

Prostitution Labor Supply and Education.*

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July 20, 2016

Abstract

We analyze the relationship between education and criminal behavior based on a survey of nearly 700 North American female escorts who provide (typically illegal) prostitution services. Nearly 40% of the women in our sample report college completion. College-educated women are less likely to see clients in any given week and do not earn higher average hourly wages. However, conditional on seeing any clients, college-educated prostitutes see more clients and provide longer client sessions. We demonstrate that these results are consistent with a model in which college-educated prostitutes have better outside options to prostitution, but are also able to reduce the marginal disutility of prostitution work by attracting fewer unpleasant clients and by combining sexual services with non-sexual services such as companionship, where college education may be productive.

JEL Codes: I18, K42, Z18

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1 Introduction

The economic literature on prostitution has examined factors determining the relatively high wages earned by workers in that sector.¹ In other occupations, one of the key determinants of high wages is typically education; however, prostitution is commonly seen as a uniquely “unskilled,” but high wage, occupation. In this paper, we employ unique data from a large survey of women in North America who either are providing, or have recently provided, service as escorts (nearly always including prostitution services) in order to examine the role of education in labor supply for this industry.

A large share of our survey respondents, nearly 40 percent, reported having completed college. We have documented elsewhere the impact of the internet and other new technologies in creating a *de facto* partial legalization of what was traditionally an occupation in which only those with few other options entered.² Traditional streetwalking has been replaced to some degree by indoor sex work in which prostitutes use internet advertising and other technology-facilitated market mechanisms to identify safer clients, arrange assignments, and avoid arrest.³

Our survey shows that, consistent with the traditional view of prostitution as a low-skill industry, calculated hourly wages for college-educated prostitutes are not on average higher than those of prostitutes with less education (except in certain niche segments of the market). Also, likely due to their better legitimate labor market and monogamous coupling opportunities, college-educated women are less likely to work as prostitutes in any given week.

However, conditional on working as a prostitute (i.e., seeing clients) in a given week, college-educated women see more clients, a larger share of which are return clients (or “regulars”), and provide longer average sessions to clients. We show that this finding is consistent with a theory that college-educated prostitutes are able to effectively reduce the marginal disutility of prostitute labor supply by attracting men who are less likely to be violent or otherwise unpleasant as clients, and by combining sexual services with

¹Edlund and Korn (2002), Guista, Tommaso and Strom (2009), Gertler, Shah and Bertozzi (2005), Arunachalam and Shah (2008), Robinson and Yeh (2012).

²Cunningham and Kendall (2011*b*), Cunningham and Kendall (2014).

³Cunningham and Kendall (2011*a*).

companionship and conversation, where education may increase productivity. In addition, human capital associated with college completion may be productive in the sense of reducing the probability of arrest. Consistent with these theories, we find that college-educated prostitutes in our sample report having more attractive clients, being more likely to kiss their clients on the lips, and having a lower perceived risk of arrest.

Our survey includes responses from almost 700 female escorts in the United States and Canada, and encompasses information on over 2,000 individual client transactions for these women. We use sample weights to address unobserved sampling bias to the extent possible and also attempt to control for selection. While realizing the inherent limitations when attempting to study people engaging in behavior that is nearly always illegal, we believe our survey to be the largest available on sex workers in modern economies, and one of the few surveys to extensively examine the labor market practices of prostitutes.

Our research contributes to the literature by presenting new information on earnings and labor market practices among prostitutes in a developed country among sex workers who operate using modern information technology. In an extensive literature survey, Weitzer (2005) finds that street-based prostitution may constitute as little as 20% of the U.S. market for prostitution, although it has attracted upwards of 80% of academic research. In examining earnings among indoor prostitutes, we build on a more recent literature that has begun to examine earnings in this important segment of the industry (Moffatt and Peters, 2004; Logan and Shah, 2013; Edlund, Engelberg and Parsons, 2009; Cunningham and Kendall, 2011*a*). In finding systematic variation in labor supply by education status, we highlight heterogeneity as a key aspect of prostitution labor supply in North America. Also, in distinction with previous literature on prostitution, we examine non-pecuniary “job amenities” and not only wages.

Our paper also contributes to a better understanding of the general relationship between human capital and criminal labor supply (Raphael, 2001; Lochner, 2004; Krueger, 2008). Our results are consistent with criminal labor market segmentation by education, as Lochner (2004) found with respect to white-collar crimes, and consistent with the inverse relationship between general crime rates and educational levels (e.g., Gould, Weinberg and Mustard (2002)).

Section II presents our labor supply model, while Section III describes the survey instrument and Section IV presents empirical results. Section V concludes.

2 An “occupational choice” model of prostitution labor supply

We adapt for our uses Grossbard’s (2005) model of female occupational choice, in which a woman chooses between labor force participation, marriage, and state welfare dependency. In our adaptation, a woman chooses her time allocation among employment in a legitimate (non-prostitution) job, monogamous coupling with a partner (including, but not exclusive to, marriage), and prostitution.⁴

Obviously, the vast majority of women in the U.S. are far from the margin at which engaging in prostitution is a relevant choice. Our focus is on the smaller set of women for which this is a relevant margin, due to their preferences regarding the disutility of sex work and/or their options for legitimate employment and monogamous coupling. Sociological studies of prostitution find some women who undertake it as a career (Lucas, 2005). Other women, however, move in and out of prostitution over time, taking a legitimate job for some time until a separation occurs and then dipping into the prostitution market, or finding a boyfriend for some time until a separation occurs and then dipping into the prostitution market (Robinson and Yeh, 2011, 2012). In our empirical work, we focus on a woman’s labor supply of prostitution in the most recent week. In our survey, many prostitutes are either self-employed or work for an escort agency and have some control over their own hours. This is characteristic of the modern, indoor prostitution market, although it may not be so of streetwalking or other older forms of prostitution, where many workers are exploited by their “employers” (i.e., pimps).

