one of the major risk factors for psychological disorders in adolescence.

The aim of the present study was to address the role of maturational timing within a model of the development of problem behavior in adolescence. Alhough previous research has begun to elucidate the mechanisms related to these effects, more information is required about

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the role of social factors such as family and peer contexts (Petersen, 1988).

Throughout this study, problem behavior was identified by two related concepts. First, transgression proneness (Jessor & Jessor, 1977) was the degree to which an adolescent showed positive attitudes toward norm-breaking behaviors. Second, contact with deviant peers was conceived as the prevalence of norm-breaking behaviors in the adolescent's peer group.

In the model, contexts of development, such as the family, were distinguished from individual conditions, such as maturational timing. It was expected that both would exert direct and indirect influences on problem behavior. According to Kaplan's (1980) theory of deviance, the self is the major link between individual and contextual antecedents on one hand, and developmental outcomes on the other hand. More specifically, in the model in this study, self-derogation, or negative self-esteem, was expected to increase transgression proneness that, in turn, was expected to increase contacts with deviant peers.

The model specified three antecedent, or background, variables, two representing context and one representing the individual. The contexts represented are the family and the peer group. The family-child interaction was characterized by the degree of parental support. The peer context was described in terms of acceptance versus rejection of schoolmates. Finally, maturational timing was an antecedent variable at the individual level. In sum, the model included six variables: maturational timing, parental support, peer rejection, self-derogation, transgression proneness, and contacts with deviant peers.

Because stability and change of the relationships were of interest, the model also included two assessments, obtained one year apart, of self-derogation, contacts with deviant peers, and transgression proneness. To further address the role of maturational timing in the present analyses, two age groups were included: one termed the early adolescent cohort (aged 11 years) and another termed the middle adolescent cohort (aged 14 years).[1] Because middle adolescence is a time of rather rapid changes in the development of intimate friendships (Youniss, 1980), maturational timing may have more effects in this age group than in early adolescence. The present analyses focused on girls because the maturational status and timing data for boys could be collected only occasionally in the younger cohort.

HYPOTHESES

The following hypotheses guided the analyses:

1. Maturational timing was expected to play a role in the development of problem behavior. Considering that most girls are either prepubertal or just beginning to mature by 11 years of age but pubertal or postpubertal by age 14 years (see Marshall & Tanner, 1969), all effects of maturational timing were expected to be especially strong for the older cohort. Earlier research (e.g., Simmons et al., 1979; Simmons et al., 1983) led to the hypothesis that there would be negative effects on the self with early maturation as compared to late maturation. There were no specific hypotheses for consequences of peer rejection. Although both early and late maturers may deviate relative to the peer group in terms of social interests (Simmons et al., 1983), the importance of timing deviations may change across adolescence (Faust, 1960). Late maturers may lag behind their schoolmates in social activities, with higher peer rejection as one result (Dunphy, 1963). Based on the findings of Magnusson et al. (1986), early maturing girls should have had more contacts with deviant peers.
2. Parental support was hypothesized to exert protective effects; that is, it should have decreased transgression proneness and deviant contacts (Snyder & Patterson, 1987).
3. It was expected that peer rejection would play a key role in the development of problem behavior. Following Kaplan (1980), likely reactions are negative effects on the self and attempts to find alternative reference groups. Thus, self-derogation and contacts with deviant peers were hypothesized to be higher among adolescents who experienced more rejection.
4. Again drawing on Kaplan (Kaplan, Martin, & Robbins, 1984), self-derogation was expected to increase future transgression proneness and contacts with deviant peers. Furthermore, prior transgression proneness should promote deviant peer contacts in the future.

METHOD

Subjects

The sample for the present study consisted of 62 girls in the early adolescent cohort (mean age 11.5 years) and 193 girls in the middle adolescent cohort (mean age 14.7 years). All subjects attended schools in West Berlin; the younger adolescents attended grades 5 and 6, and the older adolescents attended grades 8 and 9.

This sample was drawn from all subjects who took part in the 1985 and 1986 data collections of the Berlin Youth Longitudinal Study

(BYLS).[2] The BYLS used a stratified random sampling procedure on more than 70 schools (one classroom per school) representative of schools in Berlin with respect to socioeconomic status and school program or track. The BYLS sampled subjects for the older cohort attending all three types of schools in West Germany: (a) 30% in the Hauptschule, or nonacademic school (including some from the Gesamtschule, offering both academic and nonacademic programs); (b) 21% in the Realschule, or more academically oriented school; and (c) 49% in the Gymnasium, or traditional preuniversity school program. (See Holmes, 1983 for details on the school system in West Germany.) These percentages undersample the Hauptschule/Gesamtschule (38% in the population) and oversample the Gymnasium (40% in the population), but are quite accurate for Realschule (22% in the population). The younger cohort can be classified according to schools ultimately attended. Again, representation is fairly close ([a] is 43% versus 38% in the population; [b] is 14% versus 22%; and [c] is 43% versus 40%); thus, the lowest track is oversampled in the younger cohort, with the middle track undersampled and the highest track quite similar.

