

Timing of transitions and psychosocial adjustment in
African-American and European-American adolescent girls

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DRAFT: DO NOT CITE WITHOUT PERMISSION OF AUTHORS

Paper presented at the biennial meetings of the Society for Research in Child Development, April 15-18, 1999; Albuquerque, NM. Corresponding author: Alice Michael, 5201 Institute for Social Research, 426 Thompson St. Ann Arbor, MI. 48106. Internet address: alicem@umich.edu.

This research was supported by a grant from the Mac Arthur Foundation Research Network on Successful Adolescent Development Among Youth in High-Risk Settings awarded to Jacquelynne S. Eccles. We would like to thank the following people for their assistance: Jacquelynne Eccles (P.I.), Arnold Sameroff (P.I.), Todd Bartko, Elaine Belansky, Nick Butler, Diane Early, Kari Fraser, Ariel Kalil, Linda Kuhn, Sarah Lord, Karen McCarthy, Leslie Morrison, Oksana Malanchuk, Stephen Peck, Daria Ray, Robert Roeser, Kate Rosenblum, Sherri Steele, Erika Taylor, Cindy Winston, Carol Wong, and numerous undergraduate assistants and interviewers.



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This paper considers the relations between the timing of maturational events in early adolescence and girls' psychological and social adjustment. Several previous investigations have demonstrated the existence of concurrent links between the timing of pubertal development and girls' adjustment, such that early pubertal development increases European and European-American girls' vulnerabilities to a range of mental health distress, including depressive symptoms, eating disturbances, and negative body image, as well as more involvement in problem behaviors (Stattin & Magnusson, 1990; Silbereisen, et al, date; Koff & Rierdan, date; Graber et al. 1997). The current paper builds on this literature in three central ways: (1) by examining the effects of maturational timing on girls' adjustment over-time from middle-school into high school, (2) through inclusion of both European-American and African-American girls in order to examine the racial/ethnic context of maturation, and (3) by including three independent markers of maturation during early adolescence, one biological, one psychological, and one social.

Transitions of early adolescence

The sheer number of changes in physical, cognitive, emotional and social development during early adolescence provides fertile terrain for researchers interested in the etiology of many of the contemporary pitfalls of the adolescent decade. Puberty, the biological transition to reproductive maturity, constitutes one of the quintessential markers of the transition from childhood to adolescence. The development of secondary sex characteristics is notable to the adolescent girl and those around her, and catalyzes the need to reorganize one's self-perceptions, and to acclimate to changes in others' responses to these physical changes. Because sexuality is implicit in pubertal development, the changes are more likely to be met with indirect or conflictual communications (i.e., teasing instead of congratulations, shame and embarrassment as

well as pride and excitement) (Brooks-Gunn, Newman, Holderness & Warren, 1994; Grief & Ulman, 1982; Ruble & Brooks-Gunn, 1982; Scott, Arthur, Panizo & Owen, 1989). In addition, as a series of events that *happens to* the adolescent, it deprives the individual of a sense of choice or control, and holds a sense of mystery and uncertainty, both of which may contribute to emotional disregulation or distress during puberty (Tobin-Richards, Boxer & Petersen, 1983). For European-American girls, puberty constitutes both a change towards societally valued body shape (e.g., breasts) but also away from the 'slim-ideal' that defines contemporary white feminine standards of beauty. Thus, the transitions of puberty are taken to be a source of stress and a need for self-reorganization.

Another of the salient transitions of early adolescence is the change from same-sex to heterosocial peer groups, and the beginning of dating. Although thought to be influenced by both biological (e.g., hormonal) and social (e.g., peer group, societal permissiveness, parental restrictiveness) contexts, and clearly temporally related to pubertal maturation, previous research has indicated that grade cohort effects are more determining of entry into and participation in dating and heterosocial activities than pubertal timing or status (Dornbusch, Carlsmith, Gross, Martin, Jennings, Rosenberg, & Duke, 1981; Gargiulo, Attie, Brooks-Gunn, & Warren, 1987). Dating or heterosocial peer group affiliation also has meaning and import for adolescents. In contrast to puberty, the transition into heterosocial environments has some degree of choice or intention associated with it. Nonetheless, developing social and sexual interests afford a similar quality of uncertainty about how much one will enjoy and how successful one will be within a peer group or a particular dating relationship. Thus, this social transition is a source of anxiety as well as anticipation for most adolescents. Heterosocial groups and dating also serve as important socialization for future adult attachments, and as salient measures of self-worth and peer-status during adolescence (Petersen, Crouter, & Wilson, 1987).

The beginning of the second decade of life is not only a time of many changes, it is also a time of heightened self-awareness and self-consciousness for early adolescents. The peer group is

in constant reference in an attempt to provide an estimation, and hoped-for reassurance regarding the pace and nature of one's own changing feelings, ideas, and body. Although biological, cognitive and social development is normative during early adolescence, there is considerable variation in the rate and tempo of these changes between individuals (Eichorn, 1975). Thus several authors have argued that the *timing* of adolescent transitions relative to their peer group may impact on their psychological adjustment over and above the fact of development, per se. Empirical support for this idea, when applied to European-American adolescent girls, has been substantial in demonstrating that the timing of transitions does affect mental health and social behavior during adolescence (Brooks-Gunn & Petersen, 1983; Cauffman & Steinberg, 1996; Graber, Brooks-Gunn, Paikoff, & Warren., 1994; Graber, Lewinsohn, Seeley, & Brooks-Gunn, 1997; Hayward, Killen, Wilson, & Hammer, 1997; Lerner, 1988; Simmons & Blyth, 1987; Stattin & Magnusson, 1990).

Two contrasting hypotheses, the stage-termination, (also called "developmental readiness") hypothesis and the social deviance hypothesis, have been used to explain vulnerabilities that can arise as a function of maturing significantly "off-time" relative to ones' peers. According to the stage-termination hypothesis, early maturation does not allow for consolidation of the developmental tasks of the pre-adolescent latency period, thus precipitating problems for these adolescents as they grapple with the changes of early adolescence with fewer cognitive and emotional skills than their later developing peers. That is, they are not "developmentally ready" for the changes, and therefore, the stage-termination hypothesis predicts difficulties only for early maturers (Rierdan & Koff, 1993). In contrast, according to the social deviance hypothesis, distress is associated with passage through salient developmental markers either significantly earlier or later than peers, due to the perceived lack of shared experience with others, and feeling of difference from peers (Neugarten, 1969; 1979). In general, studies of European-American middle-class adolescent girls have provided stronger support for the stage-termination hypothesis in examination of the effects of off-time pubertal development, as

problematic outcomes across social and emotional domains are most common among early maturers (Ge, Conger & Elder, 1996; Lerner, 1988; Silbereisen, Petersen, Albrecht & Kracke, 1989; Simmons & Blyth, 1987).

Previous investigations of maturational timing during early adolescence have used a number of different indicators to assess adolescents' development as on or off-time. Most frequently, studies have used a salient biological marker, age at menarche for girls. However, the investigation of the timing of early adolescent transitions has also included other means of assessment, out of the recognition that puberty is not only a biological event, but also a psychological and social phenomenon. To assess the psychological impact of the timing of development more directly, a number of studies have asked adolescents for own perception of pubertal timing relative to others their age (Graber, et al., 1997; Wilen & Petersen, 1980; Silbereisen, et al., 1989; Simmons & Blyth, 1987). Additionally, the timing of entry into dating, or heterosocial culture has been investigated, both as a consequence of earlier pubertal maturation (Dornbusch, et al., 1981; Garguilo, et al., 1987; Stattin & Magnussen, 1990), as an antecedent of earlier sexual activity (Flannery, Rowe & Gulley, 1993; Phinney, Jensen, Olsen & Cundick, 1990; Presser, 1978). In this study, each of these three aspects of development are used as independent markers in which a girl is developing either earlier, the same as, or later than her age-mates. This strategy follows from the belief that each developmental marker has both shared and distinct antecedents and meanings, such that they are likely to constitute unique patterns of associations to girls' psychological adjustment.

Ethnic context of development

The majority of the studies reviewed above have examined the processes of early adolescent development in European-American samples only. Investigations of these processes within other ethnic groups are increasingly coming to the fore. Within the United States, previous studies of the effects of social context on pubertal development have focused on school transitions (Simmons & Blyth, 1987) and participation in athletic endeavors such as dance and

gymnastics that demand pre-pubertal body shapes (Brooks-Gunn, Attie, Burrow, Rosso & Warren, 1989). Ethnic group membership is also likely to serve as a critical moderator of developmental experiences, as the meaning of these developmental transitions for an individual is partially constructed vis-a-vis responses from the culture within which they are developing (Mead, 1936).

Much of the recent literature on African-American adolescents and maturation has focused on understanding teen pregnancy and parenting, while little attention has been devoted to normative developmental issues, or responses to maturation. A recent investigation of girls' pubertal development documented that African-American girls reach menarche 7 months earlier, on average, than do European-Americans (mean age= 12.16 years in African-Americans, and 12.88 in European-Americans) (Herman-Giddens, Slora, Wasserman, Bourdony, Bhapker, Koch & Hasemeier, 1997). Thus, if early maturation is a universally problematic event, as suggested by stage-termination theory, early maturing African-American girls would be the most likely to manifest evidence of 'crisis' (Neugarten, 1979), as they are among the earliest.

A few studies have explicitly examined African-American girls' expectations and response to menarche (Scott, Arthur, Panzino, & Owen, 1989; Scott, Arthur, Owen, & Panzino, 1989), and have compared their reports to studies conducted on European-American samples only (Ruble & Brooks-Gunn, 1982), finding similar results across racial groups in many respects. For example, both African-American and European-American girls indicate that surprise is the most common response to menarche, with similar ratios of positive and negative emotional responses across ethnic groups (Scott et al., 1989a; 1989b). However, these studies also suggest the existence of important differences between African-American and European-American girls' experience of menarche. First, African-American girls attribute more positive responses from their mothers than do European-American girls. In addition, results from studies examining African-American (Scott, et al., 1989b) and European-American (Brooks-Gunn & Ruble, 1982) suggest that girls may differ with respect to their experience of being reassured about the changes

of puberty, such that African-American girls reported more reassurance than did European-American girls. This difference in communication could moderate girls' responses to menarche, as well as other developmental processes, such as dating or sexual behavior, across ethnic group. That is, if African-American girls are experiencing more social support, and more positive maternal expectations regarding their ascendance into adult woman status, they may be expected to have fewer negative psychological responses to these maturational events.

Another documented cultural difference that should affect reactions to pubertal timing is the differentiated ideal body image preferences within African-American and European-American cultures. Rucker and Cash (1992) found that African-American female college students reported greater body satisfaction, and body ideals that were less thin and less discrepant from their actual body size, as compared to European-American college females. Thompson and colleagues (Thompson, Sargent & Kemper, 1996) reported greater acceptance among African-American males for larger female body size (hips and thighs in particular) when compared to European-American male preferences. In a multi-method study conducted by Parker and colleagues (Parker, Nichter, Nichter, Vuckovic, Sims & Ritenbaugh, 1995), African-American adolescent girls' ideas about physical beauty were characterized as "flexible and fluid." In contrast, European-American adolescents were more likely to adopt "rigid and fixed" ideas about beauty and physical appearance characterized by needing to approximate "a living manifestation of the Barbie doll" (p.106). These findings suggest that African-American girls would be less distressed and more welcoming of the physical changes and weight gain associated with puberty than are European-American girls.

Implications of maturational timing over the course of adolescence

Whereas a number of previous studies have demonstrated effects of maturational timing on white girls' adjustment during early adolescence, the effects of maturational timing on adjustment beyond the early adolescent years have received less empirical attention. Three competing hypotheses can be offered as to the course of development and adaptation for girls

maturing early or off-time relative to their peers. In this report, these three hypotheses are referred to as (1) temporary stress, (2) enduring scar, and (3) altered trajectory.

First, the temporary stress hypothesis posits that the effects of maturational timing may dissipate with time. Given that development occurs in virtually all individuals sooner or later, its occurrence is a normative event. Thus, the distress of being early or off-time may lessen, and longer term psychological adaptation and social functioning likewise may return to levels commensurate with 'on-time' maturers (Figure 4.1).

Second, it is possible that the differences in adjustment that manifest in early adolescence for early or off-time maturers are maintained but not exacerbated with time. That is, girls who demonstrate higher levels of psychological distress or social problems in early adolescence may maintain their elevated levels of distress throughout adolescence, but will not experience changes in their functioning at a greater rate than those who were not early or off-time maturers. This hypothesis suggests that early or off-time maturation creates a psychological 'scar' for some girls, and that this scar endures, but does not create additional vulnerabilities that accrue over-time (Figure 4.2).

Finally, the altered trajectory hypothesis posits that early development may set girls on a trajectory that differs from their peers, such that they not only experience greater distress during early adolescence, but continue to experience psychological and social problems in high school. At a greater rate, or with increasing severity (i.e., develop a depressive disorder or eating disorder, instead of subclinical distress) than peers. Thus, early development in middle-school may translate into increasingly differentiated functioning from non-early peers; the effects of timing in early adolescence may become strengthened (Figure 4.3).

The present investigation was conducted in order to report on patterns of adjustment and maladjustment for both European-American and African-American girls into mid-adolescence, and the contributions of salient transitions of early adolescence to later adolescent adjustment. Specifically, three markers of the early adolescent transition: menarche, perception of pubertal

timing, and heterosocial activity will be assessed in 8th grade, and the timing of these three transitions will be examined in association with girls' adjustment in 7th grade, 8th grade, and 11th grade for both African-American and European-American girls. One important assumption underlying the studies presented here is that all of these adolescent pitfalls—whether manifest as eating disturbance, depressive symptoms, problem behavior, early sexual activity or pregnancy—may be viewed as constituting troublesome adjustment, as defined by mental health or societal standards, that is partially determined by individual adaptation to the developmental transitions of the adolescent decade. This will provide useful information about the generalizability of the theories, and allow for refinement. In particular, the current investigation was conducted to assess whether effects of maturational timing on adjustment maintain any effect on girls' adjustment beyond the early adolescent years.

METHOD

Study participants

This report makes use of data collected as part of the first, third and fourth waves of the Maryland Adolescent Development in Context (MADIC) study, an on-going longitudinal investigation of adolescent development across multiple contexts (Eccles & Sameroff, PIs). The MADIC study includes questionnaire and interview data gathered from target adolescents, as well as primary and secondary caregivers.

Families were recruited through the schools attended by the target adolescent. After receiving a brief description of the study, families who were interested in learning more about the study were asked to sign and return a form indicating permission for study staff to contact them. At the first wave of data collection, when the adolescents were in the 7th grade (in 1991), 1961 families signed the permission form. Of these, 76% were successfully included as study participants. Most of the remaining families declined due to time constraints, scheduling conflicts, or lack of interest. Some were never successfully interviewed due to difficulties

obtaining current contact information. The sample retained at the 8th grade assessment (1993) represented 71% of the original participants from the first data collection, and the sample in 11th grade represented a 58% retention of the sample across all three waves of data collection. Mean comparisons between the study sample and the initially identified sample (n=1961) indicated that, overall, the youth who did not participate over-time in the study were slightly older and tended to be from less affluent families.

Current Study

Data used in the present investigation were obtained from adolescent girls and their primary care-givers at three points in time: during the fall and spring of the target adolescents' 7th grade year (ages 12-13), again in the summer following the 8th grade year (ages 13-14), and finally during their junior year of high school (ages 16-17). No differences in age as a function of race existed in the sample.

Inclusion in this study was based on a number of criteria. First, only girls were included. Second, eighteen girls were excluded from analyses because they were not of white non-Hispanic or African-American ethnic group membership, as other groups were not sufficiently well represented for comparable analyses. Finally, thirty-three girls were excluded because they were notably older or younger than is typically the case for their grade [as determined in the 8th grade: 12 years (n=24); 15 years (n=8); 17 years (n=1)]. This was necessary because the indicator of menarche was determined by grade, not by age, and data were not available regarding the reasons for the age-grade disynchrony for these girls.

Finally, because the measures of maturational timing were determined in the 8th grade, only girls who had data available at both the 7th and 8th grades were selected for inclusion (n = 435). Of these girls, roughly 80 were not available for interview in the 11th grade assessment. Attrition analyses revealed two differences between girls who were and were not included in the 11th grade assessment: (1) parental education was lower among girls who dropped-out between the 8th grade and 11th grade assessments ($t(436)=2.35, p<.05$), and (2) drop-outs rated themselves

to be more popular in the 7th grade than those who remained in the sample over-time ($t(412) = -2.00, p < .05$). No differences were found for any of the other demographic characteristics, maturational timing variables, or outcomes at either 7th or 8th grade as a function of sample attrition.

The sample is unique in its inclusion of large samples of both African-American and European-American families of comparable socioeconomic status (see Table 2.1). Mean annual income was \$43,700 for African-Americans and \$50,200 for European-Americans in 1993. Although racial group membership and SES were not independent in the sample, ($r = .21, p < .001$), these numbers reflect comparable, middle class, standards of living overall. Living arrangements of the families were somewhat different across groups. Of the African-American girls, 50% were living with both biological parents in 8th grade. For European-American girls, this figure was 68%. European-American girls were significantly more likely to live in homes with 2-biological parents, and less likely to live-in homes with a single, never-married parent ($\chi^2(5,438) = 19.22, p < .001$), as determined in the 8th grade assessment.

Data for this report were primarily gathered from the target adolescent. Information taken from the primary caregiver regarding concerns for their daughter's future, and adolescent mental health and behavioral symptoms were also included. These primary caregivers (PCGs) were predominantly mothers (90%). Those who were not mothers were typically fathers (5%), stepmothers (2%), or adoptive mothers (1.3%). Because the PCG was, in the majority of cases, the mother, I refer to data from this person as "maternal report" for the sake of brevity.

