Learned Distrust? An Age-Period-Cohort Analysis of Trends in Declining Confidence in Science during the Expansion of Higher Education in the General Social Survey.

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INTRODUCTION TO THE PROBLEM

One of the primary functions of education as an institution is to promote economic competitiveness and a social capacity to solve pressing global problems through science and technology (Goldin & Katz, 2008). Several recent reports emphasize the high-stakes facing the U.S. science and innovation sector and point to the role of higher education in promoting science in society (National Academies 2010a, 2010b; National Science board, 2010). However, widening access to higher education over the past several decades (Buchmann & DiPrete, 2006; Massey et al., 2003; McDaniel et al., 2011; Roksa et al., 2007), has coincided with a decline in public confidence in science (Beslet, 2013; Gauchat, 2012). These trends may be due to a combination of three temporal processes. These are: changes in the association between educational attainment and trust among more recent cohorts (cohort effects), a wider cultural change in confidence in science (period effects), or life-course related changes in attitudes (age effects). Identifying how postsecondary attainment shapes confidence in science is imperative for anticipating public support for science in the future.

This research will use an age-period-cohort approach to analyze nationally representative survey data from the General Social Survey (GSS) to explore the association between postsecondary degree attainment and public confidence in science from 1972 to 2012. In doing so, it will deliberate between two explanations for the simultaneous decline in confidence in science and expansion of higher education. First, some have argued that this decline reflects greater cultural cynicism toward science suggesting that declining confidence in science among the college-educated reflects a difference in the socialization of college graduates over time (Gauchat, 2012). Second, because the rapid expansion of higher education in this period yielded greater access to postsecondary education among previously underrepresented groups, differences in confidence among graduates may reflect changes in the selectivity of college graduates (Klugman and Xu, 2008). In making sense of the role of expanding access to post-secondary attainment, this project will shed light on the mechanism by which trust in science is shaped by both educational attainment and selection into higher education in the U.S. In doing so, we offer a forecast for future opinions regarding the scientific community.

RESEARCH QUESTIONS

1) How has confidence in science changed over the last four decades by level of educational attainment?
2) To what extent do the three types of temporal processes – age, period, and cohort – account for these trends?
3) How does the widening of access to higher education based on family of origin shape trends relating to confidence in science by level of educational attainment?

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DATA

This project utilizes the General Social Survey (GSS) 1972 to 2012 cumulative data file. The GSS is uniquely suited to this research question because it is nationally representative of the U.S. adult population with repeated attitudinal questions across waves and as such permits the studying of societal trends across several decades. We restrict our sample to individuals over 25 years of age to allow respondents sufficient time to complete educational attainment[2].

MEASURES[3]

Confidence in the Scientific Community: The outcome variable of interest to this study is derived from a series of questions in which the GSS asks individuals their level of confidence regarding several social institutions. The question stated, "As far as the people running these institutions are concerned, would you say you have a great deal of confidence, only some confidence, or hardly any confidence at all in them?" This project uses the responses generated for "the scientific community." This variable is then recoded to form a dichotomous variable indicating whether an individual has a great deal of confidence in the scientific community or not.

Educational Attainment: Of primary explanatory variable is the respondent's level of education classified into five categories: less than high school (LTHS), high-school (HS), junior college (JC), bachelor's degree (BA), and master's degree or above (MA).

Family of Origin Variables: Selection variables include the characteristics of a respondent's family of origin that may shape their educational attainment in general and their propensity to attend college in particular. These measures are constructed from questions regarding the respondent's home life and family at age 16, just prior to the transition to college. These include religious affiliation (protestant or catholic), fundamentalism (fundamentalist or not), region, family income, mother's and father's level of education, and the number of siblings of the respondent.

Control Variables: Control variables include age, sex, region, political views (extremely liberal to extremely conservative) and party identification (strong democrat to strong republican) and race.

METHODS

In order to analyze the data over time, responses are separated into four decades, the 1970's, 1980's, 1990's, and 2000's. We answer our first research question by descriptively analyzing the proportion of respondents with a great deal of confidence in science at each level of educational attainment by decade. Next our preliminary analysis explores our third research question concerning whether widening access to college accounts for declining confidence in science. After preforming multiple imputation and weighting for the GSS survey design, logistic regression was used to generate odds ratios for each variable concerning its predictive power towards confidence in the scientific community over time. This was done with three models. The baseline model contained only respondent's age as a control, the second contains all controls, and the third contains family of origin variables. The coefficients for educational attainment were then compared using T-tests to detect if they were statistically significantly different from each other for each decade.

