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The Long-Term Impact of Natural Mentoring Relationships: A Counterfactual Analysis

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Highlights

- Among the first studies to use counterfactual analysis to examine the impact of natural mentoring.
- To our knowledge, the first natural mentoring study to examine outcomes beyond early adulthood.
- Highlighted differential impact of weak- and strong-tie mentors.
- Results provide strong rationale for practice/policy implementations to promote natural mentoring.

Abstract Previous research suggests that youth's natural mentoring relationships are associated with better academic, vocational, and psychosocial functioning. However, little is known about the extent to which the impact of mentoring endures beyond adolescence and early adulthood. Furthermore, most natural mentoring research is confounded by selection bias. In this study, we examined the long-term impact of mentoring using the nationally representative, longitudinal Add Health dataset. We conducted counterfactual analysis, a more stringent test of causality than regression-based approaches. Compared to their unmentored counterparts, adults (ages 33–42) who had a natural mentor during adolescence or emerging adulthood reported higher educational attainment, more time spent volunteering, and more close friends, after controlling for a range of confounding factors. However, outcomes differed when mentors were classified as "strong ties" (e.g., grandparents, friends) or "weak ties" (e.g., teachers, coaches, employers). Having a strong-tie mentor was associated with having more close friends and a lower income. In contrast, having a weak-tie mentor was associated with higher educational attainment, higher income, and more time spent volunteering. These findings suggest that natural mentoring relationships can exert lasting influence on young people's developmental trajectories, providing strong rationale for efforts to expand their availability and scope.

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Introduction

Natural mentors are caring, nonparent adults who provide youth with support and guidance. By definition, natural mentoring relationships arise through organic social connections rather than formal mentoring programs. Research suggests that these naturally occurring relationships can have a powerful impact on youth development. Compared to their unmentored peers, youth with natural mentors go on to experience better educational, vocational, and psychosocial outcomes during early adulthood (McDonald & Lambert, 2014; Miranda-Chan, Fruiht, Dubon, & Wray-Lake, 2016). However, little is known about the durability of these group differences, and whether the impact of mentoring remains evident as individuals approach midlife. Furthermore, natural mentors comprise a diverse group that can include grandparents, neighbors, teachers, coaches, and religious leaders, among others, and few studies have examined whether long-term outcomes vary by mentors' social roles. Finally, natural mentoring studies are confounded by selection bias because youth with more resources and better functioning at baseline may be more likely to acquire mentors. Although researchers have attempted to control for confounding variables by including them as covariates in regression analyses, this approach tends to overestimate the effects of nonexperimental independent variables (McDonald & Lambert,

2014; Morgan & Winship, 2007). To fill these research gaps, this study utilized counterfactual analysis, a more stringent test of causality, to examine the impact of different types of mentoring relationships on adult outcomes.

Short- and Long-Term Mentoring Outcomes

Cross-sectional, retrospective, and short-term longitudinal studies have demonstrated notable differences between youth with and without natural mentors. Compared to their unmentored counterparts, mentored youth tend to have higher academic engagement, educational aspirations, and grades (Chang, Greenberger, Chen, Heckhausen, & Farruggia, 2010; Hurd & Sellers, 2013). Furthermore, youth with previous or current mentors are less likely to engage in problem behaviors like substances use, theft, and violence (Dubois & Silverthorn, 2005b; Haddad, Chen, & Greenberger, 2011). They also report less depression and anxiety and higher self-esteem (Chang et al., 2010; Dubois & Silverthorn, 2005b; Haddad et al., 2011).

As data from longer-term longitudinal studies are becoming increasingly available, researchers have found that many group differences between previously mentored and unmentored youth are evident in early adulthood. Among a large, nationally representative sample of adults ages 24–34, those who previously reported having a natural mentor demonstrated higher educational attainment, more intrinsically rewarding jobs (i.e., higher authority and autonomy at work), better psychological well-being (i.e., more optimism, higher self-esteem, less depression), and higher-quality interpersonal relationships (McDonald & Lambert, 2014; Miranda-Chan et al., 2016). Furthermore, a recent study (MENTOR, 2018) found that adults who reported having a natural mentor during childhood or adolescence are more likely to serve as a formal and/or natural mentor during adulthood, suggesting that previous mentoring experiences may lead to greater generativity and civic engagement in adulthood.

Midlife and Life Course Development

The majority of long-term, longitudinal studies of natural mentoring have examined outcomes during early adulthood (i.e., mid to late twenties and early thirties), and little is known about the extent to which previous mentors' influence remains evident during the transition to midlife. Increasingly, researchers are recognizing midlife as a distinct developmental period with unique challenges and concerns (Lachman, 2015). For many adults approaching midlife, roles as caregivers and providers become increasingly salient. Midlife often entails greater financial responsibilities related to child rearing, property ownership, and medical bills, among others, making work and income central concerns (Hutteman, Hennecke, Orth, Reitz, & Specht, 2014; Lachman, 2004). Although the likelihood and severity of "midlife crises" are generally overestimated and mischaracterized in popular culture, these increased responsibilities have the potential to induce stress and other mental health challenges (Arnett, 2018; Lachman, 2004). Related to the burgeoning study of midlife, life course development research has demonstrated that experiences during childhood, adolescence, and emerging adulthood can significantly influence developmental trajectories through midlife and beyond (Shanahan, Mortimer, & Johnson, 2016). Thus, examining vocational and psychosocial markers at midlife is vital to understanding the developmental impact and reach of natural mentoring relationships.

Mentoring Mechanism and Processes

Theoretical and empirical work focusing on mentoring processes and mechanisms have identified several pathways through which these relationships might lead to positive, long-term developmental outcomes. According to Rhodes' (2005) widely used conceptual model of mentoring processes, mentors have the potential to influence three developmental pathways. In the context of supportive relationships, mentors may influence youth's socioemotional development by enhancing emotional well-being, self-esteem, and interpersonal skills (Miranda-Chan et al., 2016; Rhodes, 2005). Furthermore, mentors may cultivate better cognitive and academic functioning by providing direct instruction, scaffolding critical thinking skills, and reinforcing academic engagement (Chang et al., 2010; Miranda-Chan et al., 2016; Rhodes, 2005). Finally, mentors can support youth's identity development by offering guidance and role modeling (Hurd, Sánchez, Zimmerman, & Caldwell, 2012; Miranda-Chan et al., 2016; Rhodes, 2005). As Rhodes (2005) acknowledges, socioemotional, cognitive, and identity development are overlapping and reciprocal, and are not necessarily mutually exclusive.

