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Original Article

## Utilization of Digital Technologies in Doctoral Thesis Supervision at the University of Nairobi: Implications for Quality Assurance

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### ABSTRACT

The utilization of online digital technologies in higher education teaching and learning has gained impetus in the post-COVID-19 era. A number of higher educational institutions have invested in capacity-building programmes related to the utilization of online digital technologies for teaching and learning. However, the utilization of these technologies in doctoral supervision is hampered by challenges related to access to digital devices, internet connectivity and the general attitude among digital technology users. Furthermore, despite supervisors' efforts to reinforce mentoring, the lack of in-person engagement between supervisors and students portends a greater challenge. Therefore, the study sought to determine the influence of doctoral students' gender on their thesis progression, the relationship between the frequency of engaging supervisors and thesis progression, the preferred mode of supervisor engagement and the level of student utilization of digital technologies in their doctoral work. The study sampled 109 students from a population of 150 PhD students of the University of Nairobi. Data were gathered through questionnaires and interviews that were administered to doctoral students and their supervisors respectively. The results showed a weak negative correlation between student and supervisor engagement and their stage in theses writing. The study also established low utilization of digital technologies in doctoral thesis supervision. Nonetheless, the results showed that student-supervisor engagement has an impact on their progression and that a significant number of doctoral students were comfortable with engaging their supervisors through a combination of face-to-face/in-person and virtual/online sessions. The study recommends that universities should adopt a blended doctoral supervision model to leverage the strengths of both in-person and virtual student-supervisor engagement. Further, there is a need to train both students and supervisors in the use of digital tools to enhance their engagement.

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## INTRODUCTION

The doctoral supervision process took a paradigm shift at the onset of COVID-19. The supervision process which requires gradual development and processing of doctoral students through face-to-face mode was challenged by measures set to mitigate the spread of the COVID 19 pandemic. Technological disruption became a remedy which provided digital technologies that could help engage students in teaching and learning activities synchronously and asynchronously thus bridging the social distance parameters. Doctoral supervision is a specialized process. It involves the gradual development of the supervisory relationship which occurs through encounters during which supervisors and supervisees evaluate each other in terms of ideologies, values, and behaviour as well as tones and manners of communication (Lee & Green, 2009).

Supervising online provides important tools and/or applications which are the 21st-century era enablers of supervision. The gradual development of the supervisory relationship occurs through encounters during which supervisors and supervisees evaluate each other in terms of ideologies, values and behaviour as well as tones and manners of communication (Lee & Green, 2009). In positive cases, the quality of the supervisory relationship contributes to the candidates' overall well-being, satisfaction (Stubb et al., 2011; Zhao et al., 2007) and progress with regard to research (Leijen et al., 2016; Sverdlik et al., 2018).

Supervisory modality, function, and approaches are interrelated to the responsibilities of a supervisor. It can be divided into four sets: those related to the progress of the candidate,

mentoring, coaching in the study subject, study methodology, how to write the thesis and sponsorship of the student's involvement in academic or regular exercise. Respectable supervisory applies aid students to achieve their potential and add to the University's research outline. A good supervisor cannot be a scientific adviser on topics on which he does not have in-depth specialized knowledge (Almusaed & Almsasad, 2020).

Recent reforms in doctoral education have strived to enhance the quality of supervision. These reforms refer to, for example, organising training for supervisors and sharing the supervisory burden with the wider academic community (Mc Callin & Nayar, 2012; Taylor, 2012).

Maor and Currie (2017) investigated how the use of information and communication technology (ICT) and a more collaborative pedagogy could improve supervision focused on eight supervisors and nine students in two Australian universities. The study found less movement from traditional supervision. It found, however, that students and supervisors used email, mobile phones, Skype and Dropbox to interact while some used social media like Twitter. Students reported their supervisors were competent in using ICT, sometimes initiating the uptake of new technologies. They also established that all participants were using what they considered to be basic ICT, such as email and mobile phones for communication and exchange of information, iPads, laptops and applications such as Twitter, video communications, audio recording and editing software. Most were also using Skype for meetings when unable to meet face-to-face or if distance supervision was involved. All

supervisors reported the use of Word documents using ‘track changes’ and exchanging these via email, Dropbox or during Skype meetings, for sharing written drafts. All participants used the Internet for information seeking and sharing, as well as research databases and university-specific software. Some used social networking mediums such as Twitter and Google Hangouts, which support web conferencing.

