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The Efficacy of Online Distance Learning (ODL) Versus Conventional Learning Mode in The Final Year Project (FYP) Course of Engineering Undergraduate

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Abstract

Periodic positive carrier data from the COVID-19 outbreak in Malaysia intensified government efforts to enforce the movement control order (MCO); Malaysians must remain at home to prevent the virus from spreading fast. The sequence of movement control has an impact on the undergraduates of the Final Year Project (FYP). Undergraduate students from the College of Engineering were instructed to stay at home and utilising the Online Distance Learning (ODL) mode as they were unable to continue their FYP in a conventional approach. The repercussions of the online approach as a teaching and learning tool were implemented as an alternative for student to perform their FYP accordingly. A survey was done among the 302 undergraduate students to assess their satisfaction with the ODL approach during the pandemic, to highlight the challenges they experienced, and to determine the most effective learning mode for FYP. The ODL mode has been implemented globally and does not impair future immersive learning and foster exceptional accomplishment of the FYP. The effectiveness of Open and Distance Learning (ODL) in the Final Year Project (FYP) was demonstrated by the survey results, which indicated the students' satisfaction with their accomplishments. The findings reveal a clear inclination towards Open and Distance Learning (ODL), with 45.7% of participants indicating contentment, in contrast to only 20.2% for traditional classroom-based learning. It may be inferred that the majority of respondents in the Engineering Program's Final Year Project (FYP) are more satisfied with Open and Distance Learning (ODL) compared to traditional classroom learning.

Keywords: Online Distance Learning (ODL), Undergraduates, Final Year Project (FYP)

1. Introduction

The global spread of the infectious disease COVID-19, originating in Wuhan, China, has elicited widespread concern, particularly in countries like Malaysia where its high contagion rate has fuelled apprehension. This novel disease has raised anxieties to a level surpassing that of previous global outbreaks such as Saudi Arabia's Middle East Respiratory Syndrome (MERS-CoV) and the Spanish Influenza A (H1N1). The escalating daily statistics of COVID-19 cases in early 2020 have compelled the government to implement stringent measures, including travel restrictions and urging citizens to stay at home to curb the disease's transmission. Before the pandemic, the teaching and learning process was conducted face-to-face. However, after the emergence of COVID-19, the learning process has changed to full online mode. It is a challenge for lecturers and students; whether they like it or not, they must all accept online learning (Adedoyin & Soykan, 2020). The challenges of online learning include the absence of devices, a less conducive atmosphere, a lack of digital technology skills,

and students' negative attitudes during online learning sessions (Alawamleh et al. 2020). In response to these unprecedented circumstances, educational approaches have undergone a transformation, with terms like e-learning (Keis et al., 2017), blended learning (Deschacht & Goeman, 2015), online learning (Wallace, 2003), and interactive learning gaining prominence. The term "Online Distance Learning (ODL)" is frequently used interchangeably with these concepts, encompassing informal learning activities facilitated through internet tools, where direct social interaction with lecturers is limited (Kuo et al., 2014). As nations grapple with the challenges posed by the pandemic, the adaptation of these learning methodologies becomes crucial for maintaining educational continuity while prioritizing public health.

The Ministry of Education underscores the importance of online distance learning, particularly for final-year engineering undergraduates amid the pandemic. Challenges arise, notably the limited availability of essential computers, hindering effective ODL due to resource constraints and the need to share devices within families. Recognizing these hurdles, universities adopt innovative approaches for successful learning outcomes. This study aims to evaluate the efficacy and satisfaction of Open and Distance Learning (ODL) in conducting Final Year Projects (FYP) for undergraduates in the College of Engineering at Universiti Teknologi MARA (UiTM) Shah Alam, in comparison to the traditional mode of instruction. The Final Year Project (FYP) is a research endeavor undertaken by students in their last year of study, specifically during Semester 7 and Semester 8. The project is divided into two parts: FYP1 in Semester 7 and FYP2 in Semester 8. The objectives include evaluating the current situation and satisfaction levels, identifying predominant challenges faced during the pandemic, and assessing the effectiveness of different ODL mediums. E-learning integrates Internet platforms and knowledge management. The e-learning environment comprises network systems that encompass several functions aimed at enhancing the quality of teaching and learning activities. (Chandra, 2020; Chung et al. 2020). The study explores the benefits for undergraduates, such as identifying suitable e-learning methods and addressing challenges through effective problem-solving. It also considers the impact on students' soft skills and technical knowledge, providing insights into the efficacy ODL approach. In addition to the tangible factors (i.e., facilities, resources, Internet, & infostructure), many studies have found that the success of online learning also could be influenced by intangible factors. These include reduction in comparison bias, group participation, product originality, product demonstrability, perceived usefulness, and perceived enjoyment (Bączek et al. 2021).

