

When Children Lose Bargaining Power: An Economic Model of Domestic Violence against Children

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Abstract

This paper develops a noncooperative family game-theoretic model to analyze domestic violence against children, focusing on how children's bargaining power affects the equilibrium outcomes between them and their parents in violent games. I present two scenarios: one in which children retain some negotiating leverage through external support services and another in which children lose bargaining power entirely. In the first scenario, parents use violence up to the point where children's utility matches their threat point, which is based on the support provided by external services. In contrast, parents in the second scenario maximize their violent behavior while staying below the threshold that would trigger external interventions. My analysis extends existing economic models of domestic violence by specifically addressing violence against children, who often lack the economic resources or by negotiating the leverage that adult victims may possess.

Keywords

Noncooperative Family Game Model, Domestic Violence, Child Abuse

1. Introduction

Economists began extensively analyzing domestic violence behavior between abusers and victims in the 1990s. Manser & Brown (1980) were the first to use a cooperative marriage game model to illustrate decisions and resource distribution within a household bargaining framework. McElroy & Horney (1981) model a two-player family cooperative game to derive a Nash outcome. Subsequent research switches to noncooperative game theory in domestic violence scenarios

because it allows unequal distributions among the engaged parties, has flexible restrictions on abusers, and does not require equilibrium to be Pareto optimal (Lundberg & Pollak, 1994). Farmer & Tiefenthaler (1997) used a noncooperative game model to understand how women's income levels and external support resources can affect the violence level imposed by their husbands. Tauchen et al. (1991) found that an increase in income can benefit women by relieving their utility constraints. Bloch & Rao (2002) tested a noncooperative model using survey data. They explain the relationship between dowry offers and the risk of marital violence in India, where a woman's marriage is driven by parental preferences and social norms.

Multiple factors can affect household domestic violence incidents. Farmer & Tiefenthaler (2003) found that societies with increased legal services, better economic conditions, and an aging population have fewer cases of domestic violence. Aizer (2010) proposes that decreasing the inner household wage gap could reduce violence against women. However, whether a woman's employment reduces the likelihood of abuse also depends on her partner's employment status. When men lose income, they may abuse their wives to reassert control and regain a sense of masculinity through violence (Macmillan & Gartner, 1999). However, women with jobs can always create higher utility because high-income families have a better equilibrium, as the constraint for total consumption can be relieved (Tauchen et al., 1991). Cash transfer programs aimed at helping female survivors of domestic abuse can improve their situation by providing stable housing options, economic empowerment, and less spiritual stress (Sullivan et al., 2023; Buller et al., 2018; Haushofer et al., 2019). The method used to distribute cash aid to women can alter its effectiveness (Roy et al., 2019). If transfer or external support threatens men's power of control in the house, they become more violent (Angelucci, 2008). More available and accessible shelter services can restrain violent men; however, men use violent threats without physical abuse as an alternative (Bobonis et al., 2013). Not all violent abuse is used to extract resources; some violence is used for pleasure (Haushofer et al., 2019). For example, emotional cues, such as unexpected homecoming game loss, can significantly make an area's men become more violent against their partners (Card & Dahl, 2011).

In addition to violence between husbands and wives, domestic violence often involves children. For instance, men tend to use children as bargaining chips in place of direct abuse, threatening women and forcing them to compromise (Sullivan et al., 2023). This tactic is effective because women living in a patriarchal society will be threatened verbally, physically, sexually, and mentally to obey traditional customs (Boujarian et al., 2016). Survivors with children face more barriers. Any attempt to fight for safety and relief is likely to result in unexpected consequences. More than half of women with children choose to stay in abusive relationships because of uncertainty and potential loss, causing mothers and children to drop into a zero-sum trap (Thomas et al., 2015). Furthermore, domestic violence can also affect the health of newborns. Women who experience domestic

abuse during pregnancy are more likely to give birth to babies with reduced birth weight (Aizer, 2011). Therefore, domestic violence affects not only women but also their children.

However, few studies have analyzed domestic violence against children. The traditional noncooperative game model assumes that both parties have binding constraints; however, unlike the women in the game, children have almost nothing with which to negotiate. They lack personal revenue, causing them to lose the self-empowerment channel. Although children could rely on shelter services, external interventions can be challenging due to children's strong dependence on their parents. Such power asymmetry renders the traditional noncooperative game model inadequate for explaining violence against children.

