The Creativity Premium: Exploring the Link Between Childhood Creativity and Life Outcomes *

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Abstract

Success in life increasingly depends on key skills that allow people to thrive in education, the labor market, and their interactions with others. In this paper, we emphasize creativity as a key skill that is essential to open-ended problem solving and resistant to automation. We use rich longitudinal data to study the relationship between people's creativity measured in childhood and their individual attributes and life outcomes. We find that childhood creativity predicts labor market and educational success: more creative individuals earn more during the course of their careers, work in higher occupational categories, and reach higher levels of educational attainment. Our analysis of attributes further suggests that creative individuals have a package of practical skills that allows them to thrive in work environments where learning from experience is important.

Keywords: *Creativity; skills; life outcomes; children; longitudinal; labor market; wages; earnings; occupational category; educational attainment; practical skills; experience; cognitive ability; human capital.*

JEL Classification: *D91; J24.*

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1 Introduction

In this age of computerization, automation and rapid technological change, success in life increasingly depends on a set of key cognitive and non-cognitive skills that allows people to thrive in education, in the labor market, and in their interactions with others (e.g., Heckman et al., 2006, Gill and Prowse, 2016, Deming, 2017a, Castillo et al., 2019, 2020, Fe et al., 2022, Angerer et al., 2023, Cortes et al., forthcoming).[1] At the same time, the relative returns to different skills have changed (e.g., Edin et al., 2022).[2] In this paper, we focus on creativity as a key skill in modern society.

Creativity is the ability to produce novel ideas or solutions that are useful or appropriate in a given situation (e.g., Amabile, 1997, Bradler et al., 2019). Kaufman and Sternberg (2010) emphasize that creative ideas first must be new or innovative, second must be of high quality, and third must be appropriate or relevant to the task at hand. Creativity is underpinned by discovering original combinations of existing ideas (e.g., Feinstein, 2011, Ward and Kolomyts, 2019), by reasoning by analogy from existing situations to new ones (e.g., Magee, 2005, Ward and Kolomyts, 2019), by thinking laterally to depart from usual associations (e.g., De Bono, 2015, Sternberg, 2019), by using imagination (e.g., Gaut, 2010, Gotlieb et al., 2019), and by employing judgment to evaluate new ideas (e.g., Runco and Chand, 1995, Runco and Acar, 2019). Feinstein (2006) emphasizes that creativity is more than a momentary flash of inspiration and depends on a larger process of creative development driven by creative interests.

A variety of authors highlight the importance of creativity for society. "Creativity is the key to success in almost all areas of life" and "defines who we are as human beings" (Glăveanu and Kaufman, 2019). Much of economic life is creative (Lucas, 1988), and creativity is a crucial input into societal success and is a main driver of the world economy (Charness and Grieco, 2019). The creative process of generating new ideas by recombining existing knowledge enables fast economic growth (Weitzman, 1998). Creativity is fundamental to entrepreneurship (Erat and Gneezy, 2016) and to innovation (Feinstein, 2013; Gross, 2020), while creative leaders help organizations to succeed and thrive (Reiter-Palmon et al., 2019). A "creative class" is increasingly important for successful and vibrant cities (Florida, 2002, 2019). Finally, learning rests on a creative process of combining new stimuli with existing knowledge (Beghetto, 2019).

Furthermore, the automation of routine tasks through computerization and new technologies amplifies the comparative advantage of the skills required to solve non-routine or open-ended problems, and creativity is one of these key skills that is (currently!) difficult to replace with computers (Autor et al., 2003; Deming, 2017b; Frey and Osborne, 2017; Jaimovich and Siu, 2020). In Autor (2015)'s words: "the interplay between machine and human comparative advantage allows computers to substitute for workers in performing routine, codifiable tasks while

[1] For example: Heckman et al. (2006) emphasize non-cognitive skills; Deming (2017a) and Cortes et al. (forthcoming) emphasize social skills; Fe et al. (2022) emphasize theory of mind (i.e., the ability to understand the mental states of others); Gill and Prowse (2016) emphasize cognitive ability; and Castillo et al. (2019) and Angerer et al. (2023) emphasize patience.

[2] For example, Edin et al. (2022) document strongly increasing returns to non-cognitive skill and modestly declining returns to cognitive skill, while Castex and Kogan Dechter (2014) also find declining returns to cognitive skill (our notion of cognitive skill is broader than the one used in this literature, encompassing aspects like theory of mind studied by Fe et al., 2022). One possible reason for these trends is that some tasks requiring cognitive ability are becoming routine for computers: as we note later, the automation of routine tasks increases the comparative advantage of skills required to solve non-routine problems.

amplifying the comparative advantage of workers in supplying problem-solving skills, adaptability, and creativity." Kirstetter et al. (2013) go so far as to claim that we are transitioning to a new "creativity era."

The psychology literature has focused on the factors that predict creativity (Kaufman et al., 2019),[3] while the economics literature has focused on how to incentivize performance in tasks that require creativity. The motivation to create depends on a complex interplay of intrinsic motivation, incentives provided by extrinsic rewards, and the type of creative task (Charness and Grieco, 2019). Building on earlier work in psychology (surveyed by Hennessey, 2019), a nascent literature in economics investigates how best to motivate and incentivize creative performance. Most of this economics literature uses evidence from laboratory experiments to study creativity (Ariely et al., 2009; Dutcher, 2012; Ederer and Manso, 2013; Erat and Gneezy, 2016; Bradler et al., 2019; Charness and Grieco, 2019; Gneezy et al., 2021), while Azoulay et al. (2011), Gibbs et al. (2017) and Gross (2020) present evidence from the field.[4]

Despite the emphasis across a range of academic disciplines on the importance of creativity for society, we know little about how individuals' creative ability relates to their choices, behavior and outcomes throughout the life course. As noted by Gross (2020), creativity has received very little attention as an economic behavior. As a result, we lack a clear understanding of the mechanisms by which creativity matters for society. Understanding how creativity drives individuals' choices and outcomes will help to quantify the benefits of: (i) launching interventions that aim to enhance or train creativity in children or adults; and (ii) designing incentives, organizations and environments that encourage and spark creative thinking.

In this paper, we study the relationship between people's creativity and their individual attributes and life outcomes, including self-evaluated skills, labor market outcomes and educational attainment. To do so, we use the National Child Development Study (NCDS), a rich longitudinal birth-cohort study that has followed almost all individuals born in the United Kingdom in the first week of March 1958 throughout their life course. The NCDS includes teacher evaluations of creativity at age seven, together with measures of various individual attributes and outcomes in adulthood. In educational settings, psychologists commonly use survey-based teacher evaluations of creativity, and twenty-seven states use definitions of child giftedness that include creativity (Plucker et al., 2019).

Using a measure of creativity in childhood provides a number of benefits. First, choices later in life (e.g., which subjects to study in high school, whether to attend college, what type of job to work in) cannot affect childhood creativity, and so the associations that we study are not driven by the joint effect of life choices on creativity and outcomes (similarly, Castillo et al., 2019, and Angerer et al., 2023, use childhood measures of patience to study the relationship between economic preferences and later educational outcomes). Second, alongside childhood creativity, the NCDS collected detailed information about the characteristics of the individual's parents, home and school in childhood (together with information about the individual themself), and we include these variables as controls in our regressions. Third, our measure of childhood creativity

[3]See Web Appendix IV.8 for details.

[4]See also Eckartz et al. (2012), Ramm et al. (2013), Bradler (2015), Laske and Schröder (2017), Englmaier et al. (2018), Artes et al. (2019), Attanasi et al. (2019a,b, 2023), Dutcher and Rodet (2021, 2022), Rodet (2021, 2022), and Charness and Grieco (2023). In the context of a model with intrinsic motivation driven by learning, Gibbs (2021) notes that incentive pay can change workers' focus away from creative tasks.

at age seven comes from the individual's school teacher, who knew the individual well and was able to compare the individual's creativity to that of others.

Of course, teachers might make errors when they evaluate children's creativity; to address this concern, we estimate teacher evaluation errors at the child level (by comparing the teacher's evaluations of math and reading abilities to test scores) and include these estimates as a control variable in our regressions. This approach controls for teachers who systematically rate their students as better or worse than they really are relative to the population of children; similarly, the approach also controls for teachers who show positive or negative bias toward particular children.

We do not view creativity and cognitive ability as orthogonal dimensions of an individual's characteristics: Web Appendix IV.2 provides a detailed discussion of the relationship between creativity and cognitive ability. As we describe above, creativity is a multidimensional ability that is underpinned by reasoning by analogy, lateral thinking, imagination and judgment. Creativity is best described as an intellectual activity that is one important aspect of cognition. In order to control for the more traditional notion of cognitive ability and to compare the effects of creativity to those of cognitive ability, we include a measure of childhood cognitive ability in all of our regressions. We derive this measure from tests of math, reading and "general" ability (the latter tests the understanding of connections between words or shapes) that were administered to NCDS cohort members.

In Section 3 we begin by studying the relationship between childhood creativity and a variety of individual attributes. First, we find that more creative individuals report that they are more able in artistic or practical high school subjects such as art, music, woodwork or sports. Second, we find that more creative individuals report that they have better practical skills in adulthood. For example, creativity predicts higher self-evaluated skill in construction and assembly, in selling products or services, and in looking after people who need care. Third, we find that more creative individuals are more likely to work in jobs that require experience. By contrast, we find that more cognitively able individuals report that they are more able in analytical high school subjects (such as math and science) and have better analytical skills in adulthood (e.g., skill in carrying out mathematical calculations or in understanding finance), and more cognitively able individuals are more likely to work in jobs that require formal qualifications.

These results help us to understand the nature of creative people, and the analysis sheds light on the possible mechanisms by which creativity can affect labor market and educational outcomes. Furthermore, by showing that creativity and cognitive ability relate differently to individual attributes, we provide evidence that our measures of childhood creativity and cognitive ability capture different aspects of cognition, and thus we validate the usefulness of our measure of creativity. Together, the results from Section 3 suggest that creative individuals tend to have a package of practical skills that allows them to thrive in work environments in which learning from experience is important. Indeed, existing theories of creative thinking emphasize that the conceptual combination and analogical reasoning that underpin creativity are not based on analytical thinking, but instead rely on the practical application of existing knowledge based

on experience.[5] Although our results support the connection between creativity and experience proposed in the existing literature, we emphasize that experience is also likely to be an important determinant of success in occupations that predominantly demand analytical skills.

In Section 4 we then study the relationship between childhood creativity and life outcomes. First, we find that more creative individuals tend to perform better in the labor market: more creative individuals are more likely to be in work, and when they work more creative individuals also earn more during the course of their careers. For example, among individuals in work, we find that a one-standard-deviation increase in childhood creativity is associated with labor market earnings that are around two percent higher ($p < 0.001$). Furthermore, this same increase in creativity is associated with an increase of nearly one percentage point in the probability of being in work. These effects are economically significant, but they understate the importance of creativity to society because consumers and firms will capture some of the benefits that flow from creativity, while creative ideas act as public goods and form the foundation for further innovation over time (and so creative ideas are likely to be underprovided by markets, relative to the social optimum).[6] We also find evidence of a negative interaction between creativity and cognitive ability that operates through hours worked, which amplifies the effect of creativity on weekly earnings for lower cognitive ability individuals.

Second, to help understand how creativity can influence labor market success, we study the relationship between childhood creativity and the type of occupation that individuals work in. We find that more creative individuals tend to work in better quality jobs. In particular, more creative individuals are more likely to work in the higher category of "managerial and technical" occupations, while they are less likely to work in the lower category of "skilled non-manual" occupations. More cognitively able individuals also tend to work in higher occupational categories, but according to a pattern distinct from that predicted by creativity: for example, unlike creativity, cognitive ability predicts a higher probability of working in "professional" occupations and a substantially lower probability of working in the lower category of "skilled manual" occupations. Our finding that the positive effects of creativity on occupational type are concentrated on the managerial and technical category links to our earlier results showing that more creative individuals report having better practical skills, while also providing support for a view

[5]Magee (2005) emphasizes that creative problem solving depends on domain-specific "practical mastery" and expertise that is "experiential and internal in nature rather than analytical and communicable." Furthermore, Magee (2005) underscores the importance of experience for the reasoning by analogy that underpins creativity: "creative efficiency" is the ability to "turn experiences into learning and new ideas" and "an analogical transfer occurs when information and experiences from one known situation are retrieved and utilized in the search for the solution to an entirely different situation." Similarly, Charness and Grieco (2019) remark that experience is essential to the "experimental" creative style, whereby creative ideas arise from new combinations of existing items, while Huang et al. (2020)'s work on engineering design notes "the importance of practical skills and expertise to creative performance." Summarizing the literature on divergent thinking (an important aspect of creativity), Runco and Acar (2019) note that ideas generated from experience explain a large fraction of the variation in divergent thinking scores (Runco and Acar, 2010) and that R&D managers' divergent thinking performance improves with experience (Behrens et al., 2014). The link between creativity and practical skills is related to Lazear (2004)'s findings that entrepreneurs need to be multi-skilled generalists or "jack-of-all-trades" and that "most entrepreneurs are nontechnical people who form businesses in nontechnical fields."

[6]From a theoretical perspective, it is not obvious that creativity must always be beneficial to individuals or society. First, creative ideas are often risky and unconventional, and so can be met with skepticism and resistance (Mellander and Florida, 2021). Second, creativity can be used for good and for bad purposes (Cropley and Cropley, 2019). Third, creative work provides intrinsic rewards, which could drive up supply and so reduce extrinsic rewards (Liu and Grusky, 2013).

in psychology that creativity is particularly important for managers and leaders.[7]

Finally, we find that more creative individuals tend to reach higher levels of educational attainment at the high school and college levels, which helps to shed further light on the mechanisms by which creativity can affect life outcomes and labor market behavior and success. Our finding that childhood creativity predicts educational attainment later in life provides evidence in support of a view in psychology that learning and creativity are interdependent because understanding new concepts and ideas engages a creative process that combines new stimuli with existing knowledge (Beghetto, 2019). Indeed, our results are consonant with those of psychologists who have found a positive association between creativity and academic achievement (Beghetto, 2019; Kaufman et al., 2019).

Section 5 summarizes evidence about various pathways by which childhood creativity and cognitive ability might affect labor market and educational outcomes, with the full analysis in Web Appendix III.

Linking to List (2020)'s principles of external validity to understand the generalizability of our results: (i) our sample is *representative* of a major developed country since the NCDS follows almost all individuals born in the UK in a particular week; (ii) to account for *attrition* (that occurs in any large-scale birth-cohort study) we use inverse probability weighting, which makes our results representative of all the individuals in the sample; and (iii) the life outcomes that we study are *natural* since we measure labor market outcomes throughout the life course and we use national educational qualifications to measure educational attainment.

The literature on skills and labor market outcomes has traditionally focused on cognitive ability, which includes fluid intelligence (i.e., logical reasoning ability) and crystallized intelligence (i.e., acquired knowledge and verbal skills) (see Hermo et al., 2022, for a recent example). By focusing on cognitive ability, this literature fails to consider the importance of broader cognitive skills, including creativity that we study in this paper or theory of mind studied by Fe et al. (2022). As noted above, Web Appendix IV.2 discusses in detail the relationship between creativity and cognitive ability. Creativity is of particular interest because it is likely hard to automate: Web Appendix IV.3 develops this point and discusses the implications for the types of jobs that might be more resistant to automation. More recently, the literature on skills and labor market outcomes has emphasized the growing importance of social skills (e.g., Deming, 2017a,b, Cortes et al., forthcoming). As we discuss in Web Appendix IV.4, the psychology literature does not support a robust link between creativity and social skills, which suggests that creativity and social skills help labor market success in different ways.

A stream of research builds on Florida (2002)'s concept of the "creative class" to study the relationship between the size of this creative class (based on occupations) and outcomes such as firm growth and regional wages (e.g., Florida et al., 2008, Mellander and Florida, 2011, Sleuwaegen and Ramboer, 2020; see Mellander and Florida, 2021, for a summary). Florida (2002) divides the workforce into three classes: the creative class, the service class, and the working class, with the creative class making up over one-third of the workforce in the United States (see also Mellander and Florida, 2021). Florida (2019) defines the creative class as those who

[7]For example, Reiter-Palmon et al. (2019) argue that "one of the most important skills for managers is that of creative thinking" because good managers or leaders support the creative process and act as a clearing house for ideas.

"work in high skill jobs in science, technology, engineering, business, finance, management, law, healthcare, education, and arts, culture, entertainment, and media." This notion of the creative class captures much of work in higher skill professional and technical occupations, and so does not clearly distinguish creativity from broader human capital and other skills (Glaeser, 2005; Markusen, 2006; Krätke, 2010). Some authors have attempted to refine occupations more carefully according to the skills that they require (e.g., McGranahan and Wojan, 2007, and Liu and Grusky, 2013; relatedly, Allen et al., 2020, find that graduates of Dutch professional/vocational colleges who self-report working in occupations that require higher creativity also report higher wages). Even so, this approach based on occupations cannot capture the relationship between individuals' creativity and their life outcomes. By measuring the relationship between being more creative and earnings at the individual level, we capture both the effects of creativity through *choice of occupation* and the effects of individuals' creativity on wages *within occupation*. Furthermore, because we measure creativity in childhood, our measure of creativity cannot be affected by later occupational choice.

The paper proceeds as follows: Section 2 introduces the data and empirical methodology; Section 3 studies the relationship between childhood creativity and individual attributes; Section 4 studies the relationship between childhood creativity and life outcomes; Section 5 considers pathways; Section 6 concludes; and the Web Appendix provides further details.

2 Data and empirical methodology

2.1 Description of the data

The National Child Development Study (NCDS) is a British birth-cohort study that follows 18,558 cohort members born in the first full week of March 1958. The NCDS cohort members include 17,415 individuals from the Perinatal Mortality Survey (PMS), who comprise almost all individuals born in England, Scotland and Wales in the relevant week. The NCDS further includes 1,143 individuals born during the same week but who were not in the PMS (these individuals are mostly immigrants).

The NCDS data include social and obstetric information at birth (from the PMS, completed by a midwife). The NCDS further collected information on cohort members at ages 7, 11, 16, 23, 33, 42, 46, 50, and 55 (data were collected from teachers, parents, doctors and the cohort members themselves).[8] The NCDS also collected information on performance in national examinations from schools and colleges.

2.2 Analysis sample

We exclude NCDS cohort members who were not part of the PMS (because we want to control for social and obstetric information at birth collected by the PMS; see Section 2.1) or for whom we do not have the information to calculate our measure of creativity, cognitive ability or teacher evaluation error (see Sections 2.4 to 2.6). After these exclusions, we have 12,211 individuals in our analysis sample.

[8]The age 62 data collection is currently in the field.

