OCCASIONAL PAPER

AN INVESTIGATION INTO PARENT-ADOLESCENT RELATIONS AND CHILD DELINQUENCY

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Abstract

This paper uses the Economics of Incentives to develop and estimate a model of the effects of parenting styles on substance use by young children ages 10-14. The paper uses a game theoretic model which captures the repeated interactions between parents and children in the household. The NLSY-79 Child dataset is used and in the empirical specification a probit model is used for the different forms of substance use by the child to estimate the probabilities of taking substances. The results of the paper show that parenting style is significant in order to provide a more complete model of behavior. Disengaged parents are most likely to have children smoking and consuming alcohol followed by Authoritarian and Authoritative and Permissive Parents. Thus the expected utility theory in the standard economic model can be supplemented with psychological variables in order to provide an empirical model of behavior.

1   Introduction

This paper examines the interactions between parents and children in an incentive model framework and attempts to make predictions about the importance of parenting styles for substance use in households. Thus the study aims to understand what is the role of parent-child interactions in behavior and substance use by young children focusing on different child outcomes such as cigarettes and alcohol consumption. The results of the paper show that parenting style is significant in predicting behavior and in predicting the intensity of smoking and alcohol consumption. The results control for other family influences as well. The study shows that family background factors are significant in predicting substance use including parental substance use.

2   Literature Review

2.1   *Parenting Style/Parent-Adolescent Relations*

There are four basic areas of literature which motivated this research. This research draws upon them and expands their scope to identify new relationships in the role of parenting style and child outcomes. These four areas of research include: (1) Parenting Styles/Parent-Adolescent Relations; (2) Family Economics (3) Health Economics/Health Capital; and (4) Technical Methods from the Incentive Literature. The discussion below will identify important previous contributions in each of these areas (and sub-categories of the areas) and will indicate where the present research expands and contributes to the existing knowledge.

2.1.1   *Psychological Models*

This strain of research developed from the seminal paper by Baumrind (1966). In this work Baumrind predicts that authoritative parents are more likely to be able to protect their children from substance use. However, a general observation from many researchers is that adolescents thrive developmentally when the family environment is characterized by warm relationships in which individuals are permitted to express their opinions and assert their

individuality. These characteristics are warmth and psychological autonomy. Baumrind's early research created the parenting typologies of authoritative, authoritarian, permissive and disengaged parents along the multiple dimensions of demandingness and responsiveness. Demandingness denotes the expectation of parents for mature behavior from their adolescent, setting and consistently enforcing reasonable rules and standards for behavior. Responsiveness refers to warmth and demonstration of physical affection towards the child. Authoritarian parents attempt to shape, control and evaluate the behavior and attitudes of children based on absolute sets of standards, respect for authority and obedience. These parents are more likely to use harsher forms of punishment and are less responsive to the children. Authoritative parents-encouraged verbal give and take, explained the reasons behind demands and discipline, and expected the child to be independent and self-directing. Thus authoritative parents are both demanding and responsive. Permissive parents- were more likely to give way to the child's impulses, desires and actions. Few household demands of rules are established and little punishment is used and they had children who were not independent and lacked social responsibility. These parents are less demanding and more responsive and could be indulgent while disengaged parents are neither demanding nor responsive and could be termed as neglectful parents.

This paper draws on the four-fold parenting style classification given in Baumrind (1966) and subsequent studies by Baumrind (1991). In particular, factor analysis is used to construct the parenting style classifications to explore the two factors of demandingness and responsiveness. The parenting styles are on the right hand side as explanatory variables in the empirical framework as well as in the theoretical model where the utility functions are sub-classified according to the different parenting styles.

2.1.2   *Mediating/Moderating Influences*

There are several studies which examine the mediating and moderating factors in determining substance use. Kung and Farrell (2000) examine the relative importance of parents and peers in predicting substance use. The moderating factors are peer group effects as peer

influence could mitigate the influence between parents and peer groups. There are other studies such as Larson, Wilson, Brown, Furstenberg and Verma (2002), Seo (2002), Steinberg, Dornbusch and Brown (1992). Economic status is an important mediator of the relationship between family structure and child outcomes and most studies are attempting to provide measures of parental involvement and peer influence.

2.1.3   Ecological Factors

There have been other various studies in development psychology where parenting styles are classified differently or along different dimensions of support, attachment and learning theories. These classifications were not as appropriate for this research as those dimensions would require parenting inventories which are typically used in such studies.

The paper adapts Bronfrenbrenner's (1979) Model of the Ecology of Human Development to the parent-child association where the child is at the centre of the system and is surrounded by the Microsystem, which includes parenting factors, and the neighbourhood factors, which constitute the Mesosystem. The ecological paradigm began with Lewin's Behavior = f (Person, Environment) model where humans are active and shape the environments in which they live. In the context of adolescent psychological development there are individual factors such as the child's own propensity to consume substances and then the microsystem and then the mesosystem and these are the factors influencing the child's behaviour. Thus the adolescent while growing up in the household has a core behaviour and then a peripheral component which is constantly adapting to the environment. Maccoby (1990) distinguished parents along the dimensions of Permissiveness and Warmth. Maccoby (1980) explored the aspects of parental control stressing on the sub-classifications such as Consistent Enforcement of Demands and Rules, High Expectations and Training, Restrictive Parenting, Arbitrary Power Assertion or Authoritarian Parenting, Open communication patterns and Parental warmth and affection. Steinberg (1982) is the next study in this line of literature which focuses on these dimensions of Acceptance/Involvement, Strictness/Supervision, Psychology Autonomy

Granting, Parental involvement in schooling, Parental encouragement to succeed, School Performance and School Engagement

Subsequent studies by Baumrind (1977) and Maccoby and Martin (1983) analyzed the parental behaviour through dimensions such as parental warmth, acceptance, involvement, parental control or strictness. Lamberg, Mounts, Steinberg and Dornbusch (1991) consisted of similar dimensions of Parenting Practices. The importance of the family with connection to the child's social and cognitive development has been highlighted in child development and family studies literature. All such familial variables that can affect child outcomes- for example parental dispositions, marital and sibling influences, and the sociocultural context in which the family operates- are all considered within the interactions between the parent and the child. The parent-child interaction is characterized by two major parenting dimensions: nurturance (warmth and support) and control (supervision and discipline). Inadequate parenting which is characterized by lack of affection and high levels of criticism and hostility, inconsistent discipline and supervision, general lack of involvement, provides the foundation for the development of the aggressive, antisocial behaviour pattern. In addition to parental drinking there are a broad range of family influences associated with alcohol problems and externalizing behaviours (antisocial behaviour and aggression). The family background of alcohol and other drug use are mostly characterized by marital instability, lack of support, poor discipline and family conflict.

