A Comparative Static Analysis of the Effect of Sexual Crime Prevention Education under Limited Willpower Model

有限意志力模型下的性防治教育效果之比較靜態分析

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摘要

應用行為經濟學模型，在有限理性的基本假設下，經由慾望與理性因素的交互作用，以及自我控制力在行為決策產生的效應，推導學校性教育及個人性知識之關係與性教育政策對社會福利的影響關係，透過以決策者之行為選擇理論為基礎，導出之比較靜態分析的結論不僅可以提供實證分析的理論模型基礎，結論亦可做為學校及家庭性教育在防治性犯罪行為的評估參考，並提出相關建議以期望達成防治性犯罪的政策效果，增加整體社會福利。

關鍵字：性教育、性知識、慾望效用、理性效用、有限意志力

Abstract

Applying the behavioral economics model, under the basic assumption of bounded rationality, through the interaction of desire and rational factors, and the effect of self's limited willpower on behavioral decision-making. The relationship between school sexual education and personal sexuality knowledge and the influence of sexual education policies on social welfare are deduced. Based on the behavioral choice theory of decision-makers, the conclusion of comparative static analysis is deduced, which not only provides the theoretical model basis for empirical analysis, but also can be used as a reference for the evaluation of sexual education in schools and families in the prevention and treatment of sexual crimes, and puts forward relevant suggestions to achieve the policy effect of preventing and treating sexual crimes, so as to improve the overall social welfare.

Keyword: Sexual education, Sexuality knowledge, Desire utility, Rational utility, Limited willpower

1.Introduction

The World Health Organization (WHO) defined sexual education as the goal of unifying the three levels of human physiology, psychology and society, nurture a healthy individual personality, and improve interpersonal communication with love. According to the survey data released in Taiwan in 2017, 45% of people contacts with pornographic media, and 5.6% of people had sex for the first time before the age of 18. However, premature sexual experience is one of the causes of sexual assault (Huang et al., 1999). Tens of thousands of sexual assaults are reported each year, with the majority of victims between the ages of 12 and 24, leading to major campus safety projects. Therefore, aside from legal sanctions, school education has implemented the sexual assault prevention program. It contains bodily autonomy, safe sex, gender equality, the Sexual Assault Crimes Act, sexual assault crisis management, and education on sexual assault prevention techniques. Education in preventing and dealing with sexual crimes could be divided into active and passive aspects. The active aspect is the teaching and understanding of body autonomy and the establishment of appropriate interpersonal interactions and gender concepts. The passive aspect involves teaching the factors of criminal behavior and preventing the individual, event, time, location and purpose of the attack from reducing the risk of occurrence (Xu, 2011).

Teenagers spend a lot of time in school and, as a result, are heavily influenced by schooling. Their physical and psychological development is undergoing immense changes as well. Jay N. Gied (2016) found that adolescent risk behaviors were partially due to inadequacies in the development of the two brain regions. The growth of the limbic system, which stimulates emotions, accelerates from 9 to 12 years and later matures, while the prefrontal cortex, which inhibits the impulse, reaches full maturity at least 20 years. Therefore, a period of transition of imbalance comes to an end for nearly a decade. Harvard neuropsychologist Eugene Lontard found that children and adolescents relied more on the amygdala, in which emotion is regulated; and adults relied more on the prefrontal cortex, which regulates rational thinking. The results of Finucane et al. (2003) have also shown that where there is no or less time to reflect, judgements are more likely to be motivated by emotion. Consequently, for adolescents, rational thinking and emotional factors affect decision-making behaviors when stimulated and impulse control increases with age.

Self-control is the power of reducing the emotional influence and improving rational thinking. Hirschi (1969) believed that the connection between people and traditional society is to control the generation of criminal impulse, deviation, or criminal behavior, which occurs when there is a poor connection or no interaction between individual and society. According to psychologist Baumeister and Tierney (2011), self-control is the strongest influencing force of human behavior, which naturally includes sexual behavior. Pratt and Cullen (2000) found a strong correlation between self-control and crime. Benda (2005) also argued that self-control factors should be considered when studying crime and deviant behavior, especially the high correlation between low self-control and juvenile delinquent (Baron, 2003; Tung et al., 2003; Muraven et al., 2006). In a meta-study conducted by Ridder et al. (2012), self-control was also found to be a contributing factor in safe sex. Zhuang (1996) and Huang (1997) found that the lack of self-control increases the occurrence of deviant behaviors. Huang et al. (1999), Xu and Meng (1997) studied the offender from birth and found some special problems in psychological traits, resulting in antisocial tendencies. Low self-control is also one of the characteristics of sexual assault crime. Gottfredson and Hirschi (1990) proposed the general crime theory and believed that crime is with low self-control in the crime conditions, seeking their own benefits in the form of violation of social norms. The behavior that brings satisfaction and happiness shows that self-control is one of the influencing factors of sexual crime.

Any behavior related to “choice” is an economic behavior which can be analyzed by economic theory. Policy-making is also screening behavior. Thus, economic analysis can help select the most favorable policy by clarifying the value of the options available. The advantages and disadvantages of the choice are to be found in assessing the relevance of the policy. Behavioral economics has been highly valued in the academic field over the past few years, and widely used in all subjects of study, such as finance, law and labor. Methods of rational, emotional, psychological and incomplete human analysis have traditionally been ignored because the real economic behavior of most people is different from theoretical predictions. In addition, behavioral economy is included in the model to combine the psychological or emotional level to conform to the reality of the behavioral pattern, thus widely applied.

This paper uses game theory to analyze sexual crimes, uses a mathematical model of limited rationality, and uses comparative static analysis of economics to discuss the decision-making and economic implications of sexual crimes, and to understand the impact of school sexual education and private The relationship between sexuality knowledge can be used as a reference for school and family sexual education policies.

In addition to the introduction, the study unfolds as follows. Section 2 presents a literature review; Section 3 presents the economic model of sex crimes; Section 4 presents the comparative static analysis of the limited willpower model. Conclusions and suggestions are provided in Section 5.

