

MENTAL HEALTH, CREATIVITY, AND WEALTH

BARBARA BIASI, EIEF, YALE AND NBER,
MICHAEL S. DAHL, AALBORG UNIVERSITY AND AARHUS UNIVERSITY, AND
PETRA MOSER, NYU, NBER, AND CEPR

OCTOBER 17, 2021

Focusing on bipolar disorder (BD), we investigate the link between mental health, creativity, and wealth. Analyzing population data for Denmark, we find that people with BD are more likely to be musicians, but less likely to hold other creative jobs than the population. Healthy siblings of people with BD, however, are consistently more likely to work in creative jobs. We also show people in the top decile of parental wealth are seven times as likely to work in creative professions compared with the bottom decile. Yet, wealth differences only explain a small portion of the link between BD and creativity.

KEYWORDS: MENTAL HEALTH, CREATIVITY, OCCUPATIONAL CHOICE, PARENTAL WEALTH, AND BIPOLAR DISORDER.

JEL CODES: J24, O31, I12

Why are some people more creative than others? This question, essential to understanding the drivers of innovation, has proven difficult to answer. Research in psychology and medicine points to a link between mental health disorders and employment in creative professions. For instance, studies of Swedish population data have found that writers (but not people in other creative professions) face an elevated risk of BD, schizophrenia, and depression (Kyaga et al., 2011; Kyaga et al., 2013). Similarly, polygenic risk scores for the population of Iceland indicate that people with an elevated genetic predisposition for BD and schizophrenia are more likely to work in creative professions (Power et al., 2015).¹

While the neurobiological underpinnings of the link between creativity and mental health are incompletely understood, existing theories emphasize the importance of dopamine, a neurotransmitter that regulates our perception of pleasure and the ability to think and plan. Processes of dopamine regulation are affected in people with mood disorders, such as bipolar disorder, or BD (Miklowitz and Johnson, 2006). Dopamine is also related to divergent thinking (Takeuchi et al., 2010; Power et al., 2015), which allows for greater freedom to pursue high-risk projects and fresh ideas that are essential for creative work (MacCabe et al. 2010, Runco 2007).

Abstracting from these biological factors, analyses of creativity in the social sciences have focused on environmental forces. In a textual analysis of 1,400 letters by Wolfgang Amadeus Mozart, Ludwig van Beethoven, and Franz Liszt, Borowiecki (2017) shows that these famous composers created more and better music when they were grieving the death of a family member. Analyses of patents have emphasized the importance of exposure to role models and parental income (Bell, Chetty, Jaraviel, Petkova, and Van Reenen, 2019; Aghion, Akcigit, Hyytinen, and Toivanen, 2017). For instance, using tax records linked to patent data to identify 1.2 million inventors, Bell et al. (2019) show that children from the top 1% of high-income families are 10 times as likely to become inventors as those from below-median income families. Conversely, financial distress has been shown to impact mental health (Haushofer and Shapiro 2016; Ridley, Rao, Schilbach, and Patel, 2020) and the incidence of BD more specifically (Bauer et al., 2011; Sareen et al., 2011; Hakulinen et al., 2019).²

¹ Polygenic risk scores measure a person's genetic predisposition for a trait or disorder, abstracting from environmental factors (<https://www.genome.gov/Health/Genomics-and-Medicine/Polygenic-risk-scores>).

² Access to specialized mental health care has also been shown to depend, at least in part, on a person's socioeconomic status (Alegría et al., 2000; Dohrenwend et al., 1992).

Connecting these insights from psychology and economics, we investigate whether the observed link between mental health and creativity might be due to socioeconomic factors, and specifically parental wealth. To perform this analysis, we use registry data on mental health diagnoses, creative employment, and parental wealth for the population of Denmark. These data include individual-level administrative records of mental health diagnoses and occupations for all 2,524,325 people who were active in Denmark's labor force between 1995 and 2015. Family identifiers, available for 71 percent of the population, allow us to identify siblings of people with a mental health condition and observe family wealth. To define employment in creative professions, we implement definitions from psychology, which include designers, university teachers (academics), visual artists, architects, display artists, performing artists, musicians, and photographers (Ludwig, 1992; Kyaga et al., 2013; Power et al., 2015).

Our main analyses focus on BD, a “brain disorder that causes unusual shifts in mood, energy, activity levels, and the ability to carry out day-to-day tasks.”³ BD has been strongly and consistently associated with creative employment (e.g., Jamison, 1993; Power et al., 2015; and Kyaga et al., 2013). For instance, biographical evidence in Jamison (1993) suggests that many exceptionally creative individuals were affected by BD, including visual artists such as Vincent van Gogh, writers such as Virginia Woolf, and composers such as Robert Schumann.

First, we compare the likelihood of creative employment among people with BD, their siblings, and the population. We find that while people with BD are 20 percent *less* likely to be active in any creative occupation than the population, they are 50 percent more likely to be composers and musicians. Occupations that people with BD are *most* likely to pursue, instead, include clerks, librarians, archivists and curators, as well as waiters and bartenders.

Notably, we also find that that healthy siblings of people with BD are 11 percent more likely to work in creative professions, confirming the results for Sweden in Kyaga et al., (2011). Siblings of people with BD may pursue creative employment if they are affected by a milder (subthreshold) form of BD that eludes diagnosis and experience a greater penchant for divergent thinking, without suffering the adverse health effects of BD (Richards et al. 1988).

Next, we investigate whether the link between mental health and creativity can be explained by environmental factors, and specifically parental wealth. If both the incidence of BD and creative employment is higher among children of wealthier families, the correlation between

³ <https://www.nimh.nih.gov/health/topics/bipolar-disorder/index.shtml>, accessed November 22, 2019.

