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Potential approaches to establishing harmonious river-human relationships

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Abstract

This paper responds to a call to address the development and building of river-human relationships in the twenty-first century. Many literatures have identified the historical instrumental exploitation of natural resources underpinning urbanisation and the economic development leading to wide-spread degradation of environments including rivers. Clearly such relationships can no longer be considered as appropriate in the twenty-first century. This paper intends to present a conceptual rethink to address the following question: Are there potential approaches by which humans can develop harmonious coexistent relationships with riverine landscapes and associated ecosystems? In answering this question, this paper draws on ideas from new materialism thinking. New materialism offers useful guidance in understanding human-river relationships in which river landscapes are not static backgrounds to the performance of the social. River systems and environments are active participants influencing and shaping social performances through multiple and diverse interconnected and complex human-nonhuman relationships and co-productive partnerships. It is concluded that new materialist perspectives provide important guidance for developing harmonious river-human relationships. De-centring the human as the dominant actor in relations with river landscapes and acknowledging rivers as key actors within river-human relationships may enhance the building of harmonious coexistent and mutually beneficial relationships in the twenty-first century. It is further concluded the Nature Futures Framework (NFF) and Human-River Encounter Sites (HRES) frameworks in their capacity to accommodate new materialist thinking provide an opportunity for further exploration and examination of the possibilities for building harmonious coexistent river-human relationships.

KEYWORDS
de-centring humans, harmonious coexistence, new materialism, river-human relationships

1 | INTRODUCTION

This paper is a response to questions posed by *River Research and Applications* concerning what relationships humans can develop with rivers in the twenty-first century. This is an entirely reasonable query given the importance of river systems, spatially and temporally, to the development of human communities, society, and well-being is undeniable (Schönach, 2017; Wantzen et al., 2016). Historically, the

relationships humans have developed with rivers have not produced entirely balanced or mutually beneficial outcomes (Gurnell, Bertoldi, Tockner, Wharton, & Zolezzi, 2016; Tockner & Stanford, 2002). This as Wantzen et al. (2016) suggest derived from emerging river cultures which included learning how to exploit rivers that underpinned the building of communities and social systems fuelling economic development. Overwhelmingly the benefits to humans through the development of, for example, urbanisation, industry, and agriculture have been at severe cost/s to the river system and associated environment (Albert, Hack, Schmidt, & Schröter, 2021; Dunham et al., 2018; Schönach, 2017). This is a historical lesson we need to be reminded of regularly. To forget the past over-exploitation and degradation of the environment due to human actions would lead to continuously repeating disrespectful relationships with river system environments. In recent times, some effort has been focused on understanding human relations with ecosystems, including rivers, that provide valuable ecoservices for human consumption. The concept of social-ecological systems (SES) has been advanced for this purpose. This includes framing connected river and human relations and interactions as SESs (Dunham et al., 2018; Zingraff-Hamed, Serra-Llobet, & Kondolf, 2022).

SES thinking reflects the interactions of the ecological and resource users which are entrenched within management and governance frameworks (Zingraff-Hamed et al., 2022; Zingraff-Hamed, Greulich, Wantzen, & Pauleit, 2017; Zingraff-Hamed, Martin, Lupp, Linnerooth-Bayer, & Pauleit, 2019). Management of river environments is defined by Dunham et al. (2018) as '… actions to address resource issues …' and governance defined as '… interactions among political, social, economic, and administrative or regulatory systems …' affecting natural resources (p. 4). However, although the management and governance frameworks attend to the sustainability of ecological systems, they are biased towards benefiting the social through the appropriation of ecosystem services. (Janssen, 2010; Stojanovic et al., 2016). This is emphasised by Colding and Barthel (2019, p. 1) who cite Cherkasskii (1988 , p. 321) as providing an early definition of a social-ecological system '*where the biological subsystem plays the role of the governed object and the social acts as the internal regulator of these interactions*' (original italics). Here the ecological is reduced to being a subservient resource feature of the social and its management systems. In this context, the agency of ecological entities is denied (Colding & Barthel, 2019; Stojanovic et al., 2016). Although the concept of SES is presented as reflecting a balance between the ecological and the social, in practice this is questionable in terms of the equity of these relationships (Colding & Barthel, 2019; Vogt, Epstein, Mincey, Fischer, & McCord, 2015). This is noted by Zingraff-Hamed et al. (2019) when stating that the exploitation of ecological services provided by rivers has significantly impacted their ecological functioning. That is, the extent of the ecological capacity of ecosystems to cater to the social demands for ecosystem services temporally and/or spatially is reduced (Janssen, 2010).