Measures

Maturational timing

Puberty. Pubertal timing was assessed via adolescent self-report of the grade and season in which menarche occurred. For this study, the grade and season in which each girl had her first menstrual period were used to specify the continuous indicator of the timing of menarche. A

small number of girls (8 African-Americans and 18 European-Americans) had not experienced their first period at the time of the 8th grade assessment. As in other samples, the African-American girls reported experiencing menarche about 6 months earlier than did European-Americans ($t(416) = -4.72, p < .001$). On average, African-American girls experienced menarche in the spring of the 6th grade ($M = 4.55, sd = 1.12$), whereas European-American girls reached menarche in the late fall of the 7th grade ($M = 5.10, sd = 1.24$). The percentage of girls reaching menarche in each grade is presented in Figure 2.1. Girls were not designated into ‘early’ or ‘late’ maturational categories for the purposes of the present analyses; menarcheal timing was used as a continuous variable, scaled such that higher scores indicate later development.

Perception of pubertal timing. Perception of timing was assessed during the 8th grade via one 5-point item indicating whether each girl felt that she was developing earlier, about the same, or later than most girls her age. Girls who rated a ‘1’ on this scale indicated that their physical development was occurring ‘a lot before most girls,’ while those rating a ‘5’ on this item assessed their physical development as occurring ‘a lot later than most girls’ their age. Distribution of responses yielded 28% of girls reporting either ‘much earlier’ or ‘earlier’ development, 44% of girls reporting development “about the same” as others, and 28% reporting ‘later’ or ‘much later’ development for both European-American and African-American girls. There was no difference in girls’ perceived timing as a function of race, ($M = 2.87, sd = 1.12; M = 2.99, sd = 1.00$) for African-Americans and European-Americans, respectively.

Perception of timing was included in analyses two ways, given preliminary findings (not reported here) of its curvi-linear association with many of the outcomes. In addition to including the scale as a linear function (early to late development), an ‘off-time’ measure was computed, such that girls who reported perceived maturation as *either* earlier or later than their peers received higher scores (‘1’ or ‘2’), and girls who perceived themselves to be “on-time” received a lower score (‘0’).

Heterosocial maturation. Social maturation was assessed via a scale created from 5 items pertaining to heterosocial behavior and dating. Using 5-point Likert scales, adolescents reported on the age of their first unsupervised date, frequency of dating in the past month, how often they went out with friends unsupervised, how many of their friends were at least a year older, and how many of their friends pressured them to have sex, ($\alpha=.65$). Girls, on average, reported themselves to not be very involved in this sort of heterosocial contact in the 8th grade ($m = 1.88, sd = .59; M = 2.00, sd = .75, \text{range } 1-5$) for African-Americans and European-Americans, respectively, with higher scores indicating more 'advanced' heterosocial behavior. European-American girls reported marginally more involvement in heterosocial activities in the 8th grade ($t(296) = -1.87, p < .06$).

Relations between maturational timing assessments

In order to estimate the degree of independence between these three assessments of maturational timing, correlations were tested within racial group. Positive correlations between perception of timing and menarche were present for both African-American ($r = .36$) and European-American girls ($r = .54$), (associations are significantly greater among European-Americans at the $p < .05$ level, using Fisher's r to z transformation and the test of significant differences between groups). Among African-American girls, heterosocial activity was unrelated to menarcheal timing or perception of timing. However, positive associations between heterosocial activity and menarche ($r = .21, p < .01$), and heterosocial activity and perception of timing ($r = .17, p < .05$) were present for European-American girls. The relation between heterosocial activity and menarche for European-American girls was significantly different from the pattern for African-American girls at the $p < .05$ level, but correlations between perception of timing and heterosocial activity were not significantly different between racial groups.

Adolescent Adjustment

The particular aspects of psychological and social adjustment selected for study reflect a comprehensive range of adolescent outcomes hypothesized to be associated with the timing of

maturation. Overall, four broad domains of adjustment are assessed: mental health, sense of self, chances of future negative outcomes, and “problem behavior” such as truancy, stealing, and substance use. Internal consistency (Chronbach’s alpha) ratings for scales used at each assessment period are presented in Table 2.3. Unless noted, measures are identical at the three time points. In particular, the mental health assessments were expanded after the 7th grade assessment.

Youth report of Mental Health

Depressive symptoms. In the 7th grade, six items were adapted from the Symptoms Checklist 90-Revised (SCL-90; Derogatis, 1983) to assess depressive mood, loneliness, and suicidality. In the 8th and 11th grade assessments, depressive symptoms were assessed using the Children’s Depression Inventory (Kovacs, 1992), a 27-item measure of the frequency of cognitive, emotional and vegetative depressive symptoms during the past 2 weeks using a three point scale: 0 (no symptoms), 1 (mild symptoms), 2 (definite symptoms). The “suicide” item was excluded from our assessment. Because of missing data for some of the items, they were not summed according to the system used by Kovacs. Instead, a mean was taken across the items available. The range of the resulting scale was from 1 to 3, with higher numbers reflecting greater levels of depressive symptoms.

Eating Disturbance. In the 7th grade, 4 items assessing both feelings and behavior around eating were asked of participants. Although internal consistency of the scale was low all items were retained to increase comparability of measurement across time. The scale measuring eating disturbance in the 8th and 11th grade assessments, was derived from two sub-scales of the Eating Disorder Inventory (EDI-2; Garner, Olmstead & Polivy, 1983). Items from the “Drive for Thinness” and the “Bulimia” sub-scales of the EDI were included, based on their demonstrated associations with symptoms of both anorexia nervosa and bulimia. Girls were asked about their thoughts and behaviors around restricting, bingeing, and purging, and fears of weight gain. The frequency with which each symptom was experienced was assessed on a 6-point Likert scale

ranging from 1(never) to 6 (always). Both the total 9-item scale, and the two sub-scales are included in analyses.

Anger. At all three time points, girls experience of anger was assessed using three items adapted from the Symptoms Checklist 90-Revised (Derogatis, 1983). Adolescents responded to questions regarding their experience of wanting to “smash or break” something, concerns about controlling their temper, or wanting to hurt someone because of their anger within the last month. Items were assessed using a 5-point Likert scale ranging from 1 (almost never) to 5 (almost always), and scored such that higher levels indicate greater anger.

Maternal report of Adolescent Mental Health

In the 7th grade, maternal reports of adolescent depressive and anxious symptoms, as well as anger were assessed using 5 point scales. The depressed/anxious scale included 6 items tapping both depressive (i.e., ‘withdrawn’ or ‘unhappy’) and anxious feelings (i.e., ‘too fearful or anxious’), and the anger scale included 3 items assessing aggression or difficulty controlling emotions (i.e., ‘has a very strong temper and loses it easily’). For reports obtained in the 8th and 11th grade, the Child Behavior Checklist (CBCL; Achenbach & Edelbrock, 1983) was used. The CBCL is a well-established inventory of children’s behavioral maladaptation including 113 items which are scored as either 0 (not true), 1 (somewhat or sometimes true) or 2 (very true or often true) of the target child now or within the past 6 months. For this report, items were aggregated along the two broad dimensions of internalizing and externalizing behaviors. The internalizing factor includes anxious/depressed, withdrawn, and somatic symptoms. The externalizing scale includes deviant behavior and aggressive behavior symptoms. Finally, the total problem score, a summary of all items included in the CBCL, was also included in this study.

Sense of Self

Four scales were used to assess girls’ experience of themselves: global self-esteem, ratings of popularity, attractiveness, and satisfaction with their body weight. The global self-esteem measure was developed for use in several related large-scale studies of child and

adolescent development, and adapted from Harter's (1983) global self-worth scale (see Eccles, Wigfield, Flanagan, Miller, Reuman, & Yee, 1989). This 3-item scale taps adolescents' confidence in and satisfaction with themselves, assessed on a 5-point Likert scale. Items were coded and averaged such that higher scores reflect greater self-esteem. Self-concept of popularity was assessed via a single 7-point item regarding how popular they felt themselves to be as compared to other kids. Additionally, girls' beliefs about their attractiveness were assessed via 2 questions about how 'good-looking' they thought themselves to be. These two items were averaged, and scored in the direction of greater attractiveness, as assessed on a 7-point scale. Satisfaction with weight was assessed via one question regarding the amount of weight they would like to lose or gain. The scale was created such that higher scores indicated a desire to *gain* weight (i.e., a '5' indicates a desire to gain more than 10 lbs). However, as very few girls stated this desire (between 5 and 14% of girls stated a wish to gain weight across time and racial groups), the scale is interpreted with the higher end as reflecting greater *satisfaction* with weight, and the low end reflects greater desire to lose weight.

Chances for Future Events

In the 8th and 11th grades, both adolescent and maternal concerns regarding potential future problems for the adolescent were assessed in two domains: mental health and sexual events. Adolescents and mothers were asked to assess the chances that the adolescent would experience a range of negative outcomes in these areas, and separate scales were created for each respondent. Items were assessed by a 6-point Likert scale which ranged between 1 (very low) through 5 (very high) and included 6 (already happened). The mental health scale included 4 items assessing the chances that the adolescent would develop: a drinking problem, psychological problem like depression, an eating disorder like anorexia or bulimia, or experience suicidal ideation. In addition the parents scale included an assessment of whether adolescents would have trouble "finishing what he or she starts." To assess negative sexually related outcomes, girls and mothers were asked about the likelihood of 4 circumstances: becoming pregnant, being

sexually assaulted or raped, get AIDS or other sexually transmitted diseases, or having sex 'too young.'

In the 7th grade, all of these items were not available, and therefore a composite rating was computed for both adolescents and mothers, including items related to mental health (drinking), sexual activity (sex too young), as well as other problem behaviors, such as getting involved with the police, gangs, and skipping school. Finally, expectation regarding transitions to adulthood were assessed in the 11th grade; girls' reports of the age at which they expected to get married was included in this study.

Problem Behaviors

To assess problem behaviors, a scale was computed that included a wide variety of activities typically included in previous assessments of problematic behavior during adolescence. In their original form, questions included a rating of the frequency with which each problem behavior was engaged in over the course of the previous month (waves 1 and 3) or 6 months (wave 4). Items were subsequently recoded into dichotomous variables, with '0' reflecting no involvement, and '1' reflecting any degree of involvement in the behavior. Items were selected to reflect minor to severe forms of behavior, and an average was computed across forms of deviance, partially because of the low base-rates of many of these kinds of activities among girls in this sample. Representative items include activities ranging from lying to parents (minor) to alcohol and other drug use (moderate) to stealing and other anti-social criminal behavior.

Demographics.

Socioeconomic status (a composite measure of parental income, education and occupational status) and family structure were included in all analyses.

Analytic Plan

Two analytic strategies are employed to assess the duration of effects of early adolescent maturational timing on adjustment. Longitudinal patterns are examined for each adjustment outcome using hierarchical linear modeling (HLM), in order to test three alternate hypotheses

regarding the ways in which girls' developmental trajectory may be affected by the timing of maturation during early adolescence. Second, a series of repeated-measures analysis of variance are presented in order to provide an alternate examination of the question of the duration of effects of maturational timing on girls' adjustment between the 8th and 11th grades only.

Hierarchical linear modeling

Hierarchical linear modeling (HLM: Bryk & Raudenbush, 1992) was the primary technique used to examine longitudinal pathways in this data. HLM is based on linear regression, and allows for sophisticated modeling of multi-level data simultaneously. Longitudinal data points are treated as "occasions nested within persons" (p.2), such that the longitudinal pattern becomes the 'outcome,' and the statistical goal is to explain the interindividual variation in this pattern (e.g., reduce the unexplained variance in the outcome). HLM allows for estimation of both the intercept and the slope. In this study, two levels are specified; level 1 includes the three data-points for each adjustment variable (e.g., depressive symptoms in 7th grade, 8th grade, and 11th grade). Level 2 includes the variables hypothesized to affect the initial level (intercept) and shape of the trajectory (slope): racial group membership, SES, menarcheal timing, perception of timing, and heterosocial activity. Estimation of the intercept and the shape of the slopes, as described by the linear term, allows for assessment of the hypotheses outlined above. The quadratic term was not included, since it is not reliably estimated when only three data points are available (Bryk & Raudenbush, 1992). Therefore, the 'temporary stress' hypothesis (which assumes a curvilinear longitudinal function) was further investigated in subsequent analyses conducted using data from the 8th and 11th grade assessments only.

Each of the outcomes were included in separate models, and a null-model and a 'best fit model' were established in each case. The null model included none of the level 2 predictors, and provided initial estimation of the fixed and random effects of the intercept and slope of the trajectory for the adjustment outcome (e.g. depressive symptoms). Linear functions were

assessed in this initial modeling, in order to determine whether there was sufficient variance within these estimates to attempt to improve the estimation using level 2 variables. In cases where the null-model revealed significant inter-individual variance in the intercept and/or the linear slope, a second model was tested (the 'best fit' model), where the level 2 variables were included in order to determine those that significantly contributed to explaining the variance in these terms. In all cases, the 'best fit' model for the intercept was established prior to modeling of the slope, in order to accurately assess whether there was change in the trajectory over-time. This strategy is conceptually similar to using 'control' variables in OLS regression techniques, which are entered in to the equation first in order to gain accurate estimation of the magnitude of the effects of interest over and above the effects of these 'controls'. Additionally, interaction terms were computed and tested in these models. The four maturation variables were standardized and multiplied with race (0=African-American; 1= European-American) in order to allow for examination of the central hypothesis that the effects of the timing of maturation on girls' psychological and social adjustment is moderated by racial group membership.

Two constructs (depression and eating disturbance) were standardized, given that identical measures did not exist across time. Standardization of these measures allowed for longitudinal use, but changed the properties of the metric (e.g., mean is definitionally set to zero at each assessment point). Therefore, it was not possible to detect change in the overall mean-levels of these two outcomes over-time, but it was possible to test the improvement of the estimation of the inter-individual variation in the slope.

Repeated Measures ANCOVAS

Repeated Measures ANCOVAs were conducted for each outcome between the 8th and 11th grade as well (see Tables 4.12 to 4.14). The within subjects factor was the level of adjustment (e.g., depressive symptoms) at 8th grade and 11th grade. Interactions between race x time, and each maturation variable x time were the central between groups factors, and SES and family structure were included as covariates. Finally, the three-way interaction of time x

maturation x race was assessed for each of the maturation variables, to address the question of racial group moderation of the effects of maturation on adjustment over-time. The within subjects effects were of primary interest here, as these results address the question of change over-time in the level of adjustment as a function of maturational timing, race, or both. In particular, analyses were conducted to assess the ‘temporary stress’ hypothesis. Generally, findings are consistent with the results using HLM; this set of analyses will be discussed only where findings serve to clarify or extend understanding of results obtained using HLM, or in cases where HLM could not be used because data were available at only two time points.

Results

Results of the HLM analyses are presented first, then results for the RM-ANCOVAs are noted. Results for each outcome are presented separately throughout, beginning with mental health.

HLM. For all outcomes, there was sufficient inter-individual variance to model at the intercept, which was set at the 7th grade. For seven of the eleven adjustment outcomes modeled, there was sufficient inter-individual variation in the slope to permit prediction using the level 2 variables. There was insufficient inter-individual variability in the slope for popularity, attractiveness, satisfaction with weight, and problem behavior.

HLM does not provide an estimate of the variance explained (akin to the R^2 in OLS regression). However, a rough proxy for the variance explained can be computed using a simple formulaⁱ. This estimate is reported for all HLM analyses in the tables, although its use is considered questionable (see Snijders & Bosker, 1994 for discussion of limitations). For these

ⁱ percent variance = [(variance of the null model – variance of the full model)/variance of the null model]* 100.

analyses, intercept estimation ranged from 2% of the variance (for self-esteem, attractiveness, and maternal report of the chances for negative outcomes) to 28% of the variance in eating disturbance. Reduction in the unexplained variance in the slope yielded a similar range: from 3% for body mass to 23% for self-esteem—redo with numbers only for the variables presented.

Depressive symptoms. HLM modeling of depressive symptoms resulted in significant prediction of differences in 7th grade only. As shown in Table 4.1, girls who experienced earlier menarche, who perceived their maturation to be both later and more ‘off-time,’ and who were more involved in heterosocial activity reported greater depressive symptoms in 7th grade. None of the hypothesized demographic or maturational timing predictors contributed significantly to the estimation of the linear slope after differences in the intercept were accounted for.

Eating Disturbance. Initial levels of eating disturbance were related to maturational timing across the domains assessed (see Table 4.2). Girls with earlier menarche and heterosocial activity, and who perceived themselves as more off-time in their pubertal development, reported more eating disturbance in the 7th grade. In addition, European-American girls reported more eating disturbance than African-Americans. The linear slope was negative, such that girls’ eating symptoms decreased over-time in the sample as a whole. Additionally, variance in the linear slope was marginally predicted by SES, such that girls from higher SES backgrounds experienced a *less dramatic decline* in eating symptoms over-time (Figure 4.4). No interaction effects were present.

Anger. Anger in 7th grade was associated with each of the three maturation variables, such that girls who experience earlier menarche and heterosocial activities, and perceived themselves to be more off-time than their peers reported more anger (Table 4.3). The linear slope was positive; girls reported greater anger over-time. There were no significant predictors of the slope, and no significant interactions were found.

