Brothers in Arms: Spillovers from a Draft Lottery*

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Abstract

Family members tend to have similar labor market outcomes, but measuring the contribution of behavioral spillovers is difficult. To identify spillovers between brothers, we exploit Denmark's largest random assignment—of young men to 8 months of military service—where service status of brothers is correlated but draft lottery numbers are not. We find average spillovers of elder brother service on younger brother service of 7 percent, and as high as 55 percent for closely spaced brothers without sisters. Elder brother military service affects his own occupational choice and his younger brother's service through private information, thereby encouraging volunteering.

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Family members tend to behave similarly, due to correlations in resources, constraints and preferences, and regular interactions with one another.[1] Siblings can, for example, set behavior norms that are costly to deviate from, or provide information on the costs and benefits of various actions that inform one another's decisions. Such spillovers in behavior between siblings are relevant for policy evaluation, because they may reinforce or dampen the effects of individual interventions. However, very little evidence exists on the spillover effects of programs within families.

In this paper we measure spillovers between brothers in participation in a large-scale program—military service in Denmark.[2] Conscription was re-introduced in Denmark after World War II, and every male upon turning 18 has been assessed for suitability for the armed forces. Of those who are fit for service, 44 percent are randomly assigned to eight months of military service, and 21 percent volunteer even though they have not been randomly assigned to serve.[3] As the administrative registers allow us to link brothers, we are able to study how brothers influence each other when it comes to participating in the military. Our paper is the first to study sibling spillovers in military service and the first to study sibling spillovers in program participation by random assignment.

In terms of interventions, military conscription is one of the world's most comprehensive programs. Conscription exists in most countries worldwide, even though most are not involved in an armed conflict, and service duration ranges from several months to several years[4]. The health costs

[1]For recent overviews of the importance of family background for economic outcomes in later life, see Black and Devereux (2011); Björklund and Salvanes (2010), and Holmlund, Lindahl and Plug (2011).

[2]Numerous studies have shown that military service often appears to "run in the family". See Johnson and Lidow (2016) for a recent overview.

[3]Volunteering for Danish military service was first allowed in 1973. Percentages drafted and volunteering refer to birth cohorts 1976-83.

[4]See The World Factbook 2013-14. Washington, DC: Central Intelligence Agency, 2013.

of active military service are well documented (Hearst, Newman and Hulley, 1986). Peacetime service involves the risk of deployment if conflict occurs or if peace-keeping is required.[5] Outside times of war, there is evidence that the opportunity cost of military service in terms of earnings is substantial.[6] This is particularly true in Denmark, where Bingley, Lundborg and Vincent Lyk-Jensen (2014), using the same data as the current paper, find mean earnings losses of 3 percent in the age range 25-35. While most papers have focused on the costs of military service, some evidence suggests that certain types of military training might increase social skills (Grönqvist and Lindqvist, 2016). In any event, the decision to join the military is therefore not trivial, and causal evidence of sibling spillovers suggest an important behavioral role for the family in military recruitment in particular and in spreading the effects of program participation in general.

A key challenge in estimating sibling spillovers is that family members share relevant but unobserved background characteristics, making disentangling spillover effects from the influences of other shared factors difficult.[7] The Danish institutional framework provides us with a unique opportunity for overcoming the difficulties in estimating sibling spillovers. As the Danish Armed Forces use a lottery to assign fit-for-service men to military service, and as the assignment of brothers is independent, we can identify the behavioral spillover effect by exploiting the random assignment of brothers to military service. Moreover, the timing of the draft lottery means that the influence can run only from an elder brother to a younger one, a condition that allows us to resolve

[5]During our sample period, the Danish military deployed peace-enforcers to Afghanistan and Iraq, and peace-keepers in Kosovo. However, draftees were not deployed unless they volunteered for peace-keeping or peace-enforcing duties.

[6]For studies on the cost of wartime conscription in terms of labor, educational and health outcomes, see Hearst, Newman and Hulley (1986), Angrist (1990), Angrist and Krueger (1994), Bedard and Deschenes (2006), Dobkin and Shabani (2009), Angrist, Chen and Frandsen (2010), Angrist, Chen and Song (2011), Angrist and Chen (2011) and Autor, Duggan and Lyle (2011). For evidence on the effect of peacetime conscription, see Imbens and van der Klaauw (1995), Grenet, Hart and Roberts (2011), Bauer et al. (2012), Galiani, Rossi and Schargrodsky (2011), Card and Cardoso (2012) and Albæk et al. (2016).

[7]See Manski (1993) for a classic overview of the methodological issues involved in the estimation of peer effects. More recent discussions appear in Manski (2000), Moffitt (2001), and Angrist (2014).

the reflection problem, where peers both affect and are affected by each other (Manski, 2000). By exploiting the lottery, we can thus credibly estimate the causal effect of having an elder brother serving in the military on the younger brother's probability of also doing so.

Our results show strong evidence of sibling spillovers in military service. The lottery is a powerful determinant of participation in the military, and we find that having an elder brother serving increases a younger brother's service probability by 3 percentage points. This finding corresponds to a 7 percent increase in service probability at the mean. Due to our instrumental variables design, this effect reflects a younger brother's response to having an elder brother who is forced to serve because of the lottery outcome but who otherwise would not have chosen to serve. The strength of spillovers depends upon family composition. Our results extend to a sample of three brothers, with spillovers that are seven times larger than for the first two brothers in general.

We avoid several threats to identification. As the random assignment is made after the recruitment tests have taken place, we can use test results to check for balanced random assignment. Using an extensive set of pre-determined variables, we show that none of these variables can predict assignment by the lottery. We also show that the lottery numbers are uncorrelated across brothers. Moreover, we find no effect of elder brother service on younger brother height or Armed Forces Qualification Test (AFQT) scores—outcomes that should be immune to spillovers. Furthermore, when we use the younger brother's lottery outcome as an instrument for younger brother service, in a reverse-regression placebo, we show that no effect runs from a younger brother to an elder brother.

By looking for heterogeneity in responses, we explore a number of possible channels through which effects might operate. Relative height results indicate a private information channel whereby elder brothers who are below median height encourage their tall younger brothers to serve, suggesting that the advantages of being tall in the military are not widely known but are effectively communicated between brothers, especially those with a height differential. Spillover effects are largest for the group of elder brothers with high AFQT test scores, a finding consistent with these elder brothers getting the most attractive placements in the military, such as the Air Force. This AFQT gradient suggests that information transmission about the benefits of serving may play an important role. Moreover, we find that elder brothers who have higher AFQT scores than their younger brothers or who are first-born exhibit a stronger influence, perhaps reflecting interpersonal dominance. Our results also suggest that spillovers are greater among brothers having the same father and among more closely spaced brothers, who can be expected to interact more frequently.

Our paper is related to a small but growing literature that exploits natural experiments to estimate family spillovers, and we combine insights from several studies to make our unique contribution about sibling spillovers in military service by way of random assignment.[8] While Campante and Yanagizawa-Drott (2015) is the only other study analyzing spillovers in military service, they consider U.S. wartime experience of fathers and sons, not brothers. They use father's age at the time of war as an instrument for his service probability, and find a 10 percentage point spillover in service probability (88 percent at the mean).[9] Dahl, Kostøl and Mogstad (2014) also analyze parent-child spillovers, but in disability insurance program participation in Norway. Using random assignment to appeal to judges of different stringency as an instrument for parent's disability insurance award probability, they find a 12 percentage point spillover in the 10-year award probability

[8]Another strand of literature has used randomization to estimate peer effects and social network effects in other contexts. See Ludwig, Duncan and Hirschfield (2001), Kling, Liebman and Katz (2007), Kuhn et al. (2011)) for neighbors; (Sacerdote (2001); Cullen et al. (2006), Carrell, Sacerdote and West (2013), Lalive and Cattaneo (2009)) for classmates; (Duflo and Saez (2003), Bandiera, Barankay and Rasul (2010)) for co-workers; and Angelucci et al. (2010) for extended family networks.

[9]Estimates are from Campante and Yanagizawa-Drott (2015), page 45, Table 3, Column 7.

(145 percent at the mean).[10]

Like Campante and Yanagizawa-Drott (2015), we study military service, although in peacetime; and like Dahl, Kostøl and Mogstad (2014) we use random assignment for identification. However, while both these studies estimate parent-offspring spillovers, we study sibling spillovers. Other studies of sibling spillovers have not looked at military service or used random assignment.[11] Dahl, Loken and Mogstad (2014) study spillovers between brothers in paternity leave program participation in Norway. Using a regression discontinuity design based on the child's date of birth, they find a 15 percentage point spillover in paternity leave take-up (27 percent at the mean).[12] Qureshi (2011) studies sister-brother spillovers in school attendance in Pakistan. Using distance to a girl's school as an instrument for elder sister years of schooling, she finds a spillover to younger brother years of schooling of 0.4 (14 percent at the mean).[13][14] We are the first to use random assignment, rather than quasi-randomness, to identify sibling spillovers.

We make three distinct contributions to the literature. First, we estimate sibling spillovers in military service. Second, and even more importantly, we use random assignment to identify sibling spillovers. Third, because brothers are independently randomly assigned, we are able to identify the behavioral mechanisms driving brother responses.

The rest of the paper is organized as follows. Section I describes the institutional context

[10] Estimates are from Dahl, Kostøl and Mogstad (2014), page 1732, Table 3, Column 5.

[11] A few studies have examined other types of sibling spillovers. Monstad, Propper and Salvanes (2011) study sibling spillovers in teen motherhood, using an educational reform that impacted on the elder sister's teenage fertility as an instrument. Their results suggest that teen births tend to be contagious within families and that the effect is larger when siblings are close in age. Breining et al. (2015), who study indirect sibling spillovers, in, show that having a sibling exposed to an early life health intervention, based on birth weight thresholds, positively affects another sibling's educational outcomes.

[12] Estimates are from Dahl, Loken and Mogstad (2014), page 2060, Table 1, Column 3.

[13] Estimates are from Qureshi (2011), page 66, Table 10a, Column 5.

[14] Joensen and Nielsen (2015) study sibling spillovers in course choices in high school, by using a curriculum reform changing the cost of taking advanced math and science courses for the elder siblings as an instrument for his or her course choice. They find spillovers in math-science probability of 34 percentage points (183 percent at the mean), although these are insignificant for the sample as a whole.

in Denmark and the details of the draft lottery. Section II presents our empirical approach, and Section III describes the data. Section IV presents the results, and Section V concludes.

I. Military service in Denmark

On their 18th birthday all men in Denmark are called to attend an Armed Forces Day (AFD), which takes place 3-9 months later.[15] As the call is mandatory, refusal to attend this recruitment event results in a fine or imprisonment. Denmark holds 200 AFDs throughout the year, and at each of the 6 regional military recruitment centers, 40-50 men are assessed over 5-6 hours. Men found to be fit for service are randomly assigned to military service through a lottery held at the end of the AFD.

