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Most Likely to Succeed: Long-Run Returns to Adolescent Popularity

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Abstract

Sociological explanations for economic success tend toward measures of embeddedness in longstanding social institutions, such as race and gender, or personal skills represented mainly by educational attainment. In this paper we seek a distinctively social foundation for success by investigating the long-term association between high school popularity and income. Using rich longitudinal data, we find a clear and persistent association between the number of friendship nominations received and adult income, even after accounting for the mediating influences of diverse personal, family, and work characteristics. This skill is distinct from conventional personality measures such as the Big Five, and persists long into adulthood. We hypothesize that popularity encapsulates a socioemotional skill recognized by peers as the practice of being a good friend rather than an indicator of social status.

Introduction

The iconic image of one's high school past, filtered through old yearbooks with awkwardly out-of-fashion pictures, would lead many of us to hope that the time was truly buried and forgotten; having no relevance to our older, more mature current selves. Yet high school holds a place in the collective American psyche that seems to overshadow its brief temporal span. The sum of its formative experiences occupies a crucial point in our trajectory through adulthood. But, despite its central place in our collective memories, we have remarkably few examinations of how one's position in that distant high school microcosm relates to the “real world” we inhabit as adults.

We expect that much of the imprint of high school stems from its origin position in the arc of one's social identity, as a key developmental point shaping one's social interaction style. These four years mark a time of exploration, during which individuals achieve a greater subjective sense of adulthood (Arnett 2000). High school is the first stage of the process of becoming one's self, independent of parents (Turner 1967; Schulenberg, Sameroff, and Cicchetti, 2004). Adolescents in high school begin to engage in multiple facets of identity exploration involving romantic relationships and worldviews as they wrestle with a sense of

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self, which continues and matures into emerging adulthood (Erikson 1968; Arnett 2000), shaped in no small measure by the school peer environment (Hansel 1981; Cairns and Cairns, 1995; Giordano 2003; Gest, Sesma, Masten and Tellegen 2006). One's position in the high school social network and interactions with peers informs different dimensions of identity, ranging from attitudes toward intimacy to misbehavior (Brown 2004). While only a particular early point in the developmental process of becoming a fully adult self, one's relationship to peers during high school can have lasting associations with adult outcomes, by developing skills, ways of acting or preferences. Unfortunately, empirical investigation of such effects – particularly how position within a peer context shapes later life outcomes – has been severely hampered due to lack of long term data with sociometric components.

Here we explore one dimension of this potential long-reach of adolescent social embeddedness by asking whether popularity in school predicts economic success as an adult. We take advantage of the longitudinal nature of the National Longitudinal Survey of Adolescent to Adult Health (Add Health), which has the added benefit of sociometric data. Our analyses document a clear and consistent signal linking popular status in youth to economic success as an adult: Each additional received friendship nomination yields an earnings premium 15 years later of 1.4%, after controlling for a host of plausible mediating factors. This net effect is equivalent to a 5.3% earnings premium when comparing students who differ in popularity by 1 standard deviation.

We know that high school popularity is correlated with a number of other factors, including some with genetic foundations (Christakis and Fowler 2014) that can independently drive success in the adult workplace (Hamermesh and Biddle 1994; Persico, Postlewaite, and Silverman 2004; Case and Paxson 2008). Yet we identify a long-lasting imprint of school popularity that carries over into adult income even after accounting for the types of personal characteristics that drive school popularity. The findings hold independent of the mediating influences of educational success, family background and physical appearance. While the same skills and traits that manifest in popularity may lead to more schooling and higher grades, educational variables explain only one quarter of the popularity effect. Similarly, family characteristics, measures of personality traits, working hours/habits, and beauty only account for a small share of aggregate returns to popularity.

Discovering this association opens the door to thinking about the social mechanisms linking popularity and success. We imagine three interwoven social processes. To begin with, there may be a “collective intelligence” in the aggregate friendship votes that defines popularity, picking up an unknown and heretofore unmeasured trait recognized by adolescents that ends up being a key indicator of success. Any such trait would need to signal sociality, openness or some similarly attractive feature that operates independently of beauty, SES, or broad personality characteristics already measured. Such a trait would imply the observed popularity effect is spurious on the unidentified selection feature. If the effect is causal, we expect it operates distally. That is, we highly doubt that this effect reflects traditional “social capital” mechanisms, such as having contacts open job or employment opportunities (Lin, 2002). Rather, we suspect two mechanisms that can connect teenage popularity to adult success. First, the experience of being popular – of navigating the multiple constituencies that confer status – might hone a still-unmeasured skill that translates into later success. This

might include the ability to ease tensions between conflicted peers, switch language or behavior quickly between micro-social crowds or easily pick up on social cues that, allow one to navigate later employment settings with greater ease. Second, the experience of popularity might help define a self-identity carrying over into a type of confidence that translates into success, a popularity variant of the general social comparison hypothesis (Festinger 1954; Davis 1966; Coleman and Fults, 1982; Marsh and Parker 1984).

Unfortunately we cannot test these mechanisms directly here; rather we are able to identify a remarkable social signature: where the collective friendship activity of teens translates into a powerful predictor of future success.

Background & Prior Work

The simplest explanation for a long-term association between popularity and adult income is that popular adolescents have a socioemotional skill advantage recognized by their peers. When explaining income differentials, economists have traditionally focused on returns to cognitive skills measured through total education. Recently scholars have moved away from a simple conception of human capital to consider how both cognitive and socioemotional skills work together to explain economic, educational, and health behaviors (Bowles and Gintis 1976; Bowles, Gintis, and Osborne 2001; Heckman and Rubinstein 2001; Cunha et al. 2006; Heckman, Stixrud, and Urzua 2006). This reflects the simple fact that employers value socioemotional traits like collaboration and creativity beyond standard measures of cognitive ability. For example, a 2013 employer survey by the staffing firm Adecco found that 44% of senior executives cite a lack of social skills as the most pressing gap in the US workforce. Technical and computer skills trailed behind at 22% and 12%, respectively (Adecco 2013).