2.1.4   Techniques and Methodology-Scaling

Scaling techniques are used to generate the different cronbach alpha values to check for internal consistency. The number of items under each scale is not a forced classification, its a chance that there are an equal number of items under each scale. Scaling involves the assignment of objects to numbers according to a rule. Scaling is different from a response scale, where scales assign numbers according to a common rule. Scaling is used in this context to see how well these questions "hang together" and in some instances to score all the responses to generate a single number that represents the overall construct. Thus a scale refers to a set of items and each item on a scale has a scale value. There are there major types of uni-dimensional scaling methods.

Scale construction involves the creation of empirical measures for theoretical constructs and these measures mostly consist of several items. The process of measurement involves the assignment of numbers to empirical realizations of the variables of interest. In Thurstone and Guttman scales, each item represents degrees of the variables of interest, such as the difficulty of an item. In Likert and Semantic Differential Scales, each item represents different degrees of the variables of interest. The differences between the scales affect the computation of reliability. Thus in the construction of scales many items have been used to develop the scales. The concepts of directiveness have been used in the construction of scales. There are studies by Courts (1966), Bracken, Brunch, Keith & Keith (2000), Murphy & Davidshofer (2001) and Schneeweiss & Mathes (1995).

The scaling was used as a method to recognize the patterns of inter-item correlations which exist among different items within the variables which could all be potentially used under one scale. There are theoretical justifications which exist about the scale construction. It is infact true that two measures of reliability can be used as dependent variables. Exploratory factor analysis was used to isolate three factors in this study such as acceptance/ involvement, strictness/supervision and Psychological Autonomy.

2.2   Family Economics

2.2.1   Intergenerational Human Capital Models

There is another study by Akabayashi (1998) which uses the NLSY-Child dataset and links the parent and child in an inter-generational human capital framework endogenizing parental incentives while examining the cognitive and behavioural indicators for children. This dataset has extensive information on parental substance use as well as family background variables along with the data on the children collected through self-administered questionnaires.

There is another study (Brook, 1990) which is of a longitudinal nature and has focused on parenting variables as the major psychosocial influence in the child's development of AOD use

and abuse patterns. The level of mutual warmth, support, and control within the parent-adolescent relationship predicts significantly the risk of adolescent drug use. Adolescent personality characteristics such as sensation seeking, rebelliousness, and tolerance for deviance were robust predictors for adolescent AOD use. A positive relationship between the parent and adolescent served as a protective factor offsetting the risk of AOD use associated with peer AOD use.

2.2.2 Household Economics

Studies of these individual effects have included the role of parent modeling and alcohol expectancies in determining the behavior of children of alcoholics. Dyadic effects come from the interactions of two family members focusing on the parents' marital relationship and the child's relationship with the siblings.

Hao, Hotz and Jin (2003) consists of a game-theoretic model between parents and daughters. This model of parenting is further tested on different family formation structures. In families which typically have more older siblings the reputation is established for the older children using daughter and family-specific fixed effects. The impact of families on juvenile substance use is examined in Mach (2001) who examines the impact of families on juvenile substance use using the NLSY97 dataset and finds that family formation can be an important factor explaining juvenile crime. This approach looks at the influence of parents as well as siblings in explaining consumption of substances by youth using county crime rates.

Among the various dyads, the parent-child relationship has got the maximum attention in the study of alcohol-specific family influences. These dyads are divided along the lines of father-daughter, father-son, mother-son and mother-daughter relationships. In the parenting effects on alcohol strong associations exist between child conduct disorder, adolescent delinquency, adult antisocial behaviour and adult alcoholism. Almost 20% of these alcoholics meet the criteria for antisocial personality disorder which is characterized by a disregard for and violation of the rights of others. The associations between antisocial personality disorder and alcoholism

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indicates that parent-child interaction that promotes aggressive, antisocial behaviour plays a role in the alcoholism of both children of alcoholics and non-children of alcoholics.

The family has been recognized as the primary support system and socializing institution for children; the better the family operates, the more likely that a child will develop. Fundamental to positive family dynamics are the relationships that parents develop with their children. Parental support is significantly related to child and adolescent development and well-being and to less deviant behavior.

The relationship among adolescents reckless behaviors, parenting practices, adolescents employment and adolescents opportunities for risk-taking and the idea of context affecting people's decisions is not new to psychology and economics. A full understanding of adolescence requires consideration of the rapidly changing individual in a developmental context. There is an extensive literature that seeks to explain the relationship between key background variables impacting children's cognitive and behavioural development. These variables include such influences as children's and parent's background factors, poverty status, parent's cognitive support and key parenting measures. These risk factors exist and it is essential to understand what supports or protective measures can help children overcome these risk factors. Mothers cognitive ability represented by a mother's low intelligence quotient can have detrimental effects on her children. Research has shown that lower academic levels result in adverse outcomes such as poor parenting.

There are links between poverty, economic resources and child outcomes especially and children face persistent poverty face substantial developmental deficits. Low-income families may not be able to afford adequate food, shelter and other material goods – nor to provide a warm and stimulating home environment – that fosters healthy cognitive and social development of children. Thus Economic Deprivation has been linked to both externalizing behavior problems and internalizing behavior problems among children and adolescents. However, a recent review finds that the effects of low socioeconomic status are more clear for externalizing problems than internalizing problems. Economic Resources account for half of the difference in children's

outcomes in single versus two-parent families. However, economic deprivation provides a more powerful explanation for family structure effects on academic achievement and cognitive outcomes than on behavioural outcomes. Even when income is controlled, children from disrupted families demonstrate greater behaviour problems than children from intact families, indicating that differences in economic resources do not fully account for the effect of family structure on child outcomes.