The rate of unemployment in the BYLS sample was 8%, comparable to a 9% rate in Berlin generally. Both educational and occupational data on mothers and fathers very closely represent those levels in West Germany generally.

The BYLS included 218 girls in the younger and 429 girls in the older cohort. Except for a slight upward bias, the present study sample is similar to the overall sample in socioeconomic status (SES). Girls who were not living at home (17 and 15 in each cohort, respectively), those not living with both parents (60 and 111, respectively), and all girls of foreign nationality (47 and 46, respectively) were excluded from the analyses. These factors all served to produce the slight upward bias in SES. Of the remaining 108 younger girls, only 83 participated in the second measurement (attrition: 23%) and of the remaining 257 older girls, 221 took part at the second measurement (attrition: 14%). Of those participating in the second assessment, 62 and 193, respectively, had complete data. The higher attrition in the younger cohort was a consequence of educational tracking. Following grade 6, students attend different schools depending on achievement and academic aspirations, making it difficult to locate them.

Because recent studies have shown effects of family structure on adolescents' norm-breaking behavior (Dornbusch, Carlsmith, Bushwall,

Ritter, Leidermann, & Hastorf, 1985), the chosen strategy of restricting family structure to two-parent families was preferable despite the disadvantage in terms of sample size. However, the sizes of the subsamples representing other family structures were too small to make it feasible to analyze for variation in this dimension.

Measures

The scales used in the analyses consisted of a small number of items each. The BYLS gathered information on many aspects of adolescent development within the constraints of time-limited questionnaire assessments. The costs in terms of psychometric quality are acknowledged.

Maturational Timing. As part of a larger instrument (see Ewert, 1985), an item assessing perceived maturational timing relative to one's same-aged peers was administered: *In comparison with same-aged peers, I am developing slower/equally fast/faster.* Earlier studies (see Greif & Ulman, 1982) showed the relevance of such judgments in predicting psychosocial functioning. Moreover, as compared to more objective measures (Crockett & Petersen, 1987), perceived maturational timing relative to same-aged peers may more appropriately assess the processes linking biological growth to personality development.

In order to distinguish effects of early and late maturation in the analyses, the three response categories were effect-coded (Cohen & Cohen, 1975) into two dummy variables: "quick" indicates adolescents who develop quicker than their peers, that is, early maturers, and "slow" indicates adolescents who develop slower than their peers, that is, late maturers.[3]

Validity of the maturational timing measure was examined two ways: (a) by comparison with interview responses to questions about physical change available on a subsample and (b) by comparison with height, weight, and another maturational status item. As part of a complementary qualitative study on puberty (Kracke, 1988), extensive interview data were available on 11 girls belonging to the present sample. Their maturational status and the time of onset of several physical changes were assessed using a German version of the Pubertal Development Scale (PDS; Petersen et al., 1988). In 9 of these 11 cases the girls' questionnaire response and the interview assessment (accomplished two years later) led to the same rating. In the two remaining cases, girls rated themselves to be earlier maturers in the interview than in the question-

naire. Thus, responses to the maturational timing question were generally consistent with responses on actual physical changes.

Self-reported height and weight as well as maturational status were used to further check the validity of adolescents' self-attributions of maturational timing. In order to assess maturational status, subjects were asked to rate themselves with respect to their physical appearance. The item was worded, *How do you look at present*? and the response categories were: *I still look rather childlike*-0, *I am already changing*-1, *I already look more like a woman*-2.

Correlations between these variables as well as age and the three indices of timing (maturational timing, quick, slow) are given in Table 1; means and standard deviations are shown as well. Coefficients above the diagonal refer to the early adolescent cohort, below the diagonal to the middle adolescent cohort. For convenience, data are shown for the first wave of measurement only.

As indicated by differences in the means between cohorts, the older girls were indeed significantly taller, heavier, and of more mature status. Within-cohort variations in timing, however, were not influenced to any extent by age. Except for the correlation between quick and age ($r = .24$, $p < .05$) in the younger cohort, neither maturational timing nor the derivative indices quick and slow were related to chronological age within cohorts.

