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Difficulties in Emotion Regulation and Optimistic Bias in Young Drivers' Risky Driving Behaviors

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Abstract. Risky driving behavior is the most dominant human error among young novice drivers. This research's objective was to find the correlation between difficulties in emotion regulation and optimistic bias towards risky driving behavior of teenagers. Sample was Senior High School students from grade 10 to 11 S who drove private vehicles on a daily basis (N=160). Instruments used were modified Behavior of Young Novice Drivers' Scale (BYNDS), modified Difficulties in Emotion Regulation Scale (DERS) and optimistic bias scale. Hypotheses were tested using multiple regression analysis. Results showed that there was a positive and significant correlation between difficulties in emotion regulation and optimistic bias towards risky driving behavior (F (2, 157) = 47.846; p < .01). Bigger contribution was found on difficulties in emotion regulation, indicating that teenagers while driving, relied more on their emotion regulation abilities than their awareness of driving risks.

***Keywords*:** emotion regulation; optimistic bias; risky driving behavior; teenagers

The increase of private vehicle use is followed by the rise of traffic accidents rate in Indonesia (Jusuf et al., 2017; Soehodho, 2007). Based on WHO Global Road Safety report in 2018, traffic accidents still become one of the biggest risk factors in developing countries, especially in Africa and Southeast Asia, which reported three times higher death rates due to traffic accidents compared to the global index (WHO, 2018). Indonesia is one of the biggest contributors for the most deaths due to traffic accidents. Statistically speaking, the latest traffic accidents fatality rate in Indonesia was 18.01 per 100.000 of population (WHO, 2018). To note, this number is always on the linear rising trend where fatality rate was 4.71 in 2004 and rose as high as 13.74 in 2011 per 100.000 of population (Jusuf et al., 2017).

Statistical data also showed that economic loss due to traffic accidents in low to mid GDP countries had reached 3% of GDP (WHO, 2015). Indonesia reported that 2021's economic loss due to traffic accidents as per February was IDR 295 million (Korlantas, 2021). Thus, we should never turn blind eye to the huge impact of traffic accidents and its need for more attention, especially in finding the effective preventive solution. Preventive action needs more planned execution, especially in terms of determining the cause of the accidents. The most reported and biggest traffic accidents cause is human error (Ulleberg & Rundmo, 2003). Human error consists of risky driving behaviors such as violation of traffic signs and careless driving.

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Risky driving behavior is the most dominant human factor in young drivers (Reason et al., 1990). This is in line with the fact that the highest traffic accidents victim is reported by this age group both in Indonesia and other countries (WHO, 2018). Included in this group are high school and college students. Private vehicles, especially motorbikes, are very popular due to their practicality and time efficiency. One of the main reasons to use private vehicles for students is to lessen parents' burden to drive their children from and to school.

Globally, young drivers by WHO are grouped into people aged 15 to 29 (WHO, 2015). This age grouping depends on the policy of each country (Scott-Parker, 2017). Indonesia's Traffic Corps (Korlantas) often groups young drivers between 15 to 19 years old, similar to the age group of high school students' age in Indonesia (CNN, 2021). Therefore, young drivers in this research belong to this age group. This age group, by experts, is noted for the transition period from a child to an adult, characterized by their biological, psychological, moral, religious, cognitive and social developments (Sarwono, 2016). During this period, they explore their self-capabilities and are faced by their discovery of selves, how will they grow to be and where will they go in the future. Having their own private vehicle is one of the freedom expressions given by their parents. Driving, in this period, is not only seen as a transportation mode but also as a way to express their self-capabilities and freedom (Constantinou et al., 2011).

Young drivers have significantly more risk of being involved in traffic accidents compared to the other age groups (Constantinou et al., 2011; Regev et al., 2018; Scott-Parker & Oviedo-Trespalacios, 2017). Other factors include their lack of experience, but with the tendency to overestimate their abilities and underestimate the possibilities of accidents (Fisher et al., 2002). Young drivers believe they have less risk of being involved in accidents compared to adult drivers and their own peers (Constantinou et al., 2011). Their significant development progress has an impact on risky driving behavior since risk taking is one of the most common things to do during this period (Scott-Parker, 2012). Not only that, they are also affected by both personal and social factors (Shope & Bingham, 2008).

