Innovative Approaches to Treating Selective Mutism in Children

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Selective Mutism (SM) is a difficult disorder to treat. Despite an awareness of the need for new brief and multidimensional approaches (Jackson et al., 2005), few advancements have been made in the treatment of SM (Lorenzo et al., 2020). Newer treatments that have emerged are generally understudied, seldom applied, or used following unsuccessful attempts through traditional approaches (Bunnell et al., 2015). This paper will discuss three of these new treatments, that can be considered innovative as reflected in their unconventional approaches in comparison with traditional approaches, and in their successful outcomes.

Overview of Selective Mutism

SM is a pervasive disorder in which people (primarily children) who know how to speak are unable to do so in certain social situations when they are expected to (American Psychiatric Association, 2013). Several potential causes and precursors of SM have been identified, including a behaviourally inhibited temperament (Gensthaler et al., 2016), a variation in the CNTNAP2 gene (Wallis, 2015), poor standardized language scores and discrimination between speech sounds (Khan & Renk, 2018), and traumatic life events (Steinhausen & Juzi, 1996). SM is rare, with an estimated prevalence ranging between 0.03% to 1% (American Psychiatric Association, 2013). Prevalence is roughly 3 times higher among immigrant children who are second-language learners, ranging between 0.09% and 3% (Jones & Odell-Miller, 2022). SM typically emerges in the school environment (Wallis, 2015). A 2011 study by Harwood & Bork found that 53% of the participating teachers self-reported a limited knowledge of SM. This suggests that SM is highly unidentified in the environment where it is most prevalent. Furthermore, follow-up studies reveal a risk for future psychopathology, including emotional problems such as depression and attention deficits (Remschmidt et al., 2001). Individuals previously diagnosed with SM described themselves to be less self-confident, independent, mature, and motivated in their academics (Remschmidt et al., 2001). The rarity and underdiagnosis of SM support the need for further studies, while the pervasiveness and future implications highlight the importance of successful treatments for SM.

Treating Selective Mutism

The extreme difficulty in treating SM can be attributed to various factors. A patient with comorbid diagnoses including Social Anxiety Disorder (SAD) may be resistant to treatment (Bunnell et al., 2018). Clinicians often regard SM as a subtype of SAD, with estimated comorbidity rates falling between 50% and 90% (Wallis, 2015). In social situations, children with SM often present symptoms of anxiety including fidgeting, avoidance of eye contact, withdrawal, muscle tension, and increased heart rate (Bork & Bennett, 2020; Melfsen et al., 2021; Fernandez et al., 2014). While SAD and SM are generally understood to be strongly related and are treated accordingly (Bunnell et al., 2015; Melfsen et al., 2021), their connection has been disputed. Melfsen et al. (2020) propose an alternative "unsafe world" model of SM, arguing that SM can be attributed to stress reactions that an individual experiences as "unsafe" without their cognitive awareness. Further research on the "unsafe world" model could have implications on the current treatment models for SM. Treatment is also complicated by shyness, which affects ~85% of children with SM (Steinhausen and Juzi, 1996). In children, older age and severity increase the risk of negative treatment outcomes (Oerbeck et al., 2018). An older child who has displayed symptoms of SM for years in their school environment may resist transitioning out of their comfortable status as "the kid who does not talk" (Bunnell et al., 2015, 391). Other factors that complicate the treatment of SM can include *contamination*, which occurs when someone inadvertently reinforces SM by establishing a pattern of accommodation for nonverbal responses, including speaking on a child's behalf (Catchpole et al., 2019; Lorenzo et al., 2020). It is difficult to achieve a verbal response from a child with SM in a setting that is "contaminated" (Lorenzo et al., 2020). Additionally, there are financial barriers to accessing effective treatments, particularly in situations where no funding or coverage is available for mental health care. As Bunnell & Beidel note, "few clinics, especially those in the community, are able to provide assessment and treatment services at no cost, so access to treatment for many families will certainly be limited" (302). However, Bunnell et al. (2015) promote PC Applications for the ability to access free or inexpensive applications, (39) given that the user has access to a device and internet. Furthermore, treatments that employ Virtual Reality are becoming more popular as the technology improves, reducing the overall cost to a lower point than traditional therapies (Carl et al., 27). Overall, financial barriers are increasingly being addressed, particularly through innovative approaches to treatment. It is also important to consider treatments in light of the populations that are adversely affected, including low-income families and children of immigrants, as discussed in the previous section. The traditional approaches to treatment described in the following section may become even less effective for children from adversely affected populations. Unfortunately, there are significant gaps in the existing research on SM, so this topic has not been sufficiently

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addressed to date. These various factors that complicate treatment for SM emphasize the importance of successful and reliable interventions.