Socioemotional skills are difficult to measure, however, and researchers usually resort to one of two strategies. They either use self-reports on attitudinal and personality scales (Mueller and Plug 2006; Fortin 2008; Lundberg 2014) or track behaviors related to workplace discipline, such as school attendance and grade point average (Glaeser, Laibson, and Sacerdote 2002; Kuhn and Weinberger 2005; Aucejo 2015). Popularity represents an alternative approach that rests on the idea that kids who have good social skills are well-liked in school and continue to carry those social skills into adulthood. This line of argument builds on a nascent literature that relies on network measures to explain long-term economic success (Conti et al. 2013; Fletcher 2014).

This paper thus speaks to a growing literature that crosses economics, sociology, and psychology, underscoring the importance of socioemotional skills for future success. While advocates of the intelligence-as-ability approach emphasize the role of cognitive skills for explaining variation in outcomes (Herrnstein and Murray 1996; Jensen 1998), empirical evidence consistently shows that the vast majority of earnings variation remains unexplained after controlling for conventional measures of cognitive ability (Bowles et al. 2001). Individuals with observationally similar cognitive attributes often diverge markedly in educational and employment outcomes. As a result, researchers are increasingly relying on personality and behavioral attributes such as persistence, organization, and dependability to explain the residual variance (Jencks 1979; Wolfe and Johnson 1995; Duckworth and Seligman 2005; Almlund et al. 2011).

Popularity may also have a direct influence on individuals' social skills above and beyond that captured by some existing skill signal. That is, the developmental significance of friendships seems to promote one's sense of well-being and provide a range of competencies that facilitate future success (Sullivan 1953; Hartup 1996; Gest et al 2006). There are two subtly different mechanisms proposed here. On the one hand, there is an internalization of popularity that leads to a stronger sense of self, thus acting through an identity formation mechanism. For example, longitudinal empirical evidence shows that early friendship predicts adult adjustment, with socially accepted individuals exhibiting higher levels of self-worth and perceived competence, while peer rejection undermines social competencies (Bagwell, Newcomb, and Bukowski 1998; Ladd 2006). On the other hand, popularity youth likely hone a practical skill by engaging with a more diverse group of peers that allows them to more easily traverse diverse workplaces.

Differences in cognitive and socioemotional skills, whether reflected by popularity or shaped directly from peer relationships, can manifest via several labor market mechanisms that might reasonably explain the relationship between popularity and earnings. For example, we consider the mediating roles of hours worked, employment disruptions, and sorting by job content. Popular students work more hours and are less likely to be laid off or fired from a job. While occupational sorting plays a trivial role in explaining the popularity premium, evidence is nevertheless consistent with individuals sorting by job attributes. Individuals with more social ties tend to work in professions that place greater value on analytic ability, attention to detail, and leadership. Together, these labor market characteristics reduce the popularity premium to 1.2% for each friendship nomination, but do not erase it.

Data

Our data come from the National Longitudinal Study of Adolescent Health (Add Health). The first wave of data collection began in 1994–95, when students were in grades 7–12. Initial sampling selected 80 high schools from a total of 26,666 schools sorted on size, type, grade span, racial composition, urbanicity, region of origin, and sector. Participating high schools then identified feeder institutions. This produced a nationally representative sample of 144 middle, junior high, and high schools comprising 90,118 students. Respondents in eligible schools selected up to five male and five female peers from a roster of students in their own school and the corresponding sister school.² Thus each individual could nominate up to 10 friends. Information on friendship networks allows researchers to construct the structure of respondents' school environments and measure their relative placement in these social contexts.

In addition to school-level and network information, the longitudinal component of Add Health collected data from over 20,000 respondents in the first survey wave. The latest round, Wave IV, occurred between April 2007 and February 2009 when respondents were between 24 and 34 years old. 15,701 individuals remain in Wave IV from the original

²The sampling procedure commonly recruited two high schools from each community, subject to the selection criteria noted above. A sister school is the institution from the same strata. For more information on the sampling procedure, see Moody (2004).

longitudinal sample. Among these, 10,926 have comprehensive network data. The longitudinal nature of Add Health enables us to measure individuals' network status almost 15 years prior to their realized economic outcomes. In this way we are able to avoid endogeneity concerns stemming from contemporaneous observations of socioemotional skills and earnings.

Network and non-network measures

Network measures

We use standard network measures to capture a person's position in the social network. A basic and intuitive measure of a person's popularity is *in-degree centrality*, defined as the sum of friendship nominations received (Wasserman and Faust 1994). We differentiate between in-degree and out-degree in a directed network. Out-degree is the number of individuals that the respondent lists as a friend and serves as an indicator of gregariousness or sociality.

Table 1 shows the summary statistics on in and out degrees. Respondents have a mean of 4.62 nominations and a standard deviation of 3.8. The distribution skews to the left with a mode of 2 nominations and over 8% of the sample receiving zero nominations (Figure 1). Some respondents are strikingly popular with their peers, receiving nominations well into the double-digits. We top code the sample at 15 or more friends to minimize the role of outliers. Approximately 80% of the sample falls within one standard deviation of the mean.

Next, we distinguish between nominations by friends' sex (see Tuma and Hallinan 1979; McPherson, Smith-Lovin, and Cook 2001). To compare homophily in male and female friendship networks, we separate in-degree by same-sex versus cross-sex nominations. On average, respondents have 2.7 friends of the same sex, compared to 1.9 of the opposite sex. The distribution of same sex in-degree is similar to that of the overall in-degree measure (Figure 2). Nearly 40% of students receive one or two nominations. The number of respondents decreases quickly in same sex in-degree after the first three nominations, with less than 1% having 10 or more same sex friends. The distribution of cross-sex nominations peaks at zero nominations with a comparatively lower mean than same sex nominations. Nearly 40% of all respondents have no cross-sex friends (Figure 3). Both men and women are more likely to nominate members of the same sex, reflecting well-known gender homophily in adolescent networks (Table 1).

