**PRE-SCAN PREPARATION IN FMRI RESEARCH FOR CHILDREN WITH AUTISM:**

**A SCOPING REVIEW**

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**Objectives:** Functional magnetic resonance imaging (fMRI) plays a vital role in advancing our understanding of typical and atypical brain development, including for youth with autism. Progress in this field can be hampered by practical requirements of scanning, as successful image acquisition requires participants to remain still and tolerate the noise and confinement of the fMRI scanner bore. The common cognitive, emotional, and behavioral challenges associated with autism compound acquisition difficulties. Many non-pharmacological strategies are available to prepare children with autism for the fMRI environment and there is a need to understand the kinds of approaches that researchers can employ to have successful data acquisition. This scoping review of the recent literature aimed to identify pre-scan approaches used to prepare children and adolescents with autism ages 3-21 years for the fMRI environment.

**Methods:** A search of scientific databases between January 2014 – February 2018 uncovered 270 articles, of which 128 met inclusion criteria. Information on diagnosis, sample size, age-range, pre-scan preparation methods, and scanning success rate (number of participants recruited/number of participants who completed the fMRI session with acceptable quality scans) was extracted and charted.

**Results:** Out of the 38 articles reporting the use of a preparation protocol, 42% reported using a mock scanner, 16% a mock scanner with additional behavioural, visual, and technological training strategies, 26% sedation, 11% natural sleep, and 5% other methods. The data acquisition success rate of studies reporting pre-scan preparation methods was on average, considerably better than previously reported (93% vs. 66%). Sedation led to the highest rate of success (99%), followed by natural sleep (95%), mock scanner (92%), and mock scanner with additional training and other methods (87%). Sedation and natural sleep methods were primarily implemented in studies of children with autism under 6 years of age, or with autism and ID. Five articles reported detailed descriptions of their pre-scan preparation protocols. Common strategies described within the mock scanner protocol included gradual exposure to MRI noise (simulated within the mock scanner bore); practice sessions often occurred the same day with varying durations (20 – 120 minutes). Studies implementing training in addition to the mock scanner described empirically supported behavioral strategies and technology-aided instruction.

**Conclusions:** Results suggest that researchers who intend to begin a neuroimaging study with children with autism without intellectual disability may greatly increase their scanning success rate by implementing a pre-scan protocol with a single mock scanner session. Additionally, picture schedules, video demonstrations, and inclusion of a preferred movie are other important strategies to consider. For younger children with autism and those with co-occurring ID, scanning during natural sleep or via inclusion of intensive behavioural strategies in addition to a mock scan protocol have been used with success. Documenting pre-scan preparation methods, success rates, and reasons for dropouts are important steps towards standardizing the processes in future work.

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