As should be the case, maturational timing was positively correlated in both cohorts with height, weight, and maturational status. The dummy coded timing variables, quick and slow, were less consistently related to these variables. There were no significant correlations for slow, the contrast between later and average development relative to one's peers. Quick, indexing perceptions of faster development than average, was significant though moderately correlated with most of the status variables. Thus, the timing measure appears to be valid when compared with measures indexing maturational status in both cohorts. Those who perceive themselves to be faster in development appear to be carrying most of the variation.

To identify which maturational status variables were most involved with perceptions of maturational timing, multiple regressions were run with height, weight, age, and maturational status as predictors, and maturational timing as the criterion. In middle adolescence, weight ($\beta = .21, p < .05$) and maturational status ($\beta = .23, p < .01$) were the only predictors; that is, changes in gender-specific body attributes seemed to

TABLE 1. Correlations, Means, and Standard Deviations for Maturational Timing and Status, Height, Weight, and Age

	Quick	Slow	Timing	Status	Height	Weight	Age
Quick	–	.70*	.19	.20	.35	.35*	.24*
Slow	.72*	–	-.57*	.06	-.03	-.02	.13
Timing	.44*	-.30*	–	.22*	.45*	.36*	-.11
Status	.14*	-.06	.28*	–	.33*	.19	.31*
Height[a]	.07	-.05	.17*	.26*	–	.76*	.50*
Weight[b]	.20*	.01	.26*	.24*	.63*	–	.46*
Age[c]	.02	.03	-.01	.04	.12*	.09	–
Early Adolescents							
$\bar{X}$	*-.44*	*-.31*	.87	1.46	150.2	38.5	11.5
SD	*.74*	*.88*	.64	.50	8.4	7.5	.7
Middle Adolescents							
$\bar{X}$	*-.52*	*-.55*	1.03	1.84	165.0	53.0	14.7
SD	*.77*	*.73*	.56	.53	6.5	8.7	.7

NOTE: Coefficients above the diagonal refer to the early adolescent cohort (n = 62), coefficients below the diagonal to the middle adolescent cohort (n = 193). Adolescents rated their timing of maturation (timing) as slower, equally fast, or faster than their same-aged peers; quick contrasts the last category to the middle one, slow the first. Thus, quick indicates early maturation, slow late maturation. Status refers to self-rated physical appearance (child-like, feels changes, quite like a woman).

*$p \leq .05$

a. Measured in centimeters.

b. Measured in kilograms.

c. Within cohort.

provide the relevant cue for adolescents' judgments (R = .34). In early adolescence, however, the only variable predictive of maturational timing was height (β = .42, $p < .05$; R = .47). For these young girls, the height spurt may have provided a salient experience on which their judgment was based.[4] Based on these analyses, which showed that the measure of maturational timing showed the expected patterns of change and relationships with other variables, it was concluded that the measure was reasonably valid.

Parental Support. The BYLS data contain a large number of items that were drawn from German versions of various instruments addressing the quality of parent-child interaction (Helmke & Väth-Szusdziara, 1980; Moos, 1974). For the present study, three items were chosen

tapping authoritative parenting (Baumrind, 1968): (a) *When something goes wrong, my parents talk it over calmly with me,* (b) *Do your parents expect you to make up your own mind and stick to it even when they have a different opinion*? and (c) *My parents show respect to me and expect the same of me.* Adolescents judged their own experience ranging from 0 (*never*) to 4 (*always*) on the first and the last item; for the second item, their answers ranged from 0 (*no emphasis*) to 3 (*a lot of emphasis*). The internal consistencies are adequate given the small number of items. For the younger cohort $\alpha = .61$; for the older cohort $\alpha = .68$ (both in time 1).

Peer Rejection. In several publications, Kaplan and his coworkers reported a number of scales developed within the framework of their model of deviance (Kaplan, 1980). Shortened German adaptations were used in the BYLS assessments. In the present study, peer rejection, contact with deviant peers, and self-derogation were measured using items from this pool. Responses indicate agreement with scale items ranging from 0 (*not at all*) to 3 (*yes, very much*).

The peer rejection scale (Kaplan et al., 1984) was made up of three items: (a) *My schoolmates are not interested in my opinion,* (b) *I don't feel comfortable at school,* and (c) *The majority of my schoolmates aren't particularly keen on me.* The internal consistencies were reasonably high. For the younger cohort, $\alpha = .69$; for the older cohort, $\alpha = .73$ (both in time 1).

Contacts with Deviant Peers. This scale consisted of three items used originally by Kaplan (1980) to characterize adolescents' social contexts: (a) *Many of my friends lie to their parents if they want something,* (b) *I know a lot of youth who have already stolen something without being caught,* and (c) *My friends are often in trouble with adults.* Internal consistency varied from the younger cohort, $\alpha = .58$, to the older cohort, $\alpha = .72$ (both in time 1). This apparent difference in alphas between cohorts was seen also at time 2 (.54 younger and .69 older); thus, early adolescents had lower values than middle adolescents. This difference was not a function of more 0 ratings in the younger cohort (about one third of the subjects in both cohorts had at least one 0), but rather seemed due to less consistent response patterns in the younger cohort.