Self Esteem. In the 7th grade, girls’ self-esteem was positively associated with more on-time maturation (Table 4.4). Additionally, the interaction between menarche and racial group

membership was significant, such that early maturing European-American girls had the lowest self-esteem in the 7th grade. Self-esteem increased over-time in the sample as a whole, and girls who reported more involvement in heterosocial activity, as well as more “off-time” perceived development experienced a greater increase in self-esteem over-time than did comparison girls. Figure 4.5 illustrates the effects of heterosocial activity, whereby girls’ self-esteem was increasingly differentiated over-time by their involvement in heterosocial activity, such that earlier girls reported higher self-esteem. In contrast, the effects of ‘off-time’ perceived timing on both 7th grade and over-time adjustment offers a different picture of girls’ self-esteem. As shown in Figure 4.6, although off-time girls reported significantly lower self-esteem in the 7th grade, they experience a catch-up effect over-time, such that by 11th grade, their esteem was commensurate to the ‘on-time’ girls.

Figure 4.7 presents all modeled effects on self-esteem simultaneously. Although complicated, the figure also offers a compelling portrait of some of the combined influences on development and adjustment. Overall, although ‘early’ menarche and off-time perceived development appeared to be hazardous for European-American girls in 7th grade (placing them in the lowest self-esteem point), early heterosocial development actually enhanced their esteem over-time. That is, by the 11th grade European-American girls who experienced both early menarche and early heterosocial activity were solidly in the mid-range of esteem (the dotted diamond line), as compared to European-American girls who experienced early puberty and later heterosocial involvements (the dotted square line). Interestingly, it appears that experiencing early pubertal *and* early heterosocial development led to the highest self esteem in the 11th grade for African-American girls, (the solid star line). In contrast, later pubertal development coupled with earlier heterosocial activity led to the highest self-esteem among European-American girls in 11th grade (the dotted triangle line). Finally, Figure 4.7 also includes the effects of off-time perceived development on esteem; although ‘off-time’ perceived development was a liability to

positive self-esteem in the 7th grade, off-time girls' esteem improved at a more rapid rate over-time, and caught up to levels commensurate with on-time girls by 11th grade.

Appearance. Results for girls' self-concept of appearance demonstrated significant prediction of the 7th grade intercept only (Table 4.5). Girls who perceived themselves to be earlier maturing and who were African-American reported themselves to be more attractive than did other girls. Girls' estimations of their attractiveness were found to remain stable over-time. However, there was insufficient variation in the linear slope to allow for more refined prediction of the slopes among different groups of girls.

Popularity. In the 7th grade, girls' estimation of their popularity was associated with two of the three maturational indices (Table 4.6). Earlier menarche and earlier involvement in heterosocial activities were positively associated with popularity in the 7th grade. Popularity demonstrated a positive linear slope over-time. Prediction of the interindividual variation in the slope was not possible, due to insufficient variation in the linear slope identified in the null model.

Satisfaction with Weight. The results for girls' satisfaction with their weight demonstrated that, in the 7th grade, girls who experienced later menarche and perceived themselves to be developing later than peers also reported greater satisfaction with their weight (i.e., did not want to lose as much weight) (Table 4.7). There was insufficient variance in the slope to be predicted in this model, and overall, there was no significant change in the slope over-time. That is, girls in this sample as a whole did not become increasingly satisfied (or dissatisfied) with their weight over-time between the 7th and 11th grades (see Figure 4.9).

Youth report of chances for negative outcomes. All three maturational variables were related to girls' reports of their chances for negative outcomes in the 7th grade (Table 4.9). Earlier menarche, more 'off-time' development, and greater involvement in heterosocial activities were related to greater estimates of future chances of negative events. In addition, European-American girls were more likely to endorse concerns about negative future events than were African-

American girls. Although there was variation in the linear slope, none of the demographic or maturational timing indicators were significant predictors.

Maternal report of chances for negative outcomes. Maternal ratings were associated with racial group membership at the 7th grade assessment, such that European-Americans reported greater concerns than African-Americans (Table 4.10). Significant prediction of the linear slope was achieved through inclusion of racial group membership, heterosocial activities, and the interaction between menarche and racial group membership. Overall, mothers reported fewer concerns about their daughters' chances of experiencing negative events as their daughters grew older. Girls who reported earlier involvement in heterosocial activity, and who were European-American early-menarcheal girls, had mothers who were more likely to report increased concerns about their daughter's future problems over-time relative to others in the sample (see Figure 4.11).

Problem Behavior. Problem behavior in the 7th grade was predicted by earlier menarche and more heterosocial involvements (Table 4.11). The linear function was significant, and indicated that problem behaviors increased over-time. No prediction of the slope was possible, as there was not sufficient variance.

Summary of HLM findings

Results using HLM revealed significant estimation of 7th grade adjustment as a function of maturational timing. Indeed, for estimation of self-reported depressive symptoms, eating disturbance, anger, body mass, and chances for future negative events, all three maturational timing indicators (menarche, perception of timing and heterosocial activity) were significant predictors of the variation in 7th grade levels. Additionally, girls' popularity and engagement in problem behavior in the 7th grade were positively associated with earlier menarche and earlier heterosocial activity. Self-esteem and satisfaction with weight in 7th grade were associated with later menarche and more on-time perceived timing (self-esteem) or later perceived timing (satisfaction with weight). Girls' attractiveness in 7th grade was related to earlier perceived

timing. Only maternal reports of the chances of future negative events were not significantly estimated at the intercept by maturational timing. With respect to racial group, as indicated in previous analyses, African-American girls experienced fewer eating symptoms, greater self esteem, higher appraisal of their own appearance, and fewer chances for negative future events (as reported by mothers and daughters). Finally, socioeconomic status was not associated with any of the adjustment measures in 7th grade.

With respect to estimation of the linear slope, significant explanation of the inter-individual variation was achieved in three out of ???N cases: eating disturbance, self-esteem, and maternal reports of girls' chances for future negative events. While levels of reported eating disturbance decreased over-time for the sample as a whole, the trajectory for girls from higher SES backgrounds tended to experience a less steep decline in symptoms over-time, as compared to lower SES girls. The effects of maturation on self-esteem reflect all three of the hypothesized pathways: temporary stress, enduring scar, and altered trajectory in different domains of maturation. Girls who experienced earlier menarche and perceived themselves to be off-time reported lower levels of self-esteem initially. However, girls who reported earlier heterosocial activity and more off-time perceived development reported greater increases in self-esteem over-time, as compared to non-early girls. Thus, although earlier development was a liability for European-American girls initially, early heterosocial and off-time perceived development altered the trajectory for self-esteem for these girls, such that they reported levels of self-esteem commensurate with non-early girls in the 11th grade. This illustrates the temporary stress hypothesis for the effects of off-time perceived development; girls who were off-time in middle school had managed to resume comparable estimations of themselves by the 11th grade. However, the negative effects of early menarche for European-American girls persisted—an enduring scar on their self-esteem over-time. Finally, effects for heterosocial activity imply an altered trajectory, whereby girls who were more heterosocially involved reported greater increases in self-esteem over-time, independent from other aspects of their maturation.

Finally, longitudinal results for maternal reports of the chances for future negative events for their daughters were also consistent with the ‘altered trajectory’ hypothesis. Whereas there was an overall marginal decline in the levels of maternal reports over-time, girls who experienced earlier heterosocial activity had mothers who reported less diminished concerns about negative future events for their daughters over-time, relative to the sample as a whole. More strikingly, reports by mothers of early menarcheal European-American girls *increased* in level over-time, in contrast to all other groups.

For other adjustment outcomes, the ‘enduring scar’ hypothesis gained support, in that initial differences observed at 7th grade between maturational groups were not altered over-time. The patterns of girls’ adjustment within the domains of depressive symptoms, anger, popularity, attractiveness, satisfaction with weight, girls’ reports of the chances for negative outcomes, and problem behavior was best described as an ‘enduring scar’ for earlier maturers according to the HLM findings.

Collateral Analyses: Convergent Results

In order to provide a more stringent examination of the ‘enduring scars’ suggested by the HLM results, the RM-ANCOVA results are presented as collateral analyses that serve to qualify or clarify the HLM findings in some instances. When the results of the HLM analyses were supported by significant between group differences in the ANOVAs across the assessment points, then results are interpreted as more robust. Alternately, where results from RM-ANCOVAs demonstrated significant changes in the outcomes over-time, these results are used to qualify the ‘enduring scar’ findings from the HLM analyses and provide support for the ‘temporary stress’ hypothesis in some cases. All RM-ANCOVA results are summarized in Table 4.12.

Mental Health. For depressive symptoms and eating disturbance, between groups effects were no longer significant in the 11th grade, suggesting that the strength of the association between earlier maturation these aspects of mental health diminished over-time. Figure 4.12

illustrates the interactive effect between the timing of heterosocial activity and time on depressive symptoms, which partially modifies the 'enduring scar' for depressive affect. In this case, for both European-American and African-American girls, early heterosocial girls experienced declines in depressive affect between 8th and 11th grade, whereas late heterosocial girls experienced increases. For anger, Figure 4.13 demonstrates a similar effect of heterosocial timing over-time; early girls experienced less anger over-time, whereas late girls' levels of anger did not change between 8th and 11th grade. However, European-American girls who were in the early menarche and earlier perceived timing groups did experience an 'enduring scar' of development. These girls continued to report greater anger than other groups in the 11th grade (see Tables 3.10 and 3.16).

For maternal reports of girls' mental health (CBCL), RM-ANCOVA results suggest enduring scars of early menarche among European-American girls, and scars of off-time perception of development among both racial groups for maternal reports of externalizing and total problem scores (i.e., no within subjects effects on the RM-ANCOVAs, and stable between group differences). However, for reports of internalizing symptoms, results suggest not only maintenance of differences in symptoms over-time as a function of early timing across all three maturational indicators, but also increases in internalizing distress for the early menarcheal European-American girls only (see Figure 4.14). Thus, early menarche appears to place these girls on an altered trajectory with respect to internalizing distress as reported by their mothers.

Sense of Self. With respect to popularity, girls who were later in beginning their heterosocial activities in middle school were still considering themselves to be less popular in 11th grade, but the effects of menarcheal timing were no longer differentiating girls' reports of popularity (see Table 4.12). Similarly, girls who reported later perceived timing of maturation continued to rate themselves as less attractive than other girls over-time, but these effects did not endure for menarcheal timing. In addition, Figure 4.16 illustrates the interaction between perception of timing and time for attractiveness; the difference between late and non-late

maturers' sense of attractiveness was gradually diminishing with time as girls who perceived themselves to be late maturers experienced increases in their attractiveness over-time, whereas other girls remained stable in their assessments. Support was garnered for enduring scar effects on girls' satisfaction with weight. Girls who experienced earlier menarche, and who perceived themselves as earlier developers continued to report greater weight dissatisfaction than their later maturing counterparts in 11th grade. In addition, a significant interaction between heterosocial activity and time emerged for girls' weight satisfaction, such that earlier heterosocial girls experienced increased dissatisfaction with their weight between 8th and 11th grades (Figure 4.17).

Chances for Negative Outcomes & Problem Behavior. With respect to girls' reports of the chances for negative events, European-American early menarcheal girls experienced an enduring scar of menarcheal timing, and effects of heterosocial activity persisted over-time for girls in both racial groups. Additionally, a three-way interaction between perceived timing, race, and time was evident for girls' reports of the chances for negative events, such that early maturing European-American girls experienced a more dramatic increase in their perceived 'chances' over-time, as compared to all other groups (Figure 4.18). When maternal reports of the chances for negative outcomes were considered, a consistent pattern was identified across reports of negative mental health, sexual events, and global problems. That is, mothers of early menarcheal European-American girls consistently reported increased 'chances' as their daughters grew older, as compared to all other groups. The results for maternal reports for negative mental health only are shown in Figure 4.19, the pattern of results was the same across these three scales. Finally, girls who reported earlier heterosocial activity were consistently more involved in problem behavior over-time, whereas the initial negative effects of menarcheal timing were altered as a function of race and time. Overall, European-American girls experienced increases in problem behavior over-time, whereas African-American girls experienced decreased problem behavior over-time. Within menarcheal timing groups, late maturing European-American girls experienced more rapid *increases* in problem behavior over-time (a catch up effect), and African-

American on-time girls experienced more pronounced *decreases* in problem behavior between 8th and 11th grade, as they moved from being the most involved in problem behavior in the 8th grade, the least involved in the 11th grade (see Figure 4.20).

Discussion

The present study was conducted to inquire into girls' ability to successfully navigate a critical set of transitions towards adulthood. Girls' mental health, sense of self, projections into their futures, and current behaviors comprised the basis for evaluating their adjustment to the transitions of pubertal development and heterosocial activity over the course of adolescence. Three broad questions served to focus the investigation: (1) does the timing of early adolescent transitions affect girls' psychological and social adjustment, and do patterns of adjustment differ across the biological, psychological and social markers of maturation assessed here, (2) are relations between the timing of maturation and adjustment similar across European-American and African-American girls from otherwise comparable demographic circumstances, and (3) do effects of maturational timing on adjustment endure beyond the early adolescent years.

Maturational timing across biological, psychological, and social development.

Although conceptually similar, and empirically related, these three aspects of maturation do appear to contribute differentially to girls' adjustment. The positive association between menarcheal timing and perceived timing is similar to other studies, and indeed, the two measures are commonly both included in a composite measure of pubertal development (PDS; Petersen, et al., 1988). Although such a strategy creates more well-rounded and robust measures of the overall timing of pubertal maturation, these data suggest that it may also blur the unique influences of distinct elements of puberty. From qualitative studies, we know that the effects of menarche are separate from the effects of breast development in terms of the meanings that girls, families, and society assign these features (Brooks-Gunn, Newman, Holderness & Warren, 1994; Martin, 1996). Similarly, the current study indicates that perception of timing is more closely

related to girls' experience of self than is menarche per se.

Effects of maturational timing on adjustment over the course of adolescence

When the longitudinal patterns are considered, it appears that for many of the aspects of adjustment assessed, the effects of maturational timing on girls has begun either at or prior to the 7th grade, and that enduring scars are evident in girls' subsequent adjustment. For girls' reports of depression, eating disturbance, anger, appearance, popularity, satisfaction with weight, estimates of the chances of negative events, and involvement in problem behaviors, maturational timing effects were detected for the intercept alone (7th grade). Whereas all three aspects of maturational timing were predictive of girls' mental health in 7th grade, associations were more specific and limited with respect to different domains of girls' sense of self. In addition, racial group membership differentiated girls' functioning in the areas of eating disturbance, self-esteem, appearance, and both maternal and adolescent reports of the chances for negative outcomes.

Where initial differences were detected between groups, they were by and large maintained over-time—lending support to the enduring scar hypothesis. However, when the results of the repeated-measures analyses conducted between the 8th and 11th grades were considered, a few of the differences between groups were shown to diminish in strength over-time. In particular, differences in girls' depression and anger as a function of heterosocial activities were no longer apparent in the 11th grade—lending support for the temporary stress hypothesis. Also, 'catch-up' effects were demonstrated for 'off-time' girls' self-esteem, and for appearance ratings among girls who perceived themselves to be 'later' developers, further suggesting that some effects of maturational timing diminish with time—and constitute a 'temporary stress' to girls.

Finally, formal empirical support was garnered for the altered trajectory hypothesis—that maturational timing may set a girl on an increasingly differentiated pathway from peers—in a few domains of adjustment. Self esteem was shown to increase with heterosocial involvements over-time, and body mass was shown to increase with more 'off-time' development over-time.

Both of these effects were fairly subtle. Most striking were findings for maternal perceptions of early menarcheal daughters among European-Americans, where mothers reported both increased internalizing distress, and chances for future negative events of all kinds (e.g., mental health, sexual events, and more general problems) for their girls over-time. Maternal views of their daughter's chances for negative events were supported by girls' own reports of increasing chances for negative events, and increased involvement in problem behavior among earlier maturers. However, maternal reports of increased internalizing distress for early maturers is not echoed by their daughters, who report few differences in depressive affect as a function of maturational timing overall. Thus, maturational timing effects were found to endure, or become heightened in several aspects of adjustment assessed here.

Qualifications of the HLM findings

The modest ability to detect effects of linear estimates of the models presented here may be partially accounted for through the psychometric properties of the data available; such that the enduring scars of development may not be as substantial as indicated here. The reliability of the estimation of the variance in the slope was very low for several of the adjustment outcomes, in particular, anger, popularity, attractiveness, satisfaction with weight, and problem behavior, which means that there was little systematic variance in the slope to predict using individual factors. This could be due to low internal consistency (Cronbach's alpha) for the indicators at each time point, which is not the case for the majority of these scales (see Table 2.3). Alternately, and in support of the enduring scar hypothesis, reliability of the estimation could be reduced because this time period is not the right developmental window of time through which to assess changes in these aspects of adjustment. That is, low reliability estimation could reflect minimal interindividual changes within the time-frame assessed here. Perhaps individually-based influences on girls' impressions of their popularity and attractiveness, as well as their feelings of anger and involvement in problem behavior are actually fairly set and stable by the time they enter into early adolescence. This interpretation suggests that girls are likely to maintain their

rank order, relative to other girls in the sample over-time, not that mean levels of these aspects of adjustment will maintain their stability over-time.

Context of development

The collective findings from this investigation suggest that the ‘intraindividual unevenness’ in development proposed by stage-termination theory is likely not the primary or sole route to distress among most girls. With respect to pubertal maturation, it appears that the familial and social environment in which the girl is developing is also critical in setting the stage for her navigation of the tasks of early adolescence. The social environment affects the nature and extent of her preparation for the events of puberty, the meaning of growing up and becoming an adult woman, and ideas about and acceptance of adult sexuality.

This set of communications from her social world, in addition to the girls’ own developmental functioning, provide a more comprehensive model for predicting which girls will experience adjustment difficulties as a function of maturational timing, and can help account for the distress of the European-American early menarcheal girls, as well as the *lack* of distress among early African-American girls (Holmbeck, 1996; Graber & Brooks-Gunn, 1996). That is, ‘developmental readiness’ may in fact aptly describe the difference between these two groups of girls. It is not the case that African-American girls are more ‘done’ with the tasks of childhood, necessarily, but rather that they perceive there to be more to look forward to, and less to beware of, regarding adolescence—they are feeling more ‘ready’ for these changes than are European-American girls, on the whole.

