Family Structure, Education and Cigarette Smoking of the Adults in China: a Double-Hurdle Model[*]

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Abstract :

This paper suggests that cigarette smoking process can be divided into two steps: participation decision and consumption decision. Only a person decides to participate in cigarette smoking, can a positive number of cigarette consumption be observed. Following this logic, a double-hurdle statistic model is suggested for estimating the cigarette consumption, which also gives an approach to dealing with the problem of zero observations for non-smokers. Using 2004 China Health and Nutrition Survey (CHNS), this study rejects the independence of the two decisions.

The main finding is that family members can affect the participation decision of smoking but can not affect the consumption. In particular, those residing with parents, particularly with single parents, and those divorced are more likely to participate in smoking. And educational level can affect both participation decision and consumption decision, and the relation between education and cigarette addiction is more likely to be an inverted-U shape rather than a negative or positive linear relation.

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Introduction

Cigarette smoking causes a lot of medical and social problems. Sociological and psychological studies have revealed that family influences, such as family structure and marital status, and education are strongly related with cigarette smoking and other substance abuse (Conrad 1992; Thombs 1999; Jung 2001).Such relation could be linear or reciprocal causality.

Since the study in USA shows that over 90% of all adult smokers began their habit before age of 18 (Goode 1999, pp.200), current research on the relation between family structure and cigarette smoking mainly focuses on the adolescents. Case studies in US and European Countries have generally found that adolescents residing with both parents are less likely to smoke cigarettes than those living with single parent (Glendinning, Shucksmith & Hendry 1997; Amey & Albrecht 1998; Bjarnason et al. 2003). And the relation is usually a linear causality. Possible explanations include the pressures resulting from economic and social hardship of single parent families and selection processes into single parenthood; structurally deficient parental monitoring; the strain of divorce or parental absence on children and so one (Mclanahan & Sandefur, 1994). Adults in aforementioned countries usually do not live with their parents. Parental effect on smoking behavior for adults in those countries is presumed to be very little, and hence, little literature focuses on the effect of parent on adult smoking.

3

Studies on the relation between cigarette smoking and marriage for adults show that the causality may be reciprocal rather than linear (Thombs 1999, pp.188). Waldron and Lye (1989), Schone and Weinick (1998) and Umberson (1992) show that those who married are less likely to smoke cigarettes than those who are unmarried, divorced and widowed. Possible reason is partially associated with the selective pressures that expressed during dating discourage unhealthy persons from ever marrying (Franks, Pienta and Wray 2002), and also may associated with increased smoking cessation rates resulting from social support provided by marriage (Waldron and Lye 1989; Roski et al.1996; Broms et al. 2004; Weden and Kimbro, 2007; Park et al. 2004).However, Homish and Leonard (2005) also advocate that smoking spouse, particularly, husband, can influence the nonsmoking spouse to smoke or relapse from cessation.

On the other hand, assortative marriage theory predicts that smoking habit may be an important factor in choosing a marriage partner who has a similar habit (Sutton, 1980; Venters et al. 1984; Clark and Etile, 2006). Following the theory of assortative marriage (Becker 1973, 1974), Kaestner (1995) finds drug use may delay marriage and increase the probability of divorce as well. However, the theory of assortative mating predicts whom a person will marry, but not the marital status. In such a sense, a marital status could be presumed to be exogenous. Also, little literature of empirical studies on cigarette smoking can support that marital status is endogenous with cigarette smoking.

The relation between cigarette addiction and education in current literature is quite contradictive. Hu and Tsai (2000) and Yu and Abler (2007) find that education is

positively correlated with consumption of cigarettes in rural China. Studies for the UK (Jones 1989) and US (Decker and Schwartz 2000; Yen 2005) suggest that education is negatively associated with the demand for cigarettes. How does the contradiction come? It is very important to reconcile the contradictions of the current literature. As Yu and Abler(2007) pointed out, the relation between cigarette consumption and education may be an inverted-U shape. Possible explanation would be that the education level in China is still relatively low and has not reach the turning point.

