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SPECIAL SECTION ARTICLE

Using complementary methods to test whether marriage limits men's antisocial behavior

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Abstract

Married men engage in significantly less antisocial behavior than unmarried men, but it is not clear whether this reflects a causal relationship. Instead, the relationship could reflect selection into marriage whereby the men who are most likely to marry (men in steady employment with high levels of education) are the least likely to engage in antisocial behavior. The relationship could also be the result of reverse causation, whereby high levels of antisocial behavior are a deterrent to marriage rather than the reverse. Both of these alternative processes are consistent with the possibility that some men have a genetically based proclivity to become married, known as an active genotype–environment correlation. Using four complementary methods, we tested the hypothesis that marriage limits men's antisocial behavior. These approaches have different strengths and weaknesses and collectively help to rule out alternative explanations, including active genotype–environment correlations, for a causal association between marriage and men's antisocial behavior. Data were drawn from the in-home interview sample of the National Longitudinal Study of Adolescent Health, a large, longitudinal survey study of a nationally representative sample of adolescents in the United States. Lagged negative binomial and logistic regression and propensity score matching models ($n = 2{,}250$), fixed-effects models of within-individual change ($n = 3{,}061$), and random-effects models of sibling differences ($n = 618$) all showed that married men engaged in significantly less antisocial behavior than unmarried men. Our findings replicate results from other quasiexperimental studies of marriage and men's antisocial behavior and extend the results to a nationally representative sample of young adults in the United States.

Married men engage in significantly less official crime and self-reported antisocial behavior than unmarried men. This pattern has been observed in population samples (Beaver, Wright, DeLisi, & Vaughn, 2008; Burt et al., 2010; Warr, 1998) and in high-risk samples of men who have a history of crime and delinquency (Bersani, Laub, & Nieuwbeerta, 2009; Blokland & Nieuwbeerta, 2005; Farrington, 1995; Huebner & Berg, 2011; Laub, Nagin, & Sampson, 1998; Sampson & Laub, 1993; Theobald & Farrington, 2009). The association between marriage and men's antisocial behavior has been observed among individuals and in the aggregate, where communities with higher marriage rates are also characterized by lower levels of crime (Porter & Purser, 2010). The goal of this paper was to use complementary methodological approaches to test whether lower levels of antisocial behavior among married versus unmarried men are more likely to reflect causal as opposed to noncausal processes.

Causal Versus Noncausal Accounts of the Association Between Marriage and Men's Antisocial Behavior

The association between marital status and men's antisocial behavior could reflect a causal process. For instance, one possibility is that marriage may promote social bonds that serve as a brake on men's antisocial behavior. A second possibility is that marriage leads to changes in daily routines because wives explicitly restrict opportunities to engage in crime or because marital and family responsibilities preclude association with deviant peers (Warr, 1998). A third possibility is that marriage leads to changes in identity (e.g., from bad boy to responsible family man). These explanations are not mutually exclusive, and a fuller discussion of them can be found in Sampson and Laub (1993).

Alternatively, the association between marital status and men's antisocial behavior could reflect a selection effect whereby the characteristics that make men attractive marriage partners (e.g., high income potential, conscientiousness) are simultaneously associated with low levels of antisocial be-

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havior. Another possibility is reverse causation: men who already engage in low levels of antisocial behavior are the ones most likely to marry (Burt et al., 2010; Sampson, Laub, & Wimer, 2006). Thus, a range of preexisting differences could explain why married men engage in less antisocial behavior than unmarried men.

Behavioral geneticists think about these alternative explanations for the association between marriage and antisocial behavior in terms of active genotype–environment correlation. Active genotype–environment correlation refers to the process whereby individuals seek out environmental niches that are congruent with their genetic proclivities (Jaffee & Price, 2007; Plomin, DeFries, & Loehlin, 1977). For example, individuals who are genetically prone to have a personality characterized by high levels of agreeableness, low levels of negative emotionality, and high levels of conscientiousness may be highly likely to become married (Johnson, McGue, Krueger, & Bouchard, 2004) and highly unlikely to engage in antisocial behavior (Krueger, 1999). Thus, active genotype–environment correlations could generate spurious associations between marital status and antisocial behavior and could underlie some of the selection effects commonly observed in studies of marital status.

Quasiexperimental Studies of Marriage and Men's Antisocial Behavior

Given the challenges to causal interpretation in observational data, criminologists have turned to quasiexperimental designs to test whether marriage is likely to *cause* reductions in men's antisocial behavior. These studies achieve by design what an experimental study would achieve by randomly assigning participants to married and unmarried conditions, an unethical approach that would nevertheless eliminate preexisting differences between the two groups. For example, several studies have tested whether within-individual changes in life circumstances, such as marital status, employment status, or use of drugs or alcohol, are associated with within-individual changes in offending rates (Blokland & Nieuwbeerta, 2005; Horney, Osgood, & Marshall, 1995; Sampson et al., 2006). These studies consistently show that men are less likely to be convicted of a crime during periods when they are married than during periods when they are unmarried, with a reduction in risk ranging from approximately a quarter (Blokland & Nieuwbeerta, 2005) to a half (Horney et al., 1995). Such analyses of within-individual change are informative because they control automatically for characteristics of the individual that are stable over time and that may confound the relationship between marital status and crime. Because genotype is a fixed characteristic of an individual, these models directly address the possibility that active genotype–environment correlations account for observed associations between marital status and antisocial behavior.

Prior studies of within-individual change had a number of strengths. Some followed men over a substantial period of the life course, from adolescence into old age (Blokland & Nieuwbeerta, 2005; Sampson et al., 2006) or used sophisticated methods to account for complex relationships between marriage and other life circumstances over time. For example, Sampson et al. (2006) calculated an individual's propensity to be married in any given year based on what was known about the individual at the time, placing more weight on data from years in which men had a relatively low estimated probability of being in their observed marital state (i.e., married or unmarried) and "downweighting" the data from years in which men had a relatively high estimated probability of being in their observed marital state. Thus, this analysis accounted for not only temporally stable individual differences that could confound observed associations between marital status and men's antisocial behavior but also time-varying characteristics (e.g., being employed in one year but not in the next) that could affect the association in any given period.

Studies of within-individual change automatically eliminate a range of confounds to the association between marital status and antisocial behavior by using individuals as their own controls. Two other methodologies take a different approach to answering the counterfactual: what would a man who has married be like if he had not married? The first method uses information from siblings who are discordant for marriage. Burt et al. (2010) used longitudinal data from a study of 289 29-year-old monozygotic (MZ) and dizygotic (DZ) twin pairs to test whether active genotype–environment correlations (or other environmental factors) accounted for the association between marital status and men's antisocial behavior. They found that in both MZ and DZ pairs, the married twin in a pair had significantly lower levels of antisocial behavior compared with his unmarried cotwin. The twins in their sample had been reared in the same families and communities. Thus, these factors could not explain why married men engaged in less antisocial behavior than their unmarried twin brothers. Moreover, the comparison of MZ twins ruled out the possibility that genetic differences between married and unmarried men accounted for differences in their antisocial behavior because MZ twin siblings share 100% of their DNA. Therefore, these findings, like those from the within-individual change models, were consistent with a causal model in which marriage leads to desistance from antisocial behavior.

