Supplemental Information

METHODS

Participants

The Add Health study originally comprised 90 118 adolescents who were selected via a stratified, random school selection procedure. Adolescents were selected for the longitudinal in-home interview subsample via a multistage, stratified, school-based cluster sampling design and have been interviewed at 4 waves, most recently in 2008 to 2009. The wave 1 in-home interview sample comprised 20 745 12- to 18- year-old adolescents (78.9% response rate of all eligible participants), and data were collected in 1995. Wave 2 in-home interviewing was conducted in 1996 (88.2% response rate with a resulting sample size of 15 197; with 12th graders from wave 1 excluded from wave 2).

We drew a sample of the girl participants who participated in the in-home interviews and who had nonmissing weights at wave 2 (n = 6964). From this sample, girl participants who were not in any romantic or sexual relationship or who were missing data on the key outcome variable (wave 2 dating victimization) were removed (n = 2144). In addition, because there are known differences in pubertal development across race groups, we included only those who self-identified as white, African American, or Hispanic because other race groups were too small to allow us to standardize the relative pubertal development measure both within age and within race group. For example, there were only 25 American Indians and 213 Asian Americans, and these numbers got even smaller when we broke them down into groups of the same age. We additionally restricted the sample to those aged 13 to 17 years because (1) there were insufficient numbers in groups of adolescents aged 11 years (n = 2), 12 years (n = 86), 19 years (n = 31), and 20 years (n = 4); and (2) although there were 297 participants aged 18 years, the vast majority were seniors in high school and did not have older peers within their schools or within sister schools who could be nominated as friends (eg, the mean of the proportion of older peers is 0.09 for participants aged 18 years, 0.26 for participants aged 17 years, and 0.34 for participants aged 16 years).

Covariate Measures

Self-esteem was assessed with 4 items at wave 1. Participants were asked how much they agreed (1 = strongly disagree; 5 = strongly agree) with 4 statements: (1) they liked themselves just the way they were, (2) they felt like they were doing everything just about right, (3) they had a lot of good qualities, and (4) they had a lot to be proud of. Ratings were then summed to form a total score (Cronbach's α = 0.80).

Although a self-control questionnaire was not administered in Add Health, 7 items were assessed that capture aspects of self-control at the wave 1 in-home interview.[46] Consistent with the concept proposed by Gottfredson and Hirschi,[47] low self-control was defined as being impulsive (eg, tending to act before thinking through the consequences of one's actions). Participants were asked how much they agreed (1 = strongly agree; 5 = strongly disagree) with 4 statements: (1) when you have a problem to solve, one of the first things you do is to get as many facts about the problem as possible; (2) when you are attempting to find a solution to a problem, you usually try to think of as many different ways to approach the problem as possible; (3) when making decisions, you generally use a systematic method for judging and comparing alternatives; and (4) after carrying out a solution to a problem, you usually try to analyze what went right and what went wrong. In addition, participants were asked how often in the past year they had trouble paying attention in school, getting homework done, and keeping their minds on what they were doing. All 7 items were reverse coded, z-transformed, and then summed to form a composite score, with higher scores reflecting higher levels of self-control (Cronbach's α = 0.64). This self-control measure was previously found to have a good convergent validity in the Add Health study.[46]

We also included a measure of antisocial behavior measured at wave 1. Participants were asked how often (0 = never; 1 = 1 or 2 times; 2 = 3 or 4 times; 3 = ≥5 times) they engaged in a variety of property-related and violent antisocial behaviors in the past 12 months. These 13 items included deliberately damaging another person's property, stealing items worth > (or <) $50, selling marijuana or other drugs, going into a house or building to steal things, using or threatening to use a weapon to get things from others, taking part in a group (eg, gang) fight, painting graffiti, lying to parents or guardians

about where or with whom they had been, taking something from a store without paying for it, running away from home, driving a car without the owner's permission, or being loud, rowdy, or unruly in a public place. These items were all dichotomously scored to indicate whether participants ever engaged in that behavior and were then summed to get a count of the number of antisocial behaviors the respondent had committed in the past year.

RESULTS

Relative Pubertal Development and Dating History

Relative age at menarche was not associated with the number of relationships girls reported ($r = 0.02$), but girls who perceived themselves to be more physically advanced than their peers (ie, subjective measure of relative pubertal development) were involved in more relationships ($r = 0.07$). Moreover, when the sample was extended to include girls who did not report ever being in a dating relationship ($n = 1624$ who never dated in addition to the 3870 who did report dating), those with relatively more advanced pubertal development had greater log odds of ever being in a dating relationship (objective measure: B (unstandardized coeffiicent) = 0.25, SE = 06, $P < .001$; subjective measure: B = 0.34, SE = 05, $P <$

.001). These associations between objective and subjective measures of relative pubertal development and experience with dating did not vary as a function of age.

Early Maturation and ADA Between Younger and Older Girls

The effect of relative pubertal development might differ as a function of age because current physical appearance may be more closely linked to relative pubertal development among younger girls (aged 13–15 years) than among older girls (aged 16–17 years). This would suggest that girls' judgments of their relative physical development would be more variable in younger versus older girls. Contrary to our prediction, the variance of the subjective measure of relative pubertal development was of similar size in the younger (variance = 1.133) and older girls (variance = 1.134). Furthermore, negative binomial regression showed that the effect of the objective measure of relative pubertal development on ADA victimization did not differ significantly between younger and older girls (interaction B = −0.10, SE = 0.07, $P = .20$), although being older versus younger (B = 0.21, SE = 0.08, $P = .01$) and having advanced pubertal development (B = 0.17, SE = 0.06, $P = .004$) were associated with more dating abuse. Analyses involving the subjective measure of relative pubertal development revealed similar results.

ADA by Groups of Subjective Pubertal Development

The main analysis revealed significant associations between the subjective and objective measures of advanced pubertal development and ADA victimization. To get a sense of the proportion of girls with early maturation who were abused in a dating relationship, we grouped girls into an early-maturing group and an on-time/later-maturing group based on the subjective pubertal development measure. Those who rated themselves as 1 to 2 were classified into the late-maturing group (1 = "I look younger than most" to 2 = "I look younger than some"), those who rated themselves as 3 were classified into the on-time maturing group (3 = "I look about average"), and those who rated themselves as 4 to 5 were classified into the early-maturing group (4 = "I look older than some" to 5 = "I look older than most"). A total of 32% of the early-maturing girls experienced at least 1 form of ADA, and 28% of the on-time and 27% of the late-maturing girls experienced at least 1 form of ADA.

SUPPLEMENTAL REFERENCES

46. McGloin JM, Shermer LO. Self-control and deviant peer network structure. *J Res Crime Delinq*. 2009;46(1): 35–72

47. Gottfredson M, Hirschi T. *A General Theory of Crime*. 1st ed. Stanford, CA: Stanford University Press; 1990