On the other hand, girls’ *perception* of developmental timing was found to be a more individually-based report, and to support the social deviance hypothesis across racial groups. Girls across racial groups were equally likely to report themselves to be ‘off-time’ in their development, and were basing this estimation on their *actual* developmental timing (i.e.,

menarche, breast development) to roughly comparable degree. However, there appears to be significant additional influence on their perceived timing that is not accounted for currently, and that links to mental health distress across racial group. Thus, results using perceived timing suggest some internal sense of 'developmental readiness' over and above the effects of actual development that is independent of racial context.

While this study did not include family processes in its design, it generates many hypotheses regarding the reasons for the differences found here using menarcheal timing. Because these girls live in the same communities and attend the same schools, we can assume they were exposed to the same sex education in the classroom, and therefore we can interpret the findings as a more likely product of familial and peer influences rather than differences in formal educational attention to preparation for the events of puberty. For example, African-American families may better prepare girls for menarche, be more unconditionally welcoming of the event, celebrate it as an important milestone, and imbue it with less shame and stigma (Martin, 1996) than is typical in European-American families. Perhaps African-American girls are afforded more positive and sustained close relations during pubertal development, which serves to assist them in successful adaptation to these bodily changes and their corresponding social definition (Michael, 1997). Thus, in line with previous studies demonstrating the importance of context (e.g., Brooks-Gunn, et al., 1989) on the interpretation of and behavioral adaptation to pubertal development, it appears that we need to extend our understanding of developmental processes by paying close attention to the locales in which it takes place.

Early adolescence as a 'critical period' for individual development

In addition to the importance of social/ethnic context in understanding the adjustment differences reported here, the continuity of individual development is also an important 'context' for the interpretation of the findings presented here. Although early adolescence was the starting point for this investigation, it was certainly not the starting point for these girls; they were already on developmental trajectories before early adolescence arrived. Caspi and Moffitt (1991) test the

possibility that pre-existing differences within the child are actually accentuated during times of stress (such as the early adolescent transitions), and find support for this among girls who were involved in childhood problem behaviors; these girls maintained and increased their involvement over the course of early adolescence. Trickett and Putnam (1993) offer a similar rationale in suggesting that pre-pubertal sexual abuse may precipitate both earlier pubertal development, and distress in response to maturation for a sub-set of girls.

Developmental psychopathology and developmental transitions

Coming to identify and understand the unique constellation of events and circumstances that conspire to facilitate positive adaptation in one girl and maladaptation in another is a complex task. Several of the findings of this study serve to illustrate the approximation of processes through which some girls develop more serious signs of distress over the course of development. For example, the longitudinal results for self-esteem demonstrate the differential influences of maturational timing on girls' esteem as a function of their racial group membership, and in relation to other aspects of their maturation. While analyses revealed clusters of African-American and European-American girls with comparably low levels of self-esteem in the 11th grade, the ways that maturational timing influenced these girls differed by their racial group membership. This finding illustrates the concept of equifinality—that girls who begin (in the 7th grade) with differing levels of self-esteem report similar esteem by virtue of their *differing* reactions to maturational events by the 11th grade.

On the other hand, multifinality—that girls at similar initial starting points subsequently report differing adjustment as a function of their maturational timing was also demonstrated in several of these analyses (e.g., the altered trajectory findings). Although this study does not begin to include exhaustive assessments of developmental transitions or manifestations of adjustment over the course of these girls' lives, it does provide clear evidence of differentiated adjustment in response to development. Additionally, we can see some of the ways in which girls may turn

down a more pathological pathway, as well as to anticipate towards which of these pathways she may veer.

Limitations and future directions

As in any study, a number of points for improvement have been identified along the way. Certainly, it would be ideal to have a larger developmental window (in particular, to know these girls pre-pubertally) in order to assess the magnitude of the changes found here within the girls' overall development. It would also be quite useful to be able to test the hypotheses regarding the differences in ethnic context that serve to transmit different messages about maturation, as mentioned previously. Given findings from other studies (Parker, et al., 1995) that girls' reports yielded different information when they were interviewed using close-ended versus open-ended (focus group) formats, it would be informative to seek replication or verification of these findings using qualitative methods. Finally, continuing to assess heterosocial involvements over-time would provide information on the patterning of development in this area, as well as identify the liabilities or benefits of delayed participation in heterosocial activity for girls.

Also with respect to measurement, future research would do well to include assessments of more positive aspects to maturation, particularly regarding dating and sexual activities. The measure of heterosocial activity used here was biased in assessing some of the more potentially 'harmful' aspects of developing dating relationships (e.g., dating older boys, feeling pressured to have sex), and similarly, only negative events related to sexual behavior (e.g., having sex 'too early', experiencing rape) were assessed here. These are important aspects of social development or experiences to inquire about, and they were included here given previous reports finding that they constitute risks to future development and adjustment. However, they bias findings towards identifying problematic, but not positive aspects of development. Particularly given societal views of adolescence as a problem-filled phase of life, it would be useful to investigate and describe adaptive functioning as well as maladaptive.

The direction of effects from perceived timing and heterosocial activity to adjustment are certainly subject to skepticism. Both perceived timing and heterosocial activity involve some voluntary (even if not fully conscious) choices and beliefs on the part of the adolescent, and may be viewed as results of previous distress, rather than the precipitants of it. Alternately, it may be that there is a transactional process (Sameroff, 1975) at work here, such that girls' who feel worse about themselves select contexts that serve to maintain or increase these feelings and beliefs over-time, and which in turn, manifest in more serious symptoms of distress. Transactional effects are difficult to trace, empirically, but early adolescence may provide a fertile area in which to search (see Steinberg, 1988 for one such study).

The role of mothers in their daughter's early adolescent development is an area for continued study, and some of the findings here are suggestive of particular directions. The finding that European-American mothers of early menarcheal girls reported continued and indeed increasing mental health problems on the CBCL over-time, whereas the girls themselves were reporting less differentiated mental health distress by the 11th grade is of note. The reasons for the differences in these perceptions are unclear—are mothers misperceiving problems, or are daughter's under-reporting symptoms in the 11th grade? If maternal projections about expectations for girls' development were driving daughters' experiences of development (see Freedman-Doan, et al., 1993), then the pattern of the findings would be expected in the other direction (maternal scores high in the 7th grade, and girls' scores high by the 11th grade). Rather, it seems as though mothers have a harder time letting go of the image of their girls as suffering from the 'storm and stress' of early adolescence after the girls are reporting recovery. That this holds true for European-American but not African-American families is again suggestive of racial/ethnic specific beliefs and attitudes towards coming of age.

Although not thoroughly examined in this study, an important next step for this research would be to examine synergistic effects of maturation, compatible with the developmental psychopathology framework. Recent work by Caspi and colleagues (Caspi, Lynam, Moffitt &

Silva, 1993) demonstrates that earlier maturing girls are at greater risk for engaging in delinquent behaviors if they are in a mixed sex school-setting, as opposed to an all-girls' school.

Additionally, Cauffman and Steinberg (1996) report that girls' who experience earlier menarche and earlier dating are more vulnerable to the development of eating disturbance. Some patterns within the current findings are suggestive of interesting paths to pursue in future research.

Table 2.1 Sample Characteristics for African-American and European-American Participants

		African-American	European-American	Total sample	Test of differences between groups
<u>SES *</u>		-.11	.26	.03	t = -4.59***
Income		9.74	11.04	10.26	t = -3.19**
Highest Education (in years)		14.37	15.31	14.74	t = -3.66***
Highest Occupation		70.57	78.29	73.68	t = -4.24***
<u>Family Structure</u>					
Intact		134	115	249	$\chi^2=19.22***$
Step		36	21	57	
Live-In		9	5	14	
Single: Separated/Divorced		54	26	80	
Single: Never Married		26	2	28	
Widowed		7	3	10	
Stressful Life Events	8 th grade	5.18	4.26	4.82	ns
	11 th grade	4.14	4.41	4.24	ns
<u>Sample N</u>	7 th grade	266	172	438	
	8 th grade	265	170	435	
	11 th grade	221	140	361	

Notes. All variables were estimated at the 8th grade assessment unless otherwise noted.

SES is a standardized summary score that includes information regarding income, education and occupational status of the highest status member of the household.

Income was ascertained within \$5,000 increments, such that 9 = between \$40,000 and \$44,999; 11 = between \$50,000 and \$54,999 (range from 1 = less than \$5,000 to 16 = more than \$100,000).

Educational attainment was coded in years, range for this sample was from 7 to 23 years of education.

Occupational status codes were transformed according to Nam & Powers (1983), based on the 1970 census information. Codes ranged from 0 to 99, with higher numbers indicating jobs with greater prestige. Coding does not correspond to particular occupations.

Stressful life events scale: 5 = one extremely stressful event within the past 12 months.

Table 2.3 Adolescent Adjustment Measures: Scales and Internal Consistency Ratings

Scale Domain/Name	Internal Consistency		
	7 th grade	8 th grade	11 th grade
<u>Mental Health:</u>			
<u>Youth report</u>			
Depressive Symptoms ^w	.82	.88	.87
Eating Symptoms ^w	.42	.89	.89
[Drive for Thinness]	---	.90	.92
[Bulimia]	---	.80	.79
Anger	.78	.87	.87
<u>Maternal report</u>			
Externalizing Symptoms ^w	.74	CBCL/ NA	CBCL/ NA
Internalizing Symptoms ^w	.78	CBCL/ NA	CBCL/ NA
Total Problem Score	---	CBCL/ NA	CBCL/ NA
<u>Sense of Self</u>			
Global Self-Esteem	.70	.73	.75
Feminine Self Esteem	---	.81	.84
Masculine Self Esteem	---	.88	.87
Self Concept of Popularity ^p	NA	NA	NA
Self Concept of Appearance	.87	.85	.86
Satisfaction with Weight ^p	NA	NA	NA
Body Mass ^λ	NA	NA	NA
<u>Chances for future</u>			
<u>negative events</u>			
Y report: Mental health prbs	---	.71	.70
M report: Mental health prbs	---	.79	.82
Y report: Neg sexual events	---	.59	.54
M report: Neg sexual events	---	.77	.75
Y report: Global problems	.64	.78	.71
M report: Global problems	.82	.85	.76
Y's expected age at marriage ^p			NA
<u>Problem Behavior</u>	.72	.82	.82

Notes. Y= youth; M= maternal reports. Dashes indicate no assessment available at that point in time.

^w Scales are not identical across assessment points. 7th grade assessments were more limited; see Appendix A for detailed listing of items at all times of assessment.

^p One item only; no internal consistency statistic computed.

^λ Calculated using the formula $BMI = (\text{weight in kg} / \text{height in m}^2)$.

Table 4.1 Results of HLM: Full Model for Depression from 7th to 11th Grade

<i>Fixed Effects</i>	<i>Coefficient B unstandardized</i>	<i>se</i>	<i>t ratio</i>	<i>% Explained Variance</i>
Intercept	-.01	.04	-.13	
Menarche	-.06	.04	-3.79**	
Percept of Timing	.15	.04	3.46**	
Off-Time percept	.14	.04	3.71***	
Heterosocial Activity	.14	.04	3.61**	10.81%
Linear (intercept)	.02	.06	-.29	
<i>Random Effects</i>	<i>Variance Component</i>	<i>df</i>	<i>χ²</i>	
Intercept	.47	400	968.18***	
Linear slope (Residual)	.02	404	567.12***	

Note. Reliability estimate for the intercept = .59, linear slope = .23.

Table 4.2 Results of HLM: Full Model for Eating Disturbance from 7th to 11th Grade

<i>Fixed Effects</i>	<i>Coefficient B unstandardized</i>	<i>se</i>	<i>t ratio</i>	<i>% Explained variance</i>
Intercept	-.10	.05	-1.92	
Menarche	-.15	.03	-4.50***	
Off-time perception	.16	.03	4.84***	
Heterosocial activity	.10	.03	3.14**	
Race	.36	.07	5.27***	28.45%
Linear (intercept)	-.07	.07	-.91	
SES	.03	.02	1.85 +	9.45%
<i>Random Effects</i>	<i>Variance Component</i>	<i>df</i>	<i>χ²</i>	
Intercept	.23	400	579.66***	
Linear slope (residual)	.02	403	489.40**	

Note. Reliability estimate for the intercept = .33, linear slope = .18.

+p<.10 *p<.05 **p<.01 ***p<.001

Table 4.3. Results of HLM: Full Model for Anger from 7th to 11th Grade

<i>Fixed Effects</i>	<i>Coefficient B unstandardized</i>	<i>se</i>	<i>t ratio</i>	<i>% Explained variance</i>
Intercept	2.02	.06	36.20***	
Menarche	-.14	.05	-3.20**	
Off-time perception	.17	.05	3.76***	
Heterosocial activity	.18	.05	4.06***	13.90%
Linear	.23	.07	3.16**	---

<i>Random Effects</i>	<i>Variance Component</i>	<i>df</i>	χ^2
Intercept	.63	401	979.67 ***
Linear slope (Residual)	.01	404	468.66*

Note. Reliability estimate for the intercept = .56, linear slope = .08.

Table 4.4 Results of HLM: Full Model for Self Esteem from 7th to 11th Grade

<i>Fixed Effects</i>	<i>Coefficient B unstandardized</i>	<i>se</i>	<i>t ratio</i>	<i>% Explained variance</i>
Intercept	3.54	.06	62.69	
Off-time perception	-.12	.05	-2.31*	
Menarche x Race	.20	.08	2.55*	2.30%
Linear	.21	.03	7.41***	
Off-time perception	.04	.01	3.04***	
Heterosocial activity	.05	.01	3.80***	17.02%

<i>Random Effects</i>	<i>Variance Component</i>	<i>df</i>	χ^2
Intercept	1.08	462	3848.57***
Linear slope	.02	460	631.89***

Note. Reliability estimate for the intercept = .80, linear slope = .20.

+p<.10 *p<.05 **p<.01 ***p<.001

Table 4.5 Results of HLM: Full Model for Self-Concept of Appearance from 7th to 11th Grade

<i>Fixed Effects</i>	<i>Coefficient B unstandardized</i>	<i>se</i>	<i>t ratio</i>	<i>% Explained variance</i>
Intercept	4.74	.10	46.62***	
Perception of timing	-.20	.08	-2.67**	
Race	-.43	.15	-2.89**	2.86%
Linear	.17	.09	1.92	---
<i>Random Effects</i>	<i>Variance Component</i>	<i>df</i>	χ^2	
Intercept	2.15	402	1868.65***	
Linear slope (Residual)	.01	404	462.30*	

Note. Reliability estimate for the intercept = .74, linear slope = .07. The variance in the linear slope was not sufficient in the null model to merit estimation.

Table 4.6 Results of HLM: Full Model for Girls' Self-Concept of Popularity from 7th to 11th Grade

<i>Fixed Effects</i>	<i>Coefficient B unstandardized</i>	<i>se</i>	<i>t ratio</i>	<i>% Explained variance</i>
Intercept	4.36	.09	49.35***	
Menarche	-.17	.07	-2.24*	
Heterosocial Activity	.24	.07	3.24**	5.04%
Linear	.22	.10	2.33*	
<i>Random Effects</i>	<i>Variance Component</i>	<i>df</i>	χ^2	
Intercept	2.15	402	1636.82***	
Linear slope (Residual)	.11	404	409.90	

Note. Reliability estimate for the intercept = .71, linear slope = .06. The variance in the linear slope was not sufficient in the null model to merit estimation.

+p<.10 *p<.05 **p<.01 ***p<.001

Table 4.7 Results of HLM: Full Model for Satisfaction with Weight from 7th to 11th Grade

<i>Fixed Effects</i>	<i>Coefficient B unstandardized</i>	<i>se</i>	<i>t ratio</i>	<i>% Explained variance</i>
Intercept	2.32	.05	39.16***	
Menarche	.12	.06	2.07*	
Percept of timing	.22	.06	3.94***	8.00%
Linear	.08	.06	1.21	---

<i>Random Effects</i>	<i>Variance Component</i>	<i>df</i>	χ^2
Intercept	.96	402	1552.97 ***
Linear slope (Residual)	.00	404	453.83*

Note. Reliability estimate for the intercept = .73, linear slope = .03. The variance in the linear slope was not sufficient in the null model to merit estimation.

Table 4.8 Results of HLM: Full Model for Body Mass from 7th to 11th Grade

<i>Fixed Effects</i>	<i>Coefficient B unstandardized</i>	<i>se</i>	<i>t ratio</i>	<i>% Explained variance</i>
Intercept	1.71	.03	65.83***	
Menarche	-.10	.03	-3.35***	
Percept of timing	-.06	.03	-2.16**	5.34%
Linear	.20	.01	13.21***	
Percept of timing	-.01	.00	-2.40*	2.73%

<i>Random Effects</i>	<i>Variance Component</i>	<i>df</i>	χ^2
Intercept	.27	402	7439.47 ***
Linear slope (Residual)	.00	403	650.75 ***

Note. Reliability estimate for the intercept = .90, linear slope = .34.

+p<.10 *p<.05 **p<.01 ***p<.001

Table 4.9 Results of HLM: Full Model for Youth Chances for Negative Outcomes from 7th to 11th Grade

<i>Fixed Effects</i>	<i>Coefficient B unstandardized</i>	<i>se</i>	<i>t ratio</i>	<i>% Explained variance</i>
Intercept	1.33	.03	38.58***	
Menarche	-.12	.03	-4.41***	
Offtime perception	.06	.03	2.54 *	
Heterosocial Activity	.14	.03	5.60 ***	17.61%
Race	.18	.05	3.36**	
Linear	-.01	.04	-.27	
<i>Random Effects</i>	<i>Variance Component</i>	<i>df</i>	χ^2	
Intercept	.18	400	1129.52 ***	
Linear slope (Residual)	.01	404	677.65 ***	

Note. Reliability estimate for the intercept = .59, linear slope = .32.

