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Pre-service early childhood educators' attitudes toward supporting digital safety of preschool children

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ABSTRACT

The readiness of preschool teachers to ensure children's digital safety (DS) is currently one of the overarching challenges for early childhood education (ECE) systems. Unfortunately, developing countries, particularly Kazakhstan, do not necessarily possess the required resources to run preschool educational programs to ensure children's DS. This study explores pre-service early childhood educators' (PSECEs) cognitive, affective, and behavioral attitudes toward supporting DS of preschool children. It also considered PSECEs perceptions of their role and responsibility in supporting preschool children's DS and their readiness to address these issues in their future professional practice. The research adopted a cross-sectional mixed-methods design without instructional intervention. The study was carried out at the Abai Kazakh National Pedagogical University in Almaty, Kazakhstan, with 344 participants in the experiment. The findings highlight the interrelated nature of cognitive, affective, and behavioral components of study participants' attitudes. Study participants had strong affective engagement. However, the results revealed a noticeable imbalance between emotional concern and practical readiness. This research highlighted that DS content in preschool teacher education programs has not kept up to date with global digital advances. Consequently, there is a need to adopt coherent content of practice-oriented approaches to DS in preschool teacher education programs. This paper further extends the body of theory on PSECEs attitudes toward supporting DS of preschool children and provides new insights into the educator candidates' cognitive, affective, and behavioral attitudes.

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1. INTRODUCTION

The availability of global information networks with hosted resources, including for children, directly impacts the intellectual, mental, and physical development of the younger generation, as well as the formation of a child's moral character [1], [2]. However, in today's digital society, uncontrolled information often carries not only positive but also ambivalent, threatening, or negative connotations, potentially adversely affecting children's psychological, social, and moral development [3]. Preschool children are particularly vulnerable to becoming victims of digital safety (DS) breaches and may be unaware of the risks associated with using internet communication tools [4]. In this context, children's DS must be considered a key issue to ensure the safe and critical use of technologies in early childhood education (ECE) [5].

Children's DS is the subject of numerous studies [6], [7]. Basic guidelines for ensuring children's DS are proposed in studies [8]. Zgambo *et al*. [9] address DS issues related to the use of general educational communication technology resources. Theoretical and practical aspects of DS training are presented in the studies of Altun [10]. Risk factors and challenges of protecting individuals from digital influence in modern society were examined in other studies [11], [12]. Further, Chaudron *et al*. [13] presented research on the analysis of digital threats and measures for ensuring children's DS. Nevertheless, it must be acknowledged that the issue of children's DS has not yet been fully addressed and remains a serious concern [14].

Without addressing the issue of preschool-aged children's DS and ensuring their protection from the influence of negative information, the process of developing a child's identity is impossible [15]. This is not only a social but also a pedagogical problem. It is impossible to create an ideal digital environment for a child; however, it is more effective to develop their understanding of DS. This involves teaching preschoolers to understand and evaluate information, critically assessing it based on moral and cultural values. In this process, the role of pre-service early childhood educators (PSECEs) is difficult to overestimate, as their opinions are extremely important to preschoolers [16]. However, there remains a lack of understanding about how to identify and interpret educators' key attitudes toward supporting children's DS in ECE. Although previous studies have addressed children's DS in general, there is a lack of empirical research on PSECEs attitudes toward supporting DS in Kazakhstan.

Despite the efforts already undertaken by the government in Kazakhstan, including government programs and legislative initiatives on children's DS, the issue requires intensified work at all levels, particularly in preschool education [17]–[20]. Addressing this issue is impossible without improving the digital literacy of PSECEs. Protecting children from inappropriate content and harmful news online is becoming a priority for society as a whole [21]–[23]. However, training PSECEs is not sufficiently emphasized to develop their attitudes and readiness to ensure children's DS in Kazakhstan. An analysis of the professional training program revealed a focus on developing the general pedagogical competencies of PSECEs. DS for preschoolers is not identified as a separate, systematic component in training programs [24]–[26]. PSECEs' readiness to ensure children's DS develops spontaneously, often through students' personal experiences. Understanding these attitudes is essential to design effective training programs and improve educational practices for preschool educators, ensuring that interventions in children's DS are aligned with professional responsibilities and educational standards.