2.3 Introduction to the empirical methodology

In Section 3 we study the relationship between creativity measured in childhood and individual attributes such as ability in various high school subjects and skills in adulthood (e.g., practical and analytical). In Section 4 we then study the relationship between childhood creativity and labor market and educational outcomes. In the introduction (eighth paragraph) we describe the benefits of studying these relationships using a measure of creativity from childhood.

As we describe in the introduction, creativity is a multidimensional ability that is underpinned by reasoning by analogy, lateral thinking, imagination and judgment. Creativity is best described as an intellectual activity that is one important aspect of cognition. In all cases, we run OLS regressions of the attribute or outcome of interest on childhood creativity and a measure of the more traditional notion of cognitive ability. Including cognitive ability allows us to compare the effects of creativity to those of cognitive ability. Furthermore, by showing that creativity and cognitive ability relate differently to individual attributes, we validate the usefulness of our measure of creativity.

Using the rich data from the NCDS, our regressions include numerous controls for characteristics of the individuals' parents, home and school in childhood. We also include controls for childhood characteristics of the individuals (e.g., derived from obstetric information at birth and medical questionnaires). Controls include: the cohort member's sex at birth, birthweight, and school attendance record; the cohort member's parents' ages, education, and frequency of various activities with the cohort member; the cohort member's mother's working behavior, proxies for parental income and wealth (including social class based on occupation, housing characteristics, household financial difficulties, and household receipt of free school meals); number of children in the household; and characteristics of the cohort member's school (e.g., public or private, class size, and social class of classmates). Web Appendix I.1 provides a complete list of the controls, while Web Appendix IV.1 provides further discussion of our empirical methodology (Table A.36 in Web Appendix VII reports correlations for the controls).

As with all longitudinal birth-cohort studies, not all questions were completed for all individuals. As is standard, in order to make our results representative of all the individuals in the analysis sample, we follow the inverse probability weighting method, which ensures comparability between effects estimated at different points in the life cycle (Wooldridge, 2002, 2007). Web Appendix II describes the inverse probability weighting procedure.

2.4 Measurement of creativity

At age 7, teachers evaluated the creativity of the NCDS cohort members in their class on a five-point scale (this question was not repeated at other ages and was not asked of parents). Figure A.1 in Web Appendix VII provides the text of the five-point creativity scale. As we note in the introduction, psychologists commonly use survey-based teacher evaluations of creativity (Plucker et al., 2019). Section 2.6 describes how our analysis addresses the concern that teachers might make errors when evaluating creativity. Web Appendix IV.5 provides further discussion of teacher evaluation of creativity.

The teacher questionnaire emphasized that teachers should evaluate creativity in relation to all children of the same age, and not just children in the teacher's class or school (nonetheless,

we control for teachers who systematically rate their students as better or worse than they really are relative to the population of children: see Section 2.6).[9] The questionnaire further instructed teachers that in a truly representative cross-section of children, about 5% should fall in the first (top) category, 25% in the second category, 40% in the third (middle) category, 25% in the fourth category, and 5% in the fifth (bottom) category. Thus, we convert evaluations to percentile scores using the mid-points of the ranges. That is, the first category (top 5%) converts to a percentile score of 97.5, the second category (top 5%-30%) to a score of 82.5, the third category (middle 40%) to a score of 50, the fourth category (bottom 5%-30%) to a score of 17.5, and the fifth category (bottom 5%) to a score of 2.5.

We standardize the percentile scores of the individuals in the analysis sample to obtain a measure of childhood creativity with a mean of zero and variance of one that we include in our regressions.[10]

2.5 Measurement of cognitive ability

Our measure of cognitive ability is based on five tests administered to NCDS cohort members at ages 7 and 11. Shepherd (2012) provides a detailed description of the tests (and how they are scored): at age 7, the NCDS measured math ability (10 questions) and reading ability (30 questions); at age 11, the NCDS again measured math ability (40 questions) and reading ability (35 questions); and at age 11, the NCDS further measured "general ability" (80 questions) by testing the understanding of connections between words or shapes.

To facilitate comparisons between the effects of creativity and cognitive ability, we use principal factor analysis on the test scores of the individuals in the analysis sample to derive a single measure of cognitive ability from the five tests described above (in Web Appendix V.1 we show that our results on creativity are robust when, instead of using this measure of cognitive ability, we include all five underlying test scores in our regressions). Only one factor has an eigenvalue above one; following the Kaiser (1960) criterion we retain only this single cognitive ability factor. For each individual in the analysis sample, we use the cognitive ability factor loadings to translate the scores on the five tests into a single cognitive ability score. We then standardize this variable to obtain a measure of childhood cognitive ability with a mean of zero and variance of one that we include in our regressions. Web Appendix IV.6 provides further discussion of the measure of cognitive ability.

The Pearson correlation between our measures of creativity and cognitive ability is 0.54, while the partial correlation, holding all controls fixed, is 0.41.

[9] The exact wording was as follows: "It is expected that in a truly representative cross-section of children of this age, approximately five per cent. fall into the first category, the next 25 per cent. would fit the second description, the middle or average group of 40 per cent. would be in the third category, the next 25 per cent. in the fourth category and the final five per cent. in the fifth category. In so far as your professional experience will allow, please rate the child *in relation to all children of this age* (i.e., not just his present class or, even, school)."

[10] The observed distribution of teachers' five-point-scale evaluations of creativity is similar to, but not exactly the same, as the intended population distribution (described in footnote 9). Table A.35 in Web Appendix VII reports both distributions: the observed distribution has less weight in the tails (first and fifth categories), less weight in the second category, and more weight in the third and fourth categories. Web Appendix V.3 shows that our results on creativity and cognitive ability are robust when we convert creativity evaluations to percentile scores using the mid-points of the ranges of the observed distribution (instead of using the intended population distribution) and standardize based on those percentile scores.

2.6 Teacher evaluation errors

Our analysis addresses the concern that teachers might make errors when they evaluate children's creativity. Conveniently, alongside teacher evaluations of creativity, we observe equivalent teacher evaluations of each child's math and reading abilities at age 7. By comparing these teacher evaluations to the math and reading scores from the tests that were administered to NCDS cohort members at the same age (see Section 2.5), we can estimate teacher evaluation errors at the child level. We then include our estimate of the child-level teacher evaluation error as a control in our regressions. This approach controls for teachers who systematically rate their students as better or worse than they really are relative to the population of children; similarly, the approach also controls for teachers who show positive or negative bias toward particular children.[11]

Web Appendix I.2 describes how we construct the teacher evaluation error control variable. In Web Appendix V.2 we show that our results on creativity and cognitive ability are robust when we exclude the teacher evaluation error control. Web Appendix IV.5 provides further discussion of the teacher evaluation error control.

3 Creativity and individual attributes

In this section we study the relationship between childhood creativity and a variety of individual attributes. The analysis serves three purposes. First, and most importantly, the results help us to understand the nature of creative people. Second, the analysis sheds light on the possible mechanisms by which creativity can affect labor market and educational outcomes. Third, by showing that creativity and cognitive ability relate differently to individual attributes, we provide evidence that our measures of childhood creativity and cognitive ability capture different aspects of cognition, and thus we validate the usefulness of our measure of creativity.

3.1 Ability in various high school subjects

Table 1 reports the strength of relationships between childhood creativity and self-evaluated ability in various high school subjects. We find that creativity and cognitive ability relate differently to these ability self-evaluations. To summarize the main findings: (i) for artistic or practical subjects, creativity predicts positive self-evaluation, but in contrast cognitive ability tends to predict negative self-evaluation; and (ii) for analytical subjects (math and science), only cognitive ability predicts positive self-evaluation.[12]

Panel A of Table 1 shows that more creative individuals are more likely to report that they are above average ability in art, music, practical subjects (e.g., woodwork or metalwork) and sports, while at the same time more cognitively able subjects are less likely to report being

[11] Including this teacher evaluation error control helps to address potential attenuation bias due to measurement error. Including this control also helps to reduce any bias due to omitted variables (because teacher evaluation errors might be correlated with unobserved characteristics of the child or their environment).

[12] As noted by a thoughtful referee, when interpreting the results in Table 1 the reader should bear in mind that our measures of creativity and cognitive ability are partly fundamental to the individual, and partly socially constructed. Web Appendix IV.2 provides a detailed discussion of the relationship between creativity and cognitive ability, Web Appendix IV.1 provides further discussion of our empirical methodology that includes numerous controls for childhood characteristics, while Web Appendix IV.5 provides further discussion of teacher evaluation of creativity (including our control for child-level teacher evaluation errors).

above average in these same subjects (except for music where we find no effect of cognitive ability). For example, a one-standard-deviation increase in childhood creativity is associated with a five-percentage-point increase in the probability of reporting being above average ability in art, while a one-standard-deviation increase in childhood cognitive ability is associated with a four-percentage-point decrease in this probability. To help interpret the size of these effects, we also include the mean of the dependent variable (e.g., 22% report being above average ability in art).

For high school math and science, Panel A of Table 1 shows no statistically significant relationship between childhood creativity and self-evaluated ability, while childhood cognitive ability strongly predicts positive self-evaluation. Finally, for English Panel A shows that both creativity and cognitive ability predict positive self-evaluation.

Panel B of Table 1 repeats the analysis, but using a weaker measure of positive self-evaluation, namely reporting being average or above average ability. The results are broadly similar, although the effect sizes for creativity tend to be lower (in the case of English and music, the coefficients on creativity become statistically insignificant). For math, creativity now predicts negative self-evaluation.

Web Appendix IV.7 provides further discussion of self-evaluated abilities.

Panel A: Above average ability

	Math	English	Science	Art	Music	Practical	Sports
Creativity	-0.007	0.023***	0.002	0.054***	0.017**	0.026***	0.021***
	(0.005)	(0.006)	(0.005)	(0.007)	(0.007)	(0.006)	(0.006)
Cognitive ability	0.139***	0.081***	0.078***	-0.038***	0.001	-0.040***	-0.027***
	(0.006)	(0.007)	(0.006)	(0.008)	(0.008)	(0.008)	(0.007)
Number of individuals	8,809	9,011	7,483	6,520	4,508	7,458	8,757
Mean dep. var.	0.16	0.24	0.16	0.22	0.15	0.27	0.27

Panel B: Average or above average ability

	Math	English	Science	Art	Music	Practical	Sports
Creativity	-0.016***	0.004	0.008	0.055***	0.005	0.010**	0.012**
	(0.006)	(0.004)	(0.007)	(0.007)	(0.009)	(0.005)	(0.005)
Cognitive ability	0.114***	0.032***	0.018**	-0.073***	-0.011	-0.043***	-0.020***
	(0.007)	(0.005)	(0.008)	(0.009)	(0.011)	(0.006)	(0.006)
Number of individuals	8,809	9,011	7,483	6,520	4,508	7,458	8,757
Mean dep. var.	0.73	0.89	0.69	0.70	0.57	0.88	0.84

Notes: As described in detail in Section 2, we run OLS regressions of the dependent variable on standardized measures of childhood creativity and cognitive ability and a rich set of controls. At age 16, individuals who had studied the subject in question were asked "to say roughly how good you think you are at it compared with other people of your age" (below average; average; above average). Woodwork, metalwork and domestic science were given as examples of practical subjects. Heteroskedasticity-consistent standard errors are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels (two-sided tests).

Table 1: High school subject ability (self-evaluated).

3.2 Skills in adulthood

Table 2 reports the strength of relationships between childhood creativity and self-evaluated skills in adulthood. We find that creativity and cognitive ability relate differently to self-evaluations of skills. To briefly summarize the findings: (i) for practical skills, creativity predicts better self-evaluation, while by contrast cognitive ability predicts worse self-evaluation; (ii) for analytical skills, cognitive ability now predicts better self-evaluation, while we find no effect of creativity; and (iii) for mixed and guidance-related skills, both creativity and cognitive ability predict better self-evaluation (but more strongly for cognitive ability).

Panel A of Table 2 considers primarily practical skills, namely: construction and assembly; using tools; selling products or services; and looking after others. Panel A shows that more creative individuals report that they have better practical skills (all four coefficients are positive, with three statistically significant at the 1% level), while more cognitively able individuals report that they have worse practical skills (all four coefficients are negative, with two significant at the 1% level). In each of the four cases, either the coefficient on creativity is positive and statistically significant at the 1% level or the coefficient on cognitive ability is negative and significant at the same level (or both). To help interpret the size of these effects, note that we have standardized each of the skill self-evaluations (which were reported on a four-point scale). Thus, for example, the first column of Panel A shows that a one-standard-deviation increase in childhood creativity is associated with an increase of 0.05 of a standard deviation in self-evaluated skill in construction and assembly when an adult.

Panel B of Table 2 considers primarily analytical skills, namely: carrying out mathematical calculations; understanding finance; and using a computer to solve problems. In Panel B we find no evidence of any relationship between childhood creativity and self-evaluated analytical skills when an adult, while childhood cognitive ability strongly predicts better self-evaluation in these analytical skills.

Panel C of Table 2 considers mixed skills that have substantial practical and analytical components, namely: writing clearly; speaking clearly; reading plans or diagrams; and running an organization. Panel D of Table 2 considers skills that involve guiding others, namely: advising; teaching; and supervising. For all of these mixed and guidance-related skills, we find that both childhood creativity and cognitive ability predict better self-evaluation in adulthood (with the numerical magnitudes of the effects larger for cognitive ability).

Panel A: Primarily practical skills

	Construction & assembly	Using tools properly	Selling products or services	Looking after people who need care
Creativity	0.054***	0.037***	0.046***	0.019
	(0.013)	(0.013)	(0.014)	(0.013)
Cognitive ability	-0.018	-0.076***	-0.018	-0.061***
	(0.016)	(0.016)	(0.017)	(0.016)
Number of individuals	8,111	8,061	8,051	8,131

Panel B: Primarily analytical skills

	Mathematical calculations	Understanding finance	Using a computer to solve problems
Creativity	-0.006	0.003	0.001
	(0.013)	(0.013)	(0.013)
Cognitive ability	0.408***	0.273***	0.303***
	(0.015)	(0.017)	(0.016)
Number of individuals	8,098	8,103	8,126

Panel C: Mixed skills

	Writing clearly	Speaking clearly	Reading plans or diagrams	Running an organisation
Creativity	0.069***	0.041***	0.049***	0.029**
	(0.013)	(0.013)	(0.013)	(0.013)
Cognitive ability	0.214***	0.051***	0.174***	0.131***
	(0.016)	(0.017)	(0.016)	(0.017)
Number of individuals	8,185	8,165	8,115	8,072

Panel D: Guiding others

	Advising	Teaching	Supervising
Creativity	0.038***	0.047***	0.030**
	(0.013)	(0.013)	(0.013)
Cognitive ability	0.064***	0.135***	0.140***
	(0.017)	(0.017)	(0.017)
Number of individuals	8,123	8,099	8,071

Notes: As described in detail in Section 2, we run OLS regressions of the dependent variable on standardized measures of childhood creativity and cognitive ability and a rich set of controls. At age 33, individuals were asked "how good are you at the skills listed below?" (good; fair; poor; don't have skill). We standardize each skill score to give a mean of zero and variance of one (after scoring the skill on a scale of 1 to 4). The questionnaire included 15 skills about which individuals had not been asked at earlier ages. We placed each skill into one of four categories (except for typing, a physical skill that does not fit well into these categories). We abbreviated some of the skill descriptions (e.g., the first skill is "constructing, assembling or building things well"). Heteroskedasticity-consistent standard errors are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels (two-sided tests).

Table 2: Skills in adulthood (self-evaluated).

3.3 Job requirements

Table 3 studies the relationship between childhood creativity and job requirements in early adulthood. Focusing on effects with $p < 0.05$, we find that more creative individuals are more likely to work in a job that requires experience and less likely to work in a job that requires training, while more cognitively able individuals are more likely to work in a job that requires formal qualifications. These results provide suggestive evidence that creative individuals thrive in environments that reward on-the-job learning rather than training or formal qualifications.

In conjunction with our earlier results that more creative individuals report better practical skills and higher ability in practical high school subjects, the results in Table 3 accord with a world where learning from experience is important in work environments that demand creativity and good practical skills, and where as a result more creative individuals self-select (or are more likely to be hired) into jobs that require experience. Indeed, as we discuss in detail in the introduction, theories of creative thinking emphasize that the conceptual combination and analogical reasoning that underpin creativity are not based on analytical thinking, but instead rely on the practical application of existing knowledge based on experience. Having said this, we emphasize that experience is also likely to be an important determinant of success in occupations that predominantly demand analytical skills.

Similarly, in conjunction with our earlier results that more cognitively able individuals report better analytical skills and higher ability in analytical high school subjects, the results in Table 3 accord with a world where formal qualifications are important in work environments that demand cognitive ability and good analytical skills, and where as a result more cognitively able individuals self-select (or are more likely to be hired) into jobs that require formal qualifications.

	Formal qualification	Experience	Training
Creativity	0.006	0.011**	-0.013**
	(0.006)	(0.004)	(0.006)
Cognitive ability	0.134***	0.000	-0.006
	(0.008)	(0.006)	(0.007)
Number of individuals	6,635	6,635	6,635
Mean dep. var.	0.30	0.10	0.19

Notes: As described in detail in Section 2, we run OLS regressions of the dependent variable on standardized measures of childhood creativity and cognitive ability and a rich set of controls. At age 23, individuals were asked whether their job required "any particular skills, training or qualifications," and up to three responses per individual were coded by the NCDS (the question was not asked at other ages). The formal qualification variable is an indicator for the individual reporting that her job required a formal qualification. The experience variable is an indicator for the individual reporting that her job required "general knowledge of the field / previous experience." The training variable is an indicator for the individual reporting that her job required an "apprenticeship (time served)," "on the job training" or "other training." Heteroskedasticity-consistent standard errors are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels (two-sided tests).

Table 3: Job requirements in early adulthood.

4 Life outcomes

In this section we study the relationship between childhood creativity and life outcomes.

4.1 Labor market outcomes

Table 4 studies the relationship between childhood creativity and labor market outcomes in adulthood. In summary, we find that more creative individuals tend to perform better in the labor market: more creative individuals are more likely to be in work, and when they work more creative individuals also earn more during the course of their careers.

Panel A of Table 4 uses information on earnings and employment status that was collected by the NCDS six times during individuals' careers (from the individuals' early twenties up to their mid-fifties). The first two columns of Panel A show that more creative individuals tend to earn more when they work. In particular, among individuals in work, a one-standard-deviation increase in childhood creativity is associated with labor market earnings that are around two percent higher, with the effects of creativity on earnings statistically significant at the 1% level (in fact, $p < 0.001$ for both hourly and weekly earnings). The third column of Panel A shows that more creative individuals tend to work longer hours. In particular, among individuals in work, a one-standard-deviation increase in childhood creativity is associated with work hours that are nearly one percent higher. Finally, the fourth column of Panel A shows that more creative individuals are also more likely to be in work: a one-standard-deviation increase in childhood creativity is associated with an increase of nearly one percentage point in the probability of working.