As SES conceptualisations of river-human relationships may not necessarily lead to improved ecological conditions of river systems (Brierley et al., 2013; Carton, Jönsson, & Bustos, 2017; Kortelainen, 1999; Zingraff-Hamed et al., 2019), new ways of conceptualising SES are called for. This includes attention being given to the dynamics or performativity of the ecological in relation to the social (Gamble, Hanan, & Nail, 2019). This can be interpreted as acknowledging river systems as actors with their own agencies (Gamble et al., 2019; Schlüter et al., 2012). Given the connectivity, albeit a binary connection (Vogt et al., 2015), between the social and the ecological within SES concepts, acknowledging rivers as actors with their own agencies is an appropriate reconceptualization. This is the importance of new materialist thinking pointing to the need to acknowledge the ecological as actors with agency within management and governance decision making. It emphasises the importance of acknowledging river systems as actors with the power of agency within SES relations and interactions (Gamble et al., 2019; Schlüter et al., 2012). In shifting from anthropocentric perspectives, new materialism can guide new understandings of river systems as a collective of key actors in (re)shaping SES relationships. In this context, new materialist thinking can support the building of harmonious coexistent river-human relationships providing mutually beneficial outcomes (Schlüter et al., 2012). As Arias-Maldonado (2013, p. 444) argues, '… the separation between society and nature is increasingly untenable'.

This paper presents new ways of thinking from new materialism to re-conceptualise what potentially more harmonious coexistent river-human relationships moving throughout the twenty-first century may look like. In this endeavour, humans and human agency are decentred as the dominant actors or agents influencing river systems and the environment. That is, river systems are acknowledged as key actors with capacities to influence and (re)shape river environments and communities. Perspectives from new materialism commence the following conceptual rethink. This is followed by outlining two potential frameworks, the Nature Futures Framework (NFF) and the Human-River Encounter Sites (HRES), which are presented as aligning with new materialist thought allowing development of harmonious coexistent river-human relationships. A brief conclusion closes this paper's attempts to rethink harmonious coexistent river-human relationships in the twenty-first century.

2 | NEW MATERIALISM

Knowing we need to develop better, more harmonious river-human relationships moving into the future, an important question arises; Are there potential approaches by which humans can develop harmonious coexistent relationships with riverine landscapes and associated ecosystems? And if so, how do we go about forming harmonious coexistent relationships with river systems? New materialism thinking, broadly interpreted, may provide some guidance.

New materialist thinking is a shift from notions of the centrality of human agency shaping the world. It advances a relational interpretation of human-nonhuman explanations of landscape and environmental processes including river systems (Bennett, 2004, 2010; Benson, 2019; Fowler & Harris, 2015; Knappett & Malafouris, 2008). This recognises that human agency is but one aspect of a complex

interconnected human-nonhuman relational system, not the dominant aspect (Bennett, 2010; Benson, 2019; Ward, Tockner, Arscott, & Claret, 2002). Furthermore, in de-centring the human, it challenges the notion that humans and nature are separate (Bennett, 2010; O'Donovan, 2019). There becomes a recognition of the potency of nonhuman agency within relational and complex human-nonhuman co-productive relationships and partnerships (Benson, 2019; Hertz, Mancilla Garcia, & Schlüter, 2020; O'Donovan, 2019; Washick & Wingrove, 2015). A river's water provides an appropriate example of such agential potency through its characteristics of fluidity. It transforms and circulates materials and provides connectivity biophysically and socially, as well as temporally. In this sense, water's agency is active in co-constituting interconnected human-nonhuman relationships as emphasised through hydrosocial relationships (Linton & Budds, 2014; Strang, 2014). In this context, de-centring humans as the dominant actor in river-human relations provides opportunities to re-interpret and analyse more closely the role rivers play in human-river relationships such as SESs (Benson, 2019; Dunham et al., 2018; Plumwood, 2009).