2. Literature Review

2.1 Criminal behavior analysis

In the theory of crime, a rational choice has been pervasive in the analysis of criminal behaviors based on the arguments of economics, including drunken driving, infringement of intellectual property rights, smuggling, theft, fraud, and deviating behaviors of teenagers (Chiu & Madden, 1998; Zhang, 2009; Hsieh, 2012; Xu & Yang, 2017). On the premise of people's rational choice and the economic model of maximizing expected net reward of crime, Helsley and Strange (2005) discussed resource allocation and mutual relationship between government and private agencies to prevent crime and provided a reference for the economic efficiency evaluation of policy implementation.

The traditional assumption is that people will make decisions according to the rationing rule. If the reward for crime is less than the anticipated cost of sexual violence, the intent to commit a sexual assault crime would be less. As a result of the assumption of maximizing the offender's own usefulness, the offender's net interests are assessed in this document and then made choices (Xu, 2006).

In other words, when the perpetrator can obtain maximum usefulness after measuring the cost and benefit of engaging in crime, studies have shown that the assumption of full rationality is a central point of economic analysis. However, there are different empirical findings than those based on rational assumptions. Wright & Decker (1994) point out that if rapid decision-making is required, the information may be incomplete, and the "rationality" of the judgment and decision diminishes. On the assumption of complete rationality, the economist predicts increased sentences to reduce crime, but that is not factual (Spelman, 2000). A rational hypothesis cannot infer the real pattern of behavior; the hypothesis may be invalid.

Nobel laureate Richard H and Shefrin (1981) believes that human beings in the real world frequently engage in allegations of misconduct and that it is difficult to make the most of them. Therefore, he argued that humans are not completely rational, and that the best advantage of the model ignores other influences. For example, over-confidence, staffing effect, asymmetrical assessment (in the case of loss and profit of the same thing with a different assessment) that does not allow an objective and rational choice was known as "limited will". The variables of human psychological behavior in the model derive a conclusion consistent with the real economic behavior.

2.2 Self-control

In the economic analysis, Rabin (2002) first proposed the question of self-control, meaning that people are aware of the real problem, but that they cannot control their desires not to succeed in solving the problem. Baumeister et al. (1994) argued that self-control is the self-regulatory behavior of an immediate impetus to achieving important long-term goals. The thought system independently involves two conflicts of power: one which can bring immediate satisfaction, the other is valuable to individuals, but only be achieved in the long-term.

Self-control is the power of spontaneity by which spontaneity is selected (Duckworth et al., 2014). Metcalfe and Mischel (1999) used hot and cold systems to compare both brain forces. The thermal system, located in the limbic system of the brain, is responsible for motivation, emotions, instinct or survivorship behavior. It responds quickly and automatically, focusing on immediate gratification as opposed to long-term goals. The cold system, located in the prefrontal cortex of the brain, controls high-level cognitive capacities, such as executive functions, including diversion, distraction suppression, abstract goal understanding and planning, and metacognitive capabilities towards long-term objectives. Both of them are in competition. When the hot system is more responsive than the cold system, people tend to fulfill their immediate wishes. When the cold system removes the response from the hot system, individuals improve their self-controlled behaviors to move towards their long-term goals.

2.3 Limited willpower

Behavioral decisions depend on the interaction of two forces of the brain, rationality is not without limits. The utility function proposed by Gul and Pesendorfer (2001) corrects limited rational cognitive assumptions is divided into a temptation utility for the account of the response of the hot system and a commitment utility for representing the cool system. It also defines the self-control utilized to maximize the desire function under the limitation of the stock of willpower. Ali (2011) suggested that the decision-maker only partially takes into account the usefulness of the desire. With desire in mind, people use their own experience to decide future self-control decision-making issues in order to reach the appropriate level of engagement. Masatlioglu et al. (2014) proposed the self-limiting behavior for future self-reputation under willpower restriction. There is no trade-off between temptation and the usefulness of engaging without the cost of self-control.

The above literature has shown that the inclusion of psychological factors in the behavioral model of human internal decision-making could also be used to analyze individuals' behavioral choices in relation to policy or regulation. This study first applies this model to analyze sex crime decision-making. With the maximizing social welfare, the influence of school and private sexuality knowledge on sexual crimes is analyzed, which can be used as a reference for school sexual education policy and family sexual education. With the goal of maximizing social welfare, the influence of school and private sexuality knowledge on sexual crimes is analyzed, which can be used as a reference for school sexual education policy and family sexual education.

3.The Limited Willpower Model

3.1 Limited Willpower Model

In view of the influence of irrational behavior, the model of Gul and Pesendorfer (2001) assumes that the individual's decision-making behavior distinguishes between temptation and rational usefulness. Jay, N, guidry (Jay N. Gied) (2016) found that adolescents' emotional function or brain activity affecting rational thinking, their physiological stage of development, and self-control is not well-developed to stick up to the desire, which is termed "limited rationality." Therefore, Liang et al. (2020) proposed the GLH model after considering the limitation of willpower; applied to the innovative sexual behavior model in this study as follows:

$$U(A) = \max_{x\in A}[u(x) + v(x)] - \max_{y\in A} v(y)$$

$$s.t. \quad v(x) \geq \max_{y\in A} v(y) - w \qquad (3.1)$$

where A is a set with the behavior pattern related to sexual criminal behavior, and the sexual behavior performance denoted by x of others' exogenous attraction traits, age, punishment, amount of sexual education, crime cost, the probability of being punished. $u(x)$ and $v(x)$ are Neumann-Morgenstern utility functions over the decision variable.

$v(x)$ is defined as a temptation utility function because a desire can be fulfilled, and the utility generated by the satisfaction is positive; therefore, the value of the desire utility function is positive.

$u(x)$ is a rational function; it produces a negative value because it must regulate.

w is the stock of willpower, the assumption for non-negative values.

$v(x)+ u(x)$ is the final combination of temptation and rationality, defined as compromise utility, which may be positive or negative,$u(x) \leq 0 \leq v(x)$，$x \in \{0, x_i\}$, for the convenience of analysis, assume$\big(u(0), v(0)\big) = (0,0)$.