We illustrate the military conscription procedure in Figure 1. Before participating in the AFD, all prospective draftees submit a health questionnaire for use as background information for the assessment. Based on both responses to this questionnaire and supporting documentation, about 10 percent of a cohort is declared unfit for military service and therefore ineligible for the draft. Reasons for ineligibility are serious somatic or psychiatric disorders, and these need to be certified by a consultant physician at a regional public hospital (Hageman et al., 2008).

[Figure 1 about here]

On the AFD, prospective draftees undergo a fitness assessment consisting of a medical examination, a psychological evaluation, and an AFQT.[16] Because of low AFQT scores (10 percent), high body mass index (10 percent), low body mass index (5 percent), or certain medical conditions (the top three being ADHD, musculoskeletal disorders, and asthma, each at 1 percent), 30 percent

[15] Since 2004 women have been invited to participate in the AFD, but they are not required to attend, nor do they draw a lottery number. Therefore, our analyses include only men.

[16] According to several studies, the test, in use since 1957, is not undermined by lack of motivation or underperformance among the men taking it (Teasdale (2009); Teasdale et al. (2011)). The test has 78 items, and the total test score is the number of correct answers.

of AFD participants, or 27 percent of a cohort, are declared ineligible. Thus about 70 percent of those participating on the AFD (63 percent of each cohort) are declared fit for military service and are assigned a future date at which they may be required to serve (service begins every six months). Finally, at the end of the AFD, all fit-for-service men must draw a lottery number from a drum.[17]

After the AFD, any man declared fit-for-service can volunteer, and he will serve from his pre-assigned service date. Each February and August, the Ministry of Defense announces a lottery number threshold (AFD's half-year thresholds) based on the personnel needs of the military over the next 7-12 months, depending on the number of volunteers and subject to the distribution of potential service dates. All men are assigned to serve if (a) they have potential service dates within the upcoming 7-12 months and (b) they drew a lottery number below the threshold. We refer to these men as "drafted" regardless of whether or not they served, and regardless of whether or not they volunteered.

[Figure 2 about here]

Lottery numbers, which are generated by a third party (TDC A/S), range from 1-36,000. Lottery thresholds for recent years are known to these men, as is the volatility of the threshold. Figure 2 shows the relationship between service probability and proximity to the lottery threshold.[18] Those below the threshold are drafted and are much more likely to serve than those above the threshold who were not drafted. Nonetheless, about 21 percent of those above the threshold volunteer. Service probability increases somewhat approaching the threshold from above or below. Although threshold proximity appears to encourage volunteering, because the threshold is announced only

[17]In contrast to conscription in some countries, e.g., the Netherlands, no exemption is granted for a younger brother if an elder brother has previously served (Van Schellen, Apel and Nieuwbeerta, 2012).

[18]While, the mean lottery number threshold during our enlistment years is 16,730, it ranges from 3,000 in the year 2000 to 36,000 in the year 2003. Correlation in the threshold from one enlistment period to the next is -0.39.

after volunteering is complete, this pattern is likely due to a desire to reduce future uncertainty for men who have drawn a low number.

All of the men in our sample are fit-for-service, and they all draw a lottery number; of them, 44 percent draw a number below the threshold and are drafted. Thus on average 28 percent of a cohort is drafted. Out of these, while 20 percent actually serve, 8 percent end up not serving in the military. Those who are drafted but do not serve in the military can be further split into 3 percent of a cohort who are conscientious objectors and assigned to community service for their local municipality in hospitals, libraries, facilities for children or the elderly, etc.[19] This civil service lasts eight months, and the rate of pay is the same as that for military service. Of the remaining draftees who do not serve, 4 percent do not serve because of subsequent poor health, 0.5 percent is excluded because of a criminal record,[20] and 0.5 percent is convicted under the draft law, i.e., are fined or spend time in a correctional facility.

The length of military service is eight months over our sample period, although a small minority of placements can last longer, e.g., service with the Royal Guards lasts 12 months. Service is performed in the Army (82 percent), Navy (7 percent), Air Force (5 percent), civil defense, and fire and rescue services (6 percent for the last three combined). Conscripts receive compensation for their time in the military, worth approximately $3,000 per month in 2015,[21] which is 20 percent higher than the minimum gross wage in construction.

[19] In our micro data we are unable to distinguish conscientious objectors, and we refer to published statistics (reference). In the analysis, all men who are drafted but do not serve in the military are classified in one group.

[20] For practical purposes, the military performs background checks only before service begins, not on the AFD.

[21] Conscript compensation comprises a monthly taxable salary of 7,421 Danish Krone (DKK), a tax-free allowance of 6,230 DKK, and food and lodging.

II. Method

We focus on the effect of elder brother military service on a younger brother's propensity to serve, which we model as follows:

$$YOUNGER\_MILITARY_i = \pi_0 + \pi_1 ELDER\_MILITARY_i + X_i\pi_2 + \upsilon_{it}, \tag{1}$$

where $YOUNGER\_MILITARY$ is a binary indicator taking the value 1 if younger brother in family i serves in the military, $ELDER\_MILITARY$ is a binary indicator taking the value of 1 if elder of whether the elder brother in family i serves in the military, and X is a set of control variables. An OLS estimate of π_1 may be biased because the decision of an elder brother to join the military might be correlated with unobserved factors shared by a younger brother, such as family norms and other hard-to-measure background characteristics. To obtain an unbiased estimate of π_1 we use the draft lottery to provide exogenous variation in brother service status. We instrument $ELDER\_MILITARY$ with a binary indicator taking the value 1 if the elder brother is drafted, $ELDER\_LOTTERY$,as follows:

$$ELDER\_MILITARY_i = \delta_0 + \delta_1 ELDER\_LOTTERY_i + X_i\delta_2 + \eta_i. \tag{2}$$

A balanced random assignment gives unbiased instrumental variable (IV) estimates of π_1, and control variables should only improve precision. In our empirical analysis, we show that draft assignment is balanced on observed characteristics. Moreover, we check for signs of violations of randomization by comparing estimates from different specifications with different sets of control variables.

Draft status does not have a one-to-one correspondence with service status: Some choose to volunteer for military service, and a few resist serving, irrespective of the lottery outcome. Our IV estimator therefore provides a Local Average Treatment Effect (LATE) pertaining to elder brothers that would serve if they are drafted but that would otherwise not have served. The opportunity cost of serving for elder brothers who comply with the draft is greater than for elder brothers who volunteer. We must keep this point in mind when interpreting the effect of an elder brother's serving on the younger brother's probability of doing so. As the lottery numbers and draft assignments are uncorrelated across brothers[22], any positive estimated brother influence should be interpreted as an increased likelihood of a younger brother volunteering or complying with the draft because an elder brother is forced to serve.

III. Data

We have access to administrative records from the Danish Ministry of Defense on all fit-for-service men from birth cohorts 1976-1983 for AFQT scores, height, lottery number, the AFD half-year thresholds, and the potential starting half-year for their military service. Thanks to the civil registration number, military records are linked to other administrative registers at Statistics Denmark, containing information on demographic characteristics and family relationships. For our estimation sample we select the first two non-twin maternal brothers who are both fit-for-service and born in these cohorts. This criterion gives us a sample of 13,124 brother pairs, i.e., 26,248 individuals.

[Table 1 about here]

Table 1 shows descriptive statistics where all the variables are measured either during the AFD year or earlier. Columns 2-5 show our main estimation sample of fit-for service two-brother pairs,

[22] See Table 2 for draft assignment associations and Table A1 for lottery number associations.

along with all fit-for-service men from the same birth cohorts in column 1. In column 6, we show descriptive statistics for a 5 percent sample of men born 1988-1990—regardless of fit-for-service status (but participating on the AFD).[23] The main difference between samples is for AFQT scores, which are higher in the fit-for-service population (columns 1-5) than in the population as a whole (column 6). This difference is not surprising, because the AFQT score is an explicit military selection criterion.[24] Among fit-for-service men, our brother pairs were slightly heavier at birth and have parents with slightly more schooling. Among our brother pairs, those who serve have parents with slightly less schooling and come from households with 2 percent less income on average. The main difference between younger and elder brothers is for equivalized household income at age 15, which is higher for younger brothers because an elder brother is likely living outside the parental home. In sum, Table 1 makes clear that our brother pair estimation sample is remarkably similar to other fit-for-service men and relatively similar to the population participating on the AFD as a whole.

Given that the tests on the AFD are performed before the lottery, we can use the test information to assess the lottery's randomness. Moreover, we can use our extensive information on other background factors for the same purpose. If the lottery is a balanced randomization, predicting assignment based on the test results and pre-determined characteristics should not be possible. Table 2 presents tests for whether the elder brother's draft assignment is orthogonal to observed characteristics.[25] Specifically, each column presents OLS coefficients from separate regressions

[23] The reason for using cohorts born 1988-1990 is that we also observe the test results for men declared unfit for service on the AFD.

[24] True differences may be even larger because AFQTs are taken only by those attending a recruitment event. However, we only observe AFQT scores for everyone attending recruitment events from 2006, whereas our estimation sample is observed about a decade earlier, and cohort differences might explain some of the differences between columns.

[25] Appendix Table A.1 shows that elder brother's lottery draw is orthogonal to his own and his younger brother's observed characteristics.

explaining elder brother draft assignment through elder brother characteristics in columns 1-2 and explaining elder brother draft assignment through younger brother characteristics in columns 3-4.

[Table 2 about here]

As expected, assignment is not predicted by the predetermined characteristics. Coefficients are individually and jointly insignificant, and assignment is balanced on observed characteristics. Most importantly, columns 3-4 show that elder brother assignment is independent of younger brother observed characteristics. This independence of peer characteristics from focal person assignment meets Angrist's (2014) criterion for a compelling research design for studying peer effects. In columns 1 and 3 of Table 2, we do not include birth weight, parental income, or parental education, because we would lose some observations. We instead include these variables in columns 2 and 4, and the random assignment is still balanced.

IV. Results

Our large sample allows for precise estimation of main effects, and multiple random assignments allow for a variety of robustness checks and analyses of causal mechanisms. In this section we present mean estimates, and we check robustness to several threats to identification, consider heterogeneity and causal mechanisms, conduct a compliers analysis distinguishing selection from causation, present effects on occupational preferences, and end with an extension to more than two siblings.

A. Main results

Table 3 presents estimates of the relationship between elder brother draft and service status and younger brother service status. Each cell in the table contains the coefficient of interest from separate regressions. Each column presents estimates with different sets of explanatory variables. As the lottery is random and balanced, the covariates should serve mainly to increase the precision of our estimates.

In Panel A of Table 3, we first show OLS estimates of the relationship between the elder and younger brothers' service status. These regressions do not isolate the causal spillover effect and the relationship rather reflects the influence of both shared background factors and any spillover. The OLS estimates are large, positive, and significant, where having an elder brother serving is associated with a 9 percentage point increase in the likelihood that a younger brother serves.

[Table 3 about here]

Panel B shows reduced form coefficients of the effect of the elder brother's draft status on the probability that the younger brother serves. Elder brother draft increases the younger brother's probability of service by 2 percentage points, and the effect is stable across specifications. These regressions isolate a spillover effect, as we use only the variation in the elder brother's draft status coming from the lottery for identification, and lottery numbers and draft status are uncorrelated between brothers.[26] As not all elder brothers comply with their draft assignment, we need to scale this reduced form effect by the corresponding effect of the lottery on the likelihood of the elder brother's serving in the military to identify the spillover effect of having an elder brother serving per se.

