## The Effects of Parents Cigarette and Alcohol Consumption on Their

## **Children's Time Use and Educational Attainment**

Partha Deb Department of Economics Hunter College, CUNY

and

Eugenia Priedane Department of Public Health and Policy London School of Hygiene and Tropical Medicine

May 2007

#### ABSTRACT

The objective of this study is to estimate the effect of parents alcohol and cigarette use on time use and educational attainment of their children. We use data from the Russia Longitudinal Monitoring Survey (RLMS), an annual panel survey from 1995-2004. We find that both maternal and paternal cigarette consumption have adverse effects on reading and educational attainment. Parents consumption of alcohol does not appear to have effects on reading or educational attainment but does have effects on the number of hours spent watching TV. We implement a bounds analysis of selection and find that these effects are plausibly causal.

The determinants of children's educational attainment have been widely studied. For example, Bratti (2002) examines the effects of parental incomes and long-term family characteristics on the educational attainment of children in the family. Aaronson (2000), Case and Katz (1991), Cherlin, et al. (1991) and Painter and Levine (2000) examine the effects of neighborhood characteristics and family structure on children's education. Behrman and Rosenzweig (2002) and Plug (2002) find that maternal level of education has a greater effect on child's schooling than paternal levels. School and classroom characteristics have also been studied widely. In two influential studies, Case and Deaton (1999) and Angrist and Lavy (1999) show that bigger class sizes lead to poorer educational attainment.

There is also a large literature on the effects of smoking and alcohol use among adolescents and adults, and a smaller but substantial literature on the effects of illicit drugs. Excess drinking is associated with accidents, increased morbidity and mortality risks, neglect of family responsibilities and productivity. Although the effects on most outcomes are as expected, the empirical findings on the effects of alcohol consumption on productivity have remained counterintuitive. This literature is summarized in Cook and Moore (2000). Smoking has also been shown to be strongly associated with increased morbidity and mortality risks and through these health effects, associated with lost productivity. Smoking is by far the leading cause of premature death and of avoidable morbidity and disability in the United States and in most industrialized nations. Chronic inhalation of environmental tobacco smoke has been shown to cause lung cancer in nonsmokers and an assortment of diseases and functional limitations in the children of smokers. Chatterji and Markowitz (2001) and Jones et. al. (1999) examine the effects of cigarette and alcohol consumption of parents on the behavioral health of their children.

Whether cigarette and alcohol consumption of parents affect the quality and nature of time use of their children, thus also potentially affecting their educational attainment, is an open question. These are the issues we address in this paper, using two measures of time use, watching TV and reading, and one measure of educational attainment, the number of completed grades. To the best of our knowledge, these links have not been examined in the literature before.

There are two prevailing theoretical arguments that can explain correlations between parental smoking and alcohol use on the time use of their children. First, a statistical correlation can arise as a consequence of parents' time preferences. Parents who engage in cigarette and alcohol consumption have a potentially low future time preference. Parents who discount the future heavily are also likely to care less about their children's education and the quality of their daily activities, thus giving rise to a negative correlation between consumption of alcohol and cigarettes and outcomes. Second, a relationship with a causal flavor between parental smoking and alcohol consumption and the quality of a child's time use outcomes might be a consequence of a decrease in the amount of the time that parents spend with their children. Due to the addictive nature of cigarettes and alcohol, parents who smoke and drink may have less time to be actively involved in their children's educational process.

Both explanations are motivated by Becker's (1974) seminal model of interdependent family preferences, which looks at the interaction, dynamics and distribution of consumption between family members. Jacobson (2000) recently extended Becker's model to include two parents in a three-person family. Chatterji and Markowitz (2001) argue that a parent's utility is not only a function of the health capital of their child, but also and their own euphoria capital obtained by consuming mind-altering substances such as alcohol and cigarettes. The remainder of the paper is organized as follows. The dataset and variables we use are described in the next section. This is followed by a description of methods, then results and finally some discussion and conclusions.

