ARTICLE

The development and design of the Musical Functional Assessment Profile (MFAP) in autism

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ABSTRACT

The Musical Functional Assessment Profile (MFAP) in autism has been developed as a specific music therapy observational assessment tool to provide qualitative and descriptive information about the functionality of the child on the autism spectrum. It allows for assessing seven developmental functions: social interaction, communication and language, flexibility and anticipation, symbolisation, memory functions, motor functions and sensory functions. The MFAP tries to value the strengths, challenges, difficulties, and supports provided, considering current autism diagnostic criteria and treatment issues viewed from the perspective of neurodiversity. It may also allow the delineation of music therapy treatment goals and intervention planning related to a person-centred and a strength-based approach. The development and design of the tool is presented, and its practical advantages and disadvantages are discussed. Further research studies are required to determine the precise scope and accuracy of this tool; future directions are established for its validity and reliability process.

AUTHOR BIOGRAPHY

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INTRODUCTION

Autism, named as autism spectrum disorder (ASD) in the *Diagnostic and Statistical Manual of Mental Disorders* (5th Ed.) (DSM-5; American Psychiatric Association, 2013), is a neurodevelopmental condition characterised by a variety of clinical manifestations with two main diagnostic criteria: (1) difficulties in reciprocal social interaction and communication and (2) the presence of repetitive and restricted activities and interests with unusual sensory issues, forming a dimensional spectrum. Its clinical manifestation can be highly variable from one person to another (Baron-Cohen, 2017; Valdez, 2019) and may undergo modifications throughout development, posing new challenges for the person (Autism Europe International Association, 2000). Also, in autism, strengths such as attention to detail, memory capacities and the possibility of detecting patterns may be present (Baron-Cohen,

2017). Considering a dimensional and complex valuation of autism, the interventions and supports are thought and planned collaboratively with the person on the autism spectrum, their family, and the service providers in order to maximise potentials, alleviate distress, improve adaptation, promote wellbeing and increase person-environment fit (Lai et al., 2020). Following these guidelines and the current controversy in considering autism as a disorder or as an expression of human diversity (Rickson, 2021), the author decided to use the term "child or children on the autism spectrum" and "autism" to name the condition throughout this publication.

From the beginning of its development, music therapy has been used for treatment of children on the autism spectrum with different purposes such as social interaction, communication and development of pre-verbal and verbal expressive language, stimulation of cognitive functions and motor skills, sensory modulation, supporting behaviour, schooling, and everyday life contexts or even to improve in bonding with caregivers (Reschke-Hernandez, 2011). In turn, there are extensive theoretical developments to explain why the discipline can intervene on the core aspects in autism (Dimitriadis & Smeijsters, 2011; Nordoff & Robbins, 2007; Wigram, 2002). Based on current systematic reviews and randomised controlled trials (RCTs), music therapy has presented mixed results. On the one hand, it has demonstrated positive outcomes for improving social interaction, verbal and gestural communication, social-emotional reciprocity, improving independent functioning, understanding basic emotions and fostering the parent-child relationship (Geretsegger et al., 2014; James et al., 2015; Marquez-Garcia et al., 2021). Findings from narrative reviews also suggest that music therapy can improve behaviour (Simpson & Keen, 2011), social responsiveness, communication, and joint attention skills (LaGasse, 2017). A more recent RCT by Sharda et al. (2018) has demonstrated that musical activities can directly influence auditory-motor connections in the brains of children on the autism spectrum, leading to gains in functional communication. On the other hand, a large multicentre RCT by Bieleninik et al. (2017), with a total of 364 child participants, indicated that improvisational music therapy (IMT; Geretsegger et al., 2015) does not affect autism symptom severity as indexed by the Autism Diagnostic Observation Schedule (ADOS; Gotham et al., 2007) social affect domain scores. Finally, in the latest review by Geretsegger et al. (2022), which updated the review of 2014, it was established that music therapy presents moderate evidence and that it could be associated with a global improvement in the severity of autism symptoms and in quality of life, with no adverse events reported after the intervention. In addition, no clear evidence of an improvement in social interaction and non-verbal or verbal communication was established immediately after the intervention. This new evidence is important as the review included more studies with larger samples, extended age groups, longer periods of intervention, inclusion of follow-up assessments, and by predominantly using validated scales measuring generalised behaviour.

The assessment in music therapy is a process which aims at knowing how the client relates to music as a way of understanding their living conditions, their problems, their potentials and resources, and what their therapeutic needs are (Bruscia, 2001). During this process it is necessary to apply some instruments in order to better understand the client who has been referred to treatment as well as delineate therapeutic goals. Moreover, the music therapist may also assess whether music therapy is an indicated approach (Ferrari & Marsimian, 2013; Smeijsters, 2005) and the client would benefit from the intervention.

In reference to assessment in the field of autism, music therapy can allow for revealing alternative and pre-verbal forms of communication as well as strengths, potentials and resources that cannot be observed in other more formal assessments (Møller et al., 2002). Given the complex nature of autism, a multidisciplinary and multilevel approach is required for assessment and intervention, aimed at addressing the diverse support needs and for improving functioning, quality of life and wellbeing (Bölte et al., 2014; Lai et al., 2020; Marquez-Garcia et al., 2021).

Based on previous music therapy assessment tools, the Musical Functional Assessment Profile (MFAP; Marsimian, 2019) creation arises from the need of a proper and suitable tool that can assess relevant aspects, offering unique information and integrating the functionality perspective of autism, which implies the development of functional, meaningful and social valid skills (Baetti, 2018; Bölte et al., 2014; Schuck et al., 2021). Also, MFAP integrates current diagnostic features from DSM-5 and a balanced view of neurodiversity (Leadbitter et al., 2021). Added to all these issues, the MFAP was created based on the need for a specific assessment tool for Argentine population on the autism spectrum, which may be based on cultural aspects and music therapy approaches currently used (Marsimian et al., 2021).

THEORETICAL BACKGROUND

Music has implications in various developmental functions such as communication and language, motor, sensory, emotional, cognitive and social functions (Pfeiffer & Zamani, 2017; Sacks, 2009; Thaut, 2018). This can provide information on different aspects of greater potentiality that the child can present, perhaps not observed through other activities or interventions. Moreover, music in the context of music therapy has become a great motivation and interaction stimulus for many children on the autism spectrum (Nordoff & Robbins, 2007) thus promoting an integrative experience that favours the deployment of its functionality.

