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Mathias Sinning  
Shane Worner

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**Mathias Sinning**  
*Australian National University,  
RWI and IZA*

**Shane Worner**  
*Australian Securities and Investment Commission*

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IZA

P.O. Box 7240  
53072 Bonn  
Germany

Phone: +49-228-3894-0  
Fax: +49-228-3894-180  
E-mail: [iza@iza.org](mailto:iza@iza.org)

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## ABSTRACT

### Inter-ethnic Marriage and Partner Satisfaction<sup>\*</sup>

This paper investigates immigrant assortative mating and relationship satisfaction. Using a modified random effects ordered probit model, the paper demonstrates that spouses of mixed couples are significantly less satisfied with their partner than native-only and foreign-only couples.

JEL Classification: F22, I31

Keywords: international migration, assortative mating, partner satisfaction

Corresponding author:

Mathias Sinning  
Research School of Economics (RSE)  
HW Arndt Building 25a  
Australian National University  
Canberra ACT 0200  
Australia  
E-mail: [mathias.sinning@anu.edu.au](mailto:mathias.sinning@anu.edu.au)

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# 1 Introduction

It is commonly acknowledged in the empirical literature that partnership formation exhibits a non-random selection influence. This non-random matching of traits within a partnership is referred to as assortative mating. Across a number of traits that individuals bring to a partnership, some sort of positive correlation exists (Mare, 1991), known as positive assortative mating (PAM). PAM has important welfare implications for the family unit. Becker (1973) shows that the welfare gains from a partnership are maximized when certain individual traits (such as education and income) exhibit PAM. In other words, the traits that an individual brings to a partnership may affect the welfare of the couple.

So far, very little is known about matching based on ethnic background and its welfare effects. Chiswick and Houseworth (2008) show that the longer an immigrant resides in a country, the greater the probability of inter-ethnic marriage, and through the burgeoning life satisfaction literature we know that married people are happier than single people (Frey and Stutzer, 2002; Di Tella et al., 2003; Easterlin, 2003; Carroll, 2007). However, research in other social sciences suggests that the act of marriage alone is neither a sufficient nor necessary condition for increased individual happiness; rather it is the quality of the relationship between the two partners that is important (Gove et al., 1983; Coombs, 1991; Kim and McKenry, 2002).

In this paper, we investigate matching along immigrant background and its impact on partner satisfaction, using a unique relationship satisfaction variable surveyed across 7 waves of the Household, Income and Labour Dynamics in Australia (HILDA) Survey. Specifically, we analyze the gaps in partner satisfaction between three different household types. Ordered probit models are employed to account for the ordered nature of our dependent variable. To exploit the panel structure of the survey, we compare the estimates of a linear fixed effects model to those of a random effects ordered probit model with a Mundlak transformation (Mundlak, 1978), which corrects for correlation between the individual random effects and the observables. The panel

data estimates allow us to predict the conditional gap in partner satisfaction after eliminating time-invariant individual characteristics.

The paper is organized as follows. Section 2 includes a description of the data and our empirical strategy. The estimation results are presented and discussed in Section 3. Section 4 concludes.

## 2 Data and empirical strategy

Our empirical analysis uses data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey, a broad social and economic longitudinal survey which began in 2001, with particular attention paid to economic and subjective well-being, labor market dynamics and family dynamics. The panel includes about 20,000 individuals in about 8,000 households. Interviews are conducted annually with all adult members of each household. As the HILDA Survey has a longitudinal design, most questions are repeated each year. In addition, specific questionnaire modules are included each wave, focusing on questions that will not be covered every year (such as family background and personal history, household wealth, retirement and plans for retirement, etc.).

Most importantly, the HILDA Survey includes information about “satisfaction with the partner”, which is measured on an ordinal scale from zero to ten (where zero means “completely dissatisfied” and ten means “completely satisfied”). This variable serves as the dependent variable in our empirical analysis. We examine the sub-sample of married couples for the period 2001-2007. Given information about foreign-born individuals, we distinguish three types of households: (i) “native-only households” in which both partners are native-born, (ii) “immigrant-only households” in which both partners are foreign-born and (iii) “mixed households” in which one partner is foreign-born and the other is native-born.