Traditional Approaches to Treatment

Traditional approaches to treating SM have been researched for years and are widely used. As mentioned, treatments for SM are significantly related to those used to treat SAD (Bunnell et al., 2015; Melfsen et al., 2021). Behavioural interventions and techniques (ex. contingency management, stimulus fading (SF), exposure, modeling, goal setting, and role-playing) are common, centered around the individual's observable behaviour and their environment (Bork & Bennett, 2020). Cognitive Behavioural Therapy (CBT) is also common (McHolm et al., 2016) and aims to change thought patterns to reduce anxiety, which requires children to recognize and evaluate their own thoughts (McHolm et al., 2016). As a final resort following a failure of psychological approaches to treatment, pharmacological treatments may be used (Kaakeh & Stumpf, 2008). Selective Serotonin Reuptake Inhibitors (SSRI's) and other anxiety-focused medications are commonly used to treat SM (Kaakeh & Stumpf, 2008; Manassis et al., 2016). However, medication should be combined with a psychosocial intervention, to address the root causes of SM (Jackson et al., 2005; Hung & Dronamraju, 2012). Melfsen et al. (2021) also claim that treatments involving self-regulation skills can surpass an arguably insufficient focus on the reduction of anxiety. In general, existing research supports behavioural and combined strategies to treat childhood SM (Zakszeski & DuPaul, 2017).

Innovative Approaches to Treatment

In contrast with traditional approaches, innovative approaches adopt new, unconventional methodologies and report lower rates of negative outcomes. Technology has gradually become a topic of interest in the treatment of SM and was the focus of a conference held at Brock University in 2022[1]. These innovative treatments have strong relationships with the traditional approaches to treating SM, but deviate markedly in multiple respects including the methodologies, multidimensionality, and the overall duration of the intervention.

Mobile Applications (Apps)

A few studies with small samples have argued that apps are promising treatment interventions. Bunnell et al. suggest that children are less anxious while using therapeutic tools including mobile apps, versus treatments that involve reinforcement alone (2018). Apps present an opportunity to combine sound recordings and audio playback features in a customized, attractive, and engaging platform (Bunnell et al., 2015). In

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[1] See *Selective Mutism Conference 2022.* Brock University, St. Catharines, Ontario, Canada. https://brocku.ca/selective-mutism-conference/.

partnership with RETRO[2], Bunnell et al. designed a prototype app to treat SM (2015). The researchers were concerned with shaping the ability to speak in new settings, as shaping, a stepped approach to treatment that gradually increases in difficulty and involves a reward system (Hung & Dronamraju, 2012), is a proven effective treatment for SM (Shriver et al., 2011). The leveled sequence of the prototype app aligned with this technique. One game (*Lift-Off!*) encouraged patients to record their own voice and share the recording with others. It was developed and used to effectively treat SM in a case study involving a 17-year-old female who had been unsuccessfully treated for years. By the end of the first session, the participant spoke in complete, conversational sentences. While no further studies have been released involving RETRO's prototype app to date, freely available apps have also been effective. Haycock (2018) reported that multiple publicly available apps (see Figure 1) helped a child with SM use a more natural volume and voice. Although the outcomes of Bunnell et al.'s 2015 study were successful, their sample size was limited, and the study has not been replicated. This situates apps as a promising approach to treating SM that is yet to be fully verified.

Name of Application	Functions and Selective Mutism	Citation
ChatterPix	A child can take a photo, then add a recording of their voice to the photo.	Duck Duck Moose, LLC. (n.d.). *ChatterPix Kids*. https://play.google.com/store/apps/details?id=com.duckduckmoosedesign.cpkids&gl=US
Puppet Pals	Children can create animated stories using characters and backdrops, then add a recording of their voice.	Polished Play. (n.d.). *Puppet Pals*. http://www.polishedplay.com/puppetpals1
Bla|Bla|Bla	This is a "sound reactive" application, wherein the graphics on the screen will respond to the sound of a voice.	Bravi, L. (2011, March). *Bla|Bla|Bla*. https://download.cnet.com/Bla-Bla-Bla/3000-20415_4-75524304.html
dB meter	This application offers meters to measure sound levels from sources within the environment, including voices.	Excelling Apps. (n.d.). *dB Meter*. https://play.google.com/store/apps/details?id=sound.meter&gl=US

FIGURE 1. The chart presents mobile applications that Haycock (2018) found to be effective in the treatment of SM.

Virtual Reality

Researchers have also explored virtual reality as an approach to treating SM. Virtual Reality Exposure Therapy (VRET) has increasingly been used as an alternative to in-vivo exposure therapy, and comparisons with

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[2] "RETRO" stands for *Recent and Emerging Technologies Research Organization*.