BD and creative employment might vanish once we control for wealth. We find that the link between parental wealth and creative employment, which has been suggested by patent data (Bell et al. 2019, Aghion et al. 2017), holds across a broader set of creative occupations: People from the top decile of the parental wealth distribution are 7 times more likely to work in creative occupations compared with people from the bottom decile of parental wealth.

We also show that the link between creativity and mental health is robust to controlling for family background. Differences in parental wealth explain at most 8 percent of the correlation between creativity and mental health, suggesting that the link between creativity and BD might be due primarily to biology.

I. DATA

Our data comprise mental health diagnoses and occupations for the population of Denmark, including 2,524,325 people born between 1946 and 1975. Family identifiers (which we use to find siblings and measure differences in parental wealth) are available for 71 percent of the population.

Mental Health Diagnoses

Diagnoses are drawn from the Central Psychiatric Register (*Landspatientregistret for Psykiatri Diagnostiser*), which records all mental health diagnoses in Denmark between January 1, 1995 and December 31, 2015. The Register classifies mental health disorders according to the World Health Organization International Statistical Classification of Diseases and Related Health Problems (ICD-10).⁴

Implementing this classification, our variable *BD* identifies 18,729 people who have received at least one diagnosis of bipolar disorder (ICD-10: F31) or mania (ICD-10: F30). *BD* is defined as “A disorder characterized by [...] some occasions of an elevation of mood and increased energy and activity (hypomania or mania) and on others of a lowering of mood and decreased energy and activity (depression).” Mania is described as “A disorder [...] which varies from carefree joviality to almost uncontrollable excitement, [...] accompanied by increased energy, resulting in overactivity, pressure of speech, and a decreased need for sleep.”

⁴ See <http://apps.who.int/classifications/icd10/browse/2016/en#/F30-F39>.

Creative Occupations

Existing economic analyses have measured creativity through output, such as patents (Bell et al., 2019; Aghion et al., 2017), publications (Biasi and Moser, 2021), and musical compositions (Giorcelli and Moser, 2021). By contrast, studies of mental health disorders and creativity in psychology and medicine have treated creativity as an individual-level characteristic, proxied by a person's choice of occupation (Ludwig, 1992; Kyaga et al., 2011; Kyaga et al., 2013).⁵

We follow the psychology literature in defining creative occupations. Ludwig (1992) classifies creative professions to include designers, writers, academics, visual artists, architects, display artists, performing artists, composers, and musicians. Kyaga et al. (2011) exclude architects but include photographers. We include both architects and photographers among the creative occupations and report results separately by occupation.

Denmark's registries follow the International Standard Classification of Occupations (ISCO) to classify occupations.⁶ Using 4-digit ISCO codes we distinguish academics (ISCO code 2310), photographers (3131), visual artists (2452 in 1988; 2451 and 2166 in 2008), designers (3471 in 1988; 3432, 3435, 2163, and 2166 in 2008), performing artists (2454 and 2455 in 1988; 2654 and 2655 in 2008), composers and musicians (2453 in 1988, 2652 in 2008), writers (2451 in 1988; 2431, 2432, 2641, and 2642 in 2008), and architects (2141 in 1998; 2161 and 2162 in 2008). In multinomial logit regressions we aggregate ISCO codes to the 3-digit level to reduce the number of choices.

Family Identifiers and Parental Wealth

To match people with their siblings, we use their mother's or father's social security number as a family identifier. Family identifiers are available for 1,788,166 people (71 percent of the population); 75 percent of them have one or more siblings. Family identifiers allow us to identify siblings of people with BD.

Data on parental wealth are available for people whose mother or father reported assets for at least for one year between 1980 and 2015. We set assets to zero for people whose parents

⁵ Power et al. (2015, p. 953) define a "creative person" as "one who takes novel approaches requiring cognitive processes that are different from prevailing modes of thought or expression."

⁶ Years 1995-2009 use the 1988 classification and years 2010-2015 use the 2008 classification.

are listed but do not have any financial assets.⁷ To define a person’s position in the distribution of parental wealth, we calculate the percentile of parental assets for each year (from 1980 to 2015) and assign each person to their parents’ median percentile across all years.

II. BIPOLAR DISORDER AND CREATIVE EMPLOYMENT

A. People with BD Are Less Likely to Work in Creative Jobs

First, we test whether people with BD are more likely to work in creative occupations compared with the population. Specifically, we estimate the following equation separately for eight creative occupations, including writers, academics, architects, designers, musicians, photographers, visual artists, and performing artists:⁸

$$creative_{it} = \beta_1 BD_i + \gamma F_i + \theta_{c(i)} + \tau_t + \varepsilon_{it} \quad (1)$$

where the variable $creative_{it}$ equals one if person i is employed in any or in a given creative profession in year t , and BD_i equals one if the person has been diagnosed with BD at least once. An indicator for women F_i controls for possible gender differences in occupational choices. A vector of cohort fixed effects $\theta_{c(i)}$ controls for systematic differences in the propensity to hold a creative job across cohorts. A vector of year fixed effects τ_t controls for differences in the same propensity over time. We cluster standard errors at the individual level. The coefficient β_1 estimates the difference in the likelihood of holding a creative job between people with BD and the population, controlling for variation in creative employment across calendar years, birth cohorts, and gender.

Figure 1 reports occupation-specific estimates of β (and 95-percent confidence intervals) divided by the population share of each occupation; Appendix Table A3 reports the point estimates. These estimates indicate that people with BD are -0.293 percentage points *less* likely to work in any creative occupation (significant at 1 percent, Appendix Table A3, column 1). Compared with a population share of 1.474 percent, this implies that people with BD are 20 percent less likely to work in a creative occupation (Figure 1).

⁷ Assets are reported by banks and other financial institutions and not by the individuals themselves. All results are robust to excluding individuals without information on parental assets from the analyses.

⁸ To avoid picking up differences in labor force participation between people with BD and the population, we restrict attention to people with positive earnings in any given year.