2.2.3   Health Economics/Health Capital

In the case of alcohol and smoking linear regression models could have been used in the case of continuous measures for alcohol and smoking consumption. When the decision is taken as a decision to smoke or not to smoke, or in the case of alcohol consumption to consume or not consume alcohol then the model is of a discrete nature with a probabilistic outcome being regressed on all the explanatory variables. There are studies in Health Economics literature by Hill (1987), Seo (1998), Yin (2000), Lane, Gerstein, Huang & Wright (1997).

The literature also has an extensive section on the Ethnic and Ecological perspectives on Socialization in Family Socialization Theory. To present empirical generalizations and theoretical propositions about relationships between characteristics of children and parent variables of support, control attempts and power, second to evaluate the fit between the generalizations and propositions in social psychology. We can reasonably look to the theoretical orientations of symbolic interaction and social learning in which to place the generalization.

2.3   Technical Methods-Incentive Literature

Economic and psychological views of the transmission of family background and how families are perceived[1] as endogenous processes and why existing inter-generational human capital models have to be modified in that framework. Psychological views of parent-child

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[1] The Relationship between Mother's Alcohol Use and Child's Well-Being, PhD Dissertation (2000)

relationships may be useful to modify inter-generational human capital models by including the effects of parental behaviour. Economic view of psychological interactions between parents and children, that is considering the effects of family background as basic human capital with inputs chosen by both parents and children interactively. Human capital theory has contributed to explaining the level, pattern and interpersonal distribution of life cycle earnings.

The issue of endogeneity in these kinds of transmissions of family endowments is important to the extent that this enables a deeper understanding of the theory of intergenerational mobility. Intergenerational human capital formation is distinct from "self" investment in human capital.

The existing intergenerational human capital theories can be applied to the early formation of human capital models since children in earlier stages of development should be different from adults and fully controlled investment in children is not possible for parents. There are only certain kinds of behaviours which are considered appropriate in these situations in the process called "socialization". Personality is a set of characteristics which emerge determining how individuals respond to experiences and how they get along with others, and themselves. A competent child is created who is independent, self-reliant, self-controlled, explorative, and self-assertive, high linguistic, analytic and logical abilities.

Psychology is concerned with the structure and components of family influence on several dimensions of children's development- cognitive, emotional and psychological. They are exploring the relationship among the adolescents' reckless behaviours (i.e. alcohol use and non-normative behaviour), parenting practices, adolescents' employment, and adolescents' opportunities for risk-taking.

The propensity event theory examines the opportunity variables which can mediate the effects of other explanatory variables on the adolescent's participation in these reckless behaviours. This model of risk-taking behaviour is adapted from Irwin & Millstein (1986) and the definition of risk-taking inherent in psychosocial development is that risk-taking is a result of

an interaction between the biopsychosocial processes of adolescence and the environment. The development psychology literature does indicate that some risk-taking is necessary in the natural developmental process, but extreme forms of risk-taking have severe consequences. The underlying strand of thinking indicates that young children do not have an adequate understanding of the long-term consequences of their actions and therefore may take actions that are potentially destructive in nature.

A long tradition of research in development psychology has emphasized the role of mothers in the lives of their children. From psychoanalytic theorists of the early 1900's to attachment theorists in the 1960's the emphasis on the mother-child relationship was almost exclusive.

The study by Weinberg (2000) examines the impact of parental income on the incentives offered to children where the more punitive measures are being offered by low-income households such as grounding while measures such as taking away the child's allowance are being offered by higher income households. This is investigated through an incentive model of parental actions. These studies within Economics use rational choice models and the utilitarian framework to model these family choices. This approach focuses on the "Black-box" and gives reasonable equilibrium results and testable predictions for the models. However one potential gap within these approaches is that this does not adequately capture the role of parenting styles in these choice theories and thus does not use the psychological theories to emphasize the association between parents and children.

2.4   *Economic Psychology and Behavioural Economics*

The literature in the area of economic psychology and behavioural economics deals with these kinds of self-control and addiction behaviours. This includes the part on rationality of decision making processes and the cognitive influences. There is an extensive literature which examines these deviant behaviours in the context of the societal influences. The game theoretic models essentially model these rational, socially interdependent decision making processes with

psychological explanations of social problem solving as described in details in Brandstatter and Guth (1994).

There is an extensive literature on the psychology of risk-taking and risk-taking is positively associated and correlated with behavioural misadventures including an association with creative activity, courage and resiliency. Lipsitt and Mitnick (1991) examines different self-regulatory behaviours and the causal factors of these behaviours.

These behavioural deregulations and causes of accidents and injuries are highly related to aberrant judgement capabilities and a tendency to risk safety and well-being. There is an interest in trying to find out about these activities which are timely as these are issues being faced by modern societies and considered universally important as all human beings are engaged in these activities at some time or the other.

3   Theoretical Model

This section develops a theoretical framework based on the assumption of optimizing behaviour and equilibrium using the tools of microeconomic theory to model this relationship.

I am relying primarily on the principal-agent framework to model this interaction and its true that these principal-agent contracts which emerge in families closely resemble those in the workplace, between the employer and the firm. In my work I am using the informational asymmetry which arises in these relations to both motivate the model and generate the results. The child in this case takes an unobservable action that affects the utility of both the parent and the child. The principal who is the parent sees only the outcome which is imperfectly correlated with the action. The reason for using agency theory in this application is that one person, the child who is the agent is being induced by the parent, the principal to do something that the child does not want to do. It is hard and expensive for the parent to monitor the child and the parent and the child have different attitudes towards risk.

The other feature which is used in these models and which is important in this context is the intermediate or moderating variable. This is a feature that I have used to overcome the moral hazard which the parent is facing due to the unobservability of the action taken by the child. The agent has different interests or preferences from the principal. The principal who is the parent has responsibilities to ensure that the children produce a socially observable outcome and the output in the model could be higher grades in school or good behaviour or not engaging in drinking and smoking. The child who is the agent exerts a certain level of effort which is working hard at school or doing household chores or exercising self-control and abstaining from high-risk behaviours. In certain scenarios the child has incentives to shirk or to exert low effort, so the parent is offering incentives to ensure the child exerts the effort. The parents are altruistic and the children are assumed to provide utility to the parents. The social contexts in which these contracts are made are very different from private contracts once the parent and the child form a family. In the case of intra-family interactions there are large asymmetries of information and there are also high costs which arise to get information in the case of young children.

