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A microswitch-cluster program to enhance object manipulation and to reduce hand mouthing by three boys with autism spectrum disorders and intellectual disabilities

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ABSTRACT

We assessed a microswitch-cluster program to enhance object manipulation and to reduce hand mouthing by three boys with autism spectrum disorders and severe to profound intellectual disabilities. A second goal of the study was to monitor the effect of such program on the indices of happiness of the participants. The study has been carried out according to an ABB^1AB^1 sequence, where A represented baseline phases, B represented intervention phase in which the adaptive response (i.e. object manipulation) was followed by a contingent positive stimulation irrespective of challenge behavior (i.e. hand mouthing), and B^1 indicated intervention phases in which an adaptive response was followed by a contingent positive stimulation only if it occurred with the simultaneous absence of the challenge behavior. Otherwise, positive stimulation was interrupted if the challenge behavior was exhibited during its supply. Results showed an increasing of the adaptive responses and a decrease of the challenge behavior during intervention phases. All participants spent less time with the exhibition of challenge behavior, during intervention phases, compared to baseline sessions. Finally, the indices of happiness augmented during intervention phases. Clinical, practical and psychological implications of the findings are discussed.

1. Introduction

Persons with autism spectrum disorders (ASD) and intellectual disabilities (ID) may exhibit challenge behaviors such as self-injuries, tantrum behavior, eye poking, hand mouthing (Matson, 2012). They are generally described as impaired in communication, cognitive and social abilities, posing serious problems in daily context (i.e. home, school and/or rehabilitative centers) (Matson & Sturmey, 2011). Furthermore, they may present few adaptive responses and consequently fail to engage in constructive skills with negative outcomes aimed at the control of environmental stimuli (Konst, Matson, & Turygin, 2013). The low behavioral (i.e. adaptive and/or functional) repertoire combined with problem behaviors may

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seriously hamper their acceptance and social desirability by other people (Cannella, O'Reilly, & Lancioni, 2006; Lancioni, Singh, O'Reilly, & Sigafoos, 2009).

Considered the aforementioned conditions, educational and rehabilitation interventions should pursue a dual objective: increase adaptive abilities and reduce challenge behaviors (Lancioni, Comes, et al., 2005; Lancioni, Singh, O'Reilly, & Oliva, 2005; Lancioni et al., 2008). Among behavioral interventions, a wide range of strategies has been already used with persons who presented developmental disabilities (Gould, Dixon, Najdowski, Smith, & Tarbox, 2011; Machalicek et al., 2008). For example, overcorrection, contingent reinforcement, differential reinforcement of other behavior combined with punishment, environmental enrichment and response cost have been successfully employed (Baeza-Velazo, Michelon, Rattaz, & Baghdadli, 2014; Lidstone et al., 2014). Moreover, microswitch-based technology can be adopted (Lancioni, Singh, et al., 2005).

Microswitches are electronic tools enabling individuals with multiple and/or pervasive developmental disabilities to access to preferred stimuli independently by exhibiting simple behavioral responses (Saunders et al., 2001). The first step in a microswitch-based program is the selection of a plausible response. That is, the response should be part of participant's behavioral repertoire and performed reliably and without effort to easily activate the microswitch and turn on preferred stimuli contingently (i.e. during intervention phases). Although no specific rules exist, basic requirements provide that the selected response(s) (a) should already exist in individual's repertoire, and so easy to perform through simple prompts, (b) do not demand an excessive cost/effort to be performed, and (c) are discriminable for the participant and detectable for the microswitch. Moreover, the contingent stimulation that participant receives by responding and activating the microswitch should widely compensate the overall response cost. That is, stimuli should be high motivating. By learning the association between behavioral response and environmental stimuli, the participant should increase his/her adaptive behavior (Lancioni et al., 2008). Among microswitch-based program, clusters-based interventions have been designed and applied to individuals with multiple disabilities (Lancioni, O'Reilly, et al., 2007).

The latter intervention-based program (i.e. microswitch cluster) is aimed at achieving the dual objective cited (i.e. promote positive responses and decrease aberrant behaviors). Typically, microswitch cluster-based intervention strategies enable participants to (a) monitor adaptive responses and challenge behaviors simultaneously and (b) receive preferred stimuli automatically after the exhibition of the constructive response without the challenge behavior (Lancioni, Singh, et al., 2006). For example, a child may learn to increase arm-lifting responses without dystonic sideways head tilting (Lancioni, Comes, et al., 2005; Lancioni, Singh, et al., 2005). Essentially, the first intervention phase would be focused on the enhancing of the positive behavior (i.e. arm-lifting), regardless the challenge response (i.e. head tilting). Once the participant has consolidated the adaptive behavior, a new intervention phase could be introduced. That is, (a) arm-lifting would not be followed by preferred stimuli if head is tilted and (b) stimulation delivered for a positive response would be interrupted when head tilting appears.

Furthermore, microswitch clusters may represent a great educational and rehabilitative resource for children with severe to profound developmental disabilities who exhibit challenge behaviors. Learning new adaptive responses, enabling them to access to preferred stimuli independently and to reduce their challenge behaviors. Recently, Lancioni et al. (2013) worked on a 10 years old participant with a congenital encephalopathy diagnosis and multiple disabilities. They used a microswitch-cluster program aimed to promote touching objects (toys) attached to an horizontal bar in front of the participant (i.e. adaptive response detected with optic sensors) and to decrease inadequate posture consisting on head and trunk forward leaning (i.e. aberrant behavior recorded with an optic sensor). Results showed that the participant increased the adaptive response and reduced inappropriate posture through the use of microswitch technology. The literature on microswitch clusters for people who present multiple disabilities, is substantial (Lancioni, Comes, et al., 2005; Lancioni, Singh, et al., 2005; Lancioni et al., 2011; Lancioni, Singh, O'Reilly, Sigafoos, Green, et al., 2009). Surprisingly, studies concerning microswitch cluster-based programs for people with ASD are lacking (Lancioni & Singh, 2014), as poor are the evidences for their effects on participants' mood (i.e. indices of happiness), except for one study (Lancioni et al., 2008).

This study is an attempt to replicate and extend the suitability of microswitch cluster based interventions to three new participants (boys) with ASD and severe to profound ID and to encourage (a) fostering object manipulation, (b) decrease hand mouthing, and (c) monitor the effects on indices of happiness of participants (Stasolla, Perilli, & Damiani, 2014).

2. Method

2.1. Participants and setting

At the beginning of the study the participants (Chris, Sam and Tom) were 10.2, 8.4, and 9.5 years old (mean age 9.36) and were diagnosed with severe ASD with score of 49, 51 and 50, respectively, on the childhood autism rating scale (CARS) (Rellini, Tortolani, Trillo, Carbone, & Montecchio, 2004). Although no formal Intellectual Quotient scores were available since no tests were feasible, dues to their conditions, they were all considered within the range of severe to profound intellectual disabilities by clinical observations. They all presented dystonic movements, lack of speech, stereotyped behaviors (i.e. hand mouthing), social impairments, unawareness of their sphincter control, no self-help and/or constructive engagement, spending their waking time sitting.