[26] See Tables A.1 and A.2, respectively.

Panel C shows the first-stage estimates, where military service status of the elder brother is regressed on elder brother draft status. The estimates show that being drafted increases the probability of military service by 52 percentage points and the effect is highly significant. Adding control variables has very little impact on the estimated effect of the draft. Indeed, these results are expected, as with balanced randomization these controls should matter only for increasing the precision of the estimates.

We next focus on our main IV estimates (panel D in table 3). The first column shows a positive and significant effect of having an elder brother serving on younger brother service. The magnitude of the estimate suggests that having an elder brother serving increases the probability that a younger brother serves by 3 percentage points—about a 7 percent increase in the probability at the mean. This LATE measures the effect of having an elder brother who would not have served unless drafted, on a younger brother's decision to serve (either comply with draft assignment to serve or volunteer for service). The estimated effects are very stable across columns without other explanatory variables or with various sets of covariates.[27] While highly significant, our spillovers are closer to those found in other sibling rather than parent-child studies.

B. Robustness checks

In this sub-section we consider a number of threats to identification in family spillover models in general and in our context in particular, and we perform three sets of robustness checks to meet these challenges. First, we consider younger brother outcomes that should be "immune" to elder

[27] To allow for strategic volunteering among those with low lottery numbers (e.g. because they want to reduce the uncertainty of future service status), in appendix Table A2 we present estimates using both lottery draws and draft status as instruments. IV estimates of elder brother service effects on younger brother service are very similar regardless of inclusion of the lottery draw. Because results do not change when we allow for strategic behavior by expanding the instrument set, in the remainder of the paper we use only draft status to instrument for service status.

brother service—height and AFQT scores. Second, we consider the reflection problem by using double random assignment to check for reverse causality, i.e., younger brother affecting the elder brother. Third, we allow for selection out of the lottery by modeling spillovers in fit-for-service status.

Our estimates suggest a strong influence of having an elder brother serving. In our sample of fit-for-service brother pairs, both brothers participated in the draft lottery. Although the spillover we measure is from elder brother service to younger brother service, the fact that both brothers are randomly assigned allows us to conduct a placebo-like test for whether the spillover runs from a younger to an elder brother. By doing so, we test for the relevance of Manski's (2000) "reflection problem," i.e., while I affect my peer, my peer also affects me. Estimates from this placebo regression of younger brother service status (instrumented with younger brother draft status) explaining elder brother service status appear in Table 4. Despite OLS results very similar to those in Table 3, the estimated reduced form and IV coefficients are small and insignificant throughout, suggesting that the reflection problem is not an issue in our context. Given that the elder brother attends his AFD earlier than the younger brother—i.e., draft assignment of the elder brother precedes that of the younger brother—this result is expected.[28]

[Table 4 about here]

As another robustness check, we investigate whether elder brother service status has an effect on younger brother outcomes such as height, AFQT, or being fit for service. Such effects could

[28] In principle, a younger brother service may spill over to an elder brother's decision. An elder brother who was not drafted may later decide to volunteer, possibly as a function of the younger brother's service. However, the scope for such effects is small. The average birth spacing in our sample is three years, and most males serve at age 20. As almost all men who will serve have done so by age 25, only a small window exists for an elder brother to act on the younger brother's service. Only 2 percent of elder brothers serve after their younger brother. Results are robust to dropping these observations from the analysis.

reflect spurious younger brother selection on height, test taking effort, or attempts by the younger brother to avoid being declared fit-for-service in general.[29] We find no effect of the elder brother's serving on the younger brother's AFQT scores or height, suggesting that younger brothers do not change their effort in the AFQT tests or spuriously select on height in response to elder brother's service status.[30] The Ministry of Defense data to which we have access covers all men born 1976-1983 who are assessed fit for service. We know the dates of birth of all their brothers, regardless of those brother's fit-for-service status.[31] If a brother born 1976-1983 is missing from the Ministry of Defense data, we know that he was not fit for service because of death, emigration, disability, or failing AFD assessments, i.e., either from not participating on the AFD or from failing the AFD tests. The inference we have made thus far is about spillovers in service status conditional on both brothers being fit-for-service. By expanding our estimation dataset to include brother pairs where one is unfit for service, we can test for spillovers from a brother serving to another brother's fit-for-service status.[32]

[Table 5 about here]

Table 5 shows estimates of spillovers from service status to fit-for-service status, from elder to younger brother in Panel A, from younger to elder brother in Panel B, and from one brother

[29] In Appendix Table A.3 we first examine whether there is any effect of the elder brother's serving on an eligible younger brother's AFQT scores or height. AFQT scores and height are selection criteria not only for the military, but also for our data. If younger brothers manage to manipulate these measures outside the eligible range, we will not detect this manipulation in Table A.3. These regressions are thus conditional on both brothers being declared fit for service, i.e., the regressions are run on our main sample.

[30] Spillover effects may also work indirectly. When an elder brother leaves the household for an extended period, a younger brother might gain in terms of parental inputs, such as attention or help with homework. Although we have already shown that there is no effect of an elder brother serving on the AFQT score of a younger brother, we can also look for effects on a younger brother's future education and income when an elder brother is drafted. When we do so, however, the point estimates are small and insignificant (not shown).

[31] If no brother from these cohorts is assessed fit for service, we do not observe the family.

[32] Appendix Table A.4 presents descriptive statistics for the extended sample, where at least one brother, but not necessarily two, needs to be fit-for-service.

to another, regardless of birth order in Panel C. Column 1 in Table 5 shows that one brother's service is associated with a 1-2 percent higher fit-for-service probability for the other brother. This association could be due to volunteering if fitness were correlated between brothers and fit men were more likely to volunteer. Column 2 presents reduced form estimates showing that one brother's draft status is unrelated to the other brother's fit-for-service status. Column 3 shows that when one brother's service status is instrumented with his own draft status, his own service status is unrelated to the other brother's fit-for-service status. In sum, Table 5 shows that random draft assignment removes spillovers from service status to fit-for-service status, i.e., a younger brother's fit-for-service status is unaffected by his elder brother's service. Thus, in our main analysis, we do not exclude a significant spillover channel by conditioning on both brothers being fit-for-service.

Estimates are robust to the three threats to identification that we have considered. ”Immune” younger brother outcomes are not affected by elder brother service; causation runs only from elder to younger brother, suggesting an absence of the reflection problem; and brother service status does not affect sample composition, as there is no spillover to fit-for-service status. This robustness is reassuring and motivates further investigation of the heterogeneity and behavioral mechanisms driving mean effects.

C. Heterogeneity and mechanisms

Our estimates thus far are average effects. However, the strength of sibling spillovers may depend on several factors. If one mechanism driving the sibling effects is the provision of information, we expect less of a positive spillover effect when conscription entails large opportunity costs. Moreover, we expect that the closer the brothers are and the longer they have lived together, the stronger the interaction and the greater their influence on one another. We now explore these types of heterogeneity in more detail. To understand what drives the spillover in military service, we split the data according to elder and younger brother individual characteristics (table 6), relative characteristics (table 7), and time spent together during childhood (table 8).

Table 6 shows IV estimates of the effect of the elder brother's service on the younger brother's service for different quartiles of the distribution of height and AFQT scores for elder and younger brothers. Spillovers are stronger for elder brothers with above-median AFQT scores. Bingley, Lundborg and Vincent Lyk-Jensen (2014) show that because of military service, men with high AFQT scores suffer large earnings penalties in their late 20s, while the penalty is essentially zero for those with below-median AFQT scores. At first glance, the result that the positive service spillover effect is greatest for those with high AFQT scores is thus inconsistent with an information mechanism where communication about the opportunity cost of military service plays an important role for the spillover effect. If information on opportunity costs was an important mechanism, we would, on the contrary, expect weaker spillover effects for the high AFQT score group. However, young brother service decisions are likely made before elder brother earnings effects are realized or anticipated.

[Table 6 about here]

Heterogeneity in the spillover of military service by AFQT scores might instead show that other types of information are conveyed. One explanation could be that those with high AFQT scores also perceive their tasks in the military as more attractive and meaningful. Assignment to more qualified positions in the military is partly based on AFQT test scores. While random assignment to the military per se is balanced on pre-determined covariates by AFQT score quartile, this is not the case for assignment to the different armed forces. Moving from bottom to top AFQT score quartile, assignment to the Air Force increases from 3.2 to 6.7 percent, assignment to the Navy falls from 7.4 to 6.3 percent, and assignment to the Army falls from 83.6 to 81.1 percent. The assignment pattern suggests that the Air Force is the most technically demanding, requiring more than twice as many personnel from the top AFQT score quartile as from the bottom.

In contrast to elder brothers, when we split the sample by the younger brother's AFQT scores, the effects show no significant differences. That there is an AFQT test score gradient in service spillover by elder brother scores, not by younger brother scores, suggests the transfer of private yet imperfect information. If elder brothers with a high AFQT score have attractive military assignments but service spills over to younger brothers regardless of the younger brother's scores, one possibility is that younger brothers do not recognize the relationship between the task assignment and the AFQT scores. Consequently, despite their lower AFQT scores, younger brothers may still expect a task assignment as attractive as their elder brothers'. However, another possibility is that elder brothers with high AFQT scores may simply be better than those with low scores at communicating the benefits of service, whatever they may be, to their younger brothers.

Panels B and D of Table 6 show some intriguing heterogeneity by height. Elder brothers with height in the lowest quartile have the greatest influence on their younger brothers. At the same time, younger brothers with above-median height seem more heavily influenced by their elder brothers. To shed more light on these differences by characteristics, Table 7 presents regressions by the relative characteristics of the brothers.

[Table 7 about here]

In Table 7 the results in Panel A suggest that the spillovers are stronger when the elder brother is not as tall as the younger brother. Taller younger brothers drive the spillover from elder brother service. Elder brothers with below-median height appear especially aware of the advantages of greater height during military service and may encourage their taller younger brothers to serve accordingly.[33] Regardless of service status, taller elder brothers are aware of the advantages of height, whereas serving makes less tall elder brothers aware of their relative disadvantage in the military; less tall elder brothers communicate this private information to their taller younger brothers.

Table 7 also shows IV estimates of the effect of the elder brother's service on the younger brother's service, according to the brothers' relative positions for AFQT scores (panel B) and birth order (panel C). Spillovers are stronger when the elder brother has the highest AFQT score or is the first-born in the family, perhaps exhibiting interpersonal dominance. The lower panels of Table 7 show IV estimates of the effect of the elder brother's service on the younger's brother service according to whether they share the same father (panel D) or were born less than 37 months apart (panel E). An elder brother born shortly before a younger brother has the greatest influence.[34] As only 5 percent of maternal brothers have different fathers, the difference in spillovers is insignificant.

