

Are Paediatric OTs Ready to Jump on the ‘Mobile App’ Band-Wagon?

COMMENTARY

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Occupational therapists (OTs) working with children are often faced with addressing handwriting and fine motor dexterity concerns, as they comprise the primary reason for school-age referrals in North America (1,2). When working towards fine motor goals, OTs must ensure the child's interest and attention are optimally engaged. A client's active engagement in the treatment process is necessary to learning, regardless of which therapeutic approach is being used. Hence, there is value in OTs keeping up with kids' and families' current-day interests in electronic device games and mobile apps.

Parents and therapists of children with fine motor concerns may turn to Google with their queries. Any online search will yield a plethora of apps that are marketed as targeting fine motor skill development. In theory they offer an easily accessible method for children to practice fine motor skills in between OT sessions, in the format of a fun tablet- or phone-based game. As an example, Binary Lab's *Dexteria* (2011) provides opportunities for children to practice printing skills, pinching, and finger sequencing (3).

The growing number of apps, like *Dexteria*, offer potentially motivating and accessible therapy tools for clients with fine motor goals. Despite the appeal and convenience of apps as potential adjuncts to OT practice, an essential consideration is whether there is

adequate evidence of outcomes to support their use in this population. The short answer is... no, and the longer answer is... perhaps, not yet.

No research to date has been published on the outcomes of fine motor (tablet-based) app use in children with handwriting difficulties. However in a related vein of research, a few studies have explored the fine motor outcomes of app use in adults (post-stroke) with somewhat promising results. As an example, Rand et al.'s (2013) pilot study found improved hand function correlated with iPad app use in a controlled trial of adults ($n = 22$) with and without stroke (4). As well, underlying neuromotor changes were found to be associated with tablet-based fine motor practice in another controlled trial of adults using the *Dexteria* app (5). This study found neural changes consistent with increased corticospinal tract transmission (responsible for voluntary movements in the fingers) in adults using the app for 30 minutes, while remaining unchanged in the control condition. This study also found high levels of users' interest, enjoyment, perceived competence, and effort associated with app use, based on the Intrinsic Motivation Inventory (IMI) outcome measure. The authors interpreted their findings as an indication of the app's promise as a motivating training tool in adults working towards dexterity-based goals. Although their results demonstrate immediate changes

in neurological activation patterns associated with voluntary movement, they do not present evidence regarding the maintenance of changes or whether they translate into meaningful improvements in functional hand use. Furthermore these findings cannot be generalized to school-age children with fine motor concerns. Additional research is still required to address this specific query.

However some indirect support for app use in children comes from virtual reality (VR) and therapeutic video game studies, which have demonstrated beneficial effects in improving children's motor skills and functional performance. As an example, Pyk (2008) found that a group of children with arm impairments improved in reaching and grasping performance, following use of a VR-based video game, played by wearing data gloves fitted with bend sensors (6). Virtual reality games cannot be directly compared to fine motor mobile device apps, however some important comparisons can be made: both utilize a game format to embed independent choice-making and repetitive practice opportunities within a child-friendly interface, while providing accurate feedback about motor performance. Although VR studies provide a foundation for the exploration of mobile device apps' potential, they do not directly address the question of whether use of these apps result in meaningful improvements in fine motor performance. Future pediatric rehabilitation research is required to create and examine an evidence base for the outcomes of clients' app use.

Overall there is a high level of current interest in using mobile device apps. This appetite is matched with a growing number of available online tools claiming to target children's fine motor skills. Despite interest and availability there is no direct evidence

on these apps' effectiveness. Some indirect preliminary evidence has been provided by studies on tablet use in adults and VR-based interventions for children. These findings point the way for future research, which is urgently needed to examine the validity and efficacy of using mobile apps to help address fine motor concerns of paediatric OT clients.

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