Statistical Matching Studies of Marriage and Men's Antisocial Behavior

A second approach to matching married and unmarried men is to use propensity score matching (PSM) methods. PSM techniques restructure correlational data to mimic randomized experimental data where random assignment to experimental and control groups minimizes pretreatment differences between the two, leading to a less biased estimate of the treatment effect (Dehejia & Wahba, 2002; Rubin, 1997). The propensity score is the conditional probability of receiving treatment (e.g., getting married) conditional on observed co-

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variates (Rosenbaum & Rubin, 1983). For example, an individual with a history of high academic achievement, prosocial behavior, and steady employment will have a much higher estimated probability of being married than an individual who has a history of school failure, delinquency, and prolonged periods of unemployment. Each individual is assigned a propensity score and matching algorithms are used to match "treated" and "untreated" individuals with similar propensity scores (Rosenbaum & Rubin, 1985). The success of propensity score modeling hinges on whether treated and untreated matched groups are equivalent on preexposure characteristics, some of which may not have been observed. Using PSM methods to match married and unmarried men and women in the National Youth Survey, King, Massoglia, and MacMillan (2007) reported that marriage was associated with a reduction in men's self-reported antisocial behavior, but not women's.

Strengths and Limitations of Quasiexperimental and Statistical Matching Approaches

Quasiexperimental research designs and other statistical innovations like PSM methods provide stronger grounds for causal inference than standard observational studies, but they are premised on a range of assumptions, some of which may not be met. For example, the advantage to within-individual change models is that they control automatically for all characteristics of the individual (and the individual's environment) that have a stable effect over time, regardless of whether those characteristics were actually measured as part of the study. The disadvantage to within-individual change models is that they do not control automatically for characteristics of the individual or his environment that change over time. For example, some individuals may be in steady employment throughout the observation period of a study. In contrast, others may move in and out of employment, and this may be associated not only with their tendency to marry at any given point in time but also with their tendency to engage in antisocial behavior. Similarly, sibling comparisons (e.g., the cotwin control design) control automatically for features of the family and community environment that are shared by siblings raised together, but they do not control automatically for experiences that are nonshared by siblings. If, for example, the married sibling has always been in steady employment and the unmarried sibling has not, any effects of marital status on subsequent antisocial behavior cannot unequivocally be attributed to marriage rather than employment history. If researchers want to account for these time-varying or person-specific factors, they must include them as measured covariates in the models.

Unlike within-individual change or sibling comparison models, propensity score methods match married and unmarried men based on a set of *measured* covariates. These covariates are likely to include some factors that are controlled automatically in within-individual change and sibling comparison models, but they will also include factors that may change over time for an individual or be nonshared by siblings growing up in the same family (e.g., highest educational attainment) and that are not controlled automatically in within-individual change or sibling comparison models. However, PSM methods assume that all relevant confounders have been measured and included in the model of the propensity score. This assumption may not always be met.

In summary, a range of quasiexperimental and statistically innovative methods exist to test the proposition that marriage itself limits men's antisocial behavior, with each method characterized by different strengths and weaknesses. Using data from the National Longitudinal Study of Adolescent Health (Add Health), we used a range of complementary research methods. Starting with conventional regression models, we then utilized three causal inference models (PSM, within-individual change models, and sibling comparison models) to test the hypothesis that marriage limits men's antisocial behavior. Although there have now been several studies that use quasiexperimental and statistical matching approaches to measure the relationship between marriage and men's antisocial behavior, the current study extends the literature by using these methods simultaneously in the same sample to test the robustness of effects. Moreover, unlike previous studies that have focused primarily on men's antisocial behavior in high-risk samples, the current study allows us to test whether findings will generalize to a population sample of men.

Method

Sampling and data collection

Sampling. Data were drawn from the in-home interview sample of Add Health, incorporating data from Waves 1 to 4. Add Health is a large, longitudinal survey study of a nationally representative sample of adolescents in the United States. Begun in 1994, Add Health assessed a sample of students in Grades 7 through 12 ($n = 90{,}118$) through a stratified, random school selection procedure. From this baseline school sample, a longitudinal home interview subsample was selected via a multistage, stratified, school-based, cluster sampling design. In 1995, the first wave of in-home interviews was conducted with 20,745 students aged 12–18 years (78.9% response rate). Further waves were collected in 1996 ($n = 14{,}738$; 88.2% response rate, with 12th graders from Wave 1 excluded from Wave 2 but included again in later waves); 2001/2002 ($n = 15{,}197$; 77.4% response rate); and 2007/2008, at which point respondents were aged 24–32 years ($n = 15{,}701$; 80.3% response rate). Our base analytic sample was drawn from the Wave 4 in-home interview sample with longitudinal sample weights ($n = 9{,}421$). From this sample, females ($n = 5{,}145$) were removed due to our focus on men's marriages and because base rates of women's antisocial behavior in young adulthood were extremely low, making it likely that analytic models would be underpowered to detect associations between marital status and women's anti-

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social behavior. Male respondents with missing data on antisocial behavior or marriage at Wave 4 were also removed (n = 127), leading to a sample of 4,149 males. Missing data averaged 2.68% across all measures in the full sample. Analyses incorporated sampling weights and design characteristic variables (except where noted) which adjusted for the stratified and clustered sampling design of Add Health and also adjusted for differential response and attrition over time in the sample. These consisted of a strata variable (region of country), a cluster variable (school identifier), and a grand sample weight. The use of these variables makes the sample nationally representative of American male youth.

Measures

Unless otherwise noted, youth reported on all measures in face-to-face interviews, with ACASI technology used to increase the validity of reporting on sensitive subjects like antisocial behaviors. Weighted descriptive statistics for all analytic measures appear in the first column of Table 1.

Antisocial behavior. Youth reported on engagement in antisocial behaviors at each wave of the survey. Ten items assessed property, violent, drug, and financial crimes in the past year, including whether youth had damaged property, stolen items worth more than $50, stolen items worth less than $50, stolen from a house or building, used a weapon to threaten someone, sold drugs, taken part in a group fight, written a bad check, used a credit or bank card without permission, or bought, sold, or held stolen property. Each item was scored dichotomously, and the items were summed into a total score (range 0–10) indicating the number of antisocial behaviors youth had engaged in during the last year.[1]

Marital status. Youth reported on current marital status at Waves 3 and 4 (0 = *not currently married*; 1 = *currently married*).