The ongoing demands for river systems to service human activities places mounting pressure on decision-makers to develop harmonious coexistent river-human relationships (Bernhardt et al., 2006; Tundisi, Matsumura-Tundisi, Ciminelli, & Barbosa, 2015). Developing robust understandings of the connectivity and agencies functioning within river systems to service human demands may, in fact, be an ethical principle for decision makers (Yates, Harris, & Wilson, 2017). Yates et al. (2017) suggest that such ethical obligations are important considerations which acknowledge the influential agency and connectivity of river systems for human-nonhuman coexistence and sustainability. That is, humanity's ontological embeddedness within and interconnectedness to and with river systems underpins a duty of care responsibility to form more harmonious coexistent river-human relations (Hawkins, 2006; Washick & Wingrove, 2015; Yates et al., 2017). In this context, it will require humans to consider how their actions and practices impact on river systems and how river systems themselves might respond in turn. As a human-nonhuman interconnected whole, nothing operates in isolation, consequently, impacts may be more broadly dispersed than first assumed (de Loë & Patterson, 2017). In developing new understandings of river-human relations, river systems need to be acknowledged as being full of agency and continually undergoing change as internal and external SES conditions evolve (Bennett, 2010; Plumwood, 2009). That is, within a SES context, the social and the ecological are generative co-actors engaged in co-agency co-producing relational social and river landscapes (Gamble et al., 2019).

The connectivity and interconnected agencies of place and humans are dynamic and ever-changing, (re)shaping ongoing river-human relationships and human-nonhuman relationships more broadly whereby no one constant river-human relationship prevails (Stark, 2017). River-human relationships are dynamic, ever-changing, ever-developing, ever-evolving in complexity [interconnectedness] (Jones, 2009). A web of interconnected relationships has been built and re-built repeatedly throughout history as river agency and human actions have evolved and developed and responded to change. In this context, river systems are a setting for human and nonhuman co-agency and co-functionality. Floodplains are appropriate examples (Allen, 2011). Floodplains facilitate the emergence of relational ontologies within a cycle of re-configurations of meanings and values for the river, water, and the floodplain (Friess & Jazeel, 2017; Yates et al., 2017). Furthermore, a river landscape may be considered as an amalgam of a myriad of interconnected and dynamic biophysical, cultural, and social contexts as one spatially bounded whole (Friess & Jazeel, 2017). Humans, in this context, are not the sole actors or source of agency in or of landscapes, including river environments (Allen, 2011; Friess & Jazeel, 2017). This further underpins the importance of new materialism in acknowledging rivers as actors within human-river relationships and co-productive partnerships (Coole, 2013).

It needs to be noted that by not confronting the agency of river systems in human affairs would be an act of hiding from confronting its influence on humans' relationships with rivers (Bingham & Hinchliffe, 2008). As Bingham and Hinchliffe (2008, p. 85) make clear, '[w]hilst many natures might work happily alongside a collective without grumble or objection, there will always be those that will demand to be taken into account, things that simply refuse to be ignored … The missed out or the not quite bargained for that by upsetting the status quo (whether in the form of scientific assumptions or political institutions) generate events which require collective examination.' Historical and current river relationships with humans and society exemplify Bingham and Hinchliffe's perspectives through, for example, extreme flooding (Parsons, 2019). In forming more harmonious coexistent relationships with river systems '… humans [will need to] cultivate and negotiate relations with the material world' (Neimanis, Åsberg, & Hedrén, 2015, p. 81) requiring an inclusion of perspectives from nonhuman entities such as rivers, not just human-based perspectives (Neimanis et al., 2015). This line of thinking is further emphasised by Shotter (2014) when arguing that 'our being [is] within a *dynamic* reality in ceaseless, unfolding movement, in which nothing is separate from anything else …' (p. 307, original italics). A consequence of these new perspectives is that humans need to accept that they cannot force river systems to conform to imposed social and economic values, and policy-based management systems (Shotter, 2014). This further emphasises that humans are not above or superior or separate from or outside of river landscapes and the environment more broadly (Bender, 2002).