2. Methodology

The study used a dual-method approach to gather data, including both quantitative and qualitative approaches. The quantitative method entails a comprehensive examination of literature sourced from academic journals, previous research studies, and scholarly papers. On the other hand, the qualitative approach involves using a survey questionnaire that is given through a structured Google Form and disseminated to specific targets. This approach combines two methods to thoroughly and precisely examine the effectiveness and satisfaction levels of Open and Distance Learning (ODL) in comparison to traditional teaching methods among engineering students in their final year.

2.1. Data Collection

The survey questionnaire, distributed through WhatsApp and Telegram applications, was administered to final-year project students using Google Forms. The qualitative approach, implemented as a preliminary investigation with a survey, is specifically tailored to accomplish all of the study's objectives. The questionnaire consists of five sections: A, B, C, D, and E. Section A compiles personal information, Section B evaluates respondents' current situation and satisfaction with e-learning/ODL mode, Section C collects data on challenges encountered, Section D gathers information on effective ODL modes based on experience, and Section F records respondents' suggestions and opinions on improving e-learning methods for better comprehension among undergraduate students.

2.2. Data Analysis

The collected data from the conducted survey will be analysed and verified using the Statistical Package for the Social Sciences (SPSS), an analytical software created by IBM Corporation. Researchers and academics globally frequently utilize SPSS for the examination and verification of study results.

3. Results and Discussion

The expected results of this investigation were discussed, and descriptive statistical findings were obtained. A comparison analysis was performed to forecast the likely outcomes of the survey, taking into account past research. The results are derived from data obtained from a cohort of 302 engineering undergraduate students at UiTM Shah Alam. The dataset was analysed using SPSS version 26 to obtain significant insights and develop conclusions through statistical analysis.

3.1 Analysis of Demographic Data

3.1.1 Gender

Figure 1 and Table 1 shows the output from the SPSS software based on the conducted survey. As indicated in the table, the survey reveals a distribution of respondents with 60.3% being female, totaling 182 respondents, and 39.7% being male, equivalent to 120 respondents.

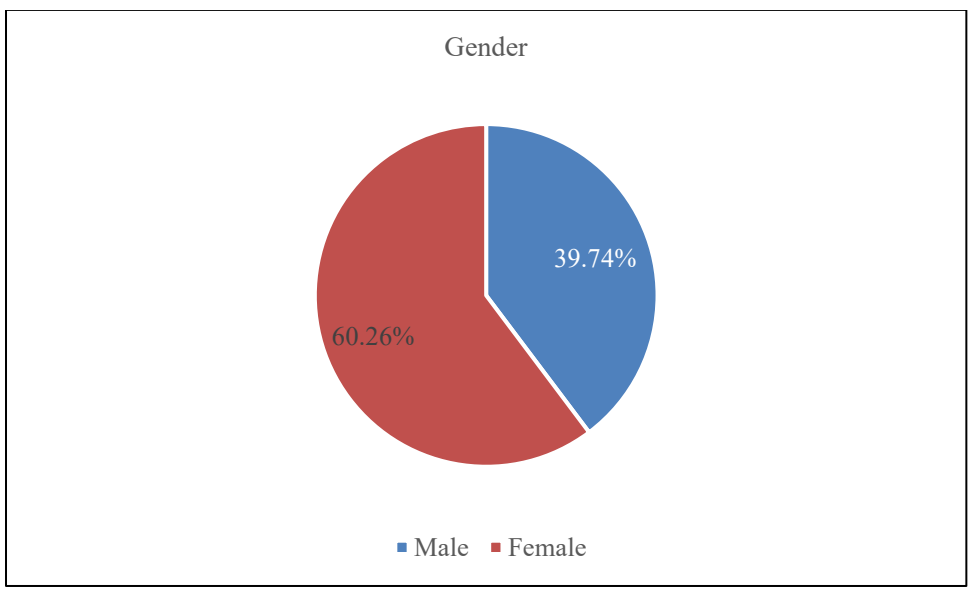


Figure 1. SPSS output for Gender Percentage

Table 1. SPSS output for the gender percentage

	Frequency		**Percent**	**Valid Percent**
Valid	Female	182	60.3	60.3
	Male	120	39.7	39.7
	Total	**302**	**100.0**	**100.0**