Covariates. Analyses included a broad range of characteristics of youth that have been shown in prior research to be associated with the likelihood of marriage and also with antisocial behaviors (Sampson et al., 2006). Controlling for these factors is important in attempting to isolate the association between marriage and men's antisocial behavior. Time-invariant characteristics that were measured at Wave 1 included youth race/ethnicity (coded as White, Hispanic, African American, Asian, multiracial, or other) and an indicator for whether youth were born in the United States. Additional covariates drawn from Wave 1 included youth age in years, youth's household income, and whether the youth's primary caregiver was married. Other covariates measured or treated as time invariant were measured at Wave 3 in order to provide greater temporal resolution. These included youth's highest level of education (coded as less than a high school degree, a high school diploma or GED, some college, or a college or professional degree), personal annual income, employment status, cohabitation with a romantic partner status, and an indicator for whether the respondent had fathered any children. Although these Wave 3 covariates could change over time (e.g., personal income could fluctuate or youth could move into and out of cohabiting relationships), we treat these covariates as time invariant because they were not measured prior to Wave 3 because youth were still in high school. Finally, at Wave 3, youth retrospectively reported on their attention-deficit/hyperactivity disorder symptoms from the time they were age 5 to age 12. Items were added for a total score ($\alpha = 0.90$).

Numerous other covariates were measured at each wave of the survey; we draw data for these measures from Waves 1 to 3. Time-varying covariates included youth engagement in substance use, including the days they had drunk alcohol in the prior year; the days they had smoked cigarettes in the prior 30 days; and the days they had used illegal drugs in the prior 30 days (summing questions concerning marijuana, cocaine, and other illegal drugs). A final measure of substance use assessed problem drinking behaviors with a scale of 7 items indicating the frequency (0 = *never* to 4 = *5 or more times*) with which youth had experienced alcohol-related problems, such as problems at school or work, being hung over, or trouble with friends or partners. At each wave, items were averaged into a total score (α = 0.73–0.79 across waves). Additional covariates assessed youth mental and physical health, including an indicator of whether their body mass index had ever met the criterion for being overweight or obese and a self-report 1-item measure of their physical health (1 = *poor health* to 5 = *excellent health*). Youth also reported on their symptoms of depression (0 = *never or rarely* to 3 = *most of the time or all of the time*) using 19 items that were summed to create a total score (α = 0.81–0.87 across waves). Youth self-esteem was assessed with 4 items asking youth to report how much they were satisfied with themselves as a person (1 = *strongly disagree* to 5 = *strongly agree*), summed to create a total score (α = 0.79–0.80 across waves). Two additional covariates assessed areas of strength for youth. Social support was measured at Waves 1 and 2 using 7 items assessing youth's feelings of caring, support, and understanding from parents, peers, and other adults (1 = *not at all* to 5 = *very much*) that were averaged into a total score (α = 0.79 both waves). Youth reported on their religiosity at Waves 1 through 3 with 4 items assessing how important religion was to them and their religious engagement (1 = *high engagement/importance* to 4 = *low engagement/importance*). Items were reverse coded and averaged so that higher scores indicate greater religiosity (α = 0.78–0.86 across waves).

1. We also examined an antisocial behavior measure that excluded the two aggressive items (used a weapon to threaten someone and took part in a group fight). Results using this measure of nonaggressive antisocial behavior paralleled those using the full measure, so we only present the results using the more inclusive measure of both aggressive and nonaggressive antisocial behavior.

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Table 1. *Sample descriptives for full sample and by marital status for full and sibling samples*

		Unmatched and PSM Samples		Sibling Sample	
	Base Sample (n = 4,149)	Not Married at W4 (n = 1,480)	Married at W4 (n = 770)	Not Married at W4 (n = 160)	Married at W4 (n = 160)
Antisocial Behaviors					
Antisocial behavior W3	0.86 (1.46)	1.05 (1.57)$_a$	0.64 (1.27)$_a$	0.83 (1.34)$_a$	0.47 (0.94)$_a$
% 0 antisocial behavior W3	59.66%	53.20%$_a$	65.55%$_a$	59.26%$_a$	71.32%$_a$
Antisocial behavior W4	0.38 (0.96)	0.49 (1.06)$_a$	0.22 (0.79) $_a$	0.43 (1. 16)$_a$	0.21 (0.61)$_a$
% 0 antisocial behavior W4	78.20%	72.89%$_a$	86.36%$_a$	75.63%$_a$	86.16%$_a$
Marital Status					
Married at W3	10.48%	—	—	—	—
Married at W4	36.41%	—	—	—	—
Covariates					
White	65.63%	65.96%$_a$	77.41%$_a$	61.25%	61.88%
Hispanic	11.29%	10.42%	8.90%	14.38%	14.38%
Black	14.01%	14.29%$_a$	6.59%$_a$	12.50%	11.88%
Asian	3.39%	2.95%	1.89%	7.50%	8.13%
Multiracial	4.23%	4.47%	4.52%	3.76%	3.13%
Other race	1.44%	1.91%	0.70%	0.61%	0.61%
US born W1	94.83%	96.89%	96.38%	91.88%	91.88%
Age W4	28.48 (1.65)	28.19 (1.59)$_a$	28.55 (1.59)$_a$	29.08 (1.68) $_a$	29.62 (1.51)$_a$
Parent's income W1	45399.13 (44747.66)	47575.56 (44165.16)	49138.37 (47910.85)	45900.83 (29119.12)	46247.93 (28764.06)
Parent's married W1	72.57%	69.63%$_a$	79.57%$_a$	78.10%	78.26%
No high school W3	12.42%	11.11%	8.86%	14.81%	9.30%
High school W3	38.95%	36.57%	36.21%	37.04%	30.23%
Some college W3	41.45%	45.60%	43.79%	41.48%	43.41%
College grad/grad school W3	7.18%	6.69%$_a$	11.14%$_a$	6.67%$_a$	17.05%$_a$
Employed W3	77.01%	74.38%$_a$	80.39%$_a$	78.52%$_a$	89.15%$_a$
Cohab W3	15.39%	14.61%$_a$	24.66%$_a$	14.07%	16.28%
No. of live births W3	0.20 (0.02)	0.13 (0.44)	0.13(0.51)	0.26(0.66)	0.25(0.59)
Personal inc W3	14394.44 (14577.47)	12645.31 (14530.75)$_a$	15672.68 (12777.53)$_a$	12334.34(13036.18)$_a$	15681.41 (12103.13)$_a$
ADHD W3	15.49 (9.23)	15.43 (9.03)	15.80 (9.34)	15.99 (9.86)	14.71 (9.24)
Days drink/year W1–3	33.69(44.82)	36.82 (43.50)$_a$	30.61 (38.74)$_a$	37.14 (52.13)	29.94 (42.65)
Days smoke/month W1–3	6.35 (8.98)	6.97 (8.90)$_a$	5.25 (8.43)$_a$	7.58 (9.60)	6.29 (9.96)
Days use ill drugs/month W1–3	2.90 (6.28)	3.65 (6.69)$_a$	1.87 (4.82)$_a$	2.99(6.77)	1.76 (5.12)
Risky alcohol W1–3	0.26 (0.33)	0.30 (0.33)$_a$	0.24 (0.31)$_a$	0.28 (0.38)	0.30 (0.46)
Ever ovwgt/obese W1–3	0.23 (0.42)	20.06%$_a$	25.69%$_a$	28.13%	23.75%
Health W1–3	4.00 (0.68)	3.99 (0.70)$_a$	4.10 (0.67)$_a$	3.88 (0.71)$_a$	4.06(0.67)$_a$
Depression W1–3	7.79 (4.54)	7.69 (4.61)	7.25 (4.24)	8.86 (4.71)	8.73 (5.11)