While in-degree centrality captures local popularity, it is agnostic on the person's status relative to the position in the larger social hierarchy (McFarland, Moody, et al 2014). Bonacich centrality builds the structure of the wider school network into the popularity measure, since an individual's centrality is a positive function of the centrality of their friends. Holding the number of connections equal, those connected to more influential individuals have higher Bonacich centrality scores.³ The mean Bonacich centrality score is

³The formula for Bonacich centrality uses a parameter β that determines the weight of more distant ties. When β approaches 0, Bonacich centrality is proportional to in-degree centrality and only accounts for direct ties. A positive value of β shifts weight to the centrality of individuals who nominate the individual, such that the importance of the global network is increasing in the magnitude of β . We scale β to 0.75 times the inverse of the largest eigenvalue of the adjacency matrix to emphasize the wider friendship network.

0.7, with a standard deviation of 0.8. While correlated with degree centrality (0.83), the two are not identical (Figure 4). As with degree, we examine the independent effects of same-sex and cross-sex Bonacich centrality⁴.

Non-network measures

Table 2 presents summary statistics for non-network variables in the final sample. The dependent variable comes from a survey question in Wave IV that asks, “Now think about your personal earnings. How much income did you receive from personal earnings before taxes – that is, wages or salaries, including tips, bonuses, and overtime pay, and income from self-employment?” We log transform all positive earnings.⁵ The final sample, excluding individuals from schools without an assigned weight, yields 9,519 respondents across 113 schools.

The nationally representative sample is 68% white, 16% black and 9% Hispanic. Respondents are between 24 and 34 years of age at the time earnings data are provided. We group regressors by potential mechanisms. First, we include controls for maternal education and marital status to account for differential family background that can influence the habits and skills of students in the sample. These differences can inform the individuals' position in the school network and the associated number of friendship ties. Mothers attain 13.3 years of education on average, and over 66% of the sample comes from households with married parents.

Second, previous research shows that wage premiums from social skills operate via educational attainment and better academic performance (Cawley, Heckman, and Vytlačil 2001). We are interested in parsing out popularity's effects, net of its influence via educational achievement and cognitive performance. Variables representing these mediating influences come from the highest level of education attained by Wave IV, average math and English grades in Wave I, and the Peabody Picture Vocabulary Test (PVT). There exists substantial variation in educational attainment among a sample with over 95% of its members at or exceeding 25 years at the time of surveying. Average schooling level is 14.3 years and the standard deviation is 2.2 years. Some remain in school during Wave IV (though overall results are not sensitive to their exclusion). Regarding the grades variables, it is well documented that teachers reward personality traits such as diligence and lack of disruptiveness (Bowles and Gintis 1976; Farkas 2003). Controlling for the average of math and English grades as well as effort invested in school enables us to focus on the components of popularity that operate independently of work ethic to influence future earnings.

⁴To ensure that our popularity measures are status indicators rather than indicators of the ability to form close-knit ties, we control for the local network structure. We capture the clustering of the local network using transitivity. An individual embedded in a network dominated by close friends are more likely to expect links between these direct ties. Someone who has many acquaintances would not expect the same, as these friends belong to different clusters and have fewer opportunities to interact. Transitivity is a property of triples: If respondent A chooses B to be her friend, and B chooses C, then a tie between A and C is most likely when the first two ties are strong. Transitivity, then, is a function of tie strength in the nearby network. Similarly, reciprocal friendships signal a mutual acknowledgement of closeness, and therefore are more likely to be based on trust and intimacy than non-reciprocated acquaintances. Results on the role of friendship tie strength, as measured by transitivity and reciprocity, are available in Online Appendix A.

⁵The highest annual earnings reported among the 10,926 individuals is \$999,995. We omit individuals reporting zero or negative earnings (689), as well as those who did not answer or did not know their earnings information (498).

Our measure of cognitive skills is an abridged version of the PVT administered for Add Health. The PVT assesses verbal comprehension and general cognitive aptitude, and is shown to maintain high construct validity with a number of intelligence tests (Baker et al. 1993). We expect substantial outcome heterogeneity to remain after controlling for educational attainment and cognitive ability, as achievement reflects only a subset of the abilities valued by employers.

Another channel that increases one's propensity to win friends and become gainfully employed is beauty (Hamermesh and Biddle 1994). Since beauty is positively correlated with wages, omitting physical appearance from the model will upwardly bias the popularity coefficient. We therefore include measures of physical attractiveness along with indicators for grooming and personality attractiveness. All data are taken from interviewers' assessments at the end of a home visit during Wave I, II, and III, in which they rate the respondent's appearance or personality on a scale of 1 to 5, ranging from very unattractive to very attractive.⁶

We also include daily activities measures on sports participation and hanging out with friends. A willingness to participate frequently may signal existing preferences for competition and ambition. In addition to signaling, the experience can foster the development of certain attributes that are advantageous in the labor market, including teamwork, discipline and leadership. The cultivation of friendships through frequent interactions suggests that the respondent possesses certain interpersonal skills that translate into higher future earnings.

A lingering question that remains after the consideration of these covariates is the content of popularity. If popularity is a broad proxy for socioemotional skills, then we need to account for potential overlap with common measures of personality traits. To address this shortcoming, we employ a number of survey questions from Waves I and IV to construct relevant personality attributes. We use measures for vigor, school effort, and self-esteem from Wave I in-school and in-home questionnaires.⁷ Finally, we take advantage of information on unexcused absences and suspensions during Wave I to measure student delinquency. We add dummy variables for never having an unexcused absence during the school year, having one unexcused absence, and ever being suspended from school.