Surprisingly, the literature specifically focusing on the effects of family structure, marital status and education on cigarette addiction for China is very little, given the fact China is the largest cigarette consumption country, consuming 31% of world total cigarettes[1]. Also some cultural and socioeconomic background in China is different from US and European countries. For instance, a lot of adults still live with their parents even after marriage due to lack of good social security system to elderly persons. Some findings in western societies may be not fit for China, which also increases the importance of studying cigarette addiction for China.

In the following sessions, after constructing a so-called double-hurdle model, we explore the impacts of family structure, marital status, education and other socioeconomic variables on adult smoking behavior in China using the data from 2004 China Health and Nutrition Survey (CHNS).

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[1] Based on the World Health Organization (WHO) statistics. In 2000, China consumed 1715 billion cigarettes sticks, while world total consumption is 5500 billion.
http://www.who.int/tobacco/media/en/China.pdf

Double-Hurdle Model

A common method used in the sociological literature for studying cigarette smoking behavior is that most focuses on the participation behavior and uses binary choice model to study whether smoking or not, and that is usually separated from consumption behavior which, however, little sociological literature focuses on .

Some economists (Atkinson, Gomulka and Stern 1984; Jones 1989) thought that the decision of cigarette smoking actually has two hurdles: participation decision (whether to smoke) and consumption decision (how many sticks to smoke). Only if a person passes the first hurdle deciding to participate in smoking cigarettes, can a positive number of cigarette consumption be observed. Following the logic, a double-hurdle model combining participation decision and consumption decision is developed to study the cigarette consumption for UK by Atkinson, Gomulka and Stern (1984) and Jones (1989). The merit of the double-hurdle model is that it can overcome the difficulty of zero observations in the consumption. Empirical studies using the model have included cigarette consumptions in UK (Jones 1989), in Spanish (Labeaga 1999) and in USA (Yen 2005). Different from the Tobit model which is a popular method dealing with zero observations; the double-hurdle model may distinguish the different effects in different hurdles (Lin and Schmidt 1984).

In order to construct a double-hurdle model, at first we assume everyone is a potential smoker, whose utility function of participating in cigarette smoking is assumed as follows,

$$V_i = \theta' z_i + v_i. \qquad\qquad (1)$$

Where z_i is a vector of observed socioeconomic and demographic variables which can affect the person's utility, θ is a vector of the corresponded coefficients, and v_i is the unobserved heterogeneities for individual i and is assumed as $v_i \sim N(0,1)$.

Jones (1989) also suggests that participation equation can be decomposed into a start equation and a quit equation. However, it is very difficult to get accurate information about quitting smoking, since most surveys are cross-sectional. Some current smokers may quit shortly; some quitters may relapse soon. Furthermore, it is also impossible to estimate start equation, quit equation and consumption equation simultaneously without imposing strong assumptions (Jones 1989).

Then we can assume that participation decision $p_i \in \{0,1\}$ which is a binary choice for individual i: $p_i = 1$ denotes participation in cigarette smoking; $p_i = 0$ denotes no participation. Then combining equation (1), we can assume the participation equation as

$$\begin{cases} p_i = 1, & if \quad \theta' z_i + v_i > 0 \\ p_i = 0, & if \quad \theta' z_i + v_i \le 0 \end{cases} \qquad (2)$$

When $p_i = 1$, which implies that individual i decide to participate in smoking, a positive consumption x_i^* can be observed. The consumption equation is assumed as

$$x_i = \beta' y_i + u_i. \qquad\qquad (3)$$

$$x_i^* = \begin{cases} x_i & if \quad V_i > 0 \\ 0 & if \quad V_i \le 0 \end{cases}$$

Where y_i is a vector of observed socioeconomic and demographic variables which can affect individual i's consumption x^*, β is a vector of the corresponded coefficients, and u_i is the unobserved heterogeneities and is assumed as $u_i \sim N(0, \sigma^2)$.