As formula (2) shows, if the hours of sexual education increases, the expected benefit still exceeds the cost, that is, the net benefit >0, x = 1. In contrast, if the hours of sexual education make the net benefit <0, x = 0, then A = {0,1}, x has only 0 or 1 values, the decision in formula (2) is simplified as follows:

$$\max_{x\in A} u(0) + v(0) = 0 - \max_{y\in A} v(1)$$

$$\max_{x\in A} u(1) + v(1) - \max_{y\in A} v(1) \qquad (3.3)(3.2)$$

The optimal choice for x is to generate a greater compromise utility ($u(0) + v(0)$ and $u(1) + v(1)$) in formulas (2) and (3). The restriction formula's condition also needs to be satisfied; that is, the temptation utility needs to be greater than the residual willpower (the maximum value of the temptation utility reduces the willpower). If the compromise utility of x = 1 in the target formula is greater than x = 0, then the criminal behavior will be selective.

3.2 The significance of educational policy of limited willpower model

Consider the static equilibrium of school sexual education on the number of sexual crimes, similar to the study by Helsley and Strange (2005), as shown in the analysis of the number of school sexual education g change, will produce two kinds of effects: One is the general effect, if there is an increase in school sexual education, because the preventive knowledge of crime increases, it effectively deters crime, direct costs of crime to select variables x reduced to 0. Another is a specific result, the number of school sexual education increases because sexual education is implemented and sexual law passed, it reduces the selection effect, the severity of sexual crime called marginal stop force, reduces the net benefit of criminal sexual conduct, and the probability of x = 0.

Therefore, in the traditional model of perfectly rational assumptions, increasing school sexual education contributes to reducing the incidence of crime.

This paper uses the game theory to determine the decision-making model of sexual criminal behavior. It is assumed that the equilibrium solution to maximize social welfare must be that schools, individuals, and sex offenders all have sufficient information on each other, and will also consider each other's decision-making before making their own decision-making behaviors. The steps of the equilibrium solution are set as follows:

Stage 1: Schools make utility-maximizing decisions about the amount of sexual education.

Stage 2: Individuals choose the amount of private sexuality knowledge under the amount of school sexual education.

Stage 3: Sex offenders aim to maximize their own utility under the amount of school and personal sexuality knowledge to determine the type and number of sexual crimes.

Defined　the functions as follows:

$$u(s) = R(\theta, n, s) - M(g, r) - O(g, y) * p * s$$
$$\boxed{+--\qquad ++\qquad ++} \tag{3.4}$$

$$v(s) = Q(\theta, n, s) + f(g, r)$$
$$\boxed{+++\qquad ++}$$

$$Let\quad v^* = \max_s v(s) \tag{3.5}$$

The limited willpower model LGH (2019) is:

$$\max_s [u(s) + v(s)] - v^*$$

$$\text{s.t. } v(s) \geq v^* - w \tag{3.6}$$

The w is means willpower.

$$L = \max_s u(s) + v(s) - v^* + \lambda[v(s) - v^* + w]$$

$$\text{F.O.C} >> \frac{\partial L}{\partial s} = \frac{\partial u}{\partial s} + \frac{\partial v}{\partial s} + \lambda \frac{\partial v}{\partial s} = 0$$
(3.7)

$$\frac{\partial L}{\partial \lambda} = v(s) - v^* + \text{w} \geqq 0 \tag{3.8}$$

(if > 0, then $\lambda = 0,\ \lambda \frac{\partial L}{\partial \lambda} = 0$,$\lambda \geqq 0$)

Apply the Kuhn-Tucker condition to get:

$\frac{\partial u}{\partial s} = \frac{\partial R}{\partial s} - o(g, y) * p,\ \frac{\partial v}{\partial s} = \frac{\partial Q}{\partial s}$，Substitute into (3.8).

$$\frac{\partial R}{\partial s} - o(g, y) * p + (1 + \lambda) \frac{\partial Q}{\partial s} = 0$$
(3.9)

$$\therefore \frac{\partial R}{\partial s} < 0, \frac{\partial Q}{\partial s} > 0\ ,\ \because \lambda > 0$$

$$v(s) - v^* + \text{w}(y) = 0 \tag{3.10}$$

$$s_i^* = s(\theta, n, g, r, w, p, y, v^*)$$

Differential (3.9) and (3.10)

$$\frac{\partial^2 R}{\partial s \partial \theta} d\theta + \frac{\partial^2 R}{\partial s \partial n} dn + \frac{\partial^2 R}{\partial s^2} ds - P\left[\frac{\partial o}{\partial g} dg + \frac{\partial o}{\partial y} dy\right] - o(g, y)dp + (1 + \lambda)\left[\frac{\partial^2 Q}{\partial s \partial \theta} d\theta + \frac{\partial^2 Q}{\partial s \partial n} dn + \frac{\partial^2 Q}{\partial s^2} ds\right] + \frac{\partial Q}{\partial s} d\lambda \leq 0 \tag{3.11}$$

Arrange to get

$$\left(\frac{\partial^2 R}{\partial s \partial \theta} + (1 + \lambda) \frac{\partial^2 Q}{\partial s \partial \theta}\right) d\theta + \left(\frac{\partial^2 R}{\partial s \partial n} + (1 + \lambda) \frac{\partial^2 Q}{\partial s \partial n}\right) dn + \left(\frac{\partial^2 R}{\partial s^2} + (1 + \lambda) \frac{\partial^2 Q}{\partial s^2}\right) ds - P\left[\frac{\partial o}{\partial g} dg + \frac{\partial o}{\partial y} dy\right] - o(g, y)dp + \frac{\partial Q}{\partial s} d\lambda \leq 0 \tag{3.12}$$

$Suppose\ \frac{\partial^2 R}{\partial s \partial \theta} > 0$，$\frac{\partial^2 Q}{\partial s \partial \theta} > 0$，$\frac{\partial^2 R}{\partial s \partial n} > 0$，$\frac{\partial^2 Q}{\partial s \partial n} < 0$，$\frac{\partial^2 R}{\partial s^2} > 0$，$\frac{\partial^2 Q}{\partial s^2} < 0$