Personality questions from Wave IV are inputs for the remaining five scaled measures: 1) internal locus of control/mastery, 2) Big Five, 3) anxiety, 4) optimism, and 5) anger/hostility. The locus of control dimension of personality describes the extent to which one regards life outcomes as being under one's own control (Rotter 1966). The Big Five components of extraversion, neuroticism, agreeableness, conscientiousness, and openness account for a substantial portion of variance in personality-relevant adjectives.⁸ The remaining variables of anxiety, optimism, and anger/hostility capture other psychosocial facets that influence

⁶We retain variables for all three waves instead of constructing an index score due to the relatively low correlations across waves. Average values for these measures range from 3.5 to 3.7.

⁷Online supplement Appendix B details the six questions used to construct the self-esteem variable. Vigor comes from the statement "I have a lot of energy" and school effort derives from responses to the question, "In general, how hard to you try to do your school work well?" We construct separate dummy variables for individuals who try very hard and those who trying hard enough but admit there is potential to exert more effort.

behavior. Each scale comprises four questions, including “I worry about things”, “I’m always optimistic about my future,” and “I get angry easily,” respectively. To ease interpretation we normalize personality scales for self-esteem, locus of control, anxiety, optimism, angry/hostility and Big Five by grade enrolled to a mean of 0 and a standard deviation of 1.9

Finally, job attributes such as occupation, task content, hours worked, and employment disruptions can shape income trajectories, though their status as exogenous to any popularity effect is questionable. To be conservative, we use Wave IV data on weekly hours worked during the respondent’s most recent or current job. Individuals who stay with jobs for sustained periods of time may accrue benefits from increased promotional opportunities while those who switch jobs frequently lose income during unemployment spells. Employment disruption data characterize the number of times respondents have been fired, let go, or laid off from a job since 2001.

We construct detailed measures of job attributes using the Occupational Information Network (O*NET). O*NET classifies each occupation by required knowledge, skills, abilities, and common activities and tasks. The full taxonomy comprises almost one thousand distinct occupations using data collected from job incumbents or occupation experts. We rely on one facet of the database called “Work Styles,” an input into worker characteristics that describe how well different personalities can perform the job. Each style of personality is ranked on an importance scale of 1 to 5, with 1 representing minimum importance and 5 representing maximum importance.¹⁰

Empirical strategy

We regress log-transformed earnings on popularity, out-degree, and a vector of covariates ranging from family background to physical appearance. We include grade and school fixed effects to permit a clearer identification of popularity’s influence while minimizing the confounding effects of school tenure and institutional context. Students in higher grades have interacted with more peers by virtue of spending more time at the school. The formation of social networks furthermore depends on grade and school characteristics such as size, presence of academic tracking, extracurricular activities, and demographic composition. Grade fixed effects remove the effect of mean differences between grades while school fixed effects control for the mediating effect of school-level factors such as average educational attainment, teacher quality, and other resource inputs.¹¹

⁸Add Health elicited these measurements from an abbreviated 20-item form of the 50-item International Personality Item Pool five-factor model. The abridged survey instrument was found to have acceptable reliability and criterion validity with full-length personality scales (Baldasaro, Shanahan, and Bauer 2013).

⁹A shortcoming of these personality traits concerns their contemporaneous measurement with earnings data. Labor market experiences may exert a reverse effect on one’s personality traits, resulting in simultaneity bias. To the extent that personality traits maintain a stable component, their inclusion in the earnings model should not be problematic for maintaining exogeneity. We rely on earlier personality variables as much as possible and only use Wave IV scales in the absence of comparable measures.

¹⁰89 percent of Wave IV occupational categories match directly to Standard Occupational Classification (SOC) codes in O*NET. We compute the average ratings for 6-digit occupational categories using a weighted average of work style scores across granular 8-digit SOC codes. The majority of remaining observations use codes for which occupational data are not collected. For these entries we use the weighted average of aggregate 2-digit codes. Using these methods we are able to match 98.1% of the final sample to work style data in O*NET.

Results

The analyses begin with a relatively sparse model containing individual demographic and family background variables, before stepping in additional behavioral traits and personal attributes. The simplest specification in Table 3 finds that an additional nomination raises the individual's annual earnings by 2.7%. Holding in-degree centrality constant, a respondent who claims an extensive network of friends *garners no earnings premium* relative to a respondent who records few ties. That is, popularity is a significant predictor of labor market outcomes while gregariousness provides little explanatory value (in fact turning negative once other controls are added)

The model in column 2 includes measures of educational attainment, cognitive ability, and school performance. To the extent that popular individuals possess work habits and a school-oriented attitude that induces them to obtain more schooling and higher GPA and test scores, omitting attainment regressors from the model results in upward bias in the popularity coefficient. According to Model 2, an additional friendship nomination is associated with a 2.0% earnings premium after controlling for schooling, cognitive ability, and GPA. Three-quarters of the original variation remains, even after controlling for social and cognitive skills channeled through achievement.

Next we include beauty, personality attractiveness and daily activities measures from Waves I–III.¹² Their inclusion lowers the coefficient on in-degree centrality to 1.4%. In particular, well-groomed individuals in Wave III are significantly more likely to earn higher wages. The positive correlation between physical appearance and earnings is consistent with other studies on the economic returns to attractiveness (Hamermesh and Biddle 1994; Averett and Korenman 1998; Biddle and Hamermesh 1998). Individuals who actively engage in sports and hang out with their friends earn significantly more than their counterparts who engage less frequently. All together, this implies that a one standard deviation increase in popularity is associated with a 5.3% wage premium for adolescents less than 15 years later.