Table 4.10 Results of HLM: Full Model for Maternal Reports of Chances for Negative Outcomes for Girls from 7th to 11th Grade

<i>Fixed Effects</i>	<i>Coefficient B unstandardized</i>	<i>se</i>	<i>t ratio</i>	<i>% Explained variance</i>
Intercept	1.20	.03	37.17***	
Race	.15	.05	2.83**	1.68%
Linear	-.03	.02	-2.07*	
Menarche	.01	.01	.54	
Heterosocial Activity	.02	.01	2.98**	
Race	.08	.02	4.56***	
Menarche x Race	-.06	.02	-3.92***	11.42%
Quadratic	.01	.00	4.38***	
<i>Random Effects</i>	<i>Variance Component</i>	<i>df</i>	χ^2	
Intercept	.28	403	10488.16***	
Linear slope (Residual)	.03	400	4486.88***	

Note. Reliability estimate for the intercept = .95, linear slope = .80.

+p<.10 *p<.05 **p<.01 ***p<.001

Table 4.11 Results of HLM: Full Model for Problem Behaviors 7th to 11th Grade

<i>Fixed Effects</i>	<i>Coefficient B unstandardized</i>	<i>se</i>	<i>t ratio</i>	<i>% Explained variance</i>
Intercept	.38	.04	8.61***	
Menarche	-.09	.03	-3.02**	
Heterosocial Activity	.08	.03	2.72**	9.88%
Linear	.33	.06	5.57***	
<i>Random Effects</i>	<i>Variance Component</i>	<i>df</i>	<i>χ^2</i>	
Intercept	.35	402	603.59***	
Linear slope (Residual)	.00	404	368.19	

Note. Reliability estimate for the intercept = .51, linear slope = .06. The variance in the linear slope was not sufficient in the null model to merit estimation.

+p<.10 *p<.05 **p<.01 ***p<.001

Table 4.12 Repeated-Measures Analyses of Covariance: Mental Health Outcomes

			<u>Covariates</u>				<u>Timing variables</u>				<u>Interactions</u>		
	Within SS	Betwn SS	Intercept	Race	SES	Family Structure	Menarche	Percept of Timing	Hetero-Social	Race x Menarche	Race x Percept.	Race x Social	
Depressive Sx	2.00	2451.56***	2.00	.14	3.44+	.02	.44	1.39	22.93***	---	---	---	
				2.54	.32	1.48	5.98**	3.48**	5.33*	2.87+	---	---	
Eating Sx	.94	547.96***	.94	.60	.17	.15	.78	.16	1.05	---	---	---	
				14.31***	.54	1.20	3.33*	2.45*	2.90+	---	---	---	
Anger	2.45	481.71***	2.45	1.09	.50	.34	1.21	1.20	12.56***	---	---	2.41*	
				1.60	.15	1.51	2.14	1.89	10.06**	---	---	---	
CBCL/Externalize	4.46*	47.99***	4.46*	7.01**	.79	1.79	.96	.62	1.20	---	---	---	
				.27	1.12	11.34**	6.05**	2.58*	.22	2.78+	---	---	
CBCL/Internalize	2.05	74.60***	2.05	9.40**	.41	5.13*	.87	3.24*	2.01	---	---	---	
				6.99**	.06	5.17*	5.98**	5.22***	5.77*	6.06**	3.14*	2.91+	
CBCL/Total Score	4.02*	76.66***	4.02*	13.53***	.02	2.62	.39	2.34+	1.21	---	---	---	
				2.90+	1.19	8.14**	7.57**	4.58**	2.30	4.92**	2.47*	---	

Table 4.13 Repeated-Measures Analyses of Covariance: Sense of Self Outcomes

			<u>Covariates</u>				<u>Timing variables</u>				<u>Interactions</u>	
	Within SS	Betwn SS	Intercept	Race	SES	Family Structure	Menarche	Percept of Timing	Hetero-Social	Race x Menarche	Race x Percept.	Race x Social
Self-Esteem			3.40+	7.23**	1.19	1.87	.31	3.78**	6.88**	---	---	---
			1853.62***	13.90***	1.03	1.15	2.74+	3.11*	.86	3.92*	---	---
Fem. Self-Image			5.32*	.53	2.23	1.24	1.84	.90	6.12*	---	---	2.74+
			2600.41***	6.74*	.68	.07	.46	4.81**	.06	---	---	---
Masc. Self-Image			2.82+	5.84*	2.16	.05	2.66+	.63	.20	---	---	---
			323.91***	.50	2.32	.82	1.16	.57	4.79*	---	---	---
Popularity			2.91+	1.42	1.35	.23	.68	1.51	.03	---	---	---
			1319.24***	1.84	.00	.10	1.25	3.10*	13.35***	---	---	---
Attractiveness			.44	1.67	.66	4.56*	2.27	2.63*	3.47+	---	---	---
			1814.88***	49.90***	1.64	.61	1.02	4.88**	1.60	---	---	---
Satisf. w Weight			6.46*	.38	2.44	.02	.29	2.21+	7.10**	---	---	---
			430.76***	9.82**	.25	.30	1.97	4.77	.01	---	---	---
Body Mass			31.71***	.01	1.01	.00	.66	4.15**	.44	---	---	---
			2322.50***	6.05*	3.00+	.71	3.12*	5.35***	.28	---	---	---

Table 4.14 Repeated-Measures Analyses of Covariance: III Chances for Future Negative Outcomes and Problem Behavior

	<u>Covariates</u>				<u>Timing variables</u>				<u>Interactions</u>		
	Intercept	Race	SES	Family Structure	Menarche	Percept of Timing	Hetero-Social	Race x Menarche	Race x Percept.	Race x Social	
Y: Neg Mntl Hlth	.19	4.26*	1.94	.47	.91	.83	1.09	---	---	---	
	Within SS										
	497.29***	21.68***	2.25	8.92**	6.57**	1.16	3.57+	7.31**	---	---	
Y: Neg Sex Evts	.01	.24	.65	8.36**	.02	.23	.12	---	---	---	
	Within SS										
	418.27***	1.72	.20	16.69***	3.49*	1.26	2.00	---	---	---	
P: Neg Mntl Hlth	.00	7.10**	.03	4.61*	3.92*	.97	2.36	6.57**	---	---	
	Within SS										
	593.00***	14.69***	5.87*	8.10**	7.80***	1.19	.02	5.18**	2.32+	8.19**	
P: Neg Sex Evts	5.27*	.02	13.62***	.33	3.12*	1.23	.90	2.58+	---	---	
	Within SS										
	501.62***	1.22	.33	8.82**	2.72+	.18	2.28	---	---	---	
Y: Global Prbs.	4.16*	7.61**	.44	.22	1.34	1.47	.11	---	5.62*	---	
	Within SS										
	564/67***	8.65**	1.42	16.13***	4.05*	1.96	12.35**	3.02*	2.03+	7.97**	
P: Global Prbs.	2.49	4.25*	.60	.45	9.50***	1.27	.02	4.80**	---	---	
	Within SS										
	631.30***	9.03**	5.43*	6.18*	3.57*	1.62	4.15*	2.55+	---	---	
Problem Behavior	.05	2.29	3.36	.31	1.17	1.02	1.52	3.55*	---	---	
	Within SS										
	181.77***	1.61	2.39	5.58*	.34	.96	38.50***	---	9.34**	---	

Figure 2.1 Timing of Menarche for African-American and European-American Girls

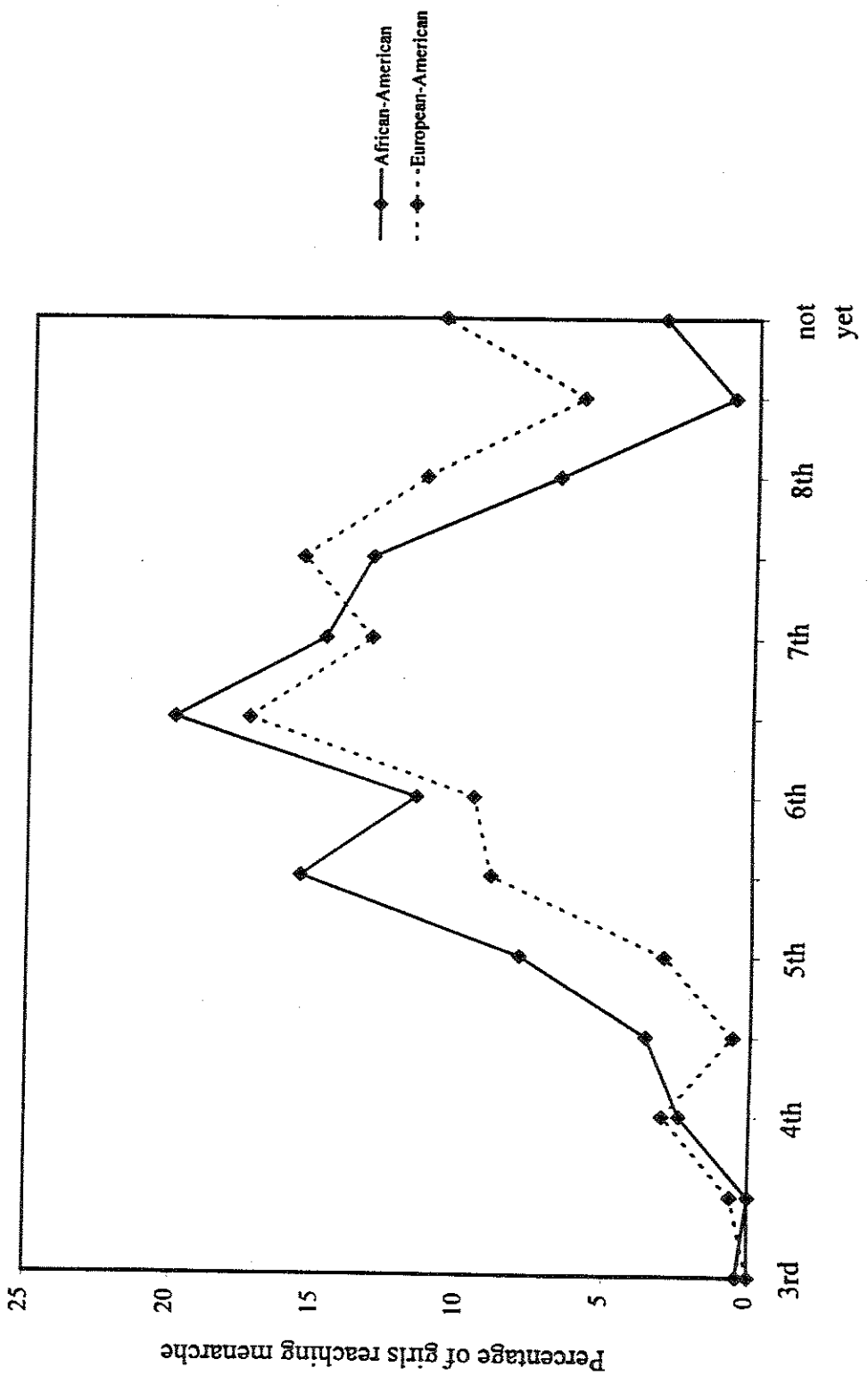


Figure 4.1 Temporary Stress Model
for Effects of Developmental Timing on Adjustment

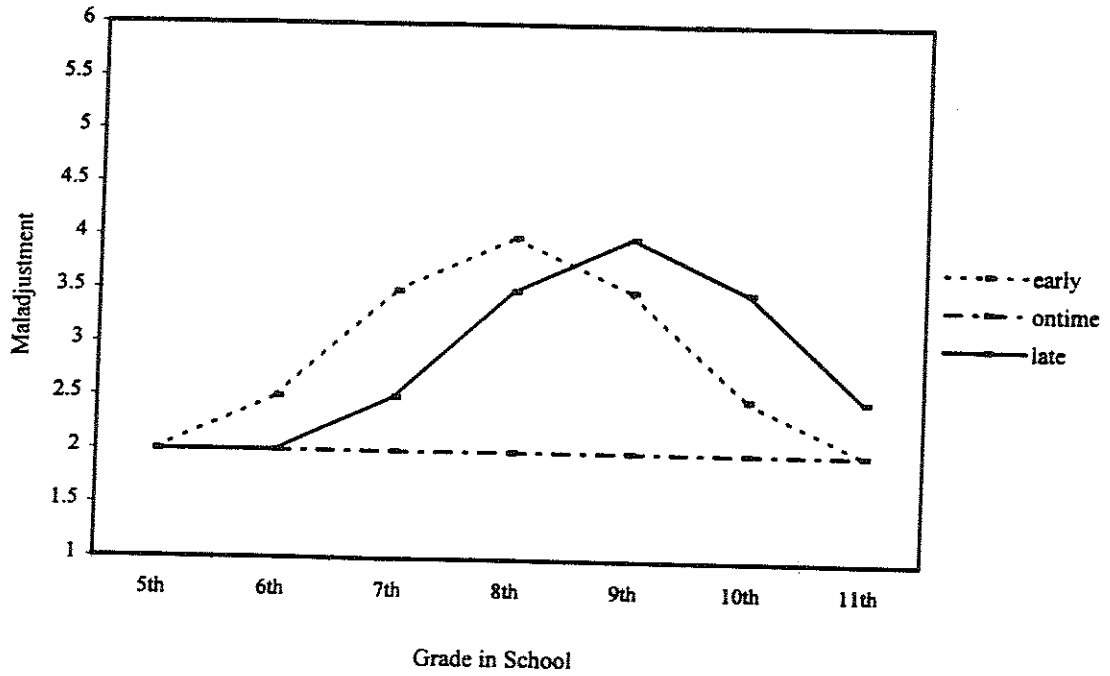


Figure 4.2 Enduring Scar Model
for Effects of Developmental Timing on Adjustment

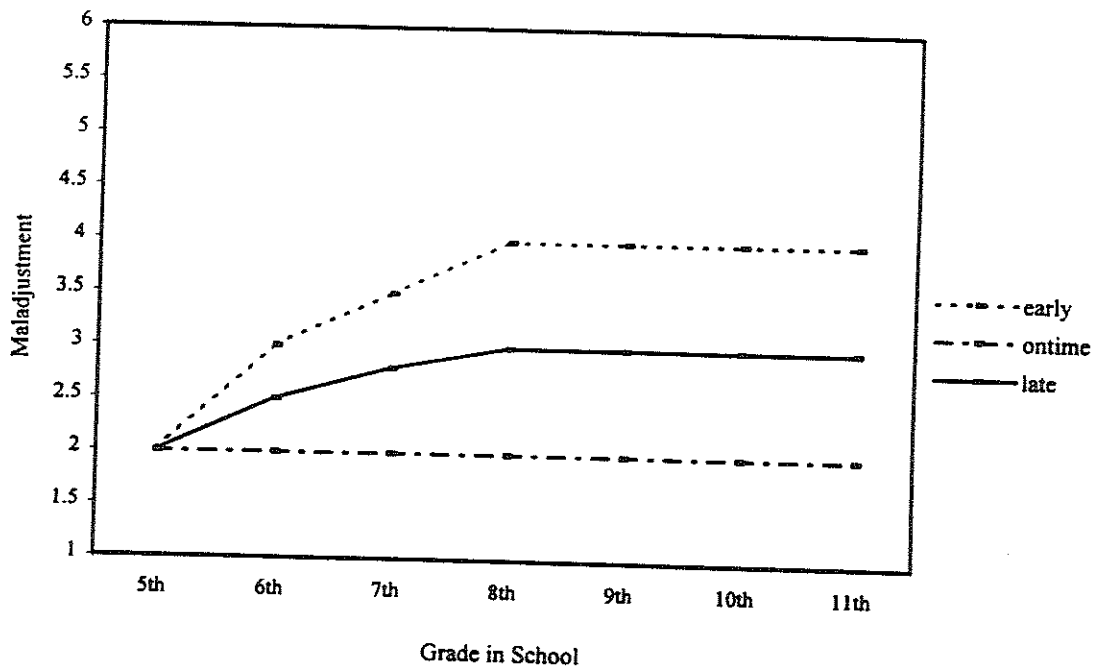


Figure 4.3 Altered Trajectory Model
for Effects of Developmental Timing on Adjustment