Occupation-specific estimates reveal moderate heterogeneity in the share of people with BD across occupations. People with BD are 15 percent less likely to be writers, 39 percent less likely to be academics, 23 percent less likely to be architects, and 14 percent less likely to be designers (significant at 5, 1, 5, and 5 percent, respectively, Figure 1 and Appendix Table A3). People with BD are also 14 percent less likely to be photographers and 8 percent less likely to be visual artists, though these estimates are not statistically significant (with p-values of 0.55 and 0.53, respectively).

Notably, people with BD are 50 percent *more* likely to be musicians and composers (significant at 5 percent). This result is consistent with biographical evidence suggesting that prominent composers (including Berlioz, Brahms, Cherubini, Gluck, Mahler, Mendelssohn, Schubert, and Schumann) may have been affected by bipolar disorder (Mula and Trimble, 2009). Our findings might also explain the result of Borowiecki’s (2017) analysis, showing sadness after the death of a family member for prominent composers. Interestingly, people with BD are also slightly more likely to be *performing artists* (actors, dancers, choreographers, and directors), though this estimate is smaller and not statistically significant (11 percent, with a p-value of 0.47).⁹

B. Healthy Siblings of People with BD Are More Likely to Be Creative

If BD is associated with creativity through a genetic link, siblings may have a milder “subthreshold” form of BD that allows them to be more creative, without experiencing debilitating symptoms. Models of BD in molecular neuropsychiatry have proposed an inverted U-shaped relationship between the genetic risk for BD and creativity. Greenwood (2016, p. 200) conjectures that “some aspects of the bipolar spectrum may confer advantages, while more severe expressions of symptoms negatively influence creative accomplishment.”

To test whether healthy siblings of people with BD are more likely to pursue creative jobs, we estimate equation (1) with an indicator for *BD siblings* instead of the indicator for BD:

$$creative_{it} = \beta_2 BD\ sibling_i + \gamma F_i + \theta_{c(i)} + \tau_i + \varepsilon_{it} \quad (2)$$

⁹ In contrast to our results and those of Borowiecki (2017), people who are diagnosed with BD in Sweden are more likely to be writers, but not musicians.

In this modified equation, the coefficient β_2 estimates the difference in the likelihood of holding a creative job between siblings of people with BD and other people of the same gender, in the same birth cohort and calendar year.

OLS estimates confirm that BD siblings are 11 percent more likely to work in creative professions compared with the population (Figure 1 and Appendix Table A4, panel A, column 1). Occupation-specific estimates imply that siblings of people with BD are 35 percent more likely to be visual artists, 28 percent more likely to be architects, and 16 percent more likely to be writers (Appendix Table A4, significant at the 5, 5, and 10 percent level, respectively). Notably, siblings are also 23 percent more likely to be musicians and composers than the population, even though this estimate is imprecise due to the small number of observations (with a p-value of 0.27). These findings are consistent with the higher share of creative employment among siblings of people who have been diagnosed with BD reported by Kyaga et al. (2011).

C. Most Frequent Occupations for People with BD

Looking beyond creative professions, we investigate what type of jobs people with BD are instead most likely to pursue. Formally, we estimate multinomial models of occupational choice, using the broader 3-digit ISCO08 codes to classify occupations.¹⁰ We model the probability that a person works in occupation j at time t as:

$$Pr(Y_{it}=j) = \exp(\beta_j BD_i + \gamma_j F_i) / \sum_k \exp(\beta_k BD_i + \theta_k F_i) \quad (3)$$

where Y_{it} is the occupation of person i in year t and F_i is an indicator for women. First, we estimate maximum likelihood values of β_j and γ_j for 129 occupations. We set both parameters to zero for “Primary Schools and Early Childhood Teachers” (ISCO08 code 234), the most common occupation (with 6.8 percent of workers). We then compute the excess probability of occupation j for people with BD as $\exp(\beta_j)-1$.

¹⁰ To define occupations consistently over time, we restrict the analysis to 2010-2015, when ISCO08 codes are available. Following the psychology literature, we use 4-digit codes to examine employment in creative professions in the main specifications. To estimate multinomial choice models of an individual’s choice across all occupations, we use 3-digit ISCO codes. An earlier study by Tremblay et al (2010) estimates a multinomial model of a choice between five occupations, using data from a total of 20,861 interviews in 5 university towns. They find that people with BD and mania are most likely to work in services and show, using a measure of creativity, that services are a creative occupation.

Multinomial logit estimates indicate that occupations that people with BD are *more* likely to pursue are diverse: People with BD are 177 percent more likely to be clerks; 50 percent more likely to be librarians, archivists, and curators; and 43 percent more likely to be waiters and bartenders (Figure 2).

Multinomial logit estimates also confirm that people with BD are less likely to work in creative professions. For example, people with BD are 34 percent less likely to be “architects, planners, and surveyor designers” and 38 percent less likely to be “artistic, cultural, and culinary associate professionals,” including designers. The largest positive coefficient among creative professions is again for composers, musicians, and performing artists (here included in “creative and performing artists”). People with BD are 27 percent more likely to be employed in this category (significant at 5 percent).

Interestingly, three of the five occupations that people with BD are *least likely* to pursue relate to management. This is in contrast with the popular idea that BD is a “CEO’s disease” (e.g., Elsberry 1998, Gartner 2011) because entrepreneurs share certain traits that are associated with BD, including overconfidence and an excessive tolerance for risk.¹¹ Rejecting the hypothesis that BD is a CEO’s disease, we find that people with BD are 82 percent *less likely* to be sales, marketing, and development managers, 81 percent less likely to be construction and distribution managers, and 80 percent less likely to be business and administration managers.

III. DOES PARENTAL WEALTH MEDIATE THE RELATIONSHIP BETWEEN BD AND CREATIVITY?

Our analysis of population data for Denmark indicates a link between mental health and creativity. In this final section we test whether this link can be explained by differences in family backgrounds, and specifically parental wealth.