The model in this study belongs to those class of models where family behaviour is determined endogenously. In family labour supply models there are game-theoretic models where the parent and child are bargaining over the household allocation. Even in the case of the Rotten Kid Theorem which comes from the theory of social interactions these are important results in the theory of incentives. A household head who is benevolent enough would internalize the effects that family members have on each other. There are earlier studies by Becker (1991) which examine the parent-child interaction and other interactions within the family. Other game-theoretic models of parental reputation formation such as Hotz et al (2000) examine parental reputation in repeated two-stage games in which the daughters' decision to have a child as a teenager and the willingness of parents to keep the daughters in their home is modeled. These models can be used to establish both in a theoretical form as well as tested econometrically that the likelihood of teenage childbearing and parental transfers to a daughter who had a teen birth will decrease with the number of daughters' who are at risk. These econometric models control for family-specific and daughter-specific fixed effects and we find evidence of differential parental financial transfer in response to teenage childbearing.

In studies such as Akabayashi (1996) there are inter-generational family influences which are modeled as processes which evolve over time. There are two dimensions which parents can use to provide an incentive framework to the child. These can be in the form of praise and punishment and while praise is used as a positive influence punishment is more of a negative influence. There are studies such as Mach (2001) who examines the impact of families on juvenile substance use using the NLSY97 dataset and finds that family formation can be an important factor explaining juvenile crime. This approach looks at the influence of parents as well as siblings in explaining consumption of substances by youth using county crime rates. The model used in Weinberg (2000) examines the impact of parental income on the incentives offered to children and predicts that while the more punitive measures are being offered by low-income households such as grounding while measures such as taking away the child's allowance are being offered by higher income households. In this study I hope to fill the gap in the existing work by using the principal-agent framework to examine the parent child association with a variety of parenting styles and using a moderating variable which enables parents to observe some close function of the variable they are interested in observing and influencing.

I am sketching a model of parent-child interactions where the child takes an action and the parents decide what incentive they should offer to the child based on some observable signal of behavior which is a function of the action taken by the child.

3.1 Basic Assumptions

I have used the following assumptions to both motivate and set up the theoretical model in a framework which would also lend empirically testable predictions. This would enable us to cover all the behavioral patterns and predict the direction of the incentive action choices in the process of building a formal model.

The model is a single period static model, with 1 parent and one child. The parent is the principal and the child is the agent. The child's output $Y_j \in \{Y_l, Y_h\}$ i.e. Y_j belongs to a discrete

set and is observed by the parent and the child may be performing well in school or being well-behaved at home and not throwing temper tantrums. Also the child exerts an effort level where e $\in \{e_l, e_h\}$, where e_h denotes the high effort level of the agent. Effort is unobserved by the parent. Higher effort level could be working hard and spending more time on homework and schoolwork, helping around at home, not partying late night and smoking, drinking. The parent takes actions, both positive and negative during the life-cycle of the child, observed by the child where $a \in [a_h, a_l]$ where $a(y_h) = a_h$ and $a(y_l) = a_l$ where a high action is being more responsive i.e. talking and a low action is being more demanding. Thus for the parent a high action is displaying positive affection towards the child, talking to the child, helping child with schoolwork, taking child to the museum, playground, parks. A low action is harsher, more punitive measures like spanking the child, grounding, taking away TV and other privileges, putting the child in a time out. These actions are determined exogenously and the parent is of a certain type and therefore is predisposed to take a certain action. There are different probabilities $p(y_h) = p$ if eh and $p(y_h) = q$ where $p > q$. There is a cost of the effort indicated by c(e). We normalize $c(el) = 0$ and denote $c(eh) = c$. The parents cannot directly observe the child's effort[2]. Thus the incentive-action taken by the parent cannot depend on e but depends only on the observable output (behavior). If effort has a direct correlation with output i.e. e^k results in y^k for k= H, L that is p=1 then q=0 then the effort can be deduced from the output once the output (behavior) is realized. The parents are risk neutral while the children are risk averse agents.

Parent's utility is $U_p = U_p(y_j)$ for Authoritarian Parent and Disengaged Parent. Let the parent's utility be $V_P = V_P[U_p(y_j), U_c(e,a)]$ for Authoritative and Permissive Parent, who are altruistic and care about the Child's utility. The preference ordering on Child's utility is as follows: $U_c(e_l; ah) > U_c(eh; ah)$[3] i.e. the child does not like to exert effort. In the case of the parent $U_p(y_h) > U_p(y_l)$ i.e. the higher output gives greater utility to the parent.

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[2] The assumption on the observability of effort is changed in the later section, to examine the comparative static's.
[3] The subscript c denotes child's utility and p stands for parent's utility
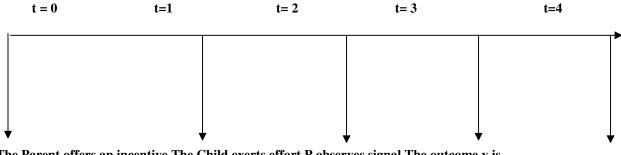
3.2   *Benchmark Model*

