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Sustainability Pays: How Economic and Environmental Considerations Influence Consumer Intention towards Purchasing Electric Vehicles

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Abstract

The research examines the factors that influence the intentions and behavior of North Indian consumers to adopt electric vehicles (EVs). To comprehend the two routes impacting customer intention and use behaviour, it makes use of the Economic Man Theory and Value-Belief-Norm Theory. Based on the results of a survey conducted on 520 EV owners in North India, sustainability and economic benefits influence behavioral intention heavily and environmental awareness does not. It was found that behavioural intention was a major intermediary between these variables and actual usage behaviour. The analysis indicates that the adoption of EV can be increased through improving the economic benefits, the importance of sustainability narratives, and bridging the awareness-action gap. Nevertheless, the cross-sectional nature of the study and geography restrictions suggest that one should be cautious in generalizing the results.

Keywords: *Electric Vehicle Adoption, Consumer Behaviour, Sustainability, Economic Benefits, Environmental Awareness, Emerging Market*

Introduction:

Transportation contributes approximately 25 percent of global CO 2 emissions and is a significant source of air pollution and carbon emissions to the atmosphere. The growing interest in air quality and climate change in urban areas has made electric vehicles the leading car of the green choice. (Li et al., 2022) As customers start to define the environmental impact of the choice, sustainability has a profound impact on the consumers buying intention of electric vehicles (EVs). Due to the increasing awareness of pollution, climatic changes, and the decline of natural resources, sustainability has become one of the primary considerations when deciding to purchase a vehicle.(Xu et al., 2021) With reduced carbon footprint and reduced reliance on fossil engines (ICEs), consumers have made electric vehicles (EVs) one of the most sustainable options over the traditional internal combustion engines (ICEs) vehicles (IEV (Jaiswal et al., 2021)) It was established that the intention to purchase an electric vehicle is positively correlated with environmental awareness and the desire to become a champion of sustainable development. (Rezvani et al., 2018) It is the motivation towards the transformation to cut down on the emission of greenhouse gases and the reliance on fossil fuels to turn around the pace of environmental degradation (Asadi et al., 2020). As a result, the paradigm of the automotive market has shifted towards the use of electrification as a central strategy in the attainment of the sustainability agenda and in the process keeping pace with the changing demand by the consumers. This change is not only predetermined by the technological development of the era; it also occurs as a consequence of reorganizing the labor force and the redesign of the process of developing automotive. Many economic and environmental factors that have a substantial effect on the purchasing intentions of customers have contributed to this trend of global electrification .(Brusseau, 2019; Lamb et al., 2021) It is noteworthy that the wish of customers to acquire electric vehicles has been increasing over time owing to the perceived environmental advantages and saving of money in the long term through energy efficiency and fuel consumption. (Carley et al., 2013; Lai et al., 2015). Government incentives and battery upgrades, which enhance the efficiency of EVs to even more closely resemble internal combustion engines,

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are also contributors to such encouraging demand (Manutworakit & Choocharukul, 2022; Thananusak et al., 2017).

Even though there are other studies that have focused on one or the other including economic or environmental factors of EV adoption, there are not many studies that have connected both in the context of a powerful theoretical framework. This paper offers a comprehensive perspective of the two-fold channels that drive consumer intention and usage behavior of EVs by integrating Economic Man Theory (rational-economic motives) and VBN Theory (value-driven moral motives)

The paper has adequately addressed the study model, hypotheses, sample characteristics, data collection and analytic technique. It further summarizes the findings of the analysis, review on findings, conclusion and finally gives recommendations on further research and policy development.

Literature Review

According to Economic Man Theory, individuals will always be rational in their actions so that they can maximise utility and minimise costs (Morgan, 1996). It has been the financial gains associated with electric vehicles (EVs) that make consumers adopt them, including lower fuel and maintenance expenses (Rezvani et al., 2015). Recent research supports this, showing that financial incentives significantly increase EV adoption.(M. K. Kim et al., 2018)

The VBN hypothesis by (Stern et al., 1999) , they suggests that consumer decisions are influenced by moral standards and environmental values, and environmental concern is a strong predictor of intention and desire to purchase EVs (Buerke et al., 2017; Franke et al., 2012) and the findings of research confirm the effect of the environmental concern on the intention and desire to purchase EVs(Higueras-Castillo et al., 2023) under the influence of the VBN model.