To account for the ordered nature of the dependent variable, we employ a pooled ordered probit model with time fixed effects to estimate the unconditional gap in part-

ner satisfaction between household types. Since we would also like to know whether differences in partner satisfaction between households with the same characteristics are significant, we further estimate the conditional gap in partner satisfaction between household types, controlling for the following characteristics: 1) a quadratic function of age, 2) the highest level of education, 3) a quadratic function of the marriage duration, 4) an indicator variable for children aged less than 14 years living in the household, 5) the size of the home relative to the number of persons in the household, 6) the income differential between the husband and the wife and 7) an indicator variable for a different smoking behavior, which is equal to 1 if one partner smokes and the other partner does not smoke and 0 otherwise.

In addition to observable characteristics, we would like to investigate differences in partner satisfaction between household types with the same unobservable individual characteristics. Since unobservable characteristics (such as personality traits) may be correlated with determinants of partner satisfaction, a fixed effects estimator is typically applied to account for (time-invariant) individual traits. Empirical studies on life satisfaction have often considered the ordinal scale of the dependent variable as continuous (cardinal) to justify the estimation of linear fixed effects models (Clark et al., 2001; Winkelmann and Winkelmann, 1998) or collapsed the scale of the dependent variable into a binary outcome to estimate conditional logit fixed effects models (Di Tella et al., 2001; Senik, 2004). Since the latter approach assumes an artificial threshold to distinguish between “high” and “low” satisfaction, it neglects all individuals who do not cross this threshold. Frijters and Ferrer-i-Carbonell (2004) provide an extension of the binary conditional fixed effects logit model of Chamberlain (1980). Their model includes individual-specific thresholds and allows a consideration of all individuals whose satisfaction differs over time. Frijters and Ferrer-i-Carbonell (2004) note that estimating a logit model with fixed effects produces similar results to estimating an ordered probit model with individual random effects and applying the transformation proposed by Mundlak (1978) if the assumed correlation structure serves only as a correction term. In this paper, we apply a Mundlak (1978) transfor-

mation of the ordered probit model with individual random effects. Specifically, we consider the following latent variable model:

$$SP_{it}^* = \alpha + x_{it}'\beta + T'\delta + \nu_i + \varepsilon_{it}, \quad (1)$$

where  $SP_{it}^*$  denotes the (unobserved) satisfaction of individual  $i$  with his or her partner at time  $t$  and  $x_{it}$  is a vector of explanatory variables. To utilize the panel structure of the data, the model includes fixed time effects,  $T$ , and individual random effects  $\nu_i$ . While fixed time effects capture yearly changes that are the same for all individuals (such as inflation), individual random effects account for unobservable characteristics that are constant across time but different for each individual (such as personality traits). While we may assume that the error term  $\varepsilon_{it}$  has mean zero and is uncorrelated with observable characteristics, this is not necessarily the case for the individual random effects, because it would imply that unobserved individual characteristics are uncorrelated with explanatory variables (such as income). To address this issue, we follow the empirical approach proposed by Mundlak (1978), which allows for correlation between individual random effects and the observable variables  $x_{it}$ . Specifically, we decompose the individual random effect  $\nu_i$  into a part that is correlated with the observed characteristics and a part that is uncorrelated with these characteristics (see also Hsiao, 1986):

$$\nu_i = \bar{x}_i'\gamma + \eta_i. \quad (2)$$

The correlation between the observed characteristics and the individual random effect is assumed to be of the form  $\bar{x}_i'\gamma$ , where the overbar denotes (the column vector of) the sample mean across time. Following Ferrer-i-Carbonell (2005), we assume that the coefficient vector  $\gamma$  represents a statistical correction factor, which picks up only the correlation between individual observable random effects and explanatory variables.

In our empirical analysis, we compare the estimates of the modified random effects ordered probit model to those of a conventional linear fixed effects model. We use the

parameter estimates from both models to predict the conditional gap in partner satisfaction between household types after eliminating all (observable and unobservable) time-invariant individual characteristics and controlling for observable time-variant characteristics.