#### Data

We use annual panel data on households obtained from the Russia Longitudinal Monitoring Survey (RLMS) from 1995 to 2004. The survey's main objective was to collect data to estimate the impact of Russian economic reform on the welfare of households and individuals. Foley (1995), Jensen and Richter (2003), Loshkin et al. (2000), Mroz and Popkin (1995), Nesterova and Sabirianova (1998) and Newell and Reilly (1996) have all used the RLMS to examine various aspects of family incomes, living arrangements, consumption and expenditures and labor force activity in Russia. The RLMS survey design uses physical dwelling units as the basic survey units. Therefore, if a household changes dwellings, it is not followed. Instead, any new occupants of the dwelling unit enter the survey. Thus, one should interpret our findings as being primarily valid for stable households.

The RLMS contains two samples of households (Phase One and Phase Two) and each sample was interviewed for multiple rounds. In this study, we use data from Phase Two because Phase One does not contain information on cigarette and alcohol consumption. Phase Two contains eight rounds of interviews for approximately 4,000 households per round in 163 survey sites consisting of cities, towns and rural areas. Our sample is limited to children between the ages of seven and thirteen who are currently enrolled in school<sup>1</sup>. We have chosen to restrict our sample to children below 14 years of age because 14 year old children can legally stop attending

<sup>&</sup>lt;sup>1</sup> About 97% of school-aged children attend school

school. Some of these children begin technical training or apprenticeships, while others may in fact be idle.

The number of children in each round declines from over 1,100 in the first round to approximately 560 in the final round. The main reason for attrition is exit from the sample due to children becoming older than 13 years of age. Because Russian fertility rates have also been rapidly declining, relatively few young children replace older, exiting ones. However, there is a small amount of additional attrition due to sample households moving to new homes. Overall, our sample consists of 6,529 children-round observations.

The survey includes information on a variety of children's time use. We consider two direct measures of the quality of time use, the number of hours per week spent watching TV and the number of hours per week spent reading. Figure 1 shows the number of hours children spend watching TV per week on average for boys and girls, stratified by age group. Both boys and girls watch more TV as they get older. Compared to girls, boys watch more TV at every age. The number of hours spent reading per week has a similar age trend, but gender effects are reversed. Reading increases with age, although the gradient is not steep. Girls spend more time per week reading at every age.

Our third measure of the quality of time use is indirect. We measure the number of grades completed by children at each age. One expects children with the poorest quality of time use to be most likely to fail at school. Figure 3 reports the fraction of children who are "behind" in school. In order to construct this measure, we have assumed that an 8 year old child should have completed at least one grade and should progress by one grade each year. Children who do not meet these criteria are defined as being behind in school. Figure 3 shows that children 7 and 8 years old are never behind in school. However, we begin to observe children behind in school

from age 9 onwards. Boys are more likely to be held back in school than girls. Note that we only use this measure for illustrative purposes. Our regressions use grades completed as the dependent variable.

#### Cigarette and Alcohol Consumption

The key independent variables for this work are parental alcohol consumption and smoking in households with school-aged children. Figure 4 displays characteristics of smoking behavior of parents. Fathers are much more likely to smoke than mothers. The fraction of mothers smoking has steadily increased over time, but no such trend is visible for fathers. Among parents who smoke, fathers also smoke more cigarettes per day than mothers, but there is no discernable trend in the number of cigarettes smoked per day. Figure 5 shows that fathers are more likely to drink than mothers, but the difference is quite small compared to the gender difference in the likelihood of smoking. The percent of fathers who drink has been declining somewhat over time. Among parents who drink, fathers consume considerably more alcohol per day than mothers.

#### Control Variables

Table 1 presents means and standard deviations of the control variables used in our analysis. Of note are the following. The average age of children is about 10.5 years old and 49 percent of them are girls. Fathers are, on average, better educated than mothers are. Approximately 17 percent of children do not reside with their fathers. In addition, we control for local-area differences using indicators for sites. The sampling frame includes 163 sites or local areas.