A. *Children of Wealthier Parents Are More Likely to Be Employed in Creative Professions*

We first test whether the finding that people with wealthy parents are more likely to become inventors extends to other creative occupations. Specifically, we plot the share (and 95-

¹¹ Medical studies document excessive risk tolerance and impulsive behavior in people with BD. In experiments with a balloon analogue risk task (BART) people with BD score higher on self-reported tests of impulsiveness (Reddy et al 2014). Swann et al. (2004) find that impulsivity – the tendency to pursue rewards without considering negative consequences – is elevated in people who experience mania.

percent confidence interval) of people employed in creative professions by their decile of parental wealth.

We find that people in the top decile of parental wealth are 7 times more likely to work in creative professions (with 2.9 percent, Figure 3) compared with people in the bottom decile (just 0.4 percent). This suggests that earlier findings based on inventors (a profession where financial resources are needed to be able to patent; Bell et al., 2019; Aghion et al., 2017) hold more broadly across creative professions: Differences in parental income and wealth help shape the link between innate creativity and professional outcomes.

B. Employment in Creative Professions for People with BD and Their Siblings

Next, we examine whether parental wealth can account for the observed relationship between mental health and creative employment. Higher rates of creative employment for healthy siblings are consistent with a biological link between BD and creativity. Yet, analyses of polygenic risk scores have found that only 1.2 percent of the variance in creative employment can be explained by genes that are associated with BD (Power et al., 2015).

We have shown above that people with wealthier parents are more likely to hold creative jobs. Recent research in economics also suggests that differences in income and wealth can directly impact mental health (see Haushofer and Shapiro, 2016 and Ridley et al., 2020 for a review). For instance, Haushofer and Shapiro (2016) show that recipients of large and unconditional cash transfers in rural Kenya experience significant increases in psychological well-being.

Connecting insights from psychology and economics, we use information on parental assets to investigate how differences in wealth affect the link between mental health and creativity. To formally test for the influence of parental wealth, we re-estimate the coefficient β_1 in equation (1) controlling for indicators for low (below median) and high (above median) parental wealth. This exercise indicates that the link between BD and creative employment is robust to controlling for parental wealth: Estimates of β_1 controlling for wealth are essentially unchanged. Controlling for wealth, people with BD are 61 percent more likely to be musicians (Table 1, panel A, column 1), while they are 50 percent more likely when we do not control for wealth (Figure 3, panel A). Across all occupations, people with BD are 19 percent less likely to have a creative job (Table 1, panel A, column 1, significant at 1 percent), while they are 20

percent less likely not controlling for wealth. These results indicate that only a small share – approximately 6 percent - of the overall association between creativity and mental health can be explained by differences in wealth.¹²

Estimates looking at siblings of people with BD paint a similar picture. Controlling for parental wealth in equation (2) leaves the estimates for β_2 virtually unchanged. Controlling for wealth, siblings of people with BD are 12 percent more likely to work in any creative profession (with an estimated coefficient for *BD Sibling* equal to 0.00169 and a share of people in creative professions equal to 0.0147, Table 1, panel B, column 1). Compared with estimates that do not control for wealth, this implies that differences in wealth explain 8 percent of the observed association between creativity and BD among siblings.

Interestingly, we find that the gradient between wealth and creative employment is weaker for people with BD than for the general population (Figure 2). Among people with BD, 2.2 percent of those with the wealthiest parents work in creative professions (compared with 2.9 percent in the population). By comparison, only 0.4 percent of people with BD with the least wealthy parents work in creative professions, the same rate as the population.

At the same time, the gradient between wealth and creative employment is slightly stronger for healthy siblings of people with BD than for the population. Among siblings of people with BD, 3.0 percent of those with the wealthiest parents and only 0.4 percent of those with the least wealthy parents work in creative professions.

This finding suggests that differences in wealth may amplify biological links between mental health and creativity. Intuitively, people with BD from high-income families may be more likely to pursue creative jobs because their occupational choices are less constrained by financial needs or because high-income people are more likely to experience positive moods. Bauer. et al. (2011), for instance, find that lower-income patients with BD experience 12.4 percent fewer euthymic days than upper-income patients and 7.1 percent more days with manic/hypomanic symptoms.

¹² All results are robust to alternative definitions of wealth, using of terciles, quartiles or other quantiles of parental assets.

IV. CONCLUSIONS

The psychology literature has unveiled a link between mental health and creativity, measured by employment in creative professions. At the same time, the economics literature has connected innovative creativity, measured with patents, with family wealth. Using population data for Denmark, we confirm the association between mental health and creativity. Focusing on BD, we show that people with BD are 50 percent more likely to be musicians, but less likely to be employed in other creative professions. Healthy siblings of people with BD, however, are consistently more likely to work in creative professions. For instance, siblings of people with BD are 16 percent more likely to be writers, 28 percent more likely to be architects, and 28 percent more likely to be visual artists.

Investigating the influence of a person's socioeconomic status, and more specifically, parental wealth, we find that children of parents in the top quartile of parental wealth are over 7 times as likely to hold a creative job as children in the bottom quartile. This striking correlation, however, cannot explain the link between mental health and creativity. Controlling for parental wealth explains just 8 percent of the observed correlation between mental health and employment in creative professions. Taken together, our findings suggest that neurobiological factors may be the primary link between mental health and creativity.