In addition to becoming active members of their disciplines, students taking higher degrees are encouraged to establish an online research presence. Changing the traditional supervision approach to a blended approach (de Beer & Mason, 2009), including greater use of ICTs through the use of online forums, for example, may assist these students to become more active members in their scholarly and/ or professional communities (Maor & Currie., 2017).

Thus, these studies in many different countries demonstrate that the collaborative-based technology in which students and supervisors interact delivers a sense of connectedness and promotes social and academic achievement (Maor & Currie., 2017). Indeed, Maor and Currie (2017) found that supervisors adopted many of these roles and strategies, moving towards a participatory pedagogy and a more collaborative and project-based approach to the supervision process.

On the contrary, Gumbo (2018) found that supervisors value the human aspect such that – though supervisors are positive about the role of technology in supervision, the human aspect should enjoy precedence in their supervision of students. This supports the claim by McCallin and Nayar (2012), who while reviewing supervision practices in New Zealand, noted that most supervision remained in the traditional model. However, different models were needed for different students and identified three types of supervision: traditional (dyadic relationship between supervisor and student); group (supervisor and multiple students); and mixed (mixture of the two previous plus new technologies). Similarly, In South Africa, de Beer

and Mason (2009) claimed that relationships did not alter as a result of using technology: the supervisor still maintained the role of advisor and mentor and provided support and quality control but with the advantage of better communication. As noted above, Cumming (2010) in Australia found that the supervision relationship was not changing enough and suggested that there was mounting pressure to implement a more open and flexible type of supervision.

The conceptual framework for the study is presented in *Figure 1*. The framework conceives the utilization of digital tools by doctoral students in their research work to be influenced by the individual student’s socio-economic factors such as family chores and financial ability to utilize the tools. From an external standpoint, the utilization is dependent on both the mode and levels of engagements applied by their supervisors. The modes of engagement tested in this study were; face-to-face, online and blended. The level of student engagement was tested in terms of their attitudes toward and willingness to use digital tools in their thesis work.

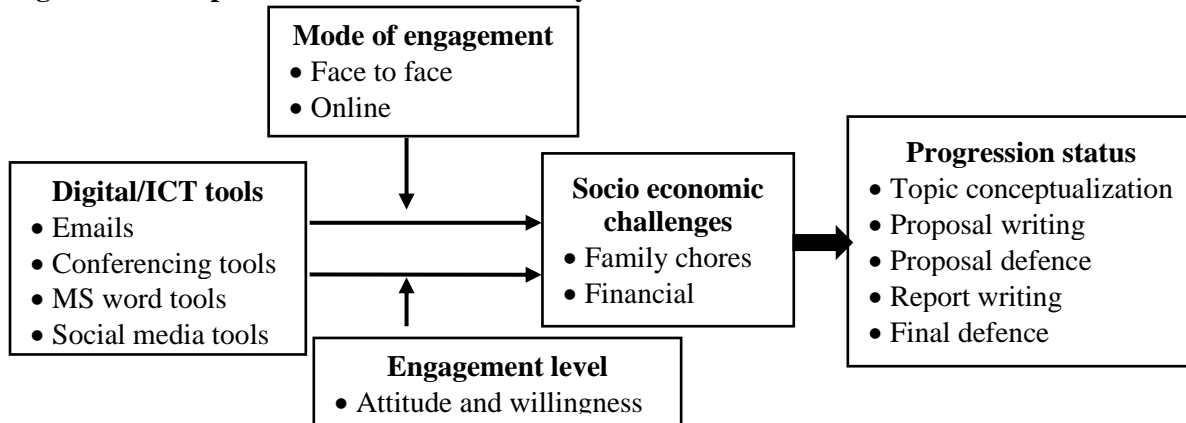
The utilization of selected digital tools (emails, conferencing tools, MS Word and social media) at the various stages in thesis supervision was investigated. The investigation covered the following five stages of thesis supervision.