A woman has an allocation of time, T , which she divides among legitimate employment, l , investment in monogamous coupling, m , prostitution labor supply, p , and leisure, s .

$$T = l + m + p + s \tag{1}$$

⁴The exclusivity of prostitution and marriage is emphasized by Edlund and Korn (2002). The exclusivity of prostitution and legitimate employment results from the social stigma connected to prostitution, emphasized by Guista, Tommaso and Strom (2009).

Consumption, c , is determined by the allocation of time to productive activities and the returns from each activity:

$$c = wl + ym + dp \quad (2)$$

where w is legitimate employment wage, d is prostitution wage, and y is the (net) “wage” associated with monogamous coupling. Wages from monogamous coupling may include explicit transfers from a partner who works, provision of housing and other shared goods, and non-pecuniary “payments” of affection and comfort.

A woman’s utility function is specified as

$$U = u(c, s) - v(l, m, p) \quad (3)$$

where v describes the disutility of labor supply to legitimate employment, monogamous coupling, and prostitution. This disutility may vary across occupations and across women. In particular, it seems likely in most cases that the disutility of prostitution is greater than that of legitimate employment because of the added risks of arrest, violence, and disease, as well as psychic harm associated with sex work (Brooks, 2006; Roberts, 2007). The disutility from investing in monogamous coupling obviously depends on the quality of the match.

Human capital may reduce the disutility associated with prostitution for several reasons. Better-educated women may be preferred by higher-quality clients who have lower disease and violence risks. In addition, better-educated women may be able to reduce arrest, violence, and disease risks by engaging in greater and more sophisticated screening of clients. As described in Cunningham and Kendall (2011*b*), sex workers operating through technology have access to various screening methods, including speaking with the potential client on the phone (using intuition to exclude clients who seem to be under the influence of drugs or who seem angry and potentially violent), searching for the potential client’s phone number or name on the internet, employing anonymous background screening companies that have been developed to serve prostitutes, or searching “white lists” maintained online by prostitutes.

Better-educated women may also, of course, have lower disutility from legitimate em-

ployment if they are better able to obtain jobs with good amenities, and they may have lower disutility from monogamous coupling if they are better able to attract good partners.

A woman maximizes her utility, specified in equation [3], subject to her time and budget constraints, specified in equations [1] and [2], which produces the following first-order constraints:

$$u_x(w - d) - v_l + v_p \leq 0 \quad (4)$$

$$u_x(y - d) - v_m + v_p \leq 0 \quad (5)$$

$$u_x(-d) + u_s + v_p \leq 0 \quad (6)$$

Assuming, as discussed above, that engaging in prostitution excludes a woman from either legitimate employment or monogamous coupling, then Kuhn-Tucker conditions under which $p > 0$ are derived from equations [4] and [5]:

$$u_x(w - d) - v_l + v_p < 0$$

$$u_x(y - d) - v_m + v_p < 0$$

These can be restated as:

$$d > \max \left\{ w - \frac{v_l}{u_x}, y - \frac{v_m}{u_x}, \frac{u_s}{u_x} \right\} + \frac{v_p}{u_x} \quad (7)$$

Equation [7] demonstrates that education has three separate potential effects on the propensity to engage in prostitution. First, if education is associated with higher legitimate market wages (w) and/or higher monogamous coupling returns (y), then education reduces prostitution participation, *ceteris paribus*. Second, if education is associated with lower marginal disutility from legitimate employment (v_l) and/or monogamous coupling (v_m), then education further reduces prostitution participation, *ceteris paribus*. Finally, if education is associated with lower marginal disutility from prostitution, for the reasons described above, then education increases prostitution entry, *ceteris paribus*.

The third factor is likely minimal with respect to traditional streetwalking forms of

prostitution, since there is relatively little ability to screen customers and consequently little productivity from education in terms of engaging in better screening (Cunningham and Kendall, 2011*b*). This explains the traditional view of prostitutes as poorly educated, since the first two factors likely dominate.

As noted above, a large share of our sample, which focuses on indoor sex workers who use technology to communicate, is college-educated. Thus, the third factor can explain this new entry of a highly-educated work force into prostitution since the introduction of the internet and other new technologies that facilitate screening. Nevertheless, among the subset of women who are on the margin of providing prostitution services in any given week, it may still be that college-educated women are less likely to do so.

Conditional on providing prostitution services in a given period, equation [6] describes the intensive margin of prostitution labor supply. Assuming an interior solution makes equation [6] an equality, and the left-hand-side of the equation indicates that an additional hour of leisure has three effects: (a) a reduction in consumption due to lower earnings, (b) an increase in direct utility from leisure, and (c) a reduction in disutility from prostitution work. A prostitute chooses her labor supply to balance these three factors. Hence, if education reduces the marginal disutility from prostitution work, for the reasons described above, and has no material effect on the marginal utility of consumption or leisure, then, conditional on participation, educated prostitutes will work more hours than those with less education.

