

## Background

Children with Severe Neurological Impairment (SNI) are typically non-verbal, non-motile and cognitively impaired. Pain is the most common symptom reported by caregivers of these children. Primary caregivers evaluate their children's pain daily and their reports are foundational to clinical assessments. They usually rely on behavioural observations, such as grimacing or vocalizations. Children with SNI often have chronic pain-like sensations with no clear source. This is called Pain and Irritability of Unknown Origin (PIUO) and the underlying pain processes are poorly understood. However, these children also regularly experience acute nociceptive-inflammatory pain with identifiable causes, such as during medical procedures. Children with SNI have historically been considered pain insensitive, however emerging research suggests individuals with intellectual disability may be more sensitive to painful stimuli. Nociceptive pain thresholds within a group experiencing PIUO is not well studied. Pain assessment is challenging for this population and an improved understanding of nociceptive pain thresholds would benefit future medical care.

## Objective

To assess the acute nociceptive pain responses in children experiencing chronic PIUO as reported by their caregivers'.

## Methods

- Sample = 52 participants in PIUO Pathway study
  - M or F, aged 6 months to 18 years with SNI and unexplained pain and irritability
- The caregiver was asked to rate their child's response to commonly painful stimuli as "normal, lessened or none, overly-painful or other"
- We analyzed these categories with the baseline results of observational and behavioural pain assessment tools targeted to evaluate their PIUO:
  - Non-communicating Children's Pain Checklist – Revised (NCCPC-R)
  - Face, Legs, Activity, Cry, Consolability scale – Revised (FLACC-R).

## Results

"What is your child's behaviour or reaction to a commonly painful stimulus (e.g. venipuncture, immunization, minor injury)?"