[Table 8 about here]

In Table 8, we show IV estimates of the effect of the elder brother's service on the younger brother's service according to different measures of years spent together in the family during childhood, i.e., brothers and both parents (panel A), brothers together (panel B), and years living with father (panel C). From columns 1 to 4, the family spends more time together. The longer the family

[33]The differences in the size of the spillover across the height distributions are conditional on quadratics in height for elder and younger brother.

[34]The stronger spillover effect for more closely spaced brothers cannot be explained by preferences for doing military service at the same time, as the timing of the mandatory service in our sample is almost always different.

has spent together, especially the longer brothers have lived together, the greater the spillovers.

In sum, Tables 6 to 8 show substantial heterogeneity in the importance of spillovers in military service. Spillovers are strongest for brothers who were close during childhood in terms of being of similar age and living together a longer time. Intuitively, that close brothers have similar preferences and that this similarity is exhibited in greater spillovers makes sense. However, some asymmetry with greater spillovers also exists if elder brothers are their mother' first born or have higher AFQT scores than their younger brother, suggesting a role for interpersonal dominance.

While heterogeneity of spillovers along other dimensions can throw light on the kind of private information that is shared between brothers, that information is not publicly available. Spillovers are strongest from elder brothers who are below-median height, have tall younger brothers, or have above-median AFQT scores. The results for height suggest even greater benefits of being tall in the military than are widely known. Stronger spillovers from elder brothers with high AFQT scores suggest a more favorable military task allocation, in turn motivating younger brothers to serve.

D. Compliers analysis of selection and causation

Our main finding is that elder brothers who serve because they are drafted make younger brothers more likely to serve. The spillover from elder to younger brothers might take the form of greater younger brother compliance with being drafted or of increasing the probability that the younger brother will volunteer. Because the younger brother is also randomly assigned to service, we can distinguish among younger brothers according to their response type and show which behavioral mechanism is behind younger brothers' response. First, we examine how selection into service and out of service is correlated between brothers. Second, we decompose the causal effect of elder brother service into changes of younger brother compliance with younger brother's draft.

Angrist, Imbens and Rubin (1996) distinguish four response types relative to assignment to a treatment. First, when told what to do, some individuals will always comply ("compliers"). Second, in contrast, some will always do the opposite ("defiers"). Third, regardless of the instructions, some will always receive the treatment ("always-takers"). Fourth, regardless of instructions, some will never receive the treatment ("never-takers"). Assuming that there are no defiers,[35] we can identify individuals who serve but were not drafted as volunteers. These individuals are known to be always-takers (KAT). Likewise, we can identify individuals who do not serve, but were drafted, as known never-takers (KNT).

Because we know the response types for some individuals (KAT and KNT), and we can calculate the joint distribution of response probabilities for everyone,[36] we can decompose younger brother behavioral response in two complementary ways. First, regressions explaining the individual response types that we can observe—KAT and KNT—are presented in Table 9. Second, conditional probabilities of response types are presented in Table 10.

[Table 9 about here]

Table 9 shows OLS estimates of elder brother known response status and draft status, explaining younger brother known response status and service status. Associations of known response types tell us about the part of the relationship that is not causal, but due to selection. Elder brother KAT (KNT) status is positively associated with younger brother KAT (KNT) status and negatively associated with younger brother KNT (KAT) status.

Selection into the military is stronger than selection out of the military, as shown by elder brother KAT (KNT) being associated with 82 (30) percent greater younger brother KAT (KNT) at

[35] The high costs of doing the opposite regardless of draft assignment, i.e. serving if not drafted and not serving if drafted, makes it natural to assume that there are no defiers in the context of military service.

[36] See Imbens et al., (1997).

the mean. Column (2) of Table 9 shows, that at the mean, 32 percent of younger brother service is due to elder brother KAT. Since 27 percent of younger brothers who serve are KATs (from means of dependent variables), 22 percent (27 percent of 82 percent) of younger brother service is due to KAT-KAT selection; the remaining 10 percent of younger brother service due to elder brother KAT selection is a mixture of volunteers and always-takers who cannot be observed individually because they are drafted.

Selection on known response type is a lower bound on the full extent of selection because we cannot observe individual always-takers who are drafted or individual never-takers who are not drafted. We present the inferred conditional distribution of response types in Table 10, enabling us to distinguish between selection and causal response for the sample as a whole.[37]

[Table 10 about here]

IV compares elder brothers who comply with the assignment to serve (row headed "comply, serve=1") with elder brothers who comply with the assignment not to serve (row headed "comply, serve=0"). Contrasts between these two rows for different columns show how the younger brother response type is affected by elder brother service. We therefore decompose the effect on the increase in younger brother service into different aspects of younger brother behavior. Most of the increase in younger brother service is 7.4 percent (1.1 percentage points) more always-takers, with 1.5 percent (0.4 percentage points) more service if drafted. These increases are at the expense of 8.6 percent (2.3 percentage points) fewer never-takers. Elder brother service causes a shift in younger brother behavior from non-service due to non-compliance and to volunteering for service.

[37]We find a moderate degree of correspondence, with 31.0 percent of brothers having the same response type as one another, compared to the 25.0 percent we would expect if the response types were independent. There is little dissonance, with 6.1 percent of brothers doing the opposite of one another (elder never-taker and younger always-taker, or elder always-taker and younger never-taker), compared to the 12.5 percent we would expect if they were independent.

The double random assignment of brother pairs to military service has enabled our joint compliers analysis to yield unique insights. Decomposing the association between elder brother service and younger brother service we find that selection effects are similar in size to causal effects.[38] Furthermore, most of the causal effect of elder brother service is through making younger brothers always-takers, and some of the causal effect is through making younger brothers more compliant if drafted.

E. Occupational preferences

While serving in the military, men gain specific skills and work experience through the training they undertake and the tasks they perform. Given their exposure to this particular occupation, preferences might change, and they might follow a different work career than they otherwise would have. In this subsection, we measure how military service affects occupational preferences by estimating how service affects subsequent occupational choice.

Experience and skills acquired in the military might also change preferences, and modify later training and occupational choice. Of 40 (3-digit classification) vocational training programs and 200 (4-digit classification) occupations with more than 100 men, born 1976-83 enrolled or employed, two training programs and three occupations were more likely to be chosen because of service.

[Table 11 about here]

Table 11 presents IV estimates of service effects on selected training programs and occupations. After adjusting p-values for multiple hypotheses testing by Bonferroni correction, among

[38] Elder brother KAT accounts for 32 percent of younger brother service. KATs are 11 percent of the sample and always-takers are 18 percent. Taken together, these sample proportions suggest that elder brother always-takers should account for 51 percent of younger brother service.

all fit-for-service men, serving significantly increases the probabilities of enrollment in the officer academy and employment in public administration and defense. For elder brothers, serving increases the likelihood of employment in public administration and defense. Military service increases subsequent employment in closely related occupations.

We do not find an effect of younger brother serving on younger brother's subsequent training or occupation. Spillovers from elder brother service to younger brother vocational training and occupation are also insignificant.[39] Both of these insignificant findings are probably due to us not observing as many post-service years for younger brothers during which to follow outcomes.

F. Extensions to more siblings

Our analysis so far has focused on spillovers from elder to younger brother for the first two maternal brothers born 1976-83, and we have ignored the influence of other siblings. While Section C illustrates some spillover mechanisms by allowing effects to vary with characteristics of the focal brother pair, this final sub-section illustrates some spillover dynamics by allowing effects to vary with sibling composition. First, we split the sample by the presence of other brothers and sisters. Second, we focus on families with more than two brothers, regardless of fitness. Third, we extend our analysis to spillovers between three brothers who are all fit-for-service.

[Table 12 about here]

Table 12 presents IV estimates of the effect of elder brother service on younger brother service split by the presence of siblings.[40] Panel A shows that spillovers are higher when there are other siblings, although when we only count other siblings born in the same 1976-83 cohort window, the

[39] We also find insignificant spillovers of elder brother service on younger brother earnings and years of schooling.

[40] Appendix Table A.5 presents OLS estimates corresponding to the IV estimates in Table 12.

point estimate becomes insignificant. Panels B and C split the sample by the presence of sisters and brothers, and reveal opposing effects by sibling gender—effects that were obscured in Panel A when we pooled brothers and sisters. When there are sisters, spillovers become insignificant. When there are more than two brothers, spillovers become larger, and counting only other brothers born in the same cohort window, spillovers become larger still—three times as large as for the full sample.

[Table 13 about here]

In Table 13 we consider only families with more than two brothers.[41] Column (1) in Table 13 corresponds to Panel C column (2) in Table 12, and the remaining columns in Table 13 further restrict this sample. When our two brothers of interest are born less than three years apart, spillovers are larger. Further restricting to three brothers born within our eight cohort window increases the spillover to 17 percentage points (36 percent at the mean). The presence of a third brother outweighs any opposing effect of sisters that we saw in Table 12. Considering households without sisters, where three brothers are born 1976-83, gives a similarly high spillover. Finally, imposing all of our restrictions, by further requiring that our two brothers of interest are also born within three years of one another, gives a spillover of 26 percentage points (55 percent at the mean)—seven times that of the full sample. While point estimates are high, standard errors also increase for these restricted samples and some estimates are not significantly different from others. Nevertheless, it is clear that point estimates of spillovers are higher for brothers who are closer.

Understanding the social multiplier is a key motivation for studying social interactions. Our setting of an elder brother affecting a younger brother helps identification by avoiding the reflection

[41] Appendix Table A.6 presents OLS estimates corresponding to the IV estimates in Table 13.

problem, but with only two brothers and directed social links we cannot identify a social multiplier. It is clear that the presence and composition of other siblings in the household has a strong influence on spillovers between our two brothers. We can go beyond this observation by modeling spillovers within three brother households, where social links are still directed, but there is scope for multiplicative effects. In our main sample we selected the first two brothers who are fit for service and born 1976-1983. However, 335 of these brother pairs have an even younger brother born within the same window, a brother who is fit for service but was previously excluded from our estimation sample. Extending the analysis to these 335 sets of three fit-for-service brothers, we can examine which brother is influenced by whom and how far the influences run in the family.

[Table 14 about here]

Table 14 presents IV estimates of spillovers between three brothers who are all fit for service.[42] Columns 1-4 show elder brothers' service explaining younger brothers' service; columns 5-9 show placebo estimates of younger brothers' service explaining elder brothers' service. Eldest brother service has a very large effect on middle brother service—an effect that is seven times larger than for first two brothers in general. Spillovers from middle to youngest brother are similarly large—six times that of the main sample—but are significant only when we also instrument for eldest brother service. Placebo estimates of reverse causation are insignificant for all combinations.

The results show that sisters reduce spillovers in military service between brothers, whereas additional brothers reinforce spillovers, especially if the brothers are closely spaced. In combination, these additional sibling spacing and gender restrictions can increase the spillovers between the first two fit-for-service brothers to 61 percent at the mean, compared to 7 percent for the full

[42] For the sample of three fit-for-service brothers, Appendix Table A.7 presents descriptive statistics and Appendix Table A.8 presents a balancing check for draft random assignment.

sample. For families of three fit-for-service brothers, spillovers at the mean are 54 percent from eldest to middle brother and 46 percent from middle to youngest.