In Table A.33 in Web Appendix VII we regress the same outcomes on binary measures of creativity and cognitive ability and their interaction. When considering work hours or the likelihood of being in work, we find a negative interaction of creativity and cognitive ability. This negative interaction in the case of work hours amplifies the effect of creativity on weekly earnings for individuals whose cognitive ability is below the mean. However, when considering hourly earnings we find no evidence of an interaction between creativity and cognitive ability. Furthermore, the results in Table A.33 imply that individuals whose creativity is above the mean earn about six to seven percent more per hour.

Panel B of Table 4 shows that our results in Panel A are not driven by an interaction of creativity and self-employment. In Panel B we exclude self-employment and find associations between creativity and earnings and hours that are similar to those in Panel A. Note that when we exclude self-employment in Panel B, we no longer include the fourth column because the pool of individuals out of work includes some individuals who would be self-employed if they did work.

In Panels A and B of Table 4, we find that the relationships between childhood creativity and labor market outcomes are in the same direction, but smaller in magnitude, compared to those for cognitive ability. This comparison provides a valuable reality check: given that cognitive ability is of fundamental importance to labor market success (e.g., Heckman et al., 2006), we argue that it would be implausible to find that other aspects of cognition relate as strongly to labor market outcomes.

Panel A: All individuals

	Individuals in work			
	Log hourly earnings	Log weekly earnings	Log weekly hours	In work
Creativity	0.016***	0.022***	0.006**	0.006**
	(0.004)	(0.006)	(0.003)	(0.003)
Cognitive ability	0.111***	0.125***	0.015***	0.035***
	(0.005)	(0.007)	(0.004)	(0.004)
Individual-year obs.	35,342	35,342	35,342	48,363
Mean dep. var.	-	-	-	0.81

Panel B: Excluding self-employed

	Individuals in work		
	Log hourly earnings	Log weekly earnings	Log weekly hours
Creativity	0.017***	0.022***	0.005
	(0.004)	(0.005)	(0.003)
Cognitive ability	0.107***	0.128***	0.021***
	(0.005)	(0.007)	(0.004)
Individual-year obs.	31,878	31,878	31,878

Notes: As described in detail in Section 2, we run OLS regressions of the dependent variable on standardized measures of childhood creativity and cognitive ability and a rich set of controls. The NCDS collected information on work and net earnings at ages 23, 33, 42, 46, 50, and 55; our individual-year observations encompass these six waves of data, and here our controls additionally include an indicator for each wave. For every wave, we trim the top 1% and bottom 1% of observations for individuals in work using hourly earnings. In Panel A, $48,363 \times 0.81 > 35,342$ because in the first three columns we do not include individual-year observations where the individual worked but did not report their earnings. In Panel B, we exclude individual-year observations where the individual was self-employed. Heteroskedasticity-consistent standard errors (clustered at the individual level) are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels (two-sided tests).

Table 4: Earnings, hours, and employment.

Finally, we find that creativity and cognitive ability relate differently to self-employment. The first two columns of Table A.5 in Web Appendix III.4 show that more creative individuals are more likely to be self-employed, while more cognitively able individuals are less likely to be self-employed. These results are consistent with Lazear (2005)'s hypothesis that more creative individuals are more likely to become entrepreneurs.

4.2 Type of occupation

How can creativity influence labor market behavior and success? To help answer this question, Table 5 studies the relationship between childhood creativity and the type of occupation that individuals work in. The NCDS classified individuals in work into one of six broad occupational categories; these categories represent a "graded hierarchy of occupations" that was used extensively in the UK to allocate individuals to social class (Rose, 1995).

We begin by summarizing the main results from Table 5. We find that both childhood creativity and cognitive ability tend to predict higher occupational categories, but with quite distinct patterns. More creative individuals are more likely to work in the higher category of managerial and technical occupations, while they are less likely to work in the lower category of skilled non-manual occupations. Focusing on the intermediate skilled occupations, we find that more cognitively able individuals are more likely to work in non-manual occupations and less likely to work in manual occupations, but we find no such pattern for creativity. Finally, cognitive ability predicts working in professional occupations, while creativity does not.

Panel A of Table 5 shows that more creative individuals are more likely to work in the higher category of managerial and technical occupations, while they are less likely to work in the lower category of skilled non-manual occupations. These two effects are statistically significant at the 1% level (in fact, $p < 0.001$ in both cases). In particular, among individuals in work, a one-standard-deviation increase in childhood creativity is associated with: (i) a two-percentage-point increase in the probability of working in the higher category of managerial and technical occupations; and (ii) a nearly two-percentage-point decrease in the probability of working in the lower category of skilled non-manual occupations. To help interpret these effect sizes, Panel A reports the mean of the dependent variable (38% of individuals work in managerial and technical occupations, while 21% work in skilled non-manual occupations). We also find a small negative relationship between creativity and the probability of working in unskilled occupations ($p = 0.055$).

Turning to the results for cognitive ability in Panel A of Table 5, we find interesting differences compared to those for creativity. Focusing on the two highest occupational categories in the first two columns of Panel A, we find that more cognitively able individuals are more likely to work both in professional occupations (the highest category) and in managerial and technical occupations (the second highest category), while creativity only predicts working in managerial and technical occupations. Focusing next on the intermediate skilled occupational categories in the third and fourth columns of Panel A, creativity and cognitive ability both predict an overall reduction in the likelihood of working in these occupations. However: (i) creativity predicts a decrease in the probability of working in the skilled non-manual category, while cognitive ability predicts an increase in this probability; and (ii) cognitive ability predicts a substantial reduction in the probability of working in the skilled manual category, while the corresponding effect of creativity is small and not statistically significant ($p > 0.2$). Finally, focusing on the two lowest occupational categories in the last two columns of Panel A, we find a strong negative relationship between cognitive ability and working in these occupations, while we find little effect of creativity.

Panel B of Table 5 shows that our results in Panel A are not driven by an interaction of creativity or cognitive ability with self-employment. In Panel B we exclude self-employment and find relationships between creativity or cognitive ability and occupational categories that are similar to those in Panel A.

Panel A: All individuals

	Professional	Managerial & Technical	Skilled non-manual	Skilled manual	Partly skilled	Unskilled
Creativity	0.002	0.022***	-0.015***	-0.005	-0.001	-0.003*
	(0.002)	(0.005)	(0.004)	(0.004)	(0.003)	(0.002)
Cognitive ability	0.037***	0.098***	0.014***	-0.077***	-0.052***	-0.020***
	(0.003)	(0.006)	(0.005)	(0.005)	(0.004)	(0.002)
Individual-year obs.	31,703	31,703	31,703	31,703	31,703	31,703
Mean dep. var.	0.05	0.38	0.21	0.20	0.13	0.03

Panel B: Excluding self-employed

	Professional	Managerial & Technical	Skilled non-manual	Skilled manual	Partly skilled	Unskilled
Creativity	0.001	0.023***	-0.014***	-0.004	-0.002	-0.004***
	(0.002)	(0.006)	(0.005)	(0.004)	(0.004)	(0.002)
Cognitive ability	0.031***	0.108***	0.012**	-0.074***	-0.056***	-0.021***
	(0.003)	(0.007)	(0.006)	(0.005)	(0.004)	(0.002)
Individual-year obs.	26,895	26,895	26,895	26,895	26,895	26,895
Mean dep. var.	0.05	0.38	0.23	0.18	0.13	0.03

Notes: As described in detail in Section 2, we run OLS regressions of the dependent variable on standardized measures of childhood creativity and cognitive ability and a rich set of controls. At ages 33, 42, 46, 50, and 55, the NCDS allocated almost all individual in work into one of the six broad occupational categories reported in the table; our individual-year observations encompass these five waves of data, and here our controls additionally include an indicator for each wave. To classify individuals into these broad categories, the NCDS made use of three-digit occupational codes from the UK's 1990 Standard Occupational Classification (or its 2000 update); we exclude age 23 because the NCDS used an older non-comparable occupational classification system (and the broad categories used by the NCDS were also different). In Panel B, we exclude individual-year observations where the individual was self-employed. Heteroskedasticity-consistent standard errors (clustered at the individual level) are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels (two-sided tests).

Table 5: Occupational categories.

Our results in Section 3 suggested that more creative individuals tend to have a better package of practical skills, while more cognitively able individuals tend to have a better package of analytical skills. The better practical skills of more creative people could, in part, help to explain why more creative individuals tend to achieve greater labor market success. In this regard, we find it striking that more creative individuals tend to hold better quality jobs even though they are not more likely to enter professional occupations, and we suggest that these professional occupations depend heavily on analytical skills. Indeed, as we note above, we find that more cognitively able individuals report having better analytical skills and are more likely to work in these professional occupations, while they are also less likely to work in skilled manual occupations.

4.3 Educational attainment

Finally, Table 6 considers the relationship between childhood creativity and educational attainment, which helps to shed further light on the mechanisms by which creativity can affect life outcomes and labor market behavior and success. In brief, we find that more creative individuals tend to reach higher levels of educational attainment: more creative individuals are more likely to achieve educational qualifications at ages 16 and 18, and they are also more likely to achieve a university qualification.

The first column of Table 6 shows that creativity predicts educational attainment at age 16. In particular, a one-standard-deviation increase in childhood creativity is associated with a three-percentage-point increase in the probability of achieving an O-level qualification at age 16, with the effect statistically significant at the 1% level (in fact, $p < 0.001$). To understand why only 52% of individuals in our sample achieved such a qualification, we note that academically weaker students did not take O-level examinations (the table notes provide further details).

The second column of Table 6 shows that creativity also predicts educational attainment at age 18. In particular, a one-standard-deviation increase in childhood creativity is associated with a one-percentage-point increase in the probability of achieving an A-level qualification at age 18, with the effect statistically significant at the 1% level. To help interpret this effect size, Table 6 reports that only 16% of individuals in our sample achieved an A-level qualification: for the NCDS cohort, schooling was compulsory only to age 16 (see Bolton, 2012, for historic data on school and university enrollment in the UK).

The third column of Table 6 shows that creativity predicts college attainment. In particular, a one-standard-deviation increase in childhood creativity is associated with a one-percentage-point increase in the probability of achieving a university qualification by age 23 ($p = 0.014$). To help interpret this effect size, Table 6 reports that only 12% of individuals in our sample achieved a university qualification (again, see Bolton, 2012, for historic data on school and university enrollment in the UK).[13]

Mirroring our findings in Table 4 for labor market outcomes, in all three cases the relationship between childhood creativity and educational attainment is in the same direction, but smaller in magnitude, compared to that for cognitive ability. Again, this comparison provides a reality check: given the fundamental importance of cognitive ability for academic success (e.g., see the review by Malanchini et al., 2020), it would be implausible to find that other aspects of cognition relate as strongly to educational attainment.

[13] As we explain in the notes to Table 6, a university qualification includes degrees, diplomas and certificates. Table A.34 in Web Appendix VII shows that the results in the third column of Table 6 are robust when we replace "university qualification" with "university degree" (which excludes undergraduate diplomas and certificates).

	O-level (age 16)	A-level (age 18)	University qualification
Creativity	0.033***	0.012***	0.009**
	(0.005)	(0.004)	(0.004)
Cognitive ability	0.250***	0.149***	0.113***
	(0.006)	(0.005)	(0.005)
Number of individuals	10,505	10,505	9,519
Mean dep. var.	0.52	0.16	0.12

Notes: As described in detail in Section 2, we run OLS regressions of the dependent variable on standardized measures of childhood creativity and cognitive ability and a rich set of controls. Based on examinations data collected by the NCDS from schools and colleges, the first dependent variable is an indicator for whether each individual received at least one O-level qualification, Certificate of Secondary Education (CSE) at grade 1, or Scottish equivalent (most NCDS cohort members took O-levels in 1974 at age 16 when O-level qualifications were pass/fail; letter grades were introduced in 1975 and A-C was considered equivalent to a pre-1975 pass; academically weaker children took CSE examinations and a CSE at grade 1 was considered equivalent to an O-level pass). Similarly, the second dependent variable is an indicator for whether each individual received at least one A-level qualification (an A-level at grades A-E or Scottish equivalent; A-levels are generally taken at age 18). The third dependent variable is an indicator for whether each individual at age 23 reported having a university qualification ("university or CNAA"): a university qualification is defined as a university-level degree, diploma or certificate; this definition excludes, e.g., professional qualifications awarded by professional institutions, nursing qualifications, and polytechnic diplomas / certificates not validated by the Council for National Academic Awards (CNAA) as university level. Heteroskedasticity-consistent standard errors are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels (two-sided tests).

Table 6: Educational attainment.

5 Analysis of pathways

In Web Appendix III we provide evidence about various pathways by which childhood creativity and cognitive ability might affect labor market and educational outcomes. Here we summarize this evidence.

In Web Appendix III.1 we explore potential pathways from childhood creativity and cognitive ability to occupational categories via skills in adulthood. To help understand these pathways, Table A.1 reports correlations between the fourteen skills in adulthood from Table 2 and working in each of the six occupational categories from Table 5. These correlations suggest the following pathways. First, these correlations suggest that the positive effect of creativity on the probability of working in the category of managerial and technical occupations operates partly via the effect of creativity on skill in selling products or services, on the four mixed skills, and on the three guidance-related skills. Second, these correlations suggest that the positive effect of cognitive ability on the probability of working in the category of managerial and technical occupations operates partly via the effect of cognitive ability on the three primarily analytical skills, on the four mixed skills, and on the three guidance-related skills. Third, these correlations suggest that the positive effect of cognitive ability on the probability of working in the category of professional occupations operates partly via the effect of cognitive ability on skill in mathematical calculations and on skill in using a computer to solve problems. Fourth, these correlations suggest that the

negative effect of creativity on the probability of working in the category of skilled non-manual occupations operates partly via the positive effect of creativity on skill in construction and assembly, on skill in using tools properly, on skill in reading plans or diagrams, on skill in running an organisation, and on skill in supervising.

In Web Appendix III.2 we study labor market outcomes controlling for educational attainment. When we include education controls in Table A.2, the effect of creativity on earnings falls by around one quarter, while the effect of cognitive ability falls by around four tenths. This suggests that some of the effects of childhood creativity and cognitive ability on earnings operate through formal education, while a majority of the effects remain after controlling for education. When we include education controls in Table A.3, the effect of childhood creativity on the likelihood of working in the higher category of managerial and technical occupations falls by around two tenths, which suggests that some of the effect operates through formal education, while a majority of the effect remains after controlling for education. Turning to cognitive ability, the results in Table A.3 suggest that some of the effect of cognitive ability on the likelihoods of working in the six occupational categories operates through formal education, while a majority of the effect remains after controlling for education.

In Web Appendix III.3 we study labor market outcomes controlling for occupational category. When we include occupational category controls in Table A.4, the effects of creativity and cognitive ability on earnings fall by around four tenths. This suggests that some of the effects of childhood creativity and cognitive ability on earnings operate through the choice of occupational category, while a majority of the effects remain after controlling for occupational category. Notably, the effect of cognitive ability on weekly hours falls sharply and becomes statistically insignificant, which suggests that the effect of cognitive ability on weekly hours operates entirely through the choice of occupational category.

In Web Appendix III.4 we use the UK DCMS's (Department for Culture, Media and Sport, 2010) classification of creative occupations: the DCMS classified 35 occupations as being creative, which together account for around 5% of employment. Interestingly, we find an effect of childhood creativity on the probability of working in a creative occupation that operates via self-employment. Specifically, Table A.5 shows that: (i) more creative individuals are more likely to be self-employed; (ii) self-employed individuals are more likely to work in creative occupations; and furthermore (iii) among the self-employed, more creative individuals are more likely to work in creative occupations. This relationship between creativity and working in creative occupations that operates via self-employment does not explain our results on the relationship between creativity and earnings or occupational categories: in those cases, our results were similar when we excluded self-employed individuals. In contrast to our results for creativity, we find that more cognitively able individuals are less likely to be self-employed.

In Web Appendix III.5 we provide evidence that, holding educational attainment fixed, childhood creativity and cognitive ability predict the type of educational path followed by individuals. To control for educational attainment, Table A.6 studies individuals who received at least one O-level qualification in any subject at age 16. Among such individuals, we find that more creative individuals are more likely to receive an O-level qualification in artistic subjects (that is, subjects related to art, music, craft and drama). By contrast, more cognitively able individuals are less likely to receive an O-level qualification in artistic subjects. Again among

individuals who received at least one O-level qualification, we also find that more cognitively able individuals are more likely to receive an O-level qualification in analytical subjects (math and science), while creativity has no effect on the probability of receiving an O-level qualification in these subjects. Table A.7 shows that these same patterns emerge when we consider A-level qualifications at age 18.

6 Conclusion

In this paper we have used rich longitudinal data to study the relationship between creativity and individual attributes and life outcomes. As we note in the introduction, a better understanding of how creativity drives behavior and outcomes helps quantification of the benefits of interventions and policies that aim to train creativity or create environments and incentive structures that spark creative thinking.

We provide evidence that creativity matters for important outcomes such as career earnings, employment rates and educational attainment. The natural question then is how best to go about training people to be more creative and motivating them to engage in creative thinking. Our results suggest that interventions which succeed in boosting creativity could have substantial positive economic impacts, although we have not evaluated the potential trade-offs, opportunity costs, or other implications associated with policies that promote creativity.

Psychologists suggest that childhood creativity can be developed by encouraging curiosity, exploration and independent decision-making (Hui et al., 2019). Linking this to our finding that more creative individuals report having better practical skills, further research should evaluate the possibility that creativity in childhood can be enhanced by a smaller emphasis on formal academic learning and a greater emphasis on learning through experience, hands-on play, experimentation, and educational tasks that require independent judgement with no right-or-wrong answers.[14] Similarly, future studies should investigate whether adult education can improve creativity by emphasizing practical and experiential learning more strongly, with more learning in the field and less learning in the classroom. These possibilities connect to our findings which suggest that more creative individuals thrive in environments that reward on-the-job learning from experience over formal training and qualifications. These possibilities also link to Feinstein (2015)'s model of creative development in which individuals who enter a creative field are first taught a core common curriculum and then explore individual paths of creative development to produce a creative output.

The confidence-assertiveness component of extraversion predicts creativity (Feist, 2019), and creative ideas are often met with resistance and skepticism because they are risky and unconventional (Mellander and Florida, 2021). Furthermore, creative people tend to be more autonomous and willing to question tradition and authority (Feist, 2019). This all suggests that training children and adults to be more confident and independent-minded could improve their creative potential by making them more likely to pursue creative ideas in the face of actual or potential opposition.

[14]Indeed, psychologists have found that creativity slumps at the start of formal schooling and at the transition from primary to secondary schooling (Hui et al., 2019), while too much formal education can have the effect of suppressing creativity (Beghetto, 2019).