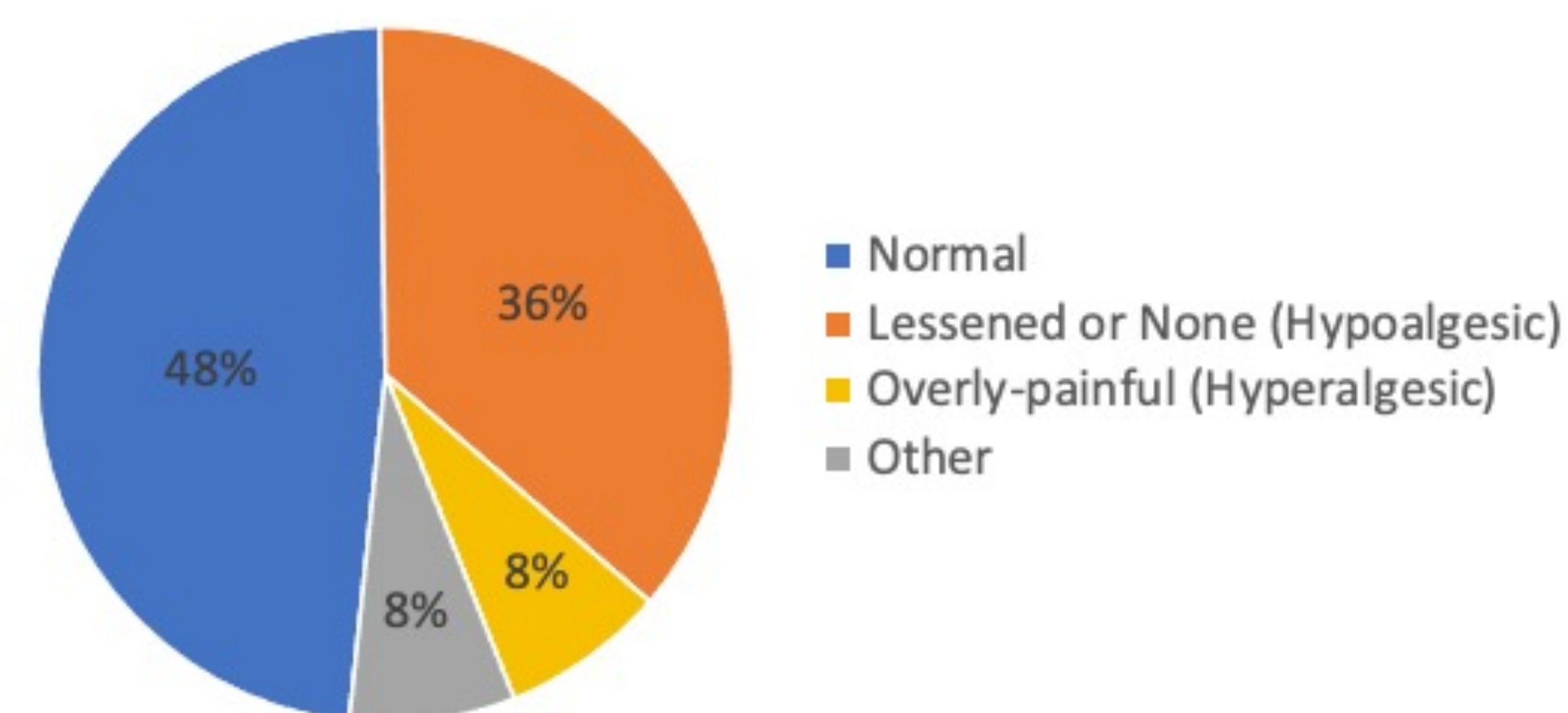


Fig 1. Caregiver reported pain responses to commonly painful stimuli

Table 1. Demographic characteristics of participants

Pain Response Category	N (%)	Age		Sex	
		Mean	Standard Deviation	Male (%)	Female (%)
Normal	25 (48)	5.5	4.6	60.0	40.0
Hypoalgesic	19 (36)	10.2	4.9	63.1	36.8
