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Authors

Vandell, Deborah Lowe
Burchinal, Margaret
Pierce, Kim M

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Early child care and adolescent functioning at the end of high school: Results from the NICHD Study of Early Child Care and Youth Development

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Abstract

Relations between early child care and adolescent functioning at the end of high school (EOHS; *M* age = 18.3 years) were examined in a prospective longitudinal study of 1,214 children. Controlling for extensive measures of family background, early child care was associated with academic standing and behavioral adjustment at the EOHS. More experience in center-type care was linked to higher class rank and admission to more selective colleges, and for females to less risk taking and greater impulse control. Higher quality child care predicted higher academic grades and admission to more selective colleges. Fewer hours in child care was related to admission to more selective colleges. These findings suggest long-term benefits of higher quality child care, center-type care, and lower child-care hours for measures of academic standing at the EOHS.

The extent to which early child care is related to academic and social functioning long after children leave child care is an important research and policy question given the large numbers of children in early child care, public and private investments in early care and education (ECE), and needs for a skilled workforce in a competitive global economy (Burchinal, Magnuson, Powell, & Hong, 2015; Nores & Barnett, 2010). In the United States, for example, about 50% of children experience regular nonparental child care as infants and toddlers, and more than 75% experience some type of child care during the preschool years (Burchinal et al., 2015). In addition, the federal government has invested heavily in early education programs such as Head Start, and many states and localities have invested in prekindergarten programs and quality rating and improvement systems (Tout et al., 2010).

Investments have been based on evidence that high-quality ECE provides one of the best means to improve life opportunities by improving early cognitive and social skills that serve as the basis for later skills (Pianta, Barnett, Burchinal, & Thornburg, 2009). The research evidence is largely based on intervention studies involving children from low-income families enrolled in model

programs. The purpose of the current study is to examine the extent to which participation in more typical early child care settings predicts academic and social outcomes at the end of high school (EOHS) in a large, economically diverse sample that includes children from middle-income families as well as high-income and low-income families.

There is considerable experimental evidence that ECE interventions have short-term positive impacts on children's cognitive, school, and social skills. In a meta-analysis of 125 studies of primarily low-income children, Camilli, Vargas, Ryan, and Barnett (2010) reported overall effect sizes of .23, .14, and .16 for cognitive, school, and social skills, respectively, immediately following early childhood interventions, with some well-known high-quality interventions having substantially larger short-term impacts. In a second meta-analysis, Duncan and Magnuson (2013) found that impacts were more likely to persist into adulthood for ECE programs like the Perry Preschool Project and the Abecedarian Project that initially had moderate to large impacts. Long-term follow-up studies of some of the strongest prekindergarten programs serving low-income children also have yielded short-term and longer term effects after the programs ended (Reynolds, Temple, Ou, Arteaga, & White, 2011).

Much less research has considered links between ECE experiences in typical early care settings and functioning in early adulthood for children from economically diverse families. The NICHD Study of Early Child Care and Youth Development (SECCYD) is one of the few longitudinal studies that can address this issue with a large sample that includes low-, middle-, and high-income children. Launched in the early 1990s to examine the effects of early child care, the SECCYD included 1,364 participants recruited at birth in 10 sites in the United States. In a series of reports, relations were considered between early child care and child functioning prior to school entry, in early elementary school, in later elementary school, and at age 15 years.

Three aspects of early child care—quality, quantity, and type—were investigated in the SECCYD and found to be differentially related to child developmental outcomes. Higher quality child care was consistently linked to better cognitive and academic skills during the preschool period (NICHD Early Child Care Research Network [ECCRN], 2002) and in early elementary school (NICHD ECCRN, 2005b), later elementary school (Belsky et al., 2007), and early high school (Vandell et al., 2010). More hours in care were related to more externalizing behaviors in early childhood (McCartney et al., 2010; NICHD ECCRN, 2002) and early elementary school (NICHD ECCRN, 2005b), and to more risk taking and impulsivity at age 15 (Vandell et al., 2010). More experience in center-type care, as opposed to more informal settings such as family child care homes, was related to higher academic skills, but also to more externalizing behaviors

in early childhood and in middle childhood (NICHD ECCRN, 2002, 2005b). In all of these reports, effects were small (d = .08 to .16) but statistically significant. Effects were roughly the same size during elementary school and high school, suggesting that substantial fadeout had not occurred.

The current study extends the examination of early child care experiences and adolescent functioning to the EOHS and considers standard measures of academic standing and behavioral indicators. The EOHS represents an important milestone for young people. Adolescents' high school records play a key role in determining who continues on to postsecondary education, which postsecondary institutions they attend, and the likelihood that they will receive a 4-year degree (Bailey, Jeong, & Cho, 2010; Bowen & Bok, 1998; Massey, Charles, Lundy, & Fischer, 2003). These higher education experiences are then predictive of a host of meaningful adult outcomes, including earnings and health status (Bowen & Bok, 1998; Rosenbaum, 2001). We examined multiple measures of EOHS academic standing that have practical significance for later outcomes, including typical grades, advanced coursework, class rank, and selectivity of the postsecondary institutions that young people plan to attend.

Social, emotional, and behavioral competencies at the EOHS also are meaningful indictors that have implications for adult development (Masten et al., 2005; McGue & Iacono, 2005; Moffitt et al., 2011). In the Dunedin Study, which followed a birth cohort of more than 1,000 children studied from birth through 32 years, self-control during middle childhood and adolescence predicted adult physical health, substance dependence, personal finances, and criminal offending (Moffitt et al., 2011). In another community-based sample in the United States involving more than 1,200 youth, associations were found between adolescent externalizing behaviors and adult substance abuse and antisocial behaviors (McGue & Iacono, 2005). In a third study, Masten et al. (2005) detected developmental cascades in which externalizing problems during childhood appeared to undermine academic competence in adolescence, which was subsequently linked to internalizing problems in young adulthood. In the current study, we examined three behavioral outcomes (impulse control, externalizing behaviors, and risk taking) that we had previously found to be related to early child care (Vandell et al., 2010) and that other investigators have linked to adult functioning.

We also considered gender as a potential moderator of relations between early child care and functioning at the EOHS. There is evidence of gender differentiation of both academic and behavioral pathways during adolescence. Females receive higher academic marks in high school and college (Voyer & Voyer, 2014), and they graduate from high school and college at higher

rates (Buchmann & DiPrete, 2006), whereas males engage in more risk-taking (Byrnes, Miller, & Schafer, 1999) and externalizing behaviors (Bongers, Koot, van der Ende, & Verhulst, 2004) during these periods. In addition, several investigators have found ECE impacts on adult outcomes to be moderated by gender. In the Chicago Child−Parent Centers intervention, for example, larger effects on high school graduation rates were found for males than females (Ou & Reynolds, 2010). Duncan and Magnuson (2013) detected additional evidence of gender moderation in their meta-analysis of 22 early education programs, with larger long-term impacts on cognitive achievement scores for females and larger effects on grades for males. The differential developmental pathways associated with gender, combined with the evidence of gender moderation in other longitudinal ECE studies, led us to ask if relations between early child care and functioning at the EOHS would be moderated by gender, even though little evidence of gender moderation was found at younger ages in the SECCYD.

In sum, this article seeks to provide new insights into potential long-term effects of early child care by tracking a large sample of American children to determine whether variations in early child care quality, quantity, and type are related to academic standing and behavioral adjustment at the EOHS and if these relations are moderated by child gender. This investigation enables us to determine whether previously detected child care effects at earlier ages were sustained or faded away, and if new effects emerged.

Method

Participants

Hospital visits were conducted in 1991 with mothers shortly after the birth of the study participants at 10 locations in the United States (Little Rock, AR; Orange County, CA; Lawrence, KS; Boston, MA; Morganton, NC; Philadelphia, PA; Pittsburgh, PA; Charlottesville, VA; Seattle, WA; Madison, WI). During selected 24-hr intervals, all women giving birth at selected hospitals were screened for eligibility. A total of 1,364 families were recruited and completed a home interview at 1 month and became the study participants, with a 52% response rate from the original approach to families in the hospital to successful recruitment in the study. At recruitment, 26% of the mothers had no more than a high school education, 21% had incomes less than 200% of the poverty level, and 22% were minority (i.e., not non-Hispanic White). For details about sample recruitment, see NICHD ECCRN (2005a).

At age 15, assent for future research contact was obtained from 946 adolescents and consent from their parents. E-mail addresses, postal addresses, and phone numbers were obtained at that time. During what was expected to be the senior year of high school, adolescents were contacted about the EOHS follow-up study, which was described to them as helping us learn about how teens' experiences affect them as they become young adults. Recruitment was conducted primarily by e-mail. When an e-mail address was missing or no longer valid, we called the participant to ask for an address. Some participants did not have valid e-mail addresses or phone numbers. In these cases, we made contact with adolescents and/or parents via social media (Facebook) or by U.S. Postal Service (USPS) mail to the last known address.

Adolescents who were 18 years old at the time of our contact received a recruitment e-mail that announced the study and provided a link to the online survey with a unique ID. Upon clicking the link, the adolescent was taken to an online study information sheet. At the end of the information sheet, the participant was instructed to click a link to continue on to the survey if he or she agreed to participate in the study. Participants were offered a choice of $50 gift cards for completing the survey, delivered via e-mail or USPS mail.

Parents of adolescents who were less than 18 years old at the time of EOHS recruitment were contacted to obtain parental consent for these adolescents to participate in the study. A recruitment e-mail was sent to the parent with a study information sheet attached. If we did not have a parent e-mail address, we mailed a hard copy of the sheet via USPS. We then called the parent to answer questions about the study and obtain his or her verbal consent for the adolescent's participation. We also confirmed or obtained the adolescent's e-mail address, then followed the same procedures used for students who were 18 years old to obtain participant assent and provide the survey for completion, and specify his or her choice of $50 gift cards. Parents were not compensated for providing consent.

