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A music therapy group intervention in an Italian prison: The subjective impact of a pilot program

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ABSTRACT

Purpose: Evidence showed that music therapy may reduce mental health problems in different clinical settings, including prison. Compared to international experiences, music therapy experiences in Italian prisons are poor. The aim of the current article was to describe a 6-month period of group music therapy activities within the Parma Penitentiary Institute (PPI).
Results: Different music therapy experiences (improvisation, song listening, song performance) were reported, culminating in the creation of a new song as a spontaneous final product of the group activity. We also commented on thoughts and emotions experienced by group participants and the music therapist during this creative music process. The music therapy group included 6 PPI adult male prisoners with mental health problems. The lyrics of the song ("I ask for forgiveness") were also reported.
Conclusions: A song creation process should be implemented together with other music therapy activities in Italian prisons, especially for its high creative value and its intrinsic ability in favoring the expression of prisoners' subjective emotional, social and cognitive experiences.

Introduction

In 2023, over 55,000 inmates were incarcerated in Italy, at an annual cost of approximately 3 billion euros. (Lorenzi, 2022). *Mental disorders* are common in this population (Pelizza & Pupo, 2024). Recent epidemiological findings showed that about 15 % of all Italian inmates had at least one psychiatric illness requiring treatment (e.g., anxiety disorder, depression, and psychosis) (Pelizza et al., 2021a). Moreover, a higher proportion (30 %) of Italian prisoners with substance use disorder was also reported (Pelizza et al., 2021b).

Despite these significant prevalence rates of mental health problems, Italian prisoners often receive inadequate mental health interventions (Pelizza et al., 2022a). Specifically, they are more frequently treated with medications rather than any type of psychosocial/psychological counseling or intervention (Pelizza et al., 2022b).

Forensic music therapy

Music therapy showed to improve psychosocial functioning and psychiatric symptoms in patients with a wide range of mental health disorders (e.g., depression, substance use disorder, psychosis), also in randomized controlled trials (Albornoz, 2011; Erkkila et al., 2011; Mossler et al., 2011). However, evidence on beneficial effects of music therapy in forensic settings is still poor, especially in Italy (Gold et al., 2014). In this regard, prison setting offers physical and emotional challenges that are very different from extramural clinical environments (Gold et al., 2011). Indeed, prisoners differ from the general population in terms of attachment styles, personality traits, and ability in emotion regulation, with negative impact on treatment response (Hansen et al., 2011). Furthermore, the context of the prison might negatively influence the context of music therapy (Chen & Hannibal, 2019), changing participants' self-perception (Odell-Miller et al., 2021).

Given the beneficial effects of music therapy in "non-incarcerated" patients with mental health problems (especially in those who are not

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responsive to traditional psychotherapy and with low treatment motivation) (Gold et al., 2013), music therapy has been proposed as a promising treatment option for prisoners. Specifically, it has been initially introduced to help cope with the stress and trauma of incarceration. Despite small sample sizes, the absence of a control condition without music therapy, and the utilization of non-standardized outcome parameters exclusively measuring immediate effects after the intervention session, early studies suggested that music therapy is feasible, well-accepted, and engaging for forensic populations (Johnson, 1981; Thaut, 1989). More recently, music therapy activities offered in some international prison settings (such as free improvisation, cognitive-behavioral modules integrated into music therapy techniques, and songwriting process) showed to be effective in reducing stress and anxiety, in improving social and emotional skills, in providing vocational opportunities, and in inducing primary benefits on expressing feelings, mind-body integration, music identity exploration, and anger management (Dickinson et al., 2012; Gold et al., 2021; Hakvoort et al., 2013; Hjornevik & Waage, 2019; Kaser & Foxx, 2022; Segall & Yinger, 2022).

Furthermore, qualitative research pointed out other potential beneficial effects of music therapy for prisoners. In this regard, it was reported that music activities may help prisoners to build connections with the outside world, to get in touch with their personal emotions, and to find a new communicative way to better express their suffering and to atone for their sins (Pelizza & Maccaferri, 2010; Tuastad & O'Grady, 2013). Finally, more recent randomized controlled trials also found significant improvements in mood and self-esteem levels in participants within the music therapy condition compared to those with standard care, especially in younger prisoners (Chen et al., 2015; Gold et al., 2021).

Given the very few experiences of music therapy provided in Italian prisons (Calandra, 2018; Ferruggio & Rosa, 2021) and its recognized beneficial effect in improving the mental health of prisoners, the main aim of this article was to describe the group music therapy activities recently implemented for a group of Italian prisoners suffering from mental health problems. These rehabilitation activities initially started as a pilot project combining improvisation, listening, and performance of songs. Subsequently, it spontaneously culminated in a creative mix of improvisational and recreational methods that gave rise to a song-making process. Specifically, the song has been reported here as an example of a creative well-being outcome achieved through the intrinsic value of group support. In this sense, no research question was specifically formulated, but the manuscript should be considered more as a simple description of the music therapy program. To our knowledge, this is the first article describing group music therapy activities in an Italian prison, especially in terms of new song creation. This should encourage similar music therapy experiences in other Italian and international prisons.