To address this gap, I develop theoretical economic frameworks to illustrate the equilibrium outcomes when children, as survivors of domestic violence, lose bargaining power. This study contributes two significant findings to the literature: 1) It demonstrates that absent or hard-to-reach external services can exacerbate the severity of abuse; 2) External forces can serve as a deterrent and impose constraints on abusive parents, preventing them from using extreme violence, even without interventions.

The rest of the paper is organized as follows. Section 2 provides a review of Farmer & Tiefenthaler (1997)'s noncooperative game model, which serves as the conceptual basis for my theoretical framework. Section 3 formally describes the methodology and combines mathematical optimization with graphical illustrations to show model development and analysis. Section 4 examines the internal and external validity of the theoretical model and discusses the challenges associated with testing the study's hypotheses using real-world data. Section 5 discusses the finding and concludes the paper.

2. Review of Farmer and Tiefenthaler's (1997) Noncooperative Game Model

In the noncooperative family game model proposed by Farmer & Tiefenthaler (1997), the husband chooses how much violence he will impose on his wife, using the extra net transfer of his income as compensation. Violence increases the man's utility by giving him the power of control and self-esteem. The extra consumption that the husband spends increases his utility. However, the more consumption he receives, the less money is available for him to transfer to his wife, making her less willing to suffer more pain. The husband's utility is also bound by the wife's threat point, which is her utility outside the marriage. If the violence he inflicts and the compensation he pays falls below her threat point, she will choose to leave the abusive relationship. Then, the husband will lose marital capital, which can be either positive or negative, and is available to him only when the wife stays.

Compared to men's utility, the wife's utility function in the noncooperative family game model has more factors. Farmer & Tiefenthaler (1997) believe that the wife's commitment to the husband plays a critical role in bargaining. Therefore,

his utility will affect her utility. Although violence decreases her payoff, his increase in utility will make her better off, but on a smaller scale compared to the extent to which she suffered from the violence. Women share the same marital capital as men. Furthermore, her utility should be at least larger than what she can get outside the marriage, which is exogenous and can be increased by better outside services, family support, divorce settlement, and so on. Accordingly, women will maximize their utility, conditioned on the violence their husbands impose, marriage capital, the net transfer from their spouse, and the utility of their husband.

The noncooperative family game model is a good theoretical representation when both parties have alternative choices and bargaining power. However, it might lose its functionality when an abused group, such as a child victim, becomes vulnerable or loses negotiating strength. Multiple types of violence may occur at different stages of a child's development. At the infant stage, parents may neglect and provide their children with insufficient basic needs. As a child grows, parents can inflict physical, psychological, or sexual abuse (World Health Organization, 2022). Such behaviors can lead to severe health issues and impaired wellness. However, most children lack the ability to detach themselves from abusive relationships. From an internal perspective, children may not possess the ability or knowledge to seek assistance. Parents can cut off their children's connections to the outside world by confining them to the home. In addition, long-term abusive relationships can cause children to develop psychological problems or believe that parental discipline and violent abuse are justified (Odhayani et al., 2013). From an external perspective, incomplete shelter services cannot replace parents. Increased restrictions and rules in shelter communities prevent young survivors from receiving instant support. These deficiencies, along with irreplaceable parental care, usually result in children returning to their abusers (Farmer & Tiefenthaler, 1996). Therefore, children do not have sufficient leverage to achieve a higher utility in the game.

3. Methodology and Model Analysis

This study employs a theoretical economic modeling approach to analyze domestic violence against children, extending Farmer & Tiefenthaler (1997)'s noncooperative family game frameworks. For better comparison, two models are defined: In the first model, the children have the leverage to negotiate, while in the second model, they lose their bargaining power. Both models specify utility functions for parents and children. Key assumptions include rational decision-making by parents, fixed parameters for external support and family capital.