Not much different with global research, research on traffic accidents in Indonesia indicates that young drivers in Indonesia tend to get distracted and generally unaware of the dangers of risky driving (Santosa et al., 2017; Zuraida e al., 2017). Moreover, Joewono and Susilo (2017) found that motorbike drivers in young age group take bigger risks than older age group drivers.

Therefore, trait, social and personal factors all need to be considered in learning more about risky driving behavior in young drivers (Scott-Parker, 2012). This identification will eventually lead to significant contribution in policy making and to get a more preventive solution of traffic accidents.

Difficulties in Emotion Regulation and Risky Driving Behaviors

Most studies have found that attitudes towards safety is the variable correlated to aggressive and careless driving behaviors (Ulleberg & Rundmo, 2003). In result, many preventive programs were held to give importance in abiding traffic laws and rules, intended to change their attitudes. However, these programs still have not managed to decrease the traffic accidents rates. This failure can be attributed to how most of the programs intend to change the attitudes without considering the role of emotions and the drivers' decision-making capabilities (Ulleberg & Rundmo, 2003).

Attitudes and behavior relate strongly to emotions. Chan and Singhal (2013) found that emotion directs drivers' attention from driving as an activity to an emotional stimulus which resulted in loss of attention and important information processing while driving. Young drivers are more vulnerable to emotional driving (Scott-Parker, 2017). A study has found that in the US, most young drivers have driven while having both strong negative or positive emotions such as anger or excitement. For example, angry driving is associated with the high tendency to speeding (Gulliver & Begg, 2007). Furthermore, excitement can lead to overly heightened sensation or expression seeking. These things can affect driving behavior since sensation can turn young drivers to alter their behavior to be riskier so that they can get more intense experience while driving (Scott-Parker, 2012). These findings indicate that emotion can play a big role in driving safety, especially if it can be regulated well. With good emotion regulation, individuals can control themselves to avoid negative behaviors (Mawardah & Adiyanti, 2014).

Emotion regulation refers to how we can control what emotion to have, when to have it, and how to experience and express those emotions. In Western context, emotion regulation includes the process of minimizing experience and behaviors resulted from negative emotions such as anger, fear, and sadness. Positive emotion is also regulated, such as when we attempt to look less excited after defeating other people (for courtesy). Emotion regulation can also involve the process of maximizing emotional experience, such as when we share good news to other people to strengthen its impact (McRae & Gross, 2020). Gratz and Roemer (2004) defined emotion regulation as individual's emotional abilities such as emotional awareness, clarity, acceptance, impulsive control; and their ability to fulfill their goals despite having negative emotions; and capability of using proper strategies to modulate their expected emotional responses. The inexistence of one of these abilities indicates the difficulties in emotion regulation (Trógolo et al., 2014).

Rhodes and Pivik (2011) found that there is an interaction between emotion and risk perception, especially in young drivers. Risk perception and situational awareness are vital for drivers to recognize the environment in which they are driving (Whelan et al., 2002). Risk perception is a subjective measurement of the possibility of anything and how big the consequences might be (Ghosh, 2004). Emotion certainly plays a role. Hu et al. (2013) found that negative emotion induces a higher risk perception while positive emotion induces lower risk perception. Hence, the ability to regulate both positive and

negative emotions becomes more important since while driving, drivers are always faced with risky situations and the need for rapid decision making.

Meta analysis conducted by Scott-Parker (2017) indicates that difficulty in emotion regulation is associated with risky driving behaviors. In Indonesia, related research had been conducted to examine the association between self regulation—in which one of its characteristics is the ability to modulate emotion—with risky driving behaviors. Nirmala and Patria (2018) found that self regulation was negatively associated with risky driving behavior while conformity was positively associated. Based on these findings, we predicted difficulties in emotion regulation will correlate positively with risky driving behavior.

Optimistic Bias and Risky Driving Behavior

Optimistic bias is defined by the tendency of individuals to believe that positive experiences are more likely to happen compared to negative experiences (Weinstein, 1989). When individuals consider themselves to be less likely to have a negative experience compared to other people in their group, unrealistic optimism is formed (Ghosh, 2004).