In addition to these psychological processes, social scientists are increasingly recognizing that natural mentoring relationships can be important sources of social capital (i.e., resources accessed through social connections), and that the transmission of social capital may be a key mechanism through which mentors impact long-term educational and vocational outcomes (Hagler, 2018; Putnam, 2015; Stanton-Salazar, 2011). Mentors may confer social capital through the same activities that influence socioemotional, cognitive, and identity development (e.g., social skill building, vocational instruction, and role modeling). Still, it is important to recognize the broader socioeconomic implications of these processes and the fact that

different types of mentoring relationships are more or less likely to expand social capital. Indeed, some mentors have the potential to introduce their mentees to new information, support, opportunities, and social connections that facilitate upward social mobility. However, mentors' ability to build youth's social capital is influenced by their own access to social capital and the extent to which they can provide resources to which youth otherwise could not access. In his theory of the "strength of weak ties," Granovetter (1973) stated that "weak ties" (i.e., connections outside of one's close social circle) are more powerful sources of social capital than "strong ties" (i.e., family relationships and close friendships). He noted that "weak ties" are less likely to have common backgrounds, knowledge, and social connections, and are thus more likely to introduce novel, nonredundant information and opportunities.

Granovetter's theory is well-supported in natural mentoring research, which suggests that mentors' impact on youth outcomes varies by the nature of the relationship and mentors' social role. In studies of national and local samples, youth with mentors outside of their families were more likely to graduate high school, attend college, be employed, and have a higher income during young adulthood (Fruiht & Wray-Lake, 2013; Hurd, Stoddard, Bauermeister, & Zimmerman, 2014; McDonald, Erickson, Johnson, & Elder, 2007), compared to both unmentored youth and those with familial mentors. Among nonfamilial mentors, those who are most strongly associated with positive academic and vocational outcomes are teachers and other school personnel (Erickson, McDonald, & Elder, 2009) and/or college educated (Chang et al., 2010). These findings support the notion that the transmission of social capital is a key mechanism through which "weak ties" promote youth's long-term socioeconomic success.

Selection Bias and Inferences of Causality in Natural Mentoring Research

By definition, natural mentoring relationships cannot be experimentally assigned, making it difficult to draw definitive causal conclusions (McDonald & Lambert, 2014). Selection into natural mentoring relationships is not random because many personal and contextual factors that influence the likelihood of forming mentoring relationships may also influence later life outcomes. As a result, it is difficult to separate the effects of mentoring relationships from this selection bias (McDonald & Lambert, 2014). The vast majority of previous natural mentoring studies have attempted to control for various confounding factors by including them as covariates in multiple regressions (e.g., Fruiht & Wray-Lake, 2013; Miranda-Chan et al., 2016). Although this is a defensible approach that

certainly reduces selection bias, it has notable limitations. Regression models are vulnerable to misestimation when there are large differences—or lack of overlap—in covariates across treatment conditions, which results in treatment estimations relying heavily on extrapolation (Stuart, 2010). As a result, regression-based approaches tend to overestimate the effects of nonexperimental independent variables (Morgan & Winship, 2007). Furthermore, regression-based approaches lack a straightforward method for assessing bias reduction. Thus, analyses can be susceptible to inadvertent "*p*-value hacking," in which researchers adjust model covariates until the desired outcome is obtained, regardless of whether these adjustments actually reduce selection bias (Austin, 2011; Stuart, 2010).

In light of these limitations, researchers working with quasi-experimental or observational data have increasingly turned to counterfactual analysis, which more rigorously addresses selection bias by matching cases that are very similar on a range of identified confounding factors but differ in whether or not they were in the "treatment" condition (e.g., mentoring). McDonald and Lambert (2014) compared the use of regression-based approaches and propensity score matching, a type of counterfactual analysis, to estimate the causal effect of natural mentoring during adolescence on vocational outcomes in early adulthood. Using regressions and covarying for a range of personal and contextual factors, the authors found that previously mentored participants had higher extrinsic (i.e., income and job benefits) and intrinsic (i.e., autonomy and authority at work) occupational rewards, and were more likely to have full-time employment, compared to their unmentored counterparts. However, using propensity score matching, they found that the effects were limited to intrinsic job benefits, concluding that the regression-based approach may have overestimated treatment effects on some outcomes.

Current Study and Hypotheses

This study builds on the existing body of natural mentoring research in a number of ways. First, we utilized propensity score matching to examine the longitudinal impact of natural mentoring during adolescence or emerging adulthood on vocational and psychosocial outcomes in a sample of adults approaching midlife (ages 33–42). Second, we examined whether mentors' social roles are differentially associated with outcomes. To our knowledge this is among the few natural mentoring studies to utilize counterfactual analysis and the first to examine outcomes in a sample of adults approaching midlife.

We developed the following hypotheses from the existing body of literature. First, consistent with McDonald and Lambert (2014), we expected that adults who had a

mentor during adolescence or emerging adulthood would report higher intrinsic job satisfaction but not higher extrinsic vocational rewards (i.e., income, benefits), compared to their unmentored counterparts. Second, we hypothesized that mentored participants would report higher educational attainment (Hurd et al., 2012; Miranda-Chan et al., 2016). Third, we expected that participants who reported having a mentor would spend more hours volunteering as adults, based on research suggesting that having a mentor may lead to higher civic engagement in adulthood (MENTOR, 2018). Fourth, we expected that previously mentored participants would report lower depression, less stress, and more close friendships in adulthood, consistent with research suggesting that prior mentoring relationships are associated better psychological well-being and interpersonal relationships in early adulthood (i.e., Miranda-Chan et al., 2016). Finally, research suggests that educational and vocational outcomes differ by mentors' social roles (Fruiht & Wray-Lake, 2013; McDonald et al., 2007). Thus, we expected that youth who reported having weak-tie mentors (e.g., teachers, coaches, religious leaders) would have higher intrinsic and extrinsic job benefits as well as higher educational attainment compared to participants who reported having strong-tie mentors (e.g., extended family members) and to those without mentors.

