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Further Evidence on the Internal Validity of the Early Legal Access Research Design

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Randomized controlled experiments are the gold standard of causal analysis, but they are unavailable to answer many questions of policy interest. Access to the Pill or abortion, for instance, was never explicitly randomly assigned, so quasi-experiments provide an important path for understanding their effects.

We agree with some of Joyce's arguments regarding abortion. But his arguments regarding the Pill lose sight of the forest for the trees and distract from the major policy questions at stake. His comments on the Pill focus narrowly on one genre of studies—those using as a research design changes in the age of consent for contraception ("early legal access to the Pill," ELA)—and ignore the larger body of quasi-experimental evidence on the broad benefits of reproductive health policy. In this response, we address his four critiques of the ELA literature, describe the assumptions necessary for them to matter in practice, and present historical and empirical evidence on their relevance.

Joyce's first critique is that dating legal changes in Pill access is difficult. We agree and have made this point ourselves (Bailey, Hershbein, & Miller, 2012; Bailey, Guldi, Davido, & Buzuvis, 2011). The difficulty in coding these laws today does not imply they did not matter. Women in the 1960s would have had no trouble figuring out whether they could obtain the Pill (by being denied a prescription, for instance). Moreover, misclassification of legal changes cannot explain the literature's results. With a binary independent variable (ELA), perfect misclassification leads to finding the *opposite* of the expected effects (Jakubson, 1986). In the presence of more modest misclassification, the literature would tend to *understate* the Pill's effects (the reverse of Joyce's argument). In practice, this problem appears minor. Figure 1 shows that the effects of early access to the Pill are statistically indistinguishable between Bailey's legal coding (2006), the earliest published legal coding, and the most recent revision in Myers (2012). Access to the Pill between 18 and 21 affects the likelihood of giving birth at precisely those ages, which lends credibility to the research design.

Joyce's second critique is that changes in access to the Pill capture underlying shifts in demand for contraception—perhaps due to evolving social norms or sexual behavior. The broader literature has, indeed, acknowledged this possibility. But had such smoothly evolving factors played a role, one would expect to see *no* abrupt changes at the relevant ages in Figure 1. If, instead, the estimates falsely attribute differential pre-trends to Pill access, one might expect the inclusion of linear state-specific trends to reduce their magnitudes. In fact, including state-specific trends tends to *increase* Figure 1's estimates. However, a *systematic* correlation of ELA laws with other unobserved factors that had similar effects would be more problematic. The problem is that there are no likely suspects. ELA changed at different levels of government (legislature, judiciary, executive), through different types of policies, and took effect at different years across states. Precisely these differences motivate the research design and support its credibility.¹

Joyce's third critique questions the existence of a correlation between legal changes in Pill *access* and Pill *use* among unmarried women. Joyce correctly observes that few surveys asked unmarried women about contraceptive use and sexual behavior in the 1960s. Nevertheless, much evidence points to the existence and strength of the first stage—if not its exact magnitude. The 1970 National Fertility Study, the one survey we have identified that contains the relevant information for more than a single cohort (and therefore allows the research design to be tested), shows that Pill use among women ages 18 to 21 increased by 16 to 19 percentage points with ELA (Bailey, Hershbein, & Miller, 2012). These estimates are important, because they show the importance of Pill access laws for Pill use *before* abortion became legal around 1970. It is unclear why Joyce dismisses them as “too big” without further theoretical or empirical evidence. New work by Edlund and Machado (2011) provides further evidence that ELA mattered by showing that some unmarried women without legal access to the Pill took the extreme step of getting *married* to get it!

Non-quantitative evidence also supports the importance of ELA laws. Contemporaneous accounts of the Pill's enormous popularity and the lengths to which women went to obtain it (e.g., lying about being engaged) support the salience of ELA laws (Goldin & Katz, 2002). Moreover, researchers and federal government agencies compiled detailed reviews of these laws in the 1960s and 1970s and documented their findings in detailed volumes (Pilpel & Wechsler, 1969, 1971; Paul et al., 1974, 1976; Department of Health and Welfare, 1974). It is hard to imagine that so many resources would have been devoted to this endeavor had ELA laws not mattered a great deal.