Optimistic bias has been studied in variations of research topics and is associated with risky behaviors ranging from health to business risks (e.g. Masiero et al., 2018; Wu et al., 2018). Most studies in optimistic bias have found that this tendency is more likely to appear in conditions that can be controlled personally, and individuals indeed see themselves having less risks compared to others (Dillard et al., 2009). Optimistic bias is especially relevant in traffic safety since the ability to measure risks can determine whether to behave risky or safely. Previous research has consistently found that the majority of drivers consider themselves to have above average capabilities in driving and believe that they will be less likely to get involved in accidents compared to other drivers (Gosselin et al., 2010). This kind of optimism can make people feel less vulnerable and less motivated to engage in protective behaviors (White et al., 2011).

Cestac et al. (2011) found that in social comparison, majority of drivers experience optimistic bias by overestimating their driving abilities, seeing their abilities as better than others. This, in turn can affect their driving behaviors as confirmed in research conducted by Jovanovic et al. (2014). By assuming that low risk perception is associated with careless driving, they found that there is a significant correlation between risk perception and overestimation of driving ability and rates of traffic regulation violation and traffic accidents. Not only in Europe, in Indonesia inaccurate risk perception has also led to high risky driving behavior among young drivers (Agung, 2014). Hence, we predicted that higher optimistic bias will be followed by higher risky driving behaviors.

Current Research

The high number of traffic accidents in young drivers and the complexities of their development stages led to our interest in doing research in this age group, especially among high school students. Seeing high school students driving is not something new in Indonesia and mostly happens in big cities in Indonesia, such as Surakarta. Geographically, Nusukan region is one of the regions with most reported transportation modes and activities in Surakarta (BPS Surakarta, 2016). One of the high schools located in this region is SMAN VI Surakarta, which based on field study fits the criterion for research sample. This school was also chosen for its strategic location, namely being far away from police station, which can lead to the possibility of higher risky driving and also the freedom for the students to drive even with no driving license.

In choosing this location, we did a small observation and interviews with involved parties. Based on the teachers' explanation, almost 60 to 70% students drove their own vehicles, whether they had driving licenses or not, and at least 2% of them had experienced traffic accidents while driving. In line with the teachers, all of the students interviewed admitted that they often engaged in traffic violations while driving. One of them was even caught by the police due to not using safety equipment, such as helmets. Moreover, when asked why they did that despite knowing the risks, they considered the actions as menial or 'normal' violations.

Studies on risky driving behaviors in young drivers have been well documented, both in Indonesia and globally. However, not many have identified the variables directly related to the context of risk taking in driving, especially in Indonesia. The tendency of young drivers to take risks can be dependent on their emotional competency, such as difficulties in emotion regulation. Moreover, variables such as optimistic bias is an interesting take since this variable is directly associated with subjective measurement of risk perception. While similar in its sense, they differ because optimistic bias can be considered as heuristic judgment often associated with emotion-laden decision making (Bodenhausen, 1993). Both variables, emotion regulation and optimistic bias, rely on the role of emotion, and are relevant to the risky driving behaviors of young drivers since they belong in the critical period of emotional development (Chervonsky & Hunt, 2019).

This research was conducted to examine the relationship between emotion regulation and optimistic bias with risky driving behaviors, especially in young drivers. This research hoped to contribute to giving more informations about difficulties in regulation emotion, optimistic bias, and risky driving behaviors, while practically could give a consideration in developing preventive programs for traffic accidents.

Method

Sample

Population in the research were all students of SMAN VI Surakarta grade 10 to 11 who used private vehicles on a daily basis, with total population of 261 students. They were

identified by the age group of 15 to 17 years old. We decided not to consider the ownership of driving license since previous research has indicated that there is no correlation between driving license ownership and traffic accidents or driving knowledge (Nastiti, 2017).

Sample was acquired using cluster random sampling. The clusters identified were grade 10 and grade 11. Grade 10 was divided into eleven groups and grade 11 was divided into nine groups. From each cluster, we took five groups randomly for research by lottery. We used the Slovin formula to determine the minimum sample size. Based on the calculation with tolerance of error 5%, the sample needed was at least 158 students. Due to the controversies surrounding the validity of Slovin formula (Tejada & Punzalan, 2012), we also used a sample size calculation using Gpower 3.1 (Erdfelder et al., 2009) with power (1-β) set at 0.70 and α = 0.05 based on effect size of 0.05 (calculated based on previous research). This calculation generated a similar sample size with at least 158 students needed to get a comprehensive finding.