Method

Participant and Procedure

The National Longitudinal Study of Adolescent to Adult Health (Add Health) included a large, nationally representative sample of adolescents and emerging adults and has followed them through early adulthood. To assemble the original sample, the researchers used stratification methods to select 80 nationally representative U.S. high schools based on geographic region, urbanicity, school size, school type, and ethnic composition. Additionally, 52 "feeder schools" (middle or junior high schools affiliated with participating high schools) were included. During the 1994–1995 school year, students were stratified by grade and gender and randomly selected within each stratum to participate in structured, in-person interviews (Wave I; $N = 20,475$). Interviews covered a range of topics including health status and behaviors, familial and peer relationships, educational experiences, and demographics. Participants engaged in follow-up interviews in 1996 (Wave II; $N = 14,738$), 2001–2002 (Wave III; $N = 15,197$), and 2008 (Wave IV; $N = 15,701$). Wave III interviews included a series of questions asking participants about the presence and characteristics of a naturally

occurring mentoring relationship with a nonparent adult since the age of 14. Recently, the Add Health team released Wave V Sample 1 data, collected between March 2016 and March 2017 ($N = 3,872$). Participants, between the ages of 33 and 42, reported on a range of vocational, economic, psychosocial, and health-related outcomes.

Consistent with Add Health analysis guidelines and previous Add Health mentoring studies (e.g., Chen & Chantala, 2014; Erickson et al., 2009; Miranda-Chan et al., 2016), only participants with complete data on all study variables were included in analysis, resulting in a final sample of 2,153 participants. Missing data analysis revealed small differences in the samples. Comparing means and 95% confidence intervals in the full and analytic samples, participants in the analytic sample were slightly younger ($M = 15.92$ vs. $M = 16.06$), more likely to be in intact biological families (60.8% vs. 58.2%), and less likely to live in urban locations (51% vs. 54%), and they tended to have slightly higher educational aspirations ($M = 4.54$ vs. $M = 4.47$), higher school connectedness ($M = 3.81$ vs. $M = 3.76$), higher educational aptitude ($M = 103.81$ vs. $M = 102.54$), and less depression ($M = 0.47$ vs. $M = 0.49$) at baseline. The full and analytic samples did not significantly differ on the mentoring variables. Descriptive statistics for demographics and other study variables are summarized in Table 1.

Measures and Analyses

Propensity score matching was conducted using the *psmatch2* package in Stata 14 (Leuven & Sianesi, 2003). In this procedure, selected control variables are used to estimate propensity scores that represent the probability of being in a particular "treatment condition." For the current analyses, separate propensity scores were estimated to indicate the likelihood of having any mentor, the likelihood of having a strong-tie mentor, and the likelihood of having a weak-tie mentor. For each of these treatment conditions, propensity score estimates were then used to match participants into pairs with similar propensity scores based on a nearest-neighbor algorithm. Consistent with McDonald and Lambert's (2014) methodology, observations were allowed to appear in multiple matches (i.e., matching with replacement) because the sample was imbalanced on the mentoring variables (approximately three quarters of the sample reported having a natural mentor). A caliper of 0.02 was used so that matches were not separated by more than a quarter of a standard deviation of the propensity score distribution.

This nearest-neighbor matching resulted in matched pairs of participants who show similar profiles across the range of confounding variables but differ on whether or not they received each mentoring treatment condition.

Table 1 Descriptive statistics for demographics and study variables

	Proportion/mean (SD)[a]	Median	Min–Max
Demographic and baseline factors			
Age (at Wave I interview)	15.92 (1.63)	15.96	12.44–21.27
Female	0.59		
Hispanic	0.14		
Non-Hispanic Black	0.18		
Non-Hispanic Asian	0.06		
Non-Hispanic Native American	0.02		
Non-Hispanic White	0.60		
College edu. parent(s)	0.40		
Intact biological family	0.61		
Lived in urban area	0.51		
Attended private school	0.08		
Mean household income of school[c]	4.71 (2.38)	4.40	1.86–17.60
Neighborhood poverty	0.14 (0.07)	0.14	0.03–0.40
Vocabulary test score	103.81 (13.87)	105.50	16.00–137.00
Educational aspirations	4.54 (0.92)	5.00	1.00–5.00
School connectedness	3.81 (0.84)	4.00	1.00–5.00
Extracurricular participation	2.49 (2.55)	2.00	0.00–33.00
Paid employment	0.58		
Self-esteem	4.13 (0.59)	4.00	1.00–5.00
Depression	0.47 (0.49)	0.40	0.00–3.00
Mentoring variables[d]			
Any mentor	0.77		
Strong-tie mentor	0.40		
Weak-tie mentor	0.32		
Adult outcomes[e]			
Age (at Wave V interview)	37.03 (1.64)	37.07	33.52–42.93
Educational attainment	4.39 (1.81)	4.00	1.00–8.00
Household income[f]	7.33 (3.18)	9.00	1.00–13.00
Job benefits	2.47 (1.02)	3.00	0.00–3.00
Job satisfaction	3.95 (0.91)	4.00	1.00–5.00
Time spent volunteering	1.67 (1.09)	1.00	1.00–6.00
Close friends	2.71 (0.86)	3.00	1.00–5.00
Depression	1.45 (0.48)	1.20	1.00–4.00
Stress	2.24 (0.73)	2.13	1.00–5.00

[a]Proportions are given for dichotomous variables.
[b]Reported at Wave I.
[c]In tens of thousands of U.S. dollars (e.g., 4.71 = $47,100).
[d]Reported retrospectively at Wave III.
[e]Reported at Wave V.
[f]Reported on a scale in which 1 = less than $5000 and 13 = $200,000 or more.