### 3 Results

A preliminary analysis of the partner satisfaction data is presented in Figures 1 and 2. The most interesting point highlighted in the figures is the gap between native-only, immigrant-only and mixed partnerships. Specifically, those individuals in a native-only or immigrant-only partnership are more likely to report a higher satisfaction (a 9 or 10) with their partner. This is true for both husbands and wives. Those in a mixed marriage are more likely to report a lower level of partner satisfaction (8 or below). But is this raw difference significant, even after controlling for observables? To determine whether this is the case, we first present the results of pooled ordered probit regressions on the dependent variable “satisfaction with the partner”. The results presented in Table 1 show the individual effects of our conditioning variables. The table presents the results for husbands and wives, which are separated into those from native-only, immigrant-only and mixed marriages.

One of the most striking features for both husbands and wives of native-only and mixed marriages is the U-shaped effect of age. Furthermore, for husbands, as a generalization, the higher their level of education, the less happy they are with their partner. In line with the life satisfaction literature, the presence of children has no positive effect with all groups experiencing decreased satisfaction with the partner in the presence of children under the age of 14 in the household. Finally, for all groups, if a difference in smoking behavior exists between partners, then partner satisfaction is lower.

Table 2 includes the results of the unconditional and the conditional gap in partner satisfaction. The parameter estimates suggest that mixed couples are less satisfied



with their partners when compared to native-only and immigrant-only couples. Although the conditional mode (column two) indicates that the gap is rather small, and in the case of husbands not significant, the coefficients still indicate that differences persist, even after controlling for age, education and other characteristics.

The pooled results may be biased if individual-level unobservables are correlated with the regressors. For that reason, we use two models that control for time-invariant unobservables: a linear fixed effects model and a random effects model that corrects for time-invariant correlations using a Mundlak transformation. The predicted gaps from both models are presented in Table 3. Once again, our main finding is that individuals in a mixed relationship are less satisfied with their partner than those in native-only or immigrant-only relationships.

## 4 Conclusions

Past empirical results point to a positive correlation in the traits individuals bring to a partnership. Theoretical implications from marriage-matching models suggest that significant welfare benefits can be achieved through this positive correlation in traits. However, other social science disciplines suggest that the quality of a relationship between two partners is more important than the act of marriage itself.

In utilising a unique partner satisfaction variable, this paper investigates this notion, specifically investigating how matching along ethnic background affects satisfactions with one's partner. Our empirical findings suggest that individuals in a mixed relationship are significantly less satisfied with their partner when compared to those from native-only and immigrant-only couples. The results are robust to different empirical strategies.