#### Methods

We estimate linear regression models for time use of children as measured by number of hours watching TV and number of hours reading as well as educational attainment measured by the number of grades completed. More precisely, outcome Y for child i in household j at site k and at time t is given by

$$y_{ijkt} = \beta_0 + \beta_1 M S_{jkt} + \beta_2 F S_{jkt} + \beta_3 M D_{jkt} + \beta_4 F D_{jkt} + \beta_5 C_{jkt} + \beta_6 M_{jkt} + \beta_7 F_{jkt} + \beta_8 H_{jkt} + \beta_9 T_t + u_{jk} + v_k + e_{ijkt}$$
(1)

The variables *MS* and *MD* denote smoking and drinking by mothers. *FS* and *FD* denote smoking and drinking by fathers. The vectors *C*, *M*, *F* and *H* denote exogenous characteristics of the child, mother, father and the household, respectively. *T* denotes the set of time dummies. The error term has been decomposed into three components. Household-specific unobserved heterogeneity  $u_{jk}$  includes parental preferences and proclivities, attitudes towards education and other characteristics relevant for their children's educational attainment. The site-specific error  $v_k$  includes neighborhood effects such as the supply and quality of schools. Finally,  $e_{ijkt}$  denotes an idiosyncratic error.

Our basic specification includes site-level fixed-effects, which controls for neighborhood effects. Although such a model may not identify the causal effect of parents' smoking and drinking on their children's outcomes because of common unobservable effects at the household level or endogeneity of smoking and drinking behavior through some other channels, our attempts to take such possible effects into account have been less than fruitful. First, we considered a model with household-level fixed effects, which would purge all time-invariant characteristics of the parents that also affected a child's outcomes. Second, we considered instrumental variables regressions. We have estimated both types of models, but in each case, the results appear to be unreliable. First, the panel appears to be too short to obtain sufficient time-variation in smoking and drinking behavior of parents. Therefore, parents smoking and drinking get mostly absorbed into the household-level fixed-effects. We have used site-level and time-varying prices of cigarettes (domestic and foreign) and alcohol (a variety of types including vodka, beer and wine) as the instruments in our IV regressions. In spite of the fact that these instruments are conceptually ideal, they turn out to have very low explanatory power in the first stage regressions. Note that these IV models include site-level fixed-effects so use within-site intertemporal variation in prices to identify effects. Perhaps it is not so surprising then, that prices have low explanatory power. Note that several other studies (Chatterji and Markowitz, 2001; Lien and Evans, 2005; Rosenzweig and Schultz, 1983) also report limited explanatory power of tobacco and alcohol prices when used as instruments. Thus the IV results are also unreliable.

Therefore, we take an approach to providing insights into the likely effects of selection inspired by the work of Altonji, Elder and Taber (2005). Consider the structural system

$$y = \beta_1 MS + \beta_2 FS + \beta_3 MD + \beta_4 FD + \gamma X + u$$
  

$$MS = \alpha_1 X + v_1$$
  

$$FS = \alpha_2 X + v_2$$
  

$$MD = \alpha_3 X + v_3$$
  

$$FD = \alpha_4 X + v_4$$
  
(2)

and denote  $\varepsilon = \begin{bmatrix} u & v_1 & v_2 & v_3 & v_4 \end{bmatrix}$  with

$$Corr(\varepsilon) = \begin{bmatrix} 1 & \cdots & \cdots & \ddots & \ddots \\ \rho_{u1} & 1 & & \vdots \\ \rho_{u2} & \rho_{12} & \ddots & \vdots \\ \rho_{u3} & \rho_{13} & \rho_{23} & \ddots & \vdots \\ \rho_{u4} & \rho_{14} & \rho_{24} & \rho_{34} & 1 \end{bmatrix}$$
(3)

Further, denote  $\boldsymbol{\beta} = \begin{bmatrix} \beta_1 & \beta & \beta_3 & \beta_4 \end{bmatrix}$  and  $\rho_{u_1} = \begin{bmatrix} \rho_{u_1} & \rho_{u_2} & \rho_{u_3} & \rho_{u_4} \end{bmatrix}$ . Note that the fact that the parameters of the system are not identified in a simultaneous equations sense unless the system has identifying exclusion restrictions. In the absence of such instruments, although it is not possible to estimate the causal effect sizes, it is possible to place bounds on their values. First, consider the system of equations in (2) with all regression coefficients set to zero. In this case,  $\rho_{u} = \overline{\rho}_{u}$  represents the raw correlations between outcome and parents consumption, which we describe as the maximum explainable correlation. The causal effect  $\beta$  can be smaller than the maximum explainable correlation for two reasons. First, to the extent that observable household, parents and children's characteristics are correlated with parents consumption of cigarettes and alcohol, introduction of these covariates in the model would decrease the consumption effects from the maximum explainable correlation. Second, to the extent that unobserved household characteristics are correlated with parents consumption, ignoring such effects would bias  $\beta$  away from zero. Thus the maximum explainable correlation can be decomposed into 3 components, the causal effect  $\beta$ , the effect of selection on observables and the effect of selection on unobservables.