Using these methods, we were able to contact 888 adolescents. Of this number, 779 (*M* age = 18.38 years, *SD* = .31; range = 17.58–19.27 years) agreed to participate and completed the online survey. Most were surveyed in the spring and summer of their senior year. Study participants who had dropped out of high school ($n = 10$), were enrolled in a GED program ($n = 27$), successfully completed a GED program ($n = 11$), or were home-schooled ($n = 11$) completed the online survey late in the spring of what would have been their senior year. Seven students who had graduated early from high school completed the survey about a year after graduation. Two students who had been held back in two grades were surveyed at the end of their 11th grade year.

Table 1 provides detailed descriptive data for the SECCYD recruitment sample (N = 1,364), the sample of children with any child care data (n = 1,214), the sample at 15 years (n = 1,002), and the EOHS sample (n = 779). As shown in Table 1, maternal education, family income, and maternal sensitivity were higher for adolescents who participated in the EOHS data collection versus those who did not participate. Males and African American adolescents were less likely to participate in EOHS surveys. Child outcome measures obtained at earlier ages were higher for EOHS participants versus nonparticipants. There were site differences in retention between recruitment and the EOHS (Arkansas [57%], California [82%], Kansas [82%], Massachusetts [89%], Pittsburgh [72%], Philadelphia [70%], North Carolina [73%], Virginia [75%], Washington [86%], and Wisconsin [86%]), χ^2 (9, 1364) = 44.66, $p < .0001$, with sites with lower incomes having lower retention than sites with higher incomes.

Table 1

Table 1

Descriptive Characteristics of the SECCYD Recruitment, Child Care, Age 15 Years, and EOHS Samples

Variables	Sample											
	Recruitment			Child care			Age 15 years			EOHS		
	n	*M*%	*SD*	*n*	*M*%	*SD*	*n*	*M*%	*SD*	*n*	*M*%	*SD*
Child and family characteristics												
Mother's education	1,363	14.23	2.51	1,214	*14.37**	2.47	1003	*14.45**	2.45	778	*14.73**[a]	2.42
Maternal vocabulary	1,167	99.01	18.35	1,150	*99.25**	18.28	946	*99.78**	18.47	739	*101.9**[a]	18.50
Maternal psychological adjustment	1,272	59.00	13.95	1,192	*59.25**	13.87	976	59.04	13.65	762	*59.73**[a]	13.64
Child gender (male = 1)	1,364	.52		1,214	.51		1003	.50		778	*.48**[a]	
Child race/ethnicity	1,364			1,214			1003			778		
White		.76			*.78**			.76			*.81**[a]	
Black		.13			*.11**			.12			*.08**[a]	
Hispanic		.06			.06			.06			.06	
Other		.05			.05			.05			.05	
Family income/needs, 6 to 54 months	1,302	3.60	2.85	1,212	*3.65**	2.79	996	*3.70**	2.76	774	*3.87*[a]	2.72
Two-parent epochs, 6 to 54 months	1,305	.84	.32	1,214	*.85*	.31	997	.85	.31	775	*.88**[a]	.28
Maternal depression, 6 to 54 months	1,304	9.36	6.76	1,214	*9.25**	6.52	997	9.40	6.54	775	*9.14*[a]	6.48
HOME total, 6 to 54 months	1,305	.80	.09	1,214	.81	.09	997	.81	.09	775	.82	.08
Maternal sensitivity, 6 to 54 months	1,306	5.01	.69	1,214	5.00	.65	997	5.01	.66	775	*5.10**[a]	.62
Family income/needs, kindergarten to Grade 6	1,140	4.19	3.37	1,106	4.18	3.25	1000	4.21	3.42	776	*4.51**	3.43
Two-parent epochs, kindergarten to Grade 6	1,154	.81	.34	1,119	*.81**	.33	1003	.81	.33	778	*.84*[a]	.32
Maternal depression, kindergarten to Grade 6	1,123	8.74	7.32	1,089	8.68	7.16	1000	8.81	7.27	778	*8.39**[a]	6.96
HOME total, Grade 1 through Grade 5	1,063	.78	.10	1,031	*.78**	.09	983	.78	.09	767	.79	.09
Maternal sensitivity, Grade 1 through Grade 5	1,114	5.51	.75	1,082	5.52	.75	992	5.53	.73	774	*5.61*[a]	.69
Family income/needs, age 15 years	924	5.26	5.79	897	5.28	5.75	924	5.26	5.79	726	5.45	5.45
Two-parent epochs, age 15 years	979	.77	.42	950	*.78**	.42	979	.77	.42	759	*.79*[a]	.41
Maternal depression, age 15 years	973	10.48	9.83	944	10.39	9.69	973	*10.48**	9.83	760	*9.97**[a]	9.43
HOME total, age 15 years	957	.83	.12	929	.84	.11	957	.83	.12	747	*.85**[a]	.11
Maternal sensitivity, age 15 years	898	4.45	.72	871	4.44	.73	898	4.45	.72	708	*4.48*[a]	.70
Child care experience, 1 to 54 months												
Quality nonrelative care	1,005	2.90	.45	961	2.91	.44	813	*2.91*	.45	639	*2.93**	.44
Hours/week in nonrelative care	1,214	16.48	14.16	1,214	16.48	14.16	973	16.67	14.15	761	16.81	14.21
Proportion of time in center care	1,214	.21	.26	1,214	.21	.26	973	.21	.25	761	.21	.26
Classroom quality Grade 1 through Grade 5	1,100	3.27	.32	1,069	3.27	.32	977	3.26	.31	759	*3.29**	.29
Child functioning												
WJR Letter−Word, 54 months	1,056	98.93	13.52	1,048	*99.01**	13.47	917	99.16	13.39	725	*100.1**[a]	13.14
WJR Applied Problems, 54 months	1,053	102.9	15.63	1,045	*103.1**	15.58	914	*103.6**	15.36	723	*105.1**[a]	15.14
PLS Language, 54 months	1,064	98.34	19.92	1,056	*98.56**	19.83	920	*99.07**	19.84	723	*101.1**[a]	19.44
CBCL Externalizing, 54 months	1,061	51.69	9.39	1,051	51.65	9.40	922	51.79	9.44	731	*51.31*[a]	9.52
WJR Picture Vocabulary, age 15 years	889	99.93	14.77	866	99.99	14.75	889	99.93	14.77	704	*101.5**[a]	14.41
WJR Applied Problems, age 15 years	887	102.9	14.22	864	103.0	14.06	887	102.9	14.22	701	*104.5**[a]	14.45
WJR Passage Comprehension, age 15 years	887	107.7	15.72	865	107.8	15.69	887	107.7	15.72	705	*109.4**[a]	15.57
YSR Externalizing, age 15 years	956	49.31	9.91	928	49.25	9.89	956	49.31	9.91	749	*48.96**[a]	9.82
Impulse control, age 15 years	957	3.51	.90	929	3.51	.90	957	3.51	.90	749	*3.55**[a]	.91
Risk-taking Index, age 15 years	957	.18	.18	929	*.18**	.17	957	.18	.18	749	*.16**[a]	.15
EOHS class rank (5 = *high*, 1 = *low*)	758	3.46	1.04	741	3.46	1.03	752	3.46	1.04	758	3.46	1.04
EOHS typical grades (8 = *high*, 1 = *low*)	775	5.42	1.47	758	5.42	1.47	769	5.41	1.47	775	5.42	1.47
EOHS advanced coursework	769	3.56	2.98	752	3.57	2.97	763	3.56	2.98	769	3.56	2.98
EOHS college selectivity	547	3.56	2.98	536	3.77	1.82	541	3.78	1.83	547	3.77	1.82
EOHS Externalizing	766	50.76	10.17	750	50.71	10.21	760	50.76	10.19	766	50.76	10.17
EOHS Risk-Taking Index	768	.25	.21	752	.25	.21	762	.25	.21	768	.25	.21
EOHS Impulse Control	756	3.70	.83	742	3.71	.83	750	3.70	.83	756	3.70	.83
Site				*						a*		

Note. HOME = Home Observation of the Environment (Caldwell & Bradley, 1984); WJR = Woodcock-Johnson Revised (Woodcock & Johnson, 1990); PLS = Preschool Language Scale (Zimmerman, Steiner, & Pond, 1979); CBCL = Child Behavior Checklist (Achenbach, 1991). We compared the recruitment sample with the child care, age 15, and end of high school (EOHS) samples. Significant differences between the recruitment sample and these subsamples are indicated with italicized mean scores.

[a] Each significant difference between the 15-year and EOHS subsamples.

* $p < .05$.

Descriptive Characteristics of the SECCYD Recruitment, Child Care, Age 15 Years, and EOHS Samples

Measures

The SECCYD involved multiple assessments that occurred in early childhood (when the study participants were 1, 6, 15, 24, 36, and 54 months of age), middle childhood (when the study participants were in kindergarten, Grades 1, 2, 3, 4, 5, and 6), and adolescence (at age 15 and EOHS). Measures of early child care are described first, followed by measures of EOHS academic standing and behavioral adjustment, and finally the family and child measures as covariates.

Early child care

Three aspects of child care were measured from birth through 4.5 years. Child care type was assessed during phone and personal interviews conducted at 3-month intervals (or epochs) through 3 years and then 4-month intervals (or epochs) to age 4.5 years. At each epoch, mothers reported all of the care arrangements used since the previous interview. The proportion of epochs in center care for at least 10 hr per week was computed and used to represent center-type care. Child care hours in nonrelative care were tallied for each epoch, and the mean of nonrelative care hours across epochs was computed. Child care quality was assessed by observations of the study children's experiences with caregivers, other children, and materials in their primary child care arrangement. Two half-day visits, scheduled within a 2-week window, were conducted at 6, 15, 24, and 36 months; and one half-day visit was conducted at 54 months. Detailed descriptions of these observations can be found in NICHD ECCRN (2002), including coding definitions, training procedures, and interobserver agreement.

EOHS outcomes

Four measures of academic standing and three measures of behavioral adjustment were collected at the EOHS using a secure website. Descriptive statistics for the outcome measures are shown at the bottom of Table 1 and separately for males and females in Appendix 1.