$\left(\frac{\partial^2 R}{\partial s \partial \theta} + (1 + \lambda) \frac{\partial^2 Q}{\partial s \partial \theta}\right) > 0$，$\left(\frac{\partial^2 R}{\partial s \partial n} + (1 + \lambda) \frac{\partial^2 Q}{\partial s \partial n}\right) < 0$，$\left(\frac{\partial^2 R}{\partial s^2} + (1 + \lambda) \frac{\partial^2 Q}{\partial s^2}\right) < 0$

$$\begin{bmatrix} \frac{\partial^2 R}{\partial s^2} + (1 + \lambda) \frac{\partial^2 Q}{\partial s^2} & \frac{\partial Q}{\partial s} \\ \frac{\partial Q}{\partial s} & 0 \end{bmatrix} \begin{bmatrix} ds \\ d\lambda \end{bmatrix} =$$

$$\begin{bmatrix} p\left[\frac{\partial o}{\partial g} dg + \frac{\partial o}{\partial y} dy\right] + o(g,y)dp - \left(\frac{\partial^2 R}{\partial s \partial \theta} + (1+\lambda) \frac{\partial^2 Q}{\partial s \partial \theta}\right) d\theta \\ -\left(\frac{\partial^2 R}{\partial s \partial n} + (1+\lambda) \frac{\partial^2 Q}{\partial s \partial n}\right) dn \\ dv^* - dw - \frac{\partial Q}{\partial \theta} d\theta - \frac{\partial Q}{\partial n} dn - \frac{\partial f}{\partial g} dg - \frac{\partial f}{\partial r} dr \end{bmatrix} \tag{3.13}$$

$$ds = \frac{\begin{vmatrix} p\left[\frac{\partial o}{\partial g} dg + \frac{\partial o}{\partial y} dy\right] + o(g,y)dp - \left(\frac{\partial^2 R}{\partial s \partial \theta} + (1+\lambda) \frac{\partial^2 Q}{\partial s \partial \theta}\right) d\theta - \left(\frac{\partial^2 R}{\partial s \partial n} + (1+\lambda) \frac{\partial^2 Q}{\partial s \partial n}\right) dn & \frac{\partial Q}{\partial s} \\ dv^* - dw - \frac{\partial Q}{\partial \theta} d\theta - \frac{\partial Q}{\partial n} dn - \frac{\partial f}{\partial g} dg - \frac{\partial f}{\partial r} dr & 0 \end{vmatrix}}{\begin{vmatrix} \frac{\partial^2 R}{\partial s^2} + (1+\lambda) \frac{\partial^2 Q}{\partial s^2} & \frac{\partial Q}{\partial s} \\ \frac{\partial Q}{\partial s} & 0 \end{vmatrix}} \tag{3.14}$$

$$d\lambda=\frac{\begin{vmatrix}\frac{\partial^2 R}{\partial s^2}+(1+\lambda)\frac{\partial^2 Q}{\partial s^2} & p[\frac{\partial o}{\partial g}dg+\frac{\partial o}{\partial y}dy]+o(g,y)dp \\ & -(\frac{\partial^2 R}{\partial s\partial\theta}+(1+\lambda)\frac{\partial^2 Q}{\partial s\partial\theta})d\theta \\ & -(\frac{\partial^2 R}{\partial s\partial n}+(1+\lambda)\frac{\partial^2 Q}{\partial s\partial n})dn \\ \frac{\partial Q}{\partial s} & dv^*-dw-\frac{\partial Q}{\partial\theta}d\theta-\frac{\partial Q}{\partial n}dn-\frac{\partial f}{\partial g}dg-\frac{\partial f}{\partial r}dr\end{vmatrix}}{\begin{vmatrix}\frac{\partial^2 R}{\partial s^2}+(1+\lambda)\frac{\partial^2 Q}{\partial s^2} & \frac{\partial Q}{\partial s} \\ \frac{\partial Q}{\partial s} & 0\end{vmatrix}} \tag{3.15}$$

$$\frac{\partial s_i}{\partial\theta}=\frac{\frac{\partial Q}{\partial\theta}}{\frac{\partial Q}{\partial s}}<0,\ \frac{\partial s_i}{\partial n}=-\frac{\frac{\partial Q}{\partial n}}{\frac{\partial Q}{\partial s}}>0,\ \frac{\partial s_i}{\partial w}=-\frac{1}{\frac{\partial Q}{\partial s}}<0,\ \frac{\partial s_i}{\partial g}=-\frac{\frac{\partial f}{\partial y}}{\frac{\partial Q}{\partial s}}<0，$$

$$\frac{\partial s_i}{\partial r}=-\frac{\frac{\partial f}{\partial r}}{\frac{\partial Q}{\partial s}}<0,\ \frac{\partial s_i}{\partial v^*}=\frac{1}{\frac{\partial Q}{\partial s}}>0 \tag{3.16}$$

Let $B_i=R(\theta,n,s)-M(g,r)-O(g,y)*p*s+Q(\theta,n,s)+F(g,r)-v^*$ (3.17)

$$n_i^d=D_i(\theta,n,s,g,r,y,w,p,v^*,B^*)=D_i(\theta,n,g,r,y,w,p,v^*,B^*) \tag{3.18}$$

Differential (3.17) can get :

$$\frac{\partial R}{\partial\theta}d\theta+\frac{\partial R}{\partial n}dn+\frac{\partial R}{\partial s}ds-\frac{\partial M}{\partial g}dg-\frac{\partial M}{\partial r}dr-$$
$$O(g,y)*s*dp-p*s*\frac{\partial o}{\partial g}dg-p*s*\frac{\partial o}{\partial y}dy+$$
$$\frac{\partial Q}{\partial\theta}d\theta+\frac{\partial Q}{\partial n}dn+\frac{\partial Q}{\partial s}ds+\frac{\partial f}{\partial g}dg+\frac{\partial f}{\partial r}dr-dv^*=dB_i$$
$$dr-O(g,y)*p*ds-O(g,y)*s*dp-p*s*$$
$$\frac{\partial Q}{\partial\theta}d\theta+\frac{\partial Q}{\partial n}dn+\frac{\partial Q}{\partial s}ds+\frac{\partial F}{\partial g}dg+\frac{\partial F}{\partial r}dr-dv^*=dB_i$$
(3.19)