Self-Derogation. This variable was assessed using four items adapted from Kaplan (1978; see Silbereisen, Reitzle, & Zank, 1986). The items are (a) *I would like to change a lot concerning myself,* (b)

Sometimes I wish I would be different, (c) *I don't think I'm worth much*, and (d) *I am satisfied with myself* (reversed). The internal consistencies for both times used in the present analyses were .58 and .73 for the younger cohort, .68 and .76 for the older cohort, each for time 1 and time 2, respectively. The term "self-derogation" chosen by Kaplan was retained, although the more common term for this construct reversed is self-esteem.

Transgression Proneness. Drawing on Jessor and Jessor's (1977) theory of problem behavior proneness, five items were formulated (see Galambos & Silbereisen, 1987): (a) *If you break the law sometimes, you get on better in life*, (b) *I can imagine myself stealing something sometime*, (c) *Sometimes I like to lie to people*, (d) *I often find adults' rules and laws bad and don't always want to follow them*, and (e) *Sometimes I really want to do something that is forbidden*. The internal consistencies were adequate: .61 and .64 for the younger cohort, .70 and .75 for the older cohort, each for time 1 and time 2, respectively.

Statistical Analyses

In order to test the model and its specific hypotheses, structural equation models were tested (Lisrel; Jöreskog & Sörbom, 1986). First, assumptions about measure invariance were tested using confirmatory factor analysis. A measurement model consisting of 5 (Self-derogation, Peer rejection, Contact with deviant peers, Transgression proneness, Parental support) × 2 (waves of measurement) correlated factors was tested separately for each cohort. Good fit was indicated by a ratio χ^2 of 1.60 (855.16/535 *df*) for the younger and 1.45 (771.34/531 *df*) for the older cohort. The loadings of the items per factor were almost identical across time and cohort, demonstrating invariant meaning of the constructs.

Relations among the variables as specified in the model and the hypotheses were formulated as two-wave structural equation models (Lisrel; Jöreskog & Sörbom, 1986). The sums of the respective item scores were used to represent the constructs. Self-derogation, contacts with deviant peers, and transgression proneness were the process variables. All lagged effects across time within and among these variables were allowed. Maturational timing, parental support, and peer rejection were modeled as background variables that could exert immediate or delayed effects. Whether they showed systematic change or mutual effects across time was tested separately.

In order to test the hypotheses, an exploratory strategy was used. Starting with the saturated model, all nonsignificant ($z > 1.96$) effects were set to zero. The resulting model was evaluated in terms of its goodness of fit. The analyses were run separately for each cohort. The importance of the cross-lagged effects was evaluated by comparing this model with a more restricted model that allowed for stability paths only (see Bentler & Bonnet, 1980).

RESULTS

The correlations, means, and standard deviations of the variables used in analyzing the data are given in Table 2. Coefficients above the diagonal refer to the early adolescent cohort, below the diagonal to the middle adolescent cohort.

As revealed in the bottom part of Table 2, the older adolescents reported significantly less self-derogation independent of time of measurement. This is consistent with research on change in self-esteem across adolescence (O'Malley & Bachman, 1983). Older adolescents also felt significantly less rejected by their school peers. The significant differences in transgression proneness and contacts with deviant peers at second measurement were mainly due to the younger adolescents' much lower scores than those of the previous year. As many of them changed schools, this decrease may actually indicate a change in the baseline of their ratings.

The structural equation model for the early adolescent cohort is depicted in Figure 1. Paths, structural residuals, and covariances are shown. Only significant effects are given.

As indicated by $\chi^2 = 32.91$ with $df = 41$ (ratio of .80, much smaller than the recommended limit of 2), and a goodness-of-fit index of .91 (larger than .90 is suggested), the fit of the model was appropriate. As shown, only a fraction of the possible effects was significant.

This model shows a significantly better fit than an alternative model assuming no cross-lagged effects. The difference amounts to $\chi^2 = 4.92$ with $df = 1$ ($p < .05$). Thus, the path from self-derogation to contacts with deviant peers is relevant for interpretation.

The model for the middle adolescent cohort is given in Figure 2. Again, paths, structural residuals, and covariances are shown. Only significant effects are depicted.