REFERENCES

- Aghion, Phillipe, Ufuk Akcigit, A. Hyytinen, and Otto Toivanen. 2017. "The social origins of inventors." *NBER Working Paper* No. 24110.
- Alegría, Margarita, Rob V. Bijl, Elizabeth Lin, Ellen E. Walters, and Ronald C. Kessler. 2000. "Income differences in persons seeking outpatient treatment for mental disorders: a comparison of the United States with Ontario and The Netherlands." *Archives of general psychiatry* 57, no. 4: 383-391.
- Bauer, Michael, Tasha Glenn, Natalie Rasgon, Wendy Marsh, Kemal Sagduyu, Rodrigo Munoz, Rita Schmid, Sara Haack, and Peter C. Whybrow. 2011. "Association between median family income and self-reported mood symptoms in bipolar disorder." *Comprehensive psychiatry* 52, no. 1: 17-25. "treated patients with bipolar disorder," *Biological Psychiatry*, vol. 62(1), pages 7-16.
- Bell, Alexander, Raj Chetty, Xavier Jaravel, Neviana Petkova, and John van Reenen. 2019. "Who becomes an inventor in America? The importance of exposure to innovation." *The Quarterly Journal of Economics*, 134(2), 647-713.

Biasi, Barbara and Petra Moser. 2021. "Effects of Copyrights on Science – Evidence from the WWII Book Republication Program." *American Economic Journal: Microeconomics*, forthcoming.

Borowiecki, Karol Jan. 2017. "How are you, my dearest Mozart? Well-being and creativity of three famous composers based on their letters." *Review of Economics and Statistics* 99.4 (2017): 591-605.

Dohrenwend, Bruce P., Itzhak Levav, Patrick E. Shrout, Sharon Schwartz, Guedalia Naveh, Bruce G. Link, Andrew E. Skodol, and Ann Stueve. 1992. "Socioeconomic status and psychiatric disorders: the causation-selection issue." *Science* 255, no. 5047: 946-952.

Giorcelli, Michela and Petra Moser. 2020. "Copyright and Creativity. Evidence from Italian Operas." *Journal of Political Economy*, November 2020.

Greenwood, Tiffany A. 2016. "Positive Traits in the Bipolar Spectrum. The Space between Madness and Genius." *Molecular Neuropsychiatry*. pp. 198-212.

Hakulinen, Christian, Katherine L. Musliner, and Esben Agerbo. 2019. "Bipolar disorder and depression in early adulthood and long-term employment, income, and educational attainment: A nationwide cohort study of 2,390,127 individuals." *Depression and anxiety* 36, no. 11 (2019): 1080-1088.

Haushofer, Johannes and Jeremy Shapiro. 2016. "The Short-Term Impact of Unconditional Cash Transfers to the Poor: Experimental Evidence from Kenya." *The Quarterly Journal of Economics*, 131(4): pp. 1973-2042.

Jamison, Kay Redfield. 1993. *Touched with Fire. Manic Depressive Illness and the Artistic Temperament*. New York: Free Press.

Kyaga, Simon, Paul Lichtenstein, Marcus Boman, Christina Hultman, Niklas Langstrom, and Mikael Landen. 2011. "Creativity and mental disorder: family study of 300 000 people with severe mental disorder." *The British Journal of Psychiatry*, 199 (5), pp. 373-379.

Kyaga, Simon, Mikael Landen, Marcus Boman, Christina Hultman, Niklas Laangstrom, and Paul Lichtenstein. 2013. "Mental illness, suicide and creativity: 40-year prospective total population study." *Journal of Psychiatric Research*, 47(1), pp. 84-90.

Ludwig, Arnold M. 1992. "Creative Achievement and Psychopathology: Comparison Among Professions." *American Journal of Psychiatry*, vol. 46 (3), pp. 330-356.

MacCabe, James H., Mats P. Lambe, Sven Cnattingius, Pak C. Sham, Anthony S. David, Abraham Reichenberg, Robin M. Murray, and Christina M. Hultman. 2010. "Excellent school performance at age 16 and risk of adult bipolar disorder: national cohort study." *The British Journal of Psychiatry* 196, no. 2, pp. 109-115.

Miklowitz, David J., and Sheri L. Johnson. 2006. "The psychopathology and treatment of bipolar disorder." *Annual Review of Clinical Psychology* 2, pp. 199-235.

Mula, Maro, and Michael R. Trimble. 2009. "Music and madness: neuropsychiatric aspects of music." *Clinical Medicine*, 9(1), pp. 83–86.

Power, Robert A., Stacy Steinberg, Gyda Bjornsdottir, Cornelius A Rietveld, Abdel Abdellaoui, Michel M Nivard, Magnus Johannesson, Tessel E Galesloot, Jouke J Hottenga, Gonke Willemsen, David Cesarini, Daniel J Benjamin, Patrik K E Magnusson, Fredrik Ullén¹, Henning Tiemeier, Albert Hofman, Frank J A van Rooij, G Bragi Walters, Engilbert Sigurdsson, Thorgerir E Thorgerirsson, Andres Ingason, Agnar Helgason, Augustine Kong, Lambertus A Kiemeney, Philipp Koellinger, Dorret I Boomsma, Daniel Gudbjartsson, Hreinn Stefansson and Kari Stefansson. 2015. "Polygenic risk scores for schizophrenia and bipolar disorder predict creativity." *Nature Neuroscience* July, 18 (7), pp. 953-5.

Richards, Ruth, Dennis K. Kinney, Inge Lunde, Maria Benet, and Ann PC Merzel. 1988. "Creativity in manic-depressives, cyclothymes, their normal relatives, and control subjects." *Journal of Abnormal Psychology*, 97(3), 281.

