

# The Impact of Swimming on Fundamental Movement Skill Development in Children (3-11 years): A Systematic Review

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## Introduction

- Previous research indicates that swimming intervention can improve FMS development (Rocha et al., 2014).
- Swimming is the only sport that is a lifesaving skill and the only compulsory sport in the UK National Curriculum (Swim England, 2023). Schools have to provide lessons in key stage 1 or 2 (Gov. UK, 2022), these sessions provide general water safety such as swimming competently for 25 m and performing self-rescue (Declerck et al., 2013), not to aid FMS development specifically.
- FMS competency is a prerequisite to daily functioning and participation in PA or sport-specific activities (Lawson et al., 2021), primarily developed in pre-school-aged children (3–5 years) (Stodden et al., 2008), a critical time for FMS development influenced by instruction and practice (Williams et al., 1992).
- Although limited, research supports the positive impact of swimming intervention on FMS development (Moura et al., 2021; Moura et al., 2022) and highlights a need for a more modern and universal swimming assessment tool (Pratt et al., 2021).



Figure 1. Swimming and Water Safety in Schools (Swim England, 2023).

## Aims

1. To assess if there is an impact of swimming on FMS development in children aged 3–11 years.
2. To identify successful tools that assess swimming and FMS individually.
3. To conclude with recommendations appropriate to the UK curriculum based on the findings of this study.

## Results

- Ten articles met the criteria worldwide - Turkey, Serbia, Poland, Portugal, Romania and United Kingdom.
- Participants: 429 (70.2%) were male and 182 (29.8%) female.
- MMAT – 30% scored highly (7 out of 7), 50% met 6 criteria and 20% 5.
- Variability in testing measures – Observations, Aquatic Movement Protocol, Water Orientation Test Alyn 2.
- FMS no standalone tool – TGMD-2, GMFM-88, KTK.
- Females had a higher AMP score ( $27.97 \pm 27.90$ ) compared to males ( $21.10 \pm 22.70$ ) ( $p < 0.05$ ) (Pratt et al., 2021) - need for a standardised assessment battery for swimming.
- Studies that included a control group found significant results between them, supporting the need for a robust swimming intervention within the curriculum, for FMS development alongside social, PA, and health benefits.
- **All studies found swimming does have a positive effect on FMS, with 8 finding a significant difference ( $P < 0.001$ ), significant improvements compared to other sports ( $p < 0.001$ ), and significant improvements in specific motor skills (Balance;  $p = 0.0004$ ).**
- An overview of key findings may be viewed in (Figure 3).

## Discussion

- Key findings: swimming interventions were successful across the board in improving FMS, but the timeframe of interventions limited results.
- Only two studies from the UK – surprising as swimming is the only compulsory sport in the National Curriculum.
- Not all used CG, male-only samples in one study, some studies with poor or no baseline tests, and some studies lacking swimming-specific assessment tools.
- No consistent testing battery - increases the risk of influences such as researcher bias, reliability of test methods, as well as comparability, a meta-analysis not possible in this circumstance.

### Future recommendations:

- To encourage the need for a universal and reliable test battery for FMS, and swimming independently.
- Effects of swimming on FMS development, over a longer period of time, policy and curriculum revisions to benefit the development of FMS for children throughout childhood.
- Re-assessment of the UK National Curriculum, looking at specifying where funding is spent, increasing funding, increase the length of time spent teaching swimming skills, providing more specific detail regarding how swimming is delivered (FITT) and assessed.

## Methodology

- An systematic literature review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) to assemble all English language, peer-reviewed articles published worldwide between January 2008 and December 2022 (Figure 2).
- **Inclusion Criteria:** participants 3–11 years; swimming measured either observationally or using a form of aquatic movement assessment such as the AMP; used an instrument to evaluate FMS; primary data collection through baseline or observational study; special educational needs and disability (SEND) were included; peer-reviewed; analysing swimming and FMS or variant terminology.
- **Studies were excluded if:** outside of 3–11-year age bracket, not reported age, studies using only qualitative data; studies which address sports in addition to swimming (e.g., football) were included.
- Databases included SPORTDiscus, PubMed/Medicine, and Google Scholar, applying all combinations of the following keywords in the title: fundamental movement skills, swimming and children.