TABLE 2. Correlations, Means, and Standard Deviations for Year 1 and Year 2 Measurements of Variables in Structural Equation Models

	Process Variables						Background Variables			
	SD1	TP1	CDP1	SD2	TP2	CDP2	Q1	S1	PS1	PR1
SD1	–	.13	.42	.58	-.03	.39	.02	.23	-.13	.45
TP1	.28	–	.22	-.05	.49	.25	.06	.02	-.18	.12
CDP1	.18	.42	–	.39	.17	.48	.06	.15	-.30	.28
SD2	.55	.23	.18	–	.13	.39	-.04	.05	-.02	.19
TP2	.15	.64	.35	.24	–	.31	-.06	-.11	-.02	.07
CDP2	.11	.43	.68	.10	.59	–	.05	-.01	-.26	.17
Q1	-.06	-.02	.17	.00	.09	.05	–	.70	-.03	.09
S1	.01	-.12	.03	.00	-.01	-.02	.72	–	-.10	.26
PS1	-.14	-.24	-.25	-.21	-.20	-.19	-.07	-.01	–	-.18
PR1	.42	.18	.30	.27	.34	.25	.11	.04	-.26	–
Early Adolescents										
$\bar{X}$	5.15	4.65	3.27	5.19	3.95	2.76	-.44	-.31	7.92	2.32
SD	2.62	2.75	2.20	2.68	2.43	1.96	.74	.88	2.18	2.08
Middle Adolescents										
$\bar{X}$	4.39	4.49	3.38	4.25	4.80	3.37	-.52	-.55	8.01	1.85
SD	2.18	2.80	2.11	2.36	3.07	2.09	.77	.73	2.12	1.76
Difference										
t	2.27*	.39	-.35	2.64*	-1.99*	-.20	.72	2.14*	-.29	1.75

NOTE: SD = self-derogation, TP = transgression proneness, CDP = contacts with deviant peers, Q = quick, S = slow, PS = parental support, PR = peer rejection. Measurement at year 1 (1), at year 2 (2). Coefficients above the diagonal refer to the early adolescent cohort (n = 62, r > .21/.30 are significant at the .05/.01 level), coefficients below the diagonal to the middle adolescent cohort (n = 193, r > .12/.17 are significant at the .05/.01 level). In comparing means across cohorts, the critical t for p < .05 is 1.65.

* indicates significant *t*s.

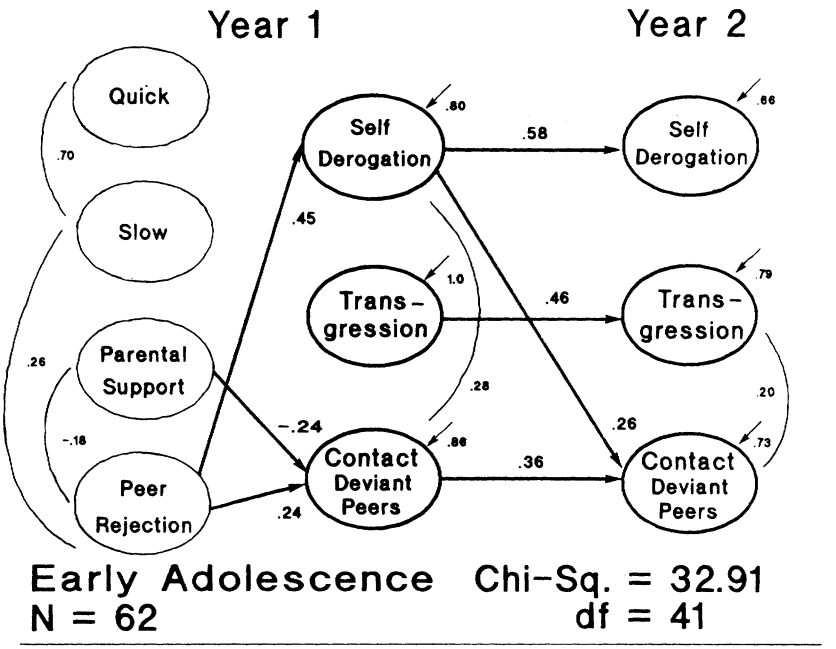

Figure 1 Structural Equation Model for the Early Adolescent Cohort. Data on these girls were gathered twice, with an interval of 12 months. At first measurement, the mean age was 11.5 years. Parental support, peer rejection, self-derogation, contact with deviant peers, and transgression proneness are represented by the sum of the items per construct. Quick and slow indicate adolescents whose self-reported maturational timing was faster (early maturers) or slower (late maturers) relative to same-aged peers. Only significant paths, covariances among the exogeneous variables, structural residuals, and covariances among residuals are depicted ($z > 1.96$). Path coefficients are set in boldface. Chi-square statistics refer to the model as depicted.

