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School spirit: Exploring the long-term effects of the U.S. temperance movement on educational attainment

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ABSTRACT

This study examines the long-term consequences of the U.S. temperance movement, one of the largest-scale policy changes impacting alcohol consumption in history. Using a sample of persons born between 1900 and 1925 drawn from nationally representative census microdata, the study investigates the effect of prenatal temperance environment on adult educational outcomes. The quantitative analysis uses proxies for temperance environment: the strength of temperance laws and the density of liquor retailers. In sum, the evidence suggests that men and women exposed to the temperance movement in utero had modestly higher education. The effect on eighth grade completion was weakly significant at best, while the effect on high school completion was robustly significant, though relatively small in magnitude. Estimates imply that the adoption of temperance laws increased the odds of high school completion by about 3–8%, and analogously that the reduction of retail liquor density, to the extent it changed from 1913 to 1921, increased the odds of high school completion by about 4–8%. The findings are consistent with several causal mechanisms including a reduction in fetal alcohol exposure and the adverse developmental outcomes with which it is associated.

1. Introduction

Temperance was a popular movement to reduce alcohol consumption in the U.S. It consisted of several waves spanning from the early 1800s to the 1930s (Kobler, 1974, Murdock, 1998, Okrent, 2010, Rumbarger, 1989). Proponents argued that alcohol had harmful effects on the health and morality of drinkers and society as a whole (Cherrington, 1908, 1915, 1920). During the nineteenth century, temperance reformers achieved several legislative victories to regulate alcohol. However, by the 1850s, most of their gains quickly withered under popular and industry pressure (Murdock, 1998, Rumbarger, 1989).

The last wave of temperance proved to be the most successful, by far. Founded in 1893, the Anti-Saloon League guided the dry movement to many victories during the early twentieth century (Kobler, 1974, Murdock, 1998, Okrent, 2010). A number of states enacted either prohibitory laws, which banned the commercial sale of alcohol statewide, or local option laws, which allowed localities (usually counties) to vote to restrict alcohol sale (Cherrington, 1908, 1915, 1920).

The movement's efforts culminated in the 18th amendment which prohibited "the manufacture, sale, or transportation of intoxicating liquors within, the importation thereof into, or the exportation thereof from the United States" (Kobler, 1974, Murdock, 1998, Okrent, 2010, Rumbarger, 1989). In January 1920, federal prohibition commenced with strong public approval and strict enforcement. Nevertheless, support for temperance faded substantially during the mid to late 1920s. America's prohibition experiment ended in 1933 with the repeal of the 18th amendment (Kobler, 1974, Murdock, 1998, Okrent, 2010, Rumbarger, 1989).

Despite the common belief that prohibition was a failure, it dramatically reduced alcohol consumption for several years (Blocker, 2006, Dills, Jacobson, & Miron, 2004, Miron & Zwiebel, 1991, Warburton, 1932). Fig. 1 illustrates the trends in alcohol consumption per capita and alcoholism deaths per 100,000 population from 1900 to 1930 (Warburton, 1932, Bureau of the Census, 1900-1931). As the figure shows, both measures decreased significantly in the late 1910s, reached their lowest level in 1920, and increased to roughly 70% of their 1900–1915 average by the mid-1920s. Thus, considerably less alcohol was consumed during the height of the temperance movement.

In this study, we examine the long-term consequences of the U.S. temperance movement, one of the largest-scale policy changes impacting alcohol consumption in history. Using a sample of persons born between 1900 and 1925 drawn from nationally representative U.S. census microdata, the study investigates the effect of prenatal

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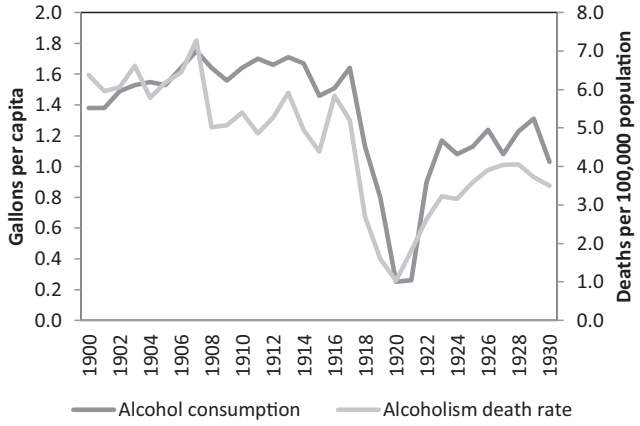

Fig. 1. Alcohol consumption per capita and alcoholism death rate in the United States, 1900-1930.
NOTE. Estimates of alcohol consumption per capita are from Warburton (1932). Estimates of deaths attributed to alcoholism are from the Bureau of the Census (1900-1931).

temperance environment on adult educational outcomes. The quantitative analysis uses proxies – the strength of temperance laws and the density of liquor retailers – to measure the degree to which the temperance movement shaped not only the physical accessibility of alcohol but also the social norms governing its consumption.

