

Technology-Supported Problem-Based Learning for Teaching Social Deviance: A Literature-Informed Pedagogical Framework for Secondary Sociology

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Abstract

Problem-Based Learning (PBL) is relevant to sociology because it organizes learning around complex social problems that rarely have single correct answers. This article develops a literature-informed pedagogical framework for technology-supported PBL in teaching social deviance at the secondary-school level. The synthesis draws on foundational PBL scholarship and recent studies of digital learning, student engagement, and sociology pedagogy. Four design principles are identified: use authentic but analytically bounded problems; scaffold movement from everyday judgments to sociological explanation; employ digital tools for inquiry, collaboration, evidence, and feedback rather than decoration; and assess reasoning, creativity, evidence use, and reflection throughout the learning process. A five-stage sequence is proposed: problem orientation, sociological questioning, evidence investigation, collaborative solution construction, and public explanation and reflection. The framework argues that technology-supported PBL is most educationally valuable when digital tools strengthen disciplinary reasoning while teacher facilitation protects analytical depth and responsible discussion of sensitive social issues. The findings position technology as a support for problem representation, evidence use, collaboration, and feedback rather than as an instructional outcome in itself.

Keywords: critical thinking; educational technology; problem-based learning; social deviance; sociology education;.

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Introduction

Problem-Based Learning (PBL) begins with a problem rather than with a completed explanation. Students encounter an ill-structured situation, identify what they need to know, investigate relevant information, discuss competing interpretations, and construct a reasoned response. This structure makes PBL particularly relevant to sociology, where social problems are multi-causal, contested, and embedded in relationships, institutions, and cultural meanings.

Social deviance is an especially suitable topic. Behaviors labeled “deviant” are not understood sociologically only by listing rule violations. Students need to examine how norms are produced, how sanctions operate, why different groups define behavior differently, and how structural conditions shape opportunities and pressures. Merton’s (1938) strain formulation is one example of a theory that redirects attention from individual moral deficiency toward the relationship between social structure and action. A problem-centered lesson can help students use such concepts to interpret cases rather than memorize theory in isolation.

Technology can strengthen PBL through digital modules, educational videos, collaborative platforms, and online evidence sources, but its value depends on how these tools serve the inquiry process. In sociology, technology should help students encounter a problem, gather and compare evidence, collaborate on explanations, receive feedback, and communicate reasoning. Digital novelty by itself does not guarantee deeper sociological understanding.

The analysis therefore repositions the article as a literature-informed pedagogical framework. This approach is more defensible and also allows the central educational question to be examined more carefully: What should technology do inside a PBL sequence for social deviance?

Research on PBL emphasizes active knowledge construction, self-directed inquiry, collaboration, and teacher facilitation (Hmelo-Silver, 2004). More recent secondary-school research shows that the effectiveness of problem-based work depends on how teachers define worthwhile problems and scaffold students' problem-solving processes (Lane et al., 2023; Lonergan et al., 2022). For sociology, this is particularly important because a problem about deviance can easily become a moral judgment task unless students are required to analyze norms, social control, power, labeling, and structural conditions.

Digital technology adds both opportunities and risks. Reviews of technology-based education show that digital environments can support engagement through interaction, feedback, and collaboration, but can also amplify distraction and inequity when access, digital literacy, or task structure is weak (Balalle, 2024). The educational aim should therefore be technology-supported sociological reasoning, not technology use for its own sake.

Method

This article uses a structured narrative synthesis of established and recent peer-reviewed literature on Problem-Based Learning, Project-Based Learning, educational technology, student engagement, and sociology pedagogy. Sources were selected for their relevance to authentic problem design, scaffolding, digital inquiry, collaboration, formative feedback, creativity, critical thinking, and the teaching of social deviance.

The synthesis is conceptual rather than systematic. It does not claim exhaustive database coverage or meta-analytic estimation. Sources were selected for their relevance to four questions: how problem-centered learning supports knowledge construction; how teachers scaffold inquiry; how digital tools shape participation and feedback; and how these principles can be translated into secondary sociology teaching.

As a conceptual synthesis, the article does not report primary intervention outcomes. Validation percentages and post-test values reported in prior studies are treated as external evidence about the potential of digital modules rather than as findings generated by this article.