3.1.2 College of Engineering

This outcome aimed to assess the distribution of undergraduate students across the College of Engineering, UiTM Shah Alam. Table 2 provides a detailed breakdown of the exact number and frequency of undergraduate students in different engineering faculties.

As illustrated in Figure 2 and detailed in Table 2, the highest response rate was observed from the School of Civil Engineering, constituting 36.4% of the total respondents, equivalent to 110 students. In contrast, the lowest response rate was recorded in the School of Mechanical Engineering, accounting for 13.9%, with only 42 students participating in the survey.

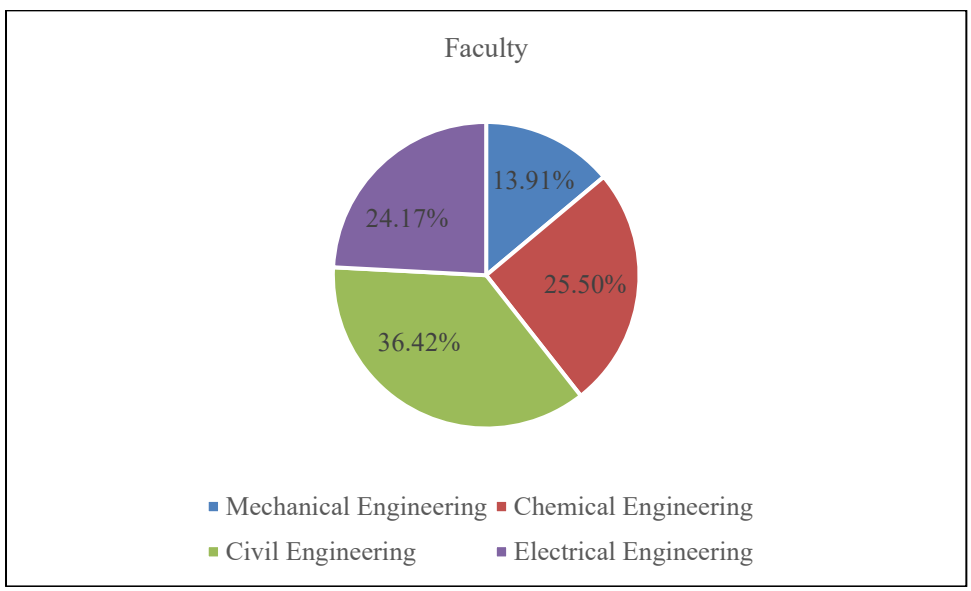


Figure 2. SPSS output for College of Engineering in UiTM Shah Alam

Table 2. SPSS output for College of Engineering in UiTM Shah Alam

	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Chemical Engineering	77	25.5	25.5	25.5
Civil Engineering	110	36.4	36.4	61.9
Electrical Engineering	73	24.2	24.2	86.1
Mechanical Engineering	42	13.9	13.9	100.0
Total	**302**	**100.0**	**100.0**	

3.2 Analysis of Current Situation and Satisfaction of Online Distance Learning (ODL) Among Engineering Undergraduates Student in UITM Shah Alam

3.2.1 Preferred Learning Method

FYP is more related to the research project done by the students during their final year which is more related to independent learning rather than guided learning. This inquiry aimed to assess the favored learning method for fulfilling program outcomes at the university. Table 3 provides the percentages and frequency distribution of the preferred learning methods. The results indicate a significant preference for online distance learning, with 45.7% of students favoring it compared to the conventional method, which garnered 20.2%. This preference among engineering students may stem from the challenges posed by certain subjects, leading them to perceive ODL mode as a more accessible avenue for achieving academic success. Moreover, findings from Solimeno et al. (2008) underscore the notion that online learning can enhance professional competencies, traditionally acquired in smaller face-to-face educational settings.