There is a clear lack of empirical research on PSECEs' attitudes toward this task in ECE in Kazakhstan, highlighting a growing need for new specialists capable of actively supporting DS in their professional activities [27], [28]. This study addresses this research gap by providing one of the first empirical investigations of PSECEs attitudes toward supporting preschool children's DS in Kazakhstan. The novelty of the study lies in the application of a structural three-component model (cognitive, affective, and behavioral components) to examine PSECEs' attitudes toward supporting preschoolers' DS within the context of early childhood teacher education. Furthermore, the research integrates quantitative survey data and qualitative interview analysis, offering a comprehensive perspective on educators' attitudes that has not previously been explored in Kazakhstan's preschool teacher training context.

Accordingly, the study aims to explore PSECEs cognitive, affective, and behavioral attitudes toward supporting the DS of preschool children. The study also examines how PSECEs perceive their role and responsibility in ensuring preschool children's DS and how they assess their readiness to address DS issues in their future professional practice. In addition, the research investigates whether differences exist in cognitive, affective, and behavioral attitude scores across years of study. The study is guided by the assumption that PSECEs' attitudes toward supporting children's DS have a three-component structure—cognitive, affective, and behavioral—with varying levels of development across these components.

2. THEORETICAL FRAMEWORK

Digitalization of the educational process in a preschool educational institution involves transforming the content, methods, and forms of teaching and development of preschool-age children through the use of professional equipment, electronic tools and educational systems, online platforms, and various digital technologies [29]. Additionally, researchers emphasize the need to develop and implement a modern preschool education model using digital technologies [30]. Digital technologies make preschool education more accessible for children with special needs, as well as frequently ill children who spend much of their preschool years at home. Teachers can interact with children and parents, providing educational materials and consultations. For example, online courses and online game-based activities can help organize work in specialized groups for children with severe speech impairments during the period of sound automation, improving quality and maintaining continuity of the correctional process both in the educational institution and at home. DS for children is becoming a tool that helps them navigate the world rather than shut

themselves off from it: understanding the boundaries of communication, how data collection works, why not to trust every message, and how to evaluate what is happening on screen. This forms the foundation of a safe digital environment where children grow up not under restrictions, but with support and clear rules. Research has shown that digital content affects various aspects of children's development, including cognitive, emotional, and behavioral development [31]. The internet's positive and negative impact stems from its global nature, capable of transmitting information that can be used for creation and development as well as for destruction and degradation. Systematic reviews conducted in Kazakhstan have identified computer and internet addiction, including video game addiction, as significant risk factors negatively affecting the psychological well-being of children and adolescents [32]. Importantly, these digital-related risks appear to extend across different types of settlements, suggesting that challenges associated with problematic digital use represent a nationwide concern. Although the present study focuses on preschool education, these findings underscore the importance of preventive DS efforts beginning in early childhood.

2.1. Components of attitudes toward digital safety

The concept of "attitude" is considered in research as the psychological connection between a subject and an object (which may be the subject themselves, another person, objects and phenomena of the surrounding world, or a social group) as a result of human interaction with the environment; as an active, conscious, integral, selective, experiential connection between the individual and various aspects of reality [33]. In studies on attitudes, attempts have been made to reduce them to one of three aspects. Maddocks [34] defined attitude as an emotional assessment, while Dinesen *et al*. [35] defined it as a behavioral predisposition. This approach has certain validity, since contributions of emotional, cognitive, and behavioral components to the formation of a general attitude are rarely equivalent, and they may not always be consistent with each other [36]. Today, cognitive, emotional, and behavioral components are viewed not as structural elements, but rather as external correlates of attitude [37]. Hepler and Albarracín [38] demonstrated that attitudes can be formed on an affective basis while also correlating with the level of awareness of the object or the assessment of the consequences of one's own actions in relation to it. Minton *et al*. [39] provided evidence that the general assessment of an object can predict affective, cognitive, and behavioral consequences; for example, it can elicit reactions such as sympathy, attributive descriptions, or willingness to act. Thus, including cognitive, emotional, and behavioral components of attitude in the study is justified and appropriate. It allows, first, the compilation of a more comprehensive typology of educators' attitudes toward children's DS, and second, the comparison of contributions of identified types with each other and evaluation of correspondence with results obtained using similar procedures. Figure 1 presents the structure of the three-component attitude model used in this study.