The synthesis organizes evidence around five pedagogical functions of technology-supported PBL: problem representation, sociological questioning, evidence investigation, collaborative explanation, and feedback/reflection. The purpose is to specify a testable instructional framework rather than to estimate an intervention effect.

The review is structured rather than systematic. Sources were selected because they address one or more of four design questions: how problem-centered learning supports knowledge construction, how teachers scaffold inquiry, how digital tools shape participation and feedback, and how social problems can be taught sociologically. Foundational sources establish core PBL principles, while more recent empirical and review studies update the discussion of project learning, technology-mediated engagement, and teacher implementation.

The synthesis proceeded by comparing recurrent concepts across the literature: authenticity of the problem, sociological explanation, collaborative inquiry, digital mediation, formative feedback, assessment, creativity and critical thinking, teacher role, access, and ethical sensitivity. The aim is not to estimate an average effect size, but to identify design conditions that are theoretically coherent and sufficiently supported to guide classroom experimentation.

The abbreviation PBL is often used for both Problem-Based Learning and Project-Based Learning, but the approaches are conceptually distinct. Problem-Based Learning begins with an ill-structured problem and uses investigation as the main vehicle for learning. The outcome may be an explanation, recommendation, or proposed solution. Project-Based Learning usually organizes a longer sequence around a driving question and culminates in a public product or artifact. A problem-based unit may produce a product, and a project may contain problems, but the organizing logic differs.

This clarification is important for social deviance. A PBL lesson does not require every group to create a video or poster. Its defining feature is that students must identify what they need to know, investigate evidence, and construct a reasoned sociological response. Digital production is useful only when it strengthens communication or reflection rather than replacing the problem-solving process.

Results and Discussion

Social Deviance as a PBL Problem Space

A high-quality PBL problem should be complex enough to require investigation but bounded enough for students to make progress. Social deviance meets these criteria when it is framed through a concrete case. A scenario involving cyberbullying, school violence, substance use, rule-breaking, or peer pressure can generate questions about norms, group membership, social control, inequality, and institutional responses.

The problem must be framed carefully. If students are simply asked, "How do we stop deviant behavior?", the task can encourage moralizing and oversimplification. A more sociological problem might ask: How do peer-group norms, school rules, family expectations, and digital platforms interact in the escalation of a bullying case? This formulation requires students to identify social mechanisms and competing perspectives.

PBL is therefore useful not because it makes the lesson "fun," but because it creates a reason for students to use sociological concepts. The problem becomes an intellectual object around which theory, evidence, and discussion are organized.

Social deviance is pedagogically powerful because students often enter the classroom with strong moral judgments. PBL can use those judgments as a starting point but should not leave them unexamined. A sociological problem asks students to identify the norm being enforced, the groups and institutions involved, the social conditions shaping behavior, and the consequences of different forms of control. Merton's (1938) strain formulation is one example of a conceptual resource that shifts attention from individual character toward the relationship between social goals and available means.

Problem design should also avoid reinforcing stigma. Asking students to identify 'deviant students' in their school would turn classmates into objects of public judgment. Composite cases, anonymized scenarios, news reports, or public data are safer and analytically stronger because they allow discussion of mechanisms without requiring personal disclosure. The ethical quality of the problem is therefore part of its pedagogical quality.

A strong PBL problem is authentic, complex, and bounded. 'Why do teenagers become deviant?' is too broad and invites stereotypical answers. A more productive problem might ask how peer-group norms and school responses shape the persistence of cyberbullying in a hypothetical case. The narrower question gives students a mechanism to investigate and a manageable body of evidence to evaluate.

The problem should also contain genuine ambiguity. If the expected answer is obvious from the first sentence, students have little reason to investigate. Ambiguity creates space for comparing explanations and considering unintended consequences. The purpose is not to eliminate moral evaluation but to require students to support it with sociological analysis.

Technology as a Support for Evidence, Collaboration, and Feedback

Short videos, news excerpts, anonymized case narratives, and interactive timelines can help students encounter the details of a social problem. Multimedia should be selected for analytical value rather than shock or entertainment. The teacher can pause a video, ask students to identify actors and norms, and distinguish observation from interpretation.

Digital resources can expand the evidence available to students, but searching is itself a literacy. Teachers should provide criteria for source credibility, require students to record where claims come from, and limit the initial search space for novice learners. An e-module can be useful when it organizes theory, guiding questions, and source links around the problem.