In the context of Argentina, and considering the level of functionality, people on the autism spectrum are considered people with a disability. This view is integrated with the International Classification of Functioning, Disability and Health (IFC; World Health Organization [WHO], 2001). IFC provides a unified and consistent terminology framework to describe an individual's disability and the functional degree that it entails, including health factors and "health-related" factors, such as environment, education, job, level of social involvement and inclusion in a community. From this perspective, a person's disability is not merely conditioned by their physical and clinical characteristics, but also by the result of a dynamic interaction of a set of factors that can be modified over time according to various interventions (WHO, 2001). In line with these guidelines, Baetti (2018) proposes the Person-Centred Planning (PCP; O' Brien & O' Brien, 2000) as a global intervention criterion for the Argentinian Ambulatory Integral Model in Autism (AIM; Baetti, 2018), being the clinical context in which the MFAP tool was created and developed. The PCP considers the person as a subject with full rights, capable of setting goals and achieving those. PCP view proposes the construction of personalised supports aimed at helping people with disabilities to project their lifestyle and to approach it. According to Verdugo-Alonso and Schalock (2010), supports are the resources and strategies aimed at promoting development, education, interests and personal well-being of an individual, as well as improving individual performance. From the PCP perspective, the professionals

and the entire community would work for the removal of barriers, the planning and integration of supports, advocacy, consumer control and self-advocacy (Aznar & González-Castañón, 2019; O' Brien & O' Brien, 2000).

Likewise, PCP perspective is more closely related to the current neurodiversity paradigm (Singer, 2016) which posits that all individuals have a different brain with similar structures and, at the same time, different neurocognitive functionality; autism is considered one of these differences (Kapp, 2020; Ratazzi, 2021). In this sense, the intervention is thought around personalised supports, planned together with the person, the family and the service providers (Lai et al., 2020; Leadbitter et al., 2021), considering the community and how each context generates opportunities, accessibility and inclusion (Ratazzi, 2021; Thompson et al., 2020; Valdez, 2019), prioritising the individual's strengths, preferences and interests (Mottron, 2017; Schuck et al., 2021) and finally maximising the individual's potential (Lai et al., 2020). In relation to music therapy, Gattino (2019) proposes that on a clinical level and in research, the intervention planning should be person-centred, inquiring about the personal purposes and goals. Furthermore, Pickard et al. (2020) propose to rethink the intentions and purposes of music therapy practices in this field to maximise potentials while respecting autistic identity.

Due to the current shortage of music therapy assessment tools specifically designed for the population on the autism spectrum in the Spanish language as seen in compilations by Cripps et al. (2016) and Gattino (2021), there is a need to develop a new assessment tool. The MFAP can be usefully applied because it has some significant differences with existing ones such as the Music Therapy Diagnostic Assessment (MTDA; Oldfield, 2006), the Individual Music-Centered Assessment Profile for Neurodevelopmental Disorders (IMCAP-ND; Carpente, 2013), the Music-based Autism Diagnostics (MUSAD; Bergmann et al., 2015), the Assessment of the Quality of Relationship (AQR; Schumacher & Calvet, 2007), Nordoff Robbins Scales (Nordoff & Robbins, 1977) and the Individualized Music Therapy Assessment Profile (IMTAP; Baxter et al., 2007). These differences lie in the theoretical framework, the domains to be assessed, the types of musical tasks, the inclusion of supports and the age group to which it is directed. The MTDA and MUSAD are focused on the detection or differentiation of symptoms compatible with the diagnosis of autism, as well as observing in music therapy context the clinical characteristics compatible with these symptoms. IMCAP-ND, IMTAP, AQR and Nordoff Robbins Scales are focused on assessing different aspects so as to delineate a complete profile. IMCAP-ND and Nordoff Robbins Scales are based on a music-centred context and on IMT interventions (Geretsegger et al., 2015). AQR focuses on relational aspects but not on functional aspects. IMTAP is a complete assessment for functional issues with sensitive characteristics but not specific enough to complete an assessment profile of a person on the autism spectrum. Instead, the MFAP does not rely on the music-centred framework and in improvisational music therapy modalities in its pure way. According to Gattino (2021) it has a diagnostic and prescriptive purpose since it aims to assess child's characteristics and functioning but do not make a differential diagnosis as the MTDA or the MUSAD.

Following Waldon et al.'s (2018) assessment methods in music therapy classification, the MFAP is an observational method which may be applied at the initial assessment stage (Marsimian, 2022b). It is characterised by a structured observation in a controlled environment (Gattino, 2021) applying a set of musical tasks, to get access to the child´s functioning in different domains identifying strengths, difficulties and supports provided. Also, it implies an indirect observation (Gattino, 2021)

reviewing the records of the four initial assessment sessions. MFAP main purpose is to provide qualitative observational data that can complement other formal and non-formal assessments from other disciplines such as psychology, psychopedagogy, phonoaudiology and occupational therapy.

MFAP DEVELOPMENT

The MFAP development is primarily focused on clinical practice and is anchored on daily music therapy experience within hospital and interdisciplinary care with children on the autism spectrum (Baetti, 2018). It was created based on the need for documenting and reviewing behaviours that were observed during the first music therapy assessment sessions and the changes in these behaviours that happened over time. In addition, it served to communicate the interdisciplinary team what was observed in the music-based framework and to collaborate in goal setting and intervention planning.

It was thought starting from the proof of some assessment scales such as the Intramusical Relationships Scale (IRS; Ferrari, 2018), AQR (Schumacher & Calvet, 2007) and the Music Interaction Rating Scale (MIRS; Pavlicevic, 2007) over five years of clinical practice with children on the autism spectrum with varying ages and profiles. All three allow the assessment, from an intra and inter musical perspective (Bruscia, 1987), in vocal and instrumental modalities, but still lack information on sensory, memory or motor issues.

Similarly, the MFAP has been fundamentally thought and designed taking into account two other main tools that the author has repeatedly implemented during her clinical practice. The first is the Harper House Music Therapy Assessment developed by Wigram (1999, 2000) which proposes a detailed observation of autistic behaviours in the context of music therapy. The other one is the Autism Spectrum Inventory (IDEA; Riviere, 2001) which aims to assess twelve characteristic dimensions in people on the autism spectrum. These dimensions were articulated considering the core aspects of autism as they occur in a greater or lesser extent. IDEA's main purpose is not pointed to the differential diagnosis of autism but rather to assess the severity of the autistic traits that a person presents. When using IDEA within the interdisciplinary teamwork some aspects were not clearly detectable in music therapy. Consequently, it was thought the way to translate IDEA's dimensions to the music therapy context. In this sense, Wigram's Assessment was useful but did not have a clear systematic implementation. In addition, anticipation, imagination capacity and mentalising abilities were not contemplated in Wigram's Assessment.