This benchmark model investigates the basic choices made during the interactions between the parent and the child. The principal in this framework is the parent and the child is the agent. The order in which the game proceeds is important since its a single period static model in which either the principal or the agent has the first-mover advantage. The principal starts by offering an incentive, a to the agent, the child where a could be financial transfers or physical affection or giving the child some pecuniary incentive or it could be emotional responsibility or taking away the child's allowance or grounding or spanking the child. This induces the agent, the child to exert an effort, e which could be working hard at school or abstaining from risky behaviours. The signal, y which is observed by the parent could be high grades in school or good behaviour at home. If the effort is not observable then to find the optimal contract the principal would try to solve the constrained optimization problem. The participation constraint requires the agent prefers the contract to any alternative and the parent ensures the child atleast a reservation level of utility. Additionally the incentive compatibility constraint must give the agent an "incentive to choose the desired effort". The takes account of the fact that the agent moves second and picks the desired effort. Thus in general the result holds that given a contract $\{a(yh), a(yl)\}$, agent (child) chooses e^H if

$$p \, u \, (a_h) + (1\text{-}p) \, u \, (a_l) \ - c \ > \ q \, u \, (a_h) + (\ 1\text{-}q\ ) \, u(a_l) \qquad \text{IC- Constraint}$$

and

$$p \, u \, (a_h) + (\ 1\text{-}p\ ) \, u \, (\ al\ ) - c \ \overline{>} \ u \qquad \text{Participation Constraint}$$

The time-line of incentive choices is represented below in a figure which shows how the incentive-action choices are made [see Figure 1]. This describes how parents and children interact over a length of time where parents decide what incentive scheme to offer the child right at the start. So they set an incentive scheme which the child takes as given and conditions effort on the incentive offered at time 0.

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Figure 1: Timing of contracting under moral hazard

TIME

| t = 0 | t=1 | t= 2 | t= 3 | t=4 |

The Parent offers an incentive The Child exerts effort P observes signal The outcome y is

scheme {a(yh), a(yl)}   **realized**

3.3   *A Model of Incentive-Action (with fully observable effort)*

We start by isolating the effects in different environments. In the first and most favorable environment where effort is fully observable the parent can contract on effort since effort is directly observable. In the case where the Principal (Parent) is Risk Neutral and the Agent (Child) is Risk Averse the utility function of the child u (a) is an increasing and convex function of a i.e. $u'(a) > 0$ and $u''(a) > 0$. yl gives utility 0 and yh gives utility v.

Thus if the effort of the child is perfectly observable and the parent (principal) wants to induce effort then for a given value of v (the parent's utility from high effort), the parent's optimization problem becomes:

$$\text{Max } p (v - a_h) - (1 - p) a_l \qquad (1)$$

s.t.

$$p \, u (a_h) + (1-p) \, u (a_l) - c > \overline{u} \qquad (2)$$

Thus the parent aims to maximize 1 subject to equation 2. Only the participation constraint is relevant in this case as then the agent can be forced to exert a positive level of effort. Since the child is risk averse the incentive compatibility constraint is always satisfied.

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λ is the Lagrange multiplier associated with the participation constraint.

$$\ell = p\,(v - a_h) - (1-p)\,a_l + \lambda\,[\,p\,u\,(a_h) + (1-p)\,u\,(a_l) - c - \underline{u}\,]$$

The first order condition gives

$$- p + \lambda\,p\,u'\,(a_h*) = 0 \qquad\qquad (3)$$
$$(1 - p) + \lambda\,(1-p)\,u'\,(\overline{a_l}*) = 0 \qquad\qquad (4)$$

where a_h* and a_l* are the first-best optimal transfers.

Therefore from equation (3) and (4) we obtain for a given value of λ:

$$\lambda = \frac{1}{u'(a_h*)} = \frac{1}{u'(a_l*)} > 0 \qquad\qquad (4)$$

which implies that $u'(a_h*) = u'(a_l*)$ and since additionally $u(a)$ is convex i.e. $u''(a) < 0$ then for 4 to hold true it must also be true that the incentive offered by the parent is constant across states.

$$\text{Therefore} \quad a* = a_h* = a_l*$$

Thus, when effort is perfectly observable, the agent obtains full insurance from the risk-neutral principal, and the transfer a* the child (agent) receives is the same whatever the state of nature. Thus the intuition behind this result is that if the effort is contractible the optimal incentive is independent of action.

Because the participation constraint 2 is binding, we can also obtain the value of this transfer, which is enough to cover the disutility of effort. So a* must solve equation 2.

$$u(a*) = \overline{u} + c$$

or $\qquad\qquad a^{pi*} = u^{-1}(\overline{u} + c) \qquad\qquad (5)$

where the subscript pi stands for perfect information.

Thus note that the action of the parent is equal to the inverse of the utility which is a constant plus cost of the child. This way the person i.e. the parent is influenced taking the reservation utility as given.

Now we can compare the utility or the gain in utility terms to the parent from the child's action. There are two situations where the utility of the child could be examined differently due to the effort being exerted, v here is the net gain in utility terms to the parent from the child's effort. This could be the parent having a greater sense of satisfaction from the child's grades in school or positive impact of the child's behaviour on the parent.

In this case for the principal inducing high effort e^H yields an expected payoff equal to

$$V_1 = pv - a*$$

If the principal decided to let the agent exert low effort e^L he would make the payment w^L to the agent that solves the following equation:

$$qu(a_h) + (1 - q)u(a_l) = \overline{u}$$

Therefore a_l would have to satisfy the linear additive combination of the following equation for some value of the probabilities, q.

or

$$a^L = u^{-1}(\overline{u})$$

Thus the principal will get

$$V_0 = qv - a^L$$

Inducing effort is thus optimal from the principal's point of view when

$V_1 > V_0$ or

$$pv - a* \geq qa - a^L$$

which gives the result that the expected gain on effort is higher than the first-best cost of inducing effort. This can also be seen in the inequality given below.

Expected gain of effort   First-best cost of inducing effort

$$(p - q)v \geq u^{-1}(\overline{u} + c) - u^{-1}(\overline{u})$$

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Parenting styles are generated endogenously from the theory. In the case of the incentives and actions these can be potentially combined to generate parenting styles which match the styles given in the literature. The cognitive development takes place by endogenous creation of personality as determined by the interaction of all factors with the person's innate ability, which was given exogenously as given in studies such as (Kan and Sai, 2003) and Levine, Pollack and Comfort (1999). The parent then chooses Encourage and Punishment in different combinations to influence the child outcomes.