3 Survey of Adult Service Providers

In this section, we describe our survey data, known as the Survey for Adult Service Providers (“SASP”). While other data sources exist providing information on observable characteristics and prices of prostitutes,⁵ surveys appear to be the only means by which education and other key background characteristics and business practices can be discerned.

Administering surveys to individuals involved in a socially-stigmatized (and usually

⁵Cunningham and Kendall (2011*b*) present an overview of available data

illegal) activity presents a number of problems to the researcher. Our experience in implementing SASP indicated that assuring respondents' anonymity was a key factor leading to participation. In order to balance this desire for anonymity with the need to maintain the integrity of the survey, potential respondents received an invitation to take the survey by email which included a random string of characters and numbers generated by a third party inaccessible to the researchers (the information librarian at Baylor University). When surveys were returned, only the random string was observable by the researchers, and not the email address of the respondent.

A number of participants expressed concern that SASP was, in fact, an enforcement effort by tax authorities or police agencies (the former typically being the more serious concern). As additional signals that the purpose of SASP was entirely scientific, the online survey instrument was hosted on Baylor University servers, and a website was posted with answers to frequently asked questions along with links to the authors' personal websites, curricula vitae, institutional review board exemption letter, and research manuscripts. The office telephone number for one of us was also included in each email, and respondents were encouraged to contact via phone if they desired. Many respondents did, indicating that participants found this to be a useful means of verifying our authenticity. Additionally, early on in the study, the Las Vegas chapter of Sex Workers Outreach Project, a major advocacy group, publicly endorsed SASP and encouraged sex workers to participate in the study, thus providing some external verification that the study was scientific.

A fundamental issue in the construction of any survey, but which is exacerbated by the underground and usually illegal nature of sex work, is the identification of a useful population from which to draw survey participants. For SASP, we based our population on the set of workers with email addresses listed on a large customer review website, TheEroticReview.com ("TER"). TER is a site that offers clients the opportunity to "review" sex workers, and while there are a number of similar sites, TER is by far the largest and most geographically-dispersed, providing reviews for over 100,000 sex workers in North America although not all of these have email addresses listed.⁶

⁶Edlund, Engelberg and Parsons (2009) and Cunningham and Kendall (2011a) use TER as a direct

We supplemented this set of sex worker email addresses from TER with an additional set of addresses from individuals listed on a popular national sex worker advertising website, Eros.com. In total, we attempted to contact 26,189 individuals to participate in the survey.

We believe this population includes a substantial share of all US-based indoor sex workers as of the date of the survey. However, SASP likely undersamples several subgroups. First, while workers employed in escort agencies, massage parlors, or brothels are commonly reviewed on TER and advertised on Eros.com, they frequently do not have personal email addresses listed; instead, only the agency or brothel manager's email is frequently available. Therefore, it seems likely that many of these workers were not reached. Second, sex workers who meet clients largely through pimps also may have been more difficult to reach through email. Finally, we believe our population may miss some very high-priced workers who operate entirely through personal referrals and avoid reviews and advertisements.

After collecting all available contact information, the list of potential survey participants was organized by city (both TER and Eros.com organize listings geographically). We then randomly selected five cities per month, and attempted to contact individuals in those cities up to four times during the month. In addition to emailing participants with a link to the survey, we also contacted a random selection of workers by telephone to encourage them to take the survey. We put the SASP survey in the field in August 2008 and wrapped up data collection in early June 2009. The actual survey instrument (if completed online, and not over the telephone) was distributed and published, and the responses collected and organized, using SNAP 9.2 software, and included approximately 267 questions. The text of all questions may be found in Appendix A. Based on timestamps associated with participant answers, respondents took approximately 25 minutes on average to complete the survey.

Among the original 26,189 emails sent, 13,333 emails were successfully delivered, with the remainder "bouncing back" as undeliverable. The high number of invalid email addresses is unsurprising, given the fact that TER data stretches back to 1998, and many

source of data.

workers active in earlier years may have left the industry or changed contact information (similarly, imagine sending letters to all business listed in the last ten years of telephone directories for a city).

While 13,333 emails were successfully delivered to an email account, some share of these accounts are likely abandoned or very irregularly checked. Thus, this number represents an upper bound on the pool of potential participants, and the real response rate is likely much higher as a result. Nevertheless, between August 2008 and June 2009, 685 respondents answered our request to take the survey, giving us a lower bound response rate of 5.14%.

While the response rate was low in comparison with large-scale surveys of workers in other industries, to the best of our knowledge, no other survey of sex workers in modern economies has provided more survey responses, particularly on labor market issues such as those examined in this paper.

Nevertheless, we acknowledge the potential for our estimates to be biased due to selection in the propensity to respond to the survey invitation. We can partially generalize SASP to the larger population of indoor sex workers by probability weighting our sample of responses to be representative of the population we sought to reach. Specifically, we used the age and race distributions of SASP respondents and of all sex workers reviewed on TER during 2007 and 2008 in an attempt to generalize our results to the set of currently-operating indoor prostitutes.