The goodness of fit is adequate: $\chi^2 = 21.69$, $df = 28$, resulting in a ratio of .77; goodness-of-fit index = .98. Again, the fit of this model was better than the fit of a model with no cross-lagged effects at all (difference $\chi^2 = 40.81$, $df = 4$, $p < .001$).

Obviously the number and variety of significant effects in the middle adolescent cohort was much more extensive than was found with younger adolescents, especially for the background variables. Multi-group comparisons were used in order to confirm the structural differences between the cohorts. While it was possible to fit the structure of the older

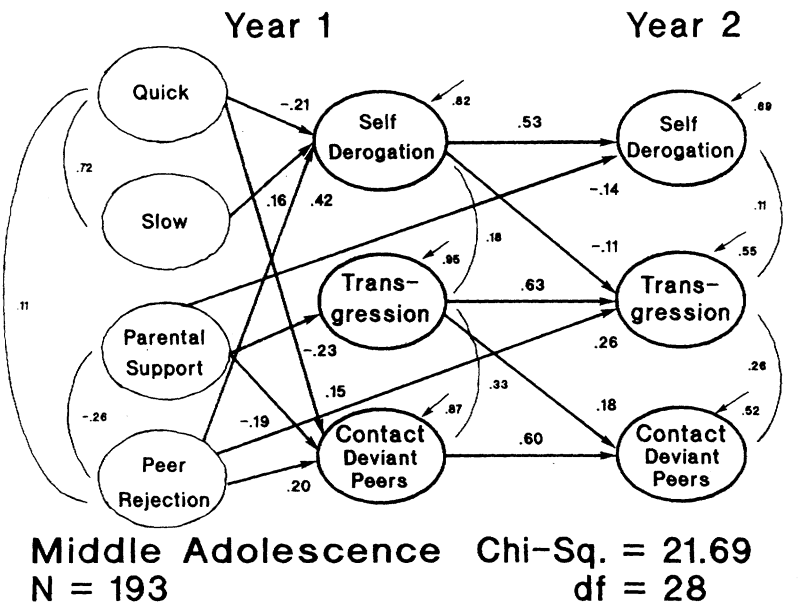

Figure 2 Structural Equation Model for the Middle Adolescent Cohort (mean age 14.7 years). Significant paths are depicted ($z > 1.96$); for the path from slow to self-derogation, $z = 1.7$. See Figure 1 for further explanation.

cohort to both groups ($\chi^2 = 84.15$, $df = 83$, $p = .44$), it was not possible to fit the structure of the younger cohort to both groups ($\chi^2 = 190.63$, $df = 93$, $p < .001$). Thus, processes and background influences shown for early adolescence seem to undergo a qualitative and quantitative change in the course of further development.[5]

In the following, further results will be presented by hypotheses. Only significant coefficients ($z > 1.96$) are mentioned. See Figures 1 and 2 for reference.

Hypothesis 1

In both cohorts, covariances with peer rejection are relevant in assessing the role of maturational timing.[6] Among the early adolescents, later maturation had a positive relation with peer rejection ($\beta = .26$). That is, late maturers reported more problems concerning acceptance by peers in school than did the other adolescents. The rejection may be based on

their prepubertal status and its psychosocial correlates. In considering effects of the background variables on the processes depicted in the model, early maturation was predicted to increase self-derogation and contacts with deviant peers. In the early adolescent cohort, there were no effects of maturational timing at all. In the middle adolescent cohort, however, some effects were found. In support of the hypothesis, early maturers reported more contacts with deviant peers ($\beta = .15$). As the negative effect of early maturation on self-derogation shows ($\beta = -.21$), they were also more satisfied with themselves. This is quite the opposite of what was expected. The slight positive effect of late maturation on self-derogation ($\beta = .16$, ns) was consistent with the surprising result. Although analysis of variance revealed no significant differences among timing groups in either cohort, the means for self-derogation declined from slower to faster in both cohorts (6.35, 4.83, 4.11 and 4.67, 4.44, and 4.00, for younger and older cohorts, respectively).

In sum, early maturation increased the risk of contacts with deviant peers in middle adolescence, as hypothesized. However, early maturation also corresponded to a more positive self-evaluation, contrary to hypothesis.

Hypothesis 2

Low social competence as a consequence of low parental support appeared to be responsible for the negative relation of support and peer rejection in both cohorts ($\beta = -.18$ and $-.26$, respectively). Higher support resulted in fewer contacts with deviant peers in the younger ($\beta = -.24$) as well as in the older cohort ($\beta = -.19$). Thus, there was a protective effect as stated in the hypothesis. Higher support was protective against transgression proneness, however, for middle adolescence only ($\beta = -.23$).