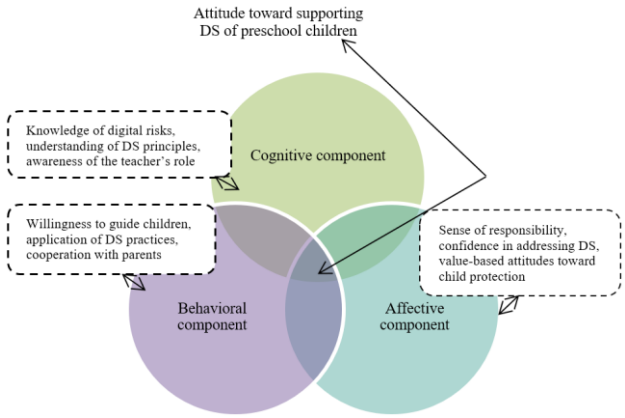

Figure 1. The structure of the three-component attitude model

3. METHOD

3.1. Study design

A non-interventional, cross-sectional mixed-methods design [40] was used for a comprehensive examination of participants' current attitudes toward children's DS without instructional intervention. This design involves examining participants once and collecting information about the factors, thereby providing an understanding of the current state of the phenomenon under investigation. The integration of quantitative and qualitative approaches allows for both statistical analysis and in-depth interpretation of respondents' perspectives. Figure 2 shows the research design.

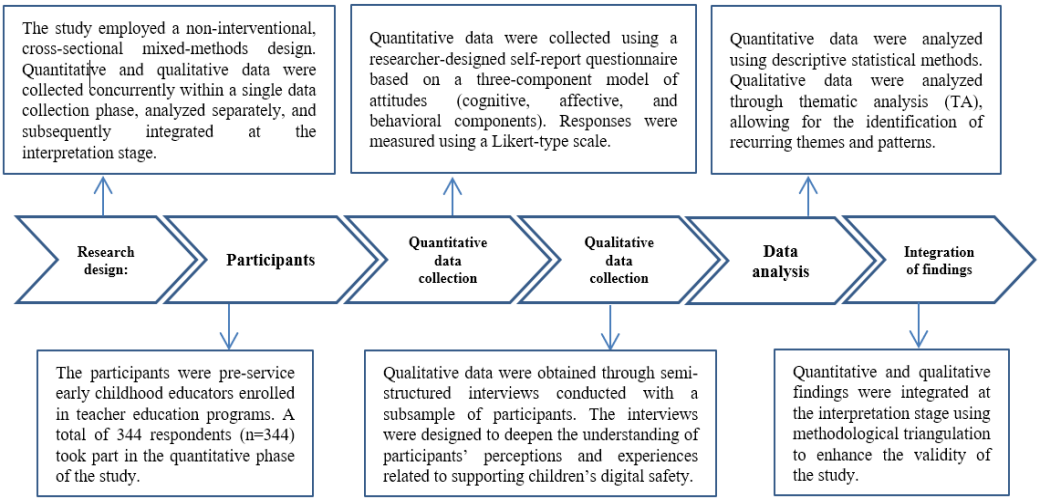

Figure 2. The research designs

3.2. Participants

The study was conducted at Abai Kazakh National Pedagogical University (Almaty, Kazakhstan). The university administration provided ethical consent for the study to go ahead. Purposive sampling was used to recruit participants, whereby the researcher attended class to explain the study. Interested students completed a sign-up sheet to take part in the study. Consent of participants included data storage and information on the right to withdraw. The experiment included 344 participants enrolled in preschool education programs. Semi-structured interviews were conducted with 20 participants. For the purposive subsample, a subset was selected from the larger quantitative sample. The study included participants of various ages. In Kazakhstan, the gender composition of entrants to preschool education programs is predominantly female. As a result, there were only female respondents, reflecting the gender-specific nature of preschool teacher education in our country. The demographic distribution of participants is given in Table 1.