- Topic conceptualization – this includes the attempt by students to locate the topic of study by clearly identifying the problem area with clear variables and scope;
- Proposal writing – this involves putting up a clear research plan with background, statement of the problem, literature review, methodology and data collection instruments. This stage requires the doctoral students to make frequent engagements with their supervisor in order to succeed;
- Proposal defence – a stage where the proposal undergoes internal examination at the departmental or/ and school level;

- data collection stage - where the doctoral student has been allowed to proceed to the field for the purpose of collecting data and writing a report, and;
- Thesis report defines –involves a final examination of the thesis report. Under this

stage the thesis report goes through supervisory scrutiny, the processed for external examination before the PhD candidate is allowed to make an oral defence (viva voce examination) before a special panel.

**Figure 1: Conceptual framework for the study**



**MATERIALS AND METHODS**

The study sought to investigate the extent digital/ICT technologies are utilized to improve the doctoral supervision process. It aimed at answering the following questions.

- In what way is the gender of doctoral student determining their thesis progression?
- Is there any relationship between the frequency of engaging supervisors and the progression of doctoral students?
- Are doctoral students’ preferred modes of supervisor engagement in line with their ICT/digital literacy competency?
- To what extent do doctoral students utilize various digital tools during their supervision?

The study adopted a descriptive research design, targeting a population of 150 (92 male and 58 female) PhD students from the Department of Management Science and Project Planning, University of Nairobi. These were students enrolled for PhD in Project Planning and Management from 2018. The Department of management Science and Project Planning was ideal for this study because it had a sizable number

of doctoral students compared to other department. This relatively large population of PhD students permitted meaningful statistical analyses.

Using the sample size calculator at 95% confidence level and a margin error of 5% yielded a sample size of 109 PhD students. Stratified random sampling technique was used to sample 67 male and 42 female students. For the qualitative interviews, convenience sampling technique was used to select 10 supervisors (5 male and 5 female). Data were gathered through online questionnaires administered to students and interview guides for PhD supervisors. Data analysis was done using SPSS Version 25.

**RESULTS**

Out of the 109 questionnaires administered, only 102 were returned for analysis. This yielded a 95.6% questionnaire return rate which was considered acceptable for analysis since it was above the average online survey return rate of 44% reported by Wu et al. (2022). Only one out of the targeted 10 supervisors was unavailable for the scheduled interviews within the study period.

**Student Gender and Progression in Thesis Supervision**

The study sought to establish the progress made by students based on the length of time in years they had worked on their theses. This information was cross-tabulated by the gender of the students and the information was summarized in *Table 1* and *Table 2*.

*Table 1* shows that a large proportion (62.7%) of PhD students were male while only 37.3% were female. It also reveals that, whereas slightly more than two-thirds (69.6%) of the students had been working on their theses for less than two years, a significant number (30.4%) had been working on their theses for more than 3 years.

**Table 1: Distribution of participants by gender and duration of working on theses**

		Duration in years of working on the thesis				Total (%)
		less than 1 (%)	1-2 (%)	3-4 (%)	4 and above (%)	
Gender	Male	15.7	30.4	14.7	2.0	62.7
	Female	6.9	16.7	9.8	3.9	37.3
	Total	22.5	47.1	24.5	5.9	100.0

Apart from the duration taken working on their theses, the stage or status of thesis writing was also considered an indicator of progression. The variables considered in this study were topic/title

conceptualization, proposal writing, proposal defence, report writing and report defence. *Table 2* shows a summary of the findings on these variables as cross-tabulated by students' gender.

**Table 2: Distribution of students by gender and their theses writing stage**

Gender	Stage of thesis writing				Total (%)
	Topic conceptualization (%)	Proposal writing (%)	Proposal defence (%)	Report writing (%)	
Male	15.7	39.2	5.8	2.0	62.7
Female	8.8	26.5	2.0	0	37.3
Total	24.5	65.7	7.8	2.0	100

*Table 2* shows that two-thirds (65.7%) of the students were at the proposal writing stage, 24.5% at topic conceptualization while 7.8% and 2.0% were at the proposal defence and report writing stages respectively. The results further reveal that there are more men showing progress than women as indicated by 5.8% of men against 2.0% of women reporting to be at the proposal defence stage.