The older cohort showed another peculiarity. Whereas there was no significant effect of parental support on self-derogation at first measurement ($\beta = -.04$, ns), more support corresponded to less self-derogation in the following year ($\beta = -.14$). Thus, the impact of parental support on self-derogation became more pronounced from age 14 to age 15 years.

To test whether the model was similar for different levels of parental support, the scores for the older cohort were split at the median for parental support and this variable was removed from the model; the resulting model was tested with high and low parental support subsamples. Although the low parental support subsample was significantly

higher on transgression (time 1), deviant peers (time 1), peer rejection (time 1), and self-derogation (time 2), there were few differences in which standardized coefficients were significant in the model. Two cross-lagged paths were significant for only one group: The path from self-derogation to transgression was significant only among the low-support group ($\beta = -.18$, high: $\beta = .02$) and the path from transgression to deviant peers was significant only among the high-support group ($\beta = .29$, low: $\beta = .11$). Only one difference appeared among the exogenous effects: The path from late maturation to self-derogation became significant among the high-support group (.30). Other effects were similar in size to the original effects, although occasionally they did not attain significance because of small *n*s.

Hypothesis 3

The influences of peer rejection were almost invariant across cohorts. Higher peer rejection resulted in more contacts with deviant peers in the younger ($\beta = .24$) and older groups ($\beta = .20$). Similarly, higher peer rejection corresponded to higher self-derogation in both cohorts ($\beta = .45$ and .42, respectively). This relation between peer rejection and self-derogation was generally the strongest effect in the model.

An effect restricted to the middle adolescent cohort was also found: Higher peer rejection in the first year was related to higher transgression proneness in the following year ($\beta = .26$). Again, the contemporaneous relationship between these two variables was less pronounced ($\beta = .13$, ns) than a time-lagged relationship.

The time-lagged effects of peer rejection and parental support could be spurious because second measurements on these variables were not part of the model (see Rogosa, 1979). Therefore, additional two-wave cross-lagged analyses were run for peer rejection and transgression proneness and for parental support and self-derogation. In both cases, the lagged effects shown in Figure 2 were not attenuated by the reverse lagged effects on peer rejection and parental support, respectively; the latter were almost nonexistent ($\beta = .00$ and ($\beta = .05$). Thus, both background variables became more important over the one-year period.

Hypothesis 4

Not expectedly, the dominant effects among the process variables were their stabilities across time. Although all were significant, the size of the coefficients varied considerably between cohorts. Both transgres-

sion proneness (β = .46 vs. .63) and contacts with deviant peers (β = .36 vs. .60) became more stable during the adolescent transition.

The hypothesis posited an influence of self-derogation on later transgression proneness and contacts with deviant peers. The latter was confirmed with the early adolescent cohort (β = .26). In the older cohort, however, the effect on transgression proneness was reversed in sign. Adolescent girls who were not satisfied with themselves tended to show less transgression proneness, not more as expected (β = −.11). It is open to speculation whether they invest instead in positive alternatives such as academic performance. This result was contrary to what was hypothesized.

With the middle adolescent group, higher scores in prior transgression proneness corresponded to more contacts with deviant peers (β = .18), as hypothesized. Taking both cross-lagged effects together, transgression proneness seemed to play a mediating role between self-derogation and deviant peer contexts.

DISCUSSION

The antecedents of and links between self-derogation and contacts with deviant peers differed in the two cohorts. In early adolescence, the levels of both variables varied mainly as a function of peer rejection. Adolescent girls who felt rejected by schoolmates had a less favorable self-perception and also tended to affiliate with deviant peers. More important, self-derogation directly increased the risk of future contacts with deviant peers, while transgression proneness was not related to this process. In middle adolescence, however, self-derogation and contacts with deviant peers were targets of multiple influences in addition to peer rejection. Among the background variables, maturational timing played a prominent role. Adolescent girls who developed faster than their agemates had more contacts with deviant peers but also showed less self-derogation. In contrast to its irrelevance in early adolescence, in middle adolescence transgression proneness seemed to mediate between self-derogation and contacts with deviant peers. Finally, a tendency was observed for parental support and peer rejection to increase their impact on self-evaluation and willingness to transgress by middle adolescence.

Consistent with the focus of this paper, the discussion will concentrate on maturational timing. Generally speaking, maturational timing played a role in the development of problem behavior, as expected. More

important, however, some of the effects seemed to contradict results of earlier studies. This was especially true for relations with the self. Girls who matured earlier than their agemates in middle adolescence reported *less* self-derogation.

The results on the link between maturation and self were different from what was expected from the literature. Certainly, the discrepancy could simply derive from differences in the measurement of maturational timing. However, Petersen (unpublished data) used similar self-report assessments and found comparable relationships with height and weight.[7] Although there was no independent, more objective measurement, the assessment of maturational timing seems valid.