Table 1 (*cont.*)

	Base Sample ($n = 4{,}149$)	Unmatched and PSM Samples: Not Married at W4 ($n = 1{,}480$)	Unmatched and PSM Samples: Married at W4 ($n = 770$)	Sibling Sample: Not Married at W4 ($n = 160$)	Sibling Sample: Married at W4 ($n = 160$)
Covariates					
Self-esteem W1–3	22.63 (2.31)	22.60 $(2.41)_a$	22.89 $(2.22)_a$	22.78 (2.73)	23.16 (2.59)
Social support W1–2	4.01 (0.52)	3.99 $(0.54)_a$	4.06 $(0.47)_a$	3.95 (0.50)	4.03 (0.50)
Religiosity W1–3	2.39 (0.77)	2.35 (0.74)	2.43 (0.78)	2.36 (0.76)	2.47 (0.78)
Antisocial behavior W1–3	2.22 (1.90)	2.45 $(1.93)_a$	1.99 $(1.69)_a$	2.47 (2.16)	2.24 (2.10)

Note: Mean (standard deviation) or percentage is reported in each cell. W1–W4, Waves 1–4; ADHD, attention-deficit/hyperactivity disorder. Within each row, shared subscripts indicate significant differences between the married and unmarried groups ($p < .05$). Sibling comparisons are among only pairs discordant for marriage at W4. Measures are self- reported by youth. Thus, some siblings differ on reported family and youth characteristics such as race/ethnicity and parent income.

Statistical analysis

For each analysis, we selected an analytic sample from our base sample that maximized the sample size and covariates. Each analytic sample is described in turn.

Unmatched and propensity score matched samples. To select the analytic sample for the base regression analyses and the PSM models, we started with males in the Wave 4 in-home survey sample with sample weights and valid antisocial behavior and marriage data at Wave 4 ($n = 4{,}149$). We removed a small proportion of the sample (10.48%) who were married at Wave 3, when men averaged 22 years old, in order to clarify the temporal ordering between marriage and antisocial behavior. Thus, the married at Wave 4 variable designated youth who entered marriage between Waves 3 and 4 and remained married at Wave 4. As shown in Table 1, just over a third of the sample was married at Wave 4. All time-invariant and time-varying covariates described above were included in the analyses, leading to a final analytic sample of $N = 2{,}250$.

Within-individual change sample. To select the analytic sample for the individual change models, we again started with males in the Wave 4 in-home survey sample with sample weights and valid antisocial behavior data at Wave 4 ($n = 4{,}149$). The primary analytic variables were antisocial behavior and marital status at Waves 3 and 4. In addition, we included a set of time-varying covariates, which were lagged by one wave (i.e., drawn from Waves 2 and 3), in order to capture respondents' characteristics and behaviors prior to marriage. Covariates included in the change models thus included all time-varying covariates that were measured consistently across Waves 2 and 3, including age, drinking, smoking, illegal drug use, risky alcohol behaviors, overweight/obesity, physical health, depression, self-esteem, religiosity, and antisocial behavior. Missing data on measures included in the analyses averaged 2.59% across all measures, leading to a final analytic sample of $n = 3{,}061$.

Sibling comparison sample. For the sibling analyses, we again started with the Wave 4 male sample. As per study design, many siblings did not have sample weights, so we did not restrict this sample (like the PSM and within-individual change samples) to men who had valid longitudinal sample weights. Within the Wave 4 sample, there were 910 same-sex male siblings (508 nontwin siblings, 214 DZ twins, and 226 MZ twins). Mirroring the PSM sample, we removed sibling pairs where at least one sibling was married at Wave 3 ($n = 42$ sibling pairs) so that married men only included those who transitioned to marriage between Waves 3 and 4. Forty-two percent of the sibling pairs were discordant for marital status at Wave 4, whereas 58% had the same marital status (both married or both unmarried). We included covariates (drawn from Waves 1 to 3) that were significantly different between sibling pairs discordant for marriage, shown in

Table 1. These included age, youth employment, youth income, education, and physical health. Missing data on measures included in the analyses led to a final analytic sample of 618 same-sex male siblings. All sibling comparison models were run without sample weights.

Results

Descriptive differences between married and unmarried men

Table 1 presents descriptive statistics for the base sample, the married and unmarried men in the unmatched and PSM samples, and the discordant pairs in the sibling sample. The first column presents weighted data on the base sample, showing that 10% of men were married at Wave 3 and 36% at Wave 4, when they averaged 28 years old. Of note are the low levels of antisocial behaviors, with men averaging less than one type of antisocial behavior at Waves 3 and 4. At Wave 3, 60% of young men reported no engagement in antisocial behaviors; this rose to 78% in Wave 4. Columns 2 and 3 present weighted descriptive statistics for the married and unmarried men at Wave 4 from the unmatched and PSM analytic samples (e.g., removing men who were married at Wave 3 and removing cases with missing data). Significant bivariate differences between the groups are noted with superscripts, indicating that married men reported significantly lower engagement in antisocial behaviors than unmarried men at Wave 4, with 86% of married men reporting no engagement (vs. 73% of unmarried men).

Columns 2 and 3 of Table 1 also identify numerous differences in the background characteristics of married and unmarried men, suggesting the important role that personal characteristics play in selecting men into marriage. For example, in relation to their personal characteristics, men who were married at Wave 4 were more likely to be White and less likely to be Black, were older, and were more likely to have been raised in a married-parent family than their unmarried peers. Married men also had higher levels of advanced education, were more likely to have been employed and to have been cohabiting with a partner at Wave 3, and had higher incomes. In relation to their health and behavior, men who were married at Wave 4 reported lower alcohol, cigarette, and drug use during adolescence and early adulthood; better health; higher self-esteem and social support; but also higher overweight/obesity than their unmarried peers. Finally, men who were married at Wave 4 reported lower engagement in antisocial behaviors from Waves 1–3.