From this starting point explained and for three years, the MFAP content delimitation of domains and subdomains was developed as well as the items, items sequence and their location in each domain. On the other hand, a first MFAP version was applied in clinical practice, as a way of systematising observations and collecting the first assessment data of several children on the autism spectrum referred to music therapy, considering the needs of the interdisciplinary team. After that, the literature was extensively reviewed contrasting the MFAP with existing tools and with consultation from a member of the International Music Therapy Assessment Consortium (IMTAC) (n.d.) who specialises within the field of assessment in autism.

For the following two years, some items were reviewed and changed based on the interdisciplinary team members' criteria. In addition, the tool was made known to fellow music therapists outside the health institution who gave their impressions on the matter. They suggested

some changes in some domains and subdomains, contributed to the clarification of some items, and proposed the creation of a scoring system. Subsequently began the systematisation of the procedures adjusted to a period of time, the specifications for the administration, and the assembly of the technical materials.

In 2019, there was a first introductory publication of the tool (Marsimian, 2019). During the last two years, a scoring system was created as well as a final report model to integrate all the assessment information. Also, the name of the tool has been changed since its first publication in 2019. Changing the word "protocol" to "profile" is much more appropriate given the potential reach of the tool.

For this publication, the theoretical foundations that support this tool were reviewed and expanded, explaining its bases within the neurodiversity paradigm. The next stage will be a second item revision with a group of experts, to maximise its content validity, prior to the tool validity and reliability process.

Based on Gattino (2021) principles for creating assessment tools, the following figure 1 shows a summary of the MFAP development process.
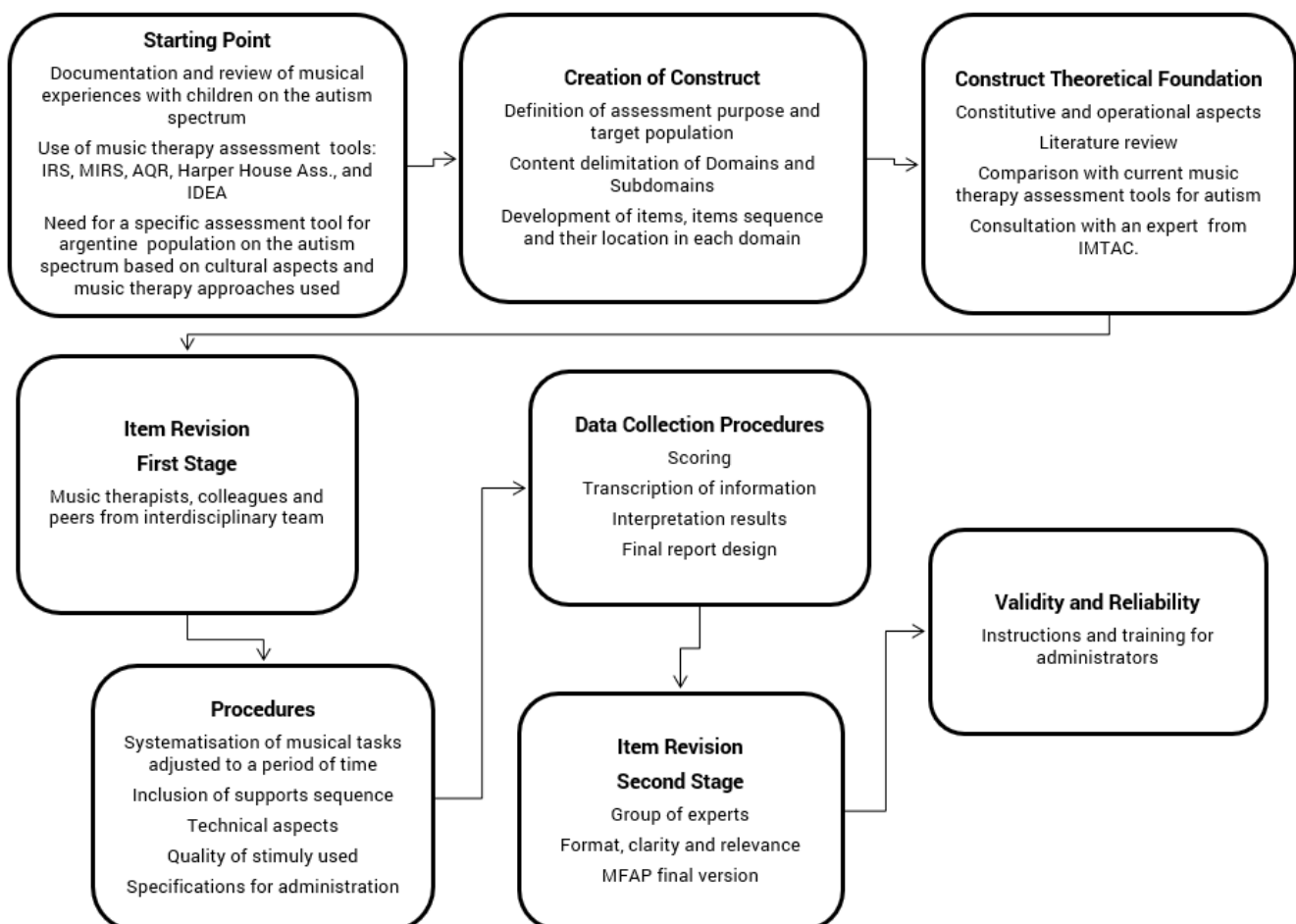

Figure 1: Summary of MFAP development

MFAP DESIGN AND STRUCTURE

The MFAP (Marsimian, 2022a) is structured in domains and subdomains which contain different functions to assess. It has an Intervention Guideline based on observations to make, and behaviours to target and elicit. Also, it has a Session Plan to follow the procedure along the assessment and finally, a Data Grid with the items to assess and to perform the scoring.

Domains and subdomains design

The first four MFAP's domains: (1) social interaction, (2) communication and language, (3) flexibility and anticipation, and (4) symbolisation are assessed and structured by the IDEA. Based on the IDEA, MFAP's social interaction and communication and language domains currently make up the first of the two current diagnostic criteria for autism; that is, the presence of persistent social interaction and communication deficits (Autism Spectrum Disorders, according to the DSM-5). The second diagnostic criterion has to do with restricted or repetitive interests or activities. This criterion is related to what Riviere (1998) proposes for flexibility and anticipation, and is assessed in this MFAP's domain.