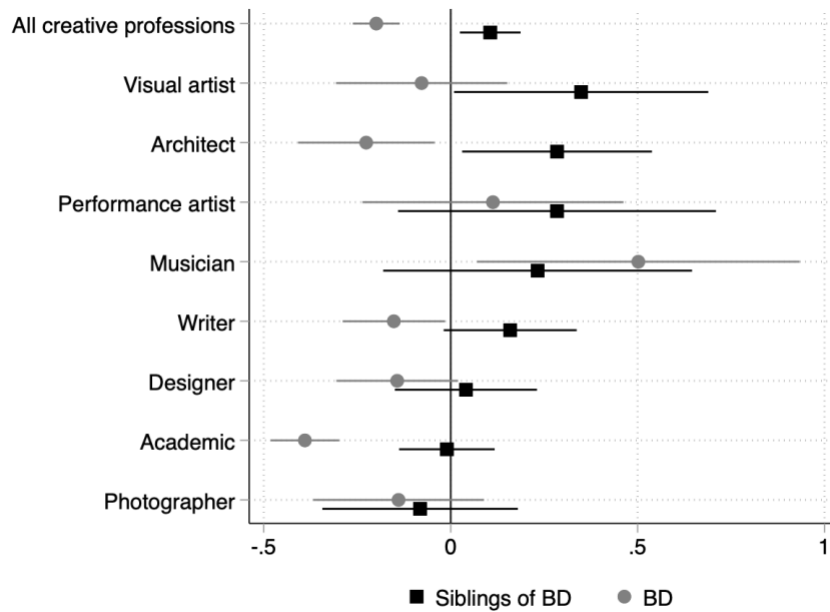
Ridley, Matthew W., Gautam Rao, Frank Schilbach and Vikram H. Patel. "Poverty, Depression, and Anxiety: Causal Evidence and Mechanisms." NBER Working Paper 27157, May 2020.

Runco, Mark A. 2007. "Creativity: Theories and Themes: Research, Development, and Practice." Elsevier Academic Press.

Sareen, Jitender, Tracie O. Afifi, Katherine A. McMillan, and Gordon JG Asmundson. 2011. "Relationship between household income and mental disorders: findings from a population-based longitudinal study." *Archives of general psychiatry* 68, no. 4: 419-427.

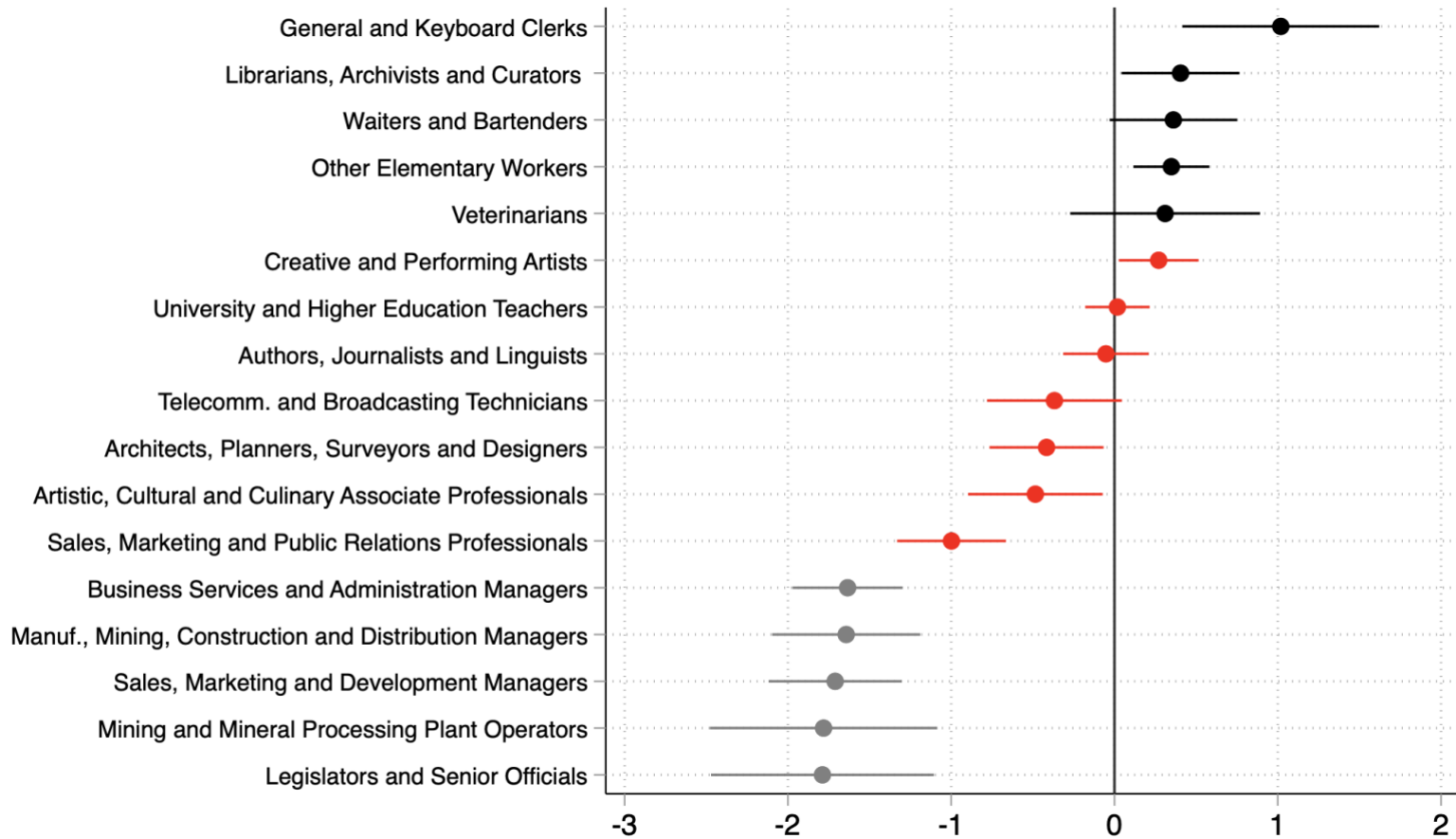
Takeuchi, Hikaru, Yasuyuki Taki, Yuko Sassa, Hiroshi Hashizume, Atsushi Sekiguchi, Ai Fukushima, and Ryuta Kawashima. 2010. "Regional gray matter volume of dopaminergic system associate with creativity: evidence from voxel-based morphometry." *Neuroimage* 51, no. 2: pp. 578-585.