control conditions have revealed large effects (Carl et al., 2019). Interactive VRET was used as a treatment method by Tan et al. (2022) for a group of 24 children diagnosed with SM. Over 6 hours divided between up to 10 weeks, participants learned social skills and interacted with a virtual classroom simulation. Different scenarios and tasks that daunted participants (ex. answering a question, greeting a classmate) were gradually presented to them. Follow-up measures indicated considerable improvements in participants, but parents did not see substantial changes in measures of anxiety and speech frequency (Tan et al., 2022). While Tan et al. consider VRET a bridge connecting clinical and in-vivo settings, it is important to note that the researchers described VRET as a commonly used "extension of cognitive behavioural therapy" (p. 351). Therefore, a more robust treatment would combine various approaches, as demonstrated in a 2020 study by Bork & Bennett. Bork & Bennett's intervention package was first used by Kehle et al. in 1998, combining 3 types of treatment: video self-modeling (VSM), SF, and reinforcement techniques, under the acronym of VSR. 3 young female students diagnosed with SM participated in the study, which was implemented by parents and teachers in the classroom setting. The researchers strongly promote the brevity of the study (totalling 65-130 minutes per participant, spread out over 8 weeks) as a highlight of their approach. The VSM component of the study is unique. Custom videos were recorded and edited to portray the child speaking to their teacher in their classroom environment. The participants repeatedly watched the edited footage of themselves speaking to their teacher, eventually becoming desensitized to seeing themselves speaking to their teacher. Strong reinforcers led up to the child reaching their goal of earning a special gift, by verbally asking for it in front of their class. Bork & Bennett's 2020 study reported significant increases in verbal activities in the participants across school and social situations. These studies suggest that virtual reality is most beneficial when used within a multidimensional framework. Tan et al.'s VRET study reported improvements in verbal activity, and Bork & Bennett's VSR study involved a small sample plus required significant resources that more flexible approaches could replace.

Music Therapy

As a form of expressive therapy, music therapy provides an individual with outlets to communicate verbally and explore contexts and outlets for their speech (Bork et al., 2015). A study by Jones & Odell-Miller (2022) presents music therapy as an empowering experience that fosters communicative confidence via vocal and oral connections. Oral instruments including kazoos, whistles, recorders, and echo / parrot toys were used to encourage, enhance, and exaggerate the voices of 6 young children diagnosed with SM. Anxiety appeared to be reduced through self-expressions such as increased physical movements, humour, and laughter. Increases in dramatic and loud self-expressions were observed in

all participants after 2 therapy sessions. The researchers also describe a pattern of musical turn-taking that they consider a close parallel to verbal conversations. Music therapy is a flexible and relaxed approach that can prepare a child for vocal interactions with adults in situations they initially find uncomfortable.

Analysis

Important discussions emerge from the relationship between innovative and traditional treatments for SM. Key considerations surround multidimensionality and individuality, systemic desensitization and the treatment setting, and length of the treatment. A strong case for multidimensionality resides in the fact that the compelling strategies offered by individual innovative treatments alone may not be sufficient. In Bunnell et al.'s 2018 app study, the researchers note that increasing the social effectiveness of their treatment may require additional interventions focused on formal social skills. Furthermore, combining approaches to treatments may lead to valuable new revelations about individual treatments, based on factors such as amplification and altering of the effects. However, as described by Bork & Bennett (2020), this is also a potential complication, as combining approaches introduces the inability to determine which individual treatment is more impactful. Proving the efficacy of singular innovative approaches becomes complicated when treatments are embedded in multidimensional frameworks. Additionally, the effectiveness of a treatment plan involves the level of individualization, which has repeatedly been linked to strong results for SM (Shriver et al., 2011). Apps can allow for a unique and interactive experience, and VSM (as seen in Bork & Bennett's 2020 VSR treatment) is another avenue for customization. Hung & Dronamraju (2012) also promote individualization, recommending that children be allowed the flexibility to select methods of communication, and that therapists be sensitive to individual interests. Jones & Odell-Miller's music therapy approach echoed this by allowing the participants to choose instruments, and by adapting session activities and length to flow with the child's interests.

All approaches discussed introduce a systemic desensitization (or graduated exposure) in a compelling way. Jones & Odell-Miller used a flexible framework, allowing participants to advance to more challenging steps when they felt prepared to do so. Bunnell et al. (2013) claim that gamified tasks (such as those embedded in apps) requiring vocalization decrease social anxiety by shifting the child's focus from speaking to other activities, allowing speech to occur. In this sense, technological exposure vs. in-vivo exposure can accelerate or even omit the process of mitigating fear responses. Fundamentally, technology-based treatments establish a conflict between VRET and in-vivo exposure therapy, and whether systemic desensitization can extend from a simulated environment into real-life situations, especially situations that have been "contaminated"

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(see Lorenzo et al., 2020). Ale et al. (2013) hold that patients experience the greatest gain from exposure therapy implemented in naturalistic settings, while the innovative studies detailed in this paper suggest this is not always the case.

Finally, traditional approaches to treatment are often lengthy, gradual procedures requiring years of dedicated, persistent treatment before achieving positive results (Jackson et al., 2005; Harwood & Bork, 2011). The innovative approaches presented in this paper, especially those using technology, have the potential to overcome this time barrier. Bunnell et al. (2015) suggest that using apps plus a reward system can decrease the resources and clinical effort required to achieve treatment milestones, in addition to decreasing the time required.

Conclusions

Innovative approaches present some significant opportunities in treating SM, particularly through combined intervention packages. However, these approaches need to be studied in more detail and replicated in larger sample sizes. While the few studies that have been conducted generally report strong outcomes, they follow a short-term, case-focused approach that is not necessarily a feasible treatment for, or generalizable to, the larger population of children who struggle with SM. Furthermore, the pervasiveness and negative future psychopathology associated with SM, along with the difficulties in treating the disorder, highlight the need for more research into approaches that are innovative.

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