The MFAP social interaction domain assesses joint actions and joint attention, and social interaction behaviours such as initiating and turn taking. It also assesses mentalising abilities linked to the Theory of Mind (Baron-Cohen et al., 1985; Baron-Cohen et al., 2000), such as requesting or showing an interesting object to the child, requesting for help, or the repetition of a musical activity. Lastly, it assesses emotional skills such as affect regulation, emotional awareness, and verbal expression about emotions. To assess this domain, musical experiences are used to foster engagement and motivation by singing or listening to preferable and familiar songs, improvising on the actions of the child and following the child´s lead (Geretsegger et al., 2015). Likewise, as LaGasse (2018) states, giving pauses as well as playing fast and playing slow can be part of this. In addition, allowing the exploration of different musical instruments and objects with colours, shapes and textures can foster engagement and motivation when assessing this domain.

The MFAP communication and language domain assesses the communicative function, that is, the presence of communicative behaviours such as the adult instrumental use of gestures or words to request, or the possibility to declare or comment on a shared experience. Also, expressive language which may be absent, functionally very limited or with a deceptive fluency (Riviere, 2001). Regarding receptive language, the MFAP assesses response to name, understanding of simple and complex commands, etc. Several studies in recent years have revealed significant information regarding the use of music as an intervention for the stimulation and development of language and communication in autism. Following Vaiouli and Andreou (2018), engagement and preverbal communication aspects were shown in the Finnigan and Starr (2010) and Paul et al. (2015) studies evidencing how through the use of songs, eye contact, gestures, social avoidance, imitation and turn taking behaviours are promoted. In regards speech production Lim (2010) and Lim and Draper (2011) studies indicated that children on the autism spectrum could improve the production of functional language as well as the understanding the information anchored in music, allowing an improvement in learning. Related to receptive language skills, Buday (1995) and Simpson and Keen (2010) studies compared the use of pre-composed songs versus speech condition to learn different target words and signs concluding

that songs were found to enhance receptive language skills. On the other hand, functional brain mechanisms underlying the processing of speech could be increased from the use of songs and therefore provide scaffolding for language in people on the autism spectrum (Lai et al., 2012; Sharda et al., 2015). To assess the communication and language domain, the MFAP procedure includes musical activities such as singing and pausing a pleasurable song, completing a song lyric, answering a sung question, understanding sung orders, etc.

The third MFAP domain, flexibility and anticipation, assesses flexibility, anticipation, planning, inhibitory control and working memory. It implies the assessment of the adaptation or opposition to environmental changes, transitioning and anticipating activities and routines. Also, what is called sense of activity which is for example, the presence of repetitive and restrictive behaviours, functional activities or complex activities with a purpose. This domain is closely linked to the executive function which has been investigated as a function with wide challenges in autism (Hill, 2004; Ozonoff, 1997). This domain is assessed from musical activities such as the tolerance for listening to songs, anticipating a musical activity or a session sequence, planning a musical activity, tolerance to change in a song content, following and inhibiting actions according to musical tasks, etc.

The MFAP symbolisation domain aims to assess the level of imitation from the most simple and evoked motor imitation to complex imitation based on internal models. That is, the ability to imitate in an intersubjective and spontaneous way, with subtle variations which are based on early patterns, resulting from affective attunement. In addition, this domain includes the assessment of imagination and fiction patterns, that is, if the child presents functional or symbolic play. Also, it assesses semiotic suspension mechanisms, which imply suspending actions or real properties of things to create gestures or metaphors. This domain is linked to the first autism diagnostic criterion (ASD, DSM-5) more specifically with difficulties in sharing an imaginative play. This domain is assessed from musical activities such as the imitation of gestures, movements and rhythmic and melodic patterns, the functional use of musical instruments and objects, the use of instruments to represent another object, the possibility of simulating daily life activities in the context of a song, etc.

The other three MFAP domains are memory, motor and sensory functions. The MFAP seeks to assess these domains that may also be affected or be present in different ways within autism according to several research studies which will be explained below.

Memory functions are important to be assessed since they may be increased for certain stimuli and interests. As Happé (2018) and Happé and Frith (2006) state, this aspect may be part of a different cognitive style. One of the memory functions that could be increased is tonal or musical memory (Heaton, 2003; Stanutz, et al., 2014), evidencing in some cases absolute pitch (Mottron et al., 1999), in addition to superior timbre processing skills (Heaton, 2009). The MFAP memory domain includes the assessment of implicit memory, musical memory, semantic memory, epic memory and autobiographical memory. For these functions, musical tasks include listening and recognising different sounds, songs worked on in the assessment, associating an event to a song, etc.

Regarding motor functions, Kanner (1943) previously described an unusual way of walking in children on the autism spectrum despite the fact that, to date, motor aspects are not part of the diagnostic criteria. However, difficulties in motor development milestones such as the age of crawling or gait can be predictive factors for autism. Likewise, authors have described difficulties in manual motor skills such as grasping and exploring objects (Sacrey et al., 2014), postural instability and delay

in posture development (Dawson et al., 2018), muscle tone and poor motor imitation (Rogers et al., 2003; Serdarevic et al., 2017) and delay in beginning of walking (Reindal et al., 2020). Finally, Donellan et al. (2013) and Thaut and Braun Janzen (2018) argue the importance of rethinking and assessing motor functions because in autism may affect other functions such as socio-emotional those of communication and behavioural ones. The MFAP motor domain assesses motor functions including tone and postural control, fine, gross and oral motor skills and motor praxis. Musical tasks include coordination of gait with instrumental performance, inhibition and action of movement according to certain tasks, using steady and predictable rhythms to perform a musical sequence, etc.

Regarding the MFAP sensory domain, the presence of unusual sensory interests is currently considered within the second main diagnostic criteria of restricted and repetitive behaviours in DSM-5. In the past decades they were already considered relevant for autism according to several authors within (Berger, 2002) and outside (Ayres, 1972; Dunn, 1997) the field of music therapy. Ayres (1972) defines sensory integration as the sensory information organisation for its use. It is a neurological process that allows making sense of the world, by receiving, registering, modulating, organising and interpreting the information that reaches our brain through our senses. In some cases, either by excess or by defect, sensory information is not properly processed and, consequently, the executive answer is incorrect. It is proposed that some behavioural and cognitive difficulties observed in autism could be due to this (Baker et al., 2008). According to several studies (Comín, 2015; Tomchek & Dunn, 2007) it is estimated that between 40 and 95% of people on the autism spectrum present a difficulty or disorder at the sensory level, which can manifest itself in one or more modalities, including visual, auditory, olfactory, gustatory, tactile, vestibular, proprioceptive. Recent research proposes three primary patterns of sensory processing: hyper-responsivity, hypo-responsivity and sensory-seeking behaviours (Dunn, 1997), although they do not occur in a pure way, but rather mixed profiles are found (Wakeford, 2018). As music is a multisensory experience capable of involving several senses in an active experience simultaneously (Srinivasan & Bhat, 2013), it is possible to be used intentionally to improve perception and sensory modulation in this population. The music therapist should know and assess core sensory features and sound-musical processing characteristics and work on the qualities of musical experiences, which can support sensory processing and modulation, so as to improve learning and development in daily life (Hernandez-Ruiz et al., 2022; Wakeford, 2018). There for, as stated by LaGasse (2018), it is essential to observe the child in various contexts and consider the individual sensory profile and needs before planning social or cognitive goals. The MFAP assesses sensory regulation, as well as the auditory, tactile, proprioceptive, vestibular and visual systems and also the presence of sensory hyper and hypo responses and seeking behaviours. The procedure implies different musical experiences such as active (improvising or singing) and receptive (listening) ones and using different musical instruments (texture, weight, colour, shape) to observe the sensory systems involved. The MFAP leaves out the gustatory and olfactory systems due to the difficulty of assessing these aspects in the music-based framework. As a summary, Table 1 shows the MFAP domains and subdomains.