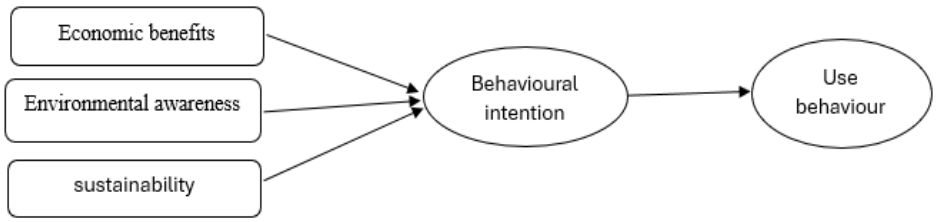

Figure 1 Source: Author

Economic Benefits

Economic benefit Multiple studies note that economic benefit is a key factor that defines the uptake of electric vehicles (EV) in different countries. In (Lai et al., 2015), it was established that consumer acceptance in Macau was strongly based on fuel saving, tax exemptions, and subsidies. In China, . (He & Zhan, 2018) revealed that financial gains and symbolic worth promote EV adoption whereas risks and fees do not. In a similar trend, (J. Kim et al., 2014) in Korea found that perceived value operational and eco-friendly benefits are positive determinants of adoption, and charging risks and high costs are barriers. In India, Khurana et al., (2020) established that perceived economic benefit and environmental concern have a direct direct effect on purchase intention with social influence mediated via attitude. The article by Wu & Lin, (2021) focused more on system-scale advantages and demonstrated how EVs with Vehicle-to-Grid (V2G) can help lower energy bills and aid in policy planning in China. The perceived economic rewards were found to be the best predictor of the electric two-wheeler adoption in India (Jayasingh et al., 2021) with gender disparities in favour of women adopters. Finally, Lashari et al., (2021) in South Korea found out that cost-effectiveness and a positive environmental impact enhance the probability of EV adoption, whereas high costs, subsidies, and adverse attitudes towards technological innovations diminish it. Taken together, these works suggest that although environmental concern and social influence are important factors, economic benefits, including cost savings, subsidies, and efficiency, are the most consistent and influential factors to drive the uptake of EV.

H1: Economic benefit has a favourable impact on behavioural intention to use electric passenger cars.

Environment Awareness

Numerous studies indicate that environmental concern is a pivotal factor influencing consumer attitudes and intentions regarding EV adoption, frequently interacting with values, norms, policies, and performance perceptions. Such as Nordlund et al., (2016) discovered in Sweden that a norm activation process, influenced by ecological worldview and moral obligation, propels adoption intentions. Similarly, Z. Wang et al., (2017) and Sun et al., (2017) in China demonstrated that environmental

awareness, coupled with supportive policies and financial incentives, significantly enhances EV adoption. (Westin et al., 2018) stressed that personal norms, age, and education are indicators of EV ownership in Sweden. Follow a similar chain Adnan et al., (2018) in Malaysia emphasized that environmental concern affects adoption indirectly via attitude and norms, although hyperbolic discounting diminishes the intention–adoption relationship. According to Okada et al., (2019) In Japan, being aware of the environment has a bigger effect on whether or not someone wants to adopt something than how happy they are with it after they buy it. N. Wang et al., (2018) identified technical performance, environmental awareness, and risks as primary factors influencing acceptance in China. Mohiuddin et al., (2018) showed that the environmental attitudes of Malaysian business students have a big effect on their plans to adopt eco-friendly practices, even though they don't do them very often. Lastly (Khazaei, (2019) confirmed that environmental concern is the strongest predictor of BEV adoption in Malaysia, followed by enjoyment. Additionally, innovativeness and driving experience enhance predictive power. In general, these studies show that environmental concern, moral norms, and supportive policies, along with performance and experiential factors, are the main reasons why people around the world are buying EVs

H2: Environmental awareness has a favourable impact on behavioural intention to use electric passenger cars.