Academic standing

Adolescents reported their typical grades in high school by selecting among the following options: mostly As, about half As and half Bs, mostly Bs, about half Bs and half Cs, mostly Cs, about half Cs and half Ds, mostly Ds, or mostly below Ds. These were scored 1 (*mostly below Ds*) to 8 (*mostly As*).

In terms of advanced coursework, adolescents reported the total number of honors courses taken (0 = *no honors classes*, 1 = *one honors class*, 3 = *two to three honors classes*, 4 = *four or more honors classes*) and the total number of advanced placement (AP) classes taken (0 = *no AP classes*, 1 = *one AP class*, 3 = *two to three AP classes*, and 4 = *four or more AP classes*). These

two reports were summed to yield amount of advanced coursework, which could range from 0 to 8. Twenty-seven percent of the sample had no honors or AP classes.

Class rank was reported in terms of cumulative grade point average on a 5-point scale: 1 = *bottom 24%*, 2 = *bottom 25% to 49%*, 3 = *top 50% to 74%*, 4 = *top 75% to 89%*, 5 = *top 10%*. A meta-analysis conducted by Kuncel, Crede, and Thomas (2005) found good reliability between school records and adolescent self-reports of class rank (average correlation = .77) and typical grades (average correlation = .82).

EOHS participants were asked about their plans after high school. Their responses were as follows: "I do not plan to get any further education beyond high school" (n = 7); "I will eventually go to college, but first I will take some time off from school" (n = 60); "I plan to join the military" (n = 15); "I have joined the military" (n = 11); "I plan to go to a trade school or technical school" (n = 35); "I plan to go to a 2-year community college program" (n = 123); and "I plan to go to a 4-year college program" (n = 518).

If adolescents reported that they planned to attend college, they were asked the name and location of the college. The selectivity of the reported 4-year institutions was scored using Barron's Profile of American Colleges for the year in which the students graduated from high school: 1 = *noncompetitive*, 2 = *less competitive*, 3 = *competitive*, 4 = *competitive+*, 5 = *very competitive*, 6 = *very competitive+*, 7 = *highly competitive*, 8 = *highly competitive+*, and 9 = *most competitive*. For this article, college selectivity was rescored as 1 = *2-year college*, 2 = *noncompetitive 4-year institution*, 3 = *less competitive 4-year institution*, 4 = *competitive or competitive+*, 5 = *very competitive or very competitive+*, and 6 = *most competitive*.

Behavioral adjustment

Three aspects of behavioral adjustment were measured. Adolescents self-reported externalizing behaviors using the Delinquent Behavior and Aggressive Behavior scales (30 items) on the Youth Self-Report (YSR; Achenbach & Rescorla, 2001; α = .86). For each item, youth rated on a 3-point scale (0 = *not true*, 1 = *somewhat or sometimes true*, 2 = *very true or often true*) how well the item described him or her currently or within the last 6 months. A T score was computed on which the expected mean is 50, and standard deviation is 10. Higher scores indicate a greater affinity to display delinquent and aggressive behaviors. The mean (50.76) and standard deviation (10.17) are similar to the national norms for this measure.

Adolescents also self-reported the extent to which, over the last year, they had engaged in the following risk-taking behaviors: used alcohol; used tobacco or other drugs; behaved in ways that

threatened their own safety, such as used or threatened to use a weapon; stole something; or harmed property (Halpern-Felsher et al., 2001). Responses were made on a 3-point scale (0 = *never*, 1 = *once or twice*, 2 = *more than twice*). Ratings were averaged and then subjected to square root transformation to reduce skew and kurtosis ($\alpha = .89$).

Finally, adolescents completed a 7-item questionnaire to assess reactions to external constraints, taken from the Weinberger Adjustment Inventory (Weinberger & Schwartz, 1990). The measure asks participants to rate (1 = *false*, 5 = *true*) how closely their behavior matches a series of statements such as "I stop and think things through before I act" and "I'm the kind of person who will try anything once, even if it's not that safe." For the current analyses, items that indicated high impulsivity were reflected. We calculated the mean of the seven items to obtain an impulse control score ($\alpha = .82$).

Child, family, and school covariates

A number of covariates were used as controls in our data analyses (see Table 1 for descriptive statistics). Child characteristics were reported by mothers at 1 month. Measures of family characteristics were collected during early childhood (1 month−4.5 years), middle childhood (kindergarten−Grade 6), and adolescence (age 15). Measures of school quality were collected when the participants were in elementary school (Grades 1, 3, and 5).

Child characteristics included as covariates were gender and race/ethnicity. The early childhood covariates were maternal education (in years); maternal vocabulary as measured by the Peabody Picture Vocabulary Test−Revised when the study child was 36 months old; maternal psychological adjustment measured with the NEO Personality Inventory when the study child was 6 months old; the mean of maternal depressive symptoms assessed by the Center for Epidemiological Studies Depression Scale reported by the mother at 6, 15, 24, 36, and 54 months; an early maternal sensitivity score created by averaging ratings of observed maternal sensitivity during semistructured free-play sessions at 6, 15, 24, 36, and 54 months, described in detail in prior publications (NICHD ECCRN, 2002; Vandell et al., 2010); family income through 4.5 years, calculated as the mean income-to-needs ratio; and the proportion of epochs through 4.5 years in which the mother reported a husband/partner was present in the home.

The middle childhood covariates, measured when the study children were in kindergarten through Grade 6, included mean maternal depressive symptoms assessed by the Center for Epidemiological Studies Depression Scale in Grades 1, 3, 5, and 6, and mean maternal sensitivity (the average of ratings of observed maternal sensitivity during semistructured activities in Grades 1, 3, and 5), family income as measured by the mean income-to-needs ratio,

and the proportion of middle childhood epochs in which a husband or partner was present in the household. In addition, the quality of school experiences was observed and rated in Grades 1, 3, and 5, and a mean classroom quality score was computed. For more details regarding the middle childhood covariates, see NICHD ECCRN (2005a).

The following adolescent family covariates were collected at age 15 and correspond to those obtained in early and middle childhood: maternal depressive symptoms, observed maternal sensitivity, income-to-needs ratio, and presence of a husband or partner in the household. See Vandell et al. (2010) and Burchinal et al. (2014) for more details about these variables.

Data Analysis

We computed descriptive statistics for all variables included in the analyses, and correlations between early child care and EOHS outcomes. The primary research questions were examined in regression analyses of the four measures of academic standing and three measures of behavioral adjustment. The regression models analyzed the EOHS outcome measures as a function of child care quality, quantity, and type, and included the following covariates: child gender and race/ethnicity; maternal education, vocabulary, and psychological adjustment; quality of elementary school classrooms; and early childhood, middle childhood, and adolescent measures of maternal depression, maternal sensitivity, family income, and the proportion of epochs in which there were two parents in the household. We focused on nonmaternal child care quality provided by individuals who were not fathers or grandparents. A dummy variable was included to indicate whether the child had only experienced child care by the father or grandparents. Including this dummy variable meant that the parameter described the association between EOHS outcomes and the quality of nonmaternal child care provided by caregivers who were not these close relatives. In Model 2, we tested for interactions between child care variables and gender.

Multiple imputations were conducted to account for missing data. The imputation model included the three child care variables; research site; the child and family covariates from early childhood, middle childhood, and adolescence; and the seven outcomes shown in Table 1, as well as 54-month and 15-year academic and social child outcomes to enhance imputation of missing child care and end-of-high school variable, respectively. The multiple imputations involved Bayesian E-M algorithm with bootstrapping (Schafer, 1997) iteratively regressing each variable on the other variables included in the multiple imputations data set. This approach to create a set of plausible values as recommended by Allison (2000) and Sterne and colleagues (2009) improve imputation and decrease bias. The imputations included the entire sample (n =

1,364) and produced 40 analysis data sets. The subsequent analyses were conducted in each data set separately, and results were combined taking into account variability within and between data sets.

According to Allison (2000), Bayesian approaches to multiple imputation appear to provide good results when the algorithms rely on separate regressions of each variable to impute missing data and the data are missing at random (MAR). Data are MAR when the probability of missing data can depend on other variables but the reason the data are missing is not caused by the variable being imputed. For example, if data are missing because individuals cannot obtain a basal score on the instrument, then the data are censored and are not MAR. Furthermore, it is recommended to improve imputation and decrease bias that a wide range of variables be included in the imputation model, including all variables in the analyses as well as other "variables predictive of the missing values themselves and all variables influencing the process causing the missing data, even if they are not of interest in the substantive analysis" (Sterne et al., 2009, p. 159).

After imputations were complete and before analyses were conducted, post high school plans were recoded and subsamples created. The original variable ranged from −5 (*no further educational plans*) to 9 (*most selective college or university*). We assigned a missing value to the recoded variable if the response indicated no further plans or plans for education that did not involve a 2- or 4-year college. We retained plans to attend a 2-year college as the lowest level (coded as 0) and added this as the lowest level of the college selectivity variable.

Results

Descriptive Statistics and Preliminary Analyses

Table 1 provides descriptive statistics for the measures of early child care and all covariates for the recruitment sample of 1,364 children, the sample of 1,214 children who had any reported child care in the SECCYD study, the sample of 1,002 children at age 15, and the sample of 779 adolescents at the EOHS. Also shown in Table 1 are descriptive statistics for the four measures of academic standing and three measures of behavioral adjustment at the EOHS.

Table 2 reports Pearson correlations among the three child care parameters and the seven EOHS outcomes. Both higher child care quality and more center-type care were correlated with higher class rank, higher grades, more advanced coursework, and plans to attend more selective colleges. Amount of time in early child care was not correlated with the measures of EOHS academic standing or behavioral adjustment.