Domains	Subdomains (functions)
1. Social interaction	Joint Reference
	Social Relationships
	Intersubjective and Mentalising Abilities
	Emotional Skills
2. Communication and language	Communicative Function
	Expressive Language
	Receptive Language
3. Flexibility and anticipation	Flexibility
	Anticipation and Planning
	Working Memory
	Sense of Activity
4. Symbolisation	Imitation
	Imagination and Fiction
	Suspension
5. Memory functions	Implicit Memory
	Musical Memory
	Semantic Memory
	Epic Memory
	Autobiographical Memory
6. Motor functions	Tone and Postural Control
	Gross Motor Skills
	Oral Motor Skills
	Fine Motor Skills
	Motor Planning
7. Sensory functions	Sensory Regulation
	Auditory Perception
	Auditory Processing
	Auditory Recognition
	Tactile
	Proprioceptive
	Vestibular
	Visual

Table 1: The MFAP domains and subdomains

Administration stages and procedure design

The MFAP is designed in four administration stages, taking four hours in total. This includes two hours for the procedure administration, divided into four half-hour assessment sessions, and two hours for reviewing records from them. For the Preparation Stage, based on Music in Everyday Life Questionnaire (MEL; Gottfried et al., 2018), a set of open-ended questions for caregivers were drafted to collect the child's musical information to include these stimuli in the assessment procedure. For analysis purposes, the sessions will be audio-visually recorded. Prior to assessment, informed consent will be requested from the child's caregivers. The instrumental set and materials will be

prepared and placed in the room. During the first stage, the music therapist will begin to bond and interact with the child and work on adaptation to the setting. The musical tasks corresponding to this stage are designed with the aim of including child's musical interests, as well as fostering motivation and interaction. During the second stage the musical tasks are characterised with a more structured guideline. The music therapist has already been recognised by the child as well as the environment and musical instruments that are used. Table 2 shows the four administration stages.

| Preparation stage | 1st assessment stage | 2nd assessment stage | Data collection stage |
| | *Intervention guideline* | | |
	Session plan		
Questionnaire for caregivers Informed consent for audio visual records Instrumental Set / Materials	Session 1-Session 2 Assessment of Social Interaction, Communication and Language, Flexibility and Anticipation Domains	Session 3-Session 4 Assessment of Symbolisation, Memory, Motor and Sensory Domains	Review of audio-visual records Data grid Scoring Final report (treatment goals and supports outline)

Table 2: The MFAP administration stages

The MFAP procedure (Marsimian, 2022a) is comprised of an Intervention Guideline and a Session Plan. The Intervention Guideline is a set of intervention goals to observe behaviours or to elicit or target behaviours for assessing functions in each domain. The Session Plan is a series of musical tasks along the four sessions to assess the seven MFAP domains. Along the procedure, musical tasks are both active and receptive, such as singing pre-composed and recreated songs, performing musical instruments with various tasks, listening to pre-recorded music, performing different sound games, etc. They were thought and articulated considering promoting intersubjective behaviours, awakening interest and motivation through a natural interaction (Dawson & Rogers, 2010), assessing the functional profile in different domains and providing guidelines with more and less structure to observe the child's functioning in these two variants. Also, they were organised within a logical sequence, from least to most complex tasks, in accordance with a developmental perspective (Baetti, 2018; Valdez, 2019) and regarding the acquisition of musical skills (Bruscia, 2012; Ferrari, 2013). Finally, a hierarchical sequence of supports was included based on the prompting sequence proposed by Neitzel and Wolery (2009), which implies the use of visual, verbal, modelling and physical cues. The MFAP uses least-to-most strategy to ensure that the child successfully responds to the task and to add support when is needed.

According to the MFAP's Session Plan, each assessment session presents 8-10 musical tasks. In turn, for each musical task the music therapist will assess functions from more than one domain. This was thought to optimise the total MFAP's assessment time. The MFAP's practical application for Social Interaction Domain can be seen in the Appendix.

DATA INTERPRETATION AND FINAL REPORT

Once the scoring is finished, the music therapist will be able to assess the domains and subdomains of strength and difficulty. The music therapist may observe that strengths correspond to a good performance in almost all the musical tasks corresponding to the domain. Perhaps a greater focus and significant eye gaze as well as greater interest and motivation for some activities are observed, or that even the child asks to repeat a musical activity. In these circumstances it could be said that the domain functions assessed are present and consistent. The difficulties may be seen when, despite several attempts and providing supports, the child fails to complete the musical tasks corresponding to the domain. In this case it could be said that the function assessed is very inconsistent or cannot be seen.

Finally, the music therapist will integrate the acquired knowledge to set person-centred goals and prepare the MFAP final report. Treatment goals will be arranged in relation to: (1) the child's chronological age, (2) the functional profile in relation to potentials, strengths and difficulties assessed in all the domains (3) the child's family, environmental, school and socialisation context, (4) the sound-musical history and musical interests, (5) musical engagement activities, attention to detail and special interests assessed and (6) the supports provided. The MFAP final report has different purposes. It may be considered as a first music therapy report with relevant data about the bond laid with the music therapist and child's performance for the different domains in the offered music-based framework. Moreover, it can be shared with other professionals for interpretation data and to collaborate in interdisciplinary goal setting and future music therapy intervention planning.

DISCUSSION

The MFAP aims to assess seven domains, with their respective functions, organised according to 128 items that consider the main characteristics in autism. The items are scored by reviewing audio-visual records from the four initial assessment sessions.