**Student's Engagement of Supervisor and Progress in Doctoral Supervision**

The study sought to establish whether the frequency of engaging supervisors had any effect on the duration and the stage of progression of the students. The doctoral students' frequency of engaging supervisors was compared with the length they had taken working on their theses and the stage at which they were in their theses

writing. Later, data on the preferred mode of engaging the supervisor were analysed and the results are presented in *Table 3*.

*Table 3* reveals that close to half (47.0%) of the students had been working on their theses for a duration between one to two years, 23.5% had been working on their theses for a duration of less than one year, and 23.7% had been working on their theses for a period of between three and four years. Only 5.8% had worked on their theses for a period of more than four years. This implies that a significant number (29.5%) of doctoral students spent longer than the period designated to doctoral thesis work. From the supervisors' standpoint, students took long on their research work due to unique personal issues as well as the high workload of the supervisors, as contained in the following two excerpts:



*Doctoral students have issues that affect their doctoral journey. I have a student who was progressing well until she took leave to attend to her new born. It has been months ever since. Some students face financial challenges that compel them to slow down on their studies. In such a case, there is little a supervisor can do (Female 2, Female).*

*I would like my students to complete their thesis in time but I am overwhelmed with teaching and other responsibilities. I can therefore do just a little at a time in order to balance the overwhelming work roles. All the same, I encourage my students to keep reminding me to look at their work (Supervisor 6, Male).*

**Table 3: Supervisor engagement, duration for working on the thesis and status of thesis writing**

Frequency of engagement				Thesis stage(%)				Total (%)
				Topic/Title	Proposal writing	Proposal defence	Report writing	
Very Frequently	How long have you been working on your thesis	1 - 2 years	2.0	0	0	0	2.0	
			3-4 years	0	0	0	0	
			4+ years	0	0	2.0	2.0	
			Total	2.0		2.0	4.0	
Frequently	How long have you been working on your thesis	less than one year	2.0	9.8	2.0	0	13.8	
		1 - 2 years	2.0	18.6	3.9	0	24.5	
		3 - 4 years	2.0	5.8	0	0	7.8	
		4+ years	0	0	2.0	0	2.0	
		Total	6.0	34.2	7.9	0	48.1	
Rarely	How long have you been working on your thesis	less than one year	0	3.9	0	0	3.9	
		1 - 2 years	7.8	13.7	0	0	21.5	
		3 - 4 years	7.8	11.8	0	0	19.6	
		4+ years	0	2.0	0	0	2.0	
		Total	15.6	31.4	0	0	47.0	
Not at all	How long have you been working on your thesis	less than one year	5.9	0	0	0	5.9	
		3 - 4 years	0	2.0	0	0	2.0	
		Total	5.9	2.0	0	0	7.9	
Total	How long have you been working on your thesis	less than one year	7.8	13.7	2.0	0	23.5	
		1 - 2 years	11.7	31.4	3.9	0	47.0	
		3 - 4 years	5.9	17.8	0	0	23.7	
		4+ years	0	1.9	1.9	2.0	5.8	
		Total	25.4	64.8	7.8	2.0	100	

Regarding the student’s thesis writing status, *Table 3* shows that close to two thirds (64.8%) of the students were at the proposal writing stage while a quarter (25.4%) of the students were at the topic conceptualization stage. The results also show that close to half (48.1%) of students engaged their supervisors frequently. A significant number (47.0%) rarely engaged their supervisors while 7.9% did not engage their supervisors at all. It is worth noting that out of the 48.1% of the students reporting engaging their supervisors frequently, a significant proportion

(34.2%) were at the proposal writing stage and 38.3% had worked on their theses for a duration less than three years. This proportion of students is likely to have benefitted from frequent student-supervisor engagements, a practice that is likely to have a positive impact on their progression.

This was confirmed in the interview with a female supervisor who affirmed that the use of digital tools to discuss thesis progress with her students was indeed beneficial. She explained:

I use technology in my supervision work. It makes it easy for me to touch base with my students who may find it difficult to meet with me physically. However, I do not engage much in online forum discussions with the students but often exchange written feedback via Word Track Changes function and WhatsApp (Supervisor 3, Female).

The correlation between student-supervisor engagement and the status level of thesis writing was computed. A correlation index of  $r = -0.429$  with  $p = 0.001$  was realized. This was considered significant at 0.05 level of confidence. It implies that there was a significant weak negative

correlation between student's supervisor engagement and the level of their theses writing. This means that there is the likelihood of students making progress in their theses writing if they engage supervisors more.

