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## The need to acknowledge similarities between the 2022 D'Souza and Cassels and the 2014 Whittingham and Douglas contextual models of infant sleep

Dear Editor,

In 2022 D'Souza and Cassels published a narrative review of evidence which informs a contextual understanding of infant sleep, and which contests dominant Westernized conceptualization of parent-infant sleep.<sup>1</sup> In this review, D'Souza and Cassels claim to provide a new model (p. 2) for infant sleep, from which they hope alternative infant sleep interventions may be developed and evaluated.

### **D'Souza and Cassels 2022 contextual model of infant sleep is very similar to the 2014 Neuroprotective Developmental Care contextual model of infant sleep (NDC-MIS)**

In [Table 1](#), I compare selected elements of the D'Souza and Cassels model with those of the Neuroprotective Developmental Care model of infant sleep (NDC-MIS), first published as a new conceptual or theoretical model of infant sleep in 2014.<sup>2</sup> The latter presented both a theoretical model and also an overview of an early clinical/educational translation of the NDC-MIS, already known at that time to Australian parents and health professionals as the Possums Sleep Program. This model and its clinical/educational translation were developed as the sleep domain of the programs known as Neuroprotective Developmental Care (NDC or the Possums programs).

The profoundly contextual nature of parent-infant sleep and also of breastfeeding is foundational to the broader NDC model,<sup>3,4</sup> which I've elucidated in about 30 research publications with various co-authors. The NDC or the Possums programs, including the NDC-MIS, have been developed over a 20 years period by applying the principles of implementation science.<sup>5</sup> I refined clinical and educational delivery iteratively over many years prior in response to parent feedback; conducted key informant interviews<sup>6</sup>; and with co-authors conducted a number of systematic or meta-narrative reviews concerning unsettled infant behavior, applying the theoretical frames of complexity science and evolutionary biology.<sup>7-9</sup>

Since 2011, multiple clinical or educational translations of the NDC-MIS have been used by health professionals and parents in Australia and internationally, including the Possums Sleep Program (2015–2016), the Possums Baby and Toddler Sleep Program (2020), and Sleep Baby and You (a 2020 collaborative adaptation of the

Possums Sleep Program for the UK context). Four promising preliminary evaluations of the Possums Sleep Program and Sleep Baby and You have been published.<sup>3,4,10,11</sup>

The NDC-MIS uniquely synthesized and interpreted existing interdisciplinary infant sleep research literature through the theoretical lenses of complexity science, evolutionary biology and contextual behavioral science.<sup>2</sup> It located infant sleep in the context of interactions between responsive infant care, breastfeeding, feeds, infant crying, infant sensory-motor needs, infant health, and parent mood and well-being. Because the NDC theoretical frameworks and clinical/educational translations have been developed over time, I apply the label NDC to the early theoretical and clinical/educational research publications retrospectively.<sup>6-8,12-18</sup>

Analysis suggests that the D'Souza and Cassels model is not a new model of infant sleep which considers cultural and personal context but is substantially similar to the earlier NDC-MIS, which foundationally addresses cultural and personal context (see [Table 1](#)).

### **D'Souza and Cassels 2022 don't acknowledge the NDC-MIS and make inaccurate reference to the NDC-MIS's clinical/educational translations**

The closing sentence of D'Souza and Cassels' article states, "Some initiatives, such as the Possums program in Australia, and the Sleep, Baby and You program, have been implemented, but there is a need for more research to support alternatives."<sup>19</sup> I address inaccuracy in D'Souza and Cassels' reference to these clinical/educational translations of the NDC-MIS in [Table 1](#) Part B.

While I wholeheartedly support D'Souza and Cassels' call for further research, it is important to appropriately acknowledge prior work that their model builds upon. Although the authors claim to have identified a gap in their review of existing sleep models, they do not acknowledge the NDC-MIS model from which both the Possums Sleep Program and Sleep Baby and You have been developed and evaluated.<sup>2,19-22</sup> Elsevier publishers state, under Duties of Authors (Originality and Acknowledgement of Sources <https://www.elsevier.com/about/policies/publishing-ethics#Authors>): "Proper acknowledgment of the work of others must always be given. Authors should ... give the work appropriate context within the larger scholarly record."