To do this, we calculated the share of individuals reviewed on TER in each age-race category, and divided that share by the similarly-calculated share of SASP respondents in that same category. Thus for instance, there are 1,155 White workers between ages 31 and 35 reviewed on TER, which is 11% of all TER-reviewed workers. Likewise, there were 99 White SASP respondents aged 31-35, which is 15% of all SASP respondents. The inverse probability of appearing in our sample is therefore 0.72 ($= 0.11 / 0.15$) for Whites aged 31-35. This process allows us to present estimates of means, regression coefficients, and linearized standard errors using these probability weights, which may be thought of as generalizable to the larger sample of indoor sex workers received on TER. Of course, these adjustments are limited to the variables we can observe in both SASP and TER.

We cannot adjust for other factors, such as the differential mobility of prostitutes.

In any case, while it could be argued that we undersample some subgroups of workers, and so our results may not be fully generalizable, we believe TER-reviewed workers represent a very large and important subset of sex workers in North America.

SASP is structured to provide two distinct datasets: (a) a sex worker-level dataset with personal characteristics and general business practices, which we refer to as the “provider file”, and (b) a transaction-level dataset with information on prices charged, sexual activities and client characteristics based on the worker’s last five clients, which we refer to as the “client file”. The provider file includes 685 respondents, while the client file contains information on 2,047 transactions. Tables 1 and 2 presents probability-weighted summary statistics from the two datasets. Notably, we estimate that 37.8% of the U.S. indoor sex worker population is college-educated.

4 Empirical Results

College education may be associated with variation in both extensive and intensive margin labor supply, i.e., the decision to enter prostitution in the first place, and then subsequent sorting into different patterns of work. This selection may cause our estimates of the relationship between education and labor supply to be biased (Heckman, 1979). We control for selection by estimating a two-sample Heckit selection model. Our first sample is pooled cross sections of the General Social Survey (1991-2010). Respondents were asked whether they had ever received compensation for sex.⁷ We estimated using probit the probability of ever receiving compensation for sex conditional on college education, high school completion, junior college completion, age, age-squared, non-white dummy, married, parent, and maternal and paternal college graduate status. These and other interesting results are contained in Table 3. Note that compared to high school dropouts, college-educated women were significantly less likely to provide sex work at any point in their lives. We then use these estimated coefficients to predict prostitution status using the provider and client files by taking the inverse of the probability density function and

⁷Respondents were also asked if they had received compensation for sex in the last year, but the number of observations is insufficiently small to warrant use in this analysis.

the cumulative density function. This inverse is called the inverse Mills ratio, and we control for it in all our regressions.⁸

The theory above indicates that the relationship between education and prostitution participation is theoretically ambiguous, but that we expect, conditional on participation in a given week, education is likely to be associated with greater hours worked if education leads to lower disutility from working. We first analyze the empirical relationship between college completion, prostitution participation, and earnings. We find that college is associated with less frequent participation in prostitution, but more clients and longer client sessions, conditional on entry. College is not associated with higher hourly wages except for sessions that are especially long. We then turn directly to measures of disutility from prostitution, and find that college-educated women appear to have lower disutility along several dimensions.

Empirically, we do not attempt to distinguish college completion from the determinants of college completion, such as intelligence or other personal characteristics. Although our theory focuses on education, the same effects would likely apply to general intelligence. Our data are also cross-sectional and consequently, we cannot measure causal impacts of education (or intelligence) distinct from the causal impacts of other factors that drive education. Again, our theory encompasses most other such factors.⁹

Table 4 addresses the relationship between education and the number of clients. Specifically, we used the provider file to count the number of clients each worker indicated she saw during the last week. In column (1), the dependent variable is an indicator for whether the worker saw any clients during the last week, a measure of market participation in that week. The regression is estimated with a probit specification, and coefficients reported are marginal effects at the means. Included as covariates are a variety of individual characteristics, including age, race, and body mass index, as well as business variables such

⁸We also estimated our regressions without the inverse mills ratio, and our results were robust to its exclusion. Results available upon request.

⁹If one did wish to interpret our results causally, some consideration of the magnitude of the omitted variable bias from measures of intelligence would be in order. Compared with other professions, college coursework seems to provide much less (or no) direct applicability to the skills relevant for sex work, which would indicate a larger omitted variable bias. On the other hand, if much of the human capital contained in college relates to socialization and an ability to communicate, then perhaps these are skills transferable to sex work.

as experience and an indicator for whether the worker is “independent” (does not work with a third-party manager such as an escort agency or a pimp).¹⁰ The result shows that college-educated workers appear to work roughly 13.7% fewer weeks in the prostitution market. The second column in Table 4 presents coefficients from a negative binomial regression with the number of clients last week as the dependent variable (conditional on seeing at least one client). The results show that, conditional on working, college-educated workers see nearly 25% more clients.

In Table 5, we focus on weekly earnings. Respondents were asked how much they earned in the last week from sex work.¹¹ We estimated models with two dependent variables: how much a respondent earned in the last week conditional on working in the last week, and how much a respondent earned unconditionally including zeroes. In column 1, Table 5, we find that college-educated sex workers earned approximately 33% more in the last week than those with less education, conditional on working, but approximately the same amount unconditionally, accounting for the fact that they are less likely to work at all.