Sustainability

Studies on sustainability and electric vehicle (EV) adoption indicate that environmental concerns, self-identity, behavioural influences, and structural conditions significantly affect consumer intentions and sustainable results. (Degirmenci & Breitner, 2017)discovered in Germany that the adoption of electric vehicles (EVs) is primarily influenced by environmental performance rather than price or range, highlighting the importance of ecological responsibility in reducing greenhouse gas emissions. In the Netherlands Peters & Dütschke, (2014) , research indicated that adopting electric vehicles (EVs) for environmental reasons enhances environmental self-identity, thereby fostering sustainable EV usage and other energy-conserving practices. (Shalender & Sharma, 2021) verified in India that attitude, social norms, perceived control, moral norms, and environmental concern substantially enhance intentions to adopt electric vehicles. Javanmardi et al., (2023) stressed that both the vehicle's internal features and outside factors, like levels of sustainable development and global crises like COVID-19, affect how people around the world buy cars. Finally, Limon et al., (2023)contended that in resource-limited developing nations, hybrid electric vehicles (HEVs) present a viable transitional approach to sustainability, considering financial and infrastructural obstacles. These studies collectively emphasize that the adoption of electric vehicles (EVs) not only mitigates emissions but also promotes more extensive sustainable behaviors, although adoption is shaped by environmental values, policy support, and socioeconomic contexts.

H3: Sustainability has a favourable impact on behavioural intention to use electric passenger cars.

Link between behavioural intention and consumer use behaviour

Both the Environmental Awareness and Sustainability (VBN Theory) and Economic Rationality (Economic Man Theory) agree that behavioural intention is a big part of why people actually use something. The Theory of Planned Behaviour (TPB) by Ajzen, (1991) says that intention is the best way to predict behaviour. Consequently, their adoption decisions are realised through intention, culminating in actual usage, regardless of whether customers are motivated by cost savings or environmental responsibility (Kumar & Alok, 2020).

H4: Behavioural intention mediates the relationship between (a) economic benefit, (b) environmental awareness, and (c) sustainability, and the actual use behavior of electric vehicles.

Methodology

Measures

Established scales modified from other studies were used to measure the constructs in the present study. The Value-Belief-Norm theory (Stern et al., 1999) served as the foundation for sustainability and environmental awareness items, while the Economic Man Theory (Simon, 1955) was used to quantify economic benefits through perceptions of fuel and maintenance cost savings. The Theory of Planned Behavior served as the model for behavioral intention toward electric cars. (Ajzen, 1991)A five-point Likert scale, from "strongly disagree" to "strongly agree," was used to score each item.

Construct	Item Statements	Source/Theoretical Basis
Sustainability & Environmental Awareness (EA/SUS)	I believe that sustainability is an important issue. I am concerned about the environmental impact of	Adapted from (Stern et al., 1999)– Value-Belief-Norm (VBN) Theory; (Dunlap et al., 2000)– New Ecological Paradigm (NEP).

	traditional gasoline vehicles. I am willing to change my lifestyle to reduce my carbon footprint. I think electric vehicles (EVs) are an effective way to combat climate change. I am aware of the environmental risks resulting from the use of diesel/petrol cars. I know that electric cars help reduce air and noise pollution.	
Economic Benefits (EB)	I am aware that electric cars save fuel energy costs while driving. I know that electric cars do not have many parts that save on maintenance costs.	Based on Economic Man Theory (Simon, 1955)Adapted from (Degirmenci & Breitner, 2017)
Behavioural Intention (BI) & use behaviour	- Shortly, I will be willing to purchase an electric passenger car. I am willing to invest extra money to get an electric passenger car. - Compared with traditional fuel vehicles, I will give priority to buying EVs. I will only use an electric car in the coming years.	Adapted from (Ajzen, 1991) – Theory of Planned Behavior; (Venkatesh et al., 2003)– UTAUT.

Data collection and sample

Research initiatives require data collection, and this study focuses on consumer buying and retention patterns in the electric vehicle market. 600 electric car owners in North India are the subject of this empirical study. Only 520 respondents successfully completed the survey, supplying pertinent data for the study, despite having a distinct demography and preferences. The goal of the study is to comprehend the issue and its ramifications more thoroughly.