Table 2

Table 2

Pearson Correlations Among Early Child Care Variables and End of High School (EOHS) Outcomes

Variable	EOHS outcomes						
	Class rank	Grades	Advanced courses	College selectivity	Externalizing	Risk taking	Impulse control
EOHS outcomes							
Grades	.69***						
Advanced courses	.54***	.51***					
College selectivity	.49***	.48***	.49***				
Externalizing	−.22***	−.28***	−.09*	.02			
Risk taking	−.23***	−.28***	−.19***	−.10*	.60***		
Impulse control	.16***	.17***	.08*	.03	−.51***	−.44***	
Child care experiences							
Quality	.13***	.19***	.17***	.24***	.02	.01	−.03
Hours	−.00	.03	.02	−.04	.00	.06	−.05
Center care	.08*	.07*	.08*	.11*	−.04	.06	−.05

* $p < .05$. *** $p < .001$.

Pearson Correlations Among Early Child Care Variables and End of High School (EOHS) Outcomes

Are There Relations Between Early Child Care and Adolescent Outcomes at the EOHS?

We examined relations between early child care and adolescent functioning at the EOHS, controlling for extensive covariates. Table 3 shows the results from the regression analyses testing the associations among early child care quality, hours, type, and the seven EOHS outcomes and Appendix 2 provides the regression coefficients for all predictors in the model. All continuous variables (predictors and outcomes) were standardized to have a mean of 0 and a standard deviation of 1 within each imputation data set. Consequently, coefficients can be regarded as effect sizes, which are designated as *d* scores. Analyses were conducted in each of the 40 multiple imputation data sets, and results were combined across analyses in a manner that included variability within and between data sets.

Table 3

Table 3

Associations Between Early Child Care and End of High School Outcomes: Regression Coefficients From Analyses With Multiple Imputation

Predictors	Class rank *B* (*SE*)	Grades *B* (*SE*)	Advanced courses *B* (*SE*)	College selectivity *B* (*SE*)	Externalizing *B* (*SE*)	Risk taking *B* (*SE*)	Impulse control *B* (*SE*)
Model 1							
Quality	.07 (.04)	.12** (.04)	.05 (.03)	.12** (.04)	.03 (.04)	.07 (.04)	−.01 (.04)
Hours	−.07 (.04)	−.02 (.04)	−.07 (.04)	−.10* (.05)	.03 (.05)	.07 (.04)	−.06 (.04)
Center	.08* (.04)	.06 (.03)	.06 (.03)	.11** (.04)	−.04 (.04)	.06 (.04)	−.03 (.04)
Model 2							
Quality × Gender	.10 (.07)	.13 (.07)	.13* (.07)	−.05 (.08)	−.09 (.07)	−.05 (.07)	.09 (.08)
Quality: Female			−.08 (.07)				
Quality: Male			.05 (.03)				
Hours × Gender	.08 (.07)	.06 (.07)	−.12 (.07)	−.04 (.08)	−.02 (.08)	−.08 (.08)	.15 (.08)
Center × Gender	−.06 (.08)	−.10 (.07)	−.02 (.07)	.02 (.08)	.07 (.09)	.20* (.08)	−.22** (.08)
Center: Female						−.14* (.08)	.19* (.08)
Center: Male						.06 (.04)	−.03 (.04)

Note. Model 1 consists of main effects for child care variables, site, and child and family covariates. Model 2 adds interactions between child care variables and child gender. Analyses include 1,216 children with any child care reported.

* $p < .05$. ** $p < .01$.

Associations Between Early Child Care and End of High School Outcomes: Regression Coefficients From Analyses With Multiple Imputation

The tests of main effects of early child care indicate that both quality of early care and proportion of center care were positively related to academic standing at the EOHS. As shown in Table 3, adolescents whose early child care was of higher quality reported higher academic grades (d = .12, $p < .01$) and plans to attend more selective colleges (d = .12, $p < .01$), compared with adolescents whose early child care was of lower quality. In addition, adolescents who had more center-type child care reported higher class ranks (d = .08, $p < .05$) and plans to attend more selective colleges (d = .11, $p < .01$). Adolescents with fewer hours in child care reported plans to attend more selective colleges (d = −.11, $p < .05$). None of the early child care variables were related to the behavioral adjustment measures at the EOHS.

Next, we asked if relations between early child care (center-type, quality, hours) and EOHS outcomes were moderated by gender. Evidence of Quality × Gender and Center × Gender interactions emerged. The bottom half of Table 3 (Model 2) shows the results of those analyses, listing the interaction coefficients and the gender-specific coefficients when the interaction terms were statistically significant. Proportion of time in center care was differentially related to risk taking (d = .20, $p < .05$) and impulse control (d = −.22, $p < .05$). More epochs in center care was associated with less risk taking (d = −.14, $p < .05$) and greater impulse control (d = .19, $p < .05$) for females but not for males (d = .06 and −.03, respectively). Higher quality care was positively, but nonsignificantly, related to reports of number of advanced courses for males (d = .05, $p >$ .05) and negatively, but nonsignificantly, related for females (d = −.08, $p > .05$). No significant

interactions between early child care hours and gender were found for EOHS academic standing and behavioral functioning.

Robustness Checks

In a series of follow-up analyses, we asked if the same pattern of findings was obtained when we examined the data from the sample of children who received child care from nonrelatives (n = 1,074), the full recruitment sample (N = 1,364), and the sample with outcome data at the EOHS (n = 779).

In the first robustness check, analyses fit to 40 multiple imputation data sets were conducted for children with child care provided by nonrelatives (n = 1,074; see Tables 4 and 5). Main effects of child care quality, center-type care, and hours on academic standing were found, consistent with the primary analyses for children with any child care. The interactions between center-type care and gender for risk taking and impulse control also were consistent with the primary analyses.

Table 4

Table 4
Robustness Checks: Child Care Main Effects

Predictors	Class rank *B* (*SE*)	Grades *B* (*SE*)	Advanced courses *B* (*SE*)	College selectivity *B* (*SE*)	Externalizing *B* (*SE*)	Risk taking *B* (*SE*)	Impulse control *B* (*SE*)
			Any child care sample: Primary results				
Quality	.07 (.04)	**.12**(.04)**	.05 (.03)	**.12** (.04)**	.03 (.04)	.07 (.04)	−.01 (.04)
Hours	−.07 (.04)	−.02 (.04)	−.07 (.04)	**−.10* (.04)**	.03 (.05)	.07 (.04)	−.06 (.04)
Center	**.08*(.04)**	.06 (.03)	.06 (.03)	**.11** (.04)**	−.04 (.04)	.06 (.04)	−.03 (.04)
			Nonrelative care sample: Robustness Analysis 1				
Quality	.07 (.04)	**.12**(.04)**	.06 (.04)	**.12* (.05)**	.03 (.04)	.08 (.04)	−.01 (.04)
Hours	−.07 (.04)	−.02 (.04)	−.06 (.04)	**−.10* (.04)**	.03 (.04)	.06 (.04)	−.06 (.04)
Center	**.08*(.04)**	.06 (.04)	.07 (.03)	**.11** (.04)**	−.04 (.04)	.07 (.04)	−.03 (.04)
			Recruitment sample: Robustness Analysis 2				
Quality	.07 (.04)	**.12**(.04)**	.06 (.03)	**.13**(.04)**	.03 (.04)	.07 (.04)	−.00 (.04)
Hours	−.08 (.04)	−.03 (.04)	−.07 (.04)	**−.09*(.04)**	.02 (.04)	.06 (.04)	−.05 (.04)
Center	.07 (.04)	.05 (.04)	.06 (.03)	**.11**(.04)**	−.04 (.04)	.06 (.04)	−.03 (.04)
			EOHS sample (no imputation): Robustness Analysis 3				
Quality	.09 (.05)	**.13**(.05)**	.08 (.05)	**.22***(.05)**	.03 (.05)	.08 (.05)	−.04 (.05)
Hours	−.03 (.05)	.01 (.05)	−.04 (.05)	−.09 (.06)	.04 (.05)	.09 (.05)	−.04 (.05)
Center	.04 (.05)	.04 (.04)	.04 (.04)	**.12* (.05)**	−.04 (.05)	.08 (.05)	−.06 (.05)

Note. Bolded values are statistically significant.
$^{*}p < .05$. $^{**}p < .01$.

Robustness Checks: Child Care Main Effects

Table 5

Table 5
Robustness Checks: Child Care Interactions With Gender

Predictors	Class rank *B* (*SE*)	Grades *B* (*SE*)	Advanced courses *B* (*SE*)	College selectivity *B* (*SE*)	Externalizing *B* (*SE*)	Risk taking *B* (*SE*)	Impulse control *B* (*SE*)
			Child care sample: Primary analyses				
Quality × Gender	.10 (.08)	.13 (.07)	**.13* (.07)**	−.05 (.08)	−.09 (.08)	−.05 (.07)	.09 (.08)
Females			**−.08 (.07)**				
Male			**.05 (.03)**				
Hours × Gender	.08 (.07)	.06 (.07)	−.12 (.07)	−.04 (.08)	−.02 (.08)	−.08 (.08)	.15 (.08)
Center × Gender	−.06 (.08)	−.10 (.07)	−.02 (.07)	.02 (.08)	.07 (.09)	**.20* (.08)**	**−.22**(.08)**
Females						**−.14 (.09)**	**.19* (.09)**
Male						**.06 (.04)**	**−.03 (.04)**
			Nonrelative care sample: Robustness Check 1				
Quality × Gender	.05 (.04)	.06 (.03)	**.07* (.03)**	−.02 (.04)	−.04 (.04)	−.03 (.04)	.04 (.04)
Females			**.02 (.04)**				
Male			**.09* (.04)**				
Hours × Gender	.04 (.04)	.04 (.04)	−.05 (.03)	−.02 (.04)	−.02 (.04)	−.04 (.04)	.07 (.04)
Center × Gender	−.03 (.04)	−.04 (.04)	−.00 (.03)	.01 (.04)	.03 (.04)	**.09* (.04)**	**−.11*(.04)**
Females						**.02 (.04)**	**.02 (.04)**
Male						**.11* (.05)**	**−.09 (.05)**
			Recruitment sample: Robustness Check 2				
Quality × Gender	.05 (.04)	.06 (.03)	.06 (.03)	−.03 (.04)	−.04 (.04)	−.03 (.04)	.04 (.04)
Hours × Gender	.04 (.04)	.03 (.03)	−.05 (.03)	−.02 (.04)	−.01 (.04)	−.03 (.04)	.07 (.04)
Center × Gender	−.03 (.04)	−.04 (.04)	−.01 (.03)	.01 (.04)	.03 (.04)	**.09* (.04)**	**−.10**(.04)**
Females						**.02 (.04)**	**.02 (.04)**
Male						**.10 (.05)**	**−.08 (.04)**
			EOHS sample (non-imputed sample): Robustness Check 3				
Quality × Gender	.05 (.05)	**.09* (.04)**	.06 (.04)	−.07 (.05)	−.06 (.05)	−.04 (.05)	.07 (.05)
Females		**−.08 (.10)**					
Male		**.12 (.05)**					
Hours × Gender	.05 (.04)	.02 (.04)	−.06 (.04)	.01 (.05)	−.00 (.05)	−.01 (.04)	**.10* (.05)**
Females							**−.12* (.05)**
Male							**.02 (.05)**
Center × Gender	−.07 (.04)	−.08 (.04)	.00 (.04)	−.01 (.05)	.03 (.05)	.08 (.04)	**−.11** (.05)**
Females							**.19 (.10)**
Male							**−.07 (.05)**