Suppose joint density distribution of $[u_i, v_i]$ is $N\left\{0, \begin{bmatrix} \sigma^2 & \rho\sigma \\ \rho\sigma & 1 \end{bmatrix}\right\}$, and the density function of consumption equation is $g[x_i^* \mid x_i^* > 0, p_i = 1] = g[x_i^* \mid p_i = 1]$. In order to estimate equation (2) and (3), the likelihood function can be given as

$$L = \prod_{x_i^*=0}[1 - \mathrm{Prob}(v_i > -\theta'z_i)]\prod_{x_i^*>0}\mathrm{Prob}(v_i > -\theta'z_i)g[x_i^* \mid \mathrm{Prob}(v_i > -\theta'z_i)]_.$$

It is a typical sample selection problem, which is also called Type 2 Tobit Model by Amemiya (1985), including a probit part and a censored part, and can be estimated by Heckman 2-step methods (Heckit) (Heckman, 1979) or maximum likelihood techniques (MLE). However, Heckit is less efficient than MLE.

Using LR test we can test if u_i and v_i are independent. If they are independent, the double-hurdle model would degenerate into a probit model for participation equation and an ordinary least squares for consumption equation which can bring a lot of computational advantages. Such an assumption is often imposed in some early studies (Dudley and Montmarquette, 1976) though it is not realistic. For instance, some unobserved heterogeneities, such as people's characteristics, usually affects both participation equation and consumption equation.

If $x_i = V_i$, implying that the utility of participation is identical with consumption, the double-hurdle model would degenerate into a standard Tobit model (Amemiya, 1985).

This case implies everyone can get positive utility if participating in cigarette smoking, which would induce a contradictive result that everyone will be a real cigarette smoker. That is impossible. The Tobit model is not realistic in term of this.

Jones (1989) also points out this model implies that participation equation dominates consumption equation, though it is a very common assumption that the two equations as well as the error terms are independent in some early studies, and it becomes Cragg's model (Cragg, 1971; Atkinson at el. 1984), consisting of a probit model and a standard Tobit model. Unlike the model used in this study, Cragg's model implies that there are some corner solutions for the consumption equation which is a quite strong assumption.

Data and Descriptive Statistics

The 2004 China Health and Nutrition Survey (CHNS), jointly conducted by The Carolina Population Center at the University of North Carolina at Chapel Hill, The National Institute of Nutrition and Food Safety, and The Chinese Center for Disease Control and Prevention, includes 9856 adult samples in which age varies from 17 year to 107. Behaviors of elderly people may be different. Particularly in China, those who were over 55 years old in 2004 were born before 1949 when the People's Republic of China was founded. Therefore, only the samples between 17 years old and 55 years old are involved in this study. After eliminating the samples of missing data, we have 6377 samples, in which 1789 are smokers and the prevalence rate is 28.1%. Table 1 shows the descriptive statistics of the variables involved in this study for the whole samples

and smoker samples, respectively.

Gender difference in smoking prevalence is very significant in China. The number of female smokers in our samples is about 4.2%, which is quite low. In the sample, the smoking prevalence rate for male is 57.9%, and 2.2% for female, which is consistent with the statistics of WHO in which 53.4% for male and 4.0% for female[2] and overall prevalence rate is 28.9% in 1998. While the prevalence rate is 25.7% for male and 21% for female and overall prevalence rate is 23.3% in the USA in 2000[3]. Obviously, compared with the USA, the smoking prevalence rate in China is higher for male and much lower for female.

Furthermore, only 593 samples of the 1789 current adult smokers started their smoking before the age of 18, only 33.15%, different from the case in USA as aforementioned where most of the adult smokers in USA start their habit before the age of 18 (Goode 1999, pp.200). By the way, the average years of smoking history for the smokers are 19.78, and it causes a lot of economic and health loss to the smokers and the society as well. Tobacco expenditure often crowds out other household expenditure, and has a negative impact on living standards, particularly for low-income households (Hu et al. 2005; Busch et al. 2004). Health damage of cigarette is also very serious. For instance, a study of the Center for Disease Control and Prevention finds that every stick of cigarette reduces one's life by seven minutes[4].

The descriptive statistics also finds that family structures are different between

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[2] Source: WHO, the same with footnote 1.
[3] Source: WHO(http://www.who.int/tobacco/media/USA.pdf).
[4] See New York Times editorial. Sep.1,1993, p.18.

smokers and no smokers. Among the adult smokers, 18.1% and 11.3% live with both parents and single parents respectively, which are slightly higher than those in the whole samples in which the numbers are 14.7% and 6.2% , respectively.