Our range of spillover estimates are closer to those found in other sibling studies rather than other parent-child studies—the 27 percent found by Dahl, Loken and Mogstad (2014) for brother spillover in Norwegian paternity leave participation, the 88 percent father-to-son spillover in US wartime military service found by Campante and Yanagizawa-Drott (2015), and the 145 percent parent-to-child spillover in Norwegian disability insurance participation found by Dahl, Kostøl and Mogstad (2014).

V. Conclusion

It is notoriously difficult to estimate the effects of social interactions. For family interactions, the key challenge is to separate within-family similarities caused by shared but unobserved factors and family members influencing one another. Consequently, very few studies provide causal estimates of family spillovers. We add to this literature by using elder brothers who are randomly assigned to military service and younger brothers who, while also randomly assigned, may be non-compliant (either by volunteering or by refusing to serve if drafted). In this setting, we can clearly identify causal effects of elder brother service on younger brother service.

Our results suggest that social influences within families are strong. An elder brother serving in the military increases a younger brother's probability of serving by about 7 percent. This estimate reflects a decision of the younger brother to volunteer (or having an increased probability of complying with the assignment to serve) as a function of having an elder brother being forced into military service. Our estimated military service spillovers are more modest than the rather large family spillovers found for participation in other programs. For families with more than two brothers, our spillovers are at the lower end of the range found by other studies.

Taken together, our results have several important implications, for military recruitment in particular, and for program participation and interpretation of sibling correlations in general. The literature on military service has focused mainly on the effect of service on subsequent health and earnings. Much less is known about the determinants of serving, and our results suggest that the common observation that military experience runs in the family partly reflects the influence that family members have on one another, rather than simply reflecting shared background. Spillovers also suggest that sibling influences decrease the cost of participating in military service. This result is valuable for nations wishing to maintain or expand the size of their armed forces.

While the advantages of military conscription as opposed to an all-volunteer force have long been debated, one advantage of the mixed recruitment of conscripts and volunteers is that more spillovers of different kinds become possible for more people. In contrast to an all-volunteer force, conscription broadens the population basis for military recruitment, and we have shown that under a mixed conscription and volunteer force, behavioral spillovers between brothers further broadens the recruitment base. Our findings should lead to future investigation into the type of information shared between brothers, with a view to making more widely available certain types of information that are currently shared only privately. Such information could help broaden the population base of volunteers and offers the prospect of allowing the government to reproduce this essential feature of conscription in an all-volunteer force.

For program participation more generally, we show the importance of the family as an information channel. Dahl, Kostøl and Mogstad (2014) have shown the importance of families in which information about a disability insurance program is scarce. In contrast, because military service is a much larger program, with a full male cohort that may be called to serve, we would expect a great deal of information to be publicly available. Nevertheless, families can still provide additional private information that significantly affects behavior.

Finally, our results speak to the large literature on sibling correlations by showing that an important part of these correlations may reflect spillover effects across siblings. This explanation complements the traditional explanation that sibling correlations are taken as a measure of the combined effects of family background and community influences on a particular outcome. This finding also complicates the interpretation of differences in sibling correlations across contexts, as differences could arise even in situations where the family and community influences are the same but where the social influences are different.

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VI. Tables and Figures

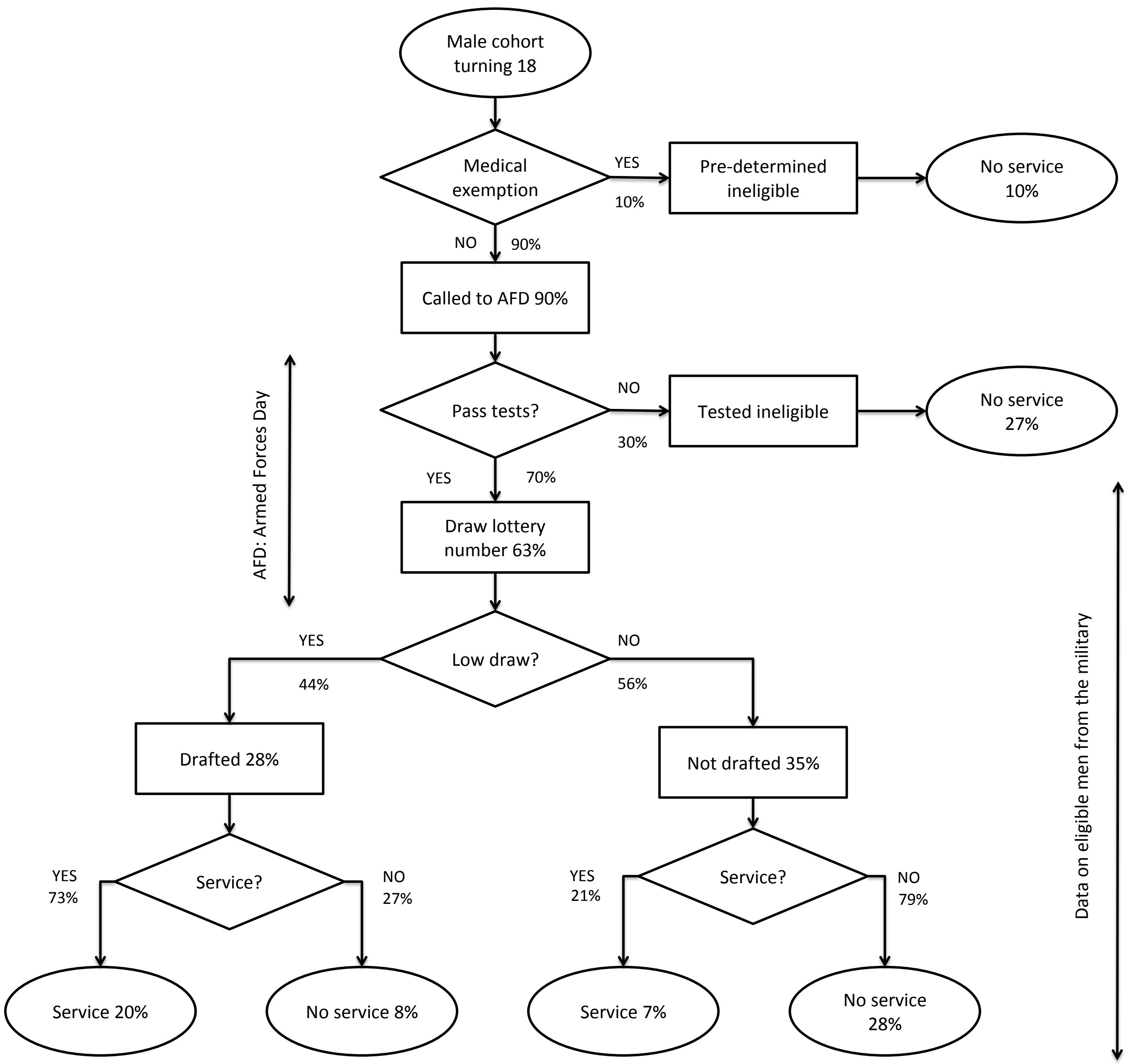

FIGURE 1. FLOW CHART OF THE CONSCRIPTION PROCESS

Notes: Numbers inside the shapes denote average percentages of our birth cohorts 1976-83. Numbers beside the arrows denote average percentages taking each route conditional on reaching the junction. The AFD includes test taking and drawing lottery numbers. Our estimation dataset contains information on all those who drew a lottery number.

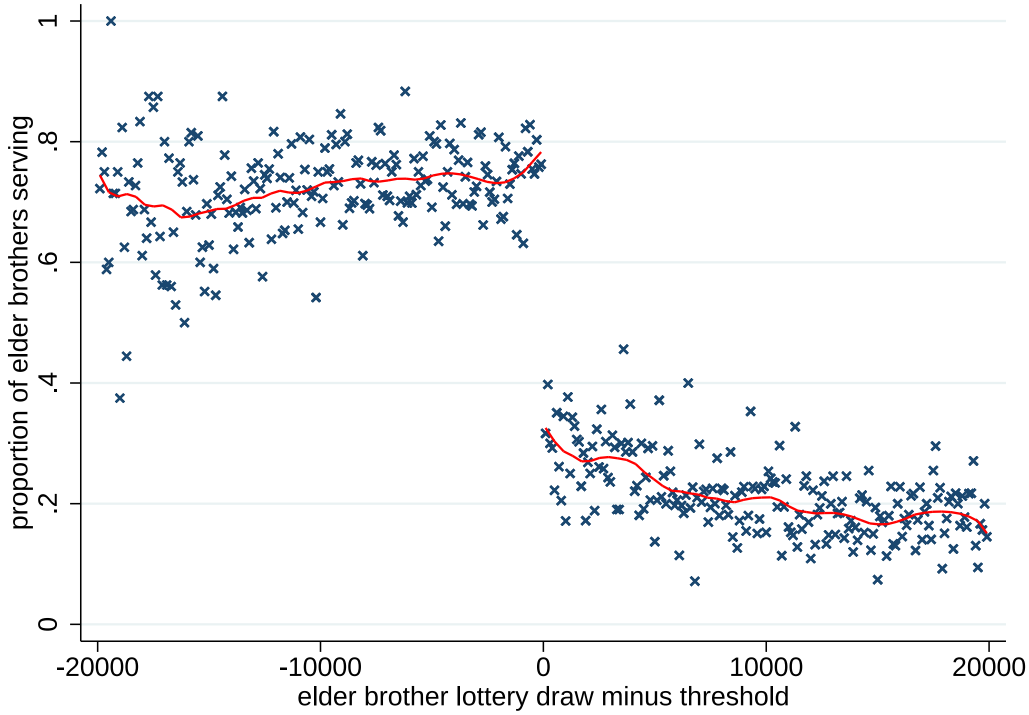

FIGURE 2. ELDER BROTHER SERVICE PROBABILITY BY ELDER BROTHER LOTTERY DRAW

Notes: Crosses indicate proportions serving among bins containing 100 consecutive lottery draws above the threshold. The lines are (Epanechikov) kernel-weighted (second degree) local polynomials estimated on the bin proportions each side of the threshold.