Broadly speaking, Bennett (2010) suggests that in coming to terms with human-nonhuman relationships, a more horizontal interpretation needs to be developed. As Bennett (2013, p. 151, original italics) argues, materiality '*horizontalizes* the relations between humans, biota, and abiota …' thereby emphasising the 'connectedness of all things.' That is, a river landscape's connectivity is related to the interconnected agencies of the atmosphere, biosphere (including humans), hydrosphere, and lithosphere at various scales (Gurnell et al., 2016; Tockner & Stanford, 2002; Ward et al., 2002). In this, there is no implied hierarchical structure constituted by individual human and other natures. In other words, no actor or agent has full

command of other actors or agents or of the outcomes of interconnected river-human relationships and interactions (Bennett, 2010). This emphasises that in developing harmonious coexistent relationships with rivers humans need to recognise the interconnected river-human agencies shaping river systems, ecoservices, landscapes, and communities (Gurnell et al., 2016).

Taking the lead from the above perspectives, a re-interpretation of Wantzen et al.'s (2016) river culture concept from a river system's perspective can be contemplated. That is, a 'river's' cultural dynamic can be constituted through the connectivity and agencies of landscape, ecosystems, and water. In this context, the river system plays a role in shaping harmonious coexistent river-human relationships. From the river's cultural perspective, it is not subject to imposed human cultural values or ideals. That is, the river system can be acknowledged as a key SES actor providing ecological services which support and enhance human well-being and community development (Ingold, 2010; Karpouzoglou & Vij, 2017; Linton & Budds, 2014; Strang, 2014; Tockner & Stanford, 2002; Wantzen et al., 2016).

Ingold (2010) argues that the immersion of something within the flows and metabolism of materials underpins the entity being alive. In this sense, a river system through its agency whereby materials flow and are metabolised shapes its status as being alive. Similarly, Ryan (2022) applies the concept of hydropoetics to refer to rivers as alive or transformative. That is, a river's communicative perspective is not framed through a 'human-type voice' but through its agency as performative (Gamble et al., 2019). Plumwood (2009) supports the view that the agency of nature can be conceptualised as an 'active voice', in terms of being performative. The functioning of river systems as performance within relationships with humans needs to be prominent in our thinking and acknowledged in decision making (Everard & Powell, 2002; Gamble et al., 2019).

Broadly speaking, performance, or performativity, focuses on the reproductive capacities and abilities and the relationship's objects have to and with other objects (Lavau, 2011a). Regarding river systems, the river is enacted or emerges through connectivity and their agency within the various relationships with humans and their practices. River-human relationships, in this sense, co-produce and (re) shape landscape and human communities and practices including, for example, agriculture, river management, and restoration (Lavau, 2011b; Zingraff-Hamed et al., 2017). Applying the concept of hydropoetics is, as Ryan (2022, p. 487, original italics) states, 'to embrace hydrocentricism or, even, what might be called *rivercentricism* … signifying a river-focused worldview as well as a physical identification with rivers as *bodies* in themselves.' From this perspective, rivers are key actors with their own agency. Their agencies as performances need to be incorporated within the place-based decision-making process relative to use and management (Gamble et al., 2019). It is from such inclusiveness of the river as an actor or an influential autopoiesis agent (Ryan, 2022) that harmonious coexistent river-human relationships can be built. Doing so provides opportunities to understand rivers and humans coexist as and within interdependent material, social, and cultural agential systems influencing and shaping landscape and human communities (Zalewski, 2012).

Although each river system's agencies may be broadly similar, forming harmonious river-human relationships may be better served through place-based thinking and approaches (Schönach, 2017). Accepting rivers as place-based actors develops from understanding the dynamics and distinctiveness of local environments and landscapes (Schönach, 2017; Tockner & Stanford, 2002). In this, place-based meanings and understandings of the agencies of local river systems become important for guiding decision-making. This in turn can lead to experimenting possible solutions for building harmonious coexistent river-human relationships (Fox et al., 2017) derived from understanding rivers as being 'rivers-in-place' (Tadaki, Brierley, & Cullum, 2014, p. 360).

3 | NATURE FUTURES FRAMEWORK (NFF) AND HUMAN-RIVER ENCOUNTER SITES (HRES): POTENTIAL FRAMEWORKS FOR HARMONIOUS RIVER-HUMAN RELATIONSHIPS

This section presents two possible frameworks which may guide building harmonious coexistent river-human relationships, namely the *Nature Futures Framework* (NFF) and *Human-River Encounter Sites* (HRES). Through incorporating new materialist thinking in these frameworks the building of harmonious coexistent river-human relationships may be supported moving forward. That is, the NFF and HRES are introduced as examples of potential conceptual frameworks for developing harmonious coexistent river-human relationships in the twenty-first century.