Note. Bolded values are statistically significant.
* $p < .05$. ** $p < .01$.

Robustness Checks: Child Care Interactions With Gender

The second robustness check was conducted using the full recruitment sample. Here, the same models were fit to the 40 multiple imputation data sets that were based on data from all 1,364 children. As shown in Table 4, consistent with the primary analyses, we found quality main effects for academic grades and college selectivity and center and hours main effects for college selectivity. The interactions between center care and gender also were found for impulse control and risk taking (see Table 5).

For the third robustness check, analyses were conducted for the 779 participants with observed data at the EOHS. The analyses did not involve imputations for missing data as recommended as a robustness test by Sterne and colleagues (2009). Findings were similar to these obtained in the primary analyses: main effects of child care quality for academic grades and college selectivity, a center main effect for college selectivity, and Center × Gender interactions for impulse control. In addition, an Hours × Gender interaction was detected for impulse control in this analysis only.

Discussion

This latest installment of a 20-year longitudinal study found relations between early child care and adolescents' academic standing and behavioral adjustment at the EOHS. Quality, type, and hours of early child care were each related to adolescent functioning at this important developmental milestone. In particular, more experience in *center-type care* was linked to higher class ranks and plans to attend more selective colleges, and for females to less risk taking and greater impulse control. *Higher quality child care* predicted higher academic grades and plans to attend more selective colleges. *Fewer hours* of child care was associated with plans to attend more selective colleges.

Some of these findings harken back to earlier results reported in the SECCYD. Beginning at age 3 (NICHD ECCRN, 2000) and continuing at 4[1/2] years (NICHD ECCRN, 2002), elementary school (Belsky et al., 2007; NICHD ECCRN, 2005b), and again at age 15 (Vandell et al., 2010), higher quality child care consistently predicted higher performance on standardized academic and cognitive measures. Positive relations between center-type care and academic and cognitive performance also were observed during both early childhood and elementary school (NICHD ECCRN, 2002, 2005b). The findings at the EOHS indicate continuity between these earlier academic findings and academic standing at the EOHS.

The effects on academic standing at the EOHS were small but remarkably similar in size (.09-.12) to the earlier findings obtained in elementary school and at age 15, suggesting that effects of early child care are maintained across the K-12 period with respect to academic outcomes. These findings broaden and extend previous longitudinal studies of early childhood programs that focused on low-income children (Campbell et al., 2012; Duncan & Magnuson, 2013; Reynolds et al., 2011) by providing evidence that children from predominantly middle income families also appear to receive long-term benefits from school-like experiences in center care and from care that is of higher quality.

A topic that warrants further study is whether the associations between early child care and academic standing at the EOHS have implications for the study participants' later economic success. In the postindustrial phase of the American economy, stable jobs with benefits and wage growth have become harder to access, insecure jobs without prospects of advancement have proliferated, and options in between have narrowed. The premium placed on skilled workers has raised the returns of higher education to historic levels, altering the young adult transition in the process. The findings from the current study may contribute to discussions about the processes and pathways by which early childhood education is linked to adult outcomes for children from more advantaged backgrounds.

We also considered behavioral outcomes in the current study. At the EOHS, early child care was associated with positive behavioral findings for girls, relations not previously reported in the SECCYD. In particular, girls who had more experience in center-type care reported engaging in *fewer* risky behaviors and exhibiting better impulse control at the EOHS, relative to girls with less center-type care, whereas boys' experience of center-type care was less related to their behavioral outcomes. These moderated effects were replicated in all of the robustness checks. As the study participants are followed into young adulthood, it will be important to determine if these gender differences are maintained and support gender-differentiated pathways.

Finally, a link between amount or quantity of early child care and adolescent functioning at the EOHS was found. In this case, fewer hours of child care were related to plans to attend more selective colleges. Hours were not consistently related to behavioral outcomes at the EOHS. These findings are at odds from the SECCYD reports at earlier ages when higher hours of care were linked to more externalizing behaviors, but not to academic outcomes. They are, however, with consistent with the longitudinal research by Masten and colleagues (2005) who observed developmental cascades in which higher externalizing behaviors in middle childhood predicted lower academic competence in adolescence. In future follow-up research of the SECCYD sample, it will be important to assess whether lower academic competencies at the EOHS is related to more internalizing problems during adulthood, a second developmental cascade observed by Masten.

The EOHS findings underscore a general point about the need for longitudinal follow-up studies of early child care in the SECCYD sample and other studies. Identification of the developmental course of early effects of early child care—whether they persist, fade away, and perhaps reemerge—requires following samples over long periods of time. The longitudinal follow-up studies of the Perry Preschool Project, the Abecedarian Project, and the Chicago Child-Parent

Center in the early education area and the Dunedin Study and Minnesota Study in area of developmental psychology have all demonstrated the value of these efforts.

Several limitations must be considered when interpreting the results of this study. First, the number of adolescents who responded to the EOHS Web based survey was only about 60% of the original participants, and the EOHS sample was more privileged. However, multiple imputation allowed us to study the full child care sample and the relatively high correlations between early and later outcomes and covariates allowed for relatively precise imputation. In addition, in our robustness checks, we tested whether the child care effects were found for the full recruitment sample and for the smaller EOHS sample, as well as the sample of children who received child care. The consistency of the findings associated with child care quality, type, and hours provide some confidence in the reported results for this sample. A second limitation is that the SECCYD sample is not nationally representative. Nonetheless, the findings are informative about long-term effects of routine child care for children from predominantly middle class families. Finally, because of the SECCYD's correlational design, there can be concerns about differential selection into child care and possible omitted variables. At the EOHS, as at earlier ages, we included many covariates, especially a large number of family characteristics, to reduce these sources of bias.

In conclusion, this latest follow-up study from the NICHD SECCYD reports relations between early child care and academic standing and behavioral functioning at the EOHS. Experiences in center-type care and in higher quality care were consistently linked to higher academic standing as measured by class rank, advanced coursework, academic grades, and admission to more selective colleges. Higher hours of early care were related to plans to attend less selective colleges. Consistent evidence of gender moderation also was detected, with more center-type early care being advantageous for girls' behavioral functioning. In future research with the SECCYD sample, it will be important to examine the practical importance of the link between early child care and high school grades, advanced coursework, class rank, and attendance at more selective colleges for future life opportunities, including college persistence, college degrees, and future earnings.

Appendix A

Descriptive Statistics for Males and Females at the End of High School (EOHS)

Appendix 1

Descriptive Statistics for Males and Females at the End of High School (EOHS)

	Males			Females		
Variables	*n*	*M*	*SD*	*n*	*M*	*SD*
Child care						
Quality	520	2.88	.44	485	2.90	.46
Hours	621	16.43	14.12	593	16.53	14.10
Center	621	.21	.26	593	.21	.25
EOHS outcomes						
Class rank	367	3.31	1.08	391	3.59	.07
Grades	374	5.11	1.57	401	5.70	1.31
Advanced courses	370	3.34	2.93	399	3.77	3.01
College selectivity	237	3.73	1.83	310	3.80	1.82
Externalizing	366	51.92	10.70	400	49.70	9.54
Risk taking	367	.31	.23	401	.20	.16
Impulse control	359	3.64	.84	397	3.76	.83

Appendix B

Regression Results: Regression Coefficients from Analyses With Multiple Imputation

Appendix 2

Regression Results: Regression Coefficients from Analyses With Multiple Imputation