In Figure 5, we relax the linearity assumption on the in-degree variable and enter separate intercepts for each popularity level. Relative to socially isolated students without any nominations, those with two friends already hold a significant earnings premium of over 10%. This suggests sizable returns to a minimum threshold of social integration. Isolated students, on the other hand, fare poorly compared to their peers along dimensions such as academic achievement and social cohesion.

Next, we redefine the popularity variable according to alters' attributes. This acknowledges the possibility that friendships differ in intention and substance, such that some types of friendships are more predictive of future labor market success than others. Column 4 shows

¹¹The empirical approach does not include household fixed effects following Fletcher (2014). Families with at least two surveyed siblings comprise only one-quarter of the full sample and the loss of power renders it difficult to detect effect sizes of the magnitude measured in this paper.

¹²In results not shown here, we find suggestive evidence that physical attractiveness, grooming, and personality attractiveness co-vary. Including only physical attractiveness and grooming yields similar coefficients on popularity as including only measures of personality attractiveness. This begs the question, “which comes first, beauty, grooming, or personality?” The interviewer may let physical looks inform his or her judgment of the respondent's personality, or vice versa. Since the interviewer fills out these ratings concurrently at the end of each meeting, we cannot identify the direction of this relationship.

the relative effects of popularity among same- versus cross-sex peers. We observe two notable trends. First, the popularity earnings premium is concentrated among same sex nominations. An additional same sex friend raises the annual earnings by 2.0% relative to 0.9% for cross-sex friendships, after controlling for socio-demographic, educational, attractiveness, and daily activities variables. This result is stable across different model specifications.

Second, changes across specifications in the magnitude and significance of the cross-sex variable suggest that students pick friends of the opposite sex for different reasons than same-sex friends. In results not shown, an additional same-sex nomination yields a 2.4% increase in annual earnings after controlling for education and cognitive ability, compared to a 1.6% increase for cross-sex nominations. The impact of cross-sex popularity decreases to 1.2% after accounting for interviewer-rated measures of attractiveness, while the influence of same sex friends decreases only slightly to 2.3%. We infer that looks and grooming are key dimensions underlying cross-sex friendship nominations. Same sex popularity, on the other hand, largely comprises characteristics not related to appearance but that are relevant for future income.¹³

In Model 5, we replace degree centrality with two alternative popularity measures, Bonacich Centrality and same sex Bonacich Centrality. Doing so extends the individual's radius of influence beyond their adjacent peers into the wider school-based network. We find that a one-unit increase in Bonacich score yields a 7.0% earnings premium. Another way of quantifying the effect is to assess changes in earnings when shifting up a standard deviation. One additional standard deviation in Bonacich Centrality yields a 5.6% earnings premium. Further evidence of the prominence of same sex nominations is shown in column 6. The majority of the Bonacich centrality effect derives from nominations from same sex peers.

Which dimensions of socioemotional skills does popularity cover?

Despite establishing the popularity premium as a robust finding across different models, we have yet to elaborate on its *informational content*. What types of personality or behavioral traits does popularity capture? In this section, we build towards an answer by investigating what popularity isn't. We present supplementary analyses that characterize the relationship between friendship nominations and common proxies for socioemotional traits including the Big Five, self-esteem, optimism, student effort, and measures of delinquent behavior. The evidence suggests that popularity encompasses traits that are distinct from measures of socioemotional skills referenced in other studies.

Table 4 begins with the baseline result from the full model specification and is subsequently augmented by additional sets of personality traits. Column 2 controls for Wave I measures of self-esteem, vigor, school effort, unexcused absences and suspensions. Their addition reduces the coefficient on popularity to 1.3% and only slightly increases the explained residual variation in the earnings function. Vigor is positively associated with earnings,

¹³When we replace the linear same-sex in-degree variable with dummies for each popularity level, we find that having one same-sex friend does not yield measurably significant labor market gains. By the second friendship nomination, however, the individual is earning 6% more than the average individual who garnered zero nominations.

while school suspensions lead to a reduction. Somewhat surprisingly, maximum self-reported effort correlates with lower earnings.¹⁴ Other dimensions of self-evaluation do not appear to explain the popularity premium. Self-esteem is not predictive of earnings, and none of the remaining personality scales demonstrate a relationship with popularity, despite their apparent effect on earnings. The inclusion of all personality variables decreases the popularity premium to 1.3%. This relatively small change provides further evidence that friendship nominations capture some facets of personality and social skills that do not overlap with common measures of personality and behavioral traits.

A closer look at labor market mechanisms

Our models thus far establish that popularity comprises something distinct from existing measures of socioemotional skills. Further evidence on its precise contents comes from a closer examination of job attributes. Since earnings depend on variables such as occupation, skills required, hours, and job tenure, we can evaluate how each dimension affects the popularity premium. Table 5 controls for weekly hours worked in the respondent's most recent or current job during Wave IV. We assume a quadratic relationship between hours and earnings.¹⁵ Earnings are a concave function of hours, and increases in time worked until approximately 90 hours. Popular individuals work more, and accounting for this intensive margin reduces the popularity premium to 1.2%. Next we include workplace disruptions into the model. Popular students report fewer disruptions, although the popularity premium remains unaffected.

The next set of results concerns job content. Salaries and wages vary by required skills and workplace attributes. Individuals with socioemotional skills that promote friendship ties may be sorting into jobs that place a high premium on these skills. We begin by looking within occupations, which we use as a crude proxy for job skills and attributes. Adding occupational fixed effects to the model slightly increases the popularity premium (Column 4). The existence of substantial within-occupation variation in earnings suggests that occupational sorting plays an insignificant role. This does not rule out the possibility that individuals are sorting on dimensions of job content that are disguised by occupational categories.