3.4   *A Model of Incentive-Action (with unobservable effort)*

If the effort is non observable but the agent as well as the principal are risk neutral then the contract has to be self-enforcing and the parent has to obey the child's incentive constraint. The utility function can be written as

$$u(a) = a$$

Thus the principal who wants to induce effort must choose the contract that solves the following problem given in equation 6 subject to the two constraints given in 7 and 8:

Max $p(v - a_h) - (1 - p)$ al   (6)

s.t. $p\,a_h + (1-p)\,a_l - c > q\,a_h + (1-q)\,\underline{al}$ (7)

and $p\,a_h + (1-p)\,a_l - c > u$ (8)

In the case of risk-neutrality the principal can choose incentive compatible transfers ah and al that make the agent's participation constraint 8 binding. Thus if effort is not contractible and the child is risk neutral the optimal contract is slightly increasing.

Finally we get $a_h^* = \overline{u} + \overline{c}\,(\dfrac{(1-p)}{p-q})$ by rearranging 8 and solving for a*

4   Empirical specification

We estimate the following reduced form specification as a probit model for the different forms of substance use by the child. The likelihood of participating in different forms of substance use is unobservable to the parent and P * is the unobservable variable which is the child's latent propensity to smoke (consume alcohol). Therefore we define the observed variable P as:

Pij =1 if P*>0
Pij=0 otherwise

Prob (Pij=1)= 1- (-Style + X)

where represents the cumulative normal distribution

X: explanatory variables includes all child-specific characteristics, mother-specific characteristics and family background variables. They include mother s substance use over the lifetime as well as mother s substance use during pregnancy.

We assume there is a two-style world and the styles are mutually exclusive and exhaustive and they are exogenously determined. Therefore we construct a Dummy for Style where Style=1 in the case of Authoritative style and Style=0 in the case of Authoritarian style.

The HOME questions in the Mother Supplement questionnaire do not directly ask the mother what action she would take if the child engages in substance abuse. The first question reads as follows. Sometimes children get so angry at their parents that they say things like I hate you or swear in a temper tantrum. Please check which action(s) you would take if this happened. The possible responses are grounding, spanking, talk with child, give him or her household chore, ignore it, send to room for more than 1 hour, take away his/her allowance, take away TV, phone, or other privileges, put child in a time out. The second question reads as If your child brought home a report card with grades lower than expected, how likely would you be to contact his or her teacher or principal, lecture the child, keep a closer eye on child's activities, punish the child, talk with the child, wait and see if child improves on his/her own, tell child to spend more time on schoolwork, spend more time helping child with the schoolwork, limit or reduce child's

non-school activities. The third question reads as "Sometimes kids mind pretty well and sometimes they dont. Sometimes they do things that make you feel good". Therefore the question in the Mother Supplement only asks what the mother would do if the child misbehaves or throws a tantrum. There is also a need to control for other behavioural problems as those could be potential sources of endogeneity so we control for those problems using the behavioural problem index. The behavioural problem index is based on responses from the mother to 28 questions in the Mother Supplement which deal with specific behaviours that children age four and over may exhibit in the previous three months. The standard score used in this paper sums across the subscores created according to the following domains: (1) antisocial behaviour, (2) anxiousness/depression, (3) headstrongness, (4) hyperactivity, (5) immature, (6) dependency and (7) peer conflict/social withdrawal. The standard score of BPI is scaled from 70–140 and the paper uses the measure of lifetime substance use i.e. if the child smoked or drank alcohol in his entire life.

The sample selection criterion are described in detail in Table 1 and in the first selection criterion only those children were selected aged 10-14 who completed the self-administered questionnaire. This questionnaire was given to all children aged 10-14 as of the December of the interview years 1994-98 so this sample deletion deleted all those children who did not complete the questionnaire. The sample was further narrowed to include those children whose mothers were also administered the Mother supplement which includes HOME questions and then subsequent sample deletions to get the final sample for smoking and for alcohol. The summary statistics are given in Table 3

5   Switching Parenting Styles

5.1   Motivation for Switching

Are parenting styles hardwired? Motivation for Switching in the model the switching results are displayed in the tables [see Figures 2 and 3]. The switching results are shown for different children in the same year and for different years for the same child. There is a tendency

to be consistent as well as to switch to different parenting styles. There were 17 Permissive parents who stayed the same and 39 Disengaged parents who stayed the same. The tendency to switch was highest among the Disengaged parents, and 40 switched to Authoritative, 18 switched to Authoritarian and 19 switched to Permissive. These numbers are out of the total of 116 parents in year 1. In the case of different children in the same year the tendency was more towards stability. There were only 6 switches among the disengaged parents, only 4 switches in the Permissive parents.

Figure 2: Switching Parenting styles across different years for the same child

To From	Authoritative	Authoritarian	Permissive	Disengaged	Total for year 1
Authoritative	0	0	0	0	0
Authoritarian	0	0	0	2	2
Permissive	6	1	17	6	30
Disengaged	40	18	19	39	116
Total for year 2	46	19	36	47	148

Figure 3: Switching Parenting Styles across different children in the same year

To From	Authoritative	Authoritarian	Permissive	Disengaged	Total for child 1
Authoritative	17	1	3	1	22
Authoritarian	0	8	0	2	10
Permissive	1	0	33	3	39
Disengaged	1	2	3	70	76
Total for child 2	21	12	41	76	152

6   Results

The empirical model which is being used in this paper is a discrete choice probit model. Such models are effective when qualitative choices are being made. The goal of this research is to provide more precision and more definitiveness in understanding the role of parents in the development of children.4 The precision is increased by testing a conceptual framework that emphasizes the associations between parenting dimensions and key domains of child functioning. The paths of this framework were derived from the substantial empirical and theoretical literatures finding links between parenting and child development. These literatures were interpreted to be compelling enough to recommend moving towards greater precision in understanding the associations, and to recommend the hypothesized paths of the model across time.

6.1   Behavioural Problem Index

The results are given for all the different types of regression analysis. The empirical specification was tested on the data and the following results hold for the linear regression model. This model was selected in the case of the behavioural problem index. The results showed that parenting style is highly significant and an important explanatory variable in determining child behaviour controlling for random effects [see Table 4]. The authoritative parenting style increases behavioural problems by 5.96 and the Authoritarian parenting style increases behavioural problems by 4.30 and Disengaged parenting style increases behavioural problems by 3.07 and all the parenting styles come out to be highly significant. The coefficients on the different parenting styles are measured relative to the omitted category permissive.