The MFAP is designed to provide concrete, replicable and simple musical activities and tasks, such as singing or listening pre-composed and recreated songs, edited music or sounds, so that any music therapist, beyond their music therapy theoretical framework, can understand and implement. Although the MFAP's first assessment stage shares some guidelines with the IMT model, such as following child's musical interests, promoting the exchange and motivation through the musical experience (Geretsegger et al., 2015), the musical tasks are not purely improvisational. Furthermore, based on Marsimian et al. (2021), it is not a tradition for music therapists in Argentina to work from these modalities in a pure way. Rather, the approaches are hybrid, taking psychodynamic, cognitive-behavioural and/or neurological bases, and also frequently including other techniques such as auditory and receptive ones.

One of the challenges regarding the MFAP procedure is that includes songs and music interesting for the child. This could represent difficulties in terms of replicability for further research since it implies certain variability in the stimuli. More specifications for selecting songs and stimulus need to be included in the manual procedure.

Regarding the MFAP's length and duration, it can be complex because of economic and temporal aspects. However, the procedure and the sequence of supports were designed to provide the child greater chances of responding so as to visualise potentials and possibilities. This aspect supports the idea of Wigram (1999), who states that the music therapy assessment may avoid children's experience of failure as may happen in formal cognitive psychology assessments which imply tasks that become successively more difficult. This also seeks to alleviate the bias (Gattino, 2021) in terms of child's performance, cognitive processing, motivation or fatigue and the fact that a most established bond with the therapist may allow greater demands. LaGasse (2018) states the importance of fostering engagement through musical and familiar materials in the beginning of an assessment process to later work on specific therapeutic goals. Riviere (1997) has pointed out the importance of giving more time in the assessment process, providing real interactive contexts and without haste and anxiety.

From a functional point of view, the MFAP has many similarities with IMTAP. However, the MFAP proposes to give a complete functional profile, assessing with the construct in full, without choosing most relevant domains, something that is proposed in IMTAP. Being a specific tool for autism all the domains are organised around this issue. For the same reason, the domains have a lower number of items compared to IMTAP. In IMTAP it is assumed that the strengths of the child are those domains not assessed, focusing the assessment on the domains where the therapist identifies difficulties from the intake sheet (Baxter et al., 2007). The MFAP assesses all its domains and observe the strengths and challenges from the musical guidelines provided. Also, the IMTAP has a specific musical domain that must be included in all kinds of assessments. This could be due to the fact that IMTAP does not originally have a protocol of pre-established musical activities. In the MFAP, musical experiences are the core of the assessment since it is proposed that music allows observing the different functions and motivates and interests the child in such a way to become meaningfully involved in activities.

The MFAP assesses basic functions visualising strengths and task´s accessibility, considering profiles with great difficulties including children with attention difficulties, absence of expressive language, slow cognitive processing and little social interaction. However, it may present limitations for children with greater possibilities in the musical aspects. Therefore, the development of a second version of MFAP will provide more complex guidelines to address this.

MFAP lines up with a balanced view of neurodiversity (Leadbitter et al., 2021), assessing and understanding the disadvantages of some neurological differences as well as the strengths inherent in cognitive diversity (Chapman, 2021). The MFAP may help approach the child´s strengths (Mottron, 2017) and collaborate in the planning of a strength-based approach (Pickard et al., 2020; Quintin, 2019) for music therapy.

The MFAP seeks to assess functions which allow collaborating in the planning of future interventions aligned with the strengths and the individual needs of the child (Marquez-García, 2021) not only based on deficits, but increasing the activities that produce natural learning, engagement and motivation (Schuck et al., 2021), social connection and autonomy (Leadbitter et al., 2021), trying to maximise the child's potential. It is the case of the assessment of communicative and language functions, which, for example, may allow in planning future intervention supporting augmentative and alternative communication interventions (Lai et al., 2020) with an analogue or electronic device (Kasari et al., 2014) and not by simply stimulating speech. From the assessment of the emotional and sensorial functions, the MFAP can collaborate in planning interventions that provide opportunities for

physical, sensory and emotional regulation (LaGasse, 2018) aiming to strengthen functional skills (Schuck et., 2021), adaptive behaviour and learning.

In line with some authors like Larose et al. (2021), who argue that it is essential to create tools that document the child's interests to think about their possible use on adaptive functions, the MFAP assesses qualitative aspects such as the level of engagement and motivation and musical interests that may appear during the procedure. A child with a privileged musical memory or who has a special interest for music may perform well on the MFAP assessment. This information may be helpful for including music into the child's routines, and as stated by Mottron (2017), to allow natural learning abilities, and helping to reduce problematic behaviours.

The MFAP proposes a procedure as well as a guide on how to gradually include supports, considering the child's response level. This last aspect is considered in IMCAP-ND but only in one of its three structural scales. When and how to provide supports is not clearly explicit. For the MFAP is fundamental to record types and amount of supports since the music therapist will probably use them as scaffolding for treatment. For example, if it was assessed that by giving visual aids the child responded appropriately, the music therapist can propose this to the interdisciplinary team, so that all those involved use this type of support. Another example would be providing visual support during the procedure by drawing or writing the content of a song. This could benefit non-verbal preschool children who access written language earlier than the oral one (Mottron, 2017). If it is assessed that the child benefits from a sung task (Lai et al., 2012; Sharda et al., 2015) within the MFAP procedure, this strategy can be used by a speech therapist, a psychologist or a teacher for different learning purposes. Comprehensively, the MFAP may give us an idea of the necessary supports that the child requires and collaborate in the future planning for a person environment fit (Lai et al., 2020).

Following guidelines from the neurodiversity paradigm and the consideration of autism, the MFAP does not seek to assess autistic traits in a music-based framework so as to treat them but rather knowing the child's autism profile and planning adequate supports and intervention strategies on developmentally and functionally relevant, adaptive and useful skills (Schuck et al., 2021), with the ultimate aim of providing quality of life and well-being.

Regarding the information collected and since the MFAP assessment sessions are recorded, it points to a greater objectivity along the process. The MFAP does not produce a global score since it provides a "map" of developing areas of functioning indicating which task and by which support the child was able to perform successfully. In addition, scoring allows a qualitative part in which to mark engagement and motivation, attention to detail and special interest in any musical activity during the procedure. The resulting MFAP final report is a profile of the child's performance. This report may be relevant for other clinicians as the language used is not limited to the specific music therapy context. Items are not formulated in parameters or musical elements as it happens in the music-centred or improvisational music therapy instruments. Rather they are formulated in relation to functions. This is an advantage for the music therapist who may not need to translate the information obtained.