The final two columns of Table 1 present descriptives for the sibling pairs who were discordant for marriage at Wave 4. Here fewer statistically significant differences were found. Married siblings were older and more likely to have a college or graduate school education, be employed, have a higher income, and report better physical health than their unmarried brothers. Married men also reported lower engagement in antisocial behaviors at Waves 3 and 4 than their unmarried siblings.

Regression analyses in the unmatched sample

The goals of the analyses were to assess whether marriage was associated with antisocial behavior among males using a series of modeling strategies to control for unmeasured bias and move closer to identifying a causal relationship. Prior to discussing the three main analyses, we present results from a more standard set of regression analyses as a comparison. In nonexperimental data, standard techniques for assessing the possibility of a causal predictive relationship include incorporating temporal ordering and controls for potentially endogenous variables to try to isolate the relationship between the criterion and outcome variables of interest (Duncan, Magnuson, & Ludwig, 2004). As such, the first analytic models were regression models in which marriage occurring between Waves 3 and 4 was used to predict men's antisocial behavior at Wave 4. The first models were simple regressions to indicate the size of the bivariate relationship, unadjusted for potential selection factors. Next, we ran multivariate models including the broad range of individual and family background characteristics described above to help control for factors that might select men into marriage and also be associated with their antisocial behaviors. In addition, men's earlier engagement in antisocial behavior (their average antisocial behavior scores from Waves 1 to 3) was included as a covariate. Including this lagged measure helped to control both for unmeasured factors that vary across individuals (e.g., a genetic proclivity or early life experiences) that might have a time-invariant effect on antisocial behavior and for potential bidirectionality, or the effect of early antisocial behaviors on men's selection into marriage (Cain, 1975; Duncan et al., 2004). Because the dependent variable of interest, antisocial behavior at Wave 4, was a count variable and was overdispersed, a traditional linear ordinary least squares regression model was not appropriate. Rather, we estimated negative binomial regression with the continuous count measure of antisocial behavior, as well as a logistic regression model, with antisocial behavior coded as a dichotomous measure reflecting whether men engaged in any antisocial behavior in the past 12 months.

Results from the models are presented in Table 2. Unstandardized beta coefficients and standard errors are presented in the first column, with incidence rate ratios or relative risk ratios presented in the second column. The results of the bivariate negative binomial regression in Panel 1 indicate that married men reported lower antisocial behaviors at Wave 4 than unmarried men. The coefficients for negative binomial models are interpreted as the difference in the log of expected antisocial behaviors for a 1-unit change in the predictor variable, and the incidence rate ratio is this coefficient exponentiated. Thus, the results indicate that marriage, unadjusted for any other covariates, was linked to a 61% decrease in the number of antisocial behaviors men engaged in during the previous year.

Panel 2 repeats this model, controlling for the extensive set of individual and family covariates, including prior antisocial behaviors. The effect of marriage dropped by about 10% but

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Table 2. *Negative binomial and logistic regression analyses of the association between marriage and antisocial behavior in the unmatched sample (n = 2,250)*

Independent Variables	Antisocial Behavior	
	B (*SE*)	IRR/RRR
Bivariate Negative Binomial Regression Model		
Married W4	−0.93 (0.22)**	0.39
Constant	−0.69 (0.07)**	—
F	18.16**	—
Multivariate Negative Binomial Regression Model		
Married W4	−0.83 (0.14)**	0.44
Hispanic	0.06 (0.21)	1.06
Black	0.30 (0.19)	1.35
Asian	0.44 (0.27)†	1.56
Multiracial	−0.44 (0.23)†	0.65
Other race	−1.09 (0.69)	0.34
US born W1	−0.18 (0.28)	0.84
Age W4	−0.15 (0.05)**	0.86
Parent's income W1	0.00 (0.00)	1.00
Parent's married W1	−0.02 (0.12)	0.98
No high school W3	−0.07 (0.21)	0.94
Some college W3	−0.17 (0.16)	0.85
College grad/grad school W3	−0.50 (0.30)†	0.61
Employed W3	−0.04 (0.13)	0.97
Cohab W3	0.17 (0.18)	1.19
No. of live births W3	0.37 (0.13)**	1.45
Personal inc W3	0.00 (0.00)	1.00
ADHD W3	0.00 (0.01)	1.00
Days drink/year W1–3	0.00 (0.00)**	1.00
Days smoke/month W1–3	−0.01 (0.01)	0.99
Days use ill drugs/month W1–3	0.01 (0.01)	1.01
Risky alcohol W1–3	0.28 (0.21)	1.32
Ever ovwgt/obese W1–3	0.13 (0.14)	1.13
Health W1–3	−0.16 (0.09)†	0.85
Depression W1–3	0.01 (0.02)	1.01
Self-esteem W1–3	0.00 (0.04)	1.00
Social support W1-2	0.10 (0.15)	1.11
Religiosity W1–3	−0.04 (0.10)	0.96
Antisocial behavior W1–3	0.20 (0.03)**	1.23
Constant	3.04 (1.91)	—
F	9.93**	—
Bivariate Logistic Regression Model		
Married W4	−1.00 (0.15)**	0.37
Constant	−0.95 (0.08)**	—
F	43.55**	
Multivariate Logistic Regression Model		
Married at W4	−0.80 (0.16)**	0.45
Constant	5.51 (2.02)**	—
F	6.20**	—

Note: IRR, incidence rate ratio; RRR, relative risk ratio; W1–4, Waves 1–4; ADHD, attention-deficit/hyperactivity disorder. Marriage at W4 compared to the omitted category of not married at W4. Both models include the same set of covariates.
†$p < .10$. **$p < .01$.

remained highly significant, with married men reporting a 56% lower rate of antisocial behaviors in comparison to unmarried men. Results from logistic models are presented in the third and fourth panels. The relative risk ratios can be interpreted as the effect of a 1-unit change in the predictor variable on the probability of being in the dependent variable category under consideration in comparison to the reference category. Thus, the unadjusted logistic models (Panel 3) found that married men had a 63% lower likelihood of engaging in any antisocial behaviors than unmarried men. Controlling for the full set of covariates (i.e., those listed in Panel 2), married men had a 55% lower likelihood of engaging in any antisocial behaviors than unmarried men (Panel 4; covariate coefficients available upon request).[2]

PSM models

Following the regression models with the unmatched sample, we used PSM techniques to provide further controls for potential bias. In the first step of each PSM model, we used a probit regression model to calculate a propensity score for each case, which is a predicted probability of being in the "treatment" group, defined here as being married at Wave 4. The probit regression model included all of the covariates listed in Table 1 as predictors (with the exception of youth age at Wave 4), all assessed between Waves 1 and 3, and therefore exogenous to marriage occurring between Wave 3 and Wave 4.