Pending satisfactory matching diagnostics, this procedure increases the likelihood that observed differences between mentored and unmentored participants are attributable to the mentoring rather than confounding factors. These differences in outcomes among matched pairs were then used to calculate average treatment effects. In particular, we will present average treatment effects for the untreated (ATU), which is computed by comparing matched mentored and unmentored participants on a given outcome variable and averaging pairwise differences across the sample. ATU is the most accurate counterfactual estimation when using matching with replacement (Austin, 2011; McDonald & Lambert, 2014; Morgan & Winship, 2007). Fifty bootstrapped samples were used to estimate robust standard errors and p-values, consistent with established norms for propensity score matching (Breiman, 1996; Leuven & Sianesi, 2003; Luellen, Shadish, & Clark, 2005; McDonald & Lambert, 2014).

In predicting job benefits and satisfaction, these procedures were conducted among a subsample of 1844 participants who were employed at the time of the Wave V interview. For all other outcomes, propensity score estimation and matching were conducted in the main analytic sample (N = 2153).

Control Variables

Potential control variables were selected based on previous theory and research. All control variables were measured at baseline (Wave I; ages 12–21).

Age. In the Add Health sample, Erickson et al. (2009) found that participants who were older at baseline were less likely to report having a mentor. Participants' age at baseline was calculated based on date of birth and the date of the Wave I interview.

Gender. Some studies have found that females are more likely to report having a natural mentor (Erickson et al., 2009; McDonald & Lambert, 2014). Thus, a dummy variable indicating whether or not participants were biologically female was included as a potential confound.

Race/ethnicity. Compared to youth from disadvantaged racial backgrounds, White youth may be more likely to have a mentor, particularly outside of their families (Erickson et al., 2009; McDonald & Lambert, 2014). Participants were sorted into mutually exclusive racial/ethnic groups according to Add Health guidelines (Chen & Chantala, 2014), and dummy codes were created indicating membership into each racial/ethnic categories. Only dummy variables for the three sufficiently large racial/ethnic groups (i.e., Hispanic, Non-Hispanic Black, and Non-Hispanic White) were included in analyses, making other racial/ethnic groups the reference category.

Parent education. Youth with college-educated parents are more likely to report having a mentor (Erickson et al., 2009; Putnam, 2015). A dichotomous variable was created to indicate whether or not each participant had at least one parent with a 4-year college degree.

Intact biological families. Youth who live in intact biological families are more likely to have a mentor (Erickson et al., 2009; McDonald & Lambert, 2014). A dichotomous variable was created to indicate whether or not each participant lived with both biological parents.

Urbanicity. Youth living in urban locations may be more likely to have a mentor (McDonald & Lambert, 2014). Add Health includes a dichotomous variable indicating whether or not participants' residence blocks were classified as "urban" by the 1990 U.S. Census.

Private school. Youth are more likely to report having a mentor if they attend a private school (McDonald & Lambert, 2014). A dichotomous variable was created to indicate whether or not participants attended a private school (including secular and religious private schools).

School resources. Youth in better-resourced schools may be more likely to report having a mentor, particular one who is a teacher or other school personnel (Erickson et al., 2009). Although direct measures of school resources were not available in Add Health datasets, schools serving more affluent student bodies tend to be better resourced because funding comes from local taxes and parental donations (Putnam, 2015). Therefore, the mean household income of each school's student body was calculated and used as a proxy indicator of school resources.

Neighborhood disadvantage. Youth living in disadvantaged neighborhoods are less likely to report having a natural mentor, particularly weak-tie mentors (Erickson et al., 2009; McDonald & Lambert, 2014; Raposa, Erickson, Hagler, & Rhodes, 2018). The Add Health dataset contains a variable indicating the percentage of households within each participants' census block with incomes below the poverty line based on the 1990 U.S. census.

Educational aptitude. Youth with higher intelligence and educational aptitude may be better able to communicate and engage with adult mentors (Erickson et al., 2009; McDonald & Lambert, 2014). Participants were administered an abridged version of the Peabody Picture Vocabulary Test, Revised, designed to measure hearing vocabulary for Standard American English (Dunn, 1981). Scores were standardized by age.

Educational aspirations. Youth with higher educational aspirations may be more likely to seek out adult mentors (McDonald & Lambert, 2014). On a 5-point Likert-type scale, participants were asked to rate the extent to which they hoped to attend college.

School connectedness. Students who feel more engaged and connected with school may be more likely to make positive connections with adults, particularly teachers (Putnam, 2015). Participants rated their agreement with three statements, such as "You felt like a part of your school", on a 5-point Likert-type scale (1 = *Strongly agree*, 5 = *Strongly disagree*). Responses were reverse coded and averaged to create a scale score in which higher scores indicated greater school connectedness ($\alpha = 0.78$).

Extracurricular participation. Participation in extracurricular activities gives youth the opportunity to interact and bond with nonparent adults (McDonald & Lambert, 2014; Zaff, Moore, Papillo, & Williams, 2003). Youth were asked to indicate if they participated in a list of 33 extracurricular activities, including academic, arts, athletic, and leadership organizations. A sum score was created by adding the number of activities in which youth participated.

Paid employment. Workplaces can offer rich opportunities for young people to connect with adult mentors (Hamilton & Hamilton, 2013). At Wave I, youth were asked to indicate whether or not they were engaged in paid employment.

Self-esteem. High self-esteem is associated with more prosocial behavior and better interpersonal relationships (Baumeister, Campbell, Krueger, & Vohs, 2003). Participants rated their agreement with six statements such as "You like yourself just the way you are" on a 5-point Likert-type scale (1 = *Strongly agree*, 5 = *Strongly disagree*). Items were reverse coded and averaged so that higher scores indicated higher self-esteem ($\alpha = 0.85$).

Depression. Social withdrawal is a core symptom of depression (Kupferberg, Bicks, & Hasler, 2016) and may interfere with youth's ability to initiate and maintain mentoring relationships. Participants were asked to rate how frequently they had certain experiences (e.g., "You felt like life was not worth living") during the past week on a 4-point Likert-type scale (0 = *Never or rarely*, 3 = *Most of the time or all the time*). Items were averaged to create a scale score in which higher scores indicated more frequent depressive symptoms ($\alpha = 0.73$).

Mentoring Relationships

At Wave III, participants (ages 18–28) were asked, "Has an adult, other than your parents or step-parents, made an important positive difference in your life at any time since you were 14 years old?" Participants who responded affirmatively were asked to indicate the mentor's social role. Those with multiple mentors were asked to identify the one who was "most important."