Table 3. SPSS output on the preferred learning method

Item	Frequency	Percent	Valid Percent	Cumulative Percent
Both	103	34.1	34.1	34.1
Conventional Learning	61	20.2	20.2	54.3
e-Learning/Online Distance Learning (ODL)	138	45.7	45.7	**100.0**
Total	**302**	**100.0**	**100.0**	

3.2.2 Effectiveness of Online Distance Learning (ODL) Compared to Meeting Regular Classroom

These findings were generated using the SPSS software to align with previous studies, offering a checklist for comparison. Table 4 illustrates the SPSS output, showcasing descriptive statistical frequencies derived from a Likert scale.

Table 4. SPSS output on the effectiveness of online distance learning (ODL) compared to meeting regular classroom

N		Minimum	Maximum	Mean	Std. Deviation
Offering convenience	302	1	5	2.54	1.163
Building skills and knowledge	302	1	5	2.46	1.137
Contributing to effective communication	302	1	5	2.66	0.918
Interaction Level	302	1	5	2.55	0.973
Offering better understanding through recorded class	302	1	5	2.61	0.981
Balancing of practical and theoretical experience	302	1	5	2.63	0.930
Valid N (listwise)	**302**				

Bettinger et al. (2017) noted that online learning may not entirely compete with certain aspects of other learning methods, particularly interactive knowledge-building between teachers and students. Despite these limitations, it creates opportunities for students to engage in self-directed learning through information

technology.
Nalini et al. (2013) highlighted that web-based learning can enhance highly personalized content for learning. This, in turn, may contribute to increased online expertise among students through exposure to diverse skills and knowledge. Lauzon (1992) argued that distance learning methods focus more on education than on skill acquisition. The current study's output reveals that Scale 3 predominates, indicating that 109 students perceive online learning as equally effective as conventional methods, accounting for 36.1%. Ni (2013) has concluded in a similar vein, emphasizing the importance of social and communicative interaction between teachers and students in traditional classroom teaching.

3.3 Satisfaction of Online Distance Learning (ODL)

The outcomes presented herein were generated through the utilization of SPSS software, aligning with previous studies and serving as a comprehensive checklist. The evaluation comprises five parameters introduced to gauge satisfaction levels in Online Distance Learning (ODL) compared to conventional learning. The SPSS output, as detailed in Table 5, encapsulates the descriptive statistical frequencies derived from a Likert scale. This meticulous examination of satisfaction parameters contributes to a nuanced understanding of the participants' perspectives on the effectiveness and contentment associated with the ODL approach in contrast to traditional learning methods.

Table 5. SPSS output on the satisfaction of online distance learning (ODL)

	N	**Minimum**	**Maximum**	**Mean**	**Std. Deviation**
How helpful was the class material provided to you?	302	1	5	2.45	.872
How satisfied are you with the balance of practical and theoretical knowledge provided by these classes?	302	1	5	2.36	.850
There is a professional development strategy towards online	302	1	5	2.32	.908
Availability of e-resources	302	1	5	2.32	.855
Availability of assistance on learning and assignment	302	1	5	2.40	.891
Valid N (listwise)	**302**				

The five-point Likert scale employed in this study is treated as an interval scale, with particular emphasis placed on the significance of the mean. The scale is delineated as follows: a score of 1 to 1.8 indicates “strongly disagree,” 1.81 to 2.60 signifies “disagree,” 2.61 to 4.30 implies “neutral,” 3.41 to 4.20 means “agree,” and 4.21 to 5 represents “strongly agree.”

This approach aligns with findings from previous research, such as that of Kaur (2020), which highlighted that numerous students face challenges due to insufficient resources for effective participation in online learning. This is reflected in the mean score of 2.40 for the last statement, indicating that students strongly disagreed regarding the availability of assistance for learning and assignments during online learning.

3.4 Challenges Faced During Online Distance Learning

3.4.1 Difficulties During Online Distance Learning

This inquiry aimed to identify the challenges encountered by students. As depicted in Figure 3, a notable 50.3% of students reported difficulties in conducting online distance learning at home, totaling 152 students. Conversely, a mere 2% of students indicated no difficulties in the process of engaging in online distance learning. This data underscores the prevalent challenges faced by a significant portion of the student population, emphasizing the need for targeted interventions and support mechanisms to enhance the online learning experience.