FIGURE 1 – SHARE IN CREATIVE OCCUPATIONS: PEOPLE WITH BD AND THEIR SIBLINGS, COMPARED WITH THE POPULATION



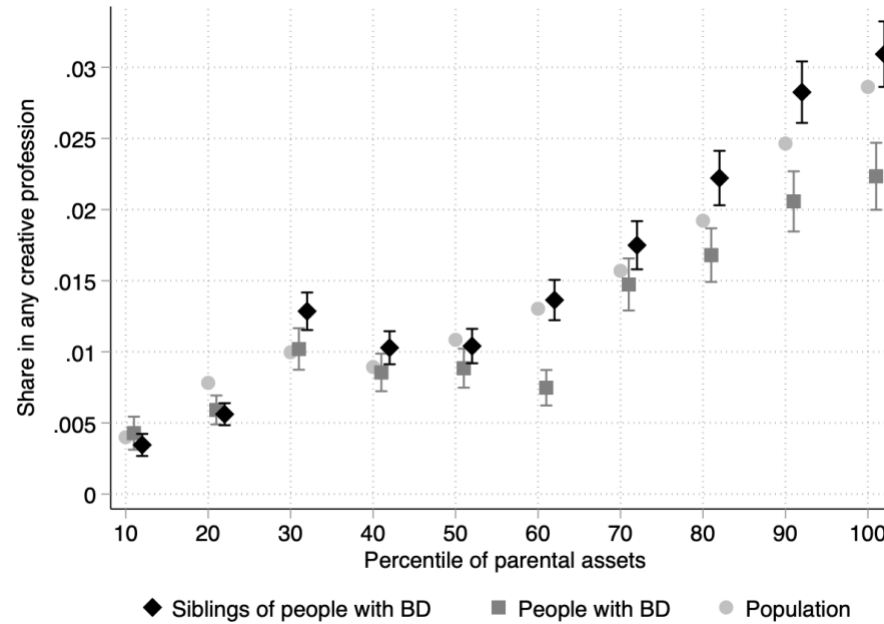
Note: OLS estimates (and 95-percent confidence intervals) of β in the equation $creative_{it} = \beta X_i + \gamma F_i + \theta_{c(i)} + \tau_t + \varepsilon_{it}$ where $creative_{it}$ equals one if person i is employed in a creative profession in year t . In the *BD* series, X_i is an indicator for people who have received at least one diagnosis of BD at least once. For *siblings of BD*, X_i indicates siblings of people with *BD*. The variable F_i is an indicator for females. A vector of cohort fixed effects $\theta_{c(i)}$ controls for systematic differences in the propensity to hold a creative job across cohorts; a vector of year fixed effects τ_t controls for differences over time. We report coefficients and confidence intervals as the share of the mean of the dependent variable. Standard errors are clustered at the individual level. Creative professions are listed in Appendix Table A2, together with ISCO-4 codes.

FIGURE 2 – MULTINOMIAL LOGIT ESTIMATES OF OCCUPATION: PEOPLE WITH BD VS POPULATION



Note: Multinomial logit estimates and 95 percent confidence intervals of the parameters β_j in equation $Pr(Y_{it}=j) = \exp(\beta_j BD_i + \theta_j F_i) / \sum_k \exp(\beta_k BD_i + \theta_k F_i)$, where Y_{it} is the occupation of person i in year t , BD_i equals one for people with BD, and F_i is an indicator for females. This figure shows the five largest and the five smallest estimates of β_j , along with estimates of β_j for creative occupations, defined by 3-digit ISCO08 codes. Standard errors are clustered at the individual level.

FIGURE 3 – CREATIVE PROFESSIONS AND PARENTAL WEALTH: POPULATION, PEOPLE WITH BD, AND THEIR SIBLINGS



Note: Share of people employed in any of the eight creative professions in Fig. 2, separately by the median decile of parental asset for people with BD, their siblings, and the population (with 95-percent confidence intervals). Implementing definitions from psychology, we define creative professions to include academics, architects, designers and display artists, musicians, performance artists, photographers, visual artists, and writers (Appendix Table A2).

TABLE 1 – CREATIVE PROFESSIONS AND BIPOLAR DISORDER. OLS, CONTROLLING FOR PARENTAL WEALTH

	All (1)	Academic (2)	Architect (3)	Designer (4)	Musician (5)	Performance (6)	Photographer (7)	Visual (8)	Writer (9)
<i>Panel A: BD</i>									
High Parental Wealth	8.629*** (0.152)	3.348*** (0.082)	1.196*** (0.057)	0.778*** (0.043)	0.216*** (0.029)	0.106*** (0.023)	0.228*** (0.036)	0.295*** (0.024)	2.462*** (0.083)
BD	-2.772*** (0.571)	-1.566*** (0.275)	-0.401** (0.203)	-0.516*** (0.147)	0.376** (0.162)	0.060 (0.108)	-0.027 (0.150)	-0.107 (0.084)	-0.590* (0.319)
Cohort	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean of dep. var.	14.742	4.850	1.918	1.586	0.612	0.488	1.012	0.634	3.642
N	35,353,460	35,353,460	35,353,460	35,353,460	35,353,460	35,353,460	35,353,460	35,353,460	35,353,460
<i>Panel B: BD siblings</i>									
High Parental Wealth	8.645*** (0.152)	3.354*** (0.082)	1.200*** (0.057)	0.780*** (0.043)	0.216*** (0.029)	0.107*** (0.023)	0.227*** (0.036)	0.296*** (0.024)	2.466*** (0.083)
BD Sibling	1.697*** (0.611)	0.263 (0.316)	0.533** (0.249)	0.050 (0.154)	0.194 (0.129)	0.130 (0.106)	-0.112 (0.135)	0.210* (0.110)	0.428 (0.331)
Cohort	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean of dep. var.	14.742	4.850	1.918	1.586	0.612	0.488	1.012	0.634	3.642
N	35,353,460	35,353,460	35,353,460	35,353,460	35,353,460	35,353,460	35,353,460	35,353,460	35,353,460

Note: The dependent variable equals 1,000 for people who are employed in a creative profession, defined by the column titles. *High Parental Wealth* is an indicator for people above the median of parental wealth. The variable *BD* equals one for people who have been diagnosed with BD at least once; the variable *BD Sibling* equals one for siblings of people with *BD*. Standard errors in parentheses are clustered at the individual level.