In the second step, the propensity scores were used to create matched samples of treatment versus "control" cases (i.e., matched samples of married versus unmarried males). We used nearest neighbor matching with common support, in which each treatment case is matched to the control case with the closest propensity score, and we limited our matched cases to treatment cases within the region of common support, excluding cases without good matches (Dehejia & Wahba, 2002).

These two initial PSM steps indicated that the matching technique was highly successful in creating matched samples of married and unmarried males. Following Caliendo and Kopeinig (2008), three methods were used to assess the quality of the matching. First, *t* tests were used to assess significant differences in the covariates before and after matching. Prior to matching, there were significant differences in 19 of the individual and family characteristics between the married and unmarried respondents. After matching and limiting the sample to the matched treated and control cases within the region of common support ($n = 1{,}548$), there were 0 significant differences between the characteristics of the treatment (married) and control (nonmarried) cases. Second, we considered the percentage reduction in bias for each covariate. The bias was substantially reduced after matching for all variables except for one, a dummy variable for Hispanic, which none-

2. Additional models with this sample and the subsequent samples were run to test if the relationship between antisocial behavior and marriage varied by age and found there to be no significant age interactions (results available upon request).

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theless remained balanced between treatment and control groups after matching. Third, we compared the McFadden pseudo R^2s of the probit models before and after matching, finding that the pseudo R^2 dropped dramatically, from approximately .08 to approximately .004, with the likelihood ratio chi-square test going from significant prior to matching to nonsignificant after matching. Thus, PSM resulted in fully balanced treatment and control groups, limiting bias from all observed characteristics.

After creating matched samples of treatment and control groups and limiting the cases to those within the region of common support, the final step of PSM involved assessing the regression-adjusted effects of the treatment. That is, using the matched cases, we reran the negative binomial and logistic regression models assessing the effect of marriage on men's antisocial behavior, incorporating the full set of covariates in order to control for any potential remaining bias from measured characteristics. Although the covariates were matched (i.e., they did not differ between the married and unmarried groups), there were still individual differences in the covariates that were predictive of men's antisocial behavior.

Results from the regression models on the PSM sample are presented in Table 3. Results very closely replicated results from the unmatched sample (Table 2) and showed that married men reported lower engagement in antisocial behaviors at Wave 4 than their matched unmarried counterparts. The negative binomial model found that married men had a 55% lower rate of antisocial behaviors in comparison to unmarried men. Similarly, the logistic model found that married men had a 56% lower likelihood of engaging in any antisocial behaviors in comparison to unmarried men.

Table 3. *Associations between marriage and antisocial behavior in propensity score matched sample (n = 1,543)*

Independent Variables	Antisocial Behavior	
	B (*SE*)	IRR/RRR
Negative Binomial Regression Model		
Married W4	−0.81 (0.15)**	0.45
Hispanic	0.11 (0.23)	1.11
Black	0.12 (0.34)	1.13
Asian	0.25 (0.41)	1.28
Multiracial	−0.94 (0.39)*	0.39
Other race	-2.19 (0.89)*	0.11
US born W1	−0.05 (0.4)	0.95
Age W4	−0.20 (0.05)**	0.82
Parent's income W1	0.00 (0.00)	1.00
Parent's married W1	−0.03 (0.19)	0.97
No high school W3	−0.36 (0.32)	0.70
Some college W3	0.02 (0.21)	1.02
College grad/grad school W3	−0.03 (0.33)	0.97
Employed W3	0.33 (0.20)	1.39
Cohab W3	0.34 (0.23)	1.41
No. of live births W3	0.49 (0.13)**	1.63
Personal inc W3	0.00 (0.00)	1.00
ADHD W3	−0.01 (0.01)	0.99
Days drink/year W1–3	0.00 (0.00)†	1.00
Days smoke/month W1–3	−0.01 (0.01)	0.99
Days use ill drugs/month W1–3	0.04 (0.02)*	1.04
Risky alcohol W1–3	0.04 (0.29)	1.04
Ever ovwgt/obese W1–3	−0.28 (0.18)	0.76
Health W1–3	−0.25 (0.14)†	0.78
Depression W1–3	0.05 (0.03)†	1.05
Self-esteem W1–3	0.01 (0.05)	1.01
Social support W1–2	0.13 (0.21)	1.14
Religiosity W1–3	−0.03 (0.13)	0.97
Antisocial behavior W1–3	0.19 (0.05)**	1.21
Constant	4.24 (2.12)*	—
F	8.92**	—
Logistic Regression Model		
Married at W4	−0.82 (0.18)**	0.44
Constant	6.41*	—
F	3.62**	—

Note: IRR, incidence rate ratio; RRR, relative risk ratio; W1–4, Waves 1–4; ADHD, attention-deficit/hyperactivity disorder. Marriage at W4 compared to the omitted category of not married at W4. Both models include the same set of covariates.
†$p < .10$. *$p < .05$. **$p < .01$.

Within-individual change analysis

Table 4 presents results from individual fixed-effects models, again including both a negative binomial regression model and a logistic regression model, known as a conditional logit. In these models, men's marital status and antisocial behaviors in Waves 3 and 4 were assessed, with covariates drawn from the preceding wave (i.e., Waves 2 and 3). It is important to note that the fixed-effects logistic regression model incorporated sampling weights and design characteristic variables; however, statistical software limitations prevented us from weighting the fixed-effects negative binomial regression. In the top panel, results indicate that movement into marriage predicted a decline in antisocial behaviors, controlling for changes in other time-varying covariates; getting married was associated with a 26% lower rate of antisocial behavior in comparison to the same man's behavior when he was unmarried. The conditional logit model shows a similar pattern wherein a movement into marriage predicted a 44% decline in the likelihood of engagement in antisocial behaviors.