Any mentor. A dichotomous variable was created to indicate whether or not participants reported having any mentor. Participants who identified younger siblings or spouses/romantic partners as mentors were coded as "unmentored" because these individuals do not meet the standard definition of mentors.

Strong-tie mentor. A dichotomous variable was created to indicate whether or not participants identified a grandparent, uncle, aunt, older sibling, friend, or neighbor as a mentor. These individuals were considered strong-tie mentors because they are likely to have overlapping social circles and resources with the participant (Granovetter, 1973; Raposa et al., 2018).

Weak-tie mentor. A dichotomous variable was created to indicate whether or not participants identified a teacher, guidance counselor, coach, athletic director, friend's parent, religious leader, coworker, employer, doctor, therapist, or social worker as a mentor. These individuals were considered weak-tie mentors because of their potential to provide novel social resources and capital (Granovetter, 1973; Putnam, 2015; Raposa et al., 2018).

Adult Outcomes

Outcomes were measured at Wave V (ages 33–42).

Educational attainment. Participants were asked to indicate their highest level of educational attainment, which was coded on an 8-point ordinal scale (1 = Less than high school diploma/GED, 8 = Doctorate or professional degree).

Household income. Participants were asked to indicate their annual, pretax household income on a 13-point ordinal scale (1 = *Less than $5000*, 13 = *$200,00 or more*).

Job benefits. Participants were asked whether or not their job offered health insurance, retirement benefits, and paid vacation/sick leave. Dichotomous indicators of the availability of each benefit were summed to create a scale ranging from 0 to 3 (McDonald & Lambert, 2014).

Job satisfaction. Participants were asked to rate their job satisfaction on a 5-point Likert-type scale (1 = *Extremely satisfied*, 5 = *Extremely dissatisfied*), which was reverse coded so that higher scores indicated higher job satisfaction.

Time spent volunteering. On a 6-point ordinal scale, participants were asked to indicate the number of hours they spent volunteering or doing community service work over the previous 12 months on a 6-point ordinal scale (1 = *0 hours*, 6 = *160 hours or more*).

Close friends. Participant were told, "Close friends are people whom you feel at ease with, can talk to about private matters, and can call on for help," and then asked to indicate how many close friends they had on a 6-point ordinal scale (0 = *None*, 5 = *10 or more*).

Depression. Participants responded to five items assessing the frequency of depressive symptoms (e.g., "I felt like life was not worth living") on a 4-point Likert-type scale (1 = *Never or rarely*, 4 = *Most of the time or all the time*). Responses were averaged to create a scale score in which higher scores indicated more frequent depressive symptoms ($\alpha = 0.81$).

Stress. On a 5-point Likert-type scale (1 = *Never*, 5 = *Very often*), participants responded to four items assessing the amount of stress in their lives (e.g., "How often have you felt that difficulties were piling up so high that you could not control them?") during the previous 30 days. Items were reverse coded when appropriate and averaged to create scale scores in which higher scores indicated more stress ($\alpha = 0.81$).

Results

Propensity Score Matching Diagnostics

Propensity score matching diagnostics for any mentor, strong-tie mentor, and weak-tie mentor treatment conditions are presented in Tables 2, 3, and 4, respectively. Among the employed subsample (in which job benefits and satisfaction were assessed), propensity score estimation and diagnostics were highly similar and equally successful compared to those in the main sample. Thus, only diagnostics for the main sample are reported for parsimony. In creating propensity scores for each treatment condition, potential confounding variables were excluded if their inclusion did not reduce bias based on matching diagnostics. For example, educational aspirations did not produce meaningful bias in the likelihood of having a strong-tie mentor, and its inclusion did not reduce bias. Thus, it was excluded from propensity score estimation and matching for strong-tie mentor analyses. These exclusions are noted in table footnotes.

For each control variable, the tables show mean values in the matched and unmatched samples. They also show the percent bias in the unmatched sample, representing the extent to which "treated" and "untreated" individuals naturally differed on each variable, and the percent bias in the matched sample, indicating the average difference among matched pairs. Bias reduction represents the amount of bias attributable to each confound that was reduced by the matching procedure. Diagnostics indicate that the matching procedures resulted in a considerable reduction in the average bias in the any mentor (10.3% to 1.7%), strong-tie mentor (7.4% to 1.5%), and weak-tie mentor (12.6% to 1.1%) treatment conditions. For each treatment condition, the remaining bias in the matched sample did not exceed |5%| for any control variable, indicating adequate balancing (Pattanayak, 2015).

Treatment Effects

Table 5 presents the average treatment effects of having any mentor, a strong-tie mentor, and a weak-tie mentor. Compared to their unmentored counterparts, adults who

Table 2 Match diagnostics for "any mentor" treatment condition

Control variable	Unmatched/matched	Mean/proportion		% bias	% bias reduction
		Strong tie	No strong tie		
Age	Matched	15.90	15.99	−5.3	85.8
	Unmatched	15.90	15.92	−0.7	
Female	Matched	0.59	0.58	3.5	34.3
	Unmatched	0.59	0.58	2.3	
Hispanic	Matched	0.12	0.19	−19.2	99.8
	Unmatched	0.12	0.12	0.0	
Non-Hispanic Black	Matched	0.18	0.17	2.2	94.0
	Unmatched	0.18	0.18	0.1	
Non-Hispanic White	Matched	0.61	0.56	11.7	98.5
	Unmatched	0.61	0.61	0.2	
Intact biological family	Matched	0.61	0.59	5.5	50.6
	Unmatched	0.61	0.60	2.7	
College edu. parent(s)	Matched	0.43	0.32	22.0	86.9
	Unmatched	0.43	0.41	2.9	
Urbanicity	Matched	0.50	0.55	−9.8	99.6
	Unmatched	0.50	0.50	0.0	
Private school	Matched	0.09	0.06	10.9	69.4
	Unmatched	0.09	0.08	3.3	
Mean school income	Matched	4.76	4.52	10.4	70.0
	Unmatched	4.76	4.69	3.1	
Extracurricular partic.	Matched	2.57	2.25	12.3	69.4
	Unmatched	2.57	2.47	3.8	
Vocab. test score	Matched	104.44	101.78	18.6	74.0
	Unmatched	104.44	105.13	−4.8	
Educational aspirations	Matched	4.57	4.44	13.8	83.7
	Unmatched	4.57	4.59	−2.3	
Paid employment	Matched	0.59	0.55	9.0	87.9
	Unmatched	0.59	0.60	−1.1	
Self-esteem	Matched	4.14	4.08	10.2	95.2
	Unmatched	4.14	4.14	−0.5	
Depression	Matched	0.47	0.48	−2.2	57.6
	Unmatched	0.47	0.46	0.9	