Hyperalgesic	4 (8)	2.6	0.7	25.0	75.0
Other	4 (8)	6.2	3.8	75.0	25.0
Total	52	7.0	5.1	60.4	39.6

The diagnoses of participants were categorized. There was no correlation between the diagnostic categories and reported pain response.

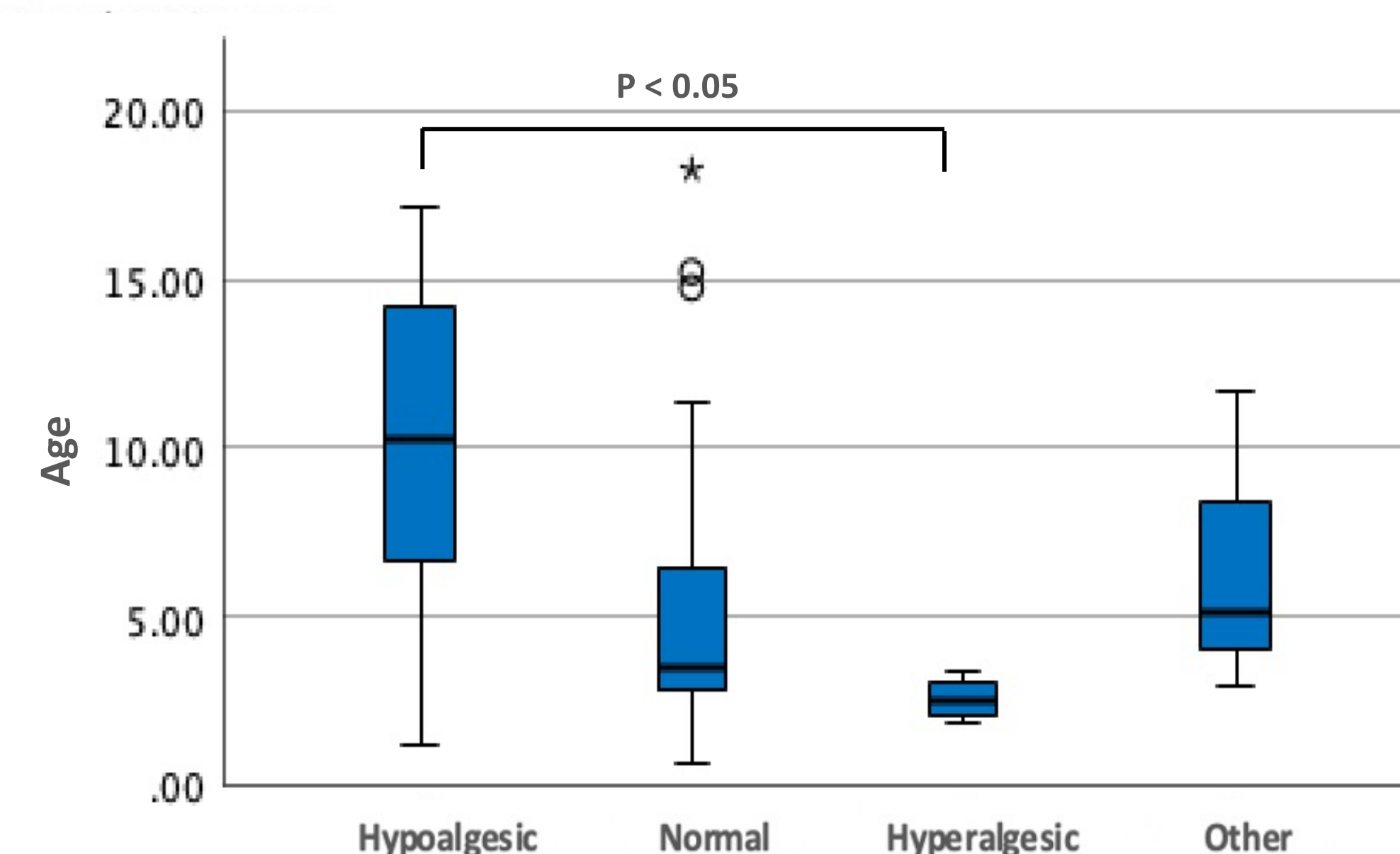
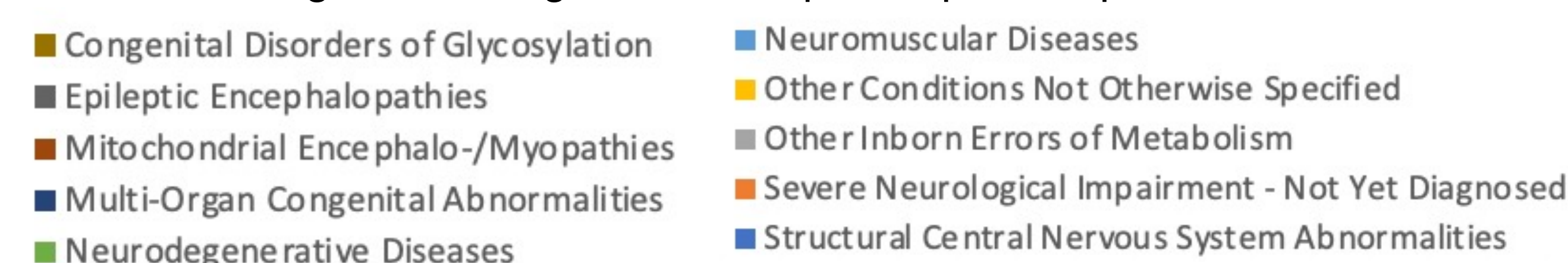