# Figures and Tables

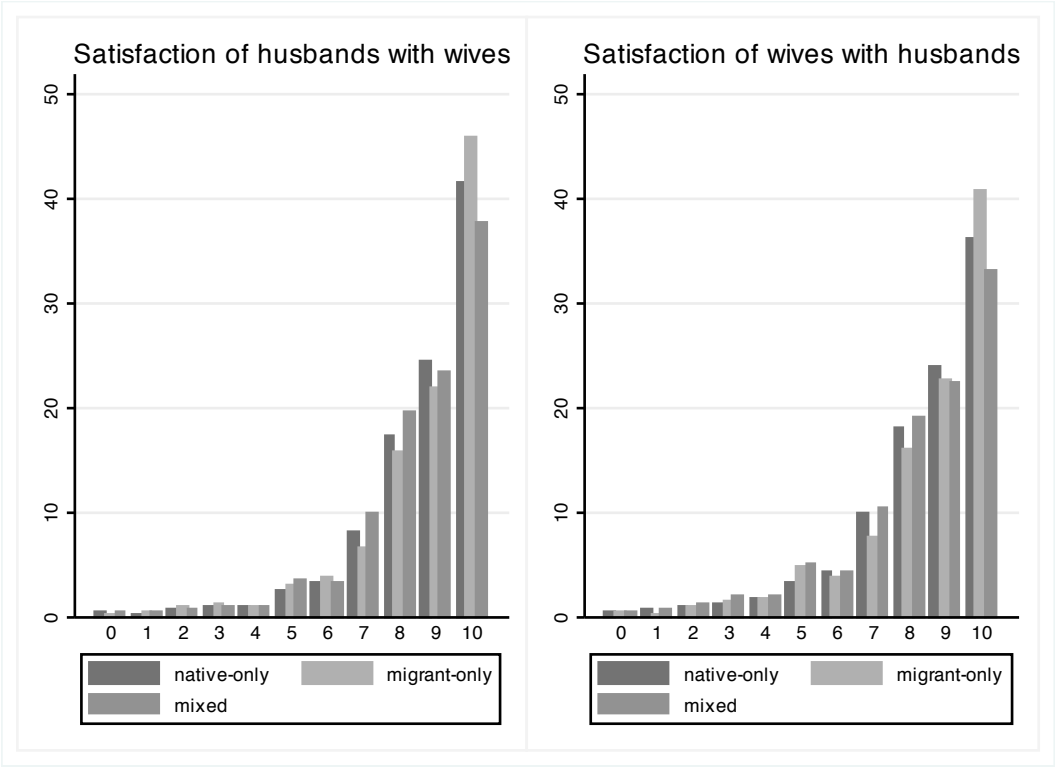


Figure 1: Partner satisfaction by type of household

Table 1:  
Partner satisfaction: pooled ordered probit

	Husbands			Wives		
	Native- only	Immigrant- only	Mixed	Native- only	Immigrant- only	Mixed
Age	-0.029*** (0.008)	0.005 (0.018)	-0.075*** (0.015)	-0.043*** (0.009)	-0.005 (0.019)	-0.044* (0.020)
Age <sup>2</sup> × 10 <sup>3</sup>	0.319*** (0.079)	-0.002 (0.165)	0.842*** (0.144)	0.458*** (0.090)	-0.029 (0.183)	0.542** (0.184)
Postgraduate, masters or doctorate	-0.428*** (0.049)	-0.359*** (0.090)	-0.372*** (0.101)	-0.095 (0.059)	-0.187 (0.101)	-0.022 (0.138)
Graduate diploma, graduate certificate Bachelor or honors	-0.404*** (0.048)	-0.535*** (0.104)	-0.342*** (0.088)	-0.206*** (0.044)	-0.266* (0.104)	-0.029 (0.082)
(Advanced) Diploma	-0.358*** (0.040)	-0.051 (0.083)	-0.638*** (0.073)	-0.206*** (0.035)	-0.468*** (0.078)	0.034 (0.079)
Certificate	-0.196*** (0.044)	-0.138 (0.088)	-0.314*** (0.072)	-0.122*** (0.034)	-0.144 (0.081)	-0.200* (0.082)
Year 12	-0.059 (0.032)	-0.086 (0.073)	-0.330*** (0.062)	-0.047 (0.035)	-0.397*** (0.066)	0.036 (0.068)
Marriage duration	-0.275*** (0.050)	0.006 (0.097)	-0.163* (0.079)	-0.017 (0.037)	-0.142* (0.071)	-0.033 (0.068)
Marriage duration <sup>2</sup> × 10 <sup>2</sup>	-0.011** (0.004)	-0.011 (0.008)	0.006 (0.007)	-0.006 (0.004)	-0.036*** (0.009)	0.001 (0.007)
Children below 14 years	0.023** (0.008)	0.038* (0.016)	-0.026 (0.013)	0.008 (0.008)	0.082*** (0.016)	-0.013 (0.014)
No. bedrooms/HH size	-0.268*** (0.034)	-0.046 (0.063)	-0.372*** (0.065)	-0.233*** (0.034)	-0.169* (0.070)	-0.233** (0.074)
Income differential × 10 <sup>6</sup>	0.091** (0.032)	0.072 (0.061)	0.046 (0.057)	0.045 (0.031)	0.063 (0.059)	0.050 (0.054)
Different smoking behavior	0.311 (0.236)	-1.035* (0.479)	0.972* (0.422)	0.630** (0.217)	-0.204 (0.444)	0.882* (0.375)
Pseudo R <sup>2</sup>	-0.191*** (0.034)	-0.224** (0.082)	-0.258*** (0.058)	-0.246*** (0.032)	-0.241** (0.075)	-0.308*** (0.054)
N	0.029	0.033	0.043	0.018	0.029	0.019
	11,494	2,798	3,300	11,494	2,798	3,300

Weighted numbers based on weights provided by HILDA. Robust standard errors are reported in parentheses. The regression further includes year dummies. \* p<0.10; \*\* p<0.05; \*\*\* p<0.01.