In Table 6, we explore this relationship between college education and earnings more closely by focusing on hourly wages. We define a wage as the gross price received for sex work using the client-file divided by the length of the session in minutes (divided by 60). Column 1 controls for observable female characteristics, column 2 controls additionally for client characteristics, and column 3 controls for the sex act(s) performed.¹² The client characteristics are standard errors are clustered by respondent. We find no significant relationship between overall sex worker wages and college education, *ceteris paribus*, in any of these three specifications.

Insofar as college educated sex workers provide a different type of service, we may find evidence for this in the length of the session. Anecdotally, respondents suggested to us

¹⁰We include only state fixed effects, although we sometimes have information on the respondents’ city. However, in many cases, the respondent did not provide city information.

¹¹Question 75: “About how much money did you make from working as an escort in the last week? Please indicate a dollar amount (example: 5.22, \$5, or \$5.00):”

¹²Client characteristics include the client’s age and age-squared, whether he was a regular client, his rated appearance (0-10), his race, whether a second provider was present, whether the transaction occurred in a hotel, and whether a massage was provided. Sex act characteristics include vaginal sex with or without a condom, oral sex with or without a condom, and anal sex with or without a condom.

that there exist two types of sessions with a client – there were shorter sessions in which the client preferred only sex, and there were longer sessions in which the client preferred a bundling of sex with other emotional services. In Table 6, we analyze the length of client sessions. As indicated in Table 2, most sessions are less than or equal to 60 minutes (the mode is 60 minutes); however, some very long sessions raise the mean session length to nearly 118 minutes. Below, we perform some analyses in which we disaggregate the data by session length, but in Table 6, we first use as a dependent variable the natural log of session length measured in minutes. The results, summarized in the first three columns, indicate that, depending on whether client and sex act characteristics are included as covariates, college-educated workers provide 14% - 17% longer sessions.

So far, we have found that college-educated women are less likely to work in any given week, and earn similar hourly prostitution wages to women without college, but earn more in a week, see more clients and have longer client sessions, conditional on working. All of this is consistent with a model in which college-educated women have better outside options, but lower disutility from sex work. We now turn to the question of disutility from prostitution labor supply more directly. First, in Table 8, we analyze calculated hourly wage, as in Table 4, but we focus exclusively on the longer sessions (greater than 60 minutes). To the extent that college-educated prostitutes combine sexual services with companionship as a way to reduce disutility, it is in these longer sessions that such an effect would be most clearly seen. The three columns in Table 7, reflecting different sets of covariates, indicate that, indeed, college completion is associated with a roughly 15% wage premium for these longer sessions. In other words, while college is not associated with statistically significant wage effects on average it is so for the longest sessions.

This result is consistent with our theory. These longer sessions, as noted above, likely involve bundling of sexual services with non-sexual services such as companionship, for which college completion may be associated with higher productivity. Because sexual favors presumably form a smaller share of the total work time in these longer sessions, and because (as shown in Table 5) college-educated workers are able to provide longer sessions, these results provide one means by which “job amenities” may be better, and therefore, the disutility of prostitution labor supply lower, for college-educated sex workers.

In Table 9, we present further evidence on this question of disutility. The first two columns, which are based on the provider-file data, examine the effect of college education on the number of “regular,” or repeat, clients, and the number of new clients, conditional on working. In particular, column (1) shows that college-educated providers appear to be able to attract 33.5% more regulars. The effect on new, never-before-seen, clients, as estimated in column (2) is also positive, but smaller in magnitude and statistically insignificant. Regular clients generally involve lower violence and arrest risk since they are already known; moreover, sex workers may be able to form warmer, less “transactional,” relationships with regulars that may mitigate some of the disutility associated with prostitution labor supply. Hence, a higher share of regular clients may represent a valued job amenity, which college-educated workers are better able to attain.

The remaining columns in Table 9 employ the transaction file to examine other job “amenities.” Column (3) shows that college-educated sex workers rate the attractiveness of their clients higher, roughly 0.37 points higher on a 10 point scale, which corresponds to a 6.4% increase over the mean value. Column (4) indicates that college-educated sex workers are 6.3% more likely to kiss their clients, potentially reflecting a more intimate relationship. Column (5) examines the ability of college-educated sex workers to attract older, and presumably lower-risk, clients, and finds a positive, though statistically insignificant result. While older clients may involve lower risk, younger clients may represent more attractive, desirable sexual partners.

In Table 10, we examine job risks, another cause of disutility associated with prostitution. In each column, the dependent variable is a subjective assessment of a particular risk, measured on a 0 to 10 scale, with lower numbers representing lower risk. These results suggest that college-educated sex workers perceive significantly lower risk of arrest associated with their work. College-educated sex workers also perceive higher HIV infection, client violence and discovery risk, but these are not statistically significant.

5 Conclusion

There are obvious concerns in generalizing too far, given the limitations inherent in surveys such as SASP. Nonetheless, the empirical evidence presented above is consistent with a theory that education improves outside opportunities sufficiently that educated women are less likely to engage in prostitution. However, education also allows women to reduce the marginal disutility of prostitution labor, which means that educated prostitutes see more clients and have longer sessions. This is a more nuanced theory of education and criminal behavior than has been promulgated in previous literature. We also emphasize for future literature the importance of non-pecuniary “job amenities” in prostitution and other criminal employment.