Predictors	Class rank *B* (*SE*)	Grades *B* (*SE*)	Advanced courses *B* (*SE*)	College selectivity *B* (*SE*)	Externalizing *B* (*SE*)	Risk taking *B* (*SE*)	Impulse control *B* (*SE*)
Child care							
Quality	.07 (.04)	.12** (.04)	.05 (.03)	.12** (.04)	.03 (.04)	.07 (.04)	−.01 (.04)
Hours	−.07 (.04)	−.02 (.04)	−.07 (.04)	−.10* (.04)	.03 (.05)	.07 (.04)	−.06 (.04)
Center %	.08* (.04)	.06 (.03)	.06 (.03)	.11** (.04)	−.04 (.04)	.06 (.04)	−.03 (.04)
Covariates							
Site	*ns*	*ns*	*ns*	***	*ns*	*ns*	*ns*
Sex (male = 1)	−.23*** (.06)	−.36*** (.06)	−.13* (.06)	−.03 (.07)	.19** (.07)	.47*** (.06)	−.12 (.07)
Race							
Black	.07 (.14)	−.27* (.15)	−.02 (.12)	−.10 (.17)	−.28* (.16)	−.45** (.14)	.15 (.16)
Hispanic	−.10 (.15)	−.07 (.14)	.15 (.14)	.02 (.17)	.18 (.15)	−.03 (.16)	−.29 (.16)
Other	.02 (.15)	−.10 (.14)	.02 (.14)	.33* (.17)	.17 (.16)	−.11 (.15)	−.10 (.16)
Maternal education	.08 (.05)	.18*** (.04)	.16*** (.04)	.19*** (.05)	−.04 (.05)	−.11* (.05)	.02 (.05)
Maternal vocabulary	.15** (.05)	.04 (.04)	.13** (.04)	.09 (.05)	.13** (.05)	.03 (.05)	−.12* (.05)
Maternal adjustment	.02 (.04)	.02 (.04)	−.00 (.04)	.01 (.05)	−.06 (.04)	−.07 (.04)	.05 (.05)
Maternal depression, 0 to 5 years	.03 (.05)	.02 (.05)	.04 (.05)	.08 (.06)	−.08 (.05)	−.08 (.05)	.05 (.05)
Maternal sensitivity, 0 to 5 years	.04 (.05)	−.01 (.05)	.03 (.04)	.05 (.05)	.01 (.05)	.01 (.05)	−.02 (.06)
Income, 0 to 5 years	.12* (.07)	.05 (.06)	.12* (.06)	.09 (.07)	−.00 (.06)	−.04 (.07)	−.01 (.07)
Two parents, 0 to 5 years	−.02 (.05)	.02 (.05)	.02 (.04)	−.05 (.06)	−.05 (.05)	−.04 (.05)	−.06 (.06)
Maternal depression, kindergarten through Grade 6	.05 (.05)	.04 (.04)	−.03 (.04)	−.04 (.05)	.01 (.05)	.02 (.04)	−.01 (.05)
Maternal sensitivity, kindergarten through Grade 6	−.00 (.05)	.02 (.04)	.04 (.04)	.01 (.06)	−.14** (.06)	−.14* (.05)	.18** (.06)
Income, kindergarten through Grade 6	−.03 (.08)	.10 (.07)	.04 (.07)	.04 (.08)	.05 (.08)	.06 (.09)	.06 (.08)
Two parents, kindergarten through Grade 6	.11* (.05)	.08 (.05)	.04 (.05)	.09 (.11)	−.03 (.06)	.05 (.05)	.01 (.05)
Classroom quality, Grade 1 through Grade 5	.05 (.04)	.08* (.03)	.05 (.04)	.00 (.05)	.00 (.04)	.01 (.04)	.03 (.04)
Maternal depression, age 15 years	−.10** (.04)	−.14*** (.04)	.01 (.04)	−.04 (.05)	.11* (.04)	.05 (.04)	−.07 (.04)
Maternal sensitivity, age 15 years	.04 (.04)	.05 (.04)	.02 (.04)	.03 (.05)	−.04 (.04)	−.06 (.04)	.13** (.04)
Income, age 15 years	−.00 (.06)	−.08 (.06)	.01 (.06)	.03 (.06)	−.07 (.06)	−.01 (.06)	−.03 (.06)
Two parents, age 15 years	−.02 (.04)	.02 (.04)	.06 (.04)	−.03 (.05)	−.08 (.05)	−.11* (.04)	.06 (.05)

Note. Analyses include 1,214 children with any child care reported.
* $p < .05$. ** $p < .01$. *** $p < .001$.

References

1. Achenbac, T. M. (1991). Manual for the Child Behavior Checklist/4-18. Burlington, VT: Author.
2. Achenbach, T. M., & Rescorla, L. (2001). Manual for the ASEBA (Achenbach System of Empirically-Based Assessment) School-Age Forms and Profiles. Burlington, VT: University of Vermont, Department of Psychiatry, Research Center for Children, Youth, and Families.
3. Allison, P. (2000). Sociological Methods & Research.
4. Bailey, T., Jeong, D. W., & Cho, S.-W. (2010). Economics of Education Review.
5. Belsky, J., Vandell, D. L., Burchinal, M., Clarke-Stewart, K. A., McCartney, K., & Owen, M. T. (2007). Child Development.
6. Bongers, I. L., Koot, H. M., van der Ende, J., & Verhulst, F. C. (2004). Child Development.
7. Bowen, W. G., & Bok, D. (1998). The shape of the river: Long-term consequences of considering race in college and university admissions. Princeton, NJ: Princeton University Press.
8. Buchmann, C., & DiPrete, T. (2006). American Sociological Review.
9. Burchinal, M. R., Lowe Vandell, D., & Belsky, J. (2014). Developmental Psychology.
10. Burchinal, M., Magnuson, K., Powell, D., Hong, S. S., Lerner, R. M., Bornstein, M., & Leventhal, T. (Ed. in Chief) (2015). Ecological settings and processes. Hoboken, NJ: Wiley.
11. Byrnes, J. P., Miller, D. C., & Schafer, W. D. (1999). Psychological Bulletin.
12. Caldwell, B. M., & Bradley, R. H. (1984). Home observation of the environment. Little Rock, AR: University of Arkansas at Little Rock.
13. Camilli, G., Vargas, S., Ryan, S., & Barnett, W. S. (2010). Teachers College Record.
14. Campbell, F. A., Pungello, E. P., Burchinal, M., Kainz, K., Pan, Y., Wasik, B. H., & Ramey, C. T. (2012). Developmental Psychology.
15. Duncan, G. J., & Magnuson, K. (2013). The Journal of Economic Perspectives.
16. Duncan, G. J. (2003). Child Development.
17. Halpern-Felsher, B. L., Millstein, S. G., Ellen, J. M., Adler, N. E., Tschann, J. M., & Biehl, M. (2001). Health Psychology.
18. Kuncel, N. R., Crede, M., & Thomas, L. L. (2005). Review of Educational Research.
19. Massey, D. S., Charles, C. Z., Lundy, G. F., & Fischer, M. (2003). The source of the river: The social origins of freshmen at America's selective colleges and universities. Princeton, NJ: Princeton University Press.

20. Masten, A. S., Roisman, G. I., Long, J. D., Burt, K. B., Obradovic, J., Riley, J. R., & Tellegen, A. (2005). Developmental Psychology.
21. McCartney, K., Burchinal, M., Clarke-Stewart, A., Bub, K. L., Owen, M. T., & Belsky, J. (2010). Developmental Psychology.
22. McGue, M., & Iacono, W. G. (2005). The American Journal of Psychiatry.
23. Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, L., Hancox, R. J., Harrington, H. L., & Caspi, A. (2011). Proceedings of the National Academy of Sciences.
24. (2000). Child Development.
25. (2002). American Educational Research Journal.
26. (2005a). Child care and child development. New York, NY: Guilford Press.
27. (2005b). American Educational Research Journal.
28. Nores, M., & Barnett, W. S. (2010). Economics of Education Review.
29. Ou, S.-R., & Reynolds, A. J. (2010). Children and Youth Services Review.
30. Pianta, R. C., Barnett, W. S., Burchinal, M., & Thornburg, K. R. (2009). Psychological Science in the Public Interest.
31. Reynolds, A. J., Temple, J. A., Ou, S.-R., Arteaga, I. A., & White, B. A. (2011). Science.
32. Rosenbaum, J. E. (2001). Beyond college for all: Career paths for the forgotten half. New York, NY: Russell Sage Foundation.
33. Schafer, J. L. (1997). Imputation of missing covariates under a multivariate linear mixed model.
34. Sterne, J. A., White, I. R., Carlin, J. B., Spratt, M., Royston, P., Kenward, M. G., & Carpenter, J. R. (2009). British Medical Journal.
35. Tout, K., Starr, R., Soli, M., Moodie, S., Kirby, G., & Boller, K. (2010). Compendium of quality rating systems and evaluations. Washington, DC: Mathematica Policy Research and Child Trends.
36. Vandell, D. L., Belsky, J., Burchinal, M., Steinberg, L., & Vandergrift, N. (2010). Child Development.
37. Voyer, D., & Voyer, S. D. (2014). Psychological Bulletin.
38. Weinberger, D. A., & Schwartz, G. E. (1990). Journal of Personality.
39. Woodcock, R. W., & Johnson, M. B. (1990). Tests of achievement, WJ-R: Examiner's manual. Allen, TX: DLM Teaching Resources.
40. Zimmerman, I. L., Steiner, V. G., & Pond, R. E (1979). Preschool language scale. San Antonio, TX: The Psychological Corporation.
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Address for Correspondence:
Deborah Lowe Vandell, School of Education, University of California, Irvine, Irvine CA 92697
Email: dvandell@uci.edu

Table 1

Table 1
Descriptive Characteristics of the SECCYD Recruitment, Child Care, Age 15 Years, and EOHS Samples