Table 1. Characteristics of study participants

Variable	Category	n	%
Gender	Female	344	100
Program of study	ECE	344	100
Age (years)	M±SD (range)	20.8±1.2 (18–24)	-
Year of study	Second year	108	31.4
	Third year	116	33.7
	Fourth year	120	34.9

3.3. Data collection instrument

Data were collected using two instruments: an author-developed attitude scale and a semi-structured interview form, as shown in Table 2. The scale items and interview questions are provided in Tables 3 and 4. The internal consistency of the attitude scale was acceptable. The cognitive, affective, and behavioral subscales (6 items each) had Cronbach's α values of 0.82, 0.85, and 0.79, respectively, and the overall 18-item scale showed a Cronbach's α of 0.88, indicating good reliability.

Table 2. Overview of data collection instruments

Instrument	Theoretical basis	Structure	Format
Attitude scale toward supporting DS	Cognitive–affective–behavioral attitude model (Rosenberg and Hovland, 1960)	18 items; 3 subscales (cognitive, affective, behavioral)	5-point Likert scale
Semi-structured interview	Qualitative interpretive approach	5 open-ended questions	Individual interviews

3.4. Data analysis

The statistical data processing methods are shown in Table 5. The phases of thematic analysis applied to the qualitative data are detailed in Table 6. These analytical procedures were used to ensure a systematic examination of both quantitative and qualitative data and to provide a comprehensive interpretation of the study results.

Table 3. Structure and items of the attitude scale toward supporting DS

Item		Item statement
Cognitive component	1	I am aware of the main digital risks that preschool children may encounter when using digital devices.
	2	I understand how inappropriate digital content can negatively affect preschool children's development.
	3	I am familiar with basic principles of DS for preschool-aged children.
	4	I know which online activities are appropriate for children in the final year of preschool.
	5	I understand the importance of adult guidance in preschool children's use of digital technologies.
	6	I am aware of the role of preschool teachers in supporting children's DS.
Affective component	7	I feel responsible for supporting preschool children's DS in educational settings.
	8	I feel confident discussing issues related to DS with preschool children.
	9	I believe that ensuring DS is an important part of a preschool teacher's professional role.
	10	I feel concerned about the potential risks digital technologies pose to preschool children.
	11	I value the importance of creating a safe digital environment for young children.
	12	I feel motivated to support preschool children in developing safe digital behaviors.
Behavioral component	13	I am willing to guide preschool children on how to use digital devices safely.
	14	I would intervene if I noticed a preschool child engaging in unsafe digital behavior.
	15	I am willing to follow DS guidelines when using technologies with preschool children.
	16	I would encourage preschool children to talk about their digital experiences.
	17	I am willing to cooperate with parents to support preschool children's DS.
	18	I am prepared to apply DS practices in my future professional work as a preschool teacher.

Table 4. Interview guide: questions on DS in preschool education

No.	Interview question
1	What digital risks do you think preschool children may face when using digital devices or online content?
2	How do you conceptualize DS in the context of preschool education?
3	How do you feel about preschool children's use of digital technologies in educational settings?
4	What concerns or expectations do you have regarding your role in supporting preschool children's DS?
5	What actions do you believe preschool teachers should take to support children's DS in everyday practice?
6	How prepared do you feel to address DS issues in your future professional work as a preschool teacher?

Table 5. Data analysis methods

Research question	Data source	Analysis method
RQ1. What are PSECEs' cognitive, affective, and behavioral attitudes toward supporting DS of preschool children?	Attitude scale (cognitive, affective, and behavioral subscales; total score)	Descriptive statistics (means, standard deviations)
RQ2. How do participants perceive their role and responsibility in supporting preschool children's DS?	Semi-structured interviews	TA
RQ3. How do PSECEs describe their readiness to address DS issues in their future professional practice?	Semi-structured interviews	TA
RQ4. Are there differences in cognitive, affective, and behavioral attitude scores across years of study?	Attitude scale scores grouped by year of study	Descriptive comparison of means

Table 6. Phases of thematic analysis applied in the study

Phase of thematic analysis	Application in the present study
1. Familiarization with the data	The researchers became familiar with the qualitative data through repeated reading of interview transcripts. Initial notes and reflective memos were produced to capture preliminary ideas related to PSECEs' perceptions of supporting children's DS.
2. Generating initial codes	Interview transcripts were systematically coded to identify meaningful units of data relevant to participants' perceptions, feelings, and self-reported practices related to children's DS. Coding was conducted manually to allow close engagement with participants' responses.
3. Searching for themes	Initial codes were examined and grouped into broader patterns. Potential themes were developed by identifying recurring ideas and relationships among codes that addressed the research questions.
4. Reviewing themes	Candidate themes were reviewed for internal coherence and clear distinction between themes. The researchers revisited the original data to ensure that the themes accurately reflected participants' perspectives and experiences.
5. Defining and naming themes	Final themes were refined and clearly defined to capture their core meaning. Each theme was assigned a concise and descriptive name, and representative quotations were selected to illustrate key aspects of the findings.