Furthermore, it is stated that the MFAP may be applied by qualified music therapists with at least one year of clinical experience in autism. This may help to guarantee the expertise in the procedure application. Also, the scoring and the delineation of conclusions in the final report imply power of synthesis and content relationship.

Finally, the MFAP can fill the gap in observational assessment tools written in Spanish, avoiding translations and trans-cultural adaptations of other tools, the vast majority written in the English language.

LIMITATIONS AND FUTURE DIRECTIONS

Considering current guidelines in relation to the development of tools and the planning of interventions and resources in the field of autism in a participatory way (Geretsegger et al., 2022; Lai et al., 2020; Leadbitter et al., 2021), it may be relevant to conduct a survey with parents of children on the autism spectrum and also people on the autism spectrum to assess the relevance of the items and procedures included in the MFAP.

Regarding the tool development and from a psychometric point of view, the MFAP is at an initial level. It is aimed in the near future for its validation process as well as testing its reliability. There is a need to complete the refinement of the items for some domains. For finishing its content validity, a last round consultation with a group of experts formed by fellow music therapists working on this population will be carried out. The next step would be assessing its construct validity by applying a factor analysis, so as to test how far the MFAP items are related to each other and can measure the construct described. So as to obtain convergent validity evidence it could be useful to compare the MFAP construct with Sensory Profile (Dunn, 2016) and IMTAP measures. Considering reliability, it would be relevant to test inter-rater measures, so as to test items consistency between different observers which could be music therapists and also therapists from other areas.

Together these processes may help in outlining better, suitable and perhaps shorter administration procedures, describing operational definitions for a better construct understanding and improving the scoring system and interpretation results. Furthermore, it may be relevant to establish a training program for administrators. An additional future project will be to develop an app that will generate the MFAP final report based on the MFAP assessment, designed in collaboration with an adult on the autism spectrum.

CONCLUSION

The use of the MFAP may help music therapists to assess in a structured, objective and integral way, which may enrich the knowledge and understanding of the child on the autism spectrum. Also, it may allow planning appropriate music therapy interventions as well as person-centred goals that integrate current perspectives in autism and neurodiversity. In terms of validity and reliability, further studies and research are needed to corroborate the tool's accuracy.

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APPENDIX

Musical Functional Assessment Profile in Autism
MFAP

Intervention Guideline

Along the whole MFAP procedure the music therapist may consider the following:

1. Include songs suggested by caregivers in the initial questionnaire.
2. Validate the child´s interests for songs, musical instruments and sound objects offered fostering engagement and motivation during the musical experience.
3. Continue with the next musical task corresponding to each plan session if sufficient interest is not obtained or the child cannot complete it.
4. Use the same selected musical stimuli (song, edited music) to propose the different tasks in the procedure, if these call the child's attention.

MFAP - SOCIAL INTERACTION DOMAIN	
SUDOMAINS (Functions)	**INTERVENTION GOALS**
Joint Reference	• Sing a Hello Song. Observe eye contact and spontaneous gaze. • Play and share harmonic instrument (guitar, piano). Observe joint actions and joint attention through its use. • Interesting musical instrument out of reach. Observe if the child looks at it and looks at the music therapist (joint attention). • Observe joint attention to the musical experiences and to the music therapist. • Create a playful situation such as "the guitar hid." Observe joint concern.
Social Relationships	• Sing a familiar song. Observe closeness to the music therapist. • Name the child during the singing of a song. Observe awareness in being named. • Listen to a familiar song. Observe child's reaction. • Observe interest towards the music therapist and the musical proposals. • Imitate some spontaneous action of the child in the context of interaction. Observe awareness in being imitated. • Offer a sound object to share musical experience. Observe initiating behaviours and turn taking during a circular musical activity. • Propose a musical task with musical instruments by turn taking. Observe reciprocal interaction.
Intersubjective and Mentalising Abilities	• Show positive affect to the child, smile and exaggerate facial expressions. Observe child's reaction. • Provide and show how to play a musical instrument to the child, for example a xylophone. Observe if the child gives it or shows it to the music therapist. • Leave a musical instrument out of reach and name it: "Look at the…" Observe pointing behaviour. • Observe if the child asks for the repetition of a musical activity. • Use sound elements that require the therapist's help to be activated. Encourage the request for help. • Leave a space for a key word during singing a familiar song. Observe child´s reaction.
Emotional Skills	• Observe child´s emotional reactions by singing or listening familiar songs. • Observe emotional attunement during the musical interaction with the music therapist. • Listen to three fragments of songs that express three different emotions. Observe if the child identifies emotions listened in music. • Share emotions verbally in relation to the sensations produced by the musical stimulus. Observe child's verbal expression about ones' own emotions. • Suggest improvising three different emotional states with musical instruments. Observe emotional awareness.

Session Plan

MFAP – SOCIAL INTERACTION DOMAIN						
Musical experience	**Musical task**	**Suggested song**	**Duration**	**Instrumental set materials**	**Function to assess (subdomains)**	**Support sequence**
1. Welcoming Song	Wait-Observe if the child approaches the harmonic instrument Sing "Hello" song with harmonic accompaniment looking at the child in the eye at a distance of one meter.	"Hello, for you and for me". Use the same welcoming song chosen for the entire procedure.	2.00 min	Harmonic instrument (guitar/piano) Voice	Joint reference Social relationships	Session 1: Unsupported Session 2: Verbal/ Visual support
2. Singing a familiar song	Sing a familiar song with harmonic accompaniment facing the child. Repeat the melody of the same selected song.	Select family song from the caregiver's questionnaire	2.00 min	Harmonic instrument (guitar/piano) Voice	Joint reference Social relationships Emotional skills	Session 1: Unsupported Session 2: Verbal/ Visual support
3. Singing a familiar song introducing silences for key words **Naming the child in the song**	Sing a familiar song with harmonic accompaniment facing the child at a distance of one and a half meters. Introduce pauses in the song (the pause instead of a key word in the song) and observe the child's reaction. Take two pauses during the song. On a second opportunity, name the child as part of the lyrics of the song.	Select family song from the caregiver's questionnaire	3.00 min	Harmonic instrument (guitar/piano) Voice	Intersubjective and mentalising abilities Social relationships	Session 1: Unsupported Session 2: Verbal/ Visual support