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Table 1 Population-weighted Survey Summary Statistics: Sex-Worker Level Variables
(from “Provider File”)

Variable	N	Mean	Linearized Std. Error
College Graduate (0/1)	540	0.378	0.031
Weekly Earnings (Conditional on Working)	393	\$2,616.72	447.483
Weekly Earnings (Unconditional)	532	\$1,965.56	340.01
Any Clients (0/1)	539	0.754	0.030
# Clients Last Week	536	5.549	1.051
# Regular Clients	534	3.004	0.623
# New Clients	534	2.528	0.461
Have Other Job (0/1)	535	0.432	0.037
Hours at Other Job	237	28.224	1.202
Age	544	28.252	0.346
Years Prostitution Experience	539	5.518	0.277
BMI	529	23.271	0.415
Non-White (0/1)	544	0.407	0.043
Married/Cohabiting (0/1)	544	0.354	0.041
Independent of Manager	539	0.922	0.021
Have Children (0/1)	540	0.392	0.039
Ever Assaulted by Client (0/1)	533	0.129	0.025
Subjective Perception of Risk:			
Arrest (1- 10)	528	4.064	0.173
Family Detection (1 - 10)	530	3.889	0.225
Client Violence (1 - 10)	531	4.294	0.283
HIV Infection (1 - 10)	530	2.605	0.143

Notes: Summary statistics reflect survey responses, probability-weighted as described in the text to correspond to the population of indoor sex workers in 2007 and 2008.

Table 2 Population-weighted Survey Summary Statistics: Transaction-Level Variables
(from “Transaction File”)

Variable	<i>N</i>	Mean	Linearized Std. Error
Calculated Hourly Wage	1983	\$325.47	6.329
Session Length	2036	118.316	10.970
Length < 60 min (0/1)	2047	0.642	0.019
Length > 60 minutes (0/1)	2047	0.360	0.019
Traveled out of state (0/1)	2047	0.138	0.012
White Client (0/1)	1970	0.808	0.018
Black Client (0/1)	1970	0.055	0.008
Asian Client (0/1)	2047	0.057	0.010
Hispanic Client (0/1)	1970	0.039	0.008
Other Race Client (0/1)	1970	0.030	0.006
Age of Client	1949	43.187	0.473
Client is regular (0/1)	2042	0.535	0.020
Client Attractiveness (1 - 10)	1986	5.781	0.093
Multiple Sex Workers (0/1)	2047	0.063	0.009
Physically Assaulted (0/1)	2040	0.010	0.004
Verbally Assaulted (0/1)	2038	0.020	0.006
Would File a Police Report if Assaulted (0/1)	1777	0.329	0.023
Sex Acts:			
Massage (0/1)	2037	0.352	0.019
No Fellatio (0/1)	1995	0.183	0.017
Fellatio / Condom (0/1)	1989	0.293	0.020
Fellatio / No Condom (0/1)	1989	0.522	0.021
No Vaginal Intercourse (0/1)	2007	0.244	0.015
Vaginal Intercourse / Condom (0/1)	2007	0.696	0.017
Vaginal Intercourse / No Condom (0/1)	2007	0.060	0.010
Anal Intercourse (0/1)	2047	0.059	0.008

Notes: Summary statistics reflect survey responses, probability-weighted as described in the text to correspond to the population of indoor sex workers in 2007 and 2008.

Table 3 Probit estimation of whether female respondents ever received compensation for sex (GSS 1991-2010)

Depvar:	Prob(Ever received compensation for sex=1)
College	-0.275*** (0.103)
High school grad	-0.090 (0.068)
Junior college	-0.345*** (0.127)
Age	0.044*** (0.011)
Age-squared	-0.000*** (0.000)
Non-white	-0.344*** (0.060)
Married	-0.244*** (0.063)
Parent of at least one child	0.066 (0.080)
Mother college graduate or higher	-0.056 (0.110)
Father college graduate or higher	0.022 (0.105)
Pseudo R-squared	0.054
N	12,886
Mean of dependent variable	0.018

Heteroskedastic robust standard errors in parenthesis. Household size sampling weights as analytical weights and include Census division fixed effects and year fixed effects. * p<0.10, ** p<0.05, *** p<0.01

Table 4 Estimates of Relationship Between Clients Seen and College Completion

Depvar:	Any clients last week	# Clients (Conditional on any clients)
Own Education: College Graduate (d)	-0.137** (0.055)	0.250** (0.126)
Age	0.005 (0.028)	-0.084 (0.053)
Age squared	0.000 (0.000)	0.001 (0.001)
Years since first Entry into Prostitution	-0.005 (0.004)	0.014 (0.010)
Non-white provider (d)	-0.484*** (0.121)	-0.032 (0.223)
Body Mass Index	-0.028 (0.024)	-0.006 (0.050)
BMI squared	0.000 (0.000)	-0.000 (0.001)
Providers is Independent (d)	0.188 (0.161)	-0.262 (0.325)
Cohabiting Partners/Spouse (d)	-0.352*** (0.101)	0.213 (0.156)
Any Children (Y/N) (d)	0.105* (0.060)	0.359** (0.144)
Inverse Mills Ratio	1.007*** (0.306)	-0.179 (0.595)
N	465	363
Mean of dependent variable	0.72	5.72