Another finding is that average alcohol drinking for the smokers is much heavier than that of the whole samples. It is consistent with some medical and economic studies. King and Epstein (2005) find that alcohol dose-dependency increases the urge to smoke, at least among light smokers. Yu and Abler (2007) find that cigarette consumption is very sensitive to the price of alcohol, while alcohol consumption is not sensitive to the price of cigarettes. In such a sense, alcohol can be presumed to be exogenous in this study.

In the rational addiction model (Becker and Murphy 1988, prices and incomes including past, current and future prices and incomes, are very important for the cigarette consumption, which is also supported by some empirical studies (Becker, Gross and Murphy 1994; Labeaga 1999).

However, the price and income information for each household in CHNS are not available. CNHS divides the income into different categories. Particularly, in rural areas, some income variables are not represented by total money but by quantity of grains and some other goods, which makes the incomes not addable and not comparable.

Furthermore, Contrast with some literature in which income is important for cigarette consumption (Jones 1989; Becker Gross and Murphy 1994; Labeaga 1999), some literature, however, finds that income actually does not play significant roles in

the cigarette consumption, such as in US (Decker and Schwartz 2000;Yen 2005) and in rural China (Yu and Abler 2007), because once someone is addicted on something, he would keep on consuming the same amount regardless of income, due to the nature of addiction ---effects of dependence(Thombs,1999), also called withdrawal effects(Jones,1999) . In term of this, omitting the income variable may not cause bias.

CNHS also surveyed the prices of some certain cigarette brands, such as *Hongtashan*, in the community survey. However, as we know, the variation of the cigarette prices in China is very large, varying from less than 1 *yuan* to more than 100 *yuan* per package. Lower income person often tends to choose lower price brand. We can not infer the price information for each person based on the community survey. It is the main reason that the price information is not included in this study, perhaps the same reason for other studies using individual survey data in which price is also omitted (Jones 1989; Yen 2005). By the way, current literature about the roles of price in cigarette demand is contradictive. Some research finds that price is not important for cigarette consumption, such as in rural China (Yu and Abler 2007) and USA (Decker and Schwartz 2000; Busch et al. 2004). Other studies, however, find that the price is very significant in US (Becker, Gross and Murphy 1994; Powell et. al. 2005) and in Spanish (Labeaga 1999).

Estimating Results and Discussion

Table 2 reports the estimation four results of the double-hurdle model using both

Hekit and MLE. As shown in it, in order to study the impacts of education, model Heckit 1 and model MLE 1 only include educational years, while model Heckit 2 and model MLE 2 include both educational years and educational years squared. For comparison, the result of a standard Tobit model is also reported. The computational software is Stata 8.0.

The results indicate that the estimators of Heckit and MLE are very close. Because MLE estimation is much more efficient than Heckit, the following discussion is based on the estimators of the model MLE 2 including educational years and educational years squared.

Differences between standard Tobit model and double-hurdle model show that the coefficients of two_parents and single_parent which measure the family structure are statistically significant for the standard Tobit model, but not for the consumption equation in the double hurdle model. However, they are statistically significant for the participation equation in the double hurdle model. The possible explanation might be that family structure plays significant roles in participation, but not in consumption. Hence, only using standard Tobit model may mix the effects of participation decision and consumption decision. It is good evidence which shows that the double-hurdle model is superior to the Tobit model.

The LR test significantly rejects the hypothesis that the unobserved heterogeneities in participation equation and consumption equation are independent, so that OLS, which is inconsistent, can not be used for estimating consumption equation.

Residing Place and Employment Status

The results show that the residing place, whether living in rural areas or in urban areas, does not play significant roles in both participation equation and consumption equation, because they are not statistically significant in both equations, even though urban China is much richer than rural China. It may capture some income effects.

Another variable which also can capture some income effects is the employment status, which, however, is also not statistically significant for both participation equation and consumption equation. The results partially support the finding in current literature that income does not play significant roles in cigarette smoking (Yen, 2005).