The neighborhood poverty and school connectedness variables were excluded because they did not produce meaningful bias in the "any mentor" treatment, and their inclusion did not reduce bias in the matched sample.

previously reported having a mentor tended to have higher educational attainment ($B = 0.20$, $p < .05$), reported having more close friends ($B = 0.12$, $p < .05$), and spent more time volunteering ($B = 0.16$, $p < .05$). Mentored and unmentored participants did not significantly differ in their household income, job benefits, job satisfaction, depression, or stress.

Compared to those who reported no mentor or a weak-tie mentor, adults who reported having strong-tie mentor during adolescence or emerging adulthood had significantly lower household incomes ($B = -0.36$, $p < .05$) and significantly more close friends ($B = 0.12$, $p < .05$). No significant differences in educational attainment, job benefits, job satisfaction, hours spent volunteering, depression, or stress were found.

Compared to those who reported no mentor or a strong-tie mentor, adults who reported having a weak-tie mentor had significantly higher educational attainment ($B = 0.40$, $p < .001$), reported higher household income ($B = 0.55$, $p < .01$), and spent more time volunteering

($B = 0.19$, $p < .01$). There were no significant differences in job benefits, job satisfaction, number of close friends, depression, or stress.

Discussion

This study utilized counterfactual analysis to examine the impact of previous natural mentoring relationships on academic, vocational, and psychosocial well-being at midlife. Having any mentor was associated with higher educational attainment, social support (i.e., more close friends), and civic engagement (i.e., hours spent volunteering) during adulthood. When mentors were categorized as "strong" or "weak ties," different outcomes emerged. Having a strong-tie mentor was associated with higher social support and lower income in adulthood. In contrast, having a weak-tie mentor was associated with higher educational attainment, household income, and civic engagement, but not with social support or other psychosocial outcomes. These

Table 3 Match diagnostics for "strong-tie mentor" treatment condition

| Control variable | Unmatched/matched | Mean/proportion | | % bias | % bias reduction |
		Strong tie	No strong tie		
Age	Matched	15.97	15.89	4.6	87.1
	Unmatched	15.97	15.98	−0.6	
Hispanic	Matched	0.11	0.15	−10.9	90.6
	Unmatched	0.11	0.11	1.0	
Non-Hispanic Black	Matched	0.22	0.15	18.1	93.3
	Unmatched	0.22	0.22	−1.2	
Non-Hispanic White	Matched	0.59	0.61	−4.9	95.2
	Unmatched	0.59	0.59	−0.2	
Intact biological family	Matched	0.59	0.62	−5.0	39.8
	Unmatched	0.59	0.61	−3.0	
College edu. parent(s)	Matched	0.38	0.41	−5.3	39.1
	Unmatched	0.38	0.37	3.3	
Urbanicity	Matched	0.50	0.41	−6.1	43.8
	Unmatched	0.50	0.37	−3.4	
Neighborhood poverty	Matched	0.14	0.13	13.0	89.0
	Unmatched	0.14	0.14	−1.4	
Mean school income	Matched	4.63	4.76	−5.6	82.4
	Unmatched	4.63	4.60	1.0	
Extracurricular partic.	Matched	2.44	2.52	−3.2	86.7
	Unmatched	2.44	2.43	0.4	
Vocab. test score	Matched	102.60	104.62	−14.6	82.7
	Unmatched	102.60	102.95	−2.5	
School connectedness	Matched	3.78	3.82	−5.3	63.8
	Unmatched	3.78	3.76	1.9	
Paid employment	Matched	0.57	0.58	−2.1	62.9
	Unmatched	0.57	0.58	−0.8	
Self-esteem	Matched	4.16	4.10	9.7	90.1
	Unmatched	4.16	4.15	1.0	
Depression	Matched	0.47	0.46	2.2	62.9
	Unmatched	0.47	0.48	−0.9	

The gender, private school, and educational aspirations variables were excluded because they did not produce meaningful bias in the "strong-tie mentor" treatment, and their inclusion did not reduce bias in the matched sample.

findings emerged using a propensity score matching procedure, which rigorously controls for a range of confounding factors and increases confidence in causal inferences (i.e., that these outcomes can be attributed to the mentoring relationships rather than selection bias).

As hypothesized, our findings support Granovetter's (1973) theory of the "strength of weak ties," as well as previous mentoring studies demonstrating differential functions and outcomes associated mentors' social roles (Erickson et al., 2009; Hurd et al., 2014; Raposa et al., 2018). Compared to strong-tie mentors like extended family members, weak-tie mentors such as teachers, coaches, and religious leaders may have been better able to provide youth with resources and support to which they otherwise would not have access. These mentors may have higher social capital than familial mentors, allowing them to build youth's cognitive and social competencies while connected them with tangible educational and occupational opportunities (e.g., jobs, college admission).

Consistent with mentoring and positive youth development research (Finlay, Wray-Lake, & Flanagan, 2009;

MENTOR, 2018), our findings also indicate that positive relationships with nonparent adults, particularly weak-tie mentors, may lead to higher civic engagement in adulthood. Adult–youth partnerships characterized by mutual respect and goal-directed activities may enhance youth's leadership skills, generativity, and civic mindedness (Zeldin, Christens, & Powers, 2013), leading to more community engagement and service during adulthood.