**Table 1** Part A. Comparison of Whittingham and Douglas' 2014<sup>2</sup> and D'Souza and Cassels 2022<sup>1</sup> contextual models of infant sleep. Part B. Analysis of mention of the Possums Sleep Program and Sleep Baby and You in D'Souza and Cassels 2022<sup>1</sup>

Part A	D'Souza and Cassels 2022: proposed new theoretical model of parent-infant sleep <sup>1</sup>
<p>Whittingham and Douglas 2014: proposed new theoretical model of parent-infant sleep<sup>2</sup></p> <p>"We understand infant sleep contextually." NDC MIS is "interdisciplinary. It integrates contemporary contextual behavioral science (including operant theory), complexity science, evolutionary anthropology, neuroscience, clinical lactation science, developmental theory."</p> <p>Strategies from contextual behavioral science support parents' capacity to experiment with new values-aligned behaviors.</p> <p>"We situate infant sleep within the wider context of the parent-infant relationship, and we understand sleeping patterns, sleeping needs, and sleeping problems as emerging out of this complex and dynamic system. The parent-infant relationship is located in the broader systems of family, society and culture."</p> <p>"For this reason, we maintain that an infant's sleeping patterns cannot be understood without also understanding the full complexity of the parent-infant relationship, including feeding patterns, patterns of sensory stimulation and physical contact, and philosophies of care."</p> <p>"Parent-infant sleep is a complex adaptive system."</p> <p>"Parents make sense of their baby's cues through a continual process of experimentation and pattern recognition, taking into account wider context."</p> <p>Takes parental cultural beliefs, norms, and values as a starting point and overarching context for examining perceived or presenting infant sleep problems. Aims to support parents if they wish to modify their contexts and behaviors in relation to the infant, in order to address the family's sleep distress. Integrates contextual behavioral science strategies which are guided by the individual or family's unique values, beliefs, and norms.<sup>17</sup> Discusses how infant factors, parental emotional and mental well-being, parent-infant interactions and the environment interact and influence each other, and how these impact on parent and infant sleep-related behavior.</p>	<p>"We, therefore, propose a new model (see Fig. 1) that adapts the transactional and ecological models by retaining elements of these models that acknowledge the influence of extrinsic factors, such as culture, on the parent-child interactive contexts."</p> <p>"We depart from these models by focusing on parental cultural beliefs, norms, and values as a starting point and overarching context for examining perceived or presenting infant sleep problems."</p> <p>Aims to "modify contexts (listed Fig. 2) including modifying parent-infant relationships."</p>
<p>How elements of the proposed new model translate into clinical or educational interventions</p> <p>Overview from Possums Sleep Program (2015–2016), The Possums Baby and Toddler Sleep Program (2020), and Sleep Baby and You (2020)<sup>2,4,21,23</sup></p>	<p>How elements of the proposed new model translate into clinical or educational interventions</p> <p>Overview from Fig. 2. Potential pathways for interventions<sup>1</sup></p>
<p>Infant</p>	<p>Infant characteristics</p>
<ul style="list-style-type: none"> <li>● Provides evidence-based biologically normal sleep education, including evolutionary adaptedness and normal behavior</li> <li>● Addresses and excludes underlying infant medical conditions that could result in unsettled infant behavior</li> <li>● Parent responsiveness to infant communications or cues</li> <li>● Parental emotional availability and physical contact in the evenings and during the night</li> <li>● Supports risk minimization in proximal sleeping</li> <li>● Supports responsive night-time interactions</li> <li>● Parent emotional well-being, occupational fatigue and mental health</li> </ul>	<ul style="list-style-type: none"> <li>● Provides evidence-based biologically normal sleep education, including evolutionary adaptedness and normal behavior</li> <li>● Addresses and excludes underlying infant medical conditions that could result in unsettled infant behavior</li> <li>● Addresses and excludes feeding issues</li> <li>● Parent interactions</li> <li>● Increase emotional availability in the evening</li> <li>● Safe proximal sleeping</li> <li>● Responsive night-time interactions</li> <li>● Parental well-being</li> <li>● Sleep hygiene</li> <li>● Parent relationships (quality time, communication)</li> <li>● Support in adapting to parenthood</li> <li>● Treating underlying psychopathology</li> <li>● Examine wake windows and daytime sleep</li> <li>● Light therapy for circadian rhythm</li> </ul>
<p>Parent</p>	<p>Environment</p>
<ul style="list-style-type: none"> <li>● Education about sleep hygiene, derived from evidence-based Cognitive Behavioral Therapy for adult sleep problems</li> <li>● Supports parent relationships (within the NDC domain of parent emotional well-being and mental health)</li> <li>● Supports the adaptation to parenthood (within the NDC domain of parent emotional well-being and mental health)</li> <li>● Identifies and treats underlying mental health problems</li> </ul> <p>Support healthy function of the biological sleep regulators</p> <ul style="list-style-type: none"> <li>● Consider infant morning wake time, day-time naps, bed-time, and pattern of night-time waking</li> <li>● Daylight exposure to promote healthy circadian rhythm</li> </ul> <p>Rich daytime sensory nourishment</p>	<p>Increase daytime stimulation</p>