Although it is not possible to estimate the causal effects  $\beta$  directly without data from an experimental design or having valid instruments in observational data, it is possible to do so under various assumed levels of unobserved selection, from no selection-on-unobservables effects to selection effects as large as 100 percent of the explainable correlation. We implement this procedure by estimating the 5 equation structural system of equations described in equation (2) including site-level fixed effects. We estimate the parameters of the 5 equation system after setting the error correlations between the outcome and consumption equations to an assumed amount of selection on unobservables. Note that correlations between the errors of the

consumption equations are estimated along with the regression coefficients. The correlations between the errors of the outcome and consumption equations are set to fixed values from 0 to 100 percent of the maximum explainable correlations for each, in increments of 10 percentage points. Altonji, Elder and Taber (2005) argue that an upper bound for the magnitude of selection on unobservables is the magnitude of selection on observables. We do not take such a strong stance but report the magnitude of selection on observables to provide a benchmark for interpretation.

#### Results

Results from the site-level fixed-effects models are reported in Table 2. The average number of observations per site is 45 and the maximum is 217. The results indicate that site-level fixed effects are statistically significant and explain 12-15 percent of the total error variance.

Alcohol consumption of both parents and cigarette consumption of fathers have significant effects on the number of hours of TV watched per week. In each case, greater consumption leads to more TV watched. Greater cigarette consumption by each parent is associated with fewer number of hours spent reading. The quantity of alcohol consumed by mothers significantly affects reading, but the quantity consumed by fathers does not. Cigarette consumption by parents also has negative effects on grades completed. Once again, alcohol consumption does not have significant effects. Overall, the association between parents' cigarette consumption and children's time use is significant and substantial. These basic findings are robust to estimation by OLS (with and without corrections for household-level clustering) and by a household-level random-effects model. As mentioned earlier, the results obtained using

household-level fixed-effects regressions and instrumental variables regressions are both unreliable.

Older children watch more TV and read more. Girls watch less TV, read more and are less likely to be behind in school than boys. Children in households with more children read less and watch less TV, but are also more likely to be behind in school. The presence of the father in the household is another important determinant of children's time use. When the father is present, children watch less TV, read more, and are more successful at school.

The results of our exercise to determine whether these effects are causal are reported in Figures 6-8. For TV watching (Figure 6), the coefficient on father's number of cigarettes is statistically significant even when the effect of unobservables is 1.5 times as large as the effect of observables. The effects of parents consumption of alcohol remain significant even when the proportion of explainable correlation due to unobservables is twice as large as that explained by observables. The effects of cigarette consumption on the amount of reading (Figure 7) are similarly strong and likely causal. Finally, the results in Figure 8 show that cigarette consumption of mothers and fathers have significant negative effects on the number of grades completed by their children even when selection on unobservables is as large as selection on observables. Alcohol consumption does not have significant effects for either reading or grades completed.

#### Conclusions

We conclude that there are likely causal effects of alcohol consumption on TV watching and of cigarette consumption on reading and number of grades completed. But why is smoking "worse" than drinking? Is it because cigarettes are more addictive than alcohol? Or is it because

people typically smoke throughout the day while alcohol is typically consumed later in the day. Our results, we speculate, are suggestive of the second explanation. Alcohol consumption appears to affect TV watching, which is a likely evening activity for "unsupervised" children. Smoking seems to affect reading substantially, which is more likely to be a daytime / afternoon activity, often connected to homework. Thus, parents leaving their children "unsupervised" to smoke could plausibly lead to less reading.