Health Status

Carbone et al. (2005) suggested that adaptation of health state may affect cigarette smoking decision. Such a hypothesis, however, is not supported by this study in which the coefficient of self health rating is not significant either for participation equation or for consumption equation. Though self health rating is a subjective variable for measuring health state which also can reflect a lot of other information, Jones (1989) also used such an index in the study of the cigarette addiction in UK and the coefficient in participation equation was negative and significant of 10%, and that in consumption equation is not significant.

Age

Current studies, either theoretical or empirical (Jones 1999; Lechene and Adda 2001),

show that there may be an inverted-U shape relation between age and addiction, including smoking participation or consumption. Similar result can be found in this study, in which coefficients both for age and for age squared either in participation equation or in consumption equation are highly significant in all models. The peak for participation equation is at 44.5 years old and that for consumption equation at 39.0 years old in the model MLE 2. The possible explanation is that the decision on smoking is a trade-off between current utility derived from smoking and a mortality risk increasing with age, and hence, individuals with a longer potential life expectancy have more incentive to cut back on smoking and self select out of smoking as well (Lechene and Adda 2001)

Education

As aforementioned, current studies for the relation between cigarette addiction and education are quite contradictive. The studies find that that education is positively correlated with consumption of cigarettes in rural China (Hu and Tsai 2000; Yu and Abler 2007) and, on the contrary, negative correlation found in the UK (Jones 1989) and US (Decker and Schwartz 2000; Yen 2005). Common wise would believe the negative correlation because education may increase the cognitive skill of an individual regarding the health risks of smoking to both the individual and others in the household through second-hand smoke (Yu and Abler 2007). But how does the positive correlation happen? As Yu and Abler(2007) proposed, the relation between cigarette consumption and education may be an inverted-U shape. It may happen that the educational level in

rural China as a whole is very low and still in the first part of the inverted-U shape, hence cigarette consumption tends to increase as education level increases there, which is supported by this study.

The result indicates that the coefficients both for educational years and for educational years squared either in participation equation or in consumption equation are highly significant.

When the variable of educational years squared is excluded from the model, all the coefficients of educational years both in participation equation and in consumption equation either in Heckit or in MLE are negative and statistically significant, which is consistent with the common wise.

When the variable of educational years squared is included in the model, the coefficient either in participation equation or in consumption equation is negative and statistically significant both in Heckit model and MLE model, which indicates the relation between education and cigarette addiction is an inverted-U shape. In particular, the coefficient of educational years is also statistically significant for the consumption equation. Furthermore we can calculate the peak for both participation equation and consumption equation. The peak is 3.34 years for participation equation and 4.49 years for consumption equation.

Not surprisingly, students are less likely to participate in smoking cigarettes due the strong monitoring of school teachers, and also consume less due less income.

Family Structure

As aforementioned, a lot of literature reveals that family structure and marital status are very important for participation in cigarette smoking, and little focusing on the relation with the consumption function. This study finds that family members, including parents and spouses, can influence the participation decision but not the consumption equation.

Interestingly, parents have positive effects on the adult smoking participation equation, but not on the consumption equation. Those residing with single parents are most likely to smoke, and those residing with both parents are less likely to smoke. Interestingly, those residing without parents are least likely to smoke. Possible explanation might be the stress from supporting the parents to reside with them due to lack of good social security system in China.

Similar with the current literature (Schone and Weinick 1998; Umberson 1992), this study finds that those divorced and separated are most likely than other marital statuses to smoke, perhaps resulting from strain of divorce and unhappy marriage, and less support from the spouses. However, marital status is not important for consumption equation.

It seems that family members have censoring effect to the behavior of the smokers. Once one passes the first hurdle which the family members can influence and starts smoking, the family member influences on the consumption quantity would be not significant.

Gender, Alcohol Drinking, Sleep Time and Smoking History

Gender differences both in participation equation and consumption equation are negative and very significant, which implies that female are less likely to participate in smoking and tend to consume less as well, which is consistent with the analysis in the descriptive statistics.

Medical and psychological research indicates that co-occurrence rates of alcohol and cigarette addition are very high (Anthony and Echeagaray-Wagner 2000). In a study of light smokers, King and Epstein (2005) find that alcohol dose-dependency increases the urge to smoke. They are consistent with this study in which the coefficients of alcohol drinking both in participation equation and in consumption equation are positive and highly significant.