### Students' preferred modes of engaging supervisors and digital literacy competency

The study further sought to identify the modes preferred by doctoral students in engaging supervisors. The variables describing the mode of engagement were defined as face-to-face, online and blended. *Table 4* summarizes the results on the three variables.

**Table 4: Mode of supervisor engagement against students' proficiency in ICT**

Mode	Rating of students' proficiency in ICT skills					Total
	Very low	Low	Moderate	High	Very high	
Face to Face	2.0	0	3.9	3.9	3.9	13.7
Online	0	0	7.8	7.8	5.9	21.5
Blended	0	7.8	9.8	26.7	22.5	66.8
Total	2.0	7.8	21.5	38.4	32.3	100

*Table 4* shows that two-thirds (66.8%) of students preferred a blended mode of engaging their supervisors. A sizable share (21.5%) of students preferred online mode while 13.7% preferred face-to-face mode. It is also notable that close to half (49.2 of those preferring a blended mode of engaging their supervisors reported to be highly and very highly proficient in ICT skills. This, therefore, poses a question as to whether supervisors had adequate skills to sustain online engagement with students. The interviews with the supervisors, however generated mixed findings. While five of the supervisors expressed confidence in the use of digital tools during supervision, the other four appeared to favour the traditional face-to-face supervision mode, perhaps due to low proficiency in using digital tools. A male supervisors stated:

*I admit that using digital tools can improve my supervision work. That said, I love working on hard copies rather than soft copies and therefore rarely make use of digital tools in my supervision process. Occasionally, I email my students to set up appointments where I provide oral feedback*

*either in a physical meeting or via Google Meet* (Supervisor 7, Male).

### Extent of utilization of digital tools in the supervision process

This section provides an analysis of the extent to which students utilize digital tools. Likert type of scale was used to generate items that measured the extent to which students agreed on various items touching on various tools. The items were rated as follows; Strongly agree (SA) = 5; Agree (A) = 4; Neutral (N) = 3; Disagree (D) = 2; Strongly Disagree (SD) = 1. *Table 5* shows a summary of students' responses in percentages and means.

It was also observed that 43.2% of students neither agreed or disagreed that their supervisors used collaborative tools when mentoring them on academic writing, pointing to a possible lack of awareness about collaborative tools among the students. There was high student agreement with using email to send (mean= 4.51) and receive feedback from supervisors and using the track changes function on MS Word (mean = 3.72). However, students disagreed that their supervisors encouraged them to join communities of practice

on social media platforms (mean = 2.60) or the supervisors used collaborative tools when mentoring them on academic writing (mean = 2.81). Similarly, a high proportion of students disagreed that they scheduled meetings with their supervisors using online digital tools (mean = 3.98). The low use of collaborative tools river

berated across the interviews with the supervisors who cited time constraints and low digital literacy levels as a major hindering factor. From the foregoing, it is deducible that sensitizing supervisors and students on various digital tools is likely to enhance their engagement during the supervision process.

**Table 5: Extent of utilization of digital tools by students**

Digital Tools	SA (%)	A (%)	N (%)	D (%)	SD (%)	Mean
I use email to send and receive work from my supervisor(s)	62.7	31.4	5.9	0	0.0	4.51
I virtually meet my supervisor(s) through the use of video conferencing tools such as Zoom, Google Meet, teams etc.	16.9	15.2	13.2	45.3	9.4	3.26
The use of the show comments/track changes the function of MS Word by my supervisor (s) has greatly enhanced my thesis	47.1	16.7	22.5	5.9	7.8	3.72
My supervisor (s) use collaborative tools such as Google Docs when mentoring me on academic writing	7.8	16.7	43.2	13.7	18.6	2.81
My supervisor (s) encourages me to join a community of practice on Facebook, Twitter and other social media platforms.	2.0	16.8	24.8	39.6	16.8	2.60
I have always scheduled my meetings with my supervisor (s) using online digital tools such as Google Calendar	11.8	21.6	30.4	24.5	11.8	2.98
Interaction with my supervisors has encouraged me to develop an interest in digital data collection tools such as Google Forms and Kobo Collect.	7.8	22.5	24.5	37.3	7.8	3.15
As a result of encouragement from my supervisors, I have good knowledge and application of data analysis software such as SPSS	11.8	16.7	24.5	35.2	11.8	3.28