To evaluate these dimensions, we use occupational "Work Styles" that characterize the suitability of different personality styles for the job. Column 5 controls for a diverse set of qualities, including the importance of analytical thinking, leadership, cooperation, and social orientation for the job. Collectively, the fifteen work style covariates reduce the popularity coefficient to 1.3%. Simultaneously accounting for hours worked, job disruptions, occupation, and skills required yields the same popularity premium of 1.2% (Column 6) as the specification that only considers weekly hours worked (Column 2). The evidence so far supports friendship nominations as exerting an effect on earnings that is distinct from the labor market mechanisms summarized here.

¹⁴We separately estimate the model by gender. The negative coefficient on effort is only significant for female students. One possibility is that the hardest-working students are most challenged by the course material and therefore this measure is implicitly picking up ability.

¹⁵Other functional forms, including a cubic and quartic of hours, do not affect the outcome.

Conclusion

We present robust evidence that popularity heralds long term economic success for a representative sample of US adolescents. In doing so, we rule out potentially confounding roles played by several mechanisms, ranging from academic attainment to beauty. Net of these effects, a one standard deviation increase in popularity still raises the earnings premium by 5.3% almost 15 years into the future. The majority of variance in eventual earnings is explained by popularity among same sex friends, suggesting that the attributes promoting nominations among same sex peers are distinct from those valued by opposite sex peers.

These results suggest that an inherently social feature, popularity, captures a persistent attribute that generates success later in life. Popularity predicts income above and beyond conventional personality measures such as the Big Five and self-esteem and works independently of standard institutional features such as race, class or gender. We speculate that this is a “likability” effect – a socioemotive skill or behavior trait that may be difficult to self-report, but that others recognize and respond via friendship nominations. Our measure of popularity aggregates actual friendships, rather than aspirational notions of popularity. As such, we believe this measure likely captures the practice of being a better friend rather than social prominence, implying that we cannot directly compare results with prior work on the lasting reputation effects associated with ascriptions of popularity or peer rejection (Gest et al 2006).

There are three basic ways such an effect could manifest. First, we cannot rule out a consistent and latent individual trait observed by other adolescents that simultaneously generates social recognition and adult success. This would render popularity's association with income spurious on the unobserved feature. On the other hand, adolescents might directly develop this skill by virtue of being popular. To the extent that popularity requires interaction with more diverse types of people, popular adolescents can learn how to navigate complex social situations better than unpopular ones. Alternatively, the effect might be to enhance one's sense of self, generating a positive *social* self-confidence that then allows them to move assuredly and successfully through workplaces. We cannot know from these data which mechanism (or others) might generate the observed association. Rather, we see this as a key question for future research to help identify the specific behavioral mechanism that peers are responding to as well as how such mechanisms differ across social groups.

Finally, we note that there are multiple other dimensions of success that extend beyond the simple economic measure of income. Conceptually analogous extensions of this work could identify features of job outcomes that hinge on sociability, such as performance ratings, to help disentangle human capital from socioemotional skills. The same set of skills that matter for economic prosperity may also influence psychological and emotional well-being, and thus affect multiple life course outcomes, including family formation, marriage stability, or even community and neighborhood engagement. More work is necessary to explore the multi-faceted relationship between popularity and long-term success.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
Popularity density and cumulative distribution function

Figure 2.
Same sex in-degree distribution

Figure 3.
Cross sex in-degree distribution

Figure 4.
Bonacich Centrality and in-degree

Figure 5.
Earnings premium by popularity level

Table 1

Summary Statistics: Network Measures

	Description	Mean	SD	Min	Max	Count
In-degree	No. of alters that nominate ego as friend	4.62	3.8	0	32	9519
Out-degree	No. of alters nominated by ego	4.66	3.0	0	10	9519
Same sex in-degree	No. of same-sex alters that nominate ego	2.74	2.1	0	14	9519
Male		2.51	2.1	0	13	4557
Female		2.98	2.1	0	14	4962
Cross sex in-degree	No. of cross-sex alters that nominate ego	1.87	2.4	0	25	9519
Male		1.87	2.5	0	19	4557
Female		1.86	2.4	0	25	4962
Bon Cent on in-degree	Ego's centrality weighted by centrality of nominating alters	0.67	0.8	0	10.1	9519
Same-sex Bon Cent	Ego's centrality weighted by centrality of same-sex alters	0.59	0.7	0	6.0	9468
In-degree trans. triples	No. of nominating alters belonging to transitive triples	2.64	3.4	0	30	9519
In-degree non-transitive triples	No. of nominating alters that don't belong to transitive triples	1.99	1.6	0	12	9519
Reciprocity	No. of alters' nominations that ego returns with nomination	1.87	1.8	0	10	9519
In-degree: not recip.	No. of alters' nominations that ego does not return	2.75	2.8	0	26	9519
Out-degree: not recip.	No. of ego's nominations that alter does not return	2.79	2.3	0	10	9519

Note: Ego is the respondent, while alter refers to students in the same school who is eligible to be nominated as a friend.