3.1 Noncooperative Game Model When Children Have Bargaining Power

The first model describes domestic violence against children by parents when they have bargaining power. This model is inspired by Farmer & Tiefenthaler (1997). In

my scenario, parents' utility of violence is formalized as $U^P = U^P(R(V), U^C, C^P, \delta)$ where $R(V)$ denotes all variables that are strictly increasing in violence, such as the relief of stress, and enhanced control over the children. U^C is the child's utility. I place children's utility within parents' utility because parents may not be fully self-interested in their children. Parents extract utility from children through violence, but if children's utility is extremely low, it could threaten the intact family because a bystander could intervene and involve a third party that will start interventions. Therefore, parents consider their children's utility when making decisions regarding violence and money transfer. C^P denotes the consumption of the parents, which is a normal good that creates positive utility. δ denotes family capital, such as emotional bonds, social standing, and family cohesion. From the children's side, the utility function for them can be written as $U^C = U^C(V, C^C, \gamma)$. V denotes the violence children endure from their parents. C^C is children's consumption¹, which is determined by money transfers from parents. γ represents all factors in the family that affect the child's psychological and emotional well-being.

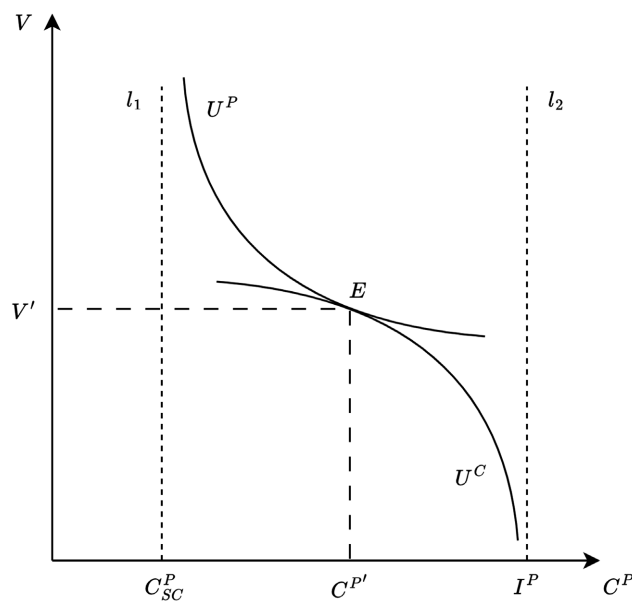


Figure 1. Equilibrium with child bargaining power.

Several factors bind the utility functions of parents and their children. Parents' consumption C^P is limited by their total income I^P and money transferred to the children C^C . Besides, parents should also ensure that the children's utility remains at least their threat point $\bar{U}^C(\theta)$ which is determined by external resources θ such as children welfare institutions. Note that γ represents capital that offers children utility only when they stay with their parents. If police engage and arrest their parents, children will lose family capital γ but receive shelter service

¹For the expression C^C , the base C refers to the consumption, while the superscript c indicates the variable specific to children. Hence, C^C denotes the consumption by children.

capital θ . θ represents all service resources that will be made available and accessible to the children, including but not limited to housing services, financial aid, trauma support, and legal representation. This can ensure that violence from parents will not cause children's payoffs to drop below a critical level. Therefore, the maximum utility equations can be written as

$$\max_{V, C^P} U^P(R(V), U^C, C^P, \delta) \text{ subject to } \overline{U^C} \leq U^C \text{ and } C^P \leq I^P - C^C \quad (1)$$

$$\max_{V, C^C} U^C(V, C^C, \gamma) \text{ subject to } \overline{U^C} \leq U^C \quad (2)$$

$$\overline{U^C} = \overline{U^C}(\theta) \quad (3)$$

Figure 1 is a graphical illustration of my domestic violence against children model when children have bargaining power and rely on outside service protection. The horizontal axis represents the consumption of parents C^P . The vertical axis measures violence level V imposed by parents against children. The curve at the top is the utility indifference curve U^P for the parents. Below is the payoff curve U^C for children. Children's utility function is concave downward because, as parental consumption increases, represented by the movement to the right on the x-axis, the amount of money available for transfer to children decreases, making children less willing to suffer more pain. The two utility functions will intercept at point E at equilibrium.