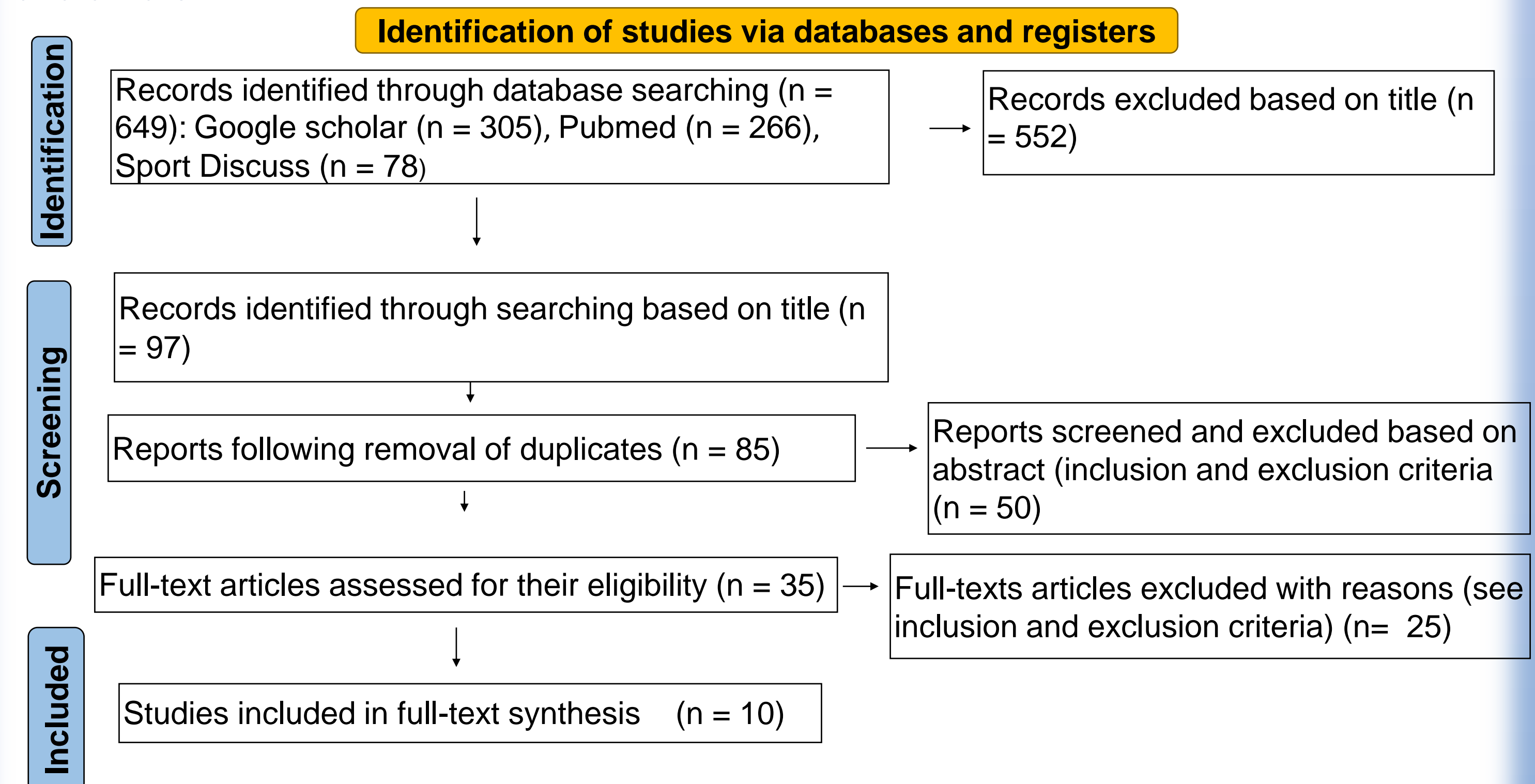


Figure 2. Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart.

- The data was explored via a narrative analysis due to an absence of heterogeneity with regards to diversity amongst populations, outcome measures, and multiple methods included.
- Thematic analysis assessed factors within the research question from a qualitative perspective, paired with the quantitative pre–post data of each study.