Variables	Sample											
	Recruitment			Child care			Age 15 years			EOHS		
	n	*M*%	*SD*	*n*	*M*%	*SD*	*n*	*M*%	*SD*	*n*	*M*%	*SD*
Child and family characteristics												
Mother's education	1,363	14.23	2.51	1,214	*14.37*[*]	2.47	1003	*14.45*[*]	2.45	778	*14.73*[*a]	2.42
Maternal vocabulary	1,167	99.01	18.35	1,150	*99.25*[*]	18.28	946	*99.78*[*]	18.47	739	*101.9*[*a]	18.50
Maternal psychological adjustment	1,272	59.00	13.95	1,192	*59.25*[*]	13.87	976	59.04	13.65	762	*59.73*[*a]	13.64
Child gender (male = 1)	1,364	.52		1,214	.51		1003	.50		778	*.48*[*a]	
Child race/ethnicity	1,364			1,214			1003			778		
White		.76			*.78*[*]			.76			*.81*[*a]	
Black		.13			*.11*[*]			.12			*.08*[*a]	
Hispanic		.06			.06			.06			.06	
Other		.05			.05			.05			.05	
Family income/needs, 6 to 54 months	1,302	3.60	2.85	1,212	*3.65*[*]	2.79	996	*3.70*[*]	2.76	774	*3.87*[a]	2.72
Two-parent epochs, 6 to 54 months	1,305	.84	.32	1,214	*.85*	.31	997	.85	.31	775	*.88*[*a]	.28
Maternal depression, 6 to 54 months	1,304	9.36	6.76	1,214	*9.25*[*]	6.52	997	9.40	6.54	775	*9.14*[a]	6.48
HOME total, 6 to 54 months	1,305	.80	.09	1,214	.81	.09	997	.81	.09	775	.82	.08
Maternal sensitivity, 6 to 54 months	1,306	5.01	.69	1,214	5.00	.65	997	5.01	.66	775	*5.10*[*a]	.62
Family income/needs, kindergarten to Grade 6	1,140	4.19	3.37	1,106	4.18	3.25	1000	4.21	3.42	776	*4.51*[*]	3.43
Two-parent epochs, kindergarten to Grade 6	1,154	.81	.34	1,119	*.81*[*]	.33	1003	.81	.33	778	*.84*[a]	.32
Maternal depression, kindergarten to Grade 6	1,123	8.74	7.32	1,089	8.68	7.16	1000	8.81	7.27	778	*8.39*[*a]	6.96
HOME total, Grade 1 through Grade 5	1,063	.78	.10	1,031	*.78*[*]	.09	983	.78	.09	767	.79	.09
Maternal sensitivity, Grade 1 through Grade 5	1,114	5.51	.75	1,082	5.52	.75	992	5.53	.73	774	*5.61*[a]	.69
Family income/needs, age 15 years	924	5.26	5.79	897	5.28	5.75	924	5.26	5.79	726	5.45	5.45
Two-parent epochs, age 15 years	979	.77	.42	950	*.78*[*]	.42	979	.77	.42	759	*.79*[a]	.41
Maternal depression, age 15 years	973	10.48	9.83	944	10.39	9.69	973	*10.48*[*]	9.83	760	*9.97*[*a]	9.43
HOME total, age 15 years	957	.83	.12	929	.84	.11	957	.83	.12	747	*.85*[*a]	.11
Maternal sensitivity, age 15 years	898	4.45	.72	871	4.44	.73	898	4.45	.72	708	*4.48*[a]	.70
Child care experience, 1 to 54 months												
Quality nonrelative care	1,005	2.90	.45	961	2.91	.44	813	*2.91*	.45	639	*2.93*[*]	.44
Hours/week in nonrelative care	1,214	16.48	14.16	1,214	16.48	14.16	973	16.67	14.15	761	16.81	14.21
Proportion of time in center care	1,214	.21	.26	1,214	.21	.26	973	.21	.25	761	.21	.26
Classroom quality Grade 1 through Grade 5	1,100	3.27	.32	1,069	3.27	.32	977	3.26	.31	759	*3.29*[*]	.29
Child functioning												
WJR Letter−Word, 54 months	1,056	98.93	13.52	1,048	*99.01*[*]	13.47	917	99.16	13.39	725	*100.1*[*a]	13.14
WJR Applied Problems, 54 months	1,053	102.9	15.63	1,045	*103.1*[*]	15.58	914	*103.6*[*]	15.36	723	*105.1*[*a]	15.14
PLS Language, 54 months	1,064	98.34	19.92	1,056	*98.56*[*]	19.83	920	*99.07*[*]	19.84	723	*101.1*[*a]	19.44
CBCL Externalizing, 54 months	1,061	51.69	9.39	1,051	51.65	9.40	922	51.79	9.44	731	*51.31*[a]	9.52
WJR Picture Vocabulary, age 15 years	889	99.93	14.77	866	99.99	14.75	889	99.93	14.77	704	*101.5*[*a]	14.41
WJR Applied Problems, age 15 years	887	102.9	14.22	864	103.0	14.06	887	102.9	14.22	701	*104.5*[*a]	14.45
WJR Passage Comprehension, age 15 years	887	107.7	15.72	865	107.8	15.69	887	107.7	15.72	705	*109.4*[*a]	15.57
YSR Externalizing, age 15 years	956	49.31	9.91	928	49.25	9.89	956	49.31	9.91	749	*48.96*[*a]	9.82
Impulse control, age 15 years	957	3.51	.90	929	3.51	.90	957	3.51	.90	749	*3.55*[*a]	.91
Risk-taking Index, age 15 years	957	.18	.18	929	*.18*[*]	.17	957	.18	.18	749	*.16*[*a]	.15
EOHS class rank (5 = *high*, 1 = *low*)	758	3.46	1.04	741	3.46	1.03	752	3.46	1.04	758	3.46	1.04
EOHS typical grades (8 = *high*, 1 = *low*)	775	5.42	1.47	758	5.42	1.47	769	5.41	1.47	775	5.42	1.47
EOHS advanced coursework	769	3.56	2.98	752	3.57	2.97	763	3.56	2.98	769	3.56	2.98
EOHS college selectivity	547	3.56	2.98	536	3.77	1.82	541	3.78	1.83	547	3.77	1.82
EOHS Externalizing	766	50.76	10.17	750	50.71	10.21	760	50.76	10.19	766	50.76	10.17
EOHS Risk-Taking Index	768	.25	.21	752	.25	.21	762	.25	.21	768	.25	.21
EOHS Impulse Control	756	3.70	.83	742	3.71	.83	750	3.70	.83	756	3.70	.83
Site				[*]						[a*]		

Note. HOME = Home Observation of the Environment (Caldwell & Bradley, 1984); WJR = Woodcock-Johnson Revised (Woodcock & Johnson, 1990); PLS = Preschool Language Scale (Zimmerman, Steiner, & Pond, 1979); CBCL = Child Behavior Checklist (Achenbach, 1991). We compared the recruitment sample with the child care, age 15, and end of high school (EOHS) samples. Significant differences between the recruitment sample and these subsamples are indicated with italicized mean scores.

[a] Each significant difference between the 15-year and EOHS subsamples.

[*] $p < .05$.

Table 2

Table 2
Pearson Correlations Among Early Child Care Variables and End of High School (EOHS) Outcomes

Variable	EOHS outcomes						
	Class rank	Grades	Advanced courses	College selectivity	Externalizing	Risk taking	Impulse control
EOHS outcomes							
Grades	.69***						
Advanced courses	.54***	.51***					
College selectivity	.49***	.48***	.49***				
Externalizing	−.22***	−.28***	−.09*	.02			
Risk taking	−.23***	−.28***	−.19***	−.10*	.60***		
Impulse control	.16***	.17***	.08*	.03	−.51***	−.44***	
Child care experiences							
Quality	.13***	.19***	.17***	.24***	.02	.01	−.03
Hours	−.00	.03	.02	−.04	.00	.06	−.05
Center care	.08*	.07*	.08*	.11*	−.04	.06	−.05

* $p < .05$. *** $p < .001$.

Table 3

Table 3
Associations Between Early Child Care and End of High School Outcomes: Regression Coefficients From Analyses With Multiple Imputation

Predictors	Class rank *B* (*SE*)	Grades *B* (*SE*)	Advanced courses *B* (*SE*)	College selectivity *B* (*SE*)	Externalizing *B* (*SE*)	Risk taking *B* (*SE*)	Impulse control *B* (*SE*)
Model 1							
Quality	.07 (.04)	.12** (.04)	.05 (.03)	.12** (.04)	.03 (.04)	.07 (.04)	−.01 (.04)
Hours	−.07 (.04)	−.02 (.04)	−.07 (.04)	−.10* (.05)	.03 (.05)	.07 (.04)	−.06 (.04)
Center	.08* (.04)	.06 (.03)	.06 (.03)	.11** (.04)	−.04 (.04)	.06 (.04)	−.03 (.04)
Model 2							
Quality × Gender	.10 (.07)	.13 (.07)	.13* (.07)	−.05 (.08)	−.09 (.07)	−.05 (.07)	.09 (.08)
Quality: Female			−.08 (.07)				
Quality: Male			.05 (.03)				
Hours × Gender	.08 (.07)	.06 (.07)	−.12 (.07)	−.04 (.08)	−.02 (.08)	−.08 (.08)	.15 (.08)
Center × Gender	−.06 (.08)	−.10 (.07)	−.02 (.07)	.02 (.08)	.07 (.09)	.20* (.08)	−.22** (.08)
Center: Female						−.14* (.08)	.19* (.08)
Center: Male						.06 (.04)	−.03 (.04)

Note. Model 1 consists of main effects for child care variables, site, and child and family covariates. Model 2 adds interactions between child care variables and child gender. Analyses include 1,216 children with any child care reported.
* $p < .05$. ** $p < .01$.

Table 4

Table 4
Robustness Checks: Child Care Main Effects

Predictors	Class rank *B* (*SE*)	Grades *B* (*SE*)	Advanced courses *B* (*SE*)	College selectivity *B* (*SE*)	Externalizing *B* (*SE*)	Risk taking *B* (*SE*)	Impulse control *B* (*SE*)
Any child care sample: Primary results							
Quality	.07 (.04)	**.12**(.04)**	.05 (.03)	**.12** (.04)**	.03 (.04)	.07 (.04)	−.01 (.04)
Hours	−.07 (.04)	−.02 (.04)	−.07 (.04)	**−.10* (.04)**	.03 (.05)	.07 (.04)	−.06 (.04)
Center	**.08*(.04)**	.06 (.03)	.06 (.03)	**.11** (.04)**	−.04 (.04)	.06 (.04)	−.03 (.04)
Nonrelative care sample: Robustness Analysis 1							
Quality	.07 (.04)	**.12**(.04)**	.06 (.04)	**.12* (.05)**	.03 (.04)	.08 (.04)	−.01 (.04)
Hours	−.07 (.04)	−.02 (.04)	−.06 (.04)	**−.10* (.04)**	.03 (.04)	.06 (.04)	−.06 (.04)
Center	**.08*(.04)**	.06 (.04)	.07 (.03)	**.11** (.04)**	−.04 (.04)	.07 (.04)	−.03 (.04)
Recruitment sample: Robustness Analysis 2							
Quality	.07 (.04)	**.12**(.04)**	.06 (.03)	**.13**(.04)**	.03 (.04)	.07 (.04)	−.00 (.04)
Hours	−.08 (.04)	−.03 (.04)	−.07 (.04)	**−.09*(.04)**	.02 (.04)	.06 (.04)	−.05 (.04)
Center	.07 (.04)	.05 (.04)	.06 (.03)	**.11**(.04)**	−.04 (.04)	.06 (.04)	−.03 (.04)
EOHS sample (no imputation): Robustness Analysis 3							
Quality	.09 (.05)	**.13**(.05)**	.08 (.05)	**.22***(.05)**	.03 (.05)	.08 (.05)	−.04 (.05)
Hours	−.03 (.05)	.01 (.05)	−.04 (.05)	−.09 (.06)	.04 (.05)	.09 (.05)	−.04 (.05)
Center	.04 (.05)	.04 (.04)	.04 (.04)	**.12* (.05)**	−.04 (.05)	.08 (.05)	−.06 (.05)

Note. Bolded values are statistically significant.
$^{*}p < .05$. $^{**}p < .01$.