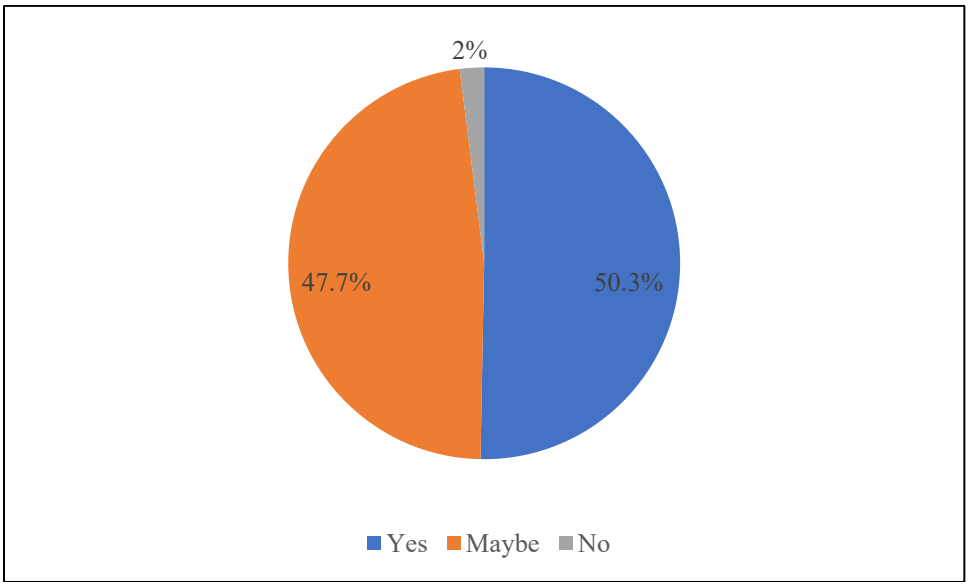
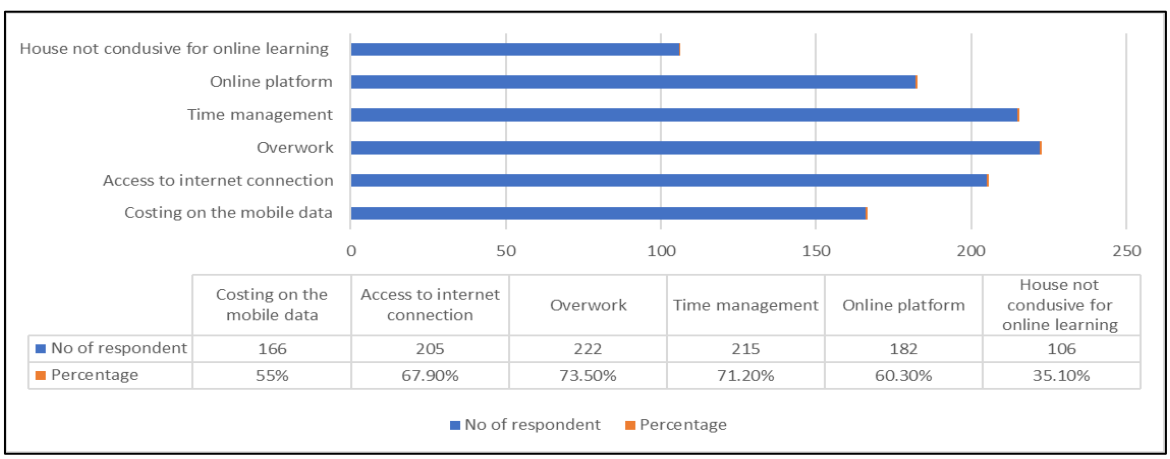


Figure 3. Difficulties in online distance learning (ODL)

3.4.2 Challenges Occurred during Online Distance Learning

Figure 4 illustrates the challenges faced by engineering undergraduate students in the context of online distance learning. The structured questionnaire included six parameters to comprehensively assess and identify the specific challenges experienced by the students during this mode of learning. This visual representation provides a clear overview of the multifaceted difficulties encountered, offering valuable insights for understanding and addressing the nuanced aspects of online distance learning challenges in the engineering education context.