Demographics of the study (table-2)

Variable	Category	Frequency	Percentage
Age	20-30 31-40 41-50 51 and above	196 204 84 36	37.7 39.2 16.2 6.9
Gender	Male Female other	416 104 -	80 20 -
Marital status	Single Married	226 290	43.5 55.8
Educational qualification	Basic schooling Diploma and graduation level Post-graduation and professional level Doctoral level	10 140 274 96	1.9 26.9 52.7 18.5
Profession	Private job/ government job Business Professional others	278 78 88 76	53.5 15 16.9 14.6

Income	Below 3 lakhs	64	12.3
	3 to 5 lakhs	104	21.9
	5 to 10 lakhs	120	23.1
	Above 10 lakhs	222	42.7

According to the demographic profile as shown in table 2 , the majority of respondents (76.9%) are between the ages of 20 and 40, and there are more men (80%) than women (20%). The majority of participants were married (54.8%) and had advanced degrees; more than half (52.7%) had professional or postgraduate degrees, and 18.5% had doctorates. Workers in the commercial and public sectors made up the largest percentage (53.5%), followed by professionals (16.9%), entrepreneurs (15%), and others (14.6%). The income distribution showed that the majority of respondents (42.7%) made more than 10 lakhs per year, while just 12.3% made less than 3 lakhs, suggesting that the sample was quite well-educated and financially secure.

Descriptives (table 3)

Construct	N	Mean	Median	SD
(EA)	520	12.40	13.00	2.76
(BI)	520	7.39	8.00	2.28
(UB)	520	7.58	8.00	2.10
(EB)	520	7.90	8.00	2.01
(SUS)	520	15.79	16.00	3.72

The descriptive statistics of the constructs are presented in Table 3. All constructs were measured using a five-point Likert scale, and the results indicate satisfactory distribution across the variables. Environmental awareness (EA) reported a mean of 12.40 (SD = 2.76), with scores ranging between 3 and 15, suggesting that most respondents demonstrated above-average awareness of environmental issues.

Behavioural intention (BI) yielded a mean of 7.39 (SD = 2.28), while use behaviour (UB) reflected a slightly higher mean of 7.58 (SD = 2.10), both indicating that respondents generally expressed strong willingness to adopt and engage in EV usage. Economic benefit (EB) had a mean score of 7.90 (SD = 2.01), implying that financial savings and cost-related factors are perceived as significant motivators among participants.

Sustainability (SUS) recorded the highest mean value of 15.79 (SD = 3.72), with a maximum score of 20. This suggests that respondents strongly associated EV adoption with long-term ecological sustainability and environmental preservation. Overall, the descriptive results confirm that participants in the study hold favourable attitudes toward environmental responsibility, perceive tangible economic benefits, and exhibit strong behavioural inclinations towards EV adoption.

Common method variance

The present study uses self-reported measures, which may be susceptible to common method bias. Therefore, to prevent CMB, we adopted the procedural remedies provided by Podsakoff et al. (2012). For instance, the consent letter assured respondents' confidentiality. Furthermore, the identification of CMB was assured using Harman's single-factor technique. A single factor accounted for 43.4% of the total variance, which falls below the permissible threshold of 50% (Harman, 1976) suggesting that the data are free from bias.

Confirmatory factor analysis

The confirmatory factor analysis (CFA) validated the measurement model consisting of Economic Benefit (EB), Environmental Awareness (EA), Sustainability (SUS), Behavioral Intention (BI), and Use Behavior (UB), with all factor loadings statistically significant ($p < 0.001$) and exceeding the recommended 0.70 threshold, thus confirming good indicator reliability and convergent validity; EA loadings ranged from 0.808 to 0.895, EB from 0.761 to 0.873, SUS from 0.747 to 0.890, while BI and UB indicators were consistently above 0.80, demonstrating strong measurement quality. Factor covariances showed significant positive relationships, such as EB–BI (0.831), EB–UB (0.810), and BI–UB (0.886), confirming behavioral intention's mediating role between antecedents and actual use behavior. The overall model fit indices indicated adequacy, with $\chi^2 = 280$ ($df = 55$, $p < 0.001$), RMSEA = 0.089 (90% CI = 0.078–0.099), CFI = 0.956, and TLI = 0.937; although RMSEA was slightly above the ideal threshold, the high CFI and TLI values demonstrate that the model fits the data well and supports the proposed theoretical structure.