The psychology literature suggests a number of other potentially fruitful routes to improving creativity in the economy. Sternberg (2019) endorses a number of techniques that can help to improve successful creative thinking, including: redefining problems, challenging assumptions, using constructive criticism to evaluate new ideas, and tolerating ambiguity while developing and refining ideas. Similarly, effective creativity training emphasizes cognitive-processing activities such as: problem identification, conceptual combination, and idea evaluation (Reiter-Palmon et al., 2019). Finally, within organizations, environments that promote creativity present people with meaningful work while encouraging the exchange of thoughts and ideas in positive peer relationships (Reiter-Palmon et al., 2019).

Furthermore, as we describe in the introduction, a new literature in economics studies how best to incentivize creativity (see the survey by Attanasi et al., 2020). The motivation to create depends on a complex interplay of intrinsic and extrinsic incentives, and we encourage economists to continue to use laboratory, field and observational evidence to understand more about how best to motivate creative performance and about how creativity benefits the economy and society more generally.

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Web Appendix

(Intended for Online Publication)

Web Appendix I

Description of controls

Web Appendix I.1

Controls for childhood characteristics

We describe here the controls referred to in the third paragraph of Section 2.3. When the value of a control is missing for some individuals in the analysis sample, we include an indicator for the value being missing. For each control listed below that is not an indicator variable, we winsorize at 2.5% (top and bottom). All controls for social class are based on occupation.

The NCDS does not include direct measures of parental income or wealth, but the controls listed below include various proxies for parental income and wealth derived from parental questionnaires (including social class based on occupation, education, housing characteristics, household financial difficulties, and household receipt of free school meals).

- Controls collected at birth from the PMS questionnaire (completed by the midwife during an interview with the mother shortly after the cohort member's birth):
  - Mother's age
  - Mother in education beyond the minimum school leaving age
  - Mother's region of residence
  - Mother's working behavior during the pregnancy
  - Mother's social class
  - Mother's father's social class
  - Mother's smoking behavior during the pregnancy
  - Mother's parity (number of previous live births or stillbirths)
  - Mother's husband's age
  - Mother's husband's social class
  - Gestational duration of the pregnancy
  - Cohort member's sex
  - Cohort member's birthweight

- Controls collected at age 7 from a parental questionnaire (completed by a health visitor during an interview with the mother):
  - Number of children aged under 21 in the household
  - Parents' preference about cohort member's school leaving age
  - Mother's activities with cohort member: frequency mother reads to cohort member; frequency mother goes on outings with cohort member
  - Father's activities with cohort member: frequency father reads to cohort member; frequency father goes on outings with cohort member
  - Father's role in managing cohort member (relative to mother)
  - Father's social class
  - Father's education: education beyond the minimum school leaving age; age when finished full-time education
  - Mother's working behavior: before cohort member started school; since cohort member started school
  - Housing: tenure; number of rooms
  - Household financial difficulties
  - Breast feeding duration for cohort member
- Controls collected at age 11 from a parental questionnaire (completed by a health visitor during an interview with the mother):
  - Number of children aged under 21 in the household
  - Parents' preference about cohort member's school leaving age
  - Mother's activities with cohort member: frequency mother goes on outings with cohort member
  - Father's activities with cohort member: frequency father goes on outings with cohort member
  - Father's role in managing cohort member (relative to mother)
  - Father's social class
  - Mother's social class
  - Mother's working behavior: since the cohort member was age 7; in the last year
  - Housing: tenure; number of rooms
  - Household financial difficulties
  - Household receives free school meals (at least one child)

- Controls collected at age 7 from a medical questionnaire (completed by a doctor during an examination of the cohort member):
  - Assessments of deficits: speech; hearing; vision
- Controls collected at age 11 from a medical questionnaire (completed by a doctor during an examination of the cohort member):
  - Assessments of deficits: speech; hearing; vision
- Controls collected at age 7 from a school questionnaire (completed partly by the headteacher and partly by the cohort member's class teacher):
  - Characteristics of the cohort member: attendance rate; help for special educational needs; native English speaker
  - Characteristics of the cohort member's school: school type (state or private); number of pupils in the school; presence of a parent-teacher association
  - Characteristics of the cohort member's school class: number of pupils in the cohort member's class; class grouping based on ability; fraction of fathers of the class pupils in various social class groups; proportion of parents of the class pupils who have met the class teacher (or the headteacher) during the current school year
- Controls collected at age 11 from a school questionnaire (completed partly by the headteacher and partly by the cohort member's class teacher):
  - Characteristics of the cohort member: attendance rate; help for special educational needs; native English speaker
  - Characteristics of the cohort member's school: school type (state or private); number of pupils in the school
  - Characteristics of the cohort member's school class: number of pupils in the cohort member's class; class grouping based on ability

Web Appendix I.2

Teacher evaluation error control

Section 2.6 explained that we: (i) estimate teacher evaluation errors at the child level by comparing teacher evaluations of math and reading ability at age 7 to the math and reading scores from the tests that were administered to NCDS cohort members at the same age; and (ii) include our estimate of the child-level teacher evaluation error as a control in our regressions. Here, we describe how we construct this control variable for each individual in the analysis sample.

(a) Teacher evaluations of math and reading ability at age 7 were elicited in the same way and using the same questionnaire as teacher evaluations of creativity at the same age. Thus, we convert teacher evaluations of math and reading ability at age 7 to percentile scores in the same way that we converted teacher evaluations of creativity at age 7 to percentile scores (see the second paragraph of Section 2.4).

(b) To make the math test scores comparable to the teacher evaluations of math ability, we: (i) compare each individual's math test score at age 7 to the test scores of the other individuals in the analysis sample; (ii) based on this comparison, categorize each individual's math test score using the same five categories that were used for teacher evaluations (see the second paragraph of Section 2.4); and (iii) convert these categories to percentile scores in the same way that we convert teacher evaluations to percentile scores (again, see the second paragraph of Section 2.4). We follow the same procedure for the reading test scores.

(c) For math, for each individual we calculate the difference (which can take a positive or negative value) between the teacher evaluation percentile score and the test percentile score. We do the same for reading, and then average the two differences to obtain our estimate of the child-level teacher evaluation error.

Web Appendix II

Inverse probability weighting

The fourth paragraph of Section 2.3 introduces the inverse probability weighting method. Here we describe the details of the procedure.

When we study an outcome or attribute using one wave of the NCDS:

(a) We construct an indicator variable that is equal to one if the question(s) that we use to construct the outcome or attribute was (were) completed for the individual in the analysis sample, and is equal to zero otherwise.[15]

(b) We estimate a logistic regression of this indicator on the controls from the PMS questionnaire (see Web Appendix I.1), which measure the baseline characteristics of the individuals.

(c) Using the parameter estimates from this logistic regression, we calculate individual-level question completion probabilities, i.e., the probability that the requisite question(s) was (were) completed given the individual's baseline characteristics.

(d) Finally, we re-weight each individual in the estimation sample (which consists of the individuals in the analysis sample who completed the requisite question(s)) by the inverse of the question completion probability that we calculated in the previous step.

When we study an outcome or attribute over multiple waves of the NCDS (e.g., when we study wages using data from different ages), we apply inverse probability weighting to each wave.

[15] An individual might not have answered a particular question due to non-response to the relevant survey, non-response to that particular question, or because the question was not asked given a previous response (e.g., wages were not asked of individuals who reported not being in work).

Web Appendix III

Analysis of pathways

In this web appendix we provide evidence about various pathways by which childhood creativity and cognitive ability might affect labor market and educational outcomes. Section 5 in the main text summarizes this evidence.

Web Appendix III.1

Skills and occupational categories

Table 2 in Section 3.2 studies how childhood creativity and cognitive ability predict various self-evaluated skills in adulthood, while Table 5 in Section 4.2 studies how childhood creativity and cognitive ability predict the type of occupation that individuals work in. To help understand potential pathways from creativity and cognitive ability to occupational categories via skills in adulthood, Table A.1 below reports correlations between the fourteen skills in adulthood from Table 2 and working in each of the six occupational categories from Table 5.

We focus on correlations with an absolute value greater than 0.1. Table A.1 reports such correlations using blue (positive correlations) and red (negative correlations). Broadly speaking, higher skills are positively correlated with working in the top two occupational categories. In particular, notice that every correlation with an absolute value greater than 0.1 in the first two columns is positive (colored in blue). At the same time, higher skills tend to be negatively correlated with working in the bottom four occupational categories. In particular, notice that every correlation with an absolute value greater than 0.1 in the final four columns is negative (colored in red), except that skill in construction and assembly, skill in using tools properly and skill in reading plans or diagrams are positively correlated with working in the category of skilled manual occupations.

The correlations reported in Table A.1 suggest the following pathways from childhood creativity and cognitive ability to occupational categories via skills in adulthood:

1. The positive correlations marked in blue in the second column of Table A.1 below suggest that the positive effect of creativity on the probability of working in the category of managerial and technical occupations (see Table 5) operates partly via the positive effect of creativity on skill in selling products or services, on the four mixed skills, and on the three guidance-related skills (see Table 2).

2. The positive correlations marked in blue in the second column of Table A.1 below suggest that the positive effect of cognitive ability on the probability of working in the category of managerial and technical occupations (see Table 5) operates partly via the positive effect of cognitive ability on the three primarily analytical skills, on the four mixed skills, and on the three guidance-related skills (see Table 2).

3. The positive correlations marked in blue in the first column of Table A.1 below suggest that the positive effect of cognitive ability on the probability of working in the category of professional occupations (see Table 5) operates partly via the positive effect of cognitive ability on skill in mathematical calculations and on skill in using a computer to solve problems (see Table 2).

4. The negative correlations marked in red in the third column of Table A.1 below suggest that the negative effect of creativity on the probability of working in the category of skilled non-manual occupations (see Table 5) operates partly via the positive effect of creativity on skill in construction and assembly, on skill in using tools properly, on skill in reading plans or diagrams, on skill in running an organisation, and on skill in supervising (see Table 2).

	Professional	Managerial & Technical	Skilled non-manual	Skilled manual	Partly skilled	Unskilled
Panel A: Primarily practical skills						
Construction & assembly	0.023	-0.026	-0.160	0.236	-0.047	-0.025
Using tools properly	-0.012	-0.044	-0.145	0.233	-0.014	-0.021
Selling products or services	-0.014	0.108	0.008	-0.063	-0.061	-0.052
Looking after people who need care	-0.033	0.048	0.039	-0.155	0.082	0.014
Panel B: Primarily analytical skills						
Mathematical calculations	0.111	0.127	-0.048	-0.020	-0.143	-0.088
Understanding finance	0.054	0.123	0.046	-0.111	-0.108	-0.080
Using a computer to solve problems	0.111	0.179	0.090	-0.206	-0.167	-0.093
Panel C: Mixed skills						
Writing clearly	0.049	0.108	0.087	-0.181	-0.051	-0.072
Speaking clearly	0.034	0.102	0.031	-0.126	-0.042	-0.046
Reading plans or diagrams	0.091	0.115	-0.146	0.115	-0.147	-0.092
Running an organisation	0.070	0.225	-0.119	-0.061	-0.120	-0.092
Panel D: Guiding others						
Advising	0.033	0.142	0.022	-0.141	-0.067	-0.054
Teaching	0.030	0.172	-0.055	-0.098	-0.059	-0.070
Supervising	0.046	0.216	-0.102	-0.024	-0.142	-0.117

Notes: This table reports the Pearson correlations between each skill in adulthood from Table 2 and working in each occupational category from Table 5. For each pair of skill and occupational category, the correlation is calculated using all the individual-year observations from Panel A of Table 5, excluding individuals not in the sample in Table 2 for that skill. Correlations ≥ 0.1 (≤ -0.1) are marked in blue (red).

Table A.1: Correlations between skills in adulthood and occupational categories.

Web Appendix III.2

Labor market outcomes controlling for educational attainment

Table A.2 below replicates Table 4 from Section 4.1, but now including controls for educational attainment. When we include education controls in Table A.2, the effect of creativity on earnings falls by around one quarter, while continuing to be statistically significant at the 1% level. This suggests that some of the effect of childhood creativity on earnings operates through formal education, while a majority of the effect of creativity on earnings remains after controlling for education. As pointed out by a thoughtful referee, the remaining effect of creativity in Table A.2 could operate partly through learning that is not captured by our formal educational attainment measures. The pattern for cognitive ability is similar, with the effect of cognitive ability on earnings falling by around four tenths when we include education controls in Table A.2.

Panel A: All individuals

	Individuals in work			
	Log hourly earnings	Log weekly earnings	Log weekly hours	In work
Creativity	0.011***	0.018***	0.007**	0.006*
	(0.004)	(0.005)	(0.003)	(0.003)
Cognitive ability	0.063***	0.082***	0.019***	0.032***
	(0.006)	(0.008)	(0.005)	(0.004)
Individual-year obs.	35,342	35,342	35,342	48,363
Mean dep. var.	-	-	-	0.81

Panel B: Excluding self-employed

	Individuals in work		
	Log hourly earnings	Log weekly earnings	Log weekly hours
Creativity	0.012***	0.017***	0.005
	(0.004)	(0.005)	(0.003)
Cognitive ability	0.059***	0.083***	0.024***
	(0.006)	(0.008)	(0.005)
Individual-year obs.	31,878	31,878	31,878

Notes: See the notes to Table 4. Here we further include controls for the three binary measures of educational attainment from Table 6.

Table A.2: Earnings, hours, and employment (with controls for educational attainment).

Table A.3 below replicates Table 5 from Section 4.2, but now including controls for educational attainment. When we include education controls in Table A.3, the effect of creativity on the likelihood of working in the higher category of managerial and technical occupations falls by around two tenths, while continuing to be statistically significant at the 1% level (the other

statistically significant effects of creativity do not change much or at all). This suggests that some of the effect of childhood creativity on the likelihood of working in managerial and technical occupations operates through formal education, while a majority of the effect of creativity on this likelihood remains after controlling for education.

Turning to cognitive ability, the average of the three positive coefficients (in the first three columns) falls by around three tenths when we include education controls in Table A.3.[16] Correspondingly, the average of the absolute values of three negative coefficients (in the final three columns) falls by the same amount. All effects remain statistically significant at the 1% level. This suggests that some of the effect of cognitive ability on the likelihoods of working in the six occupational categories operates through formal education, while a majority of the effect remains after controlling for education.

Overall, the education controls reduce the effects of creativity and cognitive ability on occupational category by less than the education controls reduce the effects of creativity and cognitive ability on earnings, although the differences are not large.

Panel A: All individuals

	Professional	Managerial & Technical	Skilled non-manual	Skilled manual	Partly skilled	Unskilled
Creativity	0.001	0.018***	-0.014***	-0.002	0.000	-0.003*
	(0.002)	(0.005)	(0.004)	(0.004)	(0.003)	(0.002)
Cognitive ability	0.021***	0.053***	0.031***	-0.050***	-0.038***	-0.016***
	(0.003)	(0.007)	(0.006)	(0.006)	(0.005)	(0.003)
Individual-year obs.	31,703	31,703	31,703	31,703	31,703	31,703
Mean dep. var.	0.05	0.38	0.21	0.20	0.13	0.03

Panel B: Excluding self-employed

	Professional	Managerial & Technical	Skilled non-manual	Skilled manual	Partly skilled	Unskilled
Creativity	-0.000	0.018***	-0.013***	-0.001	0.000	-0.004**
	(0.002)	(0.005)	(0.005)	(0.004)	(0.004)	(0.002)
Cognitive ability	0.017***	0.059***	0.031***	-0.049***	-0.041***	-0.017***
	(0.003)	(0.008)	(0.006)	(0.006)	(0.005)	(0.003)
Individual-year obs.	26,895	26,895	26,895	26,895	26,895	26,895
Mean dep. var.	0.05	0.38	0.23	0.18	0.13	0.03

Notes: See the notes to Table 5. Here we further include controls for the three binary measures of educational attainment from Table 6.

Table A.3: Occupational categories (with controls for educational attainment).

[16] Although the average falls, the likelihood of working in the skilled non-manual category increases.

Web Appendix III.3

Labor market outcomes controlling for occupational category

Table A.4 below replicates Table 4 from Section 4.1, but now including controls for the six occupational categories studied in Table 5 from Section 4.2. When we include occupational category controls in Table A.4, the effect of creativity on earnings falls by a little over four tenths (with statistical significance falling from the 1% level to the 5% level). This suggests that some of the effect of childhood creativity on earnings operates through the choice of occupational category, while a majority of the effect of creativity on earnings remains after controlling for occupational category.

The effect of cognitive ability on earnings also falls by around four tenths when we include occupational category controls in Table A.4. Notably, with occupational category controls, the effect of cognitive ability on weekly hours falls sharply and becomes statistically insignificant, which suggests that the effect of cognitive ability on weekly hours (for individuals in work) operates entirely through the choice of occupational category.

Panel A: All individuals

	Individuals in work		
	Log hourly earnings	Log weekly earnings	Log weekly hours
Creativity	0.009**	0.012**	0.004
	(0.004)	(0.006)	(0.004)
Cognitive ability	0.072***	0.069***	-0.004
	(0.006)	(0.007)	(0.005)
Individual-year obs.	28,823	28,823	28,823

Panel B: Excluding self-employed

	Individuals in work		
	Log hourly earnings	Log weekly earnings	Log weekly hours
Creativity	0.010**	0.013**	0.002
	(0.004)	(0.006)	(0.004)
Cognitive ability	0.071***	0.071***	-0.000
	(0.005)	(0.007)	(0.005)
Individual-year obs.	25,540	25,540	25,540

Notes: See the notes to Table 4. Here we further include controls for the six occupational categories from Table 5. As described in the notes to Table 5, we exclude age 23 from Table 5 because the NCDS used different occupational categories at that age; therefore we also exclude age 23 here. As further described in the notes to Table 5, we exclude individuals not in work from Table 5 because they were not allocated to an occupation by the NCDS; therefore we omit here the column from Table 4 titled "In work".

Table A.4: Earnings, hours, and employment (with controls for occupational category).

Web Appendix III.4

Creative occupations and self-employment

The NCDS reports occupations using the UK's Standard Occupational Classification system. Conveniently, the UK's DCMS (Department for Culture, Media and Sport, 2010) classified each of these occupations as creative or not creative, and therefore we use the DCMS's creativity classification to measure the creativity of each individual's occupation (see the notes to Table A.5 for details). Specifically, the DCMS classified 35 occupations as being creative, which together account for around 5% of employment. These creative occupations include, e.g., architects, graphic designers, journalists, marketing professionals, musicians, town planners, and Information Technology strategy professionals. Although the DCMS's classification of creative occupations appears well thought out and sensible, nonetheless we interpret our results in this section with caution because measuring the creativity of occupations is fraught with difficulty and controversial (Glaeser, 2005; Markusen, 2006; Krätke, 2010).[17]

Interestingly, we find an effect of childhood creativity on the probability of working in a creative occupation that operates via self-employment. Specifically, we find that: (i) more creative individuals are more likely to be self-employed; (ii) self-employed individuals are more likely to work in creative occupations; and furthermore (iii) among the self-employed, more creative individuals are more likely to work in creative occupations. In more detail:

1. The first and second columns of Table A.5 below show that more creative individuals are more likely to be self-employed. In particular, a one-standard-deviation increase in creativity is associated with a one-percentage-point increase in the probability of being self-employed, with the effect statistically significant at the 1% level. To help interpret this effect size, Table A.5 reports that 14% of individuals in work are self-employed. Comparing Panels A and B, we get similar estimates whether or not we control for educational attainment.