To extract the highest level of utility for parents themselves, at equilibrium, children have the exact amount of utility compared to what they can get outside the home $\overline{U^C}(\theta)$. Household consumption is bound by two vertical dash lines. The vertical dash line l_1 on the left is the parents' subsistence consumption level C_{SC}^P , and the vertical dash line l_2 on the right is the maximum parental expenditure, equal to their income I^P . Equilibrium point E cannot fall outside the range. The marginal rate of substitution (MRS) of violence and consumption at point E for children and parents are the same, where:

$$\frac{U_{V'}^P}{U_{C^P}^P} = -\frac{U_{V'}^C}{U_{C^C}^C} \quad (4)$$

The model above describes a scenario in which both parents and children have bargaining power. However, such equilibrium relies on these social services θ being available and accessible to children. If there are no local services that provide children with such support, or there are barriers preventing children from accessing shelter resources, then $\theta \approx 0$ and $\overline{U^C}(\theta) \approx 0$. Children lose their bargaining power in the game, and parents are relaxed from the constraint of the children's outside utility $\overline{U^C}(\theta)$.

²On the left of the equation captures the MRS between the utility parents derive from violence ($U_{V'}^P$) and the utility they derive from consumption ($U_{C^P}^P$). Similarly, on the right side is the MRS between violence and consumption for children. Note that the children's consumption level C^C at equilibrium point E is not shown in **Figure 1**.

3.2. Noncooperative Game Model When Children Lose Bargaining Power

In my second model, when children lose bargaining power, parents are restricted by two factors: the maximum level of violence against children, V^* and minimum spending on children, $C_{SC}^{C^*}$. These two restrictions ensure that children are not seriously injured or do not lack the supplies necessary to survive. If any restrictions have been violated, parents can no longer hide evidence of their abusive behavior and thus lose the chance to exploit their children. For example, if a parent strikes a child with extreme violence $V > V^*$, excessive bleeding or fainting may occur. Parents are unable to handle such injuries themselves. To prevent a fatality, they choose to call an ambulance. The police arrive, investigate, and find that the injuries are caused by domestic violence, leading to arrest. Therefore, parents tend to inflict violence within a controllable range to avoid external intervention. They maximize their utility functions under boundaries of V^* and $C_{SC}^{C^*}$. The optimum violence level and parental consumption will be enforced on children because they have no bargaining power and, therefore, can only act as passive receivers. The utility function can be written as

$$\max_{V, C^P} U^P(R(V), U^C, C^P, \delta) \text{ subject to } V \leq V^* \text{ and } C^P \leq I^P - C^C \leq I^P - C_{SC}^{C^*} \quad (5)$$

$$U^C = U^C(V, C^C, \gamma) \quad (6)$$

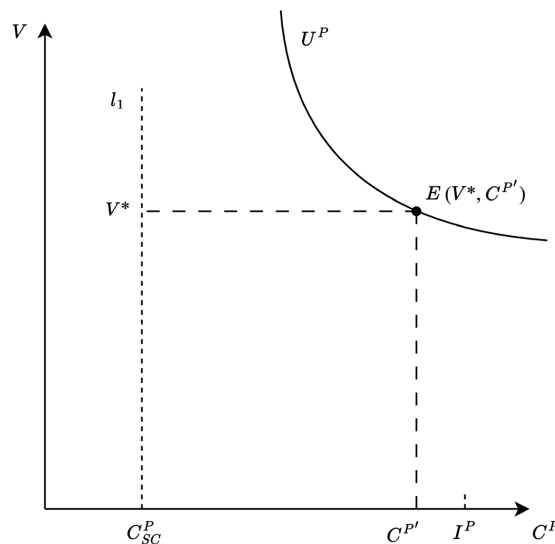


Figure 2. Equilibrium without child bargaining power and parents are purely self-interested.

I first analyze the equilibrium outcome when abusive parents are purely self-interested (see **Figure 2**). In such cases, the children’s utility does not affect parents’ payoffs. Then, instead of $\max_{V, C^P} U^P(R(V), U^C, C^P, \delta)$, parents’ utility function will be $\max_{V, C^P} U^P(R(V), C^P, \delta)$. The rectangular areas defined by V^* , E , $C^{P'}$, and C_{SC}^P are the parental consumption and violence level strategy profiles,

respectively. Consumption and violence pairs in the rectangular area allow parents and children to maintain a family relationship, and any strategy point outside the rectangular region will lead to third-party interventions, such as police arrest. The optimum choice among the strategy sets is point E , where parents only transfer the exact amount of sustainable consumption $C_{SC}^{C^*}$ to their children, consume all disposable income $C^P = I^P - C_{SC}^{C^*}$ for their own utility, and impose the highest level of violence V^* .