Sibling analysis

Analyses of siblings incorporated random effects negative binomial regression and logistic regression models to estimate within- and between-families effects of transitioning into marriage between Waves 3 and 4 on men's antisocial behaviors at Wave 4, controlling for covariates (drawn from Waves 1 to 3) that differed statistically between married and unmarried siblings (see Table 1). Specification of the sibling control model followed recommendations by Begg and Parides (2003) and took the form

$$Y_{ij} = \alpha_1 + \beta_W(X_{ij} - \bar{X}_i) + \beta_B\bar{X}_i + \varepsilon_{ij}. \quad (1)$$

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Table 4. *Associations between marriage and antisocial behavior using fixed effects (n = 3,061)*

	Antisocial Behavior	
Independent Variables	*B* (*SE*)	IRR/RRR
Fixed Effects Negative Binomial Regression Model		
Married	−0.31(0.13)*	0.74
Age	−0.17 (0.03)**	0.84
Days drink/year	0.00 (0.00)	1.00
Days smoke/month	0.00 (0.00)	1.00
Days use ill drugs/month	0.00 (0.00)	1.00
Risky alcohol	−0.26 (0.08)**	0.77
Ever ovwgt/obese	0.01 (0.13)	1.01
Health	−0.03 (0.06)	0.97
Depression	−0.01 (0.01)	0.99
Self-esteem	0.01 (0.02)	1.01
Religiosity	−0.20 (0.07)**	0.82
Antisocial behavior	−0.09 (0.02)**	0.92
Constant	6.54 (1.21)**	—
Wald χ^2 (*df*)	321.38**	—
Fixed Effects Logistic Regression Model		
Married	−0.58 (0.27)*	0.56
F	18.14**	—

Note: IRR, incidence rate ratio; RRR, relative risk ratio. Marriage compared to the omitted category of not married. Covariates are lagged to match the change between waves in the wave that proceeded marriage. Both models include the same set of covariates.
*$p < .05$. **$p < .01$.

Antisocial behavior is indexed by Y_{ij}, where i identifies the family cluster ($i = 1, 2, 3, \ldots, k$) and j identifies the individual within a family, restricted here to two siblings per family ($j = 1, 2$). Here, X_{ij} is marital status at Wave 4 for individual j in family i, and $\bar{X}_i$ is marital status averaged across siblings within family i. As specified, $\beta_W(X_{ij} - \bar{X}_i)$ represents the within-families effect of marital status and $\beta_B\bar{X}_i$ represents the between-families effect of marital status. By definition, the within-family effect in sibling models adjusts for all unmeasured factors that would have consistent within-family influences on antisocial behavior (such as early family environments, childhood neighborhood contexts, or a genetic proclivity shared by siblings), but they do not adjust automatically for person-specific characteristics or nonshared environments.

As shown in the fourth and fifth columns of Table 1, the assumption that siblings were similar for other person-specific and nonshared environments even if they were discordant for marriage was largely met. However, married siblings were older; had higher levels of education, employment, and income; and reported better health than their unmarried siblings. Thus, models controlled for these nonshared covariates. The model specification in Equation 1 is mathematically equivalent to one in which the within-families effect is specified as the deviation of an individual's marital status value from the family-averaged marital status value (Begg & Parides, 2003). In this model, sibling pairs discordant on marriage contribute to information about the within-families effect whereas both discordant and concordant pairs contribute to information about the between-families effect.

Results from the sibling models are presented in Table 5. There was a trend level within-families effect of marriage in the negative binomial regression. Although this effect was statistically weaker than in previous models (potentially due to the smaller number of cases in the sibling model), the magnitude of the effect was not substantially smaller. This effect reached conventional levels of significance in the logistic model, indicating that the likelihood of engaging in any antisocial behavior was 57% lower among men who were married compared with their unmarried brothers. Although it was not of focal interest to our hypothesis, it bears noting that the between-families effect of marital status was

Table 5. *Associations between marriage and antisocial behavior in sibling control sample (n = 618 male siblings)*

	Antisocial Behavior	
Independent Variables	*B* (*SE*)	IRR/ RRR
Negative Binomial Regression Model		
Married W4 within families	−0.66 (0.34)†	0.52
Married W4 between families	−0.43 (0.42)	0.65
Age within families	−0.20 (0.12)	0.82
Age between families	0.05 (0.14)	1.05
Employed W3 within families	0.32 (0.37)	1.38
Employed W3 between families	0.27 (0.49)	1.31
Personal inc W3 within families	0.00 (0.00)	1.00
Personal inc W3 between families	0.00 (0.00)	1.00
No high school W3 within families	0.30 (0.55)	1.35
No high school W3 between families	−0.24 (0.70)	0.78
Some college W3 within families	−0.11 (0.39)	0.89
Some college W3 between families	0.01 (0.47)	1.01
College grad/grad school W3 within families	−0.46 (0.65)	0.63
College grad/grad school W3 between families	0.50 (0.73)	1.66
Health W1–3 within families	0.12 (0.23)	1.13
Health W1–3 between families	−0.83 (0.29)**	0.44
Constant	6.69 (2.28)**	—
Wald χ^2 (*df*)	45.25**	—
Logistic Regression Model		
Married W4 within families	−0.83 (0.43)*	0.43
Married W4 between families	−0.43 (0.53)	0.65
Constant	7.17 (2.94)*	—
Wald χ^2 (*df*)	32.78**	—

Note: IRR, incidence rate ratio; RRR, relative risk ratio; W1–4, Waves 1–4. Marriage at W4 compared to the omitted category of not married at W4. Both models include the same set of covariates.
†$p < .10$. *$p < .05$. **$p < .01$.

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not statistically significant for either model, indicating that after adjusting for one's own marital status, whether or not a sibling was married had no effect on a man's antisocial behavior. Put another way, men who were unmarried but whose brothers were married did not engage in less antisocial behavior than men who were unmarried and whose brothers were also unmarried.

Discussion

Using four complementary models, we showed that married men engaged in significantly less antisocial behavior compared with unmarried men. Although our results cannot definitively establish that marriage causes men to desist from antisocial behavior, each model ruled out key alternative explanations. For example, lagged multivariate regression models and PSM models addressed the possibility that preexisting differences between married and unmarried men account for observed associations between marriage and antisocial behavior. These models established that marriage was not a random event and that men who went on to marry were better educated, wealthier, healthier, and engaged in less antisocial and other risky behaviors earlier in life compared with men who did not go on to marry. The multivariate regression models and PSM results suggested that these measured selection factors accounted for about 10% of the association between marriage and antisocial behaviors. However, even when matched on these preexisting characteristics, married men engaged in significantly less antisocial behavior than unmarried men.

As a tool for dealing with selection effects, PSM methods provide unbiased estimates of the marriage effect only insofar as they include all relevant covariates in the model. Although we modeled a wide range of measured psychological, physical, and demographic characteristics, it is possible that unmeasured heterogeneity between married and unmarried men biased estimates. Thus, alternative models were estimated that adjusted automatically for unobserved heterogeneity. First, the within-individual change model established that stable characteristics of the individual and his environment, including genetic characteristics, did not account for the association between marriage and antisocial behavior. Because the individual served as his own control, this method was not reliant on measured estimates of characteristics or environments. Results showed that changes in marital status were associated with declines in antisocial behavior, even adjusting for a range of measured time-varying characteristics. Second, sibling control models established that the association between marriage and antisocial behavior was not accounted for by factors that would have been shared by siblings growing up in the same family (e.g., socioeconomic status or race/ethnicity). These different models, with their varying assumptions and different sampling frames, indicated that marriage reduced men's likelihood of engaging in antisocial behavior by approximately 50%, with notable similarity in the effect size of marriage across analytic techniques and samples.