Data collection stage

Data Grid

MFAP – SOCIAL INTERACTION DOMAIN					
SUBDOMAINS (Functions)	**ITEM**	**SCORE**	Engagement Motivation	Attention to detail	Special Interest
Joint Reference	1. Joint attention in greeting song				
	2. Joint action on instrument/sound object without significant joint gaze				
	3. Joint attention to a musical instrument out of reach and to the music therapist				
	4. Joint attention towards the music therapist and the musical activities proposed				
	5. Joint concern				
	Raw Score				
	Possible Score	25			
	% Subdomain				
Social Relationships	6. Closeness to the therapist for own motivation during the musical activity				
	7. Response to name (gaze, gesture, sound)				
	8. Awareness in listening of a familiar song				
	9. Interest towards the music therapist and the sound object that provides for exchange				
	10. Awareness towards the imitation of a child's action				
	11. Initiating behaviour during musical circular experience				
	12. Turn taking during musical experience				
	Raw Score				
	Possible Score	35			
	% Subdomain				
Intersubjective and Mentalising Abilities	13. Attention to the music therapist's emotional expression				
	14. Shows an object to the music therapist by sharing gaze, smiling or vocalising				
	15. Points at interesting object out of reach				
	16. Request (verbally or non-verbally) for the repetition of a musical activity				
	17. Request for help (verbally or non-verbally)				
	18. Response to the listening of a familiar song with pauses in key words				
	Raw Score				
	Possible Score	30			
	% Subdomain				
Emotional Skills	19. Emotional reaction to music and songs				
	20. Emotional attunement during musical experience				
	21. Identification of emotions (joy, sadness, anger) in music				
	22. Verbal expression about felt emotions				
	23. Exploring emotional states with musical instruments				
	Raw Score				
	Possible Score	25			
	% Subdomain				
TOTAL DOMAIN	RAW SCORE				
	POSSIBLE SCORE	115			
	% DOMAIN				

Item reference

MFAP - SOCIAL INTERACTION DOMAIN
ITEM- Assessed during the whole MFAP procedure
ITEM- Assessed during MFAP session 1 and 2

Scoring procedure

Once the four assessment sessions have been carried out with the child, the seven MFAP domains are assessed.

1. The audiovisual records of the sessions are reviewed.
2. The scoring is performed on the Data Grid.
3. Each item will be scored by observing the child's behaviour according to the moment in which it appears during the procedure.
4. Colour references will be used. Items coloured in light grey are observed and scored along the four assessment sessions. Items coloured in dark grey are observed and scored in a specific assessment session (session 1, 2 3 and/ or 4).
5. Follow the Scoring Scale to assign the score for each item. The MFAP items are scored trough a five-point Likert scale. The scoring implies three integrated measures, the frequency of response, the level of support provided, and the amount of support provided. The highest score (5) corresponds to a very high performance, the lowest score (0) corresponds to a poorer performance.
6. The scoring is obtained from the manual sum of the item's scores for each subdomain obtaining a raw score. This raw score is divided by a number of a preset score in each subdomain.
7. Consider that there are some items which imply a reverse grading scale. These item's raw scores are subtracted from the subdomain raw score.
8. For the total domain score the raw scores for each subdomain are added and divided by the preset score for each domain. This gives as a result the performance percentage for each domain.
9. Finally, when assessing each domain it will be marked with a cross if any musical activity produced greater engagement and motivation in the child. It will also be marked if the child showed attention to detail and/ or a special interest for any musical activity/item used during the procedure.

Scoring scale

	PRESENT AND CONSISTENT FUNCTION		PRESENT AND INCONSISTENT FUNCTION			NOT SEEN FUNCTION
FREQUENCY OF RESPONSE	ALWAYS (75-100%)	FRECUENTLY (50-75%)	SOMETIMES (25-50%)		RARELY (0-25%)	NEVER (0%)
TYPE OF SUPPORT	NONE	VERBAL/ VISUAL	VERBAL/ VISUAL	PHYSICAL	PHYSICAL	VERBAL/ VISUAL & PHYSICAL
AMMOUNT OF SUPPORT	SUPPORT IS NOT NECESSARY	SOME SUPPORT	MUCH SUPPORT	MUCH SUPPORT	MUCH SUPPORT	NO SUPPORT IS ENOUGH
SCORE	5	4	3	2	1	0

Ελληνική περίληψη | Greek abstract

Η ανάπτυξη και ο σχεδιασμός του Μουσικού Λειτουργικού Προφίλ Αξιολόγησης (ΜΛΠΑ) στον αυτισμό

Nuria Marsimian

ΠΕΡΙΛΗΨΗ

Το Μουσικό Λειτουργικό Προφίλ Αξιολόγησης (ΜΛΠΑ) στον αυτισμό έχει αναπτυχθεί ως ένα ειδικό εργαλείο αξιολόγησης παρατήρησης στη μουσικοθεραπεία για να παρέχει ποιοτικές και περιγραφικές πληροφορίες σχετικά με τη λειτουργικότητα του παιδιού στο αυτιστικό φάσμα. Το προφίλ αυτό επιτρέπει την αξιολόγηση επτά αναπτυξιακών λειτουργιών – κοινωνική αλληλεπίδραση, επικοινωνία και γλώσσα, ευελιξία και προβλεψιμότητα, συμβολοποίηση, λειτουργίες μνήμης, κινητικές και αισθητηριακές λειτουργίες – προσπαθώντας να αξιολογήσει τα δυνατά σημεία, τις προκλήσεις, τις δυσκολίες και την υποστήριξη που παρέχεται, λαμβάνοντας υπόψη τα τωρινά διαγνωστικά κριτήρια του αυτισμού και τα ζητήματα που αφορούν τη θεραπεία ιδωμένα από τη σκοπιά της νευροδιαφορετικότητας. Το προφίλ μπορεί επίσης να επιτρέψει τον καθορισμό των μουσικοθεραπευτικών στόχων και τον σχεδιασμό της παρέμβασης βάσει μιας προσωποκεντρικής και βασισμένης στα δυνατά σημεία προσέγγισης. Το άρθρο παρουσιάζει την ανάπτυξη και τον σχεδιασμό του εργαλείου αξιολόγησης και συζητούνται τα πρακτικά πλεονεκτήματα και μειονεκτήματά του. Η διεξαγωγή περαιτέρω ερευνητικών μελετών κρίνεται απαραίτητη για να καθοριστεί το ακριβές πεδίο εφαρμογής και η ακρίβεια αυτού του εργαλείου. Σκιαγράφονται επίσης μελλοντικές κατευθύνσεις για τη διαδικασία διασφάλισης της εγκυρότητας και της αξιοπιστίας του εργαλείου.

ΛΕΞΕΙΣ ΚΛΕΙΔΙΑ

μουσικοθεραπεία, αυτισμός, παρατηρητική αξιολόγηση, λειτουργικό προφίλ, υποστήριξη, νευροδιαφορετικότητα, προσωποκεντρικό, προσέγγιση βασισμένη στα δυνατά σημεία