3.5. Ethical considerations

Participants were informed that they were participating in a study whose results would be anonymized and published. When presenting their results, participants were assigned pseudonyms to ensure the protection of their data. Voice or video recordings were not permitted in the study. Detailed field notes and verbatim quotes were used for recording, the accuracy of which was verified with each study participant. All interview participants consented to the inclusion of verbatim quotes in this study.

4. RESULTS AND DISCUSSION

Table 7 presents the descriptive statistics (means and standard deviations) for all components, as well as the overall attitude score, disaggregated by year of study. The results indicate that students across all years demonstrated positive attitudes toward supporting DS of preschool children. Lower mean values for the behavioral component suggest that students perceived practical readiness may still be developing. A consistent increase in mean scores across all components from the second to the fourth year of study was observed.

Figure 3 illustrates the mean scores of all components of participants' attitudes toward supporting DS of preschool children across years of study. The figure illustrates that the affective component had the highest mean values at each stage of training. In contrast, behavioral attitudes, while positive, remained slightly lower.

The findings from the first research question suggest that participants' cognitive, affective, and behavioral attitudes toward children's DS showed positive results across all three components. Notably, the affective component demonstrated the highest level across years 2–4 of study. Recent studies have reported mixed results concerning PSECEs' attitudes towards supporting DS of preschool children in ECE [41]. Our results are in line with previous studies' findings that PSECEs hold positive attitudes towards supporting DS of preschool children and view it as an important part of ECE [42]. Other studies [43], [44] have reported that PSECEs' attitudes towards supporting DS of preschool children do not differ significantly from those of in-service teachers. Participants' perceptions of their role and responsibility revealed a gradual increase in all attitude scores from the second to the fourth year of study. Several studies have shown that progression through preschool teacher education programs is associated with awareness, confidence, and perceived professional responsibility in DS issues [45], [46].

Table 7. Descriptive statistics of attitude scale scores by year of study

Subscale	Year of study	n	Mean (M)	SD
Cognitive	Second year	108	3.72	0.54
	Third year	116	3.89	0.51
	Fourth year	120	4.05	0.48
Affective	Second year	108	3.81	0.56
	Third year	116	3.97	0.52
	Fourth year	120	4.12	0.50
Behavioral	Second year	108	3.65	0.58
	Third year	116	3.84	0.55
	Fourth year	120	4.00	0.53
Overall attitude	Second year	108	3.73	0.49
	Third year	116	3.90	0.47
	Fourth year	120	4.06	0.45

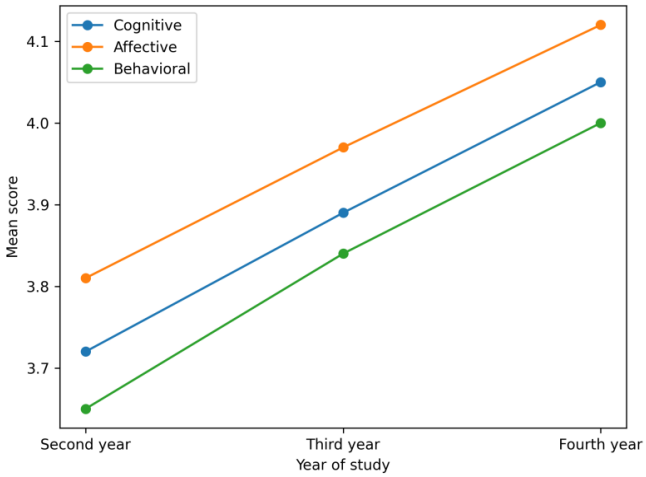

Figure 3. Mean scores of all attitude components across years of study

4.1. Qualitative results

Table 8 presents illustrative quotations supporting the identified themes and subthemes. The data reveal variability in participants' perceptions of DS, particularly in how they conceptualized the balance between protection and guidance. While expressions of concern and perceived responsibility were frequent across interviews, statements indicating strong practical confidence were comparatively less evident.