Pereira et al. (2020) proposes that transformative change in the building of harmonious river-human relationships can be supported through the creation of the Nature Futures Framework (NFF). The NFF is considered a heuristic tool in developing 'novel scenarios that incorporate diverse intervention towards positive future trajectories for nature and nature's contribution to people' (Pereira et al., 2020, p. 1173). The NFF is further considered a boundary object to facilitate plural policy and knowledge viewpoints and values of nature at multiple levels. The aim of the NFF as a boundary object is to develop multiscale scenarios of desirable futures for nature and humans simultaneously. This would facilitate flexible decision-making processes acknowledging river systems as influential actors as epistemic communities shared knowledge. The value of the NFF, in this sense, can be argued to be its acceptance of multiple knowledges, including new materialist perspectives, in developing multiscale scenarios of desired and mutually beneficial human-river relationships (Pereira et al., 2020).

It is further argued that the NFF as conceptualised is founded by three values/concepts; namely, 'nature for nature, nature for society, and nature as culture' (Pereira et al., 2020, p. 1176). However, in light of new materialist thinking, an interpretation of two of this model's concepts/values can be that the 'nature for society' and 'nature as culture' values retain a very human-centric valuing of a nature-society/culture relationships. Not wanting to throw the baby out with the

bathwater, a more aligned re-conceptualisation of NFF with new materialist thinking can be developed. This may be achieved by encompassing the three foundational values of NFF into a holistic de-centred human concept of 'nature within society (and) society within nature'. Within this concept, it is assumed that society encompasses culture and not that culture is separate from society. A nature within society (and) society within nature conceptualisation allows a de-centring of humans as the central influencing agent in river-human relationships. Furthermore, rivers as equal agential actors along with human actors collaborate and act as joint actors in a holistic and interconnected dynamic between landscape, environment, and community. The intention is to reflect nature and society as embedded, entangled, and interconnected within each other as a complex whole in space and place, mutually influencing and (re)shaping the being of the other (Castree, 2003). Acknowledging this embedded, entangled, and interconnected ontology provides a basis for conceptualising pathways towards building harmonious river-human relationships and interactions. The NFF, in this context, can facilitate the development of more harmonious coexistent relationships, including SESs, which provides less destructive futures for both river systems and humans.

Re-conceptualising the NFF incorporating a nature within society (and) society within nature as an embedded, entangled, and interconnected whole provides an opportunity to develop a new agenda for decision-makers and practitioners. This agenda includes building harmonious coexistent relationships between rivers and urban areas as Human-River Encounter Sites (HRES) (Zingraff-Hamed et al., 2017, 2021, 2022). The intention of HRES is to regenerate harmonious place-based relations between the river environment and human practices and activities. This would acknowledge river systems as key actors influencing and shaping the development of landscapes, including urban river environments, SESs, and community (Dunham et al., 2018; Zingraff-Hamed et al., 2017, 2021, 2022).

A positive aspect of HRES compared to other frameworks is that it does not promote the human as the dominant partner in river-human relationships (Zingraff-Hamed et al., 2021). The HRES model is built on the pillars of 'health (of all living entities of the environment and humans), safety (safe communities including from flooding through the protection offered by the riparian zone), functionality (the multifunctionality and connectivity of the river system needs to be incorporated within planning and decision making by urban designers), accessibility (for all organisms not just for the privilege of humans), collaboration (of all stakeholders including river and ecological systems), and awareness (moral and ethical respect of river systems as key stakeholders in its own management and use)' (Zingraff-Hamed et al., 2021, p. 4). This may facilitate a shift away from SESs as binary representations of social and ecological interactions (Vogt et al., 2015). The HRES provides for the acknowledgement of the river system as an actor within local communities. It influences and shapes community development and its social dynamics through hydrosocial relations, including flooding (Linton & Budds, 2014; Parsons, 2019). In this sense, rivers and humans co-produce biological and cultural relationships in which humans and society exist within nature and, simultaneously, nature exists within society as corporeal experiences (Zingraff-Hamed et al., 2021).