Table: 4: Confirmatory Factor Analysis (CFA) Results for the measurement model

Factor	indicator	SE	CR	AVE	Cronbach's alpha
EA	EA1	0.879	0.887	0.647	0.870

	EA2	0.846			
	EA3	0.825			
EB	EB1	0.871	0.802	0.670	0.795
	EB2	0.763			
SUS	SUS1	0.823	0.901	0.696	0.894
	SUS2	0.890			
	SUS3	0.870			
	SUS4	0.747			
BI	BI1	0.824	0.812	0.683	0.811
	BI2	0.829			
UB	UB1	0.928	0.863	0.76	0.857
	UB2	0.812			

This table presents the construct reliability and validity statistics for the measurement model of Environmental Awareness (EA), Economic Benefit (EB), Sustainability (SUS), Behavioral Intention (BI), and Use Behavior (UB). All standardized factor loadings exceed 0.70, meeting recommended thresholds for indicator reliability, except SUS4 (0.747) which is still acceptable. Composite reliability (CR) values for all constructs (EA = 0.887, EB = 0.802, SUS = 0.901, BI = 0.812, UB = 0.863) are above the 0.70 benchmark, confirming internal consistency. Average Variance Extracted (AVE) scores range from 0.647 to 0.760, surpassing the 0.50 cut-off, thereby demonstrating convergent validity. Cronbach's alpha values (ranging from 0.795 to 0.894) also support strong internal reliability of all constructs. Together, these results indicate that the measurement model possesses satisfactory reliability, convergent validity, and construct consistency, providing a sound foundation for testing the hypothesized structural relationships

Discriminant validity Table based on Heterotrait–Monotrait (HTMT) ratios (table 5)

Construct	EA	EB	SUS	BI	UB
EA	–	0.72	0.76	0.58	0.69
EB		–	0.71	0.83	0.81
SUS			–	0.66	0.71
BI				–	0.89
UB					–

The HTMT analysis results confirm that discriminant validity is established among the constructs. All HTMT ratios fall below the conservative threshold of 0.85 and the liberal threshold of 0.90, ranging from 0.58 to 0.89. This indicates that each construct—Environmental Awareness (EA), Economic Benefit (EB), Sustainability (SUS), Behavioural Intention (BI), and Use Behaviour (UB)—is empirically distinct and does not suffer from multicollinearity issues. Therefore, the measurement model demonstrates satisfactory discriminant validity, supporting the robustness of the constructs used in this study.

Structural Equation Modelling

The SEM model, estimated using Maximum Likelihood (ML) with 520 responses, examined how sustainability, environmental awareness, and economic benefit influence behavioural intention, which in turn predicts use behaviour. With reliable measurement indicators and permitted error covariances, the model confirmed behavioural intention as a mediator driving actual electric vehicle adoption. The overall test results of the SEM indicate that the model provides a good fit to the data. The chi-square value was significant ($\chi^2 = 258$, df = 56, $p < .001$), which is expected with a large sample size. Key fit indices demonstrated acceptable to strong fit: CFI = 0.960, TLI = 0.945, SRMR = 0.036, and RMSEA = 0.083 with a 90% confidence interval of 0.073–0.094. Comparative indices such as NFI (0.950), IFI (0.961), and RFI (0.931) further supported the adequacy of the model. Collectively, these results confirm the model's robustness and theoretical suitability.The parameter estimates from the SEM provide important insights into the hypothesised relationships. Economic benefit (EB) had a strong and significant positive effect on behavioural intention ($\beta = 0.837$, $p < .001$), while sustainability (SUS) also positively influenced intention ($\beta = 0.246$, $p < .001$). In contrast, environmental awareness (EA) showed a negative but marginally insignificant effect on intention ($\beta = –0.151$, $p = 0.058$). Behavioural intention (BI) was found to be a very strong predictor of use behaviour (UB) ($\beta = 0.954$, $p < .001$). Overall, the results highlight the central mediating role of behavioural intention in linking antecedents to usage.

Path Analysis

The path analysis model was estimated using the maximum likelihood (ML) method with 520 observations and 12 free parameters. The

model converged successfully, although lavaan generated a warning that standard errors could not be computed due to identification issues, suggesting caution in interpretation. Despite this, the model provided stable parameter estimates and explained a substantial proportion of variance in the dependent variable. Specifically, the R^2 value for Use Behaviour (UB) was 0.641, indicating that approximately 64.1% of the variance in UB was accounted for by the predictors (Sustainability, Environmental Benefits, Behavioural Intention, and Environmental Awareness).