2. The means of the dependent variables in the third and fourth columns of Table A.5 (reported in bold face) show that self-employed individuals are more likely to work in creative occupations. In particular, 10% of self-employed individuals work in a creative occupation, while only 4% of employees work in a creative occupation.

3. The third column of Table A.5 below shows that, among the self-employed, more creative individuals are more likely to work in creative occupations. In particular, among the self-employed, a one-standard-deviation increase in creativity is associated with a two-percentage-point increase in the probability of working in a creative occupation ($p = 0.014$ in Panel A). When we control for educational attainment in Panel B, the effect size falls from 0.020 to 0.014 (and $p = 0.062$), which suggests that some of the effect operates through formal education, while a majority of the effect remains after controlling for education.

[17] As noted by Markusen et al. (2008), depending on the methodology used, estimates of creative employment range from 1% to 50%. As noted by Krätke (2010), nearly all occupations involve a mix of creative and executive tasks. Finally, as noted by Glaeser (2005), it is difficult to estimate the degree to which work in an occupation involves creativity versus broader human capital and other skills.

Panel A: Without controls for educational attainment

	In self-employment		In a creative occupation	
	(all individuals)	(individuals in work)	(self-employed)	(employees)
Creativity	0.010***	0.011***	0.020**	-0.000
	(0.003)	(0.004)	(0.008)	(0.002)
Cognitive ability	-0.008**	-0.015***	0.030***	0.016***
	(0.004)	(0.005)	(0.009)	(0.003)
Individual-year obs.	48,363	39,277	4,806	26,914
Mean dep. var.	0.11	0.14	**0.10**	**0.04**

Panel B: With controls for educational attainment

	In self-employment		In a creative occupation	
	(all individuals)	(individuals in work)	(self-employed)	(employees)
Creativity	0.010***	0.012***	0.014*	-0.001
	(0.003)	(0.004)	(0.008)	(0.002)
Cognitive ability	-0.003	-0.009*	0.005	0.010***
	(0.004)	(0.005)	(0.010)	(0.003)
Individual-year obs.	48,363	39,277	4,806	26,914
Mean dep. var.	0.11	0.14	**0.10**	**0.04**

Notes: As described in detail in Section 2, we run OLS regressions of the dependent variable on standardized measures of childhood creativity and cognitive ability and a rich set of controls (Panel B further includes controls for the three binary measures of educational attainment from Table 6). The NCDS collected information on work at ages 23, 33, 42, 46, 50, and 55. Our individual-year observations in the first and second columns encompass these six waves of data, while the third and fourth columns exclude age 23 (as explained below), and here (as in Tables 4 and 5) our controls additionally include an indicator for each wave. The DCMS (Department for Culture, Media and Sport, 2010) classified each occupation in the UK's 2000 Standard Occupational Classification (SOC2000) as creative or not creative, and we use the DCMS's creativity classification to measure the creativity of each individual's occupation. In more detail, the age 46, 50, and 55 waves report individuals' occupations using SOC2000, and so we use the DCMS's creativity classification to directly classify each individual's occupation as creative or not creative (with the exception of a single occupation that the DCMS classified as partially creative, where we use the DCMS's weighting). The age 33 and 42 waves report individuals' occupations using the UK's 1990 Standard Occupational Classification (SOC1990), and so we cannot use the same direct methodology. Instead, we use a cross-walk methodology to calculate a creativity weighting for each occupation in SOC1990, which we then use as our measure of the creativity of each individual's occupation for the age 33 and 42 waves (specifically, the age 46 and 50 waves report individuals' occupations using both SOC1990 and SOC2000, and so we can use the age 46 and 50 waves to calculate a creativity weighting for each occupation in SOC1990 given by the frequency with which individuals in that occupation work in a creative occupation according to SOC2000). Finally, as in Table 5, we exclude age 23 from the third and fourth columns because the NCDS used an older non-comparable occupational classification system. Heteroskedasticity-consistent standard errors (clustered at the individual level) are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels (two-sided tests).

Table A.5: Self-employment and creative occupations.

We note that the relationship between childhood creativity and working in creative occupations that operates via self-employment does not explain our results on the relationship between creativity and earnings in Section 4.1 or our results on the relationship between creativity and occupational categories in Section 4.2. In those cases, our results were similar when we excluded self-employed individuals.

Finally, we note that creativity and cognitive ability relate differently to self-employment. In contrast to our results for creativity, the first and second columns of Table A.5 show that more cognitively able individuals are less likely to be self-employed.

Web Appendix III.5

Educational paths

In this section we provide evidence that, holding educational attainment fixed, childhood creativity and cognitive ability predict the type of educational path followed by individuals.

To control for educational attainment, Table A.6 below studies individuals who received at least one O-level qualification in any subject at age 16. Among such individuals, Table A.6 shows that more creative individuals are more likely to receive an O-level qualification in artistic subjects (that is, subjects related to art, music, craft and drama). In particular, a one-standard-deviation increase in creativity is associated with a three-percentage-point increase in the probability of receiving an O-level qualification in an artistic subject, with the effect statistically significant at the 1% level. By contrast, more cognitively able individuals are less likely to receive an O-level qualification in artistic subjects. Table A.6 also shows that more cognitively able individuals are more likely to receive an O-level qualification in analytical subjects (math and science), while creativity has no effect on the probability of receiving an O-level qualification in these subjects. Finally, more cognitively able individuals are less likely to receive an O-level qualification in "Mostly practical" subjects, with no effect for creativity (when interpreting this null effect of creativity, we note that the "Mostly practical" subject category includes a few analytical O-level subjects, which the NCDS subject groupings do not allow us to split out – see the notes to Table A.6).

Table A.7 below shows that these same patterns emerge when we consider A-level qualifications at age 18.

	Math	English	Science	Artistic	Mostly practical	Other
Creativity	0.004	0.009	0.001	0.031***	-0.012	0.001
	(0.009)	(0.010)	(0.009)	(0.010)	(0.010)	(0.009)
Cognitive ability	0.295***	0.255***	0.235***	-0.059***	-0.062***	0.247***
	(0.012)	(0.012)	(0.012)	(0.015)	(0.015)	(0.012)
Number of individuals	4,741	4,741	4,741	4,741	4,741	4,741
Mean dep. var.	0.43	0.65	0.39	0.26	0.37	0.62

Notes: As described in detail in Section 2, we run OLS regressions of the dependent variable on standardized measures of childhood creativity and cognitive ability and a rich set of controls. In each column, the dependent variable is an indicator for whether each individual received at least one O-level qualification or equivalent in the subject category (see the notes to Table 6 for more details about O-level qualifications). For each individual and for each of 21 subject groups, the NCDS reports whether the individual received at least one O-level qualification or equivalent in the subject group (the NCDS does not report qualifications at the individual subject level). We merge those 21 subject groups into the 6 subject categories used here. Our category "Artistic" includes a single group from the NCDS, namely "Art, Music, Craft and Drama." Our category "Mostly practical" includes three groups from the NCDS, namely "Domestic Sciences," "Commercial Subjects," and "Technical Subjects." The sample is restricted to individuals who received at least one O-level qualification or equivalent in England and Wales (for Scotland the NCDS does not report O-level qualifications at the subject group level or individual subject level). Heteroskedasticity-consistent standard errors are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels (two-sided tests).

Table A.6: Receiving an O-level (age 16) qualification in a subject category, among individuals who received at least one O-level qualification.

	Math	English	Science	Artistic	Mostly practical	Other
Creativity	-0.004	0.001	-0.002	0.044***	-0.000	-0.043**
	(0.015)	(0.014)	(0.018)	(0.014)	(0.010)	(0.020)
Cognitive ability	0.227***	0.002	0.170***	-0.157***	-0.045***	0.019
	(0.026)	(0.024)	(0.031)	(0.026)	(0.015)	(0.035)
Number of individuals	1,423	1,423	1,423	1,423	1,423	1,423
Mean dep. var.	0.19	0.18	0.31	0.13	0.07	0.61

Notes: See the notes to Table A.6: the same notes apply here, replacing "O-level" with "A-level" (except that there is no such thing as an A-level equivalent in England and Wales).

Table A.7: Receiving an A-level (age 18) qualification in a subject category, among individuals who received at least one A-level qualification.

Web Appendix IV

Further discussion and details

Web Appendix IV.1

Further discussion of the empirical methodology

Our methodology exploits the rich set of controls available in the NCDS. A recent literature on the relationship between childhood skills or preferences and later outcomes shares our empirical methodology. For example, using different longitudinal datasets, Golsteyn et al. (2014), Castillo et al. (2019) and Angerer et al. (2023) measure how patience in childhood predicts later outcomes, controlling for family characteristics and cognitive ability (and in some cases risk aversion), while Fe et al. (2022) measure how theory of mind in childhood predicts later outcomes. We also follow Castillo et al. (2019) and Angerer et al. (2023) by using inverse probability weighting to account for attrition. Unlike Castillo et al. (2019) and Angerer et al. (2023) who use relatively small samples ($< 1,000$), we share the advantage with Golsteyn et al. (2014) that our sample is large and nationally representative, with little scope for selection.

As emphasized by Angerer et al. (2023), the empirical methodology that we share with all these papers has the advantage that it rules out reverse causality. Angerer et al. (2023) state: "The fact that we measured children's patience years before they took school-track choices excludes the possibility that our finding suffers from reverse causation problems." In our case, choices later in life (e.g., which subjects to study in high school, whether to attend college, what type of job to work in) cannot affect childhood creativity, and so the associations that we study are not driven by the joint effect of life choices on creativity and outcomes. Ruling out reverse causality is an important advantage of our methodology that is not present in, e.g., Sutter et al. (2013) who measure how adolescents' time and risk preferences predict their contemporaneous behavior such as smoking, drinking and school conduct.

Exploring the relationship between childhood skills or preferences and later outcomes is a demanding undertaking because every methodology comes with its unique set of challenges. An alternative to our methodology could involve conducting a randomized intervention designed to enhance creativity in childhood, and then measuring the impact of this intervention on outcomes later in life. This alternative suffers from the following challenges:

1. This alternative would identify the causal effect of the intervention on outcomes. However, we cannot be sure that this alternative would identify the causal effect of creativity on outcomes, because the intervention could change unmeasured skills, preferences or characteristics. Golsteyn et al. (2014) make this point in the context of the literature on the effects of childhood patience: "The literature on economic preference parameters typically focuses on the predictive value of preferences. Causal effects are not possible to elicit as – even in the setting of a laboratory where the researcher can control many aspects – it would not be possible to design an experiment which influences time preferences only. One cannot exclude the possibility that other preferences are influenced as well by the experiment."

2. This alternative would take many years to produce findings since the outcomes would be measured decades after the intervention in childhood. By contrast, our methodology takes advantage of the rich data already collected by the NCDS throughout the cohort members' lifetimes.

3. This alternative would be limited to smaller and less representative samples because interventions designed to enhance creativity are intensive and time consuming, which limits the feasible size of such interventions. Sternberg (2019) summarizes the literature on enhancing creativity and mentions two specific programs: the CoRT (Cognitive Research Trust) program includes sixty lessons, split into six units, with the fourth devoted specifically to creativity; while the Productive Thinking Program has a special emphasis on creativity and comprises fifteen booklets. By contrast, our methodology takes advantage of the large and nationally representative sample already collected by the NCDS.

Web Appendix IV.2

Further discussion of the relationship between creativity and cognitive ability

We emphasize that we do not view creativity and cognitive ability as orthogonal dimensions of an individual's characteristics. As we note in the introduction: "creativity is a multidimensional ability that is underpinned by reasoning by analogy, lateral thinking, imagination and judgment" and "creativity is best described as an intellectual activity that is one important aspect of cognition." Thus, in a broad sense, we think of creativity as one example of a cognitive skill. Recent literature in economics incorporates skills like theory of mind ability and judgment within this broad notion of cognitive skills, together with traditional cognitive ability that includes fluid intelligence (i.e., logical reasoning ability) and crystallized intelligence (i.e., acquired knowledge and verbal skills). In particular, Fe et al. (2022) discuss in detail the relationship between theory of mind and cognitive ability, while Gill et al. (2023) study how judgment and cognitive ability together influence strategic behavior.

As summarized by Karwowski et al. (2016), recent evidence suggests correlations between creativity and cognitive ability as high as 0.4 to 0.5. According to Benedek and Jauk (2019) who review the literature on the relationship between creativity and cognitive ability, there is a "robust positive association between intelligence and creativity" that "generalizes to different measures of creative potential," and furthermore "higher intelligence predicts higher creativity of ideas, especially at the beginning of idea generation" while "decreased latent inhibition may be particularly fruitful in combination with high intelligence." Cognitive ability may be particularly important for creativity by helping the judgment required to evaluate new ideas: Runco and Acar (2019) point out that "some judgment is involved in all creative problem-solving," while Benedek and Jauk (2019) note that "intelligence may be particularly relevant ... for the skilled evaluation of ideas" and Sternberg et al. (2019) note that people are "analytical when they evaluate whether their ideas are good ones." Finally, Karwowski et al. (2016) provide evidence from eight studies ($N > 12,000$) that cognitive ability is a necessary-but-not-sufficient condition for creativity.

At the same time, Sternberg et al. (2019) observe that creativity is excluded from, or only tangential, to most intelligence tests and theories. They clarify that Sternberg's WICS (Wisdom, Intelligence, Creativity, Synthesized) is perhaps the model that most directly explores the connection between creativity and intelligence. Within the context of WICS, Sternberg et al. (2019) explain that "there is a set of information-processing components that underlie all higher cognitive processes" and "these components are used for creative, analytical, and practical thinking." Benedek et al. (2014) provide relevant experimental evidence by showing that fluid intelligence and creativity share a common cognitive basis through the effects of executive function: specifically, they find that "updating" is the central executive function that helps to explain part of the correlation between fluid intelligence and creativity (updating is the process of revising working memory content by replacing obsolete information with new incoming information that is relevant to the task).

Recent neuroscience research on the roles of cortical networks suggests that creativity is mainly linked to the default mode network (DMN), while problem solving and decision making are mainly linked to the task-positive network (TPN), and that these networks are antagonistic

in that neural activity in one network tends to inhibit activity in the other (Boyatzis et al., 2014). However, Friedman et al. (2015) provide nuance by noting that although "the DMN plays a critical role in creative thinking," nonetheless "the contributions of TPN regions to creative thinking cannot be ignored."

Finally, we note that we find effects of creativity on outcomes that are economically significant but smaller in magnitude than those of cognitive ability. Cognitive ability is known to be of fundamental importance to labor market and academic success (e.g., Heckman et al., 2006, and Malanchini et al., 2020), and so we argue in Section 4 that it would be implausible to find that other aspects of cognition relate as strongly to outcomes.

Web Appendix IV.3

Discussion of creativity and automation

The existing literature argues that routine codifiable tasks are more likely to be automated, compared to non-routine more cognitively challenging tasks. Furthermore, this literature suggests that tasks that require creativity are particularly resistant to automation. For example, Deming (2017b) says that "Machines are generally quite good—much better than humans—at performing routine, codifiable tasks according to a set of explicit rules. However, people are still much better at open-ended tasks that require flexibility, creativity, and judgment," while Autor (2015) says that "the interplay between machine and human comparative advantage allows computers to substitute for workers in performing routine, codifiable tasks while amplifying the comparative advantage of workers in supplying problem-solving skills, adaptability, and creativity." However, these papers do not provide a framework to help us understand why creativity might be hard to automate or which types of jobs might be more resistant to automation due to their reliance on creativity.

Why might creativity be hard to automate? A number of overlapping features of creative activity provide some insights.

1. Creativity helps to find solutions "to complex, novel, and ill-defined, or poorly structured, problems" (Mumford et al., 2019). Since such open-ended problems are hard to formalize, they are less codifiable.

2. As we describe in the introduction, creativity is a multidimensinal ability that is underpinned by reasoning by analogy, lateral thinking, imagination and judgment. Thus, creativity requires many different types of cognitive activities to work in tandem.

3. Producing creative output is a complex dynamic process. As noted by Mumford et al. (2019), "it is not one creative idea but chains of ideas that result in innovation" and "those asked to lead creative efforts are leading an exploratory problem-solving effort where problems unfold over time, leading to the progressive refinement, or development, of innovative products or services."

4. Theories of creative thinking emphasize the complexity involved in developing creative abilities: "individuals come to be creative through a process of creative development, exploring creative interests and gathering elements – data, ideas, models, possibilities, techniques" (Feinstein, 2011).

5. As we describe in the introduction, the conceptual combination and analogical reasoning that underpin creativity rely on the practical application of existing knowledge based on experience (footnote 5 expands on this point in detail). Relatedly, creativity requires expertise in multiple domains: "multiple different forms of expertise must be brought to bear to understand problems and generate creative problem solutions" (Mumford et al., 2019).

These features of creative activity provide clues about the types of jobs that might be more resistant to automation due to their reliance on creativity. Generally speaking, these jobs will include those that require solving complex, novel, ill-defined, poorly structured or open-end problems. Overlapping categories of such jobs include:

1. Jobs that require the development of innovative products or services, e.g., jobs in high tech firms or industries undergoing rapid structural change.

2. Jobs that require the development of brand new ideas, e.g., scientific research or jobs in the legal industry that depend on developing innovative arguments in complex legal cases.

3. Jobs that require the practical application of existing knowledge based on experience, e.g., landscaper, chef, or teacher. These types of jobs tend to require considerable on-the-job learning, which links to our empirical finding that more creative individuals are more likely to work in jobs that require experience.

Web Appendix IV.4

Discussion of the relationship between creativity and social skills

The psychology literature does not support a robust link between creativity and social skills. Perry-Smith and Shalley (2003) develop an influential framework in which creativity is highest among workers with weak social ties in the network of work relationships, because weak ties provide access to diverse sources of information, while facilitating autonomy rather conformity in thinking. For primary-school children, Alptekin et al. (2022) find that only the problem-solving subscale of social skills is robustly associated with creativity. Creative people tend to be autonomous, introverted and hostile (Plucker et al., 2019). There is evidence of a negative relationship between agreeableness and divergent thinking (Runco and Acar, 2019) and of an inverse U-shaped relationship between agreeableness and imagination (Feist, 2019). There is also evidence of a positive relationship between creativity and extraversion; however, it is the confidence-assertiveness component of extraversion that predicts creativity rather than the sociability-gregariousness component (Feist, 2019). Furthermore, creative people often create social problems: "creative people tend to doubt and buck social norms and question tradition and authority" (Feist, 2019); "creative ideas challenge established norms and bring disorder, which imply a risk since creative people tend to be met with resistance and skepticism" (Mellander and Florida, 2021); and "creative people can generate more ideas because they do not limit themselves to socially appropriate and acceptable ideas" (Runco and Acar, 2019).