Our findings and discussion regarding the importance of weak ties do not imply that strong-tie mentoring relationship is not important; we found that reporting a strong-tie mentor was associated with having more close friendships during adulthood. As individuals enter middle adulthood, friendships tend to be replaced by spousal and parent–child relationships (Bhattacharya, Ghosh, Monsivais, Dunbar, & Kaski, 2016). However, friendships enhance psychosocial well-being during midlife (Hartup & Stevens, 1999), and developing a mentoring relationship with an older friend, neighbor, or extended family member may enhance young people's ability to maintain close relationships outside of their nuclear families as they age. Strong-tie mentoring

Table 4 Match diagnostics for "weak-tie mentor" treatment condition

Control variable	Unmatched/matched	Mean/proportion		% bias	% bias reduction
		Weak tie	No weak tie		
Age	Matched	15.82	15.97	−9.3	81.3
	Unmatched	15.82	15.79	1.7	
Female	Matched	0.60	0.58	3.1	56.2
	Unmatched	0.60	0.59	1.4	
Hispanic	Matched	0.12	0.14	−7.4	73.5
	Unmatched	0.12	0.11	2.0	
Non-Hispanic Black	Matched	0.13	0.20	−18.9	93.0
	Unmatched	0.13	0.12	1.3	
Non-Hispanic White	Matched	0.66	0.57	18.7	93.8
	Unmatched	0.66	0.67	−1.2	
Intact biological family	Matched	0.64	0.59	10.0	76.1
	Unmatched	0.64	0.62	2.4	
College edu. parent(s)	Matched	0.47	0.37	21.2	92.9
	Unmatched	0.47	0.46	1.5	
Neighborhood poverty	Matched	0.13	0.14	−15.8	96.9
	Unmatched	0.13	0.13	0.5	
Private school	Matched	0.10	0.07	9.6	97.0
	Unmatched	0.10	0.10	0.3	
Mean school income	Matched	4.95	4.58	15.3	97.9
	Unmatched	4.95	4.94	2.3	
Extracurricular partic.	Matched	2.75	2.36	15.3	85.1
	Unmatched	2.75	2.69	2.3	
Vocab. test score	Matched	106.94	102.26	34.9	98.0
	Unmatched	106.94	107.04	−0.7	
Educational aspirations	Matched	4.60	4.51	99.7	99.2
	Unmatched	4.60	4.60	0.1	
School connectedness	Matched	3.84	3.79	5.8	83.6
	Unmatched	3.84	3.85	−1.0	
Paid employment	Matched	0.61	0.56	9.6	98.0
	Unmatched	0.51	0.61	−0.2	
Self-esteem	Matched	4.13	4.12	1.7	65.2
	Unmatched	4.13	4.13	0.6	
Depression	Matched	0.44	0.48	−7.3	92.5
	Unmatched	0.44	0.44	0.5	

The urbanicity variable was excluded because it did not produce meaningful bias in the "weak-tie mentor" treatment, and its inclusion did not reduce bias in the matched sample.

relationships tend to be characterized by emotional closeness and frequent contact (Dubois & Silverthorn, 2005a), which might provide youth with a context to develop interpersonal competencies and appreciation for the value of close relationships.

Unhypothesized findings should also be addressed. In particular, it was surprising that having a strong-tie mentor was associated with having a lower household income during adulthood, after controlling for a range of personal and sociodemographic variables. It seems unlikely that having a strong-tie mentor has a deleterious effect on one's future income. Rather, the nomination of a strong-tie may have been a proxy indicator of having a tighter-knit, homogeneous social network. That is, some participants who selected extended family members, neighbors, or friends as mentors may have lacked significant connections with adults outside of their immediate social circles, who could have provided novel information, support, and

opportunities. Thus, the supposed "treatment effect" of identifying a strong-tie mentor may be attributable to having limited social capital rather than to the mentoring relationship itself.

Furthermore, McDonald and Lambert (2014) found that mentoring relationships were associated with higher intrinsic job benefits during adulthood, so it was surprising that we did not find mentoring to be associated with job satisfaction. This study used a later wave of Add Health data, following up on participants nearly 10 years later. It is possible that the impact of mentoring on intrinsic job satisfaction diminished over time. Overall, job satisfaction in our sample was high, and research suggests that job satisfaction increases from young to middle adulthood (Oshagbemi, 1998; Robinson, 2002). Thus, it may be that most participants, regardless of mentoring history, found satisfying jobs over time, resulting in a ceiling effect.

Table 5 Average treatment effects of having any mentor, a strong-tie mentor, and a weak-tie mentor during adolescence/emerging adulthood on adult outcomes

Treatment	Outcome	B[a]	SE[b]	p-value	95% CI[c]
Any mentor	Educational attainment	0.20	0.10	<.05	0.00–0.40
	Household income	0.04	0.19	.83	−0.33 to 0.41
	Job benefits	0.01	0.08	.88	−0.14 to 0.16
	Job satisfaction	0.02	0.07	.79	−0.11 to 0.15
	Time spent volunteering	0.16	0.07	<.05	0.03–0.30
	Number of close friends	0.12	0.05	<.05	0.03–0.22
	Depression	−0.01	0.03	.57	−0.07 to 0.04
	Stress	−0.01	0.05	.83	−0.11 to 0.09
Strong-tie mentor	Educational attainment	−0.07	0.10	.48	−0.26 to 0.12
	Household income	−0.36	0.16	<.05	−0.68 to −0.04
	Job benefits	−0.06	0.06	.26	−0.18 to 0.05
	Job satisfaction	0.05	0.06	.39	−0.07 to 0.18
	Time spent volunteering	0.07	0.05	.21	−0.04 to 0.17
	Number of close friends	0.12	0.05	.03	0.01–0.22
	Depression	−0.02	0.03	.52	−0.07 to 0.04
	Stress	0.01	0.04	.81	−0.07 to 0.08
Weak-tie mentor	Educational attainment	0.40	0.09	<.001	0.22–0.57
	Household income	0.55	0.17	<.01	0.21–0.89
	Job benefits	0.04	0.05	.43	−0.06 to 0.15
	Job satisfaction	0.03	0.06	.61	−0.09 to 0.15
	Time spent volunteering	0.19	0.07	<.01	0.06–0.32
	Number of close friends	−0.09	0.05	.10	−0.19 to 0.02
	Depression	0.00	0.03	.97	−0.05 to 0.05
	Stress	−0.06	0.04	.19	−0.14 to 0.03

[a]Standardized Beta.
[b]Robust standard error estimated using bootstrapping.
[c]95% confidence interval.