Table 2:

Unconditional and conditional gaps in partner satisfaction (pooled ordered probit)

	unconditional	conditional
Husbands		
Native-only vs. immigrant-only	0.057* (0.026)	0.051 (0.027)
Native-only vs. mixed	-0.072** (0.024)	-0.035 (0.024)
Immigrant-only vs. mixed	-0.125*** (0.032)	-0.052 (0.032)
Wives		
Native-only vs. immigrant-only	0.051* (0.026)	0.042 (0.026)
Native-only vs. mixed	-0.086*** (0.025)	-0.065* (0.026)
Immigrant-only vs. mixed	-0.134*** (0.032)	-0.083** (0.032)
N	35,368	35,368

See notes to Table 1.

Table 3:  
 Predicted gaps in partner satisfaction

	Fixed effects OLS	Random effects ordered probit (Mundlak)
Husbands		
Native-only vs. immigrant-only	0.040 (0.086)	-0.023** (0.010)
Native-only vs. mixed	-0.131** (0.052)	-0.217*** (0.009)
immigrant-only vs. mixed	-0.171* (0.095)	-0.193*** (0.013)
Wives		
Native-only vs. immigrant-only	0.069 (0.045)	-0.045*** (0.010)
Native-only vs. mixed	-0.200*** (0.072)	-0.175*** (0.012)
Immigrant-only vs. mixed	-0.269*** (0.061)	-0.130*** (0.015)
N	35,368	35,368

Standard errors (reported in parentheses) were calculated using the bootstrap method (1,000 replications). \*  $p < 0.10$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

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# Appendix

Table A.1:  
Conditional gap in partner satisfaction: pooled ordered probit

	Husbands			Wives		
	Native- only and Immigrant- only	Native- only and Mixed	Immigrant- only and Mixed	Native- only and Immigrant- only	Native- only and Mixed	Immigrant- only and Mixed
Immigrant-only	0.051 (0.027)			0.042 (0.026)		
Mixed		-0.035 (0.024)	-0.052 (0.032)		-0.065* (0.026)	-0.083** (0.032)
Age	-0.019* (0.007)	-0.042*** (0.007)	-0.036** (0.012)	-0.033*** (0.008)	-0.043*** (0.009)	-0.024 (0.015)
Age <sup>2</sup> × 10 <sup>3</sup>	0.213** (0.071)	0.467*** (0.070)	0.429*** (0.109)	0.331*** (0.080)	0.484*** (0.084)	0.259 (0.138)
Postgraduate, masters or doctorate	-0.422*** (0.044)	-0.407*** (0.044)	-0.408*** (0.066)	-0.121* (0.054)	-0.075 (0.057)	-0.116 (0.081)
Graduate diploma, graduate certificate	-0.438*** (0.044)	-0.384*** (0.042)	-0.436*** (0.069)	-0.209*** (0.041)	-0.161*** (0.040)	-0.140* (0.064)
Bachelor or honors (Advanced) Diploma	-0.280*** (0.036)	-0.431*** (0.035)	-0.349*** (0.055)	-0.265*** (0.032)	-0.147*** (0.033)	-0.218*** (0.057)
Certificate	-0.177*** (0.039)	-0.225*** (0.038)	-0.220*** (0.055)	-0.131*** (0.031)	-0.139*** (0.032)	-0.212*** (0.057)
Year 12	-0.063* (0.029)	-0.112*** (0.029)	-0.209*** (0.048)	-0.123*** (0.031)	-0.030 (0.032)	-0.183*** (0.049)
Marriage duration	-0.185*** (0.044)	-0.250*** (0.043)	-0.075 (0.064)	-0.050 (0.033)	-0.026 (0.033)	-0.096 (0.050)
Marriage duration <sup>2</sup> × 10 <sup>2</sup>	-0.013*** (0.004)	-0.005 (0.004)	-0.003 (0.005)	-0.013*** (0.004)	-0.004 (0.004)	-0.017** (0.006)
Children below 14 years	0.031*** (0.007)	0.007 (0.007)	0.009 (0.010)	0.027*** (0.007)	0.002 (0.007)	0.035*** (0.010)
No. bedrooms/HH size	-0.219*** (0.030)	-0.283*** (0.030)	-0.215*** (0.045)	-0.215*** (0.030)	-0.230*** (0.034)	-0.190*** (0.056)
Income differential × 10 <sup>6</sup>	0.082** (0.028)	0.088** (0.028)	0.063 (0.042)	0.045 (0.028)	0.046 (0.027)	0.047 (0.040)
Different smoking behavior	0.035 (0.212)	0.493* (0.206)	0.187 (0.313)	0.469* (0.198)	0.688*** (0.189)	0.439 (0.292)
R <sup>2</sup>	-0.192*** (0.032)	-0.209*** (0.029)	-0.246*** (0.048)	-0.248*** (0.030)	-0.263*** (0.028)	-0.282*** (0.045)
N	0.029	0.031	0.033	0.019	0.018	0.020
	14,292	14,794	6,098	14,292	14,794	6,098