Heteroskedastic robust standard errors in parenthesis. SASP inverse probability weights are used in estimation. * p<0.10, ** p<0.05, *** p<0.01

Table 5 Estimates of Relationship Between Weekly Earnings from Prostitution and College Completion

Depvar:	Log(earnings worked)	Log(earnings)
Own Education: College Graduate	0.328** (0.150)	0.023 (0.174)
Age	-0.108* (0.062)	0.023 (0.092)
Age squared	0.001 (0.001)	-0.000 (0.001)
Years since first Entry into Prostitution	0.006 (0.011)	0.005 (0.015)
Non-white provider	0.016 (0.294)	-0.854** (0.417)
Body Mass Index	-0.097* (0.057)	-0.093 (0.094)
BMI squared	0.001 (0.001)	0.001 (0.001)
Providers is Independent	0.942 (0.617)	0.629 (0.418)
Cohabiting Partners/Spouse	0.237 (0.201)	-0.317 (0.280)
Any Children (Y/N)	0.299* (0.169)	0.564*** (0.200)
Inverse Mills Ratio	-0.484 (0.857)	0.917 (1.169)
N	358	488
Mean of dependent variable	7.17	1510.37

Heteroskedastic robust standard errors in parenthesis. SASP inverse probability weights are used in estimation. * p<0.10, ** p<0.05, *** p<0.01

Table 6 Estimates of Relationship Between Calculated Hourly Wage and College Completion

Depvar:	Ln(hourly wage)		
Own Education: College Graduate	0.059 (0.053)	0.072 (0.051)	0.064 (0.051)
Age	0.020 (0.021)	0.023 (0.020)	0.020 (0.019)
Age squared	-0.000 (0.000)	-0.000* (0.000)	-0.000* (0.000)
Years since first Entry into Prostitution	0.009** (0.004)	0.009** (0.004)	0.009** (0.004)
Non-white provider	-0.114* (0.063)	-0.137** (0.058)	-0.112** (0.056)
Body Mass Index	-0.022*** (0.003)	-0.068*** (0.018)	-0.078*** (0.019)
BMI squared		0.001*** (0.000)	0.001*** (0.000)
Providers is Independent	-0.141 (0.104)	-0.130 (0.102)	-0.136 (0.099)
Cohabiting Partners/Spouse	-0.012 (0.056)	-0.008 (0.055)	0.011 (0.056)
Any Children (Y/N)	0.065 (0.051)	0.042 (0.050)	0.049 (0.049)
Length of Session in Minutes	-0.001*** (0.000)	-0.001*** (0.000)	-0.001*** (0.000)
Length squared	0.000*** (0.000)	0.000*** (0.000)	0.000*** (0.000)
Inverse Mills Ratio	-0.014 (0.129)	-0.030 (0.115)	-0.053 (0.115)
Client characteristics	No	Yes	Yes
Sex act characteristics	No	No	Yes
R-squared	0.330	0.371	0.382
N	1,885	1,755	1,755
Mean of dependent variable	5.64	5.63	5.63

Heteroskedastic robust standard errors in parenthesis clustered at the provider level. SASP inverse probability weights are used in estimation. * p<0.10, ** p<0.05, *** p<0.01

Table 7 Estimates of Relationship Between College Completion and Session Length

Depvar:	Ln(Length)		
Own Education: College Graduate	0.173** (0.069)	0.139** (0.067)	0.152** (0.066)
Age	0.031 (0.027)	0.013 (0.024)	0.033 (0.024)
Age squared	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Years since first Entry into Prostitution	-0.016*** (0.005)	-0.012** (0.005)	-0.012** (0.005)
Non-white provider	0.178** (0.074)	0.166** (0.072)	0.162** (0.068)
Body Mass Index	-0.011* (0.006)	-0.052* (0.031)	-0.038 (0.027)
BMI squared		0.001 (0.001)	0.000 (0.000)
Providers is Independent	0.239 (0.145)	0.169 (0.149)	0.153 (0.130)
Cohabiting Partners/Spouse	0.052 (0.093)	0.037 (0.082)	-0.017 (0.082)
Any Children (Y/N)	-0.194*** (0.072)	-0.160** (0.070)	-0.154** (0.066)
Inverse Mills Ratio	-0.168 (0.205)	-0.072 (0.181)	-0.037 (0.173)
Client characteristics	No	Yes	Yes
Sex act characteristics	No	No	Yes
R-squared	0.185	0.269	0.300
N	1,930	1,792	1,792
Mean of dependent variable	4.25	4.24	4.24

Heteroskedastic robust standard errors in parenthesis clustered at the provider level. SASP inverse probability weights are used in estimation. * p<0.10, ** p<0.05, *** p<0.01

Table 8 Estimates of Relationship Between Calculated Hourly Wages for Long Client Sessions (> 60 min) and College Completion