Table 2

Summary Statistics: Non-Network Measures

	Description	Mean	SD	Min	Max
Log earnings	W4: log of income from personal earnings before taxes	10.18	1.0	0.0	13.8
Age	W4: age at time of interview	28.71	1.8	24.5	34.1
Male	W4: sex	0.52	0.5	0.0	1.0
White	W1: race	0.68	0.5	0.0	1.0
Black	W1: race	0.16	0.4	0.0	1.0
Hispanic	W1: race	0.09	0.3	0.0	1.0
Maternal Education	W1: response to "how far in school did mom go?"	13.29	2.3	8.0	18.0
Parents Married	W1: parental response to question on marital status	0.66	0.5	0.0	1.0
PVT Score	W1: Picture Vocabulary Test	102.91	13.3	14.0	137.0
Education	W4: highest level of education achieved to date	14.31	2.2	8.0	21.0
GPA	W1: average of math and English GPA	2.81	0.8	1.0	4.0
W1 grooming	W1: interviewer remarks on respondent's grooming	3.58	0.8	1.0	5.0
W2 grooming	W2: interviewer remarks on respondent's grooming	3.51	0.7	1.0	5.0
W3 grooming	W3: interviewer remarks on respondent's grooming	3.52	0.7	1.0	5.0
W1 personality attractiveness	W1: interviewer remarks on respondent's pers. attractiveness	3.62	0.8	1.0	5.0
W2 personality attractiveness	W2: interviewer remarks on respondent's pers. attractiveness	3.61	0.7	1.0	5.0
W3 personality attractiveness	W3: interviewer remarks on respondent's pers. attractiveness	3.68	0.8	1.0	5.0
W1 phys attractiveness	W1: interviewer remarks on respondent's phys. attractiveness	3.58	0.9	1.0	5.0
W2 phys attractiveness	W2: interviewer remarks on respondent's phys. attractiveness	3.57	0.7	1.0	5.0
W3 phys attractiveness	W3: interviewer remarks on respondent's phys. attractiveness	3.51	0.7	1.0	5.0
No active sport past wk	W1: number of times respondent played active sport	0.25	0.4	0.0	1.0
Active sport 1–2 times past wk	W1: number of times respondent played active sport	0.28	0.4	0.0	1.0
Active sport 3–4 times past wk	W1: number of times respondent played active sport	0.21	0.4	0.0	1.0
Active sport 5+ times past wk	W1: number of times respondent played active sport	0.26	0.4	0.0	1.0
Friends 0 times past wk	W1: number of times respondent hung out with friends	0.08	0.3	0.0	1.0
Friends 1–2 times past wk	W1: number of times respondent hung out with friends	0.23	0.4	0.0	1.0
Friends 3–4 times past wk	W1: number of times respondent hung out with friends	0.28	0.4	0.0	1.0
Friends 5+ times past wk	W1: number of times respondent hung out with friends	0.40	0.5	0.0	1.0
Sport clubs (Wave I)	W1: current/planned participation in sports this year	0.57	0.5	0.0	1.0
Self-esteem	W1: standardized index of the sum of 6 personality questions	0.00	1.0	–5.4	1.5
Lot of energy - strongly agree	W1: response to statement "I have a lot of energy"	0.29	0.5	0.0	1.0
Lot of energy - agree	W1: response to statement "I have a lot of energy"	0.41	0.5	0.0	1.0
I try very hard to do my best	W1: respondent tries very hard to their best	0.37	0.5	0.0	1.0
I try hard enough	W1: respondent tries hard enough, but not as hard as they can	0.49	0.5	0.0	1.0
Never skipped school	W1: zero unexcused full day absences from school	0.75	0.4	0.0	1.0
Skipped school w/out excuse once	W1: one unexcused full day absence from school	0.07	0.3	0.0	1.0
Ever suspended	W1: ever received an out-of-school suspension	0.24	0.4	0.0	1.0
Extraversion	W4: standardized score of pre-constructed variable	–0.00	1.0	–4.3	2.2
Neuroticism	W4: standardized score of pre-constructed variable	0.00	1.0	–3.8	3.6

	Description	Mean	SD	Min	Max
Agreeableness	W4: standardized score of pre-constructed variable	0.00	1.0	-6.3	2.0
Conscientiousness	W4: standardized score of pre-constructed variable	-0.00	1.0	-5.5	2.0
Openness	W4: standardized score of pre-constructed variable	-0.00	1.0	-5.4	2.1
Anxious personality scale	W4: standardized score of pre-constructed variable	-0.00	1.0	-2.8	2.6
Optimistic personality scale	W4: standardized score of pre-constructed variable	-0.00	1.0	-4.5	2.1
Angry-hostility personality scale	W4: standardized score of pre-constructed variable	0.00	1.0	-2.1	3.4
Internal locus of control	W4: standardized score of pre-constructed variable	-0.00	1.0	-5.3	2.0
Weekly hours	W4: average hours/week at most recent or current job	41.65	11.7	0.0	120.0
Fired or laid off since 2001	W4: ever fired, let go, or laid off from job since 2001	0.30	0.5	0.0	1.0
Observations: 9519					

Note: Self-esteem variable includes respondent answers to 1) you have a lot of good qualities, 2) you have a lot to be proud of, 3) you like yourself just the way you are, 4) you feel like you are doing everything just about right, 5) you feel socially accepted, and 6) you feel loved and wanted.

Table 3

Popularity, Bonacich Centrality, and log earnings

	(1)	(2)	(3)	(4)	(5)	(6)
In-degree	0.027 *** (0.004)	0.020 *** (0.004)	0.014 *** (0.004)			
Same sex in-degree				0.020 ** (0.008)		
Cross sex in-degree				0.009 * (0.005)		
Bon Cent on in-degree					0.070 *** (0.020)	
Same-sex Bonacich Centrality						0.052 * (0.028)
Out-degree	0.000 (0.005)	-0.005 (0.005)	-0.009 * (0.004)	-0.009 * (0.004)	-0.009 *** (0.004)	-0.008 * (0.005)
Male	0.410 *** (0.032)	0.471 *** (0.031)	0.458 *** (0.034)	0.462 *** (0.034)	0.457 *** (0.034)	0.461 *** (0.034)
Black	-0.294 *** (0.062)	-0.277 *** (0.065)	-0.267 *** (0.062)	-0.267 *** (0.062)	-0.263 *** (0.063)	-0.265 *** (0.063)
Hispanic	0.013 (0.058)	0.024 (0.059)	0.031 (0.059)	0.032 (0.059)	0.034 (0.058)	0.036 (0.059)
Asian	0.088 (0.093)	-0.014 (0.088)	-0.020 (0.085)	-0.021 (0.085)	-0.019 (0.084)	-0.021 (0.084)
Other Race	-0.174 ** (0.081)	-0.149 * (0.078)	-0.136 * (0.079)	-0.134 * (0.079)	-0.132 * (0.079)	-0.131 * (0.078)
Maternal Education	0.024 *** (0.007)	-0.001 (0.007)	-0.004 (0.006)	-0.004 (0.006)	-0.004 (0.006)	-0.004 (0.006)
Parents Married	0.038 (0.037)	0.008 (0.034)	0.002 (0.034)	0.001 (0.033)	0.000 (0.033)	0.000 (0.033)
PVT Score		-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
Education		0.096 *** (0.008)	0.090 *** (0.008)	0.090 *** (0.008)	0.089 *** (0.008)	0.091 *** (0.008)
GPA		0.102 *** (0.020)	0.090 *** (0.020)	0.089 *** (0.020)	0.089 *** (0.020)	0.088 *** (0.020)
Observations	9,519	9,519	9,519	9,519	9,519	9,468
R-squared	0.148	0.193	0.206	0.206	0.206	0.206