Yuningtyas, Sariyatun, and Djono (2023) developed a Problem-Based Learning e-module for sociology and reported strong expert feasibility ratings. Such findings support the practical potential of digital modules, but expert validation should not be treated as evidence of student learning effects.

Shared documents, Padlet-type boards, and collaborative presentation tools allow students to externalize their reasoning. Group members can post hypotheses, evidence, counterarguments, and proposed responses. This makes the development of an explanation more visible to both peers and teachers.

Relawati, Ramadhan, and Hainon (2024) reported increased interest in sociology when Lumio and Padlet were integrated into classroom activities. The broader evidence base similarly indicates that student engagement with technology is strongest when interaction and feedback are structured (Balalle, 2024).

Online quizzes can be useful when they reveal misconceptions and trigger explanation. A multiple-choice item on social control, for example, should be followed by discussion of why alternative answers are more or less sociologically defensible. Gamification without explanation may increase visible participation while leaving conceptual understanding unchanged.

Students can present their final reasoning as a video, infographic, podcast, digital poster, or slide presentation. The medium should not determine the grade. Assessment should focus on the quality of sociological reasoning, use of evidence, feasibility of proposed responses, clarity of communication, and reflection.

Digital Literacy and Equitable Participation

Technology-supported PBL assumes forms of digital literacy that are unevenly distributed. Students may be comfortable with social media while lacking experience with academic search, shared documents, evidence organization, or collaborative revision. Teachers should therefore teach the digital routine required by the inquiry rather than assuming competence from device familiarity.

Equity also requires attention to access. Not every student has the same device, connectivity, or private space for online work. Shared-device tasks and offline alternatives can preserve participation when access is uneven. A digital tool should expand the learning opportunity, not become a condition for membership in it.

Discussion

A Five-Stage Technology-Supported PBL Framework

Stage 1: Problem orientation. The teacher presents an authentic, age-appropriate case of social deviance through a short narrative, image sequence, or video. Students identify what they notice and what remains unclear. The goal is curiosity, not immediate judgment.

Stage 2: Sociological questioning. Students transform first impressions into questions that can be investigated. The teacher introduces or revisits concepts such as norms, sanctions, socialization, peer groups, social control, labeling, or strain. Groups state an initial explanation and list the evidence they need.

Stage 3: Evidence investigation. Students examine teacher-curated and independently located sources. Depending on the topic and ethical constraints, they may analyze school rules, news reports, anonymized survey data, or observational material. Digital tools are used to organize sources and record claims.

Stage 4: Collaborative explanation and response. Groups compare evidence, revise their initial explanation, and develop a response to the case. The response should address more than individual behavior—for example, peer-group norms, institutional procedures, family communication, or digital-platform dynamics.

Stage 5: Public explanation and reflection. Students communicate their analysis in a selected format and respond to questions from peers. Individual reflection asks what changed in their explanation, what evidence was most persuasive, and what limitations remain. The teacher assesses both the final argument and the learning process.

Scaffolding and Formative Feedback

The five stages should not be interpreted as a rigid script. The amount of guidance can vary with student readiness. Novice learners may need teacher-provided sources and question prompts during evidence investigation, while more experienced groups may be able to search independently. Scaffolding should therefore be calibrated to the intellectual demand of the task rather than removed simply because the lesson is labeled student-centered.

Feedback is especially important between stages. A weak sociological question will produce weak evidence, and weak evidence will limit the quality of the final explanation. Short checkpoints allow teachers to correct problems before they accumulate. Digital tools can support this process when students submit a question, concept map, or evidence table for rapid review.

Creativity and Critical Thinking: What Can Be Claimed?

Creativity and critical thinking are frequently proposed outcomes of PBL, but both require careful measurement. PBL can create conditions in which students generate alternatives, compare evidence, and justify decisions. Hmelo-Silver (2004) links PBL to flexible knowledge, problem-solving, self-directed learning, and collaboration. In sociology, Eglitis et al. (2016) show how problem-based work can organize engagement with complex social issues.

However, a creative digital product is not equivalent to creative sociological thinking. Originality should be evaluated in relation to the problem: Does the student propose a novel but evidence-informed explanation or response? Similarly, critical thinking should be visible in the evaluation of evidence, recognition of assumptions, comparison of explanations, and willingness to revise a claim.