Table 5

Table 5
Robustness Checks: Child Care Interactions With Gender

Predictors	Class rank *B* (*SE*)	Grades *B* (*SE*)	Advanced courses *B* (*SE*)	College selectivity *B* (*SE*)	Externalizing *B* (*SE*)	Risk taking *B* (*SE*)	Impulse control *B* (*SE*)
Child care sample: Primary analyses							
Quality × Gender	.10 (.08)	.13 (.07)	**.13* (.07)**	−.05 (.08)	−.09 (.08)	−.05 (.07)	.09 (.08)
Females			**−.08 (.07)**				
Male			**.05 (.03)**				
Hours × Gender	.08 (.07)	.06 (.07)	−.12 (.07)	−.04 (.08)	−.02 (.08)	−.08 (.08)	.15 (.08)
Center × Gender	−.06 (.08)	−.10 (.07)	−.02 (.07)	.02 (.08)	.07 (.09)	**.20* (.08)**	**−.22**(.08)**
Females						**−.14 (.09)**	**.19* (.09)**
Male						**.06 (.04)**	**−.03 (.04)**
Nonrelative care sample: Robustness Check 1							
Quality × Gender	.05 (.04)	.06 (.03)	**.07* (.03)**	−.02 (.04)	−.04 (.04)	−.03 (.04)	.04 (.04)
Females			**.02 (.04)**				
Male			**.09* (.04)**				
Hours × Gender	.04 (.04)	.04 (.04)	−.05 (.03)	−.02 (.04)	−.02 (.04)	−.04 (.04)	.07 (.04)
Center × Gender	−.03 (.04)	−.04 (.04)	−.00 (.03)	.01 (.04)	.03 (.04)	**.09* (.04)**	**−.11*(.04)**
Females						**.02 (.04)**	**.02 (.04)**
Male						**.11* (.05)**	**−.09 (.05)**
Recruitment sample: Robustness Check 2							
Quality × Gender	.05 (.04)	.06 (.03)	.06 (.03)	−.03 (.04)	−.04 (.04)	−.03 (.04)	.04 (.04)
Hours × Gender	.04 (.04)	.03 (.03)	−.05 (.03)	−.02 (.04)	−.01 (.04)	−.03 (.04)	.07 (.04)
Center × Gender	−.03 (.04)	−.04 (.04)	−.01 (.03)	.01 (.04)	.03 (.04)	**.09* (.04)**	**−.10**(.04)**
Females						**.02 (.04)**	**.02 (.04)**
Male						**.10 (.05)**	**−.08 (.04)**
EOHS sample (non-imputed sample): Robustness Check 3							
Quality × Gender	.05 (.05)	**.09* (.04)**	.06 (.04)	−.07 (.05)	−.06 (.05)	−.04 (.05)	.07 (.05)
Females		**−.08 (.10)**					
Male		**.12 (.05)**					
Hours × Gender	.05 (.04)	.02 (.04)	−.06 (.04)	.01 (.05)	−.00 (.05)	−.01 (.04)	**.10* (.05)**
Females							**−.12* (.05)**
Male							**.02 (.05)**
Center × Gender	−.07 (.04)	−.08 (.04)	.00 (.04)	−.01 (.05)	.03 (.05)	.08 (.04)	**−.11** (.05)**
Females							**.19 (.10)**
Male							**−.07 (.05)**

Note. Bolded values are statistically significant.
$^{*}p < .05$. $^{**}p < .01$.

Appendix 1

Appendix 1

Descriptive Statistics for Males and Females at the End of High School (EOHS)

Variables	Males			Females		
	n	*M*	*SD*	*n*	*M*	*SD*
Child care						
Quality	520	2.88	.44	485	2.90	.46
Hours	621	16.43	14.12	593	16.53	14.10
Center	621	.21	.26	593	.21	.25
EOHS outcomes						
Class rank	367	3.31	1.08	391	3.59	.07
Grades	374	5.11	1.57	401	5.70	1.31
Advanced courses	370	3.34	2.93	399	3.77	3.01
College selectivity	237	3.73	1.83	310	3.80	1.82
Externalizing	366	51.92	10.70	400	49.70	9.54
Risk taking	367	.31	.23	401	.20	.16
Impulse control	359	3.64	.84	397	3.76	.83

Appendix 2

Appendix 2

Regression Results: Regression Coefficients from Analyses With Multiple Imputation

Predictors	Class rank *B* (*SE*)	Grades *B* (*SE*)	Advanced courses *B* (*SE*)	College selectivity *B* (*SE*)	Externalizing *B* (*SE*)	Risk taking *B* (*SE*)	Impulse control *B* (*SE*)
Child care							
Quality	.07 (.04)	.12** (.04)	.05 (.03)	.12** (.04)	.03 (.04)	.07 (.04)	−.01 (.04)
Hours	−.07 (.04)	−.02 (.04)	−.07 (.04)	−.10* (.04)	.03 (.05)	.07 (.04)	−.06 (.04)
Center %	.08* (.04)	.06 (.03)	.06 (.03)	.11** (.04)	−.04 (.04)	.06 (.04)	−.03 (.04)
Covariates							
Site	*ns*	*ns*	*ns*	***	*ns*	*ns*	*ns*
Sex (male = 1)	−.23*** (.06)	−.36*** (.06)	−.13* (.06)	−.03 (.07)	.19** (.07)	.47*** (.06)	−.12 (.07)
Race							
Black	.07 (.14)	−.27* (.15)	−.02 (.12)	−.10 (.17)	−.28* (.16)	−.45** (.14)	.15 (.16)
Hispanic	−.10 (.15)	−.07 (.14)	.15 (.14)	.02 (.17)	.18 (.15)	−.03 (.16)	−.29 (.16)
Other	.02 (.15)	−.10 (.14)	.02 (.14)	.33* (.17)	.17 (.16)	−.11 (.15)	−.10 (.16)
Maternal education	.08 (.05)	.18*** (.04)	.16*** (.04)	.19*** (.05)	−.04 (.05)	−.11* (.05)	.02 (.05)
Maternal vocabulary	.15** (.05)	.04 (.04)	.13** (.04)	.09 (.05)	.13** (.05)	.03 (.05)	−.12* (.05)
Maternal adjustment	.02 (.04)	.02 (.04)	−.00 (.04)	.01 (.05)	−.06 (.04)	−.07 (.04)	.05 (.05)
Maternal depression, 0 to 5 years	.03 (.05)	.02 (.05)	.04 (.05)	.08 (.06)	−.08 (.05)	−.08 (.05)	.05 (.05)
Maternal sensitivity, 0 to 5 years	.04 (.05)	−.01 (.05)	.03 (.04)	.05 (.05)	.01 (.05)	.01 (.05)	−.02 (.06)
Income, 0 to 5 years	.12* (.07)	.05 (.06)	.12* (.06)	.09 (.07)	−.00 (.06)	−.04 (.07)	−.01 (.07)
Two parents, 0 to 5 years	−.02 (.05)	.02 (.05)	.02 (.04)	−.05 (.06)	−.05 (.05)	−.04 (.05)	−.06 (.06)
Maternal depression, kindergarten through Grade 6	.05 (.05)	.04 (.04)	−.03 (.04)	−.04 (.05)	.01 (.05)	.02 (.04)	−.01 (.05)
Maternal sensitivity, kindergarten through Grade 6	−.00 (.05)	.02 (.04)	.04 (.04)	.01 (.06)	−.14** (.06)	−.14* (.05)	.18** (.06)
Income, kindergarten through Grade 6	−.03 (.08)	.10 (.07)	.04 (.07)	.04 (.08)	.05 (.08)	.06 (.09)	.06 (.08)
Two parents, kindergarten through Grade 6	.11* (.05)	.08 (.05)	.04 (.05)	.09 (.11)	−.03 (.06)	.05 (.05)	.01 (.05)
Classroom quality, Grade 1 through Grade 5	.05 (.04)	.08* (.03)	.05 (.04)	.00 (.05)	.00 (.04)	.01 (.04)	.03 (.04)
Maternal depression, age 15 years	−.10** (.04)	−.14*** (.04)	.01 (.04)	−.04 (.05)	.11* (.04)	.05 (.04)	−.07 (.04)
Maternal sensitivity, age 15 years	.04 (.04)	.05 (.04)	.02 (.04)	.03 (.05)	−.04 (.04)	−.06 (.04)	.13** (.04)
Income, age 15 years	−.00 (.06)	−.08 (.06)	.01 (.06)	.03 (.06)	−.07 (.06)	−.01 (.06)	−.03 (.06)
Two parents, age 15 years	−.02 (.04)	.02 (.04)	.06 (.04)	−.03 (.05)	−.08 (.05)	−.11* (.04)	.06 (.05)

Note. Analyses include 1,214 children with any child care reported.
* $p < .05$. ** $p < .01$. *** $p < .001$.