TABLE 1—SUMMARY STATISTICS

	Men fit-for-service	Main estimation sample				5 percent population
		served=1	served=0	elder	younger	
	(1)	(2)	(3)	(4)	(5)	(6)
Height (cm)	180.36	180.42	180.43	180.38	180.46	179.93
	(6.59)	(6.49)	(6.64)	(6.55)	(6.60)	(6.77)
AFQT score	44.57	45.10	45.37	45.57	44.94	41.28
	(8.34)	(8.03)	(8.47)	(8.37)	(8.19)	(10.30)
Observations	155,750	11,377	14,871	13,124	13,124	7,486†
Raised in single-parent family	0.18	0.16	0.15	0.14	0.17	0.19
	(0.38)	(0.37)	(0.36)	(0.35)	(0.37)	(0.39)
Placed in out-of-home care	0.04	0.04	0.03	0.04	0.03	0.05
	(0.20)	(0.20)	(0.16)	(0.19)	(0.17)	(0.22)
Non-immigrant and non-descendant	0.96	0.96	0.95	0.96	0.96	0.96
	(0.20)	(0.19)	(0.21)	(0.20)	(0.20)	(0.20)
Observations	155,750	11,377	14,871	13,124	13,124	14,390‡
Birth weight (Kg)	3.372	3.407	3.430	3.290	3.550	3.342
	(6.55)	(6.51)	(6.27)	(0.630)	(0.610)	(5.99)
Household income at age 15 (DKK)	133,792	129,177	131,893	125,970	138,324	130,579
	(57,685)	(57,945)	(56,453)	(51,627)	(60,449)	(56,554)
Mother's years of schooling	11.66	11.73	11.91	11.87	11.91	11.69
	(2.88)	(2.85)	(2.90)	(2.83)	(2.83)	(2.80)
Father's years of schooling	12.03	12.12	12.33	12.30	12.32	12.19
	(3.18)	(3.09)	(3.14)	(3.07)	(3.08)	(3.04)
Observations	149,124	10,688	14,268	12,478	12,478	14,390‡

Notes: Means, standard deviations in parentheses. Statistics in columns 1-5 relate to 1976-1983 male birth cohorts who are fit for service; statistics in column 6 indicated by † are for 1988-90 male birth cohorts attending the AFD; statistics in column 6 indicted by ‡ are for full 1976-1983 male birth cohorts. AFQT is taken on the AFD. Height is measured on AFD. Birth weight is measured by midwife. Raised in single-parent family is an indicator variable for household status on 17th birthday. Placed in out-of-home care is an indicator variable taking the value one if having lived in an institution or foster home before turning 18. Household income at 15 is equivalized according to the formula (sum of income in the household + transfers - taxes)/ (1*first_adult + 0.7*second_adult + 0.5*number_of_children) and reflated to 2012 prices by the CPI. Mother's and father's schooling are measured when son is age 15.

TABLE 2—RANDOMIZATION BALANCE CHECK: EFFECT OF PRE-DETERMINED CHARACTERISTICS ON THE PROBABILITY OF ELDER BROTHER BEING DRAFTED

	(1) Elder	(2) Elder	(3) Younger	(4) Younger
AFQT	0.00043	0.00036	-0.00009	-0.00005
	(0.00050)	(0.00053)	(0.00055)	(0.00058)
Height (cm)	-0.00072	-0.00086	-0.00010	-0.00009
	(0.00063)	(0.00067)	(0.00067)	(0.00070)
Danish	0.01243	-0.00986	0.01344	0.01507
	(0.02007)	(0.02888)	(0.02203)	(0.03314)
Single parent raised	-0.00857	-0.00629	0.01076	0.01258
	(0.01174)	(0.01219)	(0.01162)	(0.01207)
Out of home care	-0.00839	-0.01295	0.02986	0.02572
	(0.02188)	(0.02289)	(0.02591)	(0.02699)
Younger brother drafted			0.00634	0.00381
			(0.00988)	(0.01014)
Birth weight (kg)		0.00311		0.00271
		(0.00666)		(0.00754)
HH income (TDKK)		-0.00005		-0.00000
		(0.00009)		(0.00008)
Mother schooling		0.00007		-0.00006
		(0.00014)		(0.00015)
Father schooling		-0.00000		-0.00014
		(0.00013)		(0.00014)
F-Statistic	0.60909	0.39600	0.56074	0.52550
F-Stat p-value	0.69298	0.93767	0.76190	0.87346
Partial R^2	0.00023	0.00029	0.00026	0.00042
Observations	13124	12478	13124	12478

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$. The table contains estimates from 4 separate OLS regressions explaining elder brother draft status. Columns 1-2 use elder brother characteristics, and columns 3-4 use younger brother characteristics. Columns 2 and 4 contain 646 fewer observations because of missing information for one or both brothers (about birth weight, household income when aged 15, and maternal or paternal schooling).

TABLE 3—ELDER BROTHER'S DRAFT STATUS, ELDER BROTHER'S MILITARY SERVICE AND YOUNGER BROTHER'S SERVICE.

	(1) No controls	(2) Basic	(3) Extended I	(4) Extended II	(5) Extended III
Panel A. OLS regression: outcome younger brother service					
Elder brother served	0.0878***	0.0901***	0.0903***	0.0898***	0.0888***
	(0.0074)	(0.0077)	(0.0077)	(0.0077)	(0.0079)
Adjusted R^2	0.2663	0.2729	0.2743	0.2752	0.2752
Panel B. Reduced form regression: outcome younger brother service					
Elder brother drafted	0.0166**	0.0160**	0.0165**	0.0164**	0.0170**
	(0.0075)	(0.0080)	(0.0080)	(0.0080)	(0.0082)
Adjusted R^2	0.2588	0.2656	0.2670	0.2679	0.2682
Panel C. First-stage regressions: outcome elder brother service					
Elder brother drafted	0.5245***	0.5145***	0.5147***	0.5149***	0.5122***
	(0.0074)	(0.0078)	(0.0078)	(0.0078)	(0.0080)
Adjusted R^2	0.2724	0.3014	0.3070	0.3081	0.3065
Mean of dep. var.	0.439	0.439	0.439	0.439	0.439
Panel D. Second stage IV regressions: outcome younger brother service					
Elder brother served	0.0317**	0.0311**	0.0321**	0.0320**	0.0332**
	(0.0143)	(0.0155)	(0.0155)	(0.0155)	(0.0159)
F-stat excl. inst.	4916	4277	4313	4322	4058
Mean of dep. var.	0.428	0.428	0.428	0.428	0.428
Observations	13124	13124	13124	13124	12478

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$. The table presents estimates from 20 different regressions, with different estimators in each panel (A-D) and different specifications in each column. Column (1) has no controls. Column (2) has basic controls for both brothers, with dummies for year of birth, month of birth, and half-year of conscription, as well as draft status for the younger brother only. Column (3) additionally includes quadratic terms for height and AFQT scores for both brothers. Column (4) adds controls for both brothers for immigrant or descendant-of-immigrant status, living in a single parent household at age 15, and having experienced out-of-home care sometime before age 18. Column (5) adds controls for both brothers for birth weight, household income at age 15, and maternal schooling and paternal schooling for both brothers. We drop 646 brother pairs for column (5) because of missing additional information for one or both brothers. In panel D, elder brother service status is instrumented with elder brother draft status.

TABLE 4—PLACEBO - YOUNGER BROTHER'S DRAFT STATUS, YOUNGER BROTHER'S MILITARY SERVICE AND ELDER BROTHER'S SERVICE.

	(1) No controls	(2) Basic	(3) Extended I	(4) Extended II	(5) Extended III
Panel A. OLS regression: outcome elder brother service					
Younger brother served	0.0792***	0.0837***	0.0833***	0.0826***	0.0814***
	(0.0074)	(0.0076)	(0.0075)	(0.0075)	(0.0077)
Adjusted R^2	0.2786	0.3079	0.3133	0.3144	0.3126
Panel B. Reduced form regression: outcome elder brother service					
Younger brother drafted	-0.0009	0.0016	0.0018	0.0012	0.0011
	(0.0074)	(0.0083)	(0.0083)	(0.0082)	(0.0085)
Adjusted R^2	0.2724	0.3014	0.3070	0.3081	0.3065
Mean of dep. var.	0.439	0.439	0.439	0.439	0.439
Panel C. First-stage regressions: outcome younger brother service					
Younger brother drafted	0.5069***	0.4977***	0.4975***	0.4968***	0.4964***
	(0.0074)	(0.0085)	(0.0085)	(0.0085)	(0.0087)
Adjusted R^2	0.2588	0.2656	0.2670	0.2679	0.2682
Mean of dep. var.	0.427	0.427	0.427	0.427	0.427
Panel D. Second stage IV regressions: outcome elder brother service					
Younger brother served	-0.0017	0.0032	0.0036	0.0025	0.0022
	(0.0147)	(0.0167)	(0.0166)	(0.0166)	(0.0171)
F-stat excl. inst.	4580	3420	3422	3414	3232
Mean of dep. var.	0.439	0.439	0.439	0.439	0.439
Observations	13124	13124	13124	13124	12478

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$. The table presents estimates from 20 different regressions, with different estimators in each panel (A-D) and different specifications in each column. Although Table 4 has the same structure as Table 3, Table 4's placebo regressions are from younger brother to elder brother. Specifications for the columns are the same as for Table 3, except for columns 2-5, which control for elder brother draft status instead of younger brother draft status. In panel D, younger brother service status is instrumented with younger brother draft status.

TABLE 5—EXPLAINING BROTHERS' FIT-FOR-SERVICE STATUS

	(1) OLS	(2) RF	(3) IV
Panel A. Explaining younger brother is fit-for-service			
Elder brother served	0.0141**		0.00291
	(0.00663)		(0.0138)
Elder brother drafted		0.00146	
		(0.00697)	
Adjusted R^2	0.120	0.120	
F-stat excluded instrument			5732
Mean of dependent variable	0.678	0.678	0.678
Observations	19343	19343	19343
Panel B. Explaining elder brother is fit-for-service			
Younger brother served	0.0170**		0.00422
	(0.00662)		(0.0140)
Younger brother drafted		0.00211	
		(0.00704)	
Adjusted R^2	0.116	0.116	
F-stat excluded instrument			5312
Mean of dependent variable	0.700	0.700	0.700
Observations	18746	18746	18746
Panel C. Explaining one brother is fit-for-service			
Other brother served	0.0177***		0.00430
	(0.00534)		(0.0112)
Other brother drafted		0.00216	
		(0.00564)	
Adjusted R^2	0.0162	0.0158	
F-stat excluded instrument			11049
Mean of dependent variable	0.689	0.689	0.689
Families	24965	24965	24965
Observations	38089	38089	38089

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$. The table presents estimates from nine separate regressions explaining brother fit-for-service status. OLS estimates are in column 1. RF (intention to treat) estimates, in column 2; and IV estimates, in column 3. We also control for the Extended II set of covariates as in Table 3, column 4. In panel A we supplement our sample of 13,124 brother pairs, in which both are fit for service, with 6,219 brother pairs where only the elder brother is fit-for-service (totaling 19,343 brother pair observations), and we run four separate regressions explaining younger brother fit-for-service status with elder brother status. Similarly, in Panel B we supplement our sample of 13,124 brother pairs, in which both are fit-for service with 5,622 brother pairs where only the younger brother is fit for service (totaling 18,746 brother pair observations), and we run regressions explaining elder brother fit-for-service status with younger brother status. In Panel C we pool the samples from Panels A and B, including 13,124 brother pairs in which both are fit-for-service; 6,219 in which only the elder is fit; and 5,622 in which only the younger is fit (totaling 24,968 brother pair observations in total). Panel C uses 38,089 fit-for-service individuals, because the 13.124 brother pairs where both are fit-for-service are used twice, and standard errors are clustered at the brother pair level.

TABLE 6—SPILLOVERS ACROSS DISTRIBUTION OF AFQT SCORES AND HEIGHT.