The analysis identified four overarching themes: perceived digital risks, understanding of DS in ECE, attitudes toward digital technologies, and professional role and readiness to support DS. Perceived digital risks were commonly articulated in terms of children's potential exposure to inappropriate content, excessive screen time, and online communication risks. Participants described concerns related to developmental, behavioral, and social implications of early digital engagement. These concerns align with prior research suggesting that excessive screen time can limit opportunities for face-to-face interactions [47].

These statements reflect cognitive awareness of potential vulnerabilities associated with preschool children's digital environments. These themes can be interpreted through the cognitive–affective–behavioral framework: perceived digital risks align with cognitive awareness, attitudes toward technology reflect affective responses, and professional readiness corresponds to behavioral preparedness. Overall, the qualitative findings complement the quantitative results by illustrating how cognitive perceptions, emotional responses, and self-evaluated preparedness intersect in shaping pre-service teachers' attitudes toward supporting children's DS.

Table 8. Illustrative quotations supporting themes

Theme	Subtheme	Illustrative quotation
Perceived digital risks	a. Exposure to inappropriate content	"*Preschool children may accidentally encounter content that is not appropriate for their age*." (P7)
		"*Some children are too young to distinguish harmful content*." (P3)
	b. Excessive screen time	"*Too much screen time can affect children's attention and behavior*." (P9)
		"*Children may prefer devices over interacting with peers*." (P2)
	c. Online communication risks	"*Online communication platforms may expose children to strangers*." (P4)
		"*Children may share personal information without understanding the risk*." (P8)
Understanding of DS in ECE	a. DS as protection	"*Adults must protect children from harmful online environments*." (P5)
		"*Preventing access to inappropriate apps is important*." (P10)
	b. DS as guidance and education	"*DS is not only about restrictions, but also about guidance*." (P15)
		"*Children need adult support to understand safe online behavior*." (P11)
	c. Shared responsibility	"*Parents and teachers share responsibility for children's DS*." (P18)
		"*Teachers should communicate with parents about risks and strategies*." (P6)
Attitudes toward digital technologies	a. Ambivalent attitudes	"*Digital tools can be useful, but they also worry me*." (P12)
		"*Sometimes technology seems beneficial, but I'm concerned about its overuse*." (P1)
	b. Perceived educational benefits	"*Technology can support learning if used properly*." (P19)
		"*Apps and videos can introduce new concepts to children*." (P20)
	c. Emotional concerns	"*I am concerned about children becoming emotionally dependent on devices*." (P15)
		"*Devices may replace face-to-face interaction with peers*." (P13)
Professional role and readiness to support DS	a. Teacher responsibility	"*As future teachers, we are responsible for guiding children*." (P14)
		"*Teachers should model safe digital behavior*." (P12)
	b. Need for professional preparation	"*We need more training about DS issues*." (P16)
		"*Workshops or courses could help us feel ready*." (P18)
	c. Perceived lack of competence	"*I do not feel fully prepared to address DS problems*." (P13)
		"*I would need guidance on handling complex situations*." (P17)

5. CONCLUSION

This study examined PSECEs cognitive, affective, and behavioral attitudes toward supporting DS of preschool children, along with their perceptions of professional responsibility and readiness for practice. Findings confirmed a three-component structure, with cognitive and affective attitudes generally stronger than behavioral readiness, highlighting a gap between understanding and practical implementation. Limitations include the cross-sectional design, reliance on self-report measures, and a sample of exclusively female participants from a single institution, which may limit generalizability and the reflection of actual behaviors. Despite these constraints, the study provides valuable insights into PSECEs' perceptions of DS and the need for practical training in ECE curricula. Future research should employ longitudinal and performance-based assessments, include more diverse and representative samples, and explore interventions that enhance behavioral readiness. Overall, the results offer actionable guidance for educators, curriculum developers, and policymakers to foster safe and responsible digital experiences for young children.

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AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
Va : **Va**lidation
Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

DATA AVAILABILITY

The corresponding author may provide study data upon reasonable request.

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