Depvar:	Ln(hourly wage)		
Own Education: College Graduate	0.127*	0.126*	0.121*
	(0.066)	(0.069)	(0.067)
Age	-0.009	-0.002	-0.007
	(0.026)	(0.028)	(0.026)
Age squared	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)
Years since first Entry into Prostitution	0.004	0.003	0.004
	(0.006)	(0.006)	(0.007)
Non-white provider	-0.095	-0.074	-0.111
	(0.077)	(0.079)	(0.083)
Body Mass Index	-0.032	-0.047	-0.052
	(0.027)	(0.030)	(0.032)
BMI squared	0.000	0.000	0.000
	(0.000)	(0.000)	(0.001)
Providers is Independent	0.031	0.051	0.041
	(0.147)	(0.140)	(0.148)
Cohabiting Partners/Spouse	0.063	0.060	0.077
	(0.076)	(0.083)	(0.083)
Any Children (Y/N)	0.181**	0.194**	0.196**
	(0.077)	(0.080)	(0.077)
Length of Session in Minutes	-0.001***	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)
Length squared	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)
Inverse Mills Ratio	-0.222	-0.161	-0.213
	(0.186)	(0.180)	(0.181)
Client characteristics	No	Yes	Yes
Sex act characteristics	No	No	Yes
R-squared	0.469	0.495	0.524
N	706	656	640
Mean of dependent variable	5.48	5.46	5.46

Heteroskedastic robust standard errors in parenthesis clustered at the provider level. SASP inverse probability weights are used in estimation. * p<0.10, ** p<0.05, *** p<0.01

Table 9 Estimates of Relationship Between Other Measures of Non-pecuniary Job Amenities and College Completion

Depvar:	# Regular clients	# New clients	Client attractiveness	Kissed client	Age of client
Own Education: College Graduate (d)	0.335*** (0.122)	0.239 (0.175)	0.367** (0.171)	0.063* (0.038)	0.094 (0.785)
Age	-0.084 (0.054)	-0.078 (0.071)	0.218** (0.099)	0.032 (0.019)	-0.022 (0.368)
Age squared	0.001 (0.001)	0.001 (0.001)	-0.002* (0.001)	-0.000 (0.000)	0.005 (0.005)
Years since first Entry into Prostitution	0.026** (0.011)	-0.002 (0.014)	0.001 (0.014)	-0.007** (0.003)	-0.142** (0.064)
Non-white provider (d)	0.057 (0.241)	-0.052 (0.296)	0.420* (0.249)	0.107** (0.046)	2.414** (1.072)
Body Mass Index	-0.065 (0.049)	0.044 (0.066)	-0.271*** (0.065)	-0.011 (0.018)	-0.822** (0.346)
BMI squared	0.001 (0.001)	-0.001 (0.001)	0.004*** (0.001)	0.000 (0.000)	0.013** (0.006)
Providers is Independent (d)	-0.345 (0.317)	-0.190 (0.389)	0.503 (0.381)	0.054 (0.089)	1.354 (1.902)
Cohabiting Partners/Spouse (d)	0.306* (0.167)	0.156 (0.215)	-0.611*** (0.209)	-0.028 (0.058)	0.425 (0.886)
Any Children (Y/N) (d)	0.361*** (0.138)	0.375* (0.213)	0.125 (0.180)	-0.056 (0.048)	-1.974** (0.794)
Inverse Mills Ratio	-0.706 (0.581)	0.124 (0.841)	0.010 (0.588)	0.037 (0.115)	-4.642** (2.169)
Client characteristics	No	No	Yes	Yes	Yes
Sex act characteristics	No	No	Yes	Yes	Yes
R-squared			0.258		0.163
N	361	361	1,827	1,787	1,827
Mean of dependent variable	2.81	2.87	5.69	0.73	43.42

Heteroskedastic robust standard errors in parenthesis clustered at the provider level. SASP inverse probability weights are used in estimation. * p<0.05, ** p<0.01, *** p<0.001

Table 10 Estimates of Relationship Between Self-Perceived Job Risks and College Completion

Depvar:	Arrest	HIV infection	Client violence	Discovery
Own Education: College Graduate	-0.615* (0.347)	0.222 (0.354)	0.445 (0.355)	0.114 (0.458)
Age	0.185 (0.142)	0.074 (0.135)	0.104 (0.191)	0.080 (0.217)
Age squared	-0.003 (0.002)	-0.001 (0.002)	-0.001 (0.003)	-0.001 (0.003)
Years since first Entry into Prostitution	0.005 (0.027)	-0.009 (0.024)	-0.014 (0.030)	-0.055 (0.034)
Non-white provider	0.053 (0.764)	0.670 (0.743)	-0.698 (0.821)	0.908 (1.041)
Body Mass Index	0.060 (0.175)	-0.279 (0.175)	-0.202 (0.161)	-0.188 (0.235)
BMI squared	-0.001 (0.003)	0.004 (0.003)	0.005** (0.002)	0.003 (0.004)
Providers is Independent	0.106 (0.975)	0.440 (0.669)	0.299 (0.589)	-3.206*** (0.743)
Cohabiting Partners/Spouse	0.280 (0.534)	0.139 (0.360)	-0.569 (0.522)	0.330 (0.684)
Any Children (Y/N)	-0.491 (0.403)	0.105 (0.328)	-0.066 (0.413)	-0.822 (0.503)
Inverse Mills Ratio	0.317 (1.816)	0.082 (1.624)	2.370 (1.943)	-1.104 (2.946)
R-squared	0.283	0.198	0.318	0.377
N	360	361	362	361
Mean of dependent variable	4.08	2.57	4.03	4.21

Heteroskedastic robust standard errors in parenthesis. SASP inverse probability weights are used in estimation. * p<0.10, ** p<0.05, *** p<0.01