A. Elder brother's AFQT quartiles	(1) Lowest	(2) 2nd	(3) 3rd	(4) Highest
Elder brother served	-0.00123	0.0282	0.0339	0.0548*
	(0.0303)	(0.0300)	(0.0333)	(0.0305)
F-stat excl. inst.	1066	1162	886	1111
Mean of dep var	0.456	0.426	0.435	0.392
Observations	3568	3473	2842	3241
B. Younger brother's AFQT quartiles	Lowest	2nd	3rd	Highest
Elder brother served	0.0153	0.0313	0.0637**	0.0191
	(0.0318)	(0.0313)	(0.0290)	(0.0319)
F-stat excl. inst.	982	1029	1236	983
Mean of dep var	0.444	0.435	0.436	0.390
Observations	3434	3392	3439	2859
C. Elder brother's height quartiles	Lowest	2nd	3rd	Highest
Elder brother served	0.0534*	0.0388	0.0259	0.000741
	(0.0276)	(0.0323)	(0.0295)	(0.0358)
F-stat excl. inst.	1334	980	1191	748
Mean of dep. var.	0.421	0.422	0.445	0.419
Observations	3589	3146	3622	2767
D. Younger brother's height quartiles	Lowest	2nd	3rd	Highest
Elder brother served	-0.00723	0.0349	0.0413	0.0710**
	(0.0283)	(0.0324)	(0.0302)	(0.0333)
F-stat excl. inst.	1269	957	1110	881
Mean of dep. var.	0.427	0.441	0.419	0.425
Observations	3645	3027	3561	2891

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$. The table presents IV estimates of spillovers from 16 separate regressions, splitting the sample according to quartiles of each brother's height and AFQT score. We also control for the Extended II set of covariates as in Table 3, column 4.

TABLE 7—SPILLOVERS BY RELATIVE CHARACTERISTICS.

	(1)	(2)
Panel A. By elder brother's height	Smaller	Taller or equal
Elder brother served	0.0666***	-0.00602
	(0.0221)	(0.0216)
F-stat excl. inst.	2115	2192
Mean of dep. var.	0.424	0.431
Observations	6232	6892
Panel B. By elder brother's AFQT	Lower	Higher or equal
Elder brother served	0.0148	0.0440**
	(0.0233)	(0.0207)
F-stat excl. inst.	1900	2388
Mean of dep var	0.428	0.427
Observations	5851	7273
Panel C. By elder brother's birth order in the family	First born	Not first born
Elder brother served	0.0370**	0.0215
	(0.0173)	(0.0347)
F-stat excl. inst.	3483	807
Mean of dep var	0.430	0.419
Observations	10402	2722
Panel D. By father	Same father	Different fathers
Elder brother served	0.0301*	0.0277
	(0.0157)	(0.0841)
F-stat excl. inst.	4212	109
Mean of dep. var.	0.425	0.476
Observations	12471	653
Panel E. By spacing	>36 months	<37 months
Elder brother served	0.00424	0.0524**
	(0.0222)	(0.0216)
F-stat excl. inst.	2161	2134
Mean of dep var	0.424	0.430
Observations	6053	7071

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$. The table presents IV estimates of spillovers from 10 separate regressions, splitting the sample according to different criteria in each panel (A-E), into two groups according to the column headers. We also control for the Extended II set of covariates as in Table 3, column 4.

TABLE 8—SPILLOVERS BY FAMILY TIME SPENT TOGETHER.

	(1) >0 years	(2) >5 years	(3) >10 years	(4) >12 years
Panel A. With elder brother, mother and father				
Elder brother served	0.0338**	0.0304*	0.0420**	0.0865**
	(0.0161)	(0.0170)	(0.0201)	(0.0337)
F-stat excl. inst.	3982	3611	2540	890
Mean of dep. var.	0.424	0.419	0.414	0.423
Observations	12019	10750	8027	3016
Panel B. With elder brother				
Elder brother served	0.0310**	0.0240	0.0331*	0.0594**
	(0.0156)	(0.0158)	(0.0179)	(0.0284)
F-stat excl. inst.	4250	4146	3190	1239
Mean of dep. var.	0.427	0.427	0.424	0.431
Observations	12909	12512	9947	3957
Panel C. With father				
Elder brother served	0.0357**	0.0303*	0.0416**	0.0467**
	(0.0160)	(0.0167)	(0.0177)	(0.0182)
F-stat excl. inst.	4044	3712	3309	3141
Mean of dep. var.	0.424	0.420	0.416	0.417
Observations	12220	11117	10119	9545

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$. The table presents IV estimates of spillovers for subsamples according to the number of years living at the same address when the youngest brother is aged 4-17 (columns 1-4) with different other members of the family (panels A-C). Sample size falls as we condition on more years of living at the same address. We also control for the Extended II set of covariates as in Table 3, column 4.

TABLE 9—COMPLIERS ANALYSIS - EXPLAINING KNOWN RESPONSE TYPES

	Younger brother		
	(1)	(2)	(3)
	KAT	Served	KNT
Elder brother KAT	0.0934***	0.139***	-0.0534***
	(0.0104)	(0.0137)	(0.00849)
Elder brother KNT	-0.0238**	-0.0748***	0.0387***
	(0.00957)	(0.0147)	(0.0105)
Elder brother drafted	0.0334***	0.0680***	-0.0313***
	(0.00676)	(0.0103)	(0.00694)
Adjusted R^2	0.0327	0.0848	0.0469
Mean of dep var	0.114	0.428	0.127
Observations	13124	13124	13124

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$. The table presents estimates from three separate OLS regressions explaining younger brother known–always-taker (KAT) status (men who serve when they are not drafted) in column 1, younger brother service status in column 2, and younger brother known never taker (KNT) status (men who do not serve when they are drafted) in column 3. We also control for the Extended II set of covariates as in Table 3, column 4.

TABLE 10—COMPLIERS ANALYSIS - JOINT DISTRIBUTION OF RESPONSE TYPES

	Younger brother				
Elder brother	Always taker	Complier served=1	Complier served=0	Never taker	All
			Row percentage		
Always-taker	31.1	23.1	30.2	15.4	100
Complier, served=1	15.9	26.3	33.0	24.6	100
Complier, served=0	14.8	25.9	32.2	26.8	100
Never-taker	13.3	22.7	29.7	34.1	100
All	17.9	24.7	31.4	25.7	100

*Notes:*The table presents the implied distribution of response types, calculating younger brother response type conditional on elder brother response type. Following Imbens and Rubin (1997), calculations are made without conditioning on covariates.

TABLE 11—IV ESTIMATES OF SERVICE EFFECTS ON STUDY AND OCCUPATION.

	(1)	(2)	(3)	(4)	(5)
	Education enrolment		Occupation		
	Officer Academy	Police Academy	Public Administration	Armed Forces	Rescue Services
Panel A. Full sample of fit-for-service men. Outcome: Own Education/Occupation					
Own service	0.00384***	0.00281	0.112***	0.114***	0.000749
	(0.000884)	(0.00141)	(0.00311)	(0.00298)	(0.000370)
F-stat excl. inst.	48824	48824	48824	48824	48824
Mean of dep var	0.00674	0.0173	0.0998	0.0914	0.00117
Observations	155750	155750	155750	155750	155750
Panel B. Sample of two brothers fit-for service. Outcome: Elder brother's Education/Occupation					
Elder served	-0.000306	0.00724	0.127***	0.130***	0.000815
	(0.00324)	(0.00486)	(0.0110)	(0.0105)	(0.00101)
F-stat excl. inst.	4322	4322	4322	4322	4322
Mean of dep var	0.00792	0.0179	0.111	0.103	0.000762
Observations	13124	13124	13124	13124	13124

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$. The table presents estimates from 15 separate IV regressions, explaining binary indicators for educational enrollment (columns 1-2) and occupation (columns 3-5), with a binary indicator for military service. Panels A and B use different samples of men and explain study and occupation with their own service. Panel C explains younger brother occupation and study with elder brother service. We also control for the Extended II set of covariates as in Table 3, column 4. P-values are adjusted for multiple hypotheses with Bonferroni corrections for 40 educations and 200 occupations.

TABLE 12—SPILLOVERS SPLIT BY PRESENCE OF OTHER SIBLINGS

	(1) Born 1976-83	(2) Any	(3) None
Panel A. Other siblings			
Elder brother service	0.0564	0.0396**	0.0286
	(0.0363)	(0.0193)	(0.0213)
F-Stat excluded instrument	754	2670	2168
Mean of dependent variable	0.446	0.434	0.433
Observations	2112	6977	6147
Panel B. Sisters			
Elder brother service	0.00912	0.0207	0.0397**
	(0.0452)	(0.0250)	(0.0175)
F-Stat excluded instrument	479	1570	3276
Mean of dependent variable	0.437	0.434	0.433
Observations	1383	4259	8865
Panel C. Other brothers			
Elder brother service	0.113**	0.0514**	0.0245
	(0.0566)	(0.0249)	(0.0175)
F-Stat excluded instrument	303	1584	3243
Mean of dependent variable	0.466	0.436	0.432
Observations	839	4054	9070

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$. The table presents IV estimates of spillovers from 9 separate regressions; with sample restrictions about gender of other siblings in Panels A-C; and whether these siblings exist in columns 2-3, or are also born 1976-83. We also control for the Extended II set of covariates as in Table 3, column 4.

TABLE 13—SPILLOVERS IN FAMILIES WITH MORE THAN TWO BROTHERS

	(1)	(2)	(3)	(4)	(5)
Sisters	Yes/No	Yes/No	Yes/No	No	No
Three brothers 1976-83	Yes/No	Yes/No	Yes	Yes	Yes
Under 36 months spacing	Yes/No	Yes	Yes	Yes/No	Yes
Elder brother service	0.0514**	0.0761**	0.169**	0.161**	0.262**
	(0.0249)	(0.0345)	(0.0818)	(0.0733)	(0.107)
F-Stat excluded instrument	1584	783	139	185	80
Mean of dependent variable	0.436	0.435	0.470	0.479	0.479
Observations	4054	2295	513	549	351

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$. For a subsample with a third brother, the table presents spillover estimates from five separate IV regressions with additional sample restrictions. Column headers indicate whether the restriction is imposed (yes), reversed (no), or ignored (yes/no). We also control for the Extended II set of covariates as in Table 3, column 4.

TABLE 14—SPILLOVERS BETWEEN THREE BROTHERS

	Elder brother explains younger				Placebo - younger explains elder			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Middle served	Youngest served	Youngest served	Youngest served	Middle served	Eldest served	Eldest served	Eldest served
Eldest served	0.217**	-0.0233	-0.00192					
	(0.0896)	(0.0876)	(0.0820)					
Middle served			0.227**	0.188*			-0.147	-0.0969
			(0.110)	(0.107)			(0.106)	(0.103)
Youngest served					0.0358	-0.0584	-0.0638	
					(0.112)	(0.0838)	(0.0940)	
F-Stat excl. instr.	121	137	27	63	64	64	20	57
Mean of dep. var.	0.460	0.481	0.481	0.481	0.460	0.504	0.504	0.504
Observations	335	335	335	335	335	335	335	335

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$. For a sample of three brothers born 1976-83 and assessed fit for service, the table presents estimates from eight separate IV regressions. Either elder brother's service explains youngest brother service in columns 1-4. Either younger brother's service explains eldest brother service in placebo regressions in columns 5-8. We also control for the Extended II set of covariates as in Table 3, column 4, depending upon which brothers we consider.