Weighted numbers based on weights provided by HILDA. Robust standard errors are reported in parentheses. The regression further includes year dummies. \* p<0.10; \*\* p<0.05; \*\*\* p<0.01.



Table A.2:  
Partner satisfaction: fixed effects OLS

	Husbands			Wives		
	Native- only	Immigrant- only	Mixed	Native- only	Immigrant- only	Mixed
Marriage duration	-0.209*** (0.022)	0.201 (0.425)	-0.265 (0.348)	-0.362 (0.192)	-0.180 (0.435)	-0.330 (0.420)
Marriage duration <sup>2</sup> × 10 <sup>2</sup>	0.081*** (0.022)	0.151*** (0.043)	0.132** (0.043)	0.147*** (0.023)	0.193*** (0.044)	0.150** (0.050)
Children below 14 years	-0.101 (0.058)	-0.089 (0.128)	-0.188 (0.144)	-0.130* (0.064)	-0.133 (0.126)	-0.316* (0.138)
No. bedrooms/HH size	0.165** (0.056)	0.207 (0.125)	0.303** (0.112)	0.057 (0.067)	0.088 (0.132)	0.272* (0.123)
Income differential × 10 <sup>6</sup>	0.829 (0.540)	2.070 (1.270)	0.628 (0.694)	0.046 (0.424)	1.442 (1.525)	-0.142 (0.899)
Different smoking behavior	-0.142** (0.053)	-0.058 (0.109)	-0.142 (0.109)	-0.057 (0.059)	0.063 (0.121)	-0.233 (0.124)
Constant	13.191*** (0.596)	0.237 (12.898)	13.412 (8.368)	16.546** (5.222)	11.309 (13.281)	14.568 (10.056)
R <sup>2</sup>	0.032	0.040	0.054	0.042	0.043	0.058
N	11,577	2,798	3,309	11,577	2,798	3,309

Robust standard errors are reported in parentheses. The regression further includes year dummies.

\* p<0.10; \*\* p<0.05; \*\*\* p<0.01.

Table A.3:

Partner satisfaction: random effects ordered probit (Mundlak transformation)

	Husbands			Wives		
	Native- only	Immigrant- only	Mixed	Native- only	Immigrant- only	Mixed
Marriage duration	-0.219** (0.073)	0.328 (0.424)	-0.284 (0.349)	-0.332* (0.132)	-0.263 (0.405)	-0.470 (0.349)
Marriage duration <sup>2</sup> × 10 <sup>2</sup>	0.058** (0.021)	0.110* (0.045)	0.120** (0.045)	0.129*** (0.020)	0.159*** (0.043)	0.158*** (0.044)
Children below 14 years	-0.129* (0.065)	-0.169 (0.151)	-0.333** (0.116)	-0.137* (0.063)	-0.246 (0.156)	-0.370** (0.114)
No. bedrooms/HH size	0.225*** (0.062)	0.160 (0.127)	0.365** (0.117)	0.102 (0.060)	0.091 (0.127)	0.308** (0.113)
Income differential × 10 <sup>6</sup>	0.721 (0.420)	1.153 (0.907)	0.718 (0.704)	-0.354 (0.433)	0.372 (0.900)	0.066 (0.701)
Different smoking behavior	-0.139* (0.055)	-0.076 (0.121)	-0.080 (0.099)	-0.031 (0.053)	0.074 (0.118)	-0.184 (0.096)
N	11,577	2,798	3,309	11,577	2,798	3,309

See notes to Table A.2.