Note: attractiveness covariates come from interviewer responses in Waves I–III. Daily activities measures come from Wave I. All weighted least squares specifications include grade and school fixed effects. Clustered standard errors at the school level.

p<0.01,

**
p<0.05,

*
p<0.1

Table 4

Alternative Personality Attributes

	(1)	(2)	(3)	(4)	(5)	(6)
In-degree	0.014 *** (0.004)	0.013 *** (0.004)	0.014 *** (0.004)	0.014 *** (0.004)	0.014 *** (0.004)	0.013 *** (0.004)
Out-degree	−0.009 * (0.004)	−0.009 * (0.005)	−0.011 ** (0.004)	−0.009 *** (0.004)	−0.009 *** (0.004)	−0.011 ** (0.005)
Self-esteem		0.009 (0.012)				−0.007 (0.012)
Lot of energy - strongly agree		0.065 (0.043)				0.063 (0.043)
Lot of energy - agree		0.086 *** (0.033)				0.086 *** (0.032)
I try very hard to do my best		−0.081 * (0.045)				−0.082 * (0.043)
I try hard enough, but not as hard as I could		−0.050 (0.034)				−0.056 (0.035)
Never skipped school		−0.052 (0.043)				−0.039 (0.044)
Skipped school w/out excuse once		−0.031 (0.057)				−0.014 (0.057)
Ever suspended		−0.084 ** (0.038)				−0.084 ** (0.037)
Extraversion			0.045 *** (0.012)			0.024 * (0.013)
Neuroticism			−0.037 ** (0.016)			−0.013 (0.019)
Agreeableness			−0.042 *** (0.014)			−0.044 *** (0.014)
Conscientiousness			0.032 ** (0.013)			0.010 (0.013)
Openness			−0.069 *** (0.016)			−0.082 *** (0.017)
Anxious personality scale				−0.044 *** (0.015)		−0.012 (0.015)
Optimistic personality scale				0.073 *** (0.015)		0.040 ** (0.015)
Angry-hostility personality scale				0.048 *** (0.018)		0.045 ** (0.020)
Internal locus of control					0.108 *** (0.015)	0.106 *** (0.018)
Observations	9,519	9,519	9,519	9,519	9,519	9,519
R-squared	0.206	0.209	0.218	0.217	0.218	0.233

Note: All models include 1) base covariates spanning age, race, maternal education, and parental marital status, 2) education covariates including Peabody Vocabulary Test, GPA, and educational attainment, 3) grooming, and physical and personality attractiveness measures, and 4) daily activities. All weighted least squares specifications include grade and school fixed effects. Clustered standard errors at the school level.

p<0.01,

**
p<0.05,

*
p<0.1

Table 5**Labor market mechanism**

	(1)	(2)	(3)	(4)	(5)	(6)
In-degree	0.014 *** (0.004)	0.012 *** (0.004)	0.014 *** (0.004)	0.015 *** (0.004)	0.013 *** (0.003)	0.012 *** (0.004)
Out-degree	−0.009 * (0.004)	−0.008 * (0.004)	−0.009 ** (0.004)	−0.010 ** (0.004)	−0.008 *** (0.004)	−0.008 * (0.004)
Analytical					0.242 *** (0.036)	0.220 *** (0.043)
Cooperation					−0.087 (0.064)	−0.012 (0.080)
Detail					0.312 *** (0.053)	0.281 *** (0.070)
Leadership					0.221 *** (0.032)	0.135 *** (0.039)
Social					−0.098 ** (0.042)	0.010 (0.049)
Concern					−0.065 (0.043)	−0.117 ** (0.046)
Control					0.110 * (0.063)	0.074 (0.078)
Dependability					−0.212 *** (0.076)	−0.174 * (0.092)
Effort					−0.021 (0.055)	−0.044 (0.082)
Independence					−0.107 ** (0.043)	−0.077 (0.047)
Initiative					−0.036 (0.068)	−0.036 (0.091)
Innovation					−0.135 *** (0.038)	−0.119 *** (0.044)
Integrity					−0.106 ** (0.049)	−0.057 (0.068)
Persistence					0.066 (0.060)	0.038 (0.067)
Stress					0.017 (0.057)	−0.042 (0.072)
Weekly hours		0.043 *** (0.004)				0.043 *** (0.004)
Weekly hours^2		−0.000 *** (0.000)				−0.000 *** (0.000)
# times fired, let go, or laid off			−0.057 ** (0.023)			−0.052 ** (0.021)
Observations	9,519	9,519	9,519	9,519	9,519	9,519
R-squared	0.206	0.274	0.213	0.234	0.245	0.304

Note: All models include 1) base covariates spanning age, race, maternal education, and parental marital status, 2) education covariates including Peabody Vocabulary Test, GPA, and educational attainment, 3) grooming, and physical and personality attractiveness measures, and 4) daily activities. All weighted least squares specifications include grade and school fixed effects. Clustered standard errors at the school level.

p<0.01,

**
p<0.05,

*
p<0.1.