As we note in the introduction, our finding that the positive effects of creativity on occupational type are concentrated on the managerial and technical category provides support for a view in psychology that creativity is particularly important for managers and leaders. However, the mechanism proposed in the psychology literature does not work through social skills, but rather through the promotion of creative output by leaders. Reiter-Palmon et al. (2019)'s survey chapter argues that "one of the most important skills for managers is that of creative thinking" and provides more details about how creativity helps leadership. Specifically, leaders use their creativity to: (i) be "supportive of creative efforts;" (ii) set "expectations for employees to be creative;" (iii) "facilitate the creative processes associated with creativity;" (iv) "act as a clearing house for ideas;" (v) "supplement their employees' skills by weighing consequences and outcomes to assist in the best course of action that would ultimately lead to a creative outcome;" and (vi) "display skills and abilities in assisting in specific creative problem-solving processes."

Web Appendix IV.5

Further discussion of teacher evaluation of creativity

In the literature on creativity assessment, survey-based teacher evaluation of creativity is a common method for assessing the creativity of children (Plucker et al., 2019). Although we are constrained by the specific creativity measure chosen by the NCDS, it is similar to the teacher-evaluated measure of creativity in the commonly used Scales for Rating the Behavioral Characteristics of Superior Students (SRBCSS).[18] The SRBCSS creativity measure asks the teacher to rate the child's "imaginative thinking ability" and "ability to come up with unusual, unique, or clever responses," among other questions. As noted by Plucker et al. (2019): "perhaps the most popular instruments, at least within educational settings, are the Scales for Rating the Behavioral Characteristics of Superior Students" and "the SRBCSS has been found to be the most frequently used measure of creativity in gifted education screening procedures..." The technical and administration manual for the SRBCSS (Renzulli et al., 2021) provides the creativity measure and has been cited nearly 1,000 times on Google Scholar.

Renzulli et al. (1971) provide evidence of the reliability and validity of the SRBCSS teacher-evaluated measure of creativity.[19] More generally, Park et al. (2016) note that subjective evaluations of creativity are potentially subject to inflation due to illusory superiority (the tendency to think of members of a group as above average) and leniency bias (the tendency to be lenient to those with whom one is personally involved). Interestingly, in our data we find no evidence of these biases in the aggregate. Instead, Table A.35 in Web Appendix VII shows that teachers downplay creativity somewhat compared to the population distribution that they are asked to target, and this result is consistent with Benedek et al. (2016) who find that teachers show a systematic tendency to underestimate the creativity of ideas.

Recognizing that teachers might make errors when they evaluate children's creativity, in Section 2.6 we describe how our regressions include estimates of child-level teacher evaluation errors as a control. An insightful referee noted that if a teacher reports an incorrect evaluation of creativity to a child, this mislabeling could impact the child's self-perceptions and behavior, including their human capital investments. Conveniently, to the extent that our estimates of teacher evaluation errors predict mislabeling, including these estimates in our regressions controls for any behavioral effects of mislabelling on outcomes. Furthermore, there was little reason for the teacher to report their creativity evaluation to the child because teachers evaluated the creativity of a small number of children in their class and confidentially reported evaluations to the NCDS. In fact, most teachers who evaluated the creativity of an NCDS cohort member

[18] Third-party evaluation of creativity is also used in other settings. For example, Park et al. (2016) highlight that supervisor evaluation of creativity is a common assessment tool for field studies in organizational settings, and they specifically reference the three-item supervisor measure of creativity developed by Oldham and Cummings (1996).

[19] Specifically, Renzulli et al. (1971): (i) find a correlation of 0.91 between the creativity evaluations of two sets of teachers who evaluated the same children after an interval of three months; (ii) find that creativity evaluations are higher for children previously identified as gifted; and (iii) find strong correlations between teacher evaluations of creativity and scores on several of the subscales of the Torrance Tests of Creative Thinking. Relatedly, Gralewski and Karwowski (2019)'s meta-analysis finds a moderately sized, but highly statistically significant ($p < 0.001$), correlation between teacher evaluations of creativity and scores on tests of divergent thinking (which is one aspect of creativity).

evaluated only one child.[20]

Our estimates of child-level teacher evaluation errors are based on the assumption that teachers' errors in evaluating math and reading ability (which we observe) help to predict their errors in evaluating creativity. Importantly, the errors in evaluating math and reading do not have to be the same size, or even the same sign, as the errors in evaluating creativity. Instead, the errors in evaluating math and reading predict the errors in evaluating creativity to the extent that they are linearly related. To help understand this, suppose that there is a noiseless linear relationship between the math / reading errors and creativity errors: then our estimates of the teacher evaluation errors are a linear transformation of the true errors in evaluating creativity, and therefore fully control for the errors. There are a number of reasons why the errors might be of different sizes or signs. For example, teachers might want to compensate a low score on one skill with a higher score on another skill (although teachers confidentially reported their evaluations to the NCDS, mitigating any reason to engage in compensation). Alternatively, teachers might use (possibly incorrect) beliefs about the correlation between creativity and cognitive ability to help evaluate a child's creativity.

Of course, there is likely some noise in the relationship between errors in evaluating math and reading ability and errors in evaluating creativity, in which case our estimates of the teacher evaluation errors act as a noisy control. One reason is that teachers might evaluate some skills more accurately than others. This specific concern is mitigated by the fact that the teachers evaluating the NCDS cohort members at age seven were generalist teachers, and so had a broad knowledge of the child's characteristics across multiple domains (although Benedek et al., 2016, find that teachers' ability to evaluate the creativity of ideas is correlated with their openness, intelligence and language competence). While Plucker et al. (2019) provide a detailed summary of the literature on creativity assessment (recall in particular the evidence discussed in the second paragraph above on teacher evaluation of creativity), we are not aware of any evidence specifically comparing individual teachers' ability to evaluate creativity with their ability to evaluate other skills.

[20]The NCDS does not include information about how many cohort members were in each teacher's class. However, we know that the NCDS sample includes almost all individuals born in a particular week in 1958 (see Section 2.1). Assuming class sizes of thirty, and assuming that all individuals born in the relevant week are in the NCDS sample, then, conditional on a teacher having at least one cohort member in their class, the probability that this cohort member was the only cohort member in that teacher's class is approximately 0.74.

Web Appendix IV.6

Further discussion of the measure of cognitive ability

Cognitive ability includes fluid intelligence (i.e., logical reasoning and problem-solving ability) together with crystallized intelligence (i.e., acquired knowledge and verbal skills): see Gray and Thompson (2004) and Fe et al. (2022). As we describe in Section 2.5, our measure of cognitive ability is based on five tests administered to NCDS cohort members at ages 7 and 11. Moulton et al. (2020) review the cognitive tests included in five British birth-cohort studies, including the NCDS. According to Moulton et al. (2020), the five cognitive tests that make up our measure of cognitive ability capture crystallized, quantitative, and fluid intelligence. Specifically, Moulton et al. (2020) note that the two reading tests capture crystallized intelligence, the two math tests capture quantitative intelligence, and the general ability test captures fluid intelligence by measuring verbal and non-verbal reasoning (the general ability test also captures some crystallized intelligence). Thus, the five tests provide a broad assessment of cognitive ability.

Nonetheless, as pointed out by a thoughtful referee, scores on the cognitive tests partially reflect ability in test-taking and following rules-based procedures at school. Since school children everywhere are exposed to test-taking and learning to the test, this concern applies to a greater or lesser extent to any cognitive test. In our context, we note the following:

1. As noted above, the 80-question general ability test that measures verbal and non-verbal reasoning captures fluid intelligence, which is "an individual's ability to solve novel problems, without relying on acquired knowledge" (Moulton et al., 2020, p.16). The 40 non-verbal questions are similar to Raven's progressive matrices (Raven et al., 2000), while the 40 verbal questions asked the children to link words "either logically, semantically or phonologically" (Moulton et al., 2020, p.87). Indeed, Breen and Goldthorpe (2001, p.85) note that scores on the general ability test "serve as a good proxy for IQ scores." Thus, scores on the general ability test are a particularly clean measure of cognitive ability. Furthermore, in Web Appendix V.1 we show that our results on creativity are robust when, instead of using our single measure of cognitive ability based on factor analysis, we include all five underlying cognitive test scores in our regressions, and thus include the general ability test scores as an individual control.

2. As Moulton et al. (2020) describe, the cognitive tests administered to NCDS cohort members at ages 7 and 11 have been used as measures of cognitive ability in a wide variety of academic literature. For example, in the economics literature, Case and Paxson (2008) use the math and reading test scores at age 7 as measures of childhood cognitive ability, finding that cognitive ability explains much of the height premium in earnings (see also Galindo-Rueda and Vignoles, 2005).

3. The cognitive tests administered to NCDS cohort members were low-stakes tests since most teachers who had an NCDS cohort member in their class had only one such child (see footnote 20 in Web Appendix IV.5). Indeed, Moulton et al. (2020)'s review of the cognitive tests in the NCDS does not include school educational attainment measures, partly because of "the high stakes for teachers and schools encouraging a "teaching to the test" mentality" (Moulton et al., 2020, p.4).

4. Finally, we note that our measure of cognitive ability clearly captures skills important outside of the classroom since the measure strongly predicts labor market earnings (see Section 4.1).

Web Appendix IV.7

Further discussion of self-evaluated abilities

As pointed out by a thoughtful referee, it is possible that self-evaluated abilities depend partly on creativity, holding abilities constant. To the extent that this is true, the effects of creativity on self-evaluated ability at age 16 in various high school subjects (Table 1 in Section 3.1) and on self-evaluated skills in adulthood (Table 2 in Section 3.2) capture both the effect of creativity on abilities and the effect of creativity on beliefs about abilities, holding abilities constant. We emphasize that even if the effects of creativity on self-evaluated abilities include a channel via beliefs, holding abilities constant, our evidence on the relationship between creativity and self-evaluations in Tables 1 and 2 continues to provide insight about how creativity affects life outcomes (because how people perceive their abilities affects important life choices), and continues to provide evidence that our measures of childhood creativity and cognitive ability capture different aspects of cognition.

We do not have clean objective measures of ability at age 16 in various high school subjects, and therefore we are not able to evaluate directly the extent to which creativity affects self-evaluations at age 16, holding abilities constant. We do not have clean objective measures of ability because the decision about how many and which O-level examinations to sit at age 16 was endogenous, depending on the individual's (and their teacher's) beliefs about their ability in specific subjects, the individual's interest in specific subjects, and the individual's cognitive ability (which helped to determine how many O-levels the individual was allowed to sit by their school). Indeed, many individuals did not sit O-level examinations even in English and math.[21]

Even though we do not have clean objective measures of ability at age 16, in Table A.6 below we show how creativity and cognitive ability predict the probability of receiving O-level qualifications at age 16 in various high school subjects. Specifically, we regress whether individuals received at least one O-level qualification in each of six different subject categories on creativity and cognitive ability (and our other controls), among those individuals who received at least one O-level qualification in any subject. In Section 3.1, we summarized the results from Table 1 as follows: "(i) for artistic or practical subjects, creativity predicts positive self-evaluation, but in contrast cognitive ability tends to predict negative self-evaluation; and (ii) for analytical subjects (math and science), only cognitive ability predicts positive self-evaluation." Table A.6 shows that creativity and cognitive ability predict receiving O-level qualifications in subject categories according to a similar pattern to how they influence ability self-evaluations in Table 1.[22]

[21] Around 74% of individuals in our sample in England and Wales sat an O-level or CSE examination in English, and around 65% of individuals sat an O-level or CSE examination in a math subject (here we use the same broad subject categories as in Table A.6). See the notes to Table 6 for more details about O-level qualifications.

[22] The main difference is that Table A.6 shows no statistically significant relationship between creativity and the probability of receiving an O-level qualification in "Mostly practical" subjects (although, similarly to Table 1, the relationship between cognitive ability and the probability of receiving an O-level qualification in this subject category is negative). We note, however, that the "Mostly practical" subject category includes a few analytical O-level subjects, which the NCDS subject groupings do not allow us to split out (as explained in the notes to Table A.6, "Mostly practical" subjects include three subjects groups from the NCDS, namely "Domestic Sciences," "Commercial Subjects," and "Technical Subjects").

	Math	English	Science	Artistic	Mostly practical	Other
Creativity	0.004	0.009	0.001	0.031***	-0.012	0.001
	(0.009)	(0.010)	(0.009)	(0.010)	(0.010)	(0.009)
Cognitive ability	0.295***	0.255***	0.235***	-0.059***	-0.062***	0.247***
	(0.012)	(0.012)	(0.012)	(0.015)	(0.015)	(0.012)
Number of individuals	4,741	4,741	4,741	4,741	4,741	4,741
Mean dep. var.	0.43	0.65	0.39	0.26	0.37	0.62

Notes: As described in detail in Section 2, we run OLS regressions of the dependent variable on standardized measures of childhood creativity and cognitive ability and a rich set of controls. In each column, the dependent variable is an indicator for whether each individual received at least one O-level qualification or equivalent in the subject category (see the notes to Table 6 for more details about O-level qualifications). For each individual and for each of 21 subject groups, the NCDS reports whether the individual received at least one O-level qualification or equivalent in the subject group (the NCDS does not report qualifications at the individual subject level). We merge those 21 subject groups into the 6 subject categories used here. Our category "Artistic" includes a single group from the NCDS, namely "Art, Music, Craft and Drama." Our category "Mostly practical" includes three groups from the NCDS, namely "Domestic Sciences," "Commercial Subjects," and "Technical Subjects." The sample is restricted to individuals who received at least one O-level qualification or equivalent in England and Wales (for Scotland the NCDS does not report O-level qualifications at the subject group level or individual subject level). Heteroskedasticity-consistent standard errors are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% levels (two-sided tests).

Table A.6: Receiving an O-level (age 16) qualification in a subject category, among individuals who received at least one O-level qualification.[23]

In Table 2 we measured the effects of creativity and cognitive ability on self-evaluated skills in adulthood. These self-evaluations were recorded when the individuals were aged 33, after individuals in work had gained substantial experience of the workplace. This work experience gave individuals in work a good basis to evaluate accurately their skills in adulthood. Table A.8 below shows that the results from Table 2 are robust when we restrict our sample to those individuals who were in work when self-evaluated skills in adulthood were recorded at age 33.[24]

[23]This table is also included in Web Appendix III.5 (with the same table number).

[24]The main difference is that the negative effect of cognitive ability on self-evaluated skill in construction and assembly becomes statistically significant when in Table A.8 we restrict our sample to those individuals in work.

Panel A: Primarily practical skills

	Construction & assembly	Using tools properly	Selling products or services	Looking after people who need care
Creativity	0.055***	0.032**	0.042***	0.023
	(0.014)	(0.015)	(0.016)	(0.015)
Cognitive ability	-0.035**	-0.094***	-0.026	-0.068***
	(0.018)	(0.018)	(0.019)	(0.019)
Number of individuals	6,355	6,400	6,392	6,366

Panel B: Primarily analytical skills

	Mathematical calculations	Understanding finance	Using a computer to solve problems
Creativity	-0.012	0.003	0.002
	(0.014)	(0.015)	(0.015)
Cognitive ability	0.398***	0.247***	0.317***
	(0.017)	(0.019)	(0.018)
Number of individuals	6,351	6,351	6,370

Panel C: Mixed skills

	Writing clearly	Speaking clearly	Reading plans or diagrams	Running an organisation
Creativity	0.068***	0.036**	0.049***	0.032**
	(0.015)	(0.015)	(0.014)	(0.015)
Cognitive ability	0.207***	0.053***	0.138***	0.117***
	(0.018)	(0.019)	(0.018)	(0.019)
Number of individuals	6,401	6,391	6,349	6,414

Panel D: Guiding others

	Advising	Teaching	Supervising
Creativity	0.044***	0.042***	0.033**
	(0.015)	(0.015)	(0.014)
Cognitive ability	0.043**	0.124***	0.114***
	(0.019)	(0.019)	(0.018)
Number of individuals	6,364	6,432	6,416

Notes: See the notes to Table 2. Here we exclude from our sample individuals who were not in work when self-evaluated skills in adulthood were recorded at age 33.

Table A.8: Skills in adulthood (self-evaluated) for individuals in work.

Web Appendix IV.8

Details referred to in footnote 3

For example, psychologists have found a robust association between creativity and the personality trait of openness to experience (Feist, 2019). Psychologists are also interested in how creativity changes over the life course, finding interesting slumps that coincide with the start of formal schooling and the transition from primary to secondary schooling (Hui et al., 2019), and in cross-cultural differences in creativity (Lubart et al., 2019). Runco et al. (2010) summarize the evidence about the relationship between creativity measured in childhood and creative achievement in adulthood.

At age 50, the NCDS measured the Big Five personality traits (John et al., 2008), as well as the personality trait of well-being / optimism (Warwick–Edinburgh Mental Well-being Scale; Tennant et al., 2007). The Pearson correlations between our measure of creativity at age 7 and these personality traits at age 50 are as follows: openness to experience: 0.244; conscientiousness: 0.092; extraversion: 0.080; agreeableness: 0.137; neuroticism: -0.059; well-being / optimism: 0.087. Below we discuss the two correlations ≥ 0.1.

As we note in the first paragraph in this section, psychologists have found a robust association between creativity and openness to experience. Indeed, according to Feist (2019)'s literature review: (i) "open people tend to be imaginative and curious and so it is not surprising that open people are more creative;" and (ii) "it is becoming increasingly clear that Openness to Experience, among all Big Five personality dimensions, is the strongest and most robust correlate of creative thought." Reassuringly, this finding replicates using the NCDS dataset. Furthermore, the fact that this finding replicates despite the long temporal gap between the measurement of creativity in childhood and personality in adulthood provides further validation of the usefulness of our measure of creativity in childhood.

Agreeableness is made up of a number of facets including trust, modesty and altruism (see, e.g., John et al., 2008, Gill and Rosokha, forthcoming). We find a modest positive correlation between creativity and agreeableness in the NCDS dataset. This modest correlation is consistent with an inverse U-shaped relationship between creativity and imagination that peaks at slightly above average levels of agreeableness (see Chang et al., 2014, and Feist, 2019).