The regression reported in the first column is estimated by OLS with standard errors which are robust to the presence of heteroskedasticity. The reported estimate omits the lagged endogenous variable since inclusion severely reduces the number of observations.

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[4] Parental Support, Psychological Control and Behavioural Control: Assessing Relevance Across Time, Method and Culture, Barber, Stolz, Olsen and Maugham, Monographs Series of the Society for Research in Child Development

6.2 Smoking

In order to examine the relationship between parenting style and other child outcomes such as smoking and alcohol consumption an alternative model i.e. a discrete choice probability model was selected. Additionally, in the case of smoking and alcohol consumption as dependent variables since there are repeat observations on the same individual I have used a random effects probit model. This model takes account of child-specific effects. Such a specification is typical of panel data equations. For the main results from the random effects probit analysis [see Tables 5 and 6[5]]. In the case of smoking an authoritative parenting style increases the probability of smoking by 0.12 and an authoritarian parenting style reduces the probability of smoking by 0.58 but these results are not significant. The disengaged parenting style increases smoking by 0.05. The child working and the age of the child increase the probability of smoking and in both cases the coefficients are significant. The racial decomposition reveals that being Black reduces the probability of smoking by about 1.53 and the coefficients are significant. The mother's smoking habits as well as smoking during pregnancy have a positive effect on the child's smoking. The family structure suggests that greater number of children in the family increases the probability of smoking. The family income has a negative effect on smoking. The income effects can be supported by the literature which suggests that both single parent family and low income families have children who are more likely to smoke.

In this research since substance use outcomes were measured repeatedly across a panel i.e. a series of repeat observations on the same person, the goal is often to examine the effects of different treatments and/or predictors on usage levels can be aggregated to provide a single outcome per subject, for example an average substance use. In these cases, standard statistical procedures can be applied. However, these approaches are limited because they ignore changes across time or they only consider within subject change that is linear. Finally, from a statistical point of view these approaches are inefficient. The development of more general statistical methods for longitudinal data analysis has been an active area of statistical research. There are

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[5] The tables comprise of the main selected variables and their coefficients, but the regression is run with a larger selection of variables

several features that make Random-Effects Regression Models especially useful in longitudinal research.

6.3   *Alcohol Consumption*

As we see from Table 6, the authoritative parenting style does not affect probability, nor does allowance. The coefficient on authoritative style is 0.02085.   No other factors were significant

7   Conclusion

Thus the results have revealed that the effect of parenting style is significant in the NLSY-Child sample for 10-14 year old children depending on the child outcome being investigated. In the case of smoking and alcohol consumption the results are not highly significant but in the case of behaviour i.e. the behavioural problem index the results are highly significant. In the case of the behavioural problem index the linear regression model is used but in the case of smoking and alcohol consumption the discrete probability models are used. Thus this analysis is a step towards a better understanding of the interaction effects and what is the implication of endogenizing parenting styles. The empirical analysis needs to be enhanced to incorporate the endogenous parenting style which is a function of different behavioral and cultural characteristics. Thus we could estimate the equations as a two-step Bivariate Probit with selection and we would need valid instruments: the financial transfers that parents received when they were children is one valid instrument and this variable is included in the NLS dataset.

This work controlled for all family background factors including parental substance use. In the case of parental substance use the results show that the coefficients are significant. Thus the importance of Parenting style is highlighted and Parenting style is constructed as an index from several questionnaires responses. Therefore this brings out the importance of Parent-Child interactions from the Sociology and Psychology literature and uses the methodology and framework of Economics to model these relationships. Parenting style is an independent

variable influencing child outcomes, focusing here on alcohol and smoking. While exploring this relationship there is a need to control for all other influences which are simultaneously impacting the child outcomes. Parenting style is also distant from parenting practices which are the actions parents can take. Parenting style is a broader and comprehensive term which consists of various parenting practices and additionally a broader spectrum of parental behaviours which define the parenting style in these households.

In the switching results the pattern of results turned out this way because Disengaged is pulling out from every other category and there is a very high percentage of disengaged. Across years its highly consistent. This study enables us to understand the importance of all explanatory factors in substance use by young children. These results and studies are important in determining how policy makers could influence these juvenile delinquent behaviours. These behaviours are potentially risky both for the individual and also put the society at risk in general due to their impact through various criminal activities. Thus the dynamics of intra-familial interactions is one more area which is being exploited to get a better view of a healthy society which has healthy children as well from the perspective of maintaining peace and order which needs the youth to function in an orderly manner. Thus there is a substantial interest in trying to find all the possible causal mechanisms which can explain these behaviours and in the case of very young children the parental control is much higher then parenting style can be explored as a logical explanation for substance use in households. Its partially an explanation or an interest to model comparative statics where current phenomenon of substance use can be explained. Moreover its also to predict and forecast these behaviours and how such families could be identified as possible homes for juvenile delinquency. This is important especially in the current age group which is young enough to be identified and if possible corrected to prevent the onset of substance use in later adolescent years. There are several studies which examine the high-school population and there are surveys such as Monitoring the Future Surveys and High School and Beyond Surveys which concentrate on older adolescents.

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Table 1: Sample deletion for different groups

Numbers of observations and Reasons for deletion from sample	N	Black	Hispanic	Non Black Non Hispanic
Number of observations on Children Respondents of NLSY79 aged 10-14 interviewed in 1998	10007	3499	2250	4258
After deletion as children did not answer SA questions on substance use	7553	2713	1698	3142
After deletion as children's residence is not with mother	7441	2640	1662	3139
After deletion as child did not answer SA questions on getting an allowance	4030	1367	930	1733
After deletion as mother reactions to the child questions are not missing	3399	1105	757	1537
After deletion as explanatory variables missing like race, highest grade completed and family income	2237	691	478	1068
After deletion as child did not answer questions on smoking (Smoking sample)	2191	672	466	1053
After deletion as child did not answer questions on alcohol (Alcohol sample)	2203	682	467	1054