Now, suppose I do not omit children's utility in the parent's utility function. The initial increase in V provides high marginal utility to parents because $\frac{\partial R(V)}{\partial V} > 0$ and $\frac{\partial^2 R(V)}{\partial V^2} < 0$. As parents impose more violence, the negative impact on children's utility U^C becomes pronounced, reducing U^P significantly because $\frac{\partial U^C}{\partial V} < 0$, $\frac{\partial^2 U^C}{\partial V^2} < 0$ and $\frac{\partial U^P}{\partial U^C} > 0$. Any further increase in V beyond the optimal point would reduce U^P because the diminishing return of V on $R(V)$ makes the additional utility gained from $R(V)$ cannot be offset by the loss in utility from the decreased U^C . To find the equilibrium, set the violence point where additional utility gained from $R(V)$ is exactly offset by the loss in utility U^C as \bar{V} . The equation can be written as:

$$U^P = U^P(R(V), U^C, C^P, \delta) \text{ subject to } V \leq V^* \text{ and } C^P \leq I^P - C^C \leq I^P - C_{SC}^{C^*} \quad (7)$$

Maximize parents' utility U^P with respect to V

$$a) \frac{\partial U^P}{\partial V} = \frac{\partial U^P}{\partial R(V)} \cdot \frac{\partial R(V)}{\partial V} + \frac{\partial U^P}{\partial U^C} \cdot \frac{\partial U^C}{\partial V}$$

Set the derivative to zero for optimization:

$$b) \frac{\partial U^P}{\partial R(V)} \cdot \frac{\partial R(V)}{\partial V} + \frac{\partial U^P}{\partial U^C} \cdot \frac{\partial U^C}{\partial V} = 0$$

At the optimum parental utility point:

$$c) \frac{\partial U^P}{\partial R(\bar{V})} \cdot \frac{\partial R(\bar{V})}{\partial \bar{V}} = - \frac{\partial U^P}{\partial U^C} \cdot \frac{\partial U^C}{\partial \bar{V}}$$

If $\bar{V} > V^*$ (see **Figure 3**), parents will maximize utility by setting $V = V^*$, because at V^* , $\left| \frac{\partial U^P}{\partial R(V^*)} \cdot \frac{\partial R(V^*)}{\partial V^*} \right| > \left| \frac{\partial U^P}{\partial U^C} \cdot \frac{\partial U^C}{\partial V^*} \right|$.

If $\bar{V} \leq V^*$ (see **Figure 4**), parents will maximize utility by setting $V = \bar{V}$, because $\left| \frac{\partial U^P}{\partial R(\bar{V})} \cdot \frac{\partial R(\bar{V})}{\partial \bar{V}} \right| = \left| \frac{\partial U^P}{\partial U^C} \cdot \frac{\partial U^C}{\partial \bar{V}} \right|$.

Parents will not abuse children using violence level V^* , due to

$$\left| \frac{\partial U^P}{\partial R(V^*)} \cdot \frac{\partial R(V^*)}{\partial V^*} \right| \leq \left| \frac{\partial U^P}{\partial U^C} \cdot \frac{\partial U^C}{\partial V^*} \right|$$

³Parents' subsistence consumption level is the minimum spending for parents' strategy profile.

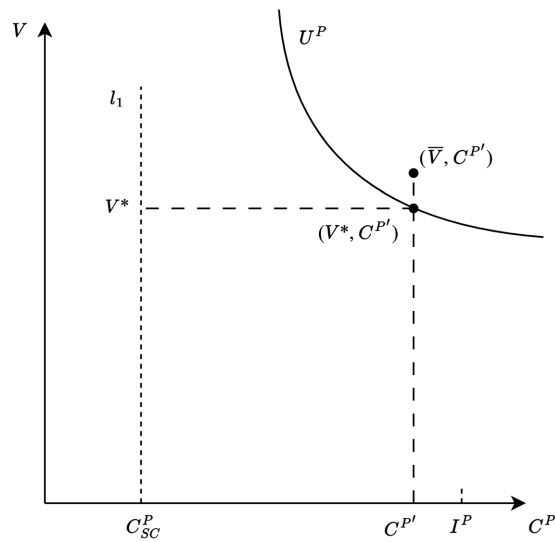


Figure 3. Equilibrium without child bargaining power and with $\bar{V} > V^*$.