Data collection was conducted in ten days with 199 students using self report questionnaires. They were administered classically in each class during counselling guidance class with the school permission. Fifteen students were exluded from analysis due to incompleteness of the questionnaires and the other 24 were considered outliers based on Mahalanobis distance, Cook's distance and leverage. Final sample used in the analysis was 160 students.

Instruments

Risky driving behavior was measured the Behavior of Young Novice Drivers Scale (BYNDS), developed by Scott-Parker et al. (2012) and modified by the author consistent with Indonesian context. For example, authors eliminated all items involving legal alcohol consumption or illegal drugs, as these violations are not particularly documented among youngsters in Indonesia. Other modifications included the addition of helmets usage for safety measures, considering majority of the population use motorbikes instead of cars. This measure was chosen due to its relevancy for target respondents and has been through a well-documented validity testing (Scott-Parker et al., 2012). The scale was a Likert 5-points ranging from 1 for never to 5 for always, consisting of 27 items (α=0.893) with dimensions such as transient violations ("*You deliberately sped when overtaking*"), fixed violations ("*Your passengers did not wear helmets or seatbelts*"), misjudgment ("*You misjudged the gap when you were turning right*"), risky exposure ("*You drove at dusk or dawn*"), driver mood ("*Your driving was affected by negative emotions like anger or frustration*"). Higher score in the scale indicates higher tendency of engaging in risky driving behavior. All scale modifications have been going through content validity by methodological experts. Item analysis conducted prior also showed the scale having a good item discrimination index with corrected item total correlation (r_{it}) ranging from 0.301 – 0.656.

Difficulties in emotion regulation was measured using Difficulties in Emotion Regulation Scale (DERS) by Gratz and Roemer (2004) based on six emotion regulation dimensions which are non-acceptance of emotional responses ("*I become irritated with myself when I am upset*"), difficulties engaging in goal-directed behavior ("*I have difficulty getting work done when I am upset*"), impulse control difficulties ("*I have difficulty thinking about anything else when I am upset*"), lack of emotional awareness ("*My emotions feel overwhelming when I am upset*"), limited access to strategies ("*I believe that I will remain that way for a long time when I am upset*") and lack of emotional clarity ("*I have difficulty making sense out of my feelings*."). This scale has been adapted frequently to Indonesian language and was often used to target respondents with younger age group (e.g. Amanda et al., 2018; Athalia & Kilis, 2020). We employed the adapted version by Putri (2015). The scale was Likert 5-points ranging from 1 for highly disagree to 5 for highly agree, consisting of 21 items (α=0.920) with item discrimination index ranging from 0.432 - 0.796. Higher score in the scale indicates higher difficulties in emotion regulation faced by the individual.

Optimistic bias. We employed direct comparison technique with a scale constructed by the authors based on three life event risks defined by Prentice et al. (2005). We asked respondents how likely they are to experience these events based on three life risks which are controllable ("*Getting involved in traffic accidents due to traffic violations*"), uncontrollable ("*Becoming a victim of mugging in the road*") and neutral ("*Getting stuck in a bad traffic*"). The scale was a Likert 7-points ranging from 1 for very unlikely to 7 for highly likely. Final scale consists of 21 items (α=0.936) with item discrimination index ranging from 0.333 – 0.779. Lower score indicates higher optimistic bias.

A preliminary study was conducted to 33 respondents to analyze the basic psychometric components of each scale, the descriptive statistics, and discriminatory index to determine whether to keep or drop the items. Reliability testing was conducted by internal consistency technique Cronbach's Alpha.

Data Analysis

To test the relationships between independent variables difficulties in emotion regulation and optimistic bias with dependent variable risky driving behavior, we used multiple linear regression. Prior to hypothesis testing, all the assumptions for multiple linear regression were tested. The research model has met the normality, linearity, no multicollinearity, autocorrelation, and heteroscedasticity assumptions. All the tests were conducted with the help of statistical program Statistical Product and Service Solution (SPSS) version 24.0 for Windows.