Differential (3.19), then multiply λ

$$\lambda(\frac{\partial Q}{\partial\theta}d\theta+\frac{\partial Q}{\partial n}dn+\frac{\partial Q}{\partial s}ds+\frac{\partial f}{\partial g}dg+\frac{\partial f}{\partial r}dr)\geq\lambda(dv^*-dw) \tag{3.20}$$

Add (3.19) and (3.20) to get:

$$(\frac{\partial R}{\partial\theta}+(1+\lambda)\frac{\partial Q}{\partial\theta})d\theta+(\frac{\partial R}{\partial n}+(1+\lambda)\frac{\partial Q}{\partial n})dn$$
$$+(\frac{\partial R}{\partial s}-o(g,y)*p+(1+\lambda)\frac{\partial Q}{\partial s})ds$$
$$-\left(\frac{\partial M}{\partial g}-(1+\lambda)\frac{\partial f}{\partial g}+p*s*\frac{\partial o}{\partial g}\right)ds$$
$$-(\frac{\partial M}{\partial g}-(1+\lambda)\frac{\partial f}{\partial g}+p*s*\frac{\partial o}{\partial g})dg$$
$$-\left(\frac{\partial M}{\partial r}-(1+\lambda)\frac{\partial f}{\partial r}\right)dr$$
$$-o(g,y)*s*dp-p*s*\frac{\partial o}{\partial y}dy$$
$$+\lambda dw-(1+\lambda)dv^*\geq dB_i \tag{3.21}$$

Suppose $(\frac{\partial R}{\partial n}+(1+\lambda)\frac{\partial Q}{\partial n})<0$，then

$$\frac{\partial n_i^d}{\partial\theta}=-\frac{(\frac{\partial R}{\partial\theta}+(1+\lambda)\frac{\partial Q}{\partial\theta})}{(\frac{\partial R}{\partial n}+(1+\lambda)\frac{\partial Q}{\partial n})}>0 \tag{3.22}$$

$$\frac{\partial n_i^d}{\partial g}=\frac{(\frac{\partial M}{\partial g}-(1+\lambda)\frac{\partial f}{\partial g}+p*s*\frac{\partial o}{\partial g})}{(\frac{\partial R}{\partial n}+(1+\lambda)\frac{\partial Q}{\partial n})}<0 \tag{3.23}$$

$$\frac{\partial n_i^d}{\partial r}=\frac{(\frac{\partial M}{\partial r}-(1+\lambda)\frac{\partial f}{\partial r})}{(\frac{\partial R}{\partial n}+(1+\lambda)\frac{\partial Q}{\partial n})}<0 \tag{3.24}$$

$$\frac{\partial n_i^d}{\partial y}=\frac{p*s*\frac{\partial o}{\partial y}}{(\frac{\partial R}{\partial n}+(1+\lambda)\frac{\partial Q}{\partial n})}<0 \tag{3.25}$$

$$\frac{\partial n_i^d}{\partial p}=\frac{o(g,y)*s}{(\frac{\partial R}{\partial n}+(1+\lambda)\frac{\partial Q}{\partial n})}<0 \tag{3.26}$$

$$\frac{\partial n_i^d}{\partial w}=\frac{-\lambda}{(\frac{\partial R}{\partial n}+(1+\lambda)\frac{\partial Q}{\partial n})}>0 \tag{3.27}$$

$$\frac{\partial n_i^d}{\partial v_i^*}=\frac{1+\lambda}{(\frac{\partial R}{\partial n}+(1+\lambda)\frac{\partial Q}{\partial n})}<0 \tag{3.28}$$

$$\frac{\partial n_i^d}{\partial B_i}=\frac{1}{(\frac{\partial R}{\partial n}+(1+\lambda)\frac{\partial Q}{\partial n})}<0 \tag{3.29}$$

$$N^D(\theta,g,r,y,p,v_i^*,w,B_i^*)\mathrm{N}^s(B_i^*) \tag{3.30}$$

$$\sum n_i^D(\theta,g,r,y,p,v_i^*,w,B_i^*)=N^s(B_i^*) \tag{3.31}$$

$$\sum\frac{\partial n_i^D}{\partial\theta}d\theta+\sum\frac{\partial n_i^D}{\partial g}dg+\sum\frac{\partial n_i^D}{\partial r}dr+\sum\frac{\partial n_i^D}{\partial y}dy+\sum\frac{\partial n_i^D}{\partial p}dp+\sum\frac{\partial n_i^D}{\partial v_i^*}dv_i^*+\sum\frac{\partial n_i^D}{\partial w}dw+(N^{D'}-N^{S'})dB_i^*=0 \tag{3.32}$$

To satisfy a convergent equilibrium solution，let $N^{D'}-N^{S'}<0$， then

$$\frac{\partial B_i^*}{\partial\theta}=-\frac{\frac{\partial n_i^D}{\partial\theta}}{N^{D'}-\mathrm{N}^{S'}}>0 \tag{3.33}$$

$$\frac{\partial B_i^*}{\partial g}=-\frac{\frac{\partial n_i^D}{\partial g}}{N^{D'}-\mathrm{N}^{S'}}<0 \tag{3.34}$$

$$\frac{\partial B_i^*}{\partial r}=-\frac{\frac{\partial n_i^D}{\partial r}}{N^{D'}-\mathrm{N}^{S'}}<0 \tag{3.35}$$

$$\frac{\partial B_i^*}{\partial y}=-\frac{\frac{\partial n_i^D}{\partial y}}{N^{D'}-\mathrm{N}^{S'}}<0 \tag{3.36}$$

$$\frac{\partial B_i^*}{\partial p}=-\frac{\frac{\partial n_i^D}{\partial p}}{N^{D'}-\mathrm{N}^{S'}}<0 \tag{3.37}$$

$$\frac{\partial B_i^*}{\partial w}=-\frac{\frac{\partial n_i^D}{\partial w}}{N^{D'}-\mathrm{N}^{S'}}>0 \tag{3.38}$$