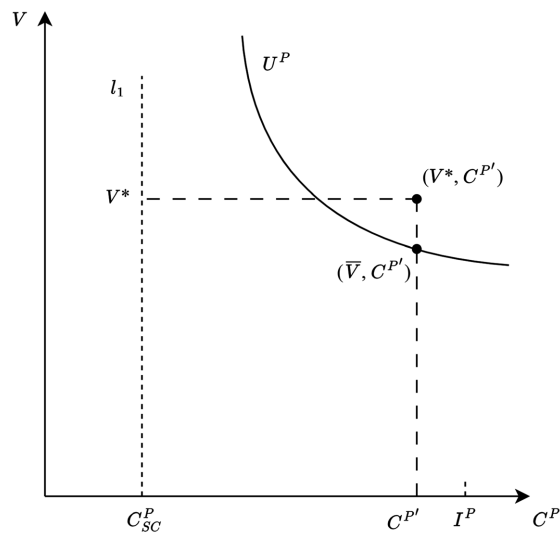


Figure 4. Equilibrium without child bargaining power and with $\bar{V} > V^*$.

The equilibrium results show that parents will not use violence greater than V^* even when their children lose their bargaining power. Parents' actions are limited by the threat of external interventions that serve to protect children's rights and constrain the maximum level of abuse that parents can enforce on their children. These findings underscore the crucial role of support services and legal protection in safeguarding against and mitigating domestic violence against children.

However, providing children with accessible external services remains a challenge. Children usually return to their abusers after staying in shelters. Research has found that victims' choices to return to their situation frustrate service providers, leading to reduced service quality (Farmer & Tiefenthaler, 1996). In recent years, shelters have implemented more rules for community residents, restricting survivor empowerment (Glenn & Goodman, 2015). Such increasing regulations

and codes of conduct within the community create isolation and force survivors to leave (Wood et al., 2020). Furthermore, for domestic violence, police involvement is a palliative treatment, and its effect is transitory (Tauchen & Witte, 1995). These challenges emphasize the need for more effective and sustainable interventions to protect children from abuse.

4. Validity Discussion

In my model, I made several key assumptions necessary for the mathematical calculations; however, these may limit its real-world applicability. I assume that the parents and children are rational. Parents decide to maximize their utility within a set of binding constraints. However, this may oversimplify the irrational nature of human violence when abusive decisions are driven by emotional disorders or impulsivity. In addition, my model assumes fixed parameters such as external support services. Such fixed assumptions cannot reflect the actual value that each household can obtain from the outside because different geographical and economic restrictions may lead to different accessibility. Similarly, measuring bargaining power and shelter support effectiveness can be difficult.

Regarding the model's external validity, cultural factors such as social norms or child-rearing policies can affect the dynamics of domestic violence, which my analysis does not capture. Further research should address these variations to test the effectiveness of the noncooperative game model across diverse settings. In addition, the theoretical model should be tested using real-world data. However, the availability and quality of data could be a problem because, in the context of child abuse, underreporting and legal deficiencies could impact data records.

5. Conclusion

In this paper, I develop a noncooperative game model of domestic violence to explore how the loss of bargaining power can affect a victim's equilibrium utility. My model focuses on domestic violence against parental children. The results were derived under two conditions. Under the first condition, children retain some negotiating leverage with the help of external services. In the second condition, children lose it entirely, which closely reflects reality because shelter services could be difficult for children to access, and parental care is difficult to replace. My theoretical results indicate that the loss of negotiating leverage makes children vulnerable and more likely to suffer severe abuse.

Cultural factors that are difficult to measure or challenges regarding data accessibility could impact the model validation process. Moreover, legal interventions, such as police assessment or immediate shelter support, are not always practical for child survivors because the loss of primary caregivers can further exacerbate children's vulnerability. Therefore, a balanced approach that combines legal protection with a comprehensive support system is required for child survivors.

In conclusion, this paper fills a gap in the noncooperative game model analysis of domestic violence against children. This study underscores the importance of

external support for protecting children from domestic violence. This study provides a theoretical foundation for future research and policy interventions aimed at enhancing the protection and empowerment of child survivors.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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