Results

Prior to hypothesis testing and after the assumptions testing, we employed demographic analysis with mean comparison. Respondents' characteristics were shown in Table 1.

Table 1.

Respondents' Characteristics

Characteristics	N	%
Age		
15 years old	18	10
16 years old	81	51.25
17 years old	61	38.75
Sex		
Male	92	57.5
Female	68	42.5
Years of driving		
1-2 years	78	48.75
3-4 years	46	28.75
5-6 years	28	17.5
7-8 years	8	5

Mean comparisons based on age and number of years since driving were conducted using analysis of variances (ANOVA), meanwhile comparison based on gender was conducted using Mann Whitney since this grouping distribution did not meet the homogeneity assumption. Analysis results were shown in Table 2. We found no differences in risky driving behavior based on demographic characteristics age, gender or number of years since driving.

Table 2.

Risky Driving Behavior Mean Comparisons Based on Demographic Characteristics

ANOVA					
Predictor	**Sum of Squares**	***df***	**Mean Square**	***F***	***Sig.***
Age	405.219	2	202.610	1.211	0,301
Years of driving	479.819	3	159.940	0.953	0,417

Mann Whitney Test				
Predictor	**Mann Whitney *U***	**Wilcoxon *W***	***Z***	***Sig.***
Sex	2884.500	5230.500	-0.841	0.401

Regression analysis showed a significant relationship between difficulties in emotion regulation and optimistic bias together with risky driving behavior in young drivers from SMA Negeri 6 Surakarta ($F(2, 157) = 47.846$; $p < 0.01$) with $R^2 = 0.379$. This indicated that 37.9% of variances and predictors difficulties in emotion regulation and optimistic bias explained risky driving behavior, while the other 62.1% were explained by other factors outside the research.

Table 3.

Partial Correlations

Model	Unstandardized Coefficient		Standardized Coefficient	*r*	*t*	*Sig.*
	B	*SE*	Beta			
Constant	29.561	6.249			4.731	0.000
DERS	0.928	0.108	0.552	0.566	8.605	0.000
OB	0.151	0.053	0.183	0.222	2.852	0.005

a Dependent variable: BYNDS ($R = 0.615$, $R^2 = 0.379$, Adj. $R^2 = 0.371$)

Partial correlation shown in Table 3 was conducted to examine each independent variable's association with the dependent variable once the other variables were statistically controlled. When optimistic bias was statistically controlled, significant and positive correlation was found between difficulties in emotion regulation and young drivers' risky driving behavior ($\beta = 0.552$; $r = 0.566$; $p < 0.05$). In other words, the higher the difficulties in emotion regulation, the higher their tendency to be engaged in risky driving behavior. Meanwhile when the difficulties in emotion regulation were statistically controlled, significant and positive correlation was also found between optimistic bias with risky driving behavior ($\beta = 0.183$; $r = 0.222$, $p < 0.05$). The higher respondents' tendency to be optimistically biased, the higher their risky driving behaviors. Comparisons of β score of each variable showed that higher contribution was given by difficulties in emotion regulation compared to optimistic bias.

Discussion

This research was conducted to examine whether difficulties in emotion regulation and optimistic bias tendency were associated with risky driving behaviors in young drivers. Results showed these two variables indeed significantly predict the tendency of young drivers to engage in risky driving behaviors.

Previous studies have found the associations of young drivers' driving behavior with their emotional competencies (Scott-Parker, 2017). Young drivers, in terms of their developmental stage, are more vulnerable to driving emotionally. Based on the developmental stages, this period is the peak of emotional development. One of the

achievements of this emotional development is a competent emotion regulation. Emotion regulation refers to individuals' ability to control and match their emotional reactions with the appropriate intensity to reach their goals. Moreover, young people in this stage are more likely to develop egocentric attitudes (Redshaw, 2004). Egocentrism is one of the key factors inducing the tendency to be optimistically biased, or the tendency to believe their likelihood to experience positive events is higher than that of the negative events.

Firstly, this research is in line with previous studies which have found the association between emotions and driving behaviors. Among them are Scott-Parker (2012) who had found emotion as a big factor in risky driving for young drivers, and Chan and Singhal (2013) who also found emotion is related to their attention management while driving. Specifically, this research extends those studies by explaining that not only the emotion valences, but their difficulties in emotion regulation affected by their developmental stages are main drivers of risky driving behaviors in young drivers. This result supports the findings of Trógolo et al. (2014) where they found that difficulties in emotion regulation were associated with driving behavior that is aggressive and dissociative. Aggressive and dissociative traits can be considered risky when we put them in the context of driving, where the need for a full attention is high.