[2] An alternate specification of the sample – restricting to adults over 30 to allow for more time to complete one's education yields results consistent with those shown here.

[3] Measures and methods refer to the preliminary analysis reported here which analyzes our Research Questions 1 and 3 concerning trends and selection effects, respectively. For details about our age-period-cohort analysis, see "further analysis".

PRELIMINARY RESULTS

Figure 1 displays the percentage of individuals within each educational group that reported a great deal of trust in the scientific community in each decade. In answering research question 1, it indicates that for individuals receiving a college degree the group trust in the scientific community has been declining since the 1980's. This appears to be a large portion of the overall declining public trust in science.

Next, our preliminary analysis turned our attention to research question 3. Logistic regression was run with HS as the reference category and the results of the T-Tests comparing the effect of a BA and MA are listed in Table 1. In all three models the estimated influence of obtaining a MA has increased consistently over time while the estimated influence for BA increases throughout the first three decades but then returns to its 1970's level or lower in the 2000's. The relationship between receiving a bachelor's degree and a master's degree is such that their influence on confidence in the scientific community is statistically equivalent up until the most recent decade, the 2000's. At that point the two degrees exert statistically different influences, while both still being positive. In models two and three, the addition of control and family of origin variables reduces the difference between master's degrees and bachelor's degrees in the estimated effects of educational attainment on confidence in science. We interpret this as indicating preliminary support for the importance of widening access to education as contributing to declining confidence in science.

FUTURE ANALYSIS

Further analysis of these relationships will delve deeper into selection processes to consider a wider array of family of origin characteristics to examine the statistical difference between recent BA and MA individuals and evaluate the return in the relationship between these higher education markers to their historic equivalence. We will also expand our analysis to include age, cohort, and period influences to disentangle temporal mechanisms between expanding heterogeneity in higher education and declining confidence in science.

Figure 1 Percentage of A Great Deal of Trust by Education Over Time

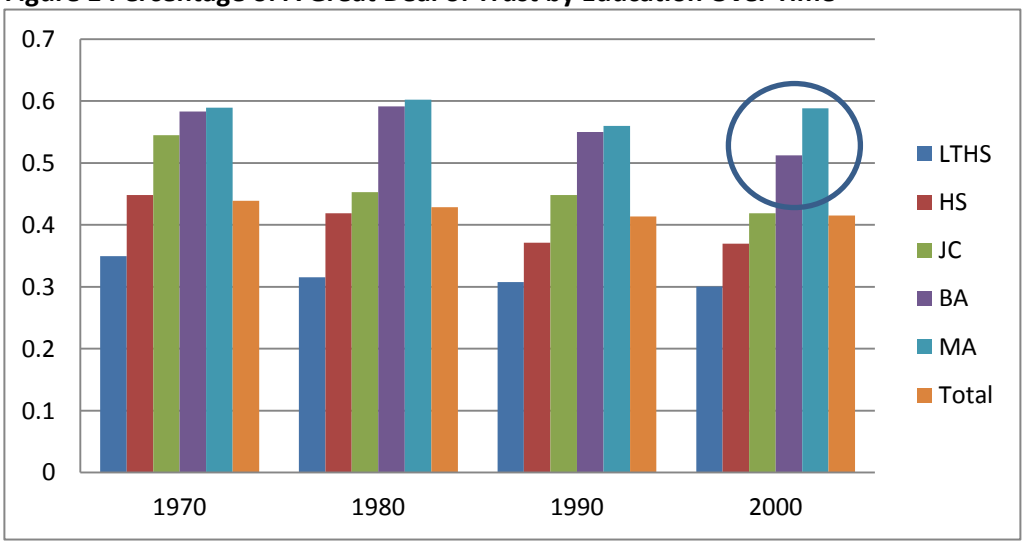

Table 1 Odds Ratio Coefficients Predicting Trust Over Time

	1970			1980			1990			2000		
	1	2	3	1	2	3	1	2	3	1	2	3
BA	1.95	1.71	1.48	1.95	1.86	1.6	1.98	1.95	1.64	1.75	1.72	1.48
MA	2.14	1.73	1.51	2.14	2.01	1.69	2.17	2.06	1.68	2.28	2.18	1.80
T-Test	.698	.937	.921	.355	.443	.578	.347	.557	.793	.001	.003	.013

*all odds ratio coefficients p<.001

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