Joyce's fourth, and potentially most important, critique is that ELA studies misattribute the effects of abortion legalization to Pill access. In support, he cites a strong correlation between (log) distance to New York and abortion rates. We agree with his conclusion that travel costs affected abortion use. But this cross-sectional correlation *alone* is not relevant to the ELA research design. The relevant question is whether *distance to obtain an abortion* is also correlated with *changes in Pill access*. In a word, the answer is *no*. Figure 2 shows that

¹Joyce also reports correlations of lagged state covariates with the changes in Pill access. Note that the inclusion of these covariates and their lags is not motivated by theory or any specific concern. Moreover, these correlations alone are not a threat to the ELA research design *unless* they are also correlated with the age-specific fertility rates in the same manner as Pill access. Joyce provides no evidence that this is the case.

distance to New York is *not* correlated with changes in Pill access for unmarried women. Consistent with this finding, Bailey, Hershbein, and Miller (2012) show that including Joyce's measure of distance to the nearest abortion provider has a negligible effect on their estimates.

Bailey (2009) presents an even cleaner and more direct test of Joyce's claim about the misattribution of abortion's effects. Although Joyce cites her paper, he omits mention of Bailey's evidence on this point. Her test relies on the idea that childbearing decisions before age 21 could not be affected by abortion legalization among women who turned 21 before 1970 *before* abortion first became legal in some states. If Joyce's hypothesis about misattribution were correct, the estimated effects of ELA should be weaker or nonexistent for these cohorts. Figure 3, however, shows this is not the case: Legal access to the Pill had effects that were slightly larger (though not statistically different) for women too old to obtain legal abortions before age 21. In fact, estimates suggest ELA laws were getting less important over time as social norms changed and abortion became legal, not the reverse as Joyce's hypothesis anticipates.

In summary, we agree with Joyce that the ELA research design should be carefully vetted. But the potential threats to internal validity he raises find no empirical support. The evidence does not support his claim that cross-state travel to obtain a legal abortion has been misattributed to the Pill. We hope this discussion refocuses researchers on the important policy questions: How might reproductive health policy be better designed to improve women's and children's health? What are the costs and longer term benefits of various policy approaches? What are the welfare implications of cutting or expanding funding for family planning through Title X or Medicaid? Are there other quasi-experiments available to answer these important policy questions? Making progress on such questions is crucial for improving the evidence basis for reproductive health policy.

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Figure 1. The Effect of Early Legal Access (ELA) to the Pill on First Birth before a Given Age, Cohorts Born 1935 to 1959

Notes: We estimate models, $Prob(1(Age\ at\ first\ birth_{ics} < k) | \cdot) = \Phi(\beta^k ELA_{cs} + \lambda_s + \lambda_c)$, where the dependent variable is equal to 1 if a respondent, i , born in year, $c=1935, 1936, \dots, 1959$, observed in state, s , had her first child before age k separately for each age k . ELA is a binary variable equal to 1 if a woman in a state-birth-cohort cell had the legal capacity to consent to the Pill before age 21 according to the indicated coding. Models also include fixed effects for state of residence, λ_s , and single year-of-birth cohorts, λ_c . Figure 1 plots average partial effects of ELA for each model (age is the horizontal axis), and the dashed lines plot a 90-percent confidence intervals for each ELA estimate using Bailey's (2006) coding. Confidence intervals are corrected for an arbitrary within-state covariance. See posted coding for more detail. Sample: Women ages 36 to 60 born between 1935 and 1959 and married by the time of observation.

Source: 1979–1995 June Current Population Survey.

A. Bailey (2006) Legal Coding *B. Myers (2012) Legal Coding*

Figure 2. The Relationship of Distance to New York to Year When Unmarried Women Could Legally Obtain the Pill

Note: Following Joyce et al. (2013), distance is measured in hundreds of miles and then logged. The regressions are weighted by the population of women aged 18 to 22 in each state, averaged between 1960 and 1970. Results are unchanged if the numbers of women aged 15 to 44 are used as weights instead. Regression coefficients and standard errors (adjusted for heteroskedasticity) from the linear regression are shown.

Figure 3. The Effect of Early Legal Access to the Pill on First Birth before a Given Age, Cohorts Born 1935 to 1949

Notes: See Figure 1. Sample: Women ages 36 to 60 born between 1935 and 1949 and married by the time of observation.

Source: 1979–1995 June Current Population Survey.