These estimates of the marriage effect are also similar to those produced by other quasiexperimental studies of the relationship between marriage and men's antisocial behavior. For example, using within-individual change methods, Sampson et al. (2006) reported that marriage reduced the likelihood of a criminal conviction by approximately 35%, which is consistent with the range of estimates (26% to 44%) produced in our within-individual change analyses. In their study of MZ and DZ twins who were discordant for marital status, Burt et al. (2010) reported a similarly sized marriage effect on antisocial behavior. In contrast, we note that the sibling comparison and PSM models we estimated produced somewhat larger estimates of the marriage effect on men's antisocial behavior, with the sibling comparison model showing that marriage reduced the likelihood of engaging in any antisocial behavior by as much as 57%. Although we highlight the overall consistency of the findings produced by the various methods used to test whether marriage leads to reductions in men's antisocial behavior, it is likely that some of these models controlled more comprehensively for unobserved heterogeneity than others. Within-individual change models and comparisons of discordant MZ twins arguably do the best job of accounting for unobserved heterogeneity, and it bears noting that across three different studies, these methods tend to converge on the finding that marriage reduces men's antisocial behavior by about one-third.

These analyses of marriage and men's antisocial behavior had a number of strengths. First, the finding that marriage was associated with reductions in men's antisocial behavior was replicated across a number of analytic models, all of which allowed for stronger causal inference than conventional models in which measured covariates are adjusted statistically in a regression framework. Second, the finding that marriage was associated with reductions in men's antisocial behavior was established in a nationally representative sample. The majority of findings related to marriage and antisocial behavior come from selected samples of men who have been involved in high levels of crime and delinquency. Our study is the first to use data from a nationally representative US population to show that marriage is associated with reductions in men's antisocial behavior even when premarriage base rates of antisocial behaviors are quite moderate.

As described in the introductory section, many criminological studies of marriage and men's antisocial behavior have been hampered by threats to causal inference. A growing number of studies (including our own) that use quasiexperimental and other statistically innovative methods have demonstrated that the association is robust to a range of alternative explanations, including spurious associations, reverse causation, and active genotype–environment correlation. Once researchers have established that the relationship between marriage and men's antisocial behavior is likely to be causal, the field can move on to different kinds of research questions. It is possible that marriage is beneficial under some conditions but not others. For example, some researchers have hypothesized that "high-quality" marriages, characterized by warmth and mutual trust, are most likely to facilitate desistance from antisocial behavior, whereas marriages characterized by conflict and mutual hostility are unlikely to facilitate desistance

(Laub et al., 1998; Sampson et al., 2006). The few empirical findings related to this question are mixed (Laub et al., 1998; Sampson et al., 2006), and more research using quasiexperimental approaches is needed to resolve the issue.

Another possibility is that marriage has stronger effects on limiting men's antisocial behavior when men make the transition to marriage at relatively younger versus older ages (Theobald et al., 2009; Theobald & Farrington, 2011). Tests of this hypothesis are complicated by normative declines in men's antisocial behavior during the period of emerging adulthood. In other words, marriage may have beneficial effects on men's antisocial behavior even when they make the transition to marriage at relatively older ages, but the effect may be more difficult to detect in this group because of reduced variability in older men's antisocial behavior.

A further possibility is that marriage has different effects on different types of offenders, with some studies showing that marriage is most beneficial in terms of promoting desistance from crime among men who engage in low or moderate levels of crime (Blokland & Nieuwbeerta, 2005). However, another study found that the effect of marriage on promoting desistance from crime was strongest among men who had the lowest propensity to marry (King et al., 2007). Given that the propensity to marry was heavily influenced by prior offending levels, these different findings on the conditional effects of marriage are difficult to reconcile.

Further research is needed to explore whether marriage has similar effects on women's antisocial behavior as men's. Although there is substantial assortative mating for antisocial behavior (Krueger, Moffitt, Caspi, Bleske, & Silva, 1998), there are also significant sex differences in base rates of antisocial behavior, the implication being that women who engage in antisocial behavior are less likely to have noncriminal spouses than men who engage in antisocial behavior. Because of differences in the pool of available marriage partners, marriage may have very different effects on women's versus men's antisocial behavior, and findings for women may be more difficult to interpret. One study of 109 women with offending histories found that marriage alone did not promote desistance from crime, although marriage combined with full-time employment (or having a husband in full-time employment) did promote desistance. Another study found that the beneficial effect of marriage on women's antisocial behavior was contingent on their propensity to marry in the first place; marriage only benefited those who had a moderate propensity to marry (King et al., 2007). The authors speculated that marriage did not benefit women who had a high propensity to marry because they engaged in such low levels of offending in the first place and that marriage did not benefit women who had a low propensity to marry because of the likelihood that their spouse was engaged in high levels of antisocial behavior (King et al., 2007). A third study of men and women in The Netherlands with criminal conviction records found that marriage was associated with reduced odds of offending in both groups, but the effect was significantly stronger for men than for women (Bersani et al., 2009). More studies of female offenders are needed to clarify sex differences and similarities in pathways into and out of crime.

Limitations

Our study was characterized by a number of limitations. First, we assessed within-individual change over only two time points. Incorporating more time points might provide a stronger test of within-individual change. This would allow one both to determine the stability of declines in antisocial behavior following marriage and to assess changes in antisocial behaviors of men moving into and out of marriage.

Second, although our sibling comparisons included MZ and DZ twins as well as nontwin full siblings, we did not exploit differences in genetic relatedness among these sibling groups to test hypotheses about genotype–environment correlations. Of the 113 MZ twin pairs, only 41 pairs were discordant for marriage at Wave 4, and of these, an even smaller number were discordant for marriage and antisocial behavior, which is the group that powers the within-families analysis. Although the findings from the within-individual change models did not support the hypothesis that active genotype–environment correlations account for the association between marital status and antisocial behavior, cotwin control models would have provided a more direct test of this hypothesis by allowing us to identify genotypic differences specifically as a potential source of confounding.

Conclusion

A number of studies using quasiexperimental designs and other statistically innovative methods have shown that marriage is likely to play a causal role in limiting men's antisocial behavior. In the absence of experimental data, progress is achieved when different studies, using different designs with different limitations, converge on similar findings (Jaffee, Strait, & Odgers, 2012). Although men who marry are advantaged in many respects compared with men who remain unmarried, marriage itself seems to reduce men's antisocial behavior by about one-third. Public policy efforts will be better directed by more evidence about whether certain kinds of marriages are more effective than others in promoting desistance from crime and whether certain men are more likely than others to benefit from marriage. Although genotype–environment correlations do not appear to play a major role in explaining why marriage limits men's antisocial behavior, it is possible that individual differences in genotype partially explain why marriage promotes desistance more effectively for some men than for others.

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