The findings on contacts with deviant peers are consistent with earlier research. Early-maturing girls reported more such contacts; that is, they agreed more with statements that characterize their friends as having trouble with adult norms. Magnusson et al. (1986) interpreted the higher risk of problem behavior among early-maturing girls as a consequence of age-inappropriate friendships with older males. Unfortunately, no data on the ages of their boyfriends were available. However, early-maturing girls were more likely to have close friendships with males ($r = .24$; $p < .001$). Thus, the results may relate at least in part to the more grown-up social affiliates of the girls.

How can this result be brought together with the higher self-esteem of early maturers in this study? Simmons et al. (1983) reported lower self-esteem among early-maturing girls. In the present study the reverse was found: higher self-esteem among early maturers. The processes producing these different results require further examination. However, the apparent advantage to early maturers could be temporary.

There are a number of problems with the present study that demand further research. The results require cross-validation on independent samples. Additional waves of measurement are required in order to determine whether the reported differences between cohorts indeed represent qualitative change in the role of maturational timing. A more extended time-span would help to distinguish relatively stable effects from short-term variations.

We also wish to further illuminate the interplay between maturation and social development by adding other target behaviors to the model. More specifically, it would be highly interesting to compare effects on problem behaviors with those on more positive alternatives such as prosocial action.

A final word concerning the positive relation between early maturation and self-evaluation: Most other studies on this issue deal with samples from the United States. Although a definite resolution of whether the present finding may be generalized requires systematic comparisons of matched national groups,[8] we risk a premature answer at present. It may well be the case that a true cultural difference exists. Concerning sex education, for instance, adolescents in West Germany receive much more information in regular school curricula than their American agemates. The remarkably low rate of adolescent pregnancy as compared to the United States (Statistisches Bundesamt,1984) is but one of the presumable consequences.

NOTES

1. It is noted that usually even 14-year-olds are called early adolescents. However, distinctive names were needed for the younger and the older cohort.

2. The principal aim of the BYLS (for short technical reference see Verdonik & Sherrod, 1984) is the analysis of the role of problem behavior in normal adolescent development. Risk and protective factors within the individual, and within family, work, and leisure contexts, are investigated in Berlin, West Germany. By 1989, one of the cohorts will have been followed up once every year from ages 11 to 18. A parallel study was started in Warsaw, Poland, in 1985.

3. Adolescents whose maturational timing is consistent with their peers receive a score of −1 on both dummy variables. Adolescents who develop faster get a 1 on quick, and a 0 on slow; conversely, those who develop slower get a score of 0 on quick, and a 1 on slow. These raw dummy variables represent a contrast between the group indicated by 1 and −1, respectively. However, when both are used simultaneously in the same regression analysis, due to effects of partialling-out, each of them represents a contrast with the remaining groups. Thus, a positive effect of quick on contacts with deviant peers would indicate more such contacts among early maturers than in the two other categories of maturational timing.

4. Other attributes such as the development of breast and pubic hair were not measured. Our interpretation is supported by data from the second measurement. One year later, the only predictor is maturational status ($\beta = .29, p < .05; r = .35$). Although of similar size, the coefficient for height fails to achieve significance due to large variance. Judged from a study on a Swiss sample in which the age at peak height velocity is 12.2 years (Gasser et al., 1984; Largo & Prader, 1983), the age at peak height velocity for girls is close to 12 years in Germany.

5. Note that all computations were done using the sum of the respective item scores in order to represent the constructs. Additional analyses were based on multiple indicator models. For the older cohort the results were confirmed ($\chi^2 = 609.35$,

df = 433, *GFI* = .84). Unfortunately, for the younger cohort the multiple indicator analyses revealed a rather bad fit (χ^2 = 668.82, *df* = 442, *GFI* = .66). This seems to result from the low stability of contacts with deviant peers (see Figure 1 for comparison). Thus, results on the younger cohort should be taken with some caution. Furthermore, random fluctuations in this small sample lead to unstable estimates (which is especially serious when running multiple indicator models).

6. The covariance between quick and slow deserves no attention as it is simply required by the method of dummy-coding chosen.

7. For example, among eighth graders (13 to 14 years) in a United States sample, "quick" had very low correlations with height and weight, "slow" was significantly negatively related to both variables (–.37 and –.35, respectively), and perceived timing was positively related (.32 and .51 with height and weight, respectively).

8. In collaborative research we have just begun to design cross-national secondary analyses on adolescents living in Berlin and Warsaw (Berlin Youth Longitudinal Study), Chicago (Developmental Study of Adolescent Mental Health), and Pennsylvania (Rural Adolescent Project).

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