## Discussion

The results show that a significant proportion (30.4%) of doctoral students had been working on their theses for more than 3 years. This may be attributable to other work and/or family activities doctoral students engage in which limit the time they commit to doctoral studies. The results confirm the findings by Lepp et al. (2016) that personal events in a student's life such as the birth of a child, relationship problems and illnesses compel them to take academic leave which slow down their study progress. The authors argue that in cases where doctoral students return from academic leave, it is often difficult for them to get adjusted to research and the work routine.

This study established that male students made good progress in their thesis work compared to the female students. The aforesaid result supports the findings by Fisher et al. (2020) that on average, female students take 10% longer than male students to complete their doctoral training.

It is worth noting that out of the 48.1% of the students reporting engaging their supervisors frequently, slightly more than one third (34.2%) were at the proposal stage and 38.3% had worked on their theses for a duration less than three years. This is suggestive that frequent student-supervisor engagement has an impact on their progression. Indeed, previous studies (e.g. Leijen et al., 2016; Sverdlik et al., 2018) show that the quality of the



supervisory relationship contributes to the student's progress with regard to research, hence the need to foster frequent and quality student-supervisor engagements in order to improve doctoral supervision.

Further analysis of the relationship between student-supervisor engagement and their stage/status of thesis progress indicated a correlation index of  $r = -0.429$  with  $p = 0.001$  implying that there was a significant weak negative correlation between student-supervisor engagement and their stage/status theses writing. This was reflected in the students' disagreement that their supervisors encouraged them to join communities of practice on social media platforms or used collaborative tools when mentoring the students on academic writing. The deficiency of academic writing skills has been pointed out in previous studies. For example, in a study by Lepp et al. (2016), a majority of the supervisors considered the writing skills of doctoral students to be problematic. According to the supervisors, weak academic writing skills increased the workload of supervisors, as poorly written manuscripts need thorough and repeated feedback. This could partly account for the long duration students take in their doctoral work.

Close to a half (49.2%) of the doctoral students who preferred the blended mode of engaging their supervisors had a high level of digital skills. This suggests that digital skills proficiency is a catalyst to enhancing student-supervisor engagement in doctoral research. This assertion is supported by Maor and Currie (2017) who contend that collaborative-based technology in which students and supervisors interact delivers a sense of connectedness and promotes social and academic achievement. The results also show that doctoral students prefer the blended mode of engaging their supervisors to either purely online or face-to-face modes. The value for the human aspect in communication could explain this preference. In a study by Gumbo (2018), doctoral supervisors, though positive about the role of technology in supervision, argued that the human aspect should enjoy precedence in their supervision of students.

Thus, the study concluded that a significant number of doctoral students were not only proficient in digital skills but also comfortable with engaging their supervisors through a combination of face-to-face/in-person and virtual/online sessions.

The use of email to send and receive work from supervisors by students and the use of the "show comments/track changes" function of Microsoft Word by the supervisor(s) was highly preferred as indicated by a majority of doctoral students at means of 4.51 and 3.72 respectively. This finding resonates with the findings by Maor and Currie (2017) that supervisors reported the use of Word 'track changes' function and relayed their feedback with students via email. Worth noting is the high proportion of doctoral students indicating indifference to the utilization of digital tools, a pointer to the likelihood of low exposure to or encountering challenges in using the digital tools by the supervisors. This result led to the conclusion that there was low utilization of digital tools for supervision, a factor that was likely to slow down students' progression in their theses work.

### **Recommendations**

Based on the foregoing discussion, the study recommends that universities should adopt a blended doctoral supervision model in order to leverage the strengths of in-person and virtual student-supervisor engagement. They should also specify the tools/methods to be used in both face-to-face and online aspects of supervision. Further, there is a need to train both students and supervisors in the use of digital tools to enhance their engagement. Future studies can examine the effect of the supervisor's gender on doctoral supervision progress. Doctoral students' productivity with regard to manuscripts and publications during and after doctoral studies would also be an intriguing variable to investigate.

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### Declaration of Interest Statement

The authors of this article have no conflict of interest to declare.

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