$$\frac{\partial B_i^*}{\partial v_i^*}=-\frac{\frac{\partial n_i^D}{\partial v_i^*}}{N^{D'}-\mathrm{N}^{S'}}<0 \tag{3.39}$$

$$n_i^*=n_i^d(\theta,g,r,y,p,v_i^*,B_i^*(\theta,g,r,y,p,v_i^*)) \tag{3.40}$$

$$\frac{\partial n_i^*}{\partial\theta}=\frac{\partial n_i^d}{\partial\theta}(1-\frac{\frac{\partial n_i^d}{\partial B_i^*}}{N^{D'}-\mathrm{N}^{S'}})>0 \tag{3.41}$$

$$\frac{\partial n_i^*}{\partial g}=\frac{\partial n_i^d}{\partial g}\,(1-\frac{\frac{\partial n_i^d}{\partial B_i^*}}{N^{D'}\text{-}N^{S'}})<0 \qquad (3.42)$$

$$\frac{\partial n_i^*}{\partial \mathrm{r}}=\frac{\partial n_i^d}{\partial \mathrm{r}}\,(1-\frac{\frac{\partial n_i^d}{\partial B_i^*}}{N^{D'}\text{-}N^{S'}})<0 \qquad (3.43)$$

$$\frac{\partial n_i^*}{\partial y}=\frac{\partial n_i^d}{\partial y}\,(1-\frac{\frac{\partial n_i^d}{\partial B_i^*}}{N^{D'}\text{-}N^{S'}})<0 \qquad (3.44)$$

$$\frac{\partial n_i^*}{\partial p}=\frac{\partial n_i^d}{\partial p}\,(1-\frac{\frac{\partial n_i^d}{\partial B_i^*}}{N^{D'}\text{-}N^{S'}})<0 \qquad (3.45)$$

$$\frac{\partial n_i^*}{\partial v_i^*}=\frac{\partial n_i^d}{\partial v_i^*}\,(1-\frac{\frac{\partial n_i^d}{\partial B_i^*}}{N^{D'}\text{-}N^{S'}})<0 \qquad (3.46)$$

substitute B_i^* to s_i^*

$$s_i^*=s_i^*(\theta,n(\theta,g,r,y,w,p,v_i^*,$$
$$B_i^*(\theta,g,r,y,p,w,v_i^*),g,r,y,p,v_i^*) \qquad (3.47)$$

$$\frac{\partial s_i^*}{\partial \theta}=\frac{\partial s_i}{\partial \theta}+\frac{\partial s_i}{\partial n}*\frac{\partial n_i^*}{\partial \theta}<0 \qquad (3.48)$$

$$\frac{\partial s_i^*}{\partial g}=\frac{\partial s_i}{\partial g}+\frac{\partial s_i}{\partial n}*\frac{\partial n_i^*}{\partial g}>0 \qquad (3.49)$$

$$\frac{\partial s_i^*}{\partial r}=\frac{\partial s_i}{\partial r}+\frac{\partial s_i}{\partial n}*\frac{\partial n_i^*}{\partial r}>0 \qquad (3.50)$$

$$\frac{\partial s_i^*}{\partial y}=\frac{\partial s_i}{\partial y}+\frac{\partial s_i}{\partial n}*\frac{\partial n_i^*}{\partial y}>0 \qquad (3.51)$$

$$\frac{\partial s_i^*}{\partial p}=\frac{\partial s_i}{\partial p}+\frac{\partial s_i}{\partial n}*\frac{\partial n_i^*}{\partial p}>0 \qquad (3.52)$$

$$\frac{\partial s_i^*}{\partial v_i^*}=\frac{\partial s_i}{\partial n}*\frac{\partial n_i^*}{\partial v_i^*}>0 \qquad (3.53)$$

3.3 A Comparative Static Analysis of Individual Optimal Private Sexuality knowledge

$$\max_{r}[R(\theta,n_i^*,s_i^*)\text{-}M(g,r)\text{-}O(g,y)*p*s$$
$$+Q(\theta,n_i^*,s_i^*)+f(g,r)]\text{-}v^*$$

s.t. v(r)≤v*-w(y) (3.54)

$$\mathrm{L}=R(\theta,n_i^*,s_i^*)\text{-}M(g,r)\text{-}O(g,y)*p*s_i^*+Q(\theta,n_i^*,s_i^*)$$
$$+f(g,r)\text{-}v^*+(v(g,r)\text{-}v^*+w)\lambda \qquad (3.55)$$

FOC

$$\frac{\partial L}{\partial r}=\frac{\partial R}{\partial n}*\frac{\partial n_i^*}{\partial r}+\frac{\partial R}{\partial s}*\frac{\partial s_i^*}{\partial r}\text{-}\frac{\partial M}{\partial r}+\frac{\partial Q}{\partial n}*\frac{\partial n_i^*}{\partial r}+\frac{\partial Q}{\partial s}*\frac{\partial s_i^*}{\partial r}+\frac{\partial f}{\partial r}$$
$$+\lambda\left[\frac{\partial Q}{\partial n}*\frac{\partial n_i^*}{\partial r}+\frac{\partial Q}{\partial s}*\frac{\partial s_i^*}{\partial r}+\frac{\partial f}{\partial r}\right]\text{-}O(g,y)*p*\frac{\partial s_i^*}{\partial r}=0(3.56)$$

$$\frac{\partial L}{\partial \lambda}=Q(\theta,n_i^*,s_i^*)+f(g,r)\le v^*\text{-}w \qquad (3.57)$$