Hypothesis testing results (Table 6)

Hypothesis	Path	Standardised Estimate (β)	p-value	Result
H1	EB → BI	0.426	< .001	Supported
H2	EA → BI	0.014	> .05	Not Supported
H3	SUS → BI	0.168	< .001	Supported
H4a	EB → BI → UB	Indirect effect via BI (significant)	< .001	Supported
H4b	EA → BI → UB	Indirect effect via BI (not significant)	> .05	Not Supported
H4c	SUS → BI → UB	Indirect effect via BI (significant)	< .001	Supported
Direct Effect:	BI → UB	0.284	< .001	Significant

According to the study, sustainability, environmental benefits, and behavioural intention are the most significant determinants of UB, while environmental awareness has a lesser impact. Sustainability and environmental benefits influence behavioural intention, whereas environmental awareness has a minimal effect. A feedback loop is suggested where actual usage encourages behavioural goals, indicated by a reciprocal path from UB to BI. Path analysis shows that sustainability plays a supportive role in explaining UB, but behavioural intention and environmental benefits have the greatest influence. However, further model refinement is needed for validation.

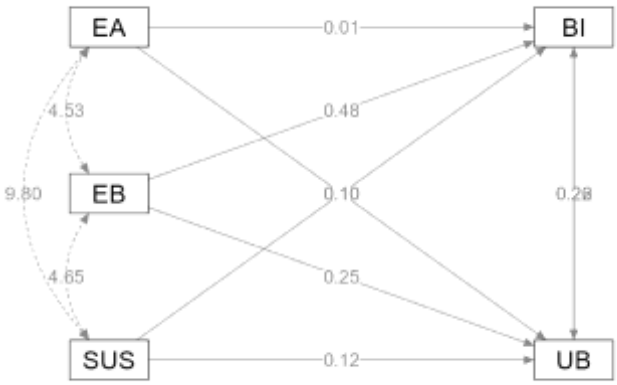

Figure 2

Findings

Path Analysis of Electric Vehicle Adoption

Discussion and limitations

The study examines the impact of sustainability, economic advantages, and environmental consciousness on individuals' intentions and actual utilization of electric vehicles (EVs). Since customers often think about the pros and cons of new technology, it was found that economic incentives have a big effect on how people plan to act. However, environmental awareness did not have a big effect on behavioral intention. This shows that there is a "attitude-behavior gap," where awareness can increase knowledge but not always change intentions without clear benefits. Long-term sustainability concepts such as resource conservation and intergenerational responsibility are significant; thus, sustainability, a key factor in EV adoption, profoundly influences behavioral intention.

Conclusion, Implications and Limitations

The study examines the impact of sustainability, environmental awareness, and economic incentives on the intention and utilization of electric vehicles (EVs). It was found that environmental knowledge does not significantly influence behavioral intention, whereas

sustainability and economic incentives do. The effects of environmental and economic benefits on EV adoption are influenced by behavioral intention, which is a key indicator of actual usage behavior. The study differentiates between sustainability and environmental awareness, underscoring that sustainability serves as a superior predictor of behavioral intention. This shows how important behavioral intention is to models of sustainable mobility.

The results show that to get more people to buy electric vehicles, we need to make financial incentives stronger, spread stories about sustainability, and close the gap between knowing about something and doing something about it. It also means that things like test drives, better charging infrastructure, and campaigns to teach consumers about EVs can help turn intentions into real use. The study has some problems, such as a cross-sectional design that makes it hard to draw causal conclusions, a single sample of 520 respondents, and the fact that it didn't look at things like technological trust, social influence, and policy awareness. It also didn't take into account moderating variables like cultural values and perceived behavioral control. Future studies should examine these elements to gain a more profound understanding of the relationship between behavior and environmental awareness.

To sum up, the study shows that economic and environmental concerns are the biggest reasons people buy electric cars. Environmental awareness, on the other hand, needs to be combined with other methods to change how people act. By taking these insights into account, policymakers, automakers, and researchers can create better programs that speed up the shift to more environmentally friendly transportation systems.

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Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper

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