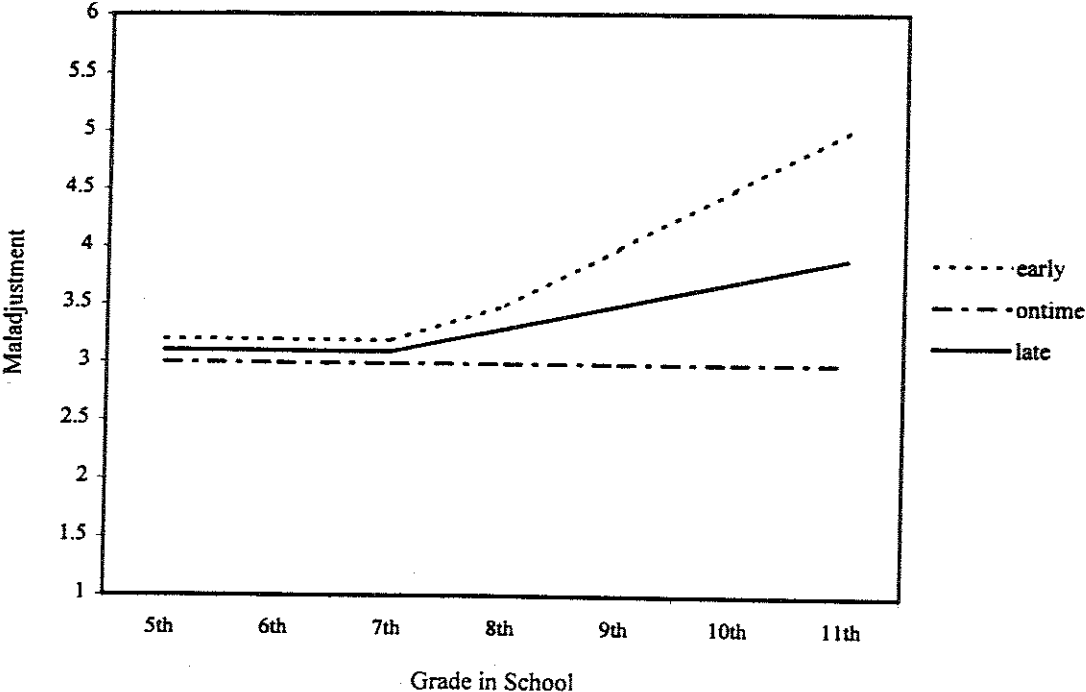
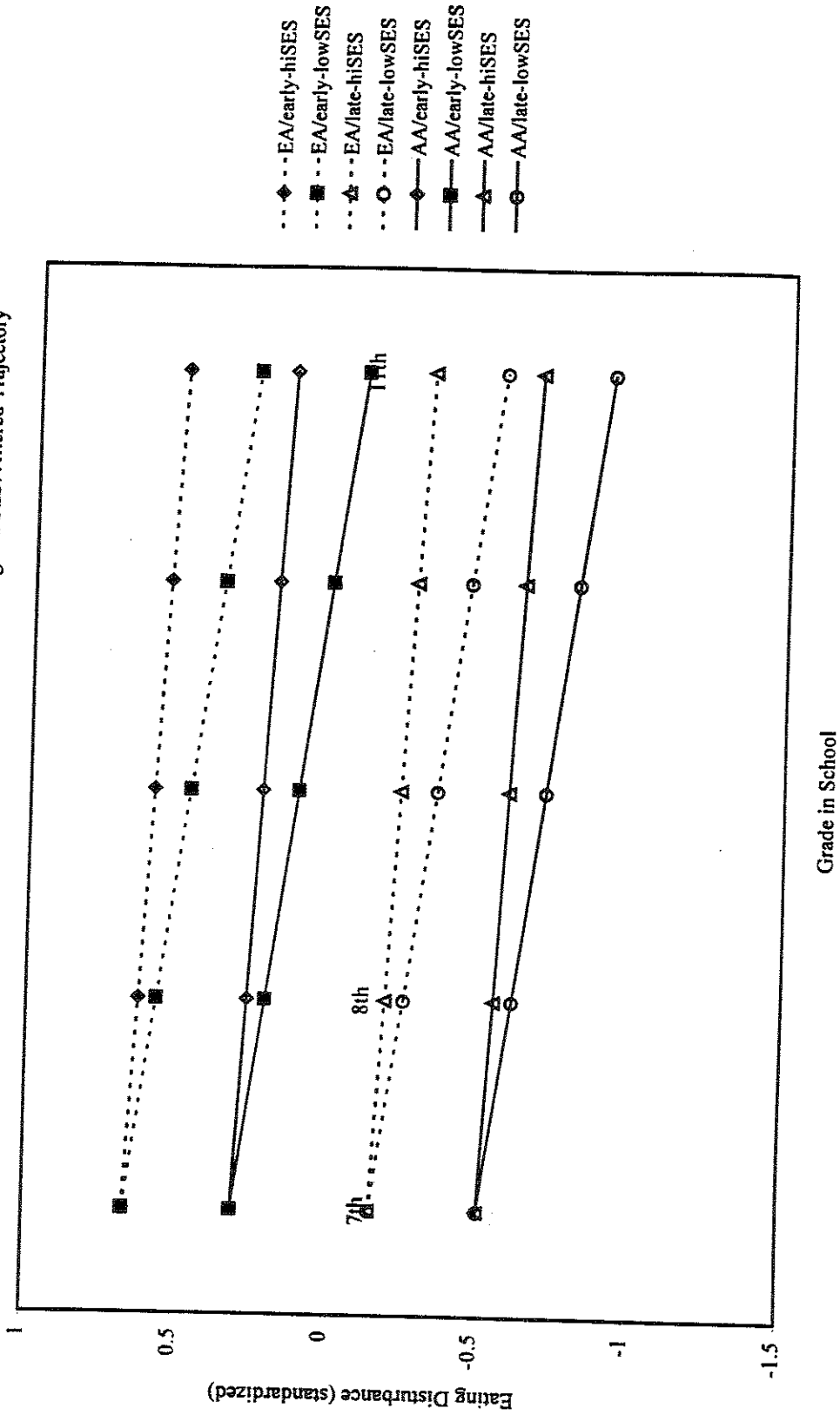


Figure 4.4 Eating Disturbance Overtime as a function of Maturation Timing and SES: Altered Trajectory



Note. Intercept = menarche + perception of timing + hetsec + race. Slope = SES only. Data available at 7th, 8th and 11th grades only.

Figure 4.5 Self Esteem Overtime as a Function of Heterosocial Activity

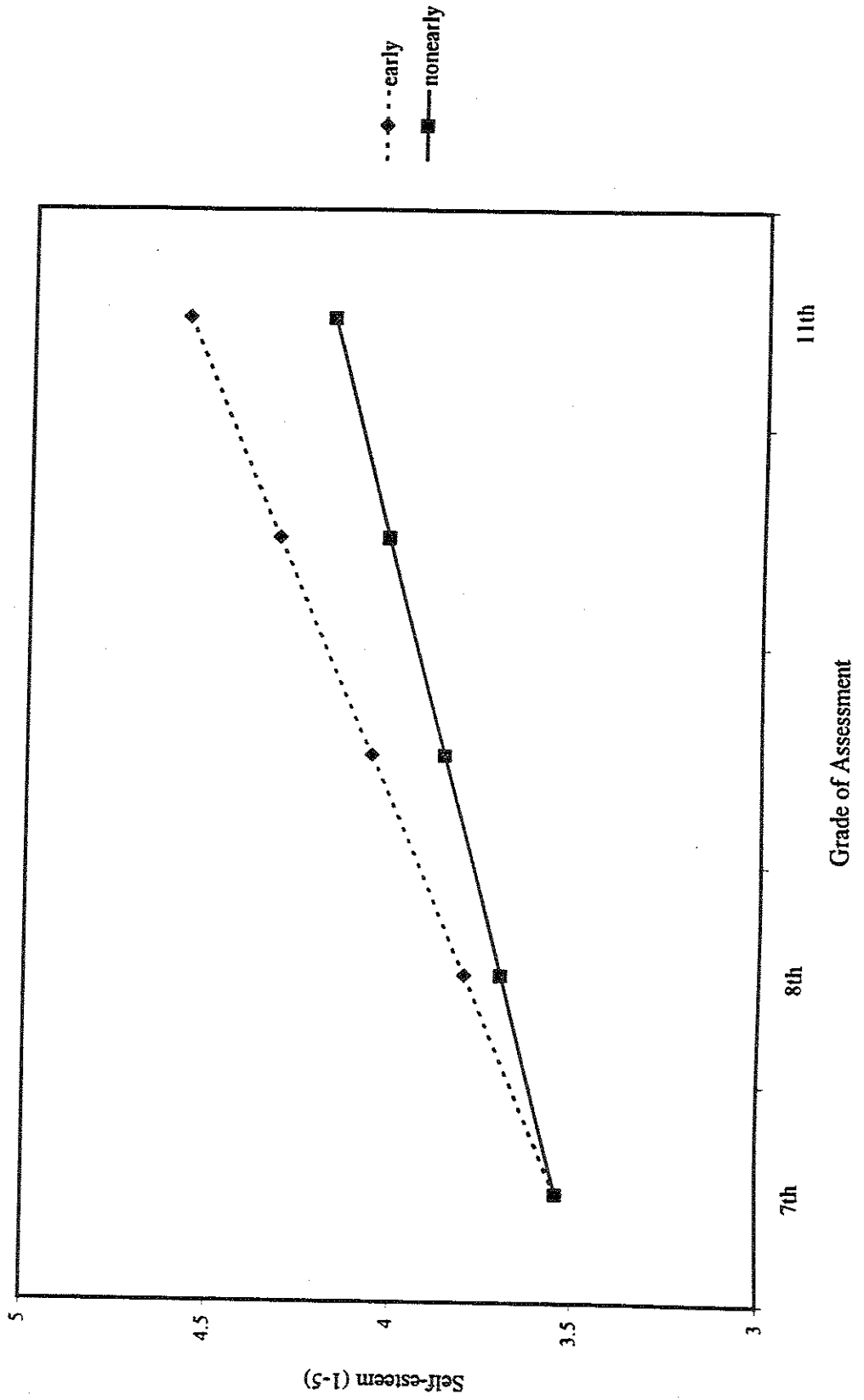


Figure 4.6 Self-Esteem Over-time as a Function of Perception of Timing

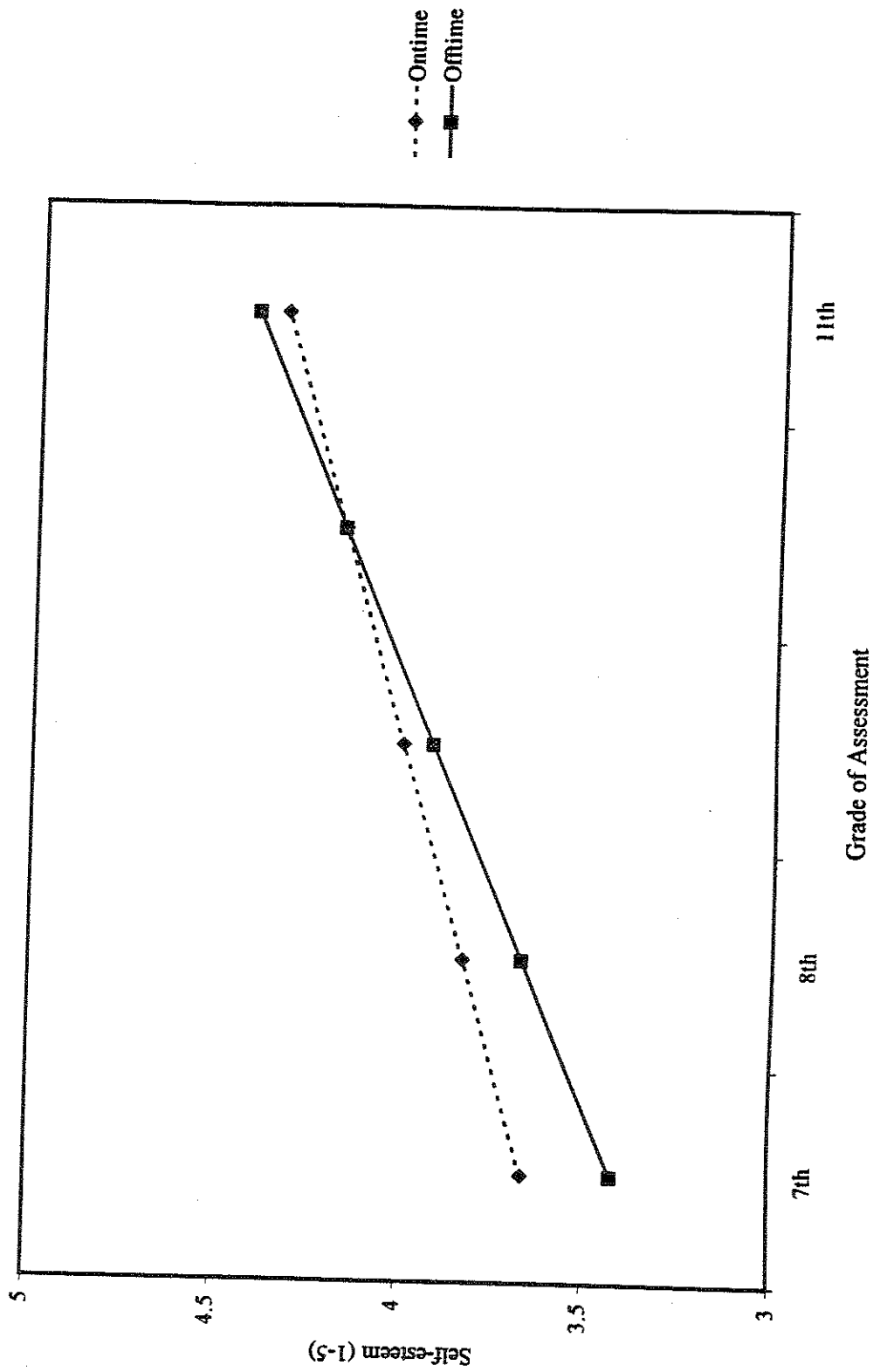
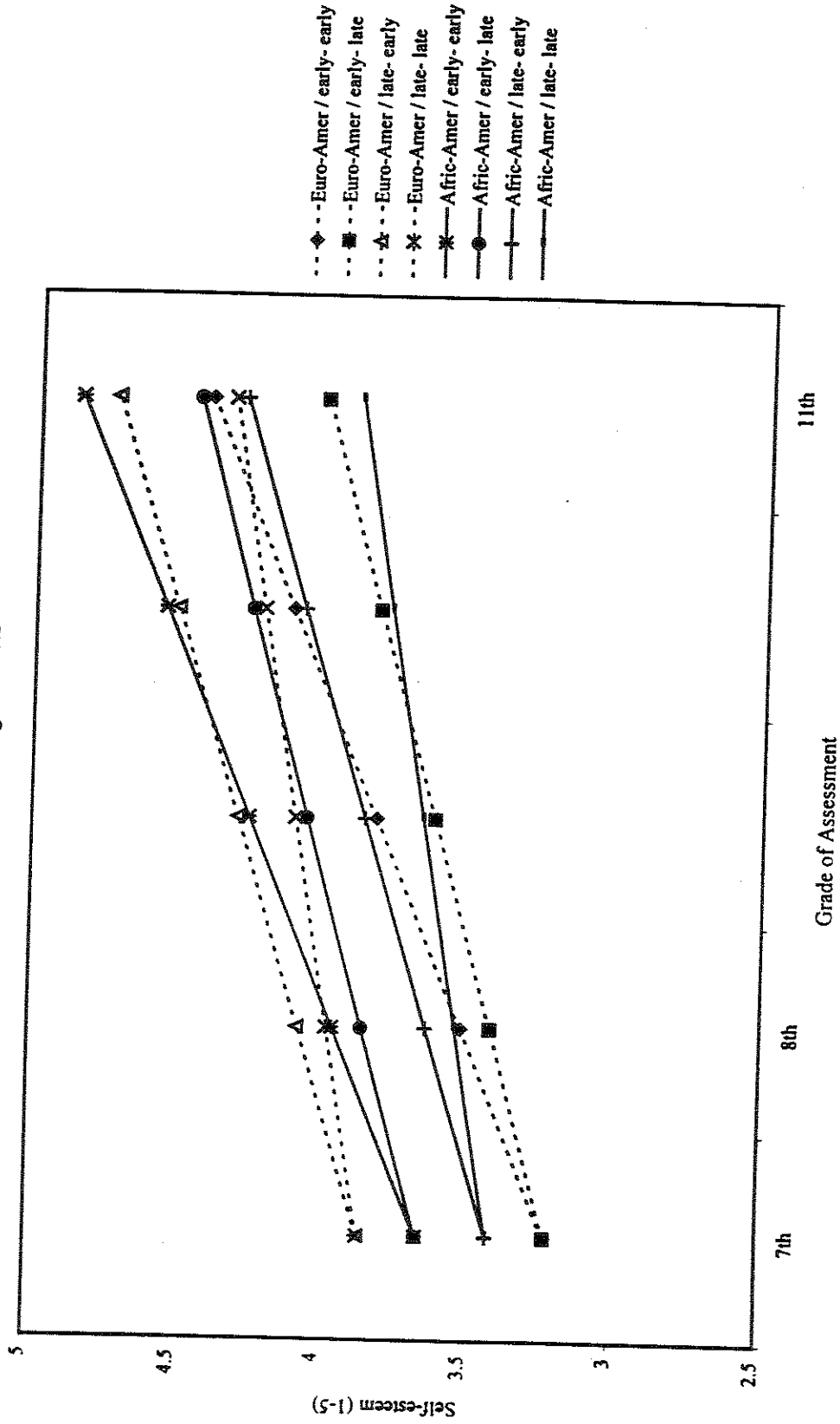
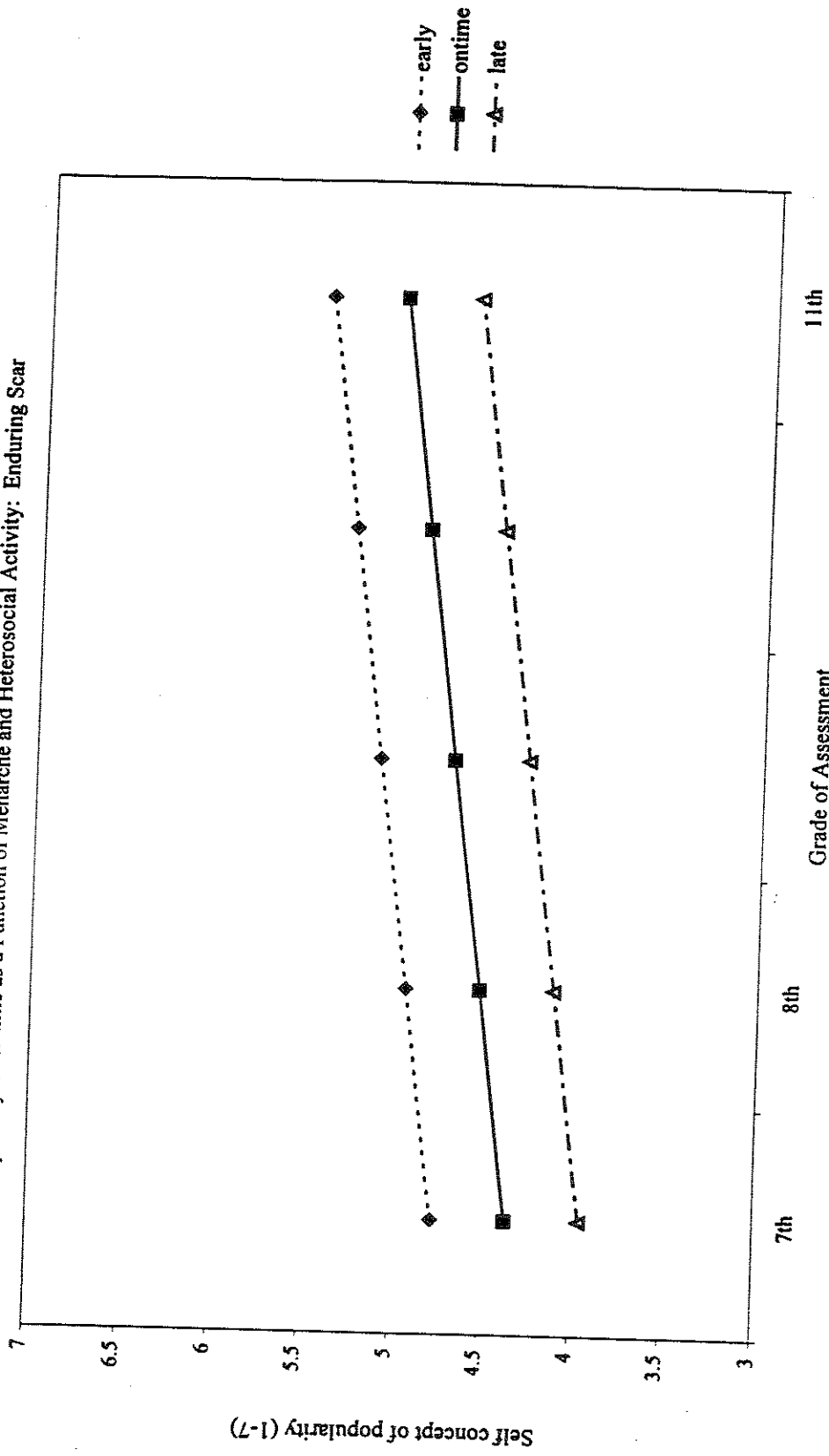