	Costing on the mobile data	Access to internet connection	Overwork	Time management	Online platform	House not condusive for online learning
No of respondent	166	205	222	215	182	106
Percentage	55%	67.90%	73.50%	71.20%	60.30%	35.10%

Figure 4. Challenges occurred during online distance learning enhance figure resolution

The results reveal that the most prominent challenge faced during online distance learning is "overwork," garnering the highest score at 73.5%, representing 222 respondents. In contrast, the least reported challenge, with 35.1% of the 302 students, is the perception that their homes are not conducive to online distance learning.

These challenges align with the observations made by Soni (2020), who highlights that both teachers and students encounter difficulties during self-isolation due to factors such as a lack of proper learning attitude, insufficient learning materials, increased participation in classroom learning, a struggle with self-discipline, and an inadequate learning atmosphere in some home environments. Understanding these challenges is crucial for implementing targeted strategies to enhance the online learning experience for both educators and students.

3.5 Effective Medium Adopted During the Online Distance Learning

3.5.1 Preferred Medium Adopted to an Effective Study

This inquiry seeks to ascertain the preferred medium of study adopted by undergraduate students for effective online distance learning, recognizing that diverse methods may be chosen based on individual comfort. A range of multiple-choice options has been provided for respondents to indicate their preferences. The SPSS Output in Table 6 presents the descriptive statistical analysis of the modes adopted during online learning. This comprehensive examination of the preferred study mediums offers valuable insights into the diverse choices made by students, contributing to a deeper understanding of the varied approaches utilized in the pursuit of effective online distance learning.

Table 6. SPSS output on the preferred mode adopted during online learning

N		Minimum	Maximum	Mean	Std. Deviation
Google Classroom	302	1	5	2.79	1.491
Zoom	302	1	5	2.71	1.492
Google Meet	302	1	5	2.84	1.283
Cisco WebEx	302	1	5	2.55	1.142
YouTube Video	302	1	5	2.56	1.064
Facebook/YouTube Streaming	302	1	5	2.36	0.981
WhatsApp/Telegram	302	1	5	2.59	1.125
Email	302	1	5	2.29	0.999
Telephonic conversation	302	1	5	1.95	0.923
Valid N (listwise)	**302**				

The five-point Likert scale utilized in this study is treated as an interval scale, with the mean value holding a significant interpretive value. The scale categorizes responses as follows: "Rarely" from 1 to 1.8, "Sometimes" from 1.81 to 2.60, "Always" from 2.61 to 3.40, "Usually" from 3.41 to 4.20, and "Often" from 4.21 to 5.

Among the various platforms introduced, Telephonic Conversation emerges as the least frequently utilized mode for online learning, falling within the "Rarely" category. In contrast, Google Classroom stands out as an efficient and dominant mode of learning when compared to the other eight platforms. The findings underscore Google Classroom's prominence, positioning it as a preferred mode of study, while telephonic conversation is relegated to a less utilized role in the context of online learning.

4. Conclusion and Recommendation

The study aimed to assess the proportion of the current situation and satisfaction with Open and Distance Learning (ODL) in comparison to traditional learning among the Final Year Project (FYP) participants in the Engineering Programme. The study yielded noteworthy results in this regard. The results indicate a preference for ODL with 45.7% of respondents expressing satisfaction compared to 20.2% for conventional learning.

Furthermore, the study focused on identifying the top challenges during online distance learning, a substantial 73.5% of students acknowledged the burden of overwork as the most prevalent challenge. This challenge is particularly noteworthy for engineering students, given the hands-on nature of many technical courses that often involve laboratory testing.

Consecutively the study enables us to determine the dominant medium of study for ODL, Google Classroom emerged as the predominant choice among FYP students in the Engineering Programme. This signifies its dominance over other modes, with telephonic conversation being identified as a less frequently adopted mode of study in comparison. These findings shed light on the prevalent preferences and challenges within the context of e-learning for engineering students.

In light of these findings, the effectiveness of ODL emerges as a potential solution to challenges faced by undergraduate engineering students at UiTM Shah Alam. However, further studies are warranted to explore appropriate strategies, including the use of software, to enhance the effectiveness of study for engineering undergraduates at UiTM Shah Alam.

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Declaration of Conflicting Interests

All authors declare that they have no conflicts of interest.

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