Applying a HRES framework which adopts a nature within society (and) society within nature perspective provide a sound foundation to acknowledge the river as an actor influencing landscape and human practices. From this position, humans may implement a stewardship of and over their own behaviours rather than 'imposing' idealised stewardship principles upon the agencies of river systems. This in turn may deliver a better place-based foundation for developing and building local harmonious coexistent river-human relationships into the twenty-first century. This can be considered what Arias-Maldonado (2013) identifies as 'open sustainability' whereby '[t]here is no single sustainability, but a whole range of different, even simultaneous, possibilities' (p. 441). Such a perspective aligns well with building harmonious coexistent and mutually beneficial river-human relationships. That is, river systems and human management systems co-produce river landscapes that support human and nonhuman communities as HRES. However, this will require '[a]s a priority, our intimacy with Nature [including rivers] …' being '… rekindled' (Hosken, 2011, p. 25). And through a rekindled intimacy, the river system's 'voice' or performativity (Gamble et al., 2019), as expressed through agency, can begin to be heard and understood. In other words, it '… is about places [as a river landscape] working on people' in which the river system speaks, creates, and teachers (Larsen & Johnson, 2016, p. 153), Thus, humans learn to relate to rivers with empathy and live with rivers harmoniously (Blythe et al., 2021).

4 | CONCLUSION

In addressing the two questions posed in this paper, there are two important points to emphasise relative to developing harmonious coexistence river-human relationships in the twenty-first century. The first derives from new materialist perspectives in which the human is de-centred as the central source of agency influencing river systems. New materialism offers opportunities for a re-conceptualisation of river systems as actors and co-agents in the development of landscapes and human communities. That is, new materialist ideas recognise the influencing agencies of natural features. In developing harmonious coexistent river-human relationships, humans can no longer be privileged over and above the river and its environment. This includes SES conceptualisations of river-human relations. Acknowledging rivers as actors influencing landscape and human communities is a necessary initial component for building harmonious coexistent and positive visions of river-human relationships into the future. A second important point to emphasise is that significant understandings of river systems may be forthcoming by adopting a river's perspective concerning its relationships with humans. This requires developing understandings of river systems from multiple perspectives which include diverse community values and the influence of river system connectivity and its interconnected agencies. How humans relate to and engage with the natural and ecological entities of active river systems will determine how river environments provide ecoservices, or not, and shape human futures. In this, the frameworks of NFF and HRES incorporating new materialist thinking have

important roles in shaping decision-making and river management and restoration practices.

In developing relationships with river systems, humans have two choices. One is where humans morally and ethically recognise and respect the connectivity and agencies of river systems and their ecosystems that underpin our continuing existence. Developing more harmonious coexistent relationships with river systems are crucial if river systems are to continue being healthy and provide the ecological services that humans demand and need. Therefore, for humans to continue benefiting from using resources and ecological services provided by river systems, for example, water, floodplains, and biodiversity, building harmonious coexistent relations is an imperative. The other choice is where humans ignore the connectivity and agencies of river systems and their ecosystems and blindly continue their exploitative relationships leading to further degradation. If this is the path to be continuously chosen, river systems will no longer have the capacity to underpin our continuing existence. Rivers do not require humans to manage or govern them, but rather to view river systems as coexistent actors co-producing river environments and communities. Importantly, human attitudes towards rivers systems including the conceptualisation river systems through the lens of instrumental values needs to change. It is an immediate imperative humans rethink their relationships and engagement with rivers. Not to do so may hasten the demise of river systems as well as human communities reliant on the ecological services derived from healthy river systems. As argued by Guerrero, Haase, and Albert (2018), 'actions for rivers that offer multiple positive benefits for humans and nature must become the mainstream option' (p. 1). This provides opportunities for future research to embark upon. Research and testing or experimenting with alternative or novel approaches in which the human is de-centred as the dominant agent or actor in river-human relationships needs to be seriously considered. In such research endeavours, a final worthwhile point to draw attention to is that the NFF and the HRES frameworks are receptive to accommodating new materialist perspectives. In this context, they have the potential to support explorations and examinations of approaches to building harmonious coexistent river-human relationships that provide mutually beneficial outcomes for river systems and humans in the twenty-first century.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analysed during the current study.

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