Fig 3. Mean age decreases as nociceptive stimuli sensitivity increases. There was a significant difference between the mean ages in the hypoalgesic and hyperalgesic categories ( $p < 0.05$ )

Fig 4. Mean NCCPC-R scores showed no significant difference between the nociceptive pain response categories.

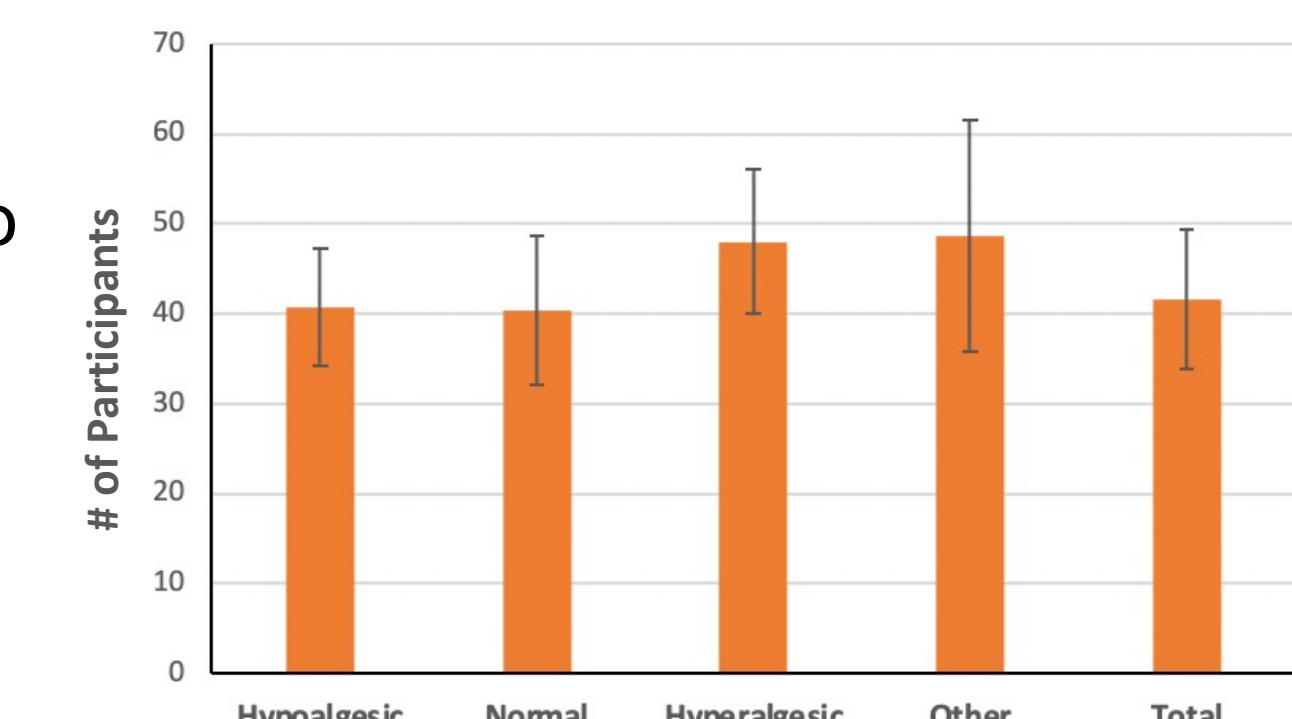
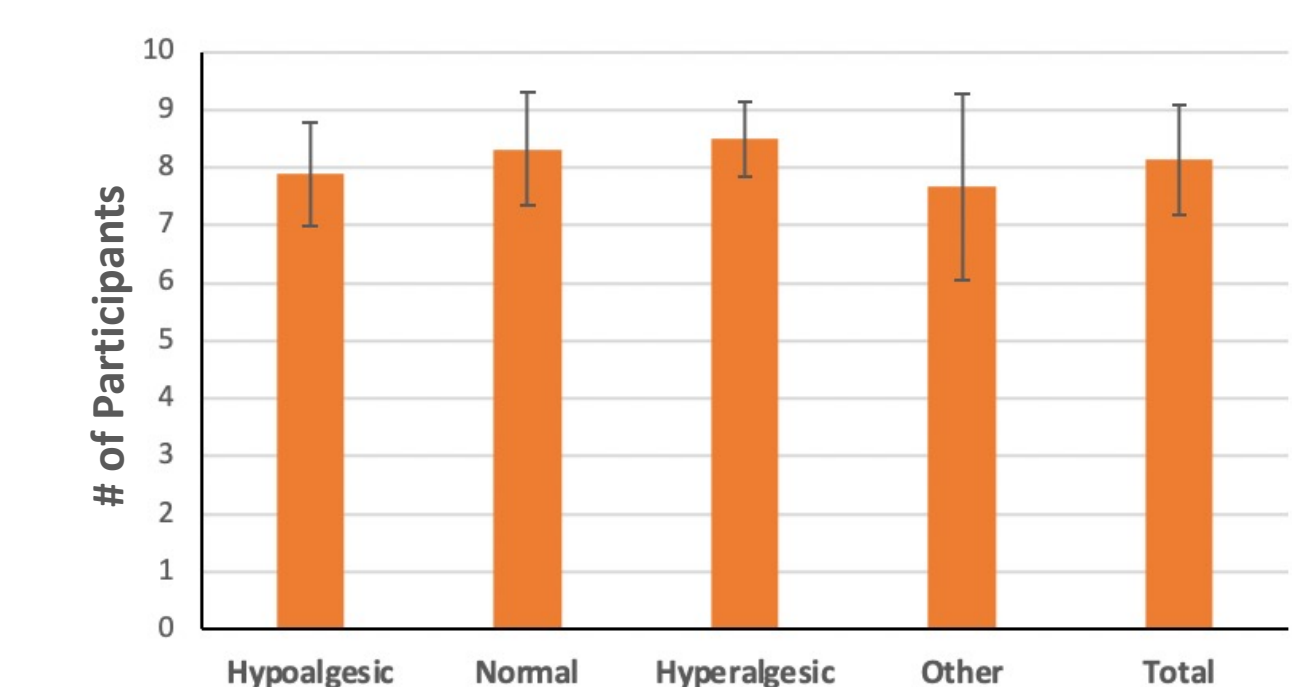


Fig 5. Mean FLACC-R scores showed no significant difference between the nociceptive pain response categories.



## Conclusions

The majority of caregivers reported a normal or lessened response to painful, nociceptive stimuli. This differs from recent literature showing children with SNI may be more sensitive to painful stimuli. The reported acute, nociceptive responses did not correlate with the chronic, PIUO evaluated by the NCCPC-R or FLACC-scales. As nociceptive stimuli sensitivity increased, mean age decreased. This could reflect differences in pain behaviour recognition by caregivers or in pain processing itself. A future study could determine the consistency of these reports with objective measures of nociceptive pain responses in children experiencing PIUO.

## References

- Hauer, J. & Houtrow, A. J. Pain assessment and treatment in children with significant impairment of the central nervous system. *Pediatrics* 139, (2017).
- Warlow, T. & Hain, R. 'Total Pain' in Children with Severe Neurological Impairment. *Children* 5, 13 (2018).
- Steele, R. et al. Charting the territory: Symptoms and functional assessment in children with progressive, non-curable conditions. *Arch. Dis. Child.* 99, 754–762 (2014).
- Pascolo, P. et al. Needle-related pain and distress management during needle-related procedures in children with and without intellectual disability. *Eur. J. Pediatr.* 177, 1753–1760 (2018).
- Bembich, S. et al. Venipuncture activates the cerebral cortex in children with intellectual disability. *Arch. Dis. Child.* 106, 167–172 (2021).

## Acknowledgements

Funded by the CHILD-BRIGHT Network, SPOR and CIHR. Thank you to the participants and their families for joining our project.