To summarize, the evidence suggests that men and women exposed to the temperance movement in utero had modestly higher education. The effect on eighth grade completion was weakly significant at best, while the effect on high school completion was robustly significant, though relatively small in magnitude. Our preferred estimates from logistic models imply that the adoption of temperance laws increased the odds of high school completion by about 3–8%, and analogously that the reduction of retail liquor density, to the extent it changed from 1913 to 1921, increased the odds of high school completion by about 4–8%. Comparable estimates from linear probability models reveal an increase in high school completion of roughly 1.5 percentage points. We argue the findings are consistent with several causal mechanisms including a reduction in fetal alcohol exposure and the adverse developmental outcomes with which it is associated.

All in all, this study contributes to the literature. Social scientists have been increasingly interested in the link between prenatal environment and educational outcomes (e.g., Fuller, 2014, Lee 2014, Neelsen & Stratmann, 2011, Sanders, 2012). Previous research on the effects of the temperance movement has focused almost entirely on contemporaneous outcomes, e.g., alcohol consumption and violence (Owens, 2011, 2014, Livingston, 2016, Warburton, 1932, Miron & Zwiebel, 1991, Dills et al., 2004, Blocker, 2006, Miron, 1999, Asbridge & Weerasinghe, 2009). This is the first study to link prenatal temperance environment with educational attainment. Additionally, previous epidemiological research on the effects of maternal drinking on children's outcomes may be subject to some degree of reporting bias, which can arise from reliance on maternal self-reported drinking behaviors, as well as omitted variable bias, which can arise when persons prenatally exposed to alcohol and those unexposed differ in unobserved factors. By using a policy experiment, this study aims to minimize the influence of such biases that may be present in the literature.

The remainder of the article is organized as follows. Section 2 describes the data and methods, Section 3 presents the results, and Section 4 discusses the conclusions.

2. Data and methods

2.1. Sample

In a multivariate logistic regression framework, a person's educational attainment is regressed on the state-level temperance environment while he or she was in utero. To create the dataset, a sample of persons born in the U.S. between 1900 and 1925 is drawn from nationally representative U.S. census microdata available from IPUMS (Ruggles et al., 2010). Samples from census years 1950, 1960, and 1970 are selected. Each of these are 1-in-100 national random samples of the population. In those census years, nearly all persons born between 1900 and 1925 had completed their schooling and were still alive. Advantageously, the 1960 and 1970 censuses identify year and quarter of birth and provide information on educational attainment for all persons, whereas the 1950 census identifies only year of birth and provides information on educational attainment for only "sample-line" (randomly selected) persons. For this reason, only "sample-line" persons from census year 1950 are retained.

Each person in the sample is matched with measures of temperance environment corresponding with place (state) and time (first trimester) in utero. It is assumed that state in utero was identical to state of birth. For census years 1960 and 1970, it is assumed that persons were in utero three quarters (i.e., nine months) prior to their reported quarter of birth. For example, someone born in the first quarter of 1910 is assumed to be in utero in the second quarter of 1909. For census year 1950, it is assumed that persons were in utero during the year prior to their reported birth year, given that only birth year is available.

2.2. Variables

According to Goldin (1998), educational attainment steadily increased during the first half of the twentieth century. Throughout the period, females were more likely than males to graduate from high school, which, in Goldin's view, suggests that the return to high school completion was larger for women. Indeed, tabulations using our census data confirm that females had higher eighth grade and high school completion for every birth cohort in the sample population. In the empirical analysis, the dependent variables consist of two measures of educational attainment: whether a person completed eighth grade or higher (binary) and whether a person completed high school or more (binary). Both variables are from IPUMS.

The main exposure variable is temperance environment, which is measured by either the strength of temperance laws or the density of liquor retailers in separate regressions. These measures reflect the extent to which economic and social barriers (e.g., prices, legal penalties, social acceptability, and availability) constrained the alcohol consumption of men and women and, therefore, serve as proxies for prenatal alcohol exposure.

The strength of temperance laws is coded from Anti-Saloon League reports (Cherrington, 1908, 1915, 1920). Early twentieth century state temperance laws are described in Appendix Table A1. "Weak" is a binary indicator that equals one if there was a local option or other substantive anti-liquor law in effect when and where a person was in utero. "Strong" is a binary indicator that equals one if the commercial sale of alcohol was effectively prohibited when and where a person was in utero. This variable takes a value of one for all states from the third quarter of 1919 to the first quarter of 1925, a period which commenced with the Wartime Prohibition Act and continued with the 18th amendment. Note that it is problematic to consider cohorts born after 1925, as drinking patterns changed drastically in the mid to late 1920s, even though prohibitory laws were still on the books. Fig. 2 depicts the number of states with temperance laws during 1899–1925. Until 1909, most U.S. states had no substantive temperance laws. The number of states with strong laws increased modestly between 1908 and 1909 and then dramatically between 1914 and 1920.

The density of liquor retailers is constructed from Bureau of Internal Revenue reports (1899-1925) and Bureau of the Census (1996) population estimates. The Bureau of Internal Revenue (later renamed the Internal Revenue Service) published data on liquor retailers during the entire period of study, except for 1919. "Liquor retailer density" equals the number of liquor retailers per 1000 population when and where a

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