

Perceived Barriers and Benefits of Using Transcutaneous Spinal Cord Stimulation on Children With Spina Bifida from Carer's Perspectives.



Jessica Truman¹, Holly Spencer²

¹Cardiff and Vale University Health board, ²School of Healthcare Sciences, Cardiff University

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INTRODUCTION

Spina bifida is a congenital condition caused by incomplete closure of the neural tube during foetal development (Brea et al. 2025). The most common and severe form, myelomeningocele, involves the spinal cord and nerves protruding through an opening in the spine, affecting motor, sensory, and autonomic function (Karsonovich et al. 2025).

Transcutaneous spinal cord stimulation (tSCS) is a promising non-invasive neuromodulation technique that delivers electrical currents to the spinal cord via skin electrodes. By doing so it aims to facilitate neural activation and improve motor and autonomic function (Taylor et al. 2021), helping to address the impairments associated with spinal cord damage in spina bifida.

Existing research on tSCS is promising but limited with a focus on quantitative results, including improved muscle activation (Keller et al. 2021; Motavalli et al. 2019), gait speed (Hofstoetter et al. 2020) and autonomic function (Kreydin et al. 2022). The **experiences of families and carers using this intervention remain unexplored** despite them playing an important role in facilitating the treatment at home.

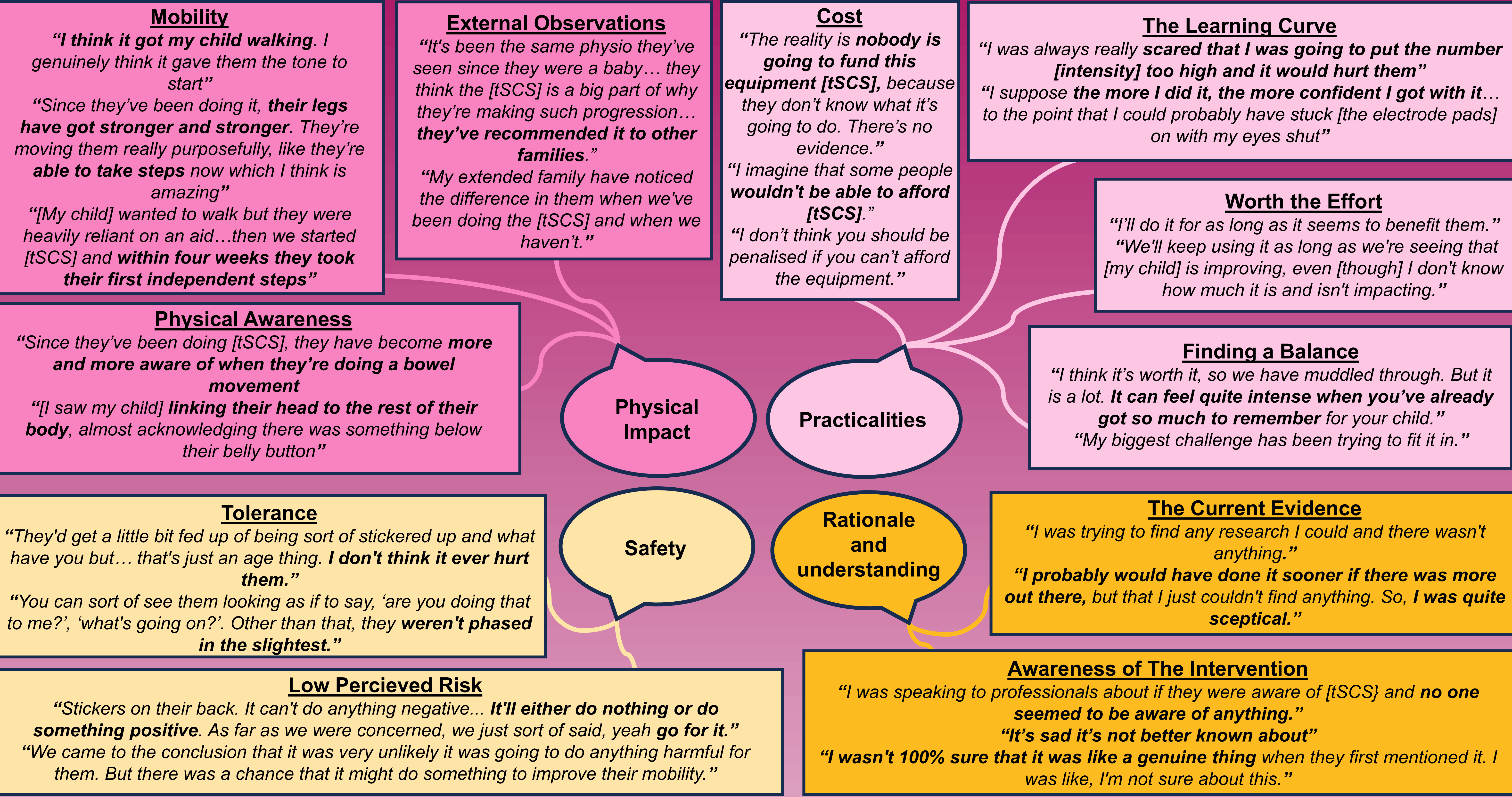
PURPOSE

Explore and analyse the perceived **barriers and benefits of using tSCS** from the **perspective of carers** to help identify factors influencing the use of tSCS in children with spina bifida and guide future areas of research.

METHODS

Design: Qualitative interpretive.
Participants: Carers of children with spina bifida who have used tSCS within the past 12 months (**N = 3**).
Recruitment: Purposive sampling via a gatekeeper.
Data collection: Online focus group. Audio recordings were transcribed verbatim.
Analysis: Reflexive thematic analysis was used to interpret the data and generate themes for discussion.

IDENTIFIED THEMES (4) AND SUB THEMES (11)



CONCLUSION

Four key themes emerged: current evidence, safety, practicalities, and physical impact. Within these, carers identified several benefits of tSCS, reporting it was well tolerated and improved their children’s mobility and physical awareness. Carers also viewed tSCS as a low-risk intervention, increasing their willingness to trial it. Despite its promise, successful implementation depends on addressing barriers such as high equipment costs, availability of carer education, limited evidence, and low awareness among professionals. Although the initial learning curve was demanding, carers adapted quickly. Balancing tSCS with other caregiving duties was difficult but did not prevent long-term use, and all carers found the intervention worthwhile.

IMPLICATIONS

Further research is needed to strengthen the evidence base and establish clinical guidelines for tSCS in children with spina bifida. Improving professional awareness and access to carer training, as well as addressing cost and access barriers, will be key to supporting safe and equitable use of the intervention in paediatric neurorehabilitation.

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ETHICAL APPROVAL

Ethical approval was granted in 2024 by the Cardiff University School of Healthcare Sciences Ethics Committee.

CONTACT US

To receive a copy of the complete research project or to ask any questions please email us at:
Jesstruman@icloud.com
SpencerHL@cardiff.ac.uk



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