If either maternal or paternal alcohol and cigarette consumption is related to children's activities and attainment, both parents and children can benefit from policies and programs that are aimed at reducing adult smoking and alcohol use. The effectiveness of these policies could have positive long-term feedback implications.

# References

Aaronson, D. (2000). "Using Sibling Data to Estimate the Impact of Neighborhoods on Children's Educational Outcomes", *The Journal of Human Resources*, 32, 916-946.

Angrist, J. and V. Lavy (1999a). "Using Maimonides' Rule to Estimate the Effect of Class Size on Scholastic Achievement", *Quarterly Journal of Economics*, 114, 533-575.

Altonji, J., T. Elder and C. Taber (2005), "Selection on Observed and Unobserved Variables: Assessing the Effectiveness of Catholic Schools", *Journal of Political Economy*, 113, 151-184.

Aughinbaugh, A. and M. Gittleman (2003). "Maternal Employment and Adolescent Risky Behavior", U.S. Bureau of Labor Statistics, Working Paper 336.

Becker, G. (1974). "A Theory of Social Interactions", *Journal of Political Economy*, 82, 1063-1093.

Behrman, J. and M. Rosenzweig (2002). "Does Increasing Women's Schooling Raise the Schooling of the Next Generation?", *American Economic Review*, 92, 323-334.

Bratti, M. (2002). "Parents' Current Income, Long-Term Family Characteristics and Children's Educational Outcomes: Evidence from the 1970 British Cohort Study", *The University of Warwick Economic Research Paper*: 658

Case, A. and A. Deaton (1999). "School Inputs and Educational Outcomes in South Africa", *Quarterly Journal of Economics*, 114, 1047-1084.

Case, A. and L. Katz (1991). "The Company You Keep: The Effects of Family and Neighborhood on Disadvantaged Youth", National Bureau of Economic Research, Working Paper.

Chatterji, P. and S. Markowitz (2001). "The Impact of Maternal Alcohol and Illicit Drug Use on Children's Behavior Problems: Evidence from the Children of the National Longitudinal Survey of Youth", *Journal of Health Economics*, 20, 703-731.

Cherlin, A., F. Furstenberg, L. Chase-Landsdale, K. Kiertan, and others (1991). "Longitudinal Studies of Effects of Divorce on Children In Great Britain and the United States", *Science*, 252, 1386-1389

Corcoran, M., R. Gordon, D. Laren and G. Solon (1992). "The Association between Men's Economic Status and Their Family and Community Origins", *Journal of Human Resources*, 27, 575-601.

Foley, M. (1995). "Labour Market Dynamics in Russia", Yale Economics Growth Center, Working Paper 780.

Glewwe, P. (2002). "Schools and Skills in Developing Countries: Education Policies and Socioeconomic Outcomes", *Journal of Economic Literature*, 15, 436-482.

Heeringa, S. (1997). "Russian Longitudinal Monitoring Survey (RLMS) Sample Attrition, Replenishment, and Weighting in Rounds V-VII", Carolina Population Center, University of North Carolina at Chapel Hill, North Carolina.

Huang, L., F. Cerbone and J. Gfroerer (1996). "Children at Risk because of Parental Substance Abuse", OAS Working Paper, Substance Abuse and Mental Health Services Administration.

Jacobson, L. (2000). "The Family as Producer of Health-an Extended Grossman Model". *Journal of Health Economics*, 19, 611-637.

Jones, A., D. Miller and D. Salkever (1999). "Parental use of Alcohol And Children's Behavioral Health: A Household Production Analysis", *Health Economics*, 8, 661-683.

Lang, K. and J. L. Zagorsky (2001). "Does Growing up with a Parent Absent Really Hurt?", *The Journal of Human Resources*, 36, 253-273.

Lien, D.S and W.N. Evans (2005). "Estimating the impact of large cigarette tax hikes: the case of maternal smoking and infant birth weight", *Journal of Human Resources*, 40, 373-392.

Loshkin, M., K. Mullan Harris, and B. Popkin(2000). "Single Mothers in Russia: Household Strategies for Coping with Poverty", *World Bank Working Paper*.

Mroz, T. A. and B. M. Popkin (1995). "Poverty and the Economic Transition in the Russian Federation", *Economic Development and Cultural Changes*, 44, 1-31.