Each individual has different risk perceptions for each life event. Therefore, risk perception is a subjective measurement by individuals of how likely an event to happen and how big the consequences are likely to happen (Sjöberg et al., 2004). Risk perception is ideally formed by the assumption of rational decision making, where individuals are expected to evaluate the consequences based on benefit and loss. However, this judgment is not always rational and can be easily affected by heuristics (Paek & Hove, 2017). One of the heuristic judgments in risk perception is the optimistic bias. People with high optimistic bias are more likely to perceive their risks to be less than that of others (Dillard et al., 2009; Paek & Hove, 2017). Optimistic bias is especially relevant in traffic safety since risk perception ability can determine whether people behave safely or risky, including driving. Jiang et al. (2008) found optimistic bias in their respondents with high risky driving behaviors. This finding is also supported by Jovanovic et al. (2014) who found that there is a significant association between risk perception, overestimation of driving ability with the likelihood of drivers to engage in traffic violations and accidents. In line with those findings, this research specifically found the significant association between optimistic bias in perceiving risks while driving and risky driving behaviors.

We found a bigger contribution of difficulties in emotion regulation more than optimistic bias in predicting risky driving behaviors. This can be attributed to the fact that optimistic bias as a construct is more often measured in the group level of analysis, where the life events had been specified and measurement targets were comparative. The measurement in the individual level of analysis is not very well-documented. Due to those limitations, research with optimistic bias can be considered new. Weinstein et al. (2005) stated that the methodological problems in measuring optimistic bias could explain

the difficulties in examining how this bias can directly influence risky behaviors, unlike easily accessed constructs such as self-efficacy or affects. Higher contribution in emotion regulation also indicates that young drivers in particular, rely more on their emotional controls rather than their risk awareness while driving.

We also found gender as a variable with insignificant contribution in determining whether there was a difference in risky driving behaviors among these groups. In contrast with previous studies who have found gender as a significant predictor to risky driving behaviors (e.g., Jelalian et al., 2000; Scott-Parker, 2017), we found no evidence to support these findings. Meanwhile, this result is in line with the suggestion that the gap between men and women is decreasing each year (Chen et al., 2010). Furthermore, hormonal effect and cognitive analysis by Kusev et al. (2017) on risky behaviors also showed no evidence for differences based on gender.

Not only gender, we also did not find any evidence of differences based on age in the young drivers' age group or number of years since driving, in contrast with previous theories in how age can influence risky driving or the development of emotional competencies (Scheibe et al., 2016; Scott-Parker, 2012). However, this can be very well explained for the small gap of age numbers in our sample age group. Therefore, the age range for young drivers should be important to define for future research, considering these variations are vital to generalization and the need of designing target-appropriate intervention programs (Scott-Parker, 2017). Constantinou et al., (2011) found that young drivers in productive age were significantly more likely to be involved in traffic accidents than other age groups. Hence, different results might be found among other age groups.

Conclusion

Our findings generally supported our main hypothesis indicating the association between difficulties in emotion regulation and optimistic bias with risky driving behaviors in young drivers. This finding can be included in suggestions for relevant parties such as the school, communities and authorities on the importance of good emotion regulation development strategies and in raising risk awareness to minimize risky driving behavior.

Limitations and Future Research

This research is not free from limitations. Among them is scale administration which could not be distributed at the same time, hence we could not ensure identical conditions and contexts for data collection. To overcome this, we could only ensure the exact standard of the instructions given during each administration. We also could not find differences based on age, in contrast with previous theories. Therefore, consideration given for future research is to employ samples from various age groups.

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Author's contribution
First author NA was responsible for the overall content of the article. NA built the theoretical concepts, did the data collection and wrote the whole manuscript. Second author M helped in developing theoretical concepts, literature review and managing data collection. Finally, PAS developed the original research ideas, responsible for most of the data analysis and some parts of the discussion.

Conflict of interests
The authors declare no conflict of interests in writing this article.

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