Future empirical research could test the proposed framework with a pre/post design, student artifact rubrics, classroom observation, and interviews. Such a study would need to distinguish engagement, creativity, conceptual understanding, and critical thinking rather than treating them as interchangeable outcomes.

Creativity should be assessed as a feature of reasoning rather than only of visual design. Indicators can include the number and variety of plausible explanations, the originality of a proposed response, the ability to connect evidence from different sources, and the elaboration of a sociological argument. Critical thinking can be assessed through evidence evaluation, recognition of assumptions, comparison of theoretical explanations, and justification of conclusions.

A useful empirical design would ask students to analyze an unfamiliar deviance case before and after a PBL sequence. The assessment could examine whether explanations become more multi-causal, whether evidence is

used more explicitly, and whether students distinguish explanation from moral judgment. Such measures would provide stronger evidence than self-reported enjoyment or the visual quality of project products.

Teacher Role and Implementation Conditions

Technology-supported PBL places substantial demands on teachers. They must select a sociologically productive problem, anticipate misconceptions, curate initial resources, teach search and source-evaluation routines, manage group interaction, and provide feedback on emerging explanations. Reviews of secondary ICT integration show that technology use succeeds when pedagogical purpose, teacher competence, access, and support are aligned (Msafiri et al., 2023). Digital competence research adds that teachers need professional judgment about when a tool advances learning and when it merely adds complexity (Tzafilkou et al., 2023).

Infrastructure matters as well. Device access, internet stability, school policies, and student digital literacy can shape participation. A low-technology version of the same PBL sequence should therefore be available. Printed case packs, offline videos, paper evidence cards, and face-to-face presentations can preserve the intellectual structure when digital access is unreliable.

Ethical Safeguards for Sensitive Social Problems

Sensitive topics require additional caution. Cases should be anonymized, teachers should avoid inviting disclosure of personal experiences, and discussion norms should distinguish sociological analysis from moral condemnation. The aim is to understand how social definitions and structures operate, not to label students or groups.

Technology-supported PBL expands rather than reduces the teacher's role. Teachers design the problem, select and curate evidence, model sociological questions, monitor group processes, provide feedback, and decide when a digital tool is helping or distracting. Grossman, Dean, Kavanagh, and Herrmann (2019) make a similar point for project-based teaching: authentic student work requires strong disciplinary support and iterative guidance.

Teacher digital competence should therefore be defined pedagogically. Knowing how to operate a platform is insufficient. Teachers need to understand what the tool makes visible, how its output can inform instruction, what inequities it may create, and what alternative will preserve the learning goal if the technology fails.

Social deviance requires stronger ethical safeguards than many routine classroom topics. Teachers should avoid cases that encourage students to expose classmates, disclose private experiences, or reproduce stigmatizing labels. Discussion norms should distinguish analyzing a behavior from humiliating a person and should allow students to participate without revealing personal histories.

If field inquiry is included, students need age-appropriate guidance on consent, privacy, respectful questioning, and data storage. These practices are not merely procedural restrictions. They teach a fundamental sociological lesson: knowledge about social life is produced through relationships and carries responsibilities toward the people represented.

Implementation is more sustainable when schools provide stable connectivity, shared devices, time for collaborative planning, and professional development focused on subject-specific digital pedagogy. Teachers should not be expected to solve technical, curricular, and assessment problems individually. Institutional support allows the teacher to focus on the intellectual quality of the inquiry.

At classroom level, simplicity can be a strength. A well-designed case, a shared document, and structured discussion may produce deeper sociological reasoning than a complex collection of apps. The framework therefore recommends selecting the minimum technology necessary to improve observation, evidence use, collaboration, feedback, or communication.

Limitations and Future Research

As a structured narrative review, this article does not provide exhaustive database coverage, formal risk-of-bias assessment, or meta-analytic estimation. Its contribution is conceptual: it integrates several bodies of literature into a framework for one disciplinary problem. The framework should therefore be treated as a testable proposition rather than a validated intervention.

Future research can implement the framework through design-based studies that collect classroom observations, student artifacts, teacher reflections, and interviews across multiple lesson cycles. Quasi-experimental work could examine changes in the quality of sociological explanations, while qualitative studies could analyze how students negotiate moral and structural interpretations during group discussion. Research should also examine whether digital tools distribute participation more evenly or amplify existing differences in confidence and access.