(continued on next page)

**Table 1** (continued)

Part B	Mention of the Possums Sleep Program and Sleep Baby and You in D'Souza and Cassels 2022. <sup>1</sup> "More attachment-style parenting and cue-care parenting (41) styles focus on the need for nighttime responsiveness and proximity. In families using these parenting styles, parents may report more waking through proximal sleep, and may be led to believe that their infant has a sleep problem due to cultural messaging that equates night-waking or parental presence at bedtime with sleep problems."	Comment Cites (41) Whittingham and Douglas 2014 <sup>2</sup> as an example of cue-care parenting styles, in the context of D'Souza and Cassels' observation that cue-care parenting styles may increase parents' tendency to internalize Westernized belief that their infant has sleep problem. The Possums Sleep Program directly addresses this cultural messaging and invites parents to experiment with other ways of making sense of their infant's behavior. Evaluations show that the Possums Sleep Program and Sleep Baby and You decrease parental perceptions of sleep problems. <sup>19-22</sup>
"Daytime routines and high levels of appropriate and sensitive stimulation can positively impact infant sleep (41)."		1. Citing (41) Whittingham and Douglas 2014 <sup>2</sup> to support the claim that "daytime routines .... can positively impact infant sleep" is not accurate. Adherence to daytime routines do not feature in the NDC-MIS or its clinical/educational translations. Instead, NDC-MIS supports parental flexibility and experimentation in the context of rich sensory nourishment and frequent flexible feeds for the infant. 2. Citing (41) Whittingham and Douglas 2014 <sup>2</sup> to support the claim that "high levels of appropriate and sensitive stimulation can positively impact infant sleep" is accurate. To my knowledge the NDC-MIS was the first infant sleep model to propose that an infant's sensory-motor needs interact with sleep, which becomes a fundamental aspect of the clinical/educational translations.

NDC-MIS, Neuroprotective Developmental Care Model of Infant Sleep.

## Conclusion

Currently, social media influencers wield unprecedented power over dissemination of information and the well-being of parents with infants, arbitrating the financial survival of small businesses operating in this space. In social media and online promotions, the descriptor "evidence-based" is used as a potent but potentially misleading marketing tool for the new genre of non-extinction-based infant sleep education products, since parents do not receive explanations about what might comprise a genuinely scientific evidence-base to clinical or educational programs. Similarly, health professionals are often not trained to understand how the principles of implementation science apply to the development of novel, genuinely evidence-based programs. Careful adherence to ethical standards in infant sleep research, including acknowledgment of others' prior work and of conflict of interest, is vitally necessary to protect parents and providers alike - whether or not the infant sleep models and interventions being promoted rely upon extinction methods.

## Ethics approval

Not applicable.

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Dr Douglas has received no funding for this Letter to the Editor.

## Declaration of conflict of interest

Dr Douglas founded an Australian health promotion charity Possums for Mothers and Babies Pty Ltd in 2013. From 2015 until September 2023, when it ceased operating, this charity sold online educational resources for parents including the Possums Sleep Program (2015–2016) and the Possums Baby and Toddler Sleep Program (2020). Dr Douglas also developed and offered Neuroprotective Developmental Care courses from the charity's platform for health professionals and providers. She created this educational content without payment and has never received licensing fees or royalties. Dr Douglas is author of *The Discontented Little Baby book*, which includes an iteration of the Possums Baby and Toddler Sleep Program, and receives standard royalties from UQP for its sale. She is offering health professional education in Neuroprotective Developmental Care or the Possums programs at [ndcinstitute.com.au](http://ndcinstitute.com.au), and is currently developing an updated version of the Possums Baby and Toddler Sleep Program for online sale to parents, not yet available.

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