The coefficients of sleep time are negative and statistically significant both in participation equation and consumption equation, which implies that increase in sleep time may reduce both the probability of participating in smoking and consumption of cigarettes.

Finally, the nature of addiction---the effects of dependence and tolerance, predicts that smokers usually increase the consumption to achieve the same level utility as smoking history increases. The variable of smoking history is only included in the consumption equation, and the coefficient is 0.173 and statistically significant, which implies, a smoker would increase the consumption by 0.173 sticks of cigarette per day over each year if he continues to smoke cigarettes.

Conclusion

This paper studies the effects of family structure, education and other social and demographic variables on the adult addiction on cigarettes, in particular on participation decision and consumption decision, through combining the two decisions together. Statistical results reject the independence of the two decisions.

The main finding is that family members can affect the participation decision of smoking but can not affect the consumption. In particular, those residing with parents, in particular single parents, and those divorced are more likely to participate in smoking. While educational level can affect both participation decision and consumption decision, and the relation between education and cigarette addiction is more likely to be an inverted-U shape than a negative or positive linear relation.

Other demographic variables, such as gender, age, alcohol drinking also can affect cigarette addiction both on participation decision and consumption decision. By the way, smokers tend to increase their consumption of cigarettes as the smoking history increases due to the natures of addiction. Other findings include that residing places, employment state and health state are not import for cigarette addiction.

Besides family effects analyzed in this study, peer effects (Powell, Tauras and Ross 2005) are also equivalently important for analyzing cigarette addiction, which becomes the future direction of the study.

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Table 1 Descriptive Statistics of the Samples

		Whole Samples			Samples of Smokers		
		Mean	Min.	Max.	Mean	Min.	Max.
Cignum	Cigarette sticks smoked a day	4.726	0	60	16.846	1	60
Cigdum	currently Smoking=1; no=0	0.281	0	1	1.000	1	1
Length	Years from starting smoking				19.783	0	43
Rural	Reside in rural areas=1;no =0	0.666	0	1	0.668	0	1
Age	Age	39.584	17	55	40.712	18	55
Age2	Age squared	1668.164	289	3025	1745.907	324	3025
Female	Female =1; no=0	0.536	0	1	0.042	0	1
Two_Parents	Residing with two parents=1; no=0	0.147	0	1	0.181	0	1
Single_Parent	Residing with a single parent=1; no=0	0.062	0	1	0.113	0	1
Marriage	Marriage and live together=1; no=0	0.847	0	1	0.855	0	1
Divorce	Divorced or separated=1; no=0	0.015	0	1	0.023	0	1
Widow	Widowed=1; no=0	0.015	0	1	0.010	0	1
Education	Educational years	8.215	0	18	8.621	0	17
Education2	Educational years squared	81.163	0	324	84.500	0	289
Student	Student=1; no=0	0.029	0	1	0.010	0	1
Employ	Employed=1; no=0	0.721	0	1	0.809	0	1
Alcohol	Alcohol drinking: no drinking last year=0;	1.094	0	5	2.471	0	5
Health	Self health rating: excellent=1;good=2; fair=3 ;poor=4	2.196	1	4	2.149	1	4
Sleep_Time	Sleeping or lying hours each day	8.138	3	19	8.025	4	15
Sample Size		6377			1789		