Assessment Across the Inquiry Process

Assessment should be distributed across the inquiry rather than concentrated on the final media product. Evidence can include the initial problem analysis, the questions students formulate, source notes, concept maps,

collaborative drafts, teacher feedback, the final explanation, and individual reflection. This approach makes it possible to see where learning occurs and where a group needs additional support.

Process evidence is also important for fairness. In collaborative work, a polished product can conceal unequal participation. Short individual explanations or reflections allow teachers to assess whether each student can use the central sociological concepts and explain how evidence supports the group's conclusion. Peer assessment can contribute information about teamwork, but it should not replace teacher judgment.

Rubrics should distinguish disciplinary reasoning from communication quality. A strong presentation is valuable, but it should not compensate for inaccurate concepts or unsupported claims. Separate criteria for sociological explanation, evidence, critical comparison, creativity, ethical representation, and communication make the learning priorities transparent.

Taken together, these assessment practices align with the framework's central principle: technology is a support for inquiry, not the object of learning. The strongest evidence of success is not that students used several applications, but that they produced a more evidence-based, conceptually informed, and reflective account of a complex social problem.

The framework also has implications for teacher preparation. Professional learning should not be organized around software demonstrations alone. Teachers need opportunities to examine the quality of problem scenarios, practice facilitation questions, evaluate sample student explanations, and redesign assessment rubrics. Digital tools can then be introduced in relation to these pedagogical decisions.

Finally, repeated use of a small set of familiar tools may be more effective than constant platform change. When technical routines become automatic, students can devote more attention to sociological reasoning. Stability in the technological environment can therefore support intellectual complexity in the problem-solving task.

These principles are deliberately modest. They do not assume that every school has advanced infrastructure or that every social issue requires multimedia production. Their purpose is to preserve the intellectual core of PBL—problem formulation, evidence, explanation, and reflection—while using technology only where it expands access to those practices.

Because social deviance is both analytically complex and socially sensitive, this restrained use of technology is particularly important. The design should ensure that students spend more time interpreting evidence and comparing sociological explanations than learning technical features of a platform. In that sense, digital simplicity can be a condition for deeper disciplinary thinking.

A final design criterion is transfer. Students should eventually be able to use the same inquiry habits with a new social issue. Asking learners to analyze an unfamiliar case after the unit can show whether they have learned a sociological way of reasoning rather than memorized one project's content.

Contribution to Sociology Education

The framework developed here contributes to sociology education by specifying what problem-based learning should preserve when technology is added. The first requirement is sociological complexity: a productive problem should allow competing definitions, social norms, sanctions, group membership, power, and structural constraint to be examined. The second is functional technology use. Interactive multimedia can strengthen problem-based social-science learning when media, prompts, and tasks are aligned with the learning problem (Anissi & Darmansyah, 2024). Technology should therefore expand evidence and interaction, not determine the pedagogy.

A further implication concerns teacher preparation. Technology-supported PBL requires teachers to anticipate not only which tool will be used but what epistemic work the tool is expected to perform. Planning can therefore begin with the sociological reasoning goal and move backward to the problem, evidence, digital resource, and feedback routine. This sequence reduces the risk that attractive media become detached from conceptual learning. It also makes implementation more equitable because teachers can identify where students need access support, digital-literacy guidance, or additional scaffolding before those difficulties derail the inquiry.

The literature available through 2024 supports a cautious but productive interpretation of technology-supported PBL. The strongest conclusion is not that digital tools produce creativity by themselves, but that well-designed problem environments create repeated opportunities to generate alternatives, compare explanations, seek evidence, revise claims, and communicate solutions. Secondary PBL studies emphasize the importance of clearly specified problems and teacher scaffolding (Lonergan et al., 2022), while research on teaching problem solving shows that teachers' conceptions influence what students are actually asked to do (Lane et al., 2023).

For sociology specifically, recent Indonesian evidence shows why technology should be treated as a functional component of pedagogy. Ramadhan (2024) and Relawati, Ramadhan, and Hainon (2024) illustrate digitally supported participation in sociology, while Anissi and Darmansyah (2024) demonstrate problem-based interactive multimedia in integrated social science. Together with Pribadi, Siregar, and Kusumawardani (2021) and the digital PBL e-module developed by Yuningtyas, Sariyatun, and Djono (2023), this literature supports an

instructional sequence in which digital resources provide cases and evidence while sociological concepts organize interpretation.