$$\frac{\partial^2 L}{\partial r^2}=\{[\frac{\partial^2 R}{\partial n^2}+(1+\lambda)\frac{\partial^2 Q}{\partial n^2}]\ \frac{\partial n_i^*}{\partial r}+[\frac{\partial^2 \mathrm{R}}{\partial n\partial s}+(1+\lambda)\ \frac{\partial^2 Q}{\partial n\partial s}]$$
$$\frac{\partial s_i^*}{\partial r}\}\frac{\partial n_i^*}{\partial r}+\{[\frac{\partial^2 R}{\partial s^2}+(1+\lambda)\frac{\partial^2 Q}{\partial s^2}]\ \frac{\partial s_i^*}{\partial r}+[\frac{\partial^2 R}{\partial s\partial n}+(1+\lambda)\ \frac{\partial^2 Q}{\partial s\partial n}]$$
$$\frac{\partial n_i^*}{\partial r}\}\frac{\partial s_i^*}{\partial r}+[\frac{\partial R}{\partial s}+(1+\lambda)\frac{\partial Q}{\partial s}\text{-}O(g,y)*p]\ \frac{\partial^2 s^*}{\partial r^2}$$
$$[\frac{\partial R}{\partial n}+(1+\lambda)\frac{\partial Q}{\partial n}]\ \frac{\partial^2 n^*}{\partial r^2}\text{-}\frac{\partial^2 M}{\partial r^2}+(1+\lambda)\frac{\partial^2 f}{\partial r^2}\le 0$$

$$=[\frac{\partial^2 R}{\partial n^2}+(1+\lambda)\frac{\partial^2 Q}{\partial n^2}](\frac{\partial n_i^*}{\partial r})^2+[\frac{\partial^2 R}{\partial s^2}+(1+\lambda)\frac{\partial^2 Q}{\partial s^2}](\frac{\partial s_i^*}{\partial r})^2+2$$
$$[\frac{\partial^2 R}{\partial s\partial n}+(1+\lambda)\ \frac{\partial^2 Q}{\partial s\partial n}]\ \frac{\partial n_i^*}{\partial r}\frac{\partial s_i^*}{\partial r}+[\frac{\partial R}{\partial s}+(1+\lambda)\frac{\partial Q}{\partial \mathrm{s}}$$
$$\text{-}\ O(g,y)*p]\ \frac{\partial^2 \mathrm{s}^*}{\partial r^2}\text{-}[\frac{\partial^2 M}{\partial r^2}\text{-}(1+\lambda)\frac{\partial^2 f}{\partial r^2}]\ <0 \qquad (3.58)$$

$$\frac{\partial^2 L}{\partial r\partial g}=\left\{\left[\frac{\partial^2 R}{\partial n^2}+(1+\lambda)\frac{\partial^2 Q}{\partial n^2}\right]\frac{\partial n_i^*}{\partial r}+\left[\frac{\partial^2 R}{\partial s\partial n}+(1+\lambda)\frac{\partial^2 Q}{\partial s\partial n}\right]\frac{\partial s_i^*}{\partial r}\right\}\frac{\partial n_i^*}{\partial g}$$
$$+\{\left[\frac{\partial^2 R}{\partial s^2}+(1+\lambda)\frac{\partial^2 Q}{\partial s^2}\right]\frac{\partial s_i^*}{\partial r}+\left[\frac{\partial^2 R}{\partial n\partial s}+(1+\lambda)\frac{\partial^2 \mathrm{Q}}{\partial n\partial s}\right]\frac{\partial n_i^*}{\partial r}\}\frac{\partial s_i^*}{\partial g}$$
$$*\left[\frac{\partial R}{\partial n}+(1+\lambda)\frac{\partial Q}{\partial n}\right]\frac{\partial^2 n_i^*}{\partial r\partial g}$$
$$+\left[\frac{\partial R}{\partial s}+(1+\lambda)\frac{\partial Q}{\partial s}\text{-}O(g,y)*p\right]\frac{\partial^2 s_i^*}{\partial r\partial g}$$
$$\text{-}\frac{\partial^2 M}{\partial r\partial g}+(1+\lambda)\frac{\partial^2 f}{\partial r\partial g}\frac{\partial r}{\partial g}=\text{-}\frac{\frac{\partial^2 L}{\partial g\partial r}}{\frac{\partial^2 L}{\partial r^2}}<0 \qquad (3.59)$$

$$\frac{\partial r}{\partial g}=\text{-}\frac{\frac{\partial^2 L}{\partial g\partial r}}{\frac{\partial^2 L}{\partial r^2}}<0 \qquad (3.60)$$

3.4 Government Optimal Education Policy

$$\max_{g} w(n_i^*,r_i^*,g)=\sum_{\mathrm{i}=1}^{\mathrm{I}}\begin{matrix} R(\theta,n_i^*,S_i^*)\text{-}M(g,r^*) \\ [+Q(\theta,n_i^*,S_i^*)+f(g,r^*)]\ \text{-e*g} \\ \text{-}\varphi(n_i^*,S_i^*)\end{matrix} \qquad (3.61)$$

The e denotes average cost of sexual education of school.

Differential to get optimal solution:

$$\frac{\partial w}{\partial g}=\sum_{i=1}^{I}[\frac{\partial R}{\partial n}*\frac{\partial n_i^*}{\partial g}+\frac{\partial R}{\partial s}*\frac{\partial s_i^*}{\partial g}\text{-}\frac{\partial M}{\partial g}\text{-}\frac{\partial M}{\partial r}\frac{\partial r^*}{\partial g}+\frac{\partial Q}{\partial n}*\frac{\partial n_i^*}{\partial g}$$
$$+\frac{\partial Q}{\partial s}*\frac{\partial s_i^*}{\partial g}+\frac{\partial f}{\partial g}+\frac{\partial f}{\partial r}\frac{\partial r^*}{\partial g}\text{-}\frac{\partial \varphi}{\partial n}*\frac{\partial n_i^*}{\partial g}\text{-}\frac{\partial \varphi}{\partial s}*\frac{\partial s_i^*}{\partial g}]\text{-}e=0 \qquad (3.62)$$
$$=\sum_{i=1}^{I}(\frac{\partial R}{\partial n}+\frac{\partial Q}{\partial n}\text{-}\frac{\partial \varphi}{\partial n})*\frac{\partial n_i^*}{\partial g}+(\frac{\partial R}{\partial s}+\frac{\partial Q}{\partial s}\text{-}\frac{\partial \varphi}{\partial s})*\frac{\partial s_i^*}{\partial g}$$
$$+(\frac{\partial f}{\partial g}\text{-}\frac{\partial M}{\partial g})+(\frac{\partial f}{\partial r}\text{-}\frac{\partial M}{\partial r})\frac{\partial r^*}{\partial g}-e=0 \qquad (3.63)$$