Nesterova, D. and K. Sabirianova (1998). "Investment in Human Capitol under Economic Transition in Russia", EERC, *Working Paper*.

Newell A. and B. Reilly (1996). "The Gender Wage Gap in Russia: Some Empirical Evidence", *Labour Economics*, 3, 337-56.

Painter, G. and D. Levine (2000). "Family Structure and Youths' Outcomes: Which Correlations are Causal?", *The Journal of Human Resources*, 35, 524-549.

Plug, E. (2002). "How Do Parents Raise the Educational Attainment of Future Generation?", *IZA Discussion Paper*, 652, 1-13.

Rice, P. (1987). "The Demand for Post-Compulsory Education in the UK and the Effect of Educational Maintenance Allowances", *Economica*, 53, 465-475.

Rosenzwig, M.R. and T.P. Schultz (1983). "Estimating a household production function heterogeneity, the demand for health inputs, and their effects on birth weight". *Journal of Political Economy*, 95, 723-746.

Zohoori, N., D. Blanchette, and B. M. Popkin (2003). "Monitoring Health Conditions in the Russian Federation: The Russian Longitudinal Monitoring Survey 1992-2002." Report submitted to the U.S. Agency for International Development. Carolina Population Center, University of North Carolina at Chapel Hill, North Carolina.

Variable	Mean	Std. Deviation
Mother's cigarette consumption	1.638	4.450
Father's cigarette consumption	9.116	9.922
Mother's alcohol consumption	5.009	18.374
Father's alcohol consumption	24.482	63.998
Age	10.312	1.964
Female	0.484	0.499
Log Real family income	8.461	1.305
Number of children	1.626	0.819
Mother's age	36.220	6.435
Mother has university education	0.491	0.499
Mother has technical education	0.398	0.489
Father is present	0.823	0.381
Father's age	38.447	5.980
Father has university education	0.344	0.475
Father has technical education	0.579	0.493

# Table 1Summary statistics

Variable	Hours watching TV	Hours reading	Grades completed
Mother's cigarette consumption	0.020	-0.069***	-0.008***
	(0.027)	(0.025)	(0.002)
Father's cigarette consumption	0.045***	-0.054***	-0.002**
	(0.013)	(0.012)	(0.001)
Mother's alcohol consumption	0.021***	0.012**	-0.000
	(0.001)	(0.006)	(0.001)
Father's alcohol consumption	0.006***	-0.002	0.000
	(0.002)	(0.002)	(0.000)
Age	1.340**	3.380***	0.671***
	(0.658)	(0.603)	(0.055)
Age squared	-0.030	-0.141***	0.020***
	(0.032)	(0.029)	(0.003)
Female	-0.777***	2.170***	0.090***
	(0.227)	(0.208)	(0.010)
Log Real family income	0.036	0.233***	0.009
	(0.090)	(0.083)	(0.007)
Number of children	-1.045***	-1.076***	-0.070***
	(0.162)	(0.149)	(0.013)
Mother's age	-0.023	-0.042**	-0.003*
	(0.022)	(0.020)	(0.002)
Mother has university education	-0.688***	1.369***	0.180***
	(0.281)	(0.257)	(0.023)
Mother has technical education	0.348	-0.237	0.021
	(0.227)	(0.250)	(0.023)
Father is present	-3.185***	3.152***	0.258***
	(1.120)	(1.026)	(0.094)
Father's age	0.034	-0.058***	-0.006***
	(0.026)	(0.024)	(0.002)
Father has university education	0.369	0.892***	0.045
	(0.323)	(0.296)	(0.027)
Father has technical education	0.467	-0.028	0.029
	(0.293)	(0.268)	(0.024)
R-squared	0.06	0.09	0.89
F-statistic for fixed effects	3.27***	2.53***	4.74***

### Table 2 **Site-level Fixed-effects regressions**

Notes:

Standard errors in parentheses \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1% Coefficients on round dummies and intercept not shown







Figure 2







Figure 3





















# Effects (CI's) of parents consumption on TV watching





# Effects (CI's) of parents consumption on reading

## Figure 8



# Effects (CI's) of parents consumption on grades completed