

# Interventions for autism spectrum disorder: evidence-based interventions and inte...

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Wong et al. (2013) are identifying in their broad review interventions used in autism spectrum disorder, two main classes: focused intervention practices and comprehensive treatment models. By comprehensive treatment models, they are referring to as a "a set of practices designed to achieve a broad learning or developmental impact on the core deficits of ASD", on the other hand Odom et al (2010) describes usually shorter time period occurring, focused intervention practices as an intervention focusing on a single skill or goal. Wong et al. (2013) found in their review 27 practices, that were filling the requirements of an evidence-based practices. Most of the research (years 1990-2011) in ASD intervention practice research has been focusing on pre-school children with outcomes of social skills (19 %), communication (21%), challenging behavior (19%) and social readiness skills (8%) and approximately 2% of the ASD intervention outcome has been about cognitive performance, such as intelligence, theory of mind, attention or executive function (Wong et al. 2013). Much less has been focused on the outcomes concerning typically important concerns for adolescence like vocational skills needed for employment preparation (1%) or mental health (0, 1%) (Wong et al. 2013). Even though in the developmental transition from childhood to adolescence the interventions focusing on the core deficits of autism may continue, the interventions focusing towards independent functioning or adaptive behavior comes more to the spotlight as there might emerge also new developmental challenges or symptoms (eg. vocational engagement or independent living) (Selzer et al., 2004; Lounds et al., 2012). In a more recent review Smith & Iadarola (2015) updated the evidence-based behavioral and psychological interventions for children with ASD, but their

review covered much more narrow frame of age (children younger than 5 years old). They chose interventions that had been published after 2008, manualized and evaluated in either experimental or quasi-experimental group studies or systematic reviews of single-subject studies. They found out that individual and comprehensive based applied behavior analysis (ABA) (with primary reported outcomes of parent- rated adaptive functioning and IQ/DQ) and teacher-implemented focused ABA combined with developmental social-pragmatic interventions (DSP) (with primary reported research outcome of joint engagement in play activities with teacher and caregivers) were well-established as evidence-based interventions. Especially Lovaas therapy for ASD has been recognized potentially efficient (compared to the standard, " normal" care or optimally provided treatment for ASD) in terms of the core symptoms of ASD with improved intellectual functioning, language comprehension, and communication skills, but results are based on somehow methodologically weak studies with only few participants (Ospina et al 2008).

## **Technology-based interventions**

It is anecdotally known, that adolescents with ASD have a fascination towards technology and computers, yet the empirical research among ASD individuals has not been so strong as with typically developed peers (Mazurek et al., 2012). A growing number of studies have investigated diverse applications of technology-based interventions with children with autism (Goldsmith & LeBlanc, 2004). The development of technology has allowed the assessment methods and rehabilitation tools to evolve towards more and more naturalistic, real life conditions. This seems to be an

important progressive step, as according to Neisser (conference 1978, published 1982) cognitive psychology has been suffering from the lack of ecological validity, the relevance of the used method or system relative to the "real" world. Keintz et al. (2013) reviewed in their book technology that has been designed for individuals with ASD identifying eight interactive technology platforms: personal computers, use of the web, shared active surfaces, mobile devices, sensor and wearable technologies, robotics, natural user interfaces and virtual reality. The growing number of technological interventions has led National Autism Center, a center for the Promotion of Evidence-based Practice (2009) coining this rationally new group of different behavioral and educational treatments as "Technology-based Treatment". The use of technological devices diminishes human error, as many programs especially considering neuropsychological assessment and testing, include a built-in standardization and provide an opportunity for repetitions (Miller & Barr, 2017).

## **Virtual Reality (VR) and Virtual Environments (VE)**

There seems to be different definitions of virtual reality (VR) depending on whether the description is simply attending to reach the technological features or describe the individuals active participation within a computer-generated 3D-virtual world. Jaron Lanier was the first to use the term of virtual reality in 1986 and since then VR has been typically described as a group of technical devices including a head-mounted display, a computer with interactive 3D visualization and data gloves (Riva, Mantovani & Gaggioli, 2004). VR can also be described as a simulation of the real world, naturalistic environments using computer graphics (Wang & Reid, 2009;

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Rizzo et al. 2004). Virtual environments (VE's) provide experiences that can either help understanding concepts or learn to perform specific tasks by simulating the real world as it is or creating a totally new worlds (Chittaro & Ranon, 2007). Rizzo et al (2004) refer VEs " much like an aircraft simulator", with a difference that VEs can present simulations that " asses and rehabilitate human cognitive and fuctional processes under a range of stimulus conditions that are not easily controllable in the real world". In neuropsychology the potential of VR technology and applications has not been recognized for very long as the first discussions in neuropsychology emerged in the mid 1990s. (Pugnetti et al., 1995: Rizzo, 1994; Rose et al. 1996). The benefits of using virtual reality applications is that it affords incomparable control over the environment allowing clinicians to arrange environments to best promoting learning and generalization and it also offers a safe and highly realistic environment to teach skills that are associated with some level of danger (e. g. stranger safety) when taught in the natural environment (Goldsmith & LeBlanc, 2004). VR technology is aligned with the visuospatial preference that is generally identified as a strength and main learning channel of students with autism spectrum disorder (Fernández-Herrero et al. 2018).