Web Appendix V

Robustness

Web Appendix V.1

Robustness to measure of cognitive ability

Panel A: Above average ability

	Math	English	Science	Art	Music	Practical	Sports
Creativity	-0.006	0.027***	0.005	0.062***	0.016**	0.025***	0.016***
	(0.005)	(0.006)	(0.005)	(0.007)	(0.007)	(0.007)	(0.006)
Number of individuals	8,809	9,011	7,483	6,520	4,508	7,458	8,757
Mean dep. var.	0.16	0.24	0.16	0.22	0.15	0.27	0.27

Panel B: Average or above average ability

	Math	English	Science	Art	Music	Practical	Sports
Creativity	-0.016***	0.002	0.011	0.061***	0.007	0.008*	0.010*
	(0.006)	(0.004)	(0.007)	(0.007)	(0.010)	(0.005)	(0.005)
Number of individuals	8,809	9,011	7,483	6,520	4,508	7,458	8,757
Mean dep. var.	0.73	0.89	0.69	0.70	0.57	0.88	0.84

Notes: See the notes to Table 1. As described in Section 2.5, instead of using our measure of cognitive ability that we derived from the five underlying test scores, here we include all five test scores in our regressions.

Table A.9: High school subject ability (self-evaluated).

Panel A: Primarily practical skills

	Construction & assembly	Using tools properly	Selling products or services	Looking after people who need care
Creativity	0.059***	0.046***	0.040***	0.016
	(0.013)	(0.013)	(0.014)	(0.013)
Number of individuals	8,111	8,061	8,051	8,131

Panel B: Primarily analytical skills

	Mathematical calculations	Understanding finance	Using a computer to solve problems
Creativity	-0.013	0.000	0.010
	(0.013)	(0.014)	(0.014)
Number of individuals	8,098	8,103	8,126

Panel C: Mixed skills

	Writing clearly	Speaking clearly	Reading plans or diagrams	Running an organisation
Creativity	0.060***	0.041***	0.062***	0.024*
	(0.013)	(0.014)	(0.013)	(0.014)
Number of individuals	8,185	8,165	8,115	8,072

Panel D: Guiding others

	Advising	Teaching	Supervising
Creativity	0.036***	0.047***	0.033**
	(0.014)	(0.014)	(0.014)
Number of individuals	8,123	8,099	8,071

Notes: See the notes to Table 2. As described in Section 2.5, instead of using our measure of cognitive ability that we derived from the five underlying test scores, here we include all five test scores in our regressions.

Table A.10: Skills in adulthood (self-evaluated).

	Formal qualification	Experience	Training
Creativity	0.010	0.010**	-0.013**
	(0.007)	(0.005)	(0.006)
Number of individuals	6,635	6,635	6,635
Mean dep. var.	0.30	0.10	0.19

Notes: See the notes to Table 3. As described in Section 2.5, instead of using our measure of cognitive ability that we derived from the five underlying test scores, here we include all five test scores in our regressions.

Table A.11: Job requirements in early adulthood.

Panel A: All individuals

	Individuals in work			
	Log hourly earnings	Log weekly earnings	Log weekly hours	In work
Creativity	0.015***	0.021***	0.007**	0.005*
	(0.004)	(0.006)	(0.003)	(0.003)
Individual-year obs.	35,342	35,342	35,342	48,363
Mean dep. var.	-	-	-	0.81

Panel B: Excluding self-employed

	Individuals in work		
	Log hourly earnings	Log weekly earnings	Log weekly hours
Creativity	0.016***	0.021***	0.005
	(0.004)	(0.006)	(0.003)
Individual-year obs.	31,878	31,878	31,878

Notes: See the notes to Table 4. As described in Section 2.5, instead of using our measure of cognitive ability that we derived from the five underlying test scores, here we include all five test scores in our regressions.

Table A.12: Earnings, hours, and employment.

Panel A: All individuals

	Professional	Managerial & Technical	Skilled non-manual	Skilled manual	Partly skilled	Unskilled
Creativity	0.003	0.023***	-0.015***	-0.007*	-0.002	-0.003
	(0.002)	(0.005)	(0.004)	(0.004)	(0.003)	(0.002)
Individual-year obs.	31,703	31,703	31,703	31,703	31,703	31,703
Mean dep. var.	0.05	0.38	0.21	0.20	0.13	0.03

Panel B: Excluding self-employed

	Professional	Managerial & Technical	Skilled non-manual	Skilled manual	Partly skilled	Unskilled
Creativity	0.001	0.024***	-0.015***	-0.004	-0.002	-0.004**
	(0.002)	(0.006)	(0.005)	(0.004)	(0.004)	(0.002)
Individual-year obs.	26,895	26,895	26,895	26,895	26,895	26,895
Mean dep. var.	0.05	0.38	0.23	0.18	0.13	0.03

Notes: See the notes to Table 5. As described in Section 2.5, instead of using our measure of cognitive ability that we derived from the five underlying test scores, here we include all five test scores in our regressions.

Table A.13: Occupational categories.

	O-level (age 16)	A-level (age 18)	University qualification
Creativity	0.041***	0.019***	0.013***
	(0.005)	(0.004)	(0.004)
Number of individuals	10,505	10,505	9,519
Mean dep. var.	0.52	0.16	0.12

Notes: See the notes to Table 6. As described in Section 2.5, instead of using our measure of cognitive ability that we derived from the five underlying test scores, here we include all five test scores in our regressions.

Table A.14: Educational attainment.

Web Appendix V.2

Robustness to excluding teacher evaluation error control

Panel A: Above average ability

	Math	English	Science	Art	Music	Practical	Sports
Creativity	-0.005	0.026***	0.005	0.050***	0.015**	0.027***	0.022***
	(0.004)	(0.005)	(0.005)	(0.006)	(0.007)	(0.006)	(0.006)
Cognitive ability	0.136***	0.077***	0.073***	-0.032***	0.004	-0.042***	-0.029***
	(0.006)	(0.006)	(0.006)	(0.008)	(0.008)	(0.008)	(0.007)
Number of individuals	8,809	9,011	7,483	6,520	4,508	7,458	8,757
Mean dep. var.	0.16	0.24	0.16	0.22	0.15	0.27	0.27

Panel B: Average or above average ability

	Math	English	Science	Art	Music	Practical	Sports
Creativity	-0.013**	0.005	0.009	0.052***	0.005	0.010**	0.011**
	(0.006)	(0.004)	(0.007)	(0.007)	(0.009)	(0.005)	(0.005)
Cognitive ability	0.108***	0.031***	0.016**	-0.068***	-0.011	-0.044***	-0.019***
	(0.007)	(0.005)	(0.008)	(0.008)	(0.011)	(0.006)	(0.006)
Number of individuals	8,809	9,011	7,483	6,520	4,508	7,458	8,757
Mean dep. var.	0.73	0.89	0.69	0.70	0.57	0.88	0.84

Notes: See the notes to Table 1. As described in Section 2.6, here we exclude the teacher evaluation error control from our regressions.

Table A.15: High school subject ability (self-evaluated).

Panel A: Primarily practical skills

	Construction & assembly	Using tools properly	Selling products or services	Looking after people who need care
Creativity	0.047***	0.034***	0.037***	0.019
	(0.012)	(0.013)	(0.014)	(0.013)
Cognitive ability	-0.007	-0.072***	-0.004	-0.059***
	(0.015)	(0.016)	(0.017)	(0.016)
Number of individuals	8,111	8,061	8,051	8,131

Panel B: Primarily analytical skills

	Mathematical calculations	Understanding finance	Using a computer to solve problems
Creativity	-0.005	0.006	0.003
	(0.012)	(0.013)	(0.013)
Cognitive ability	0.406***	0.268***	0.299***
	(0.015)	(0.016)	(0.015)
Number of individuals	8,098	8,103	8,126

Panel C: Mixed skills

	Writing clearly	Speaking clearly	Reading plans or diagrams	Running an organisation
Creativity	0.072***	0.041***	0.046***	0.028**
	(0.013)	(0.013)	(0.012)	(0.013)
Cognitive ability	0.210***	0.052***	0.177***	0.133***
	(0.016)	(0.016)	(0.015)	(0.016)
Number of individuals	8,185	8,165	8,115	8,072

Panel D: Guiding others

	Advising	Teaching	Supervising
Creativity	0.036***	0.047***	0.032**
	(0.013)	(0.013)	(0.013)
Cognitive ability	0.067***	0.134***	0.137***
	(0.016)	(0.016)	(0.016)
Number of individuals	8,123	8,099	8,071

Notes: See the notes to Table 2. As described in Section 2.6, here we exclude the teacher evaluation error control from our regressions.

Table A.16: Skills in adulthood (self-evaluated).

	Formal qualification	Experience	Training
Creativity	0.008	0.011**	-0.013**
	(0.006)	(0.004)	(0.006)
Cognitive ability	0.131***	0.000	-0.006
	(0.008)	(0.005)	(0.007)
Number of individuals	6,635	6,635	6,635
Mean dep. var.	0.30	0.10	0.19

Notes: See the notes to Table 3. As described in Section 2.6, here we exclude the teacher evaluation error control from our regressions.

Table A.17: Job requirements in early adulthood.

Panel A: All individuals

	Individuals in work			
	Log hourly earnings	Log weekly earnings	Log weekly hours	In work
Creativity	0.017***	0.025***	0.007**	0.007**
	(0.004)	(0.005)	(0.003)	(0.003)
Cognitive ability	0.108***	0.121***	0.013***	0.033***
	(0.005)	(0.007)	(0.004)	(0.004)
Individual-year obs.	35,342	35,342	35,342	48,363
Mean dep. var.	-	-	-	0.81

Panel B: Excluding self-employed

	Individuals in work		
	Log hourly earnings	Log weekly earnings	Log weekly hours
Creativity	0.018***	0.025***	0.006*
	(0.004)	(0.005)	(0.003)
Cognitive ability	0.104***	0.123***	0.019***
	(0.005)	(0.007)	(0.004)
Individual-year obs.	31,878	31,878	31,878

Notes: See the notes to Table 4. As described in Section 2.6, here we exclude the teacher evaluation error control from our regressions.

Table A.18: Earnings, hours, and employment.

Panel A: All individuals

	Professional	Managerial & Technical	Skilled non-manual	Skilled manual	Partly skilled	Unskilled
Creativity	0.003	0.023***	-0.013***	-0.006*	-0.003	-0.004**
	(0.002)	(0.005)	(0.004)	(0.004)	(0.003)	(0.002)
Cognitive ability	0.035***	0.097***	0.011**	-0.075***	-0.050***	-0.019***
	(0.003)	(0.006)	(0.005)	(0.005)	(0.004)	(0.002)
Individual-year obs.	31,703	31,703	31,703	31,703	31,703	31,703
Mean dep. var.	0.05	0.38	0.21	0.20	0.13	0.03

Panel B: Excluding self-employed

	Professional	Managerial & Technical	Skilled non-manual	Skilled manual	Partly skilled	Unskilled
Creativity	0.002	0.024***	-0.012***	-0.005	-0.003	-0.005***
	(0.002)	(0.005)	(0.005)	(0.004)	(0.003)	(0.002)
Cognitive ability	0.029***	0.107***	0.009	-0.072***	-0.053***	-0.020***
	(0.003)	(0.007)	(0.006)	(0.005)	(0.004)	(0.002)
Individual-year obs.	26,895	26,895	26,895	26,895	26,895	26,895
Mean dep. var.	0.05	0.38	0.23	0.18	0.13	0.03

Notes: See the notes Table 5. As described in Section 2.6, here we exclude the teacher evaluation error control from our regressions.

Table A.19: Occupational categories.

	O-level (age 16)	A-level (age 18)	University qualification
Creativity	0.038***	0.015***	0.010***
	(0.005)	(0.004)	(0.004)
Cognitive ability	0.243***	0.145***	0.111***
	(0.005)	(0.005)	(0.005)
Number of individuals	10,505	10,505	9,519
Mean dep. var.	0.52	0.16	0.12

Notes: See the notes Table 6. As described in Section 2.6, here we exclude the teacher evaluation error control from our regressions.

Table A.20: Educational attainment.

Web Appendix V.3

Robustness to using the observed distribution of teachers' five-point-scale evaluations of creativity to convert evaluations to percentile scores

Panel A: Above average ability

	Math	English	Science	Art	Music	Practical	Sports
Creativity	-0.008*	0.022***	0.001	0.052***	0.017**	0.027***	0.022***
	(0.004)	(0.005)	(0.005)	(0.007)	(0.007)	(0.006)	(0.006)
Cognitive ability	0.140***	0.082***	0.079***	-0.037***	0.001	-0.040***	-0.028***
	(0.006)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.007)
Number of individuals	8,809	9,011	7,483	6,520	4,508	7,458	8,757
Mean dep. var.	0.16	0.24	0.16	0.22	0.15	0.27	0.27

Panel B: Average or above average ability

	Math	English	Science	Art	Music	Practical	Sports
Creativity	-0.016***	0.003	0.007	0.054***	0.005	0.011**	0.013***
	(0.006)	(0.004)	(0.007)	(0.007)	(0.009)	(0.005)	(0.005)
Cognitive ability	0.114***	0.032***	0.019**	-0.072***	-0.011	-0.044***	-0.021***
	(0.007)	(0.005)	(0.008)	(0.009)	(0.011)	(0.006)	(0.006)
Number of individuals	8,809	9,011	7,483	6,520	4,508	7,458	8,757
Mean dep. var.	0.73	0.89	0.69	0.70	0.57	0.88	0.84

Notes: See the notes to Table 1. As described in footnote 10 in Section 2.4, here we use the observed distribution of teachers' five-point-scale evaluations of creativity to convert evaluations to percentile scores before standardizing.

Table A.21: High school subject ability (self-evaluated).

Panel A: Primarily practical skills

	Construction & assembly	Using tools properly	Selling products or services	Looking after people who need care
Creativity	0.054***	0.035***	0.047***	0.019
	(0.013)	(0.013)	(0.014)	(0.013)
Cognitive ability	-0.018	-0.075***	-0.018	-0.061***
	(0.016)	(0.016)	(0.017)	(0.016)
Number of individuals	8,111	8,061	8,051	8,131

Panel B: Primarily analytical skills

	Mathematical calculations	Understanding finance	Using a computer to solve problems
Creativity	-0.006	0.007	0.002
	(0.013)	(0.013)	(0.013)
Cognitive ability	0.407***	0.271***	0.302***
	(0.015)	(0.017)	(0.016)
Number of individuals	8,098	8,103	8,126

Panel C: Mixed skills

	Writing clearly	Speaking clearly	Reading plans or diagrams	Running an organisation
Creativity	0.072***	0.042***	0.051***	0.030**
	(0.013)	(0.013)	(0.013)	(0.014)
Cognitive ability	0.213***	0.051***	0.173***	0.131***
	(0.016)	(0.017)	(0.016)	(0.017)
Number of individuals	8,185	8,165	8,115	8,072

Panel D: Guiding others

	Advising	Teaching	Supervising
Creativity	0.038***	0.048***	0.033**
	(0.014)	(0.014)	(0.014)
Cognitive ability	0.064***	0.135***	0.139***
	(0.017)	(0.017)	(0.017)
Number of individuals	8,123	8,099	8,071

Notes: See the notes to Table 2. As described in footnote 10 in Section 2.4, here we use the observed distribution of teachers' five-point-scale evaluations of creativity to convert evaluations to percentile scores before standardizing.

Table A.22: Skills in adulthood (self-evaluated).

	Formal qualification	Experience	Training
Creativity	0.006	0.011**	-0.011*
	(0.006)	(0.004)	(0.006)
Cognitive ability	0.134***	0.000	-0.007
	(0.008)	(0.006)	(0.007)
Number of individuals	6,635	6,635	6,635
Mean dep. var.	0.30	0.10	0.19

Notes: See the notes to Table 3. As described in footnote 10 in Section 2.4, here we use the observed distribution of teachers' five-point-scale evaluations of creativity to convert evaluations to percentile scores before standardizing.

Table A.23: Job requirements in early adulthood.

Panel A: All individuals

	Individuals in work			
	Log hourly earnings	Log weekly earnings	Log weekly hours	In work
Creativity	0.016***	0.023***	0.007**	0.007**
	(0.004)	(0.006)	(0.003)	(0.003)
Cognitive ability	0.111***	0.125***	0.015***	0.035***
	(0.005)	(0.007)	(0.004)	(0.004)
Individual-year obs.	35,342	35,342	35,342	48,363
Mean dep. var.	-	-	-	0.81

Panel B: Excluding self-employed

	Individuals in work		
	Log hourly earnings	Log weekly earnings	Log weekly hours
Creativity	0.017***	0.022***	0.005
	(0.004)	(0.005)	(0.003)
Cognitive ability	0.107***	0.128***	0.021***
	(0.005)	(0.007)	(0.004)
Individual-year obs.	31,878	31,878	31,878

Notes: See the notes to Table 4. As described in footnote 10 in Section 2.4, here we use the observed distribution of teachers' five-point-scale evaluations of creativity to convert evaluations to percentile scores before standardizing.

Table A.24: Earnings, hours, and employment.

Panel A: All individuals

	Professional	Managerial & Technical	Skilled non-manual	Skilled manual	Partly skilled	Unskilled
Creativity	0.001	0.023***	-0.014***	-0.005	-0.002	-0.003**
	(0.002)	(0.005)	(0.004)	(0.004)	(0.003)	(0.002)
Cognitive ability	0.037***	0.098***	0.013**	-0.077***	-0.051***	-0.020***
	(0.003)	(0.006)	(0.005)	(0.005)	(0.004)	(0.002)
Individual-year obs.	31,703	31,703	31,703	31,703	31,703	31,703
Mean dep. var.	0.05	0.38	0.21	0.20	0.13	0.03

Panel B: Excluding self-employed

	Professional	Managerial & Technical	Skilled non-manual	Skilled manual	Partly skilled	Unskilled
Creativity	0.000	0.023***	-0.013***	-0.004	-0.002	-0.005***
	(0.002)	(0.006)	(0.005)	(0.004)	(0.004)	(0.002)
Cognitive ability	0.031***	0.108***	0.012**	-0.074***	-0.055***	-0.021***
	(0.003)	(0.007)	(0.006)	(0.005)	(0.004)	(0.002)
Individual-year obs.	26,895	26,895	26,895	26,895	26,895	26,895
Mean dep. var.	0.05	0.38	0.23	0.18	0.13	0.03

Notes: See the notes Table 5. As described in footnote 10 in Section 2.4, here we use the observed distribution of teachers' five-point-scale evaluations of creativity to convert evaluations to percentile scores before standardizing.

Table A.25: Occupational categories.

	O-level (age 16)	A-level (age 18)	University qualification
Creativity	0.033***	0.009**	0.006*
	(0.005)	(0.004)	(0.003)
Cognitive ability	0.250***	0.151***	0.115***
	(0.006)	(0.005)	(0.005)
Number of individuals	10,505	10,505	9,519
Mean dep. var.	0.52	0.16	0.12

Notes: See the notes Table 6. As described in footnote 10 in Section 2.4, here we use the observed distribution of teachers' five-point-scale evaluations of creativity to convert evaluations to percentile scores before standardizing.

Table A.26: Educational attainment.

Web Appendix VI

Tables excluding cognitive ability control

In this web appendix we report our results on creativity without controlling for cognitive ability.