Figure 4.7 Self-Esteem Over-time as a Function of All Three Timing Indicators



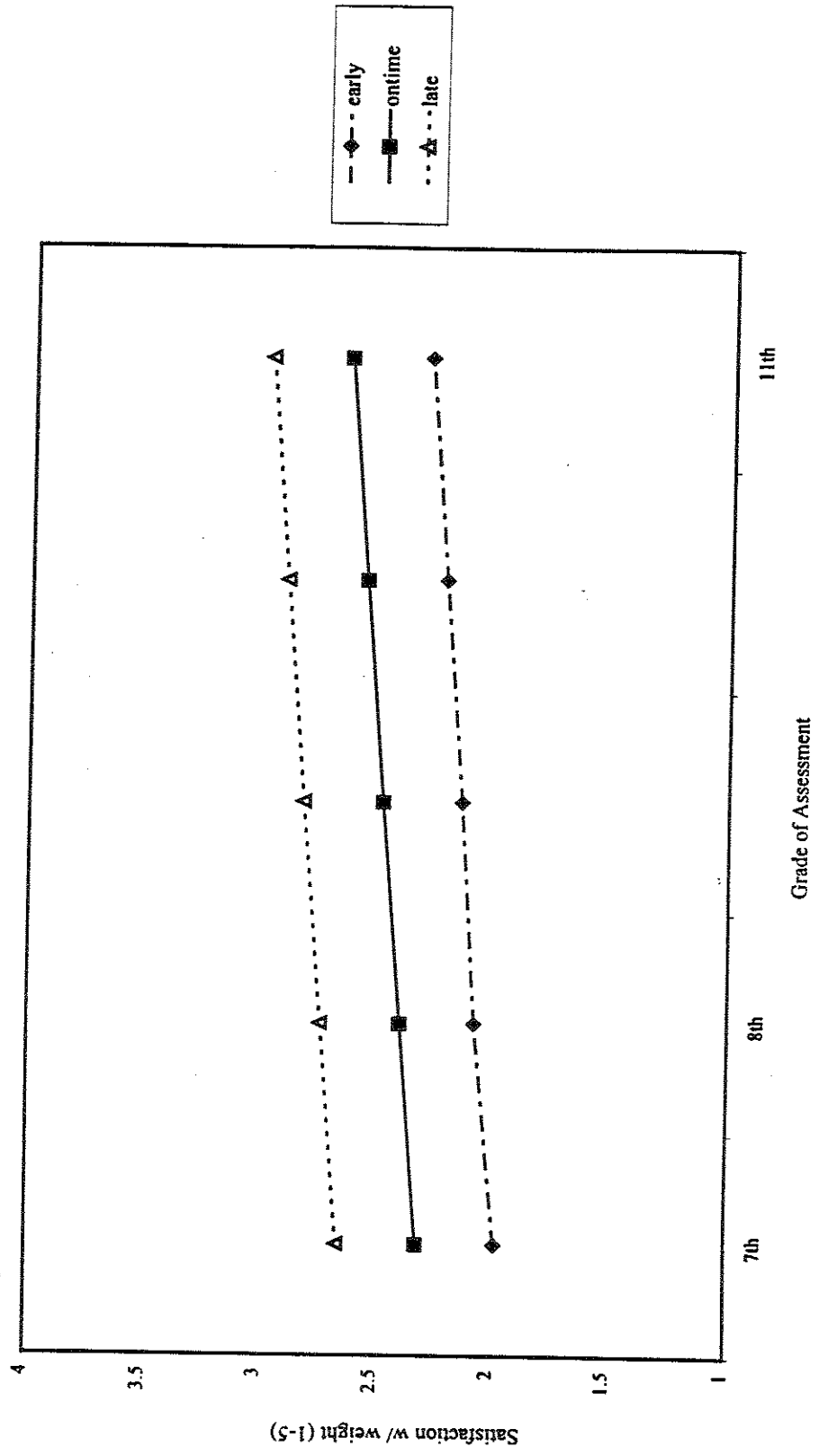
Note. Intercept: 'early' = early menarche and off-time perception; 'late' = late menarche and on-time perception.
 Slope: 'early' = early heterosocial activity + percept; 'late' = late heterosocial activity + percept.

Figure 4.8 Popularity Over-time as a Function of Menarche and Heterosocial Activity: Enduring Scar



Note. 'Early' = girls who are 1 sd earlier in their menarcheal and heterosocial development in 8th grade. 'Ontime' = girls at the mean for both maturational indices. 'Late' = girls who are 1 sd later on both indices.

Figure 4.9 Satisfaction with Weight Over-time as a Function of Menarche and Perception of Timing: Enduring Scar



Note. 'Early' = girl 1 sd earlier in their perceived and actual pubertal timing. 'Ontime' = girls at the mean for both indices of maturation. 'Late' = girls 1 sd later on both indices. Scale: 1=lose > 10 lbs; 3= satisfied with weight

Figure 4.10 Body Mass Over-time as a Function of Perception of Timing: Altered Trajectory

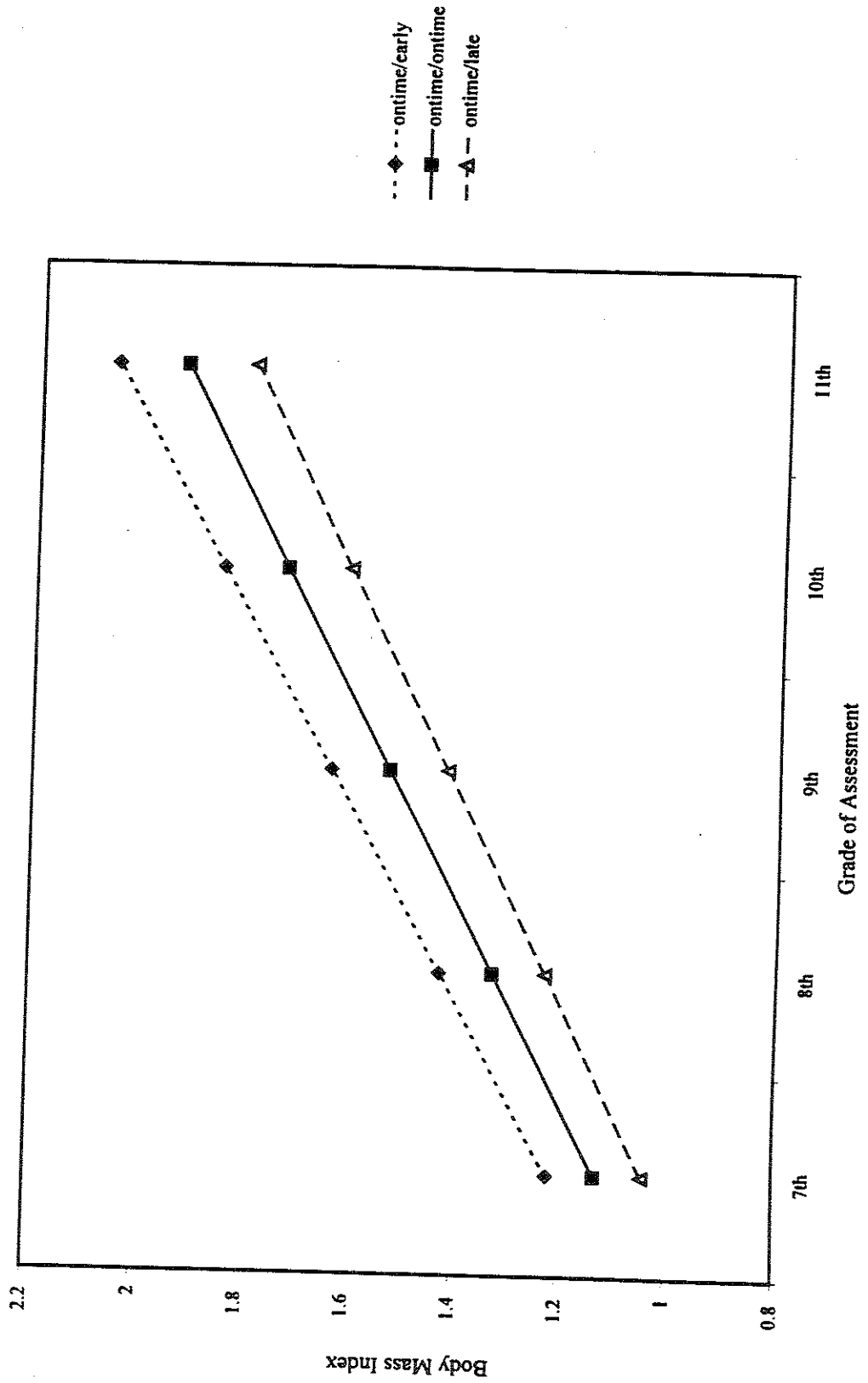
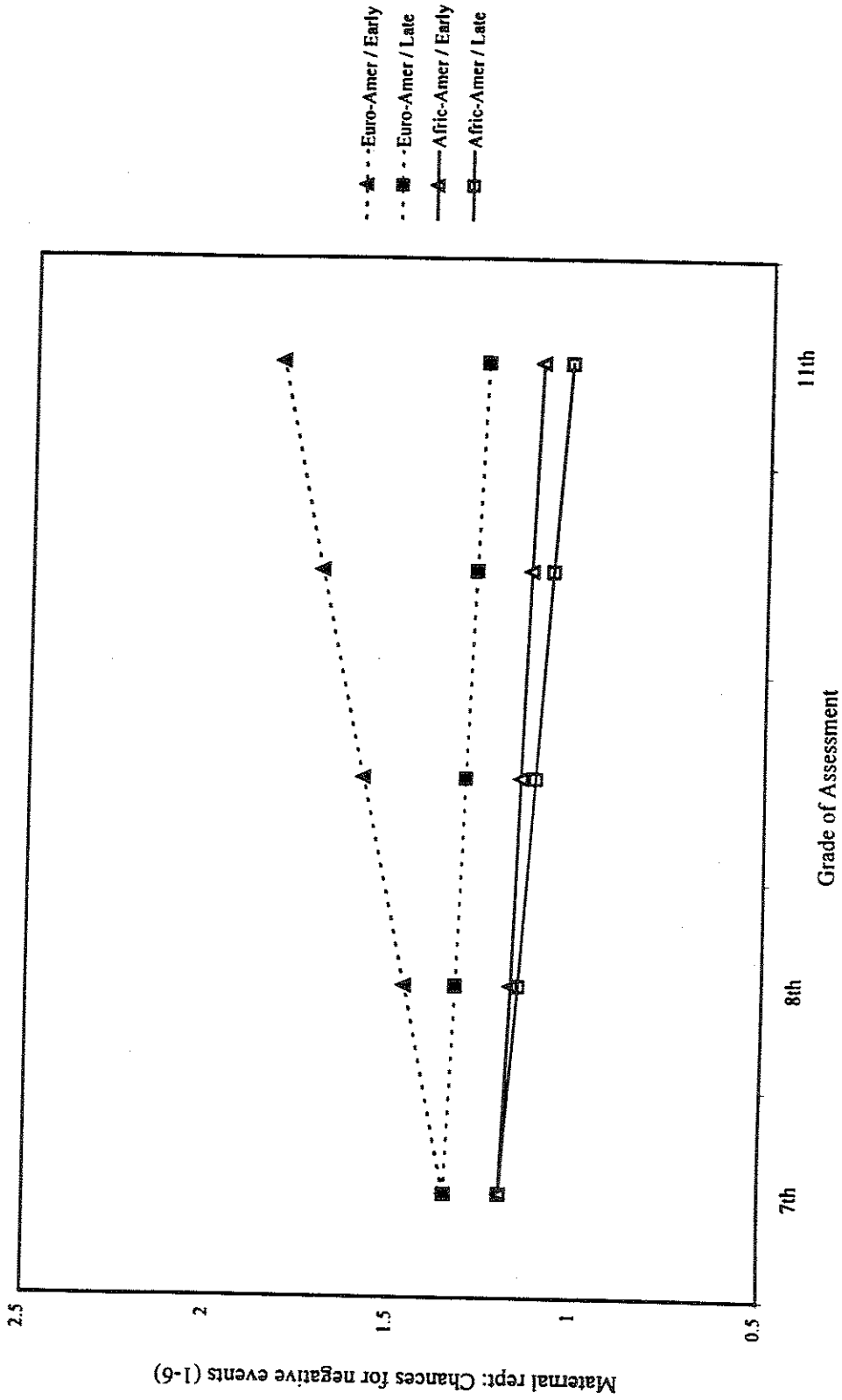


Figure 4.11 Chances for Future Negative Events as a Function of Menarche and Heterosocial Activity: Altered Trajectory



Note: 'Early' = girls 1 sd earlier than the mean on both timing of menarche and heterosocial activity. 'Late' = girls 1 sd later than the mean on both.