Similarly, Miranda-Chan et al. (2016) found that mentoring was associated with better psychological well-being in adulthood, but we did not find evidence for an effect on depression or stress. Like McDonald and Lambert (2014), Miranda-Chan and colleagues assessed outcomes in Add Health's Wave IV data, and effects may have diminished over time. Some aspects of well-being, such as the proportion of positive to negative emotions, increase from young to middle adulthood, while perceived stress tends to decrease (Stone, Schwartz, Broderick, & Deaton, 2010). These normative increases in well-being may have offset group differences associated with mentoring. Furthermore, Add Health's measures of psychological constructs are brief and may lack sensitivity to more subtle aspects and differences in job satisfaction and psychological well-being. Finally, Miranda-Chan and colleagues used a regression approach and only covaried demographics, so it is likely that selection effects contributed to observed group differences between mentored and unmentored youth.

Contributions, Limitations, and Future Research

This study makes a number of unique contributions. To our knowledge, it is the first to examine the extent to which the impact of previous natural mentoring relationships endures as individuals approach midlife. It is also among the first mentoring studies to utilize counterfactual analysis, a more stringent test of causality than regression-based approaches. Based on sociological theory, we differentiated between strong- and weak-tie mentors, highlighting the importance of attending to mentors' social roles in future research. Furthermore, this study benefits from the size, representativeness, and rigorous sampling of the Add Health data.

This study also has some limitations that should be acknowledged. Due to missing data that is inevitable in longitudinal research, we conducted our analyses among a subsample of participants with complete study data. Although the analytic and full samples differed on some variables, these discrepancies were small, and there were no significant differences on the main independent variables (i.e., mentoring). Still, these subsample characteristics may have introduced some bias into the results.

Another limitation of the Add Health mentoring module is its measurement of only the "most important" mentoring relationship. Thus, it is possible that some youth had more than one mentor, and that some youth who reported having a weak-tie mentor also had strong-tie mentors (and vice versa). Although our results indicate that it is meaningful to examine differential impacts associated with primary mentors, future research should assess

for the presence of multiple mentors, who may serve diverse functions. Similarly, because youth only reported on mentoring relationships at a single time point, we were unable to examine how these relationships change over time. Future longitudinal research should assess for the presence and characteristics of mentoring relationships at multiple time points. Furthermore, Add Health provides limited opportunity to examine mentoring processes and functions, and future studies should use mediational analysis or qualitative methods to more closely examine how mentors exert their lasting influence. Relatedly, counterfactual analysis is limited in its ability to examine moderating factors. Previous research suggests that the impact of mentors, particularly those outside the family, is stronger for youth from disadvantaged social backgrounds (e.g., Erickson et al., 2009). Future research should examine these interactional effects on midlife outcomes.

It also should be noted that the mentoring measure asks specifically about adults who made a "positive difference in your life" and thus assumes a positive valence to these relationships. Although our results suggest that weak ties can positively influence academic and socioeconomic trajectories, participants likely had many weak ties who did not make a positive difference in their lives. Social capital research generally shows that a larger number of weak ties (without an assumption of valence) is associated with better socioeconomic, academic, and vocational outcomes (Patulny & Svendsen, 2007; Stanton-Salazar & Dornbusch, 1995), but it cannot be concluded that every weak-tie relationship has a positive impact.

Finally, our categorization of "weak" and "strong ties," while useful and theory driven, is broad and could be further delineated in future research. In particular, weak-tie mentors may vary in their impact on downstream outcomes. For example, the association between weak-tie mentors and educational attainment may have been driven by the high proportion of school personnel mentors among weak-tie mentors. Future studies should explore the extent to which nonacademic weak-tie mentors, such as coaches and religious leaders, impact educational outcomes.

Practical and Policy Implications

In addition to these future research directions, our findings have a number of implications on practice and policy. Naturally occurring mentoring relationships appear to be important resources that can promote long-term academic, vocational, and social well-being. Unfortunately, these relationships are unequally distributed; socially disadvantaged youth are less likely to report having mentors, particularly weak-tie mentors (Raposa et al., 2018). Intervention at multiple ecological levels may promote the prevalence and equitable distribution of natural mentoring. Addressing

stagnating social mobility in the United States, Putnam (2015) partly implicates increasing race- and class-based segregation, which inhibit youth, particularly those from marginalized social backgrounds, from creating bonds with weak-tie adults. Thus, political efforts to increase racial and class integration in schools (e.g., busing, affirmative action) and neighborhoods (e.g., subsidized mixed-income housing) may increase youth's opportunities to bond with adults from diverse social backgrounds.

Because educators are among the most common and impactful type of weak-tie mentors (Erickson et al., 2009), schools and colleges might make efforts to incentivize and support faculty–student mentoring. For example, Purdue University has made mentoring a core criterion on tenure evaluations, an effort that could be expanded to other universities and adapted to secondary schools (Jaschik, 2015). Furthermore, efforts to eliminate the hegemony of White, middle-class cultural values in schools, such as recruiting diverse faculty and staff and including multiculturalism in curricula, might make youth from socially disadvantaged backgrounds feel more connected with school and teachers rather than feeling further marginalized. Furthermore, teachers and other adults who work with youth should have access to evidence-based mentoring resources and trainings to ensure competency in mentoring youth from diverse sociocultural backgrounds. These resources and trainings may be incorporated into existing orientations, trainings, and continuing education requirements.

To complement these higher-level policy changes, youth-initiated mentoring (YIM) interventions work directly with youth to build knowledge and skills that empower them to identify and cultivate natural mentoring relationships. Evaluations of YIM interventions suggest that they significantly enhance youth's ability to form and maintain mentoring relationships, which in turn leads to improvements in academic, vocational, and psychosocial functioning (Schwartz & Rhodes, 2016). Further development, implementation, evaluation, and refinement of YIM interventions should be prioritized by researchers, practitioners, and funders.

Conclusions

By conducting a rigorous counterfactual analysis of longitudinal data among a large, nationally representative sample, this study provides evidence that positive, long-term outcomes associated with natural mentoring are at least partially attributable to the impact of the relationships themselves, beyond selection bias, and that the influence of mentoring may endure well into adulthood. Thus, these findings provide strong rationale for practical and policy changes aiming to expand the availability and impact of natural mentoring relationships.

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