As we note in Section 2.5: "The Pearson correlation between our measures of creativity and cognitive ability is 0.54, while the partial correlation, holding all controls fixed, is 0.41." Web Appendix IV.2 puts these correlations in the context of the existing literature by providing a detailed discussion of the relationship between creativity and cognitive ability.

As expected given this positive correlation between creativity and cognitive ability, whenever the effect of cognitive ability is positive in Tables 1-6, the effect of creativity increases when we exclude cognitive ability from the regression in the corresponding table here (becoming less negative, moving from negative to positive, or becoming more positive). Similarly, whenever the effect of cognitive ability is negative in Tables 1-6, the effect of creativity decreases when we exclude cognitive ability from the regression in the corresponding table here (becoming less positive, moving from positive to negative, or becoming more negative).

Panel A: Above average ability

	Math	English	Science	Art	Music	Practical	Sports
Creativity	0.039***	0.050***	0.028***	0.041***	0.017***	0.013**	0.012**
	(0.004)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.005)
Number of individuals	8,809	9,011	7,483	6,520	4,508	7,458	8,757
Mean dep. var.	0.16	0.24	0.16	0.22	0.15	0.27	0.27

Panel B: Average or above average ability

	Math	English	Science	Art	Music	Practical	Sports
Creativity	0.021***	0.014***	0.014**	0.031***	0.001	-0.005	0.005
	(0.005)	(0.003)	(0.006)	(0.006)	(0.008)	(0.004)	(0.004)
Number of individuals	8,809	9,011	7,483	6,520	4,508	7,458	8,757
Mean dep. var.	0.73	0.89	0.69	0.70	0.57	0.88	0.84

Notes: See the notes to Table 1. Here we exclude the measure of cognitive ability from our regressions.

Table A.27: High school subject ability (self-evaluated).

Panel A: Primarily practical skills

	Construction & assembly	Using tools properly	Selling products or services	Looking after people who need care
Creativity	0.048***	0.012	0.041***	-0.000
	(0.012)	(0.012)	(0.013)	(0.012)
Number of individuals	8,111	8,061	8,051	8,131

Panel B: Primarily analytical skills

	Mathematical calculations	Understanding finance	Using a computer to solve problems
Creativity	0.126***	0.092***	0.099***
	(0.012)	(0.012)	(0.012)
Number of individuals	8,098	8,103	8,126

Panel C: Mixed skills

	Writing clearly	Speaking clearly	Reading plans or diagrams	Running an organisation
Creativity	0.139***	0.058***	0.105***	0.072***
	(0.012)	(0.012)	(0.012)	(0.012)
Number of individuals	8,185	8,165	8,115	8,072

Panel D: Guiding others

	Advising	Teaching	Supervising
Creativity	0.059***	0.090***	0.076***
	(0.012)	(0.012)	(0.012)
Number of individuals	8,123	8,099	8,071

Notes: See the notes to Table 2. Here we exclude the measure of cognitive ability from our regressions.

Table A.28: Skills in adulthood (self-evaluated).

	Formal qualification	Experience	Training
Creativity	0.049***	0.011***	-0.014***
	(0.006)	(0.004)	(0.005)
Number of individuals	6,635	6,635	6,635
Mean dep. var.	0.30	0.10	0.19

Notes: See the notes to Table 3. Here we exclude the measure of cognitive ability from our regressions.

Table A.29: Job requirements in early adulthood.

Panel A: All individuals

	Individuals in work			
	Log hourly earnings	Log weekly earnings	Log weekly hours	In work
Creativity	0.050***	0.061***	0.011***	0.017***
	(0.004)	(0.005)	(0.003)	(0.003)
Individual-year obs.	35,342	35,342	35,342	48,363
Mean dep. var.	-	-	-	0.81

Panel B: Excluding self-employed

	Individuals in work		
	Log hourly earnings	Log weekly earnings	Log weekly hours
Creativity	0.050***	0.062***	0.012***
	(0.004)	(0.005)	(0.003)
Individual-year obs.	31,878	31,878	31,878

Notes: See the notes to Table 4. Here we exclude the measure of cognitive ability from our regressions.

Table A.30: Earnings, hours, and employment.

Panel A: All individuals

	Professional	Managerial & Technical	Skilled non-manual	Skilled manual	Partly skilled	Unskilled
Creativity	0.013***	0.052***	-0.011***	-0.029***	-0.017***	-0.009***
	(0.002)	(0.005)	(0.004)	(0.004)	(0.003)	(0.002)
Individual-year obs.	31,703	31,703	31,703	31,703	31,703	31,703
Mean dep. var.	0.05	0.38	0.21	0.20	0.13	0.03

Panel B: Excluding self-employed

	Professional	Managerial & Technical	Skilled non-manual	Skilled manual	Partly skilled	Unskilled
Creativity	0.010***	0.057***	-0.010**	-0.027***	-0.019***	-0.011***
	(0.002)	(0.005)	(0.004)	(0.004)	(0.003)	(0.002)
Individual-year obs.	26,895	26,895	26,895	26,895	26,895	26,895
Mean dep. var.	0.05	0.38	0.23	0.18	0.13	0.03

Notes: See the notes Table 5. Here we exclude the measure of cognitive ability from our regressions.

Table A.31: Occupational categories.

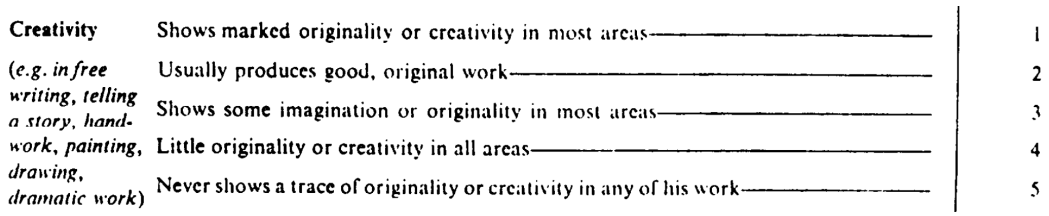
	O-level (age 16)	A-level (age 18)	University qualification
Creativity	0.115***	0.062***	0.047***
	(0.005)	(0.004)	(0.004)
Number of individuals	10,505	10,505	9,519
Mean dep. var.	0.52	0.16	0.12

Notes: See the notes Table 6. Here we exclude the measure of cognitive ability from our regressions.

Table A.32: Educational attainment.

Web Appendix VII

Additional figures and tables



Notes: The screenshot reflects the low quality of the scanned document available from the NCDS.

Figure A.1: Screenshot of five-point creativity scale.

	Individuals in work			
	Log hourly earnings	Log weekly earnings	Log weekly hours	In work
High creativity	0.065***	0.094***	0.029***	0.047***
	(0.010)	(0.014)	(0.009)	(0.008)
High cognitive ability	0.135***	0.173***	0.038***	0.069***
	(0.016)	(0.019)	(0.012)	(0.011)
High creat. × High cog. ab.	-0.005	-0.037*	-0.032**	-0.045***
	(0.018)	(0.022)	(0.013)	(0.012)
Individual-year obs.	35,342	35,342	35,342	48,363
Mean dep. var.	-	-	-	0.81

Notes: See the notes to Table 4. We run the same regressions as in Panel A of Table 4, except that we replace our measure of creativity (cognitive ability) with an indicator for whether the individual's creativity (cognitive ability) was above the mean for the individuals in the analysis sample (no individual was at the mean), and we further include the interaction of these two indicators.

Table A.33: Earnings, hours, and employment (binary measures).

	University degree
Creativity	0.009**
	(0.004)
Cognitive ability	0.109***
	(0.005)
Number of individuals	9,519
Mean dep. var.	0.11

Notes: See the notes to Table 6. Here we replace the dependent variable in the third column of Table 6 "university qualification" with "university degree" (which excludes undergraduate diplomas and certificates).

Table A.34: Educational attainment.

Creativity scale (1 is highest)	Intended population percentage	Observed percentage
1	5.00	2.73
2	25.00	16.88
3	40.00	47.80
4	25.00	29.29
5	5.00	3.30

Notes: Footnote 9 describes how the intended population distribution was communicated to the teachers.

Table A.35: Distribution of teachers' five-point-scale evaluations of creativity

	Creativity	Cognitive ability (from test scores)	Teacher evaluation of cognitive ability
Controls collected at birth from the PMS questionnaire:			
Mother's age	0.021	0.062	0.015
Mother in education beyond the minimum school leaving age	0.192	0.289	0.221
Mother's region of residence:			
North	−0.026	−0.015	−0.013
North West	0.015	0.009	0.017
E and W Riding	−0.001	−0.031	−0.009
North Midlands	0.007	−0.010	−0.003
Midlands	−0.030	−0.033	−0.035
East	0.016	0.017	−0.005
South East	0.038	0.040	0.014
South	−0.010	0.012	−0.014
South West	0.022	−0.001	0.001
Wales	0.007	−0.005	0.004
Scotland	−0.045	0.003	0.030
Mother's working behavior during the pregnancy:			
Stopped before week 13	0.001	−0.005	−0.008
Stopped in week 13–16	0.004	−0.006	−0.001
Stopped in week 17–20	0.007	0.017	0.012
Stopped in week 21–24	0.015	0.022	0.027
Stopped in week 25–28	0.010	0.035	0.025
Stopped in week 29–30	0.027	0.038	0.028
Stopped in week 31–32	0.035	0.028	0.021
Stopped in week 33–34	0.009	0.006	0.010
Stopped in week 35–36	−0.003	0.009	0.004
Stopped after week 36	−0.030	−0.030	−0.033
No job	−0.026	−0.042	−0.029
Mother's social class:			
I or II	0.084	0.127	0.094
IIIN or IIIM	0.042	0.073	0.051
IV	−0.042	−0.085	−0.058
V	−0.059	−0.064	−0.056
Mother's father's social class:			
I	0.091	0.124	0.090
II	0.075	0.129	0.082
IIIN or IIIM	0.005	0.019	0.023
IV	−0.047	−0.080	−0.058
V	−0.079	−0.136	−0.101
Mother smoked during the pregnancy	−0.076	−0.114	−0.076
Mother's parity (number of previous live births or stillbirths)	−0.146	−0.222	−0.179
Mother's husband's age	0.015	0.046	0.007

Notes: See part 5 of the table for the table notes.

Table A.36: (Part 1/5) Correlations for childhood characteristics controls.

	Creativity	Cognitive ability (from test scores)	Teacher evaluation of cognitive ability
Mother's husband's social class:			
I	0.105	0.171	0.133
II	0.153	0.206	0.147
IIIN or IIIM	−0.037	−0.034	−0.017
IV	−0.064	−0.102	−0.085
V	−0.112	−0.181	−0.133
Gestational duration of the pregnancy	0.036	0.046	0.062
Cohort member is male	−0.064	−0.039	−0.081
Cohort member's birthweight	0.071	0.130	0.106
Controls collected at age 7 from a parental questionnaire:			
Number of children aged under 21 in the household	−0.155	−0.258	−0.187
Parents want cohort member to stay in education beyond the minimum school leaving age:			
No	−0.111	−0.167	−0.138
Yes	0.168	0.241	0.198
Don't know	−0.121	−0.167	−0.137
Frequency mother reads to cohort member:			
At least every week	0.047	0.101	0.053
Occasionally	−0.022	−0.053	−0.026
Never or hardly ever	−0.035	−0.069	−0.038
Frequency mother goes on outings with cohort member:			
Most weeks	0.080	0.121	0.089
Occasionally	−0.065	−0.103	−0.073
Never or hardly ever	−0.053	−0.067	−0.056
Frequency father reads to cohort member:			
At least every week	0.049	0.096	0.070
Occasionally	0.023	0.021	0.020
Never or hardly ever	−0.077	−0.125	−0.097
Frequency father goes on outings with cohort member:			
Most weeks	0.091	0.141	0.109
Occasionally	−0.040	−0.070	−0.052
Never or hardly ever	−0.103	−0.145	−0.117
Father's role in managing cohort member (relative to mother):			
Father's role bigger or equal	0.028	0.038	0.035
Father's role smaller but significant	0.025	0.045	0.035
Father's role very small or zero	−0.081	−0.126	−0.106
Father's social class:			
I	0.106	0.181	0.133
II	0.146	0.204	0.144
IIIN	0.082	0.143	0.109
IIIM	−0.086	−0.120	−0.093
IV	−0.086	−0.139	−0.092
V	−0.094	−0.166	−0.124
Father in education beyond the minimum school leaving age	0.193	0.300	0.221
Father's age when he finished full-time education	0.182	0.279	0.205

Table A.36: (Part 2/5) Correlations for childhood characteristics controls.

	Creativity	Cognitive ability (from test scores)	Teacher evaluation of cognitive ability
Mother's working behavior before cohort member started school:			
Part-time or temporary	−0.021	−0.028	−0.021
Full-time	−0.025	−0.060	−0.038
Has not worked	0.034	0.062	0.042
Mother's working behavior since cohort member started school:			
Part-time or temporary	−0.040	−0.049	−0.038
Full-time	−0.008	−0.030	−0.009
Has not worked	0.043	0.065	0.042
Housing tenure:			
Owner occupied	0.186	0.275	0.194
Council rented	−0.162	−0.241	−0.169
Private rented	−0.030	−0.053	−0.033
Other	−0.010	0.000	−0.007
Number of rooms in the home	0.092	0.130	0.083
Household has financial difficulties	−0.160	−0.219	−0.189
Breast feeding duration for cohort member:			
Zero	−0.083	−0.110	−0.075
Positive but under one month	−0.012	−0.024	−0.020
Over one month	0.088	0.124	0.087
Controls collected at age 11 from a parental questionnaire:			
Number of children aged under 21 in the household	−0.153	−0.248	−0.170
Parents want cohort member to stay in education beyond the minimum school leaving age:			
No	−0.151	−0.221	−0.182
Yes	0.231	0.350	0.291
Don't know	−0.166	−0.256	−0.214
Mother goes on outings with cohort member:			
Most weeks	0.078	0.121	0.093
Occasionally	−0.046	−0.063	−0.053
Never or hardly ever	−0.072	−0.125	−0.087
Father goes on outings with cohort member:			
Most weeks	0.082	0.121	0.104
Occasionally	−0.025	−0.037	−0.044
Never or hardly ever	−0.100	−0.146	−0.105
Father's role in managing cohort member (relative to mother):			
Father's role bigger or equal	0.035	0.054	0.047
Father's role smaller but significant	0.013	0.034	0.020
Father's role very small or zero	−0.074	−0.133	−0.102
Father's social class:			
I	0.103	0.167	0.121
II	0.156	0.228	0.165
IIIN	0.072	0.117	0.088
IIIM	−0.083	−0.136	−0.096
IV	−0.107	−0.153	−0.115
V	−0.098	−0.146	−0.110

Table A.36: (Part 3/5) Correlations for childhood characteristics controls.

	Creativity	Cognitive ability (from test scores)	Teacher evaluation of cognitive ability
Mother's social class:			
I or II	0.095	0.119	0.099
IIIN or IIIM	0.085	0.133	0.111
IV or V	−0.135	−0.184	−0.137
Mother has worked since cohort member was age 7	−0.017	−0.015	0.004
Mother's working behavior in the last year:			
Mostly part-time	−0.007	0.008	0.007
Mostly full-time	−0.003	−0.009	0.004
Has not worked	0.009	−0.000	−0.010
Housing tenure:			
Owner occupier	0.215	0.302	0.215
Council rented	−0.199	−0.282	−0.203
Private rented	−0.029	−0.045	−0.025
Other	−0.006	0.003	0.000
Number of rooms in the home	0.117	0.156	0.104
Household has financial difficulties	−0.148	−0.205	−0.166
Household receives free school meals (at least one child)	−0.149	−0.215	−0.168
Controls collected at age 7 from a medical questionnaire:			
Speech assessment:			
Normal	0.183	0.286	0.241
Deficient	−0.169	−0.258	−0.219
Hearing assessment:			
Normal	0.047	0.056	0.060
Deficient	−0.042	−0.048	−0.053
Vision assessment:			
Normal	0.054	0.065	0.057
Deficient	−0.046	−0.051	−0.045
Controls collected at age 11 from a medical questionnaire:			
Speech assessment:			
Normal	0.074	0.132	0.099
Deficient	−0.077	−0.110	−0.094
Hearing assessment:			
Normal	0.068	0.120	0.088
Deficient	−0.066	−0.092	−0.083
Vision assessment:			
Normal	0.029	0.043	0.031
Deficient	−0.007	0.023	0.014

Table A.36: (Part 4/5) Correlations for childhood characteristics controls.

	Creativity	Cognitive ability (from test scores)	Teacher evaluation of cognitive ability
Controls collected at age 7 from a school questionnaire:			
Characteristics of the cohort member:			
Attendance rate	0.103	0.117	0.142
Help for special educational needs	−0.177	−0.243	−0.265
Native English speaker	0.058	0.081	0.086
Characteristics of the cohort member's school:			
School type is State	−0.066	−0.112	−0.081
Number of pupils in the school	−0.009	0.015	0.018
Parent-teacher association in school	0.031	0.059	0.042
Characteristics of the cohort member's school class:			
Number of pupils in the class	−0.004	0.015	0.002
Class grouping based on ability	−0.013	0.014	−0.016
Fraction of fathers of class pupils in social class I, II or IIIN	0.153	0.307	0.187
Fraction of fathers of class pupils in social class IIIM or IV	−0.020	−0.077	−0.015
Fraction of fathers of class pupils in social class V	−0.135	−0.232	−0.175
Prop. of parents of class pupils who met class or head teacher	0.064	0.085	0.050
Controls collected at age 11 from a school questionnaire:			
Characteristics of the cohort member:			
Attendance rate	0.128	0.211	0.176
Help for special educational needs	−0.224	−0.371	−0.326
Native English speaker	0.121	0.205	0.177
Characteristics of the cohort member's school:			
School type is State	−0.078	−0.143	−0.096
Number of pupils in the school	0.004	0.035	0.026
Characteristics of the cohort member's school class:			
Number of pupils in the class	0.094	0.157	0.140
Class grouping based on ability	−0.023	0.016	−0.023

Notes: Section 2 describes the standardized measures of creativity (Column 1) and cognitive ability (Column 2). To calculate teacher evaluations of cognitive ability (Column 3), we take the teacher evaluations of math and reading ability at age 7 (described in part (a) of Web Appendix I.2 and based on percentile scores), take the average, and then standardize. In some parts of the NCDS dataset, the six social class categories are placed into groups (e.g., in the case of the cohort member's mother's social class, the parental questionnaire at age 11 places the six social class categories into three groups), and the groupings vary across different parts of the dataset: we follow the social class groupings used by the NCDS. When the value of a control is missing for some individuals in the analysis sample, we drop those observations when calculating the correlations for that control. Web Appendix I.1 provides more details about the childhood characteristic controls. The table reports Pearson correlations.

Table A.36: (Part 5/5) Correlations for childhood characteristics controls.