Table 2: Variable Definitions

Descriptive Statistics	
Variable	Variable definitions
SMOKE	Smoke=1 if child ever smoked in lifetime
ALCOHOL	Alcohol=1 if child consumed alcohol in lifetime
AUTHRVE	Authrve=1 if the parenting style is Authoritative
AUTHRAN	Authran=1 if the parenting style is Authoritarian
DISENGG	Disengg=1 if the parenting style is Disengaged
PERMV	Permv=1 if the parenting style is Permissive
ALL	All=1 if child gets an allowance
CWORK	Cwork=1 if child works for pay
CHILDAGE	Age of child at time of interview (in years)
BLACK	Black=if child is Black
HISPANIC	Hispanic=1 if child is Hispanic
MALE	Male=1 if child is Male
MOMSMK	Momsmk=1 if mother smoked atleast 100 cigarettes in lifetime
MOMSP	Momsp=1 if mother smoked during pregnancy
BPI	Total standard score scaled from 70-145

Table 3: Descriptive Statistics

Variable	Means
SMOKE	0.1260434 (0.3323069)
ALCOHOL	0.1105442 (0.3137003)
AUTHRVE	0.1936561 (0.3953275)
AUTHRAN	0.0751252 (0.2637034)
DISENGG	0.4874791 (0.500519)
PERMV	0.2437396 (0.4295167)
ALL	0.7963272 (0.4028966)
CWORK	0.4023372 (0.490574)
CHILDAGE	12.04626 (1.179534)
BLACK	0.293823 (0.4557021)
HISPANIC	0.206177 (0.404728)
MALE	0.4991653 (0.5002081)
MOMSMK	0.4490818 (0.4976083)
MOMSP	0.2821369 (0.4502276)
BPI	107.5217 (13.8665)
# of total observations for smoking	2191
# of children in the smoking sample	1827
# of total observations for alcohol	2203
# of children in the smoking sample	1819

Table 4: Random Effects OLS model

Random effects OLS Model for BPI (with child fixed effects)		
Dependent Variable: BPI		
Variable	**Coefficient**	**SE-error**
CONSTANT	121.1868*	8.633856
AUTHRVE	5.960201*	1.243925
AUTHRAN	4.304364*	1.807072
DISENGG	3.067037*	.9607307
ALL	-.3667745	.9845331
CWORK	.6109651	.8387609
CHILDAGE	.1003917	.3250675
BLACK	-1.347351	1.246497
HISPANIC	-.7318175	1.253623
MALE	2.778609	.8770364
MOMSMK	2.587414	1.125395
MOMSP	.5558704	1.238046
# of observations	2191	
# of children	1827	
Rho	8.998149	
Standard Error	0.43837029	

Table 5: Random Effects Probit Analysis of Smoking

Random Effects Probit Analysis of Smoking consumption		
Dependent Variable: Smoking		
Variable	Coefficient	**SE-error**
CONSTANT	-12.06517*	4.734611
AUTHRVE	0.1261533	0.3466303
AUTHRAN	-0.5827816	0.587717
DISENGG	0.0544264	0.2626022
ALL	0.1472395	0.2795337
CWORK	0.7148676*	0.3141103
CHILDAGE	0.600842*	0.2045644
BLACK	-1.538176*	0.5979575
HISPANIC	-0.388737	0.3385916
MALE	-0.0131695	0.2317744
MOMSMK	0.6162942	0.3473868
MOMSP	0.2155296	0.3058013
# of observations	2191	
Number of children	1827	

Table 6: Random Effects Probit Analysis of Alcohol

Random Effects Probit Analysis of Alcohol Consumption		
Dependent Variable: Alcohol		
Variable	**Coefficient**	**SE-error**
CONSTANT	-4.469601	0.607792
AUTHRVE	0.0208548	0.1709761
AUTHRAN	0.1867674	0.2322555
DISENGG	0.1723868	0.1271901
ALL	-0.056421	0.1314606
CWORK	0.449961	0.1074983
CHILDAGE	0.2387521	0.0469894
BLACK	-0.0618789	0.1291293
HISPANIC	0.260862	0.1339787
MALE	-0.0568095	0.1059874
#of observations		1069
# of children		954

Appendix

The Parenting Style classification uses the following 3 questions from the HOME (D) section in the Mother Supplement Questionnaire of the NLSY-79 Mother-Child dataset for 10-14 year old children

Question:

20. "Sometimes children get so angry at their parents that they say things like "I hate you" or swear in a temper tantrum please check which action(s) you would take if this happened"

Grounding

Spanking

Talk with child

Give him or her household chore

Ignore it

Send to room for more than 1 hour

Take away his/her allowance

Take away TV, phone, or other privileges

Other

Put child in a short "time out"

21. If your child brought home a report card with grades lower than expected, how likely would you be to…

	very likely	Somewhat likely	not sure	how likely	not at all likely
contact his or her teacher or principal?	5	4	3	2	1
Lecture the child?	5	4	3	2	1
keep a closer eye on child's activities?	5	4	3	2	1
Punish the child?	5	4	3	2	1
talk with the child?	5	4	3	2	1
wait and see if child improves on his/her own?	5	4	3	2	1
tell child to spend more time on schoolwork?	5	4	3	2	1
spend more time helping child with schoolwork?	5	4	3	2	1
limit or reduce child's non-school activities (play, sports, clubs, etc.)	5	4	3	2	1

22. Sometimes kids mind pretty well and sometimes they don't. Sometimes they do things that make you feel good.

How many times in the past week have you

had to spank your child?
grounded him/her?
taken away TV or other privileges?
praised child for doing something worthwhile?
taken away his/her allowance?
shown child physical affection (kiss, hug, stroke hair, etc)?
sent child to his/her room?
told another adult (spouse, friend, co-worker, visitor, relative) something positive about child?

The substance use questions use the following questions on smoking and alcohol consumption from the Child Self-Administered Supplement Questionnaire of the NLSY-79 for 10-14 year old children

50. In your lifetime, on how many different occasions have you smoked cigarettes?

100 times or more
50 to 99 times
11 to 49 times = 1
6 to 10 times
3 to 5 times
1 or 2 times
Never smoked cigarettes in my life = 0

55. Have you ever drunk alcohol, other than just a sip or two?
  Yes
  No