MENTAL HEALTH, CREATIVITY, AND WEALTH

BARBARA BIASI, EIEF, YALE AND NBER,
MICHAEL S. DAHL, AALBORG UNIVERSITY AND AARHUS UNIVERSITY, AND
PETRA MOSER, NYU, NBER, AND CEPR

ONLINE APPENDIX

Data Appendix

Information on all demographic variables (age, gender, children, parents, employment and occupations) are drawn from a set of registries previously known as the Integrated Database for Labor Market Research (IDA). These registries combine high-accuracy information across more than 150 government registries.

Data on psychiatric patients are drawn from the LPSYDIAG registry. Data on prescriptions come from the LMDB registry.

Information on families, households and demographics are from the BEF, FAIN, FAM, FTDK, FTDM, UDDA and IDAP registries. Data on employment, occupations, unemployment, income and employers are drawn from the IDAN, IDAS, FIRM, IND and AKM registries. Information on start-ups is drawn from the IVPE and IVPS registries.

We link individual-level variables across these datasets using social security numbers (SSN). People born in Denmark receive their SSNs at birth. Immigrants and foreign employees are assigned an SSN by the municipal office or the International Citizen Service when they receive a work permit or residence permit.

We define creative occupations using the ISCO variable in the AKS Danish registry data (variables DISCO88 and DISCO08). We link the ISCO-88 and ISCO-08 using the official correspondence table, available at <http://www.ilo.org/public/english/bureau/stat/isco/>.

TABLE A1. LIST OF VARIABLES.

Variable	Variable name	Definition	Years available	Registry name	Registry
<i>Prescriptions and Diagnoses</i>					
BD		Indicator for individuals with diagnosis code ICD-10: F31	1995-2015	Landspatientregistret for Psykiatri Diagnostiser	LPSYDIAG
Mania		Indicator for individuals with diagnosis code ICD-10: F30, and for which BD = 0	1995-2015	Landspatientregistret for Psykiatri Diagnostiser	LPSYDIAG
<i>Labor Market Variables</i>					
Creative occupations	ISCO08, ISCO88	Indicator for individuals with occupation (See Table A2)	1995-2015		
<i>Family</i>					
Mother ID		Individual identifier of mother	1995-2015	Income and Employment Employment	IND, IDAP and IDAN

TABLE A2. CREATIVE PROFESSIONS.

Occupation	ISCO-88	ISCO-08	N. People	N. Obs
Academics	2310 University and Higher Education Teachers	2310 University and Higher Education Teachers	46,945	226,113
Photographers	3131 Photographers	3431 Photographers 3521 Broadcasting and Audiovisual Technicians	10,196	47,764
Visual artists	2452 Visual artists (Sculptors, Painters and Related Artists)	2651 Visual artists (Sculptors, Painters and Related Artists) 2166 Graphic and Multimedia Designers	7,902	30,051
Designers	3471 Decorators and Commercial Designers	3432 Interior Designers and Decorators 3435 Other Artistic and Cultural Associate Professionals 2163 Product and Garment Designers 2166 Graphic and Multimedia Designers 3433 Gallery, Museum and Library Technicians 3435 Other Artistic and Cultural Associate Professionals	19,076	75,156
Performing artists	2455 Film, Stage and Related Actors and Directors 2454 Choreographers and Dancers 3474 Clowns, Magicians, Acrobats and Related Associate Professionals	2654 Film, Stage and Related Directors and Producers 2655 Actors 2653 Dancers and Choreographers	6,608	23,263
Composers and musicians	2453 Composers, Musicians and Singers	2652 Musicians, Singers and Composers	5,496	29,255

Writers	2451 Authors, Journalists and Other Writers	2431 Advertising and Marketing Professionals 2432 Public Relations Professionals 2641 Authors and Related Writers 2642 Journalists	29,789	171,087
Architects	2141 Architects, Town and Traffic Planners	2161 Building Architects 2162 Landscape Architects	11,905	90,080

Note: Definition of creative professions obtained combining those of Kyaga (2011, 2013) and Ludwig (1992).

TABLE A3. CREATIVE PROFESSIONS AND BD

	All (1)	Writer (2)	Academic (3)	Architect (4)	Designer (5)	Musician (6)	Photographer (7)	Visual (8)	Performance (9)
BD	-2.934*** (0.472)	-0.553** (0.254)	-1.891*** (0.227)	-0.433** (0.178)	-0.226* (0.132)	0.307** (0.135)	-0.141 (0.117)	-0.049 (0.074)	0.046 (0.087)
Cohort	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mean dep. var.	14.742	3.642	4.850	1.918	1.58575	0.612	1.012	0.634	0.488
N	48,071,128	48,071,128	48,071,128	48,071,128	48,071,128	48,071,128	48,071,128	48,071,128	48,071,128

Note: The dependent variable is an indicator for employment in creative professions, defined as in the text, multiplied by 1000. The variable *BD* equals one for individuals with at least one diagnosis of this condition. Each coefficient is estimated from a separate regression. All specifications control for cohort and year fixed effects. Standard errors in parentheses are clustered at the person level.