Figure 4.12 Interaction effect of Heterosocial Activity and Time on Depressive Symptoms: 8th to 11th Grade

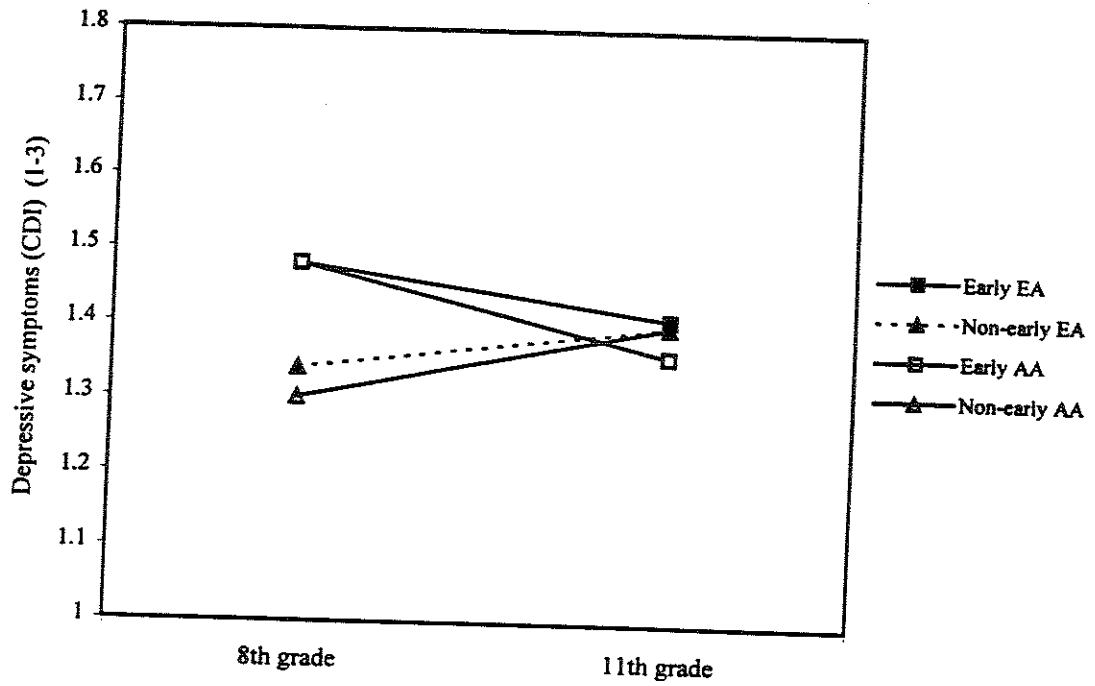


Figure 4.13 Interaction effect of Heterosocial Activity and Time on Anger: 8th to 11th Grade

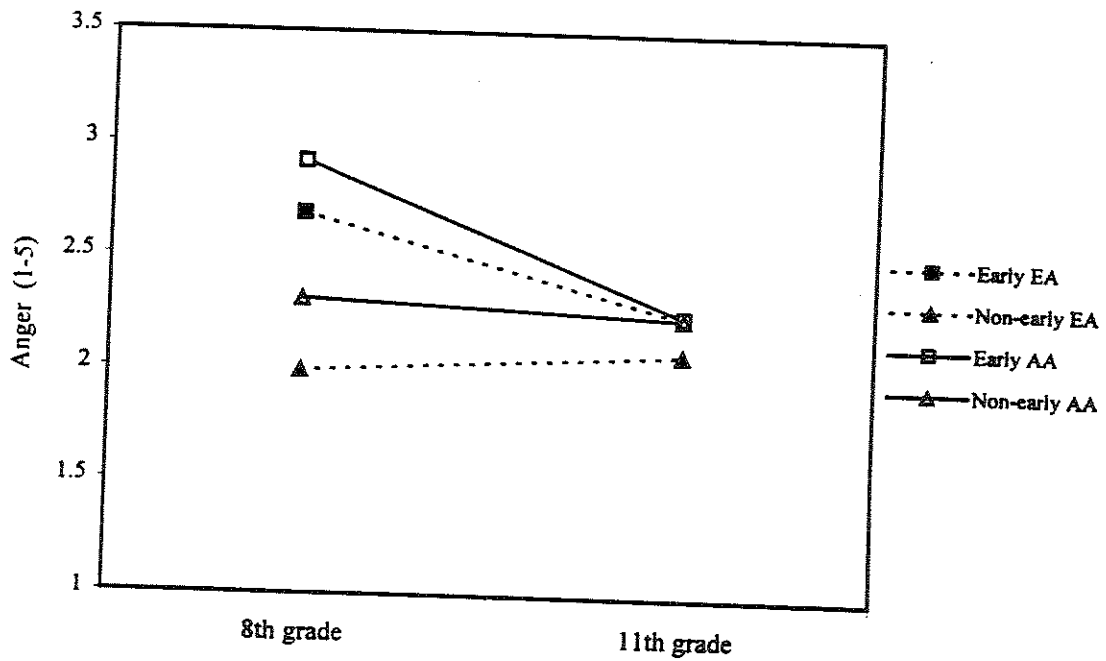


Figure 4.14 Interaction effect of Menarche, Race and Time on Internalizing Symptoms: 8th to 11th Grade

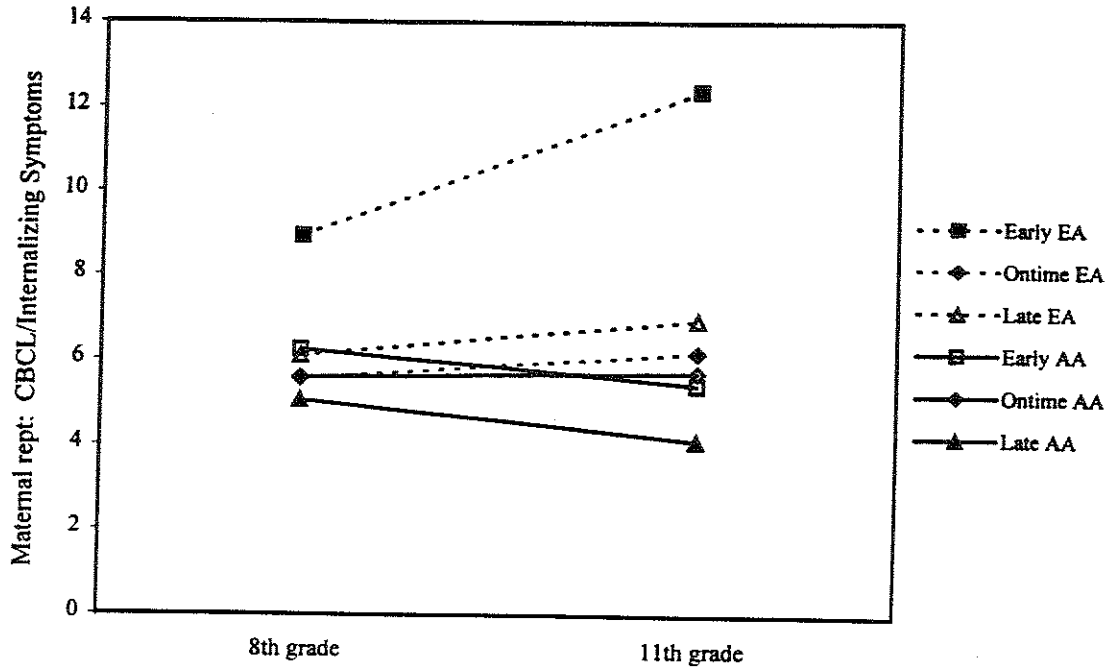


Figure 4.15 Interaction effect of Heterosocial Activity, Race and Time on Feminine Self-Image: 8th to 11th Grade

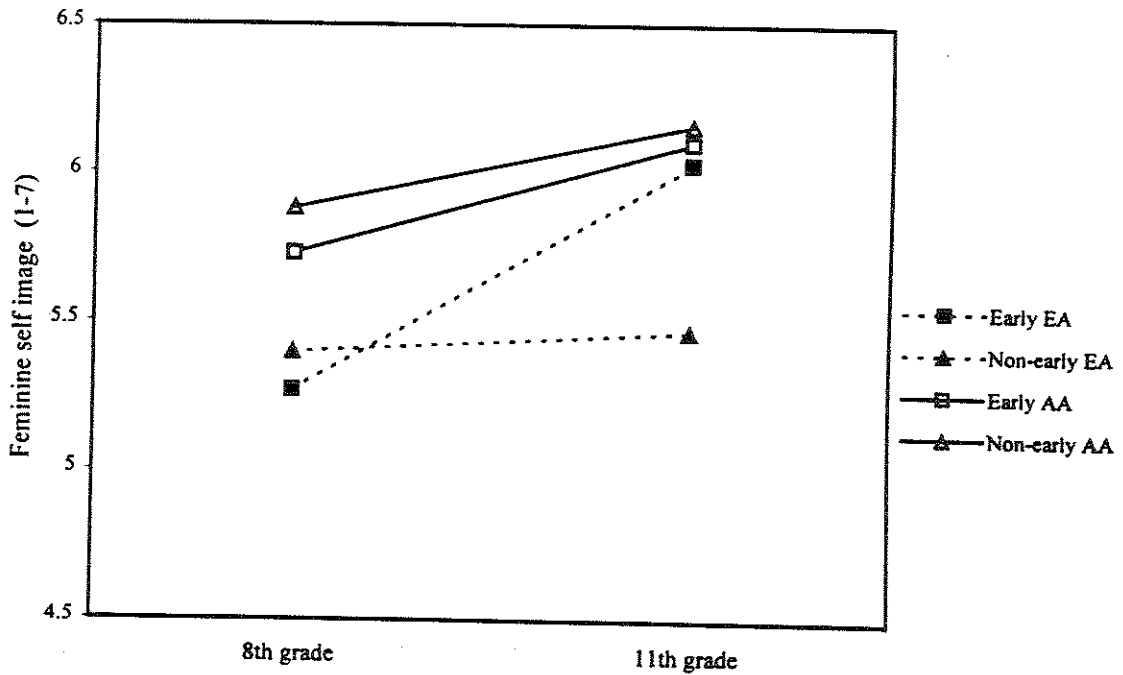


Figure 4.16 Interaction effect of Perception of Timing and Time on Self-concept of Appearance: 8th to 11th Grade

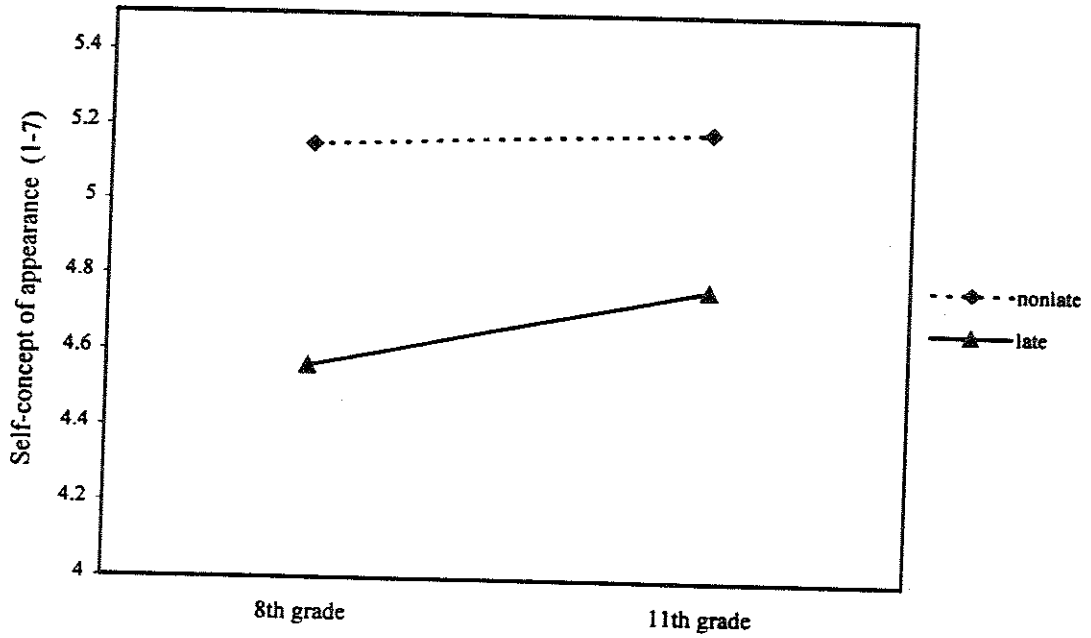


Figure 4.17 Interaction effects of Heterosocial Activity and Time on Satisfaction with Weight: 8th to 11th Grade

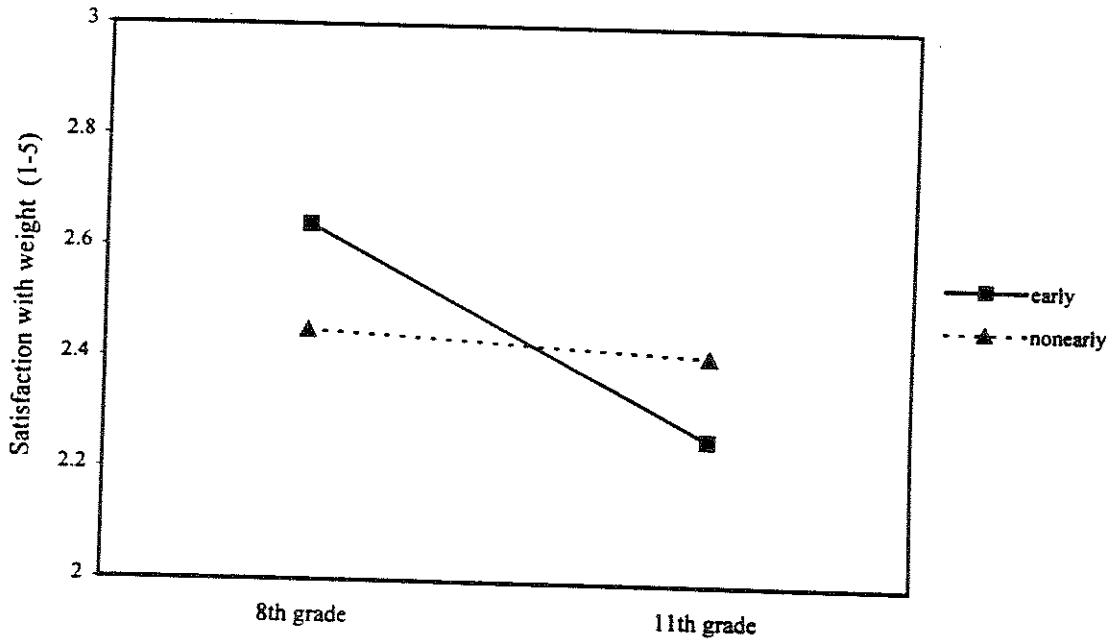


Figure 4.18 Interaction of Perceived Timing, Race and Time on Girls' Reports of Chances of Negative Events: 8th to 11th Grade

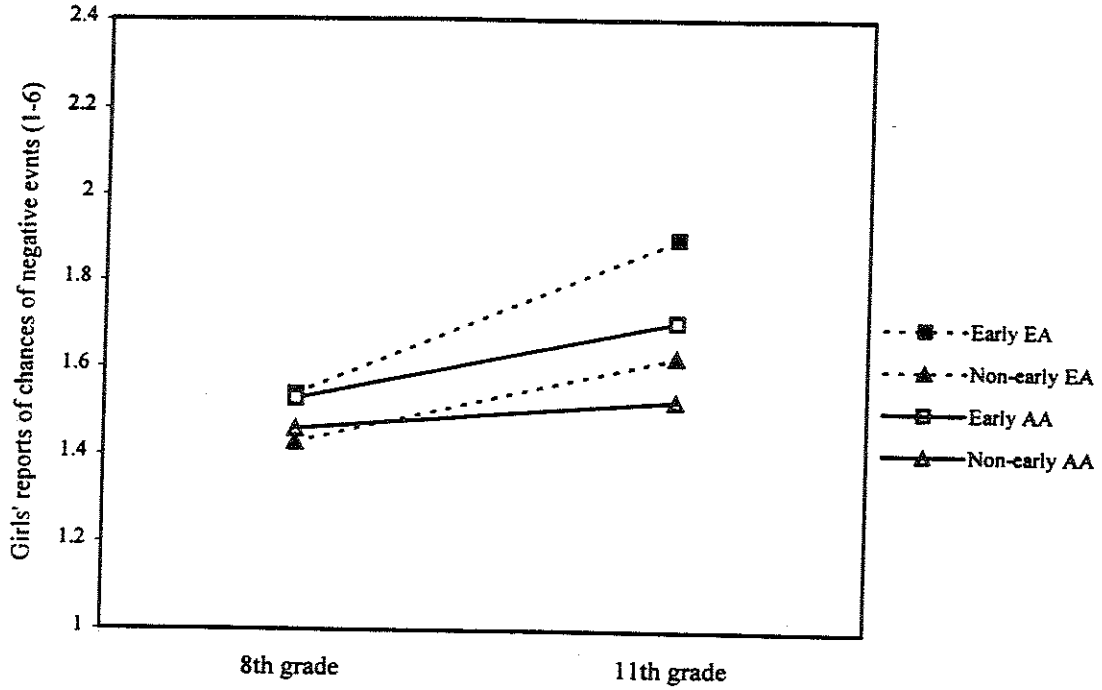


Figure 4.19 Interaction effect of Menarche, Race and Time on Mothers' Reports of Girls' Chances for Future Negative Mental Health: 8th to 11th Grade

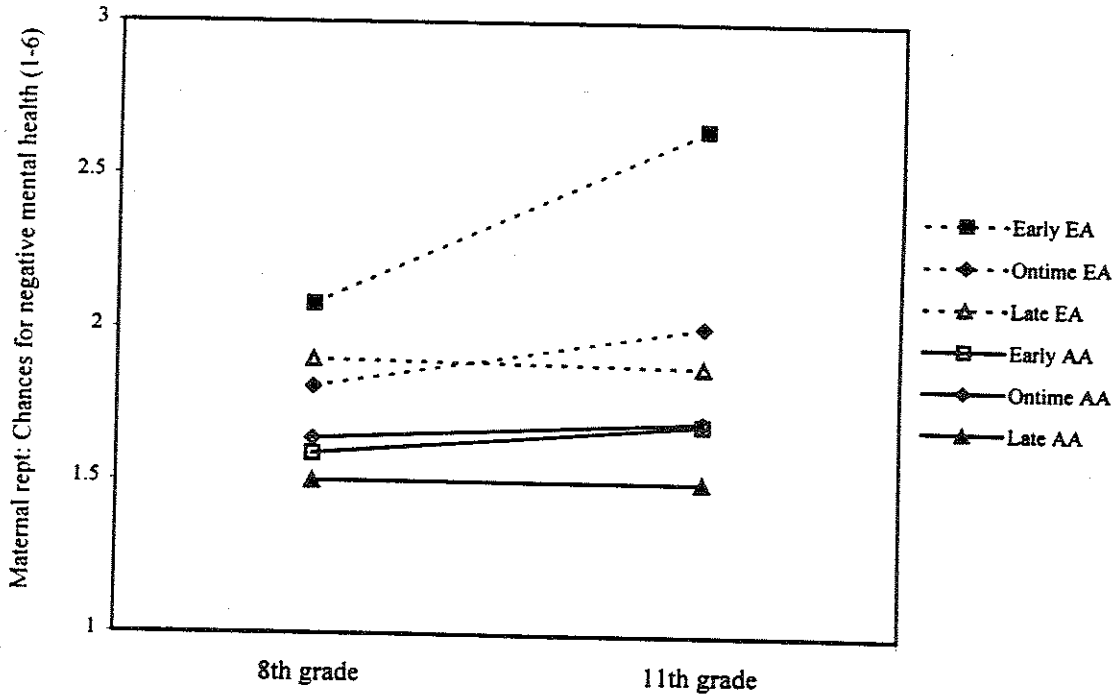


Figure 4.20 Interaction effects of Menarche, Race and Time on Problem Behaviors: 8th to 11th Grade