Table 2   Estimation of the Models

Cigarettes	Tobit		Heckit 1		Heckit 2		MLE 1		MLE 2	
	Coeff.	t-ratios	Coeff.	t-ratios	Coeff.	t-ratios	Coeff.	t-ratios	Coeff.	t-ratios
Consumtion										
Length	1.342	39.05***	0.182	3.60***	0.181	3.45***	0.174	4.77***	0.173	4.76***
Rural	0.210	0.41	0.455	0.63	0.238	0.31	0.424	0.83	0.269	0.52
Age	1.158	5.34***	1.415	2.28**	1.462	2.22**	1.024	4.33***	1.032	4.37***
Age2	-0.024	-8.80***	-0.018	-2.51**	-0.018	-2.43**	-0.013	-4.64***	-0.013	-4.62***
Female	-13.236	-15.91***	-28.967	-2.02**	-29.457	-1.97**	-19.532	-15.49***	-19.131	-15.20***
Two Parents	2.620	3.33***	0.606	0.40	0.875	0.54	0.182	0.22	0.335	0.41
Single Parent	1.884	2.34**	1.819	1.12	1.930	1.13	1.184	1.47	1.211	1.51
Marriage	0.863	1.01	1.292	0.97	1.034	0.76	1.168	1.30	0.952	1.06
Divorce	2.115	1.17	3.587	1.02	3.636	1.00	2.444	1.35	2.366	1.31
Widow	1.955	0.76	3.743	1.06	3.798	1.03	2.887	1.18	2.876	1.18
Education	0.112	0.44	-0.417	-2.13**	0.574	1.54	-0.325	-4.27***	0.430	1.77*
Education2	-0.017	-1.13			-0.064	-2.25**			-0.048	-3.28***
Student	-7.366	-3.94***	-9.539	-2.17**	-9.144	-2.04**	-7.346	-3.45***	-6.878	-3.23***
Job	0.250	0.42	-0.137	-0.15	0.069	0.08	0.073	0.12	0.242	0.40
Alcohol	0.733	5.65***	1.860	2.32**	1.907	2.26**	1.300	9.84***	1.294	9.81***
Health	-0.487	-1.57	-0.056	-0.13	-0.063	-0.14	-0.160	-0.51	-0.170	-0.55
Sleep Time	-0.588	-2.90***	-0.675	-1.99**	-0.709	-2.00**	-0.547	-2.66***	-0.565	-2.76***
Intercept	-15.931	-3.43***	-20.342	-1.14	-24.950	-1.25	-8.330	-1.67*	-10.911	-2.16**
Participation										
Rural			-0.012	-0.24	-0.024	-0.50	0.001	0.02	-0.013	-0.28
Age			0.092	4.37***	0.093	4.43***	0.096	4.69***	0.097	4.75***
Age2			-0.001	-3.98***	-0.001	-3.98***	-0.001	-4.33***	-0.001	-4.33***
Female			-2.021	-31.65***	-1.998	-31.19***	-2.007	-31.78***	-1.983	-31.31***
Two Parents			0.177	2.26**	0.190	2.42 ***	0.135	1.78*	0.147	1.94**
Single			0.222	2.74***	0.224	2.77 ***	0.192	2.47**	0.194	2.49**
Marriage			0.070	0.84	0.053	0.63	0.038	0.46	0.019	0.24
Divorce			0.447	2.50**	0.441	2.47***	0.362	2.10**	0.355	2.06**
Widow			0.180	0.82	0.177	0.81	0.202	0.96	0.201	0.95
Education			-0.030	-4.43***	0.023	1.08	-0.028	-4.30***	0.029	1.38
Education2					-0.003	-2.65***			-0.004	-2.92***
Student			-0.538	-3.17***	-0.506	-2.98***	-0.530	-3.16***	-0.495	-2.95***
Job			-0.049	-0.90	-0.037	-0.68	-0.057	-1.07	-0.044	-0.83
Alcohol			0.149	11.98***	0.149	12.00***	0.152	12.42***	0.152	12.43***
Health			0.010	0.35	0.010	0.36	0.020	0.70	0.020	0.70
Sleep Time			-0.033	-1.76*	-0.034	-1.80**	-0.034	-1.86*	-0.035	-1.90*
Intercept			-1.570	-3.57***	-1.769	-3.96***	-1.644	-3.82***	-1.853	-4.24***
λ			16.385	1.79*	16.998	1.76*	10.014	[0.467]	9.973	[0.465]
ρ							0.890	[0.018]	0.889	[0.019]
σ							11.251	[0.320]	11.216	[0.318]
							LRTest:	ρ=0	LRTest:	ρ=0
							Chi(1)=	112.52***	Chi(1)=	112.13***
Log Likelihood	-7577.6						-8506.4		-8500.2	

Note: []—Standard errors; * , ** and ***—Significance of 10%,5% and 1% respectively.