Appendix for online publication

A. Additional tables and figures

TABLE A.1—RANDOMIZATION BALANCE CHECK: EFFECT OF PRE-DETERMINED CHARACTERISTICS ON THE ELDER BROTHER LOTTERY NUMBER

	(1) Elder	(2) Elder	(3) Younger	(4) Younger
AFQT	-0.00012	-0.00010	-0.00012	-0.00010
	(0.00032)	(0.00034)	(0.00032)	(0.00034)
Height (cm)	0.00031	0.00036	0.00030	0.00035
	(0.00039)	(0.00041)	(0.00039)	(0.00041)
Danish	0.01834	0.03177*	0.01856	0.03233*
	(0.01289)	(0.01906)	(0.01287)	(0.01904)
Single parent raised	-0.00146	-0.00258	-0.00156	-0.00267
	(0.00684)	(0.00711)	(0.00684)	(0.00711)
Out of home care	-0.00198	-0.00315	-0.00154	-0.00274
	(0.01457)	(0.01526)	(0.01458)	(0.01526)
Younger brother draw			0.01231	0.01144
			(0.00881)	(0.00904)
Birth weight (kg)		-0.00231		-0.00226
		(0.00433)		(0.00433)
HH income (TDKK)		-0.00002		-0.00002
		(0.00005)		(0.00005)
Mother schooling		0.00001		0.00001
		(0.00009)		(0.00009)
Father schooling		0.00001		0.00001
		(0.00008)		(0.00008)
F-Statistic	0.61162	0.45786	0.83567	0.57293
F-Stat p-value	0.69103	0.90325	0.54204	0.83743
Partial R^2	0.00023	0.00033	0.00038	0.00046
Observations	13124	12478	13124	12478

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$. The table contains estimates from four separate OLS regressions explaining elder brother lottery number. Columns 1-2 use elder brother characteristics, and columns 3-4 use younger brother characteristics. Columns 2 and 4 contain 646 fewer observations because of missing information for one or both brothers about birth weight, household income when aged 15, and maternal or paternal schooling.

TABLE A.2—MAIN REGRESSIONS ALSO INCLUDING LOTTERY DRAW AS INSTRUMENT

	(1) No controls	(2) Basic	(3) Extended I	(4) Extended II	(5) Extended III
Panel A. First-stage regressions: outcome elder brother service					
Elder drafted	0.4727***	0.4587***	0.4577***	0.4584***	0.4546***
	(0.0112)	(0.0131)	(0.0131)	(0.0131)	(0.0135)
Elder lottery draw	-0.1179***	-0.1113***	-0.1135***	-0.1126***	-0.1149***
	(0.0191)	(0.0211)	(0.0210)	(0.0210)	(0.0216)
Adjusted R^2	0.2745	0.3028	0.3084	0.3096	0.3081
Mean of dep var	0.439	0.439	0.439	0.439	0.439
Panel B. Second stage IV regressions: outcome younger brother service					
Elder served	0.0331**	0.0329**	0.0339**	0.0338**	0.0355**
	(0.0142)	(0.0155)	(0.0154)	(0.0154)	(0.0159)
F-stat excl. inst.	1656	1438	1450	1453	1365
Mean of dep var	0.428	0.428	0.428	0.428	0.428
Observations	13124	13124	13124	13124	12478

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$. The table presents estimates from 20 different regressions, with different estimators in each panel (A-D) and different specifications in each column. In panel D elder brother service status is instrumented with elder brother draft status and elder brother lottery number. Specifications are the same as in Table 3 in the main text, with the addition of controls for younger brother lottery number in columns 2-5.

TABLE A.3—EXPLAINING YOUNGER BROTHERS' OUTCOMES

	(1) OLS	(2) RF	(3) IV
Panel A. Explaining younger brother AFQT score			
Elder brother served	-0.316**		-0.00726
	(0.136)		(0.270)
Elder brother drafted		-0.00374	
		(0.140)	
Adjusted R^2	0.189	0.189	
Mean of dependent Variable	44.94	44.94	44.94
Panel B. Explaining younger brother height			
Elder brother served	-0.0332		0.127
	(0.103)		(0.205)
Elder brother drafted		0.0655	
		(0.106)	
Adjusted R^2	0.279	0.279	
F-stat excluded instrument			4321
Mean of dependent Variable	180.5	180.5	180.5
Observations	13124	13124	13124

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$. This table presents OLS, reduced form (RF) and IV estimates of elder brother service and draft status explaining younger brother AFQT scores in Panel A and younger brother height in Panel B. We also control for the Extended II set of covariates as in Table 3, column 4, except that we omit of younger brother AFQT score (and its square) and younger brother height (and its square).

TABLE A.4—DESCRIPTIVE STATISTICS BY BROTHER FIT-FOR-SERVICE STATUS

	Elder descriptives		Younger descriptives	
	(1)	(2)	(3)	(4)
Brother fitness assessment	Younger fit	Younger unfit	Elder fit	Elder unfit
Drafted	0.43	0.42	0.43	0.45
	(0.50)	(0.49)	(0.50)	(0.50)
Served	0.43	0.42	0.44	0.41
	(0.50)	(0.49)	(0.50)	(0.49)
AFQT	45.23	43.52	45.19	43.55
	(8.33)	(8.83)	(8.31)	(8.33)
Height (cm)	180.41	179.93	180.38	180.13
	(6.56)	(6.70)	(6.54)	(6.70)
Danish	0.96	0.92	0.96	0.92
	(0.20)	(0.27)	(0.20)	(0.27)
Single parent family	0.16	0.16	0.15	0.17
	(0.36)	(0.36)	(0.36)	(0.38)
Out of home care	0.03	0.06	0.03	0.05
	(0.18)	(0.24)	(0.18)	(0.22)
Observations	13124	6219	13124	5622

*Notes:*This table compares elder brother characteristics when he has a fit-for-service younger brother (in column 1) to when he has an unfit-for service younger brother (in column 2). It also compares younger brother characteristics when he has a fit-for-service elder brother (in column 3) to when he has an unfit-for-service elder brother (in column 4).

TABLE A.5—OLS SPILLOVERS SPLIT BY PRESENCE OF OTHER SIBLINGS

	(1) Born 1976-83	(2) Any	(3) None
Panel A. Other siblings			
Elder brother service	0.0766***	0.0822***	0.101***
	(0.0214)	(0.0115)	(0.0122)
Adjusted R^2	0.0573	0.0749	0.0895
Observations	2112	6977	6147
Panel B. Sisters			
Elder brother service	0.0801***	0.0809***	0.0957***
	(0.0267)	(0.0148)	(0.0102)
Adjusted R^2	0.0539	0.0751	0.0845
Observations	1383	4259	8865
Panel C. Other brothers			
Elder brother service	0.0667*	0.0729***	0.0997***
	(0.0348)	(0.0151)	(0.0101)
Adjusted R^2	0.0495	0.0809	0.0810
Observations	839	4054	9070

*Notes:*Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$. The table presents OLS estimates of spillovers from nine separate regressions, with sample restrictions about gender of other siblings in Panels A-C, and whether these siblings are in columns 2-3, or were also born 1976-83. These OLS estimates correspond with IV estimates from Table 12 in the main text.

TABLE A.6—OLS SPILLOVERS IN FAMILIES WITH MORE THAN TWO BROTHERS

	(1)	(2)	(3)	(4)	(5)
Sisters	Yes/No	Yes/No	Yes/No	No	No
Three brothers 1976-83	Yes/No	Yes/No	Yes	Yes	Yes
Under 36 months spacing	Yes/No	Yes	Yes	Yes/No	Yes
Elder brother service	0.0729***	0.0840***	0.0340	0.0893**	0.0822
	(0.0151)	(0.0204)	(0.0473)	(0.0440)	(0.0592)
Adjusted R^2	0.0809	0.0724	0.0279	0.0612	0.0168
Observations	4054	2295	513	549	351

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$. For a subsample with a third brother, the table presents spillover estimates from five separate OLS regressions with additional sample restrictions. Column headers indicate whether the restriction is imposed (yes), reversed (no), or ignored (yes/no). These OLS estimates correspond with IV estimates from Table 13 in the main text. Additional explanatory variables are as in Table 3, column 4.

TABLE A.7—THREE BROTHERS DESCRIPTIVE STATISTICS

	Eldest	Middle	Youngest
Drafted	0.50	0.39	0.54
	(0.50)	(0.49)	(0.50)
Served	0.50	0.46	0.48
	(0.50)	(0.50)	(0.50)
AFQT	45.09	45.42	44.72
	(9.05)	(8.54)	(8.67)
Height (cm)	179.74	179.73	180.36
	(7.13)	(6.62)	(6.67)
Danish	0.89	0.89	0.89
	(0.32)	(0.31)	(0.31)
Single parent family	0.13	0.16	0.15
	(0.33)	(0.37)	(0.36)
Observations	335	335	335

Notes: The table presents descriptive statistics for the sample of three brothers born 1976-83 who are fit for service, with columns for eldest (1), middle (2), and youngest brother (3).

TABLE A.8—THREE BROTHERS' RANDOMIZATION BALANCE CHECK—EXPLAINING ELDER BROTHER DRAFT STATUS WITH PRE-DETERMINED CHARACTERISTICS

	(1) Eldest explains eldest	(2) Middle explains eldest	(3) Middle explains middle	(4) Youngest explains middle
AFQT	0.00203	0.02154	0.03030	0.01702
	(0.02332)	(0.03307)	(0.02899)	(0.03113)
Height (cm)	-0.11592	-0.23686	-0.18334	-0.14263
	(0.11834)	(0.17442)	(0.19656)	(0.16272)
Danish	-0.00046	0.00194	-0.06152	0.03885
	(0.10680)	(0.10798)	(0.10165)	(0.10985)
Single parent family	-0.05197	-0.04185	-0.02924	-0.01513
	(0.08623)	(0.08613)	(0.07076)	(0.08297)
Out of home care	0.02411	-0.08563	0.02484	0.10800
	(0.10155)	(0.17246)	(0.14111)	(0.15167)
Middle drafted		-0.00810		
		(0.06603)		
Youngest drafted				-0.03396
				(0.06826)
F-Stat. excluded instrument	0.43822	0.49932	0.42732	0.39505
F-Stat p-value	0.87771	0.85637	0.88486	0.92284
Partial R^2	0.01069	0.01377	0.01031	0.01089
Observations	335	335	335	335

Notes: Robust standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$. The table contains estimates from four separate OLS regressions explaining elder brother draft status. Columns 1-2 explain eldest brother draft status, and columns 3-4 explain middle brother draft status. Column 1 uses eldest brother characteristics, columns 2-3 use middle brother characteristics, and column 4 uses youngest brother characteristics.