Differential (3.62) to get:

$$\frac{\partial^2 w}{\partial g^2}=\sum_{i=1}^{I}(\frac{\partial^2 R}{\partial n^2}+\frac{\partial^2 Q}{\partial n^2}\text{-}\frac{\partial^2 \varphi}{\partial n^2}](\frac{\partial n_i^*}{\partial g})^2$$
$$+[\frac{\partial^2 R}{\partial s^2}+\frac{\partial^2 Q}{\partial s^2}\text{-}\frac{\partial^2 \varphi}{\partial s^2}](\frac{\partial s_i^*}{\partial g})^2$$
$$+2\left[\frac{\partial^2 R}{\partial n\partial s}+\frac{\partial^2 Q}{\partial n\partial s}\text{-}\frac{\partial^2 \varphi}{\partial n\partial s}\right]\frac{\partial s_i^*}{\partial g}\frac{\partial n_i^*}{\partial g}$$
$$+\left[\frac{\partial R}{\partial n}+\frac{\partial Q}{\partial n}\text{-}\frac{\partial \varphi}{\partial n}\right]\frac{\partial^2 n_i^*}{\partial g^2}+\left[\frac{\partial R}{\partial s}+\frac{\partial Q}{\partial s}\text{-}\frac{\partial \varphi}{\partial s}\right]\frac{\partial^2 s_i^*}{\partial g^2}$$
$$+\frac{\partial^2 f}{\partial g^2}\text{-}\frac{\partial^2 M}{\partial g^2}+\left(\frac{\partial^2 f}{\partial r\partial g}\text{-}\frac{\partial^2 M}{\partial r\partial g}\right)\frac{\partial r^*}{\partial g}+\left(\frac{\partial f}{\partial r}\text{-}\frac{\partial M}{\partial r}\right)\frac{\partial^2 r_{\mathrm{i}}^*}{\partial g^2}<0 \qquad (3.64)$$

$$\frac{\partial^2 w}{\partial g\partial r}=\sum_{i=1}^{I}\left((\frac{\partial^2 R}{\partial n^2}+\frac{\partial^2 Q}{\partial n^2}\text{-}\frac{\partial^2 \varphi}{\partial n^2})\frac{\partial n_i^*}{\partial r}\frac{\partial n_i^*}{\partial g}\right)$$

$$
\begin{aligned}
&+\left(\left(\frac{\partial^2 R}{\partial n \partial s}+\frac{\partial^2 Q}{\partial n \partial s}-\frac{\partial^2 \varphi}{\partial n \partial s}\right)\frac{\partial s_i^*}{\partial r}\frac{\partial n_i^*}{\partial g}\right)\\
&+\left(\frac{\partial R}{\partial n}+\frac{\partial Q}{\partial n}-\frac{\partial \varphi}{\partial n}\right)\frac{\partial^2 n_i^*}{\partial g \partial r}+\left(\frac{\partial^2 R}{\partial s \partial n}+\frac{\partial^2 Q}{\partial s \partial n}-\frac{\partial^2 \varphi}{\partial s \partial n}\right)\frac{\partial n_i^*}{\partial r}\frac{\partial s_i^*}{\partial g}\\
&+\left(\frac{\partial^2 R}{\partial s^2}+\frac{\partial^2 Q}{\partial s^2}-\frac{\partial^2 \varphi}{\partial s^2}\right)\frac{\partial s_i^*}{\partial r}\frac{\partial s_i^*}{\partial g}+\left(\frac{\partial R}{\partial s}+\frac{\partial Q}{\partial s}-\frac{\partial \varphi}{\partial s}\right)\frac{\partial^2 s_i^*}{\partial g \partial r}\\
&+\frac{\partial^2 f}{\partial g \partial r}-\frac{\partial^2 M}{\partial g \partial r}+\left(\frac{\partial^2 f}{\partial r^2}-\frac{\partial^2 M}{\partial r^2}\right)\frac{\partial r_i^*}{\partial g}+\left(\frac{\partial f}{\partial r}-\frac{\partial M}{\partial r}\right)\frac{\partial^2 r_i^*}{\partial g \partial r}<0 \qquad (3.65)
\end{aligned}
$$

$$
\frac{\partial g}{\partial r}=-\frac{\frac{\partial^2 w}{\partial g \partial r}}{\frac{\partial^2 w}{\partial g^2}}<0 \qquad (3.66)
$$

A sufficient condition for the equilibrium solution is that the marginal influence of school sexual education on sex crimes is decreasing, and the relationship between school and personal sexuality knowledge is a substitute.

4. Conclusion

This paper attempts to apply the behavioral economics model, under the basic assumption of bounded rationality, in addition to the existing influencing factors of sexual crimes, to introduce psychological factors that affect sexual crimes, and to analyze the relationship between desire and rational factors under the consideration of the perpetrator's physiological constraints. Interaction, focusing on the influence of the accumulation of personal resources on the Internet and media on desire and rationality, as well as the effect of self-control on behavioral decision-making, developing different academic perspectives, improving the framework of traditional theories, and deducing how decision makers "choose" The theoretical basis of sexual crime behavior, providing the understanding of the causes of sexual crime behavior in sexual education policies, and formulating corresponding sexual education strategies accordingly, achieving the policy effect of preventing sexual crimes, and increasing the welfare of the whole society. It can be obtained from the derivation of static comparison theory. The effectiveness of private and school sexual education is inversely related. Under the goal of maximum social welfare, the two are substitute effects. Therefore, the amount of sexual education in schools should be age-appropriate, considering the different characteristics of students. Younger private sexuality knowledge is insufficient. It is necessary to strengthen sexual education in schools, and college students have more sources and accumulations of sexuality knowledge, and the amount of education in schools should not be heavy, to achieve the best sexual education policy benefits. This article provides a derivation and analysis of the theoretical framework of the impact of sexual education on campus sexual crimes. Empirical analysis will continue on actual sample data to understand the usefulness of the theoretical model.

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