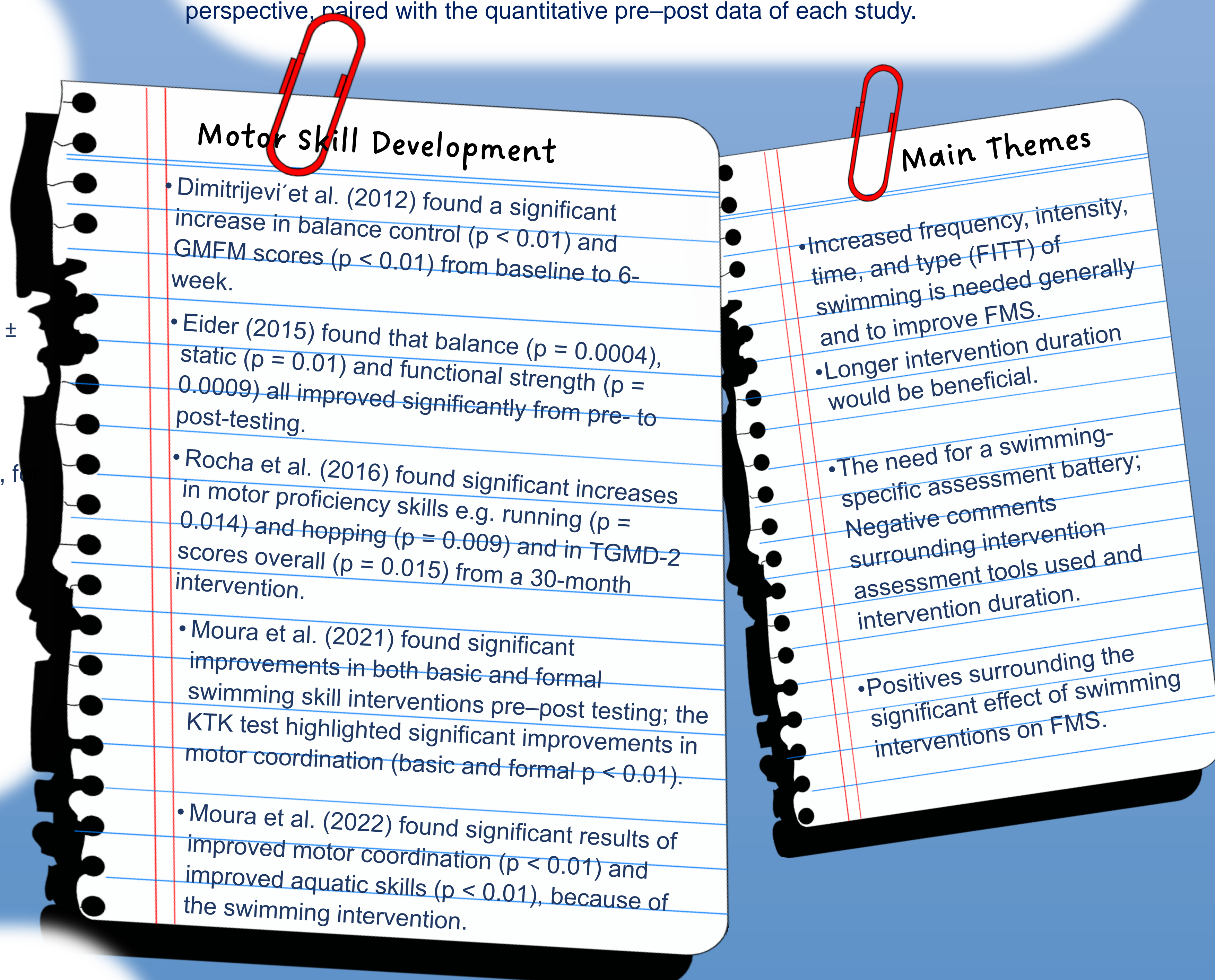


Figure 3. An overview of key Findings

## Conclusion

- First SLR to investigate the effects of swimming on FMS development and first study to investigate this by specifically addressing the UK National Curriculum.
- This research supports that swimming **DOES** improve FMS development significantly.
- Increased frequency, intensity, time, and type of swimming are needed generally.
- To improve FMS, a **longer intervention duration** and research into gender differences would be beneficial.
- Future research is required to establish **standardised assessment tools** for both **swimming** and **FMS** independently.
- Recommendations for revision of the National Curriculum to benefit child development more broadly, ensuring children have access to swimming for motor skill development and essential lifesaving skills.

## References

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