Research on secondary problem-based and digitally supported learning also emphasizes orchestration. Motivation and participation vary with design and context rather than appearing automatically when students receive authentic problems or technology (Wijnia et al., 2024). Reviews of ICT integration likewise identify teacher support, infrastructure, and pedagogical fit as recurring conditions for productive use (Msafiri et al., 2023). The framework proposed here therefore places teacher scaffolding at the center: technology broadens the problem space, but disciplined sociological reasoning depends on prompts, evidence criteria, discussion, and feedback.

A further design issue is the sequence through which students encounter digital evidence. Technology-supported PBL is likely to become superficial when students search freely before they understand the sociological problem, because search engines reward topical similarity rather than conceptual relevance. A stronger sequence begins with a carefully framed deviance case, asks students to articulate competing sociological explanations, and only then uses digital sources to test or complicate those explanations. The teacher can require an evidence log containing the source, perspective, concept addressed, and reason for inclusion. This routine converts browsing into inquiry and provides a visible basis for feedback on source use. It also reduces the likelihood that viral examples or moralizing commentary will be accepted as sociological evidence merely because they are accessible or emotionally salient.

Assessment should mirror this design logic. If the learning goal is sociological problem solving, a final product should be judged not only for creativity or technical quality but also for problem definition, conceptual accuracy, diversity and credibility of evidence, comparison of alternative explanations, and justification of a proposed response. Short individual explanations can be added to group products so that collective production does not conceal uneven understanding. These assessment criteria also create feedback points during the project: students can revise a weak conceptual frame before investing effort in a polished digital artifact. In this sense, technology is best understood as an evidence and communication environment, while the quality of learning remains dependent on sociological reasoning, teacher scaffolding, and opportunities for revision.

Several adjacent sources further clarify the framework. Boardman et al. (2024) demonstrate that authentic project enactments can create productive student-centered work while leaving tensions around participation and disciplinary coverage. Dah et al. (2024) show that open inquiry benefits depend on how inquiry processes are structured, and Chen and Yang (2019) similarly demonstrate that project outcomes vary with implementation conditions. Indonesian work by Kurniasari et al. (2024) and the review by Yusri et al. (2024) reinforce the same point: contemporary skills emerge from purposeful task architecture rather than from project labels or digital tools alone.

For teachers, the framework can be translated into a simple planning check before a technology-supported PBL unit begins: Is the problem sociologically contestable? Which concepts must students use? What evidence can digital tools make accessible? What criteria will distinguish a credible source from a merely popular one? Where will students receive feedback before the final product? And what individual evidence of understanding will accompany group work? Making these decisions explicit helps preserve the disciplinary core of sociology while still giving students meaningful autonomy. It also provides concrete points for teacher reflection when a project is revised in a subsequent cycle.

Conclusion

Technology-supported Problem-Based Learning offers a promising way to make social deviance analytically meaningful in secondary sociology, but its value does not come from technology alone. The central design problem is how to move students from an authentic case toward sociological questioning, evidence use, collaborative explanation, and reflection. The framework proposed here places digital tools in service of those goals. Videos make problems observable; digital resources support evidence gathering; collaborative platforms make thinking visible; quizzes provide feedback; and multimodal products support communication. Each tool is pedagogically justified only when it strengthens disciplinary reasoning. The article's methodological repositioning is also important. Without primary intervention data, claims about measured creativity gains or module effectiveness would be unwarranted. A literature-informed framework provides a more transparent basis for future classroom development and empirical testing.

Declarations

Author contribution

Author 1: developed the main research idea and objectives, designed the research methodology, conducted data collection and investigation, performed the data analysis, and prepared the first draft of the manuscript.

Author 2: contributed to the development and implementation of the research methodology, supported the data collection and investigation process, and reviewed and revised the manuscript to improve its academic quality, clarity, and structure, provided input into the research concept and direction, supervised and guided the overall research process, reviewed and improved the manuscript, and contributed to obtaining financial support or research funding

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Conflict of Interest

The authors declare that there is no conflict of interest related to the publication of this article.

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