Methods: the context and procedures

Participants

All prisoners enrolled in our music therapy activities were male adults (aged 20–40 years) with mental health problems. They were all allocated in the Parma Penitentiary Institute (PPI) between July 1, 2019, and January 31, 2020. Furthermore, they were all retained in care by the intramural mental healthcare service of the Parma Department of Mental Health (DMH), in the Northern Italy. Specifically, a *new music therapy group* was set up in July 2019. It included 6 PPI prisoners affected by substance use disorder (n = 3) or major depressive disorder (n = 3). They were all taking psychotropic medications during the music therapy activity. Driven by their unmet mental health needs or referred for support and treatment by PPI mental healthcare team members, all group participants explicitly expressed a desire to experience interpersonal connection through music and group content sharing. The Italian language was used by the music therapist during the group activities. The expected duration of this music therapy group's laboratory was 6 months.

Setting

The *PPI* is a male adult, high-security prison. PPI incarceration is based on geographical location of common crimes or because prisoners specifically committed "mafia" or "mafia-like" crimes in Italy (Pelizza et al., 2022c). Indeed, the PPI includes two sections for common crimes and one high-security section for prisoners with current social dangerousness, for a total of over 700 prisoners incarcerated each day in 2022.

Similarly to mental health interventions usually provided in Italian community mental healthcare services (Pelizza et al., 2021c), the Parma DMH specifically implemented specialized, patient-centered treatments for prisoners with mental health problems aimed at planning individualized therapeutic-rehabilitation programs supported by dedicated intramural, multi-professional mental healthcare teams in close collaboration with patients, their family members, and health/social agencies of their local belonging community (Palmisano et al., 2021).

All patients provided written informed consent to participate in music therapy activities, as well as to share and publish the result of their song creation process. Local relevant ethical approval was obtained to use this song for publication (AVEN Ethics Committee protocol n. 67506/2020). The music therapist who conducted group activities and attended the recording of the song in prison also gave informed written consent to share and publish her personal considerations on group dynamics.

Procedures: music therapy activities in the PPI

Music therapy activities at the PPI were developed as a laboratory within a pilot project starting in October 2018. They were specifically provided by a qualified music therapist employed by a social enterprise ("Cooperativa Sociale Le Mani Parlanti"), in agreement with the Parma DMH (Avanzini, 2021). This public-private partnership has continued to this day, allowing music therapy activities to continue steadily over time. Music therapist had more than 10 years of clinical experience and used a mixed psychodynamic and cognitive approach.

As indicated by Bruscia (1990), *music therapy* at the PPI was developed as a treatment in which the therapist helps clients promote their mental health using both music experiences and therapeutic alliance. Although constantly adapted in accordance with current needs and abilities of each participant, the main *objectives* of our group music therapy activities at the PPI were: (a) to strengthen prisoners' communication and expressive-relational skills; (b) to reactivate their bodily and cognitive abilities (often anesthetized by anxiety, social isolation, and psychopharmacological therapy); (c) to regain confidence in the present and in oneself; and (d) to offer a concrete group experience of active listening and sharing emotions (Bunt, 1997). Specifically, these group activities aimed to create a human environment where relationships were built not only through words, but also through music, non-verbal communication codes, improvisation, and songs played and sung live.

Results: program description and song creation

The PPI music therapy pilot project

In July 2019, a new music therapy group including 6 participants was set up. The group selection was on voluntary basis. Specifically, music therapy activities were offered to ten young, incarcerated people with mental health problems retained in care within the PPI mental healthcare service. However, only six prisoners accepted our proposal.

Group music therapy *activities* were offered weekly. Each meeting lasted 2 h. All participants attended all sessions. The sequence of music

therapy activities slightly differed among sessions because of adapting them to client's current or urgent wishes and needs (Alvin, 1979). In fact, it is essential that the music therapist is always in tune and connected ("here and now") with the current emotional state of mind of the group, using music as a narrative "common thread" within the therapeutic context (Benenzon, 1997). Each meeting usually started with an ocean *drum*'s percussion: each prisoner took his turn, playing it in accordance with his own feelings. Afterwords, participants had the opportunity to tell the news of the week, their concerns, and anything else they wanted to share with everyone else in the group. Anxiety, fear for criminal proceedings, hope for change in their prison condition often emerged, but most of all the desire to contact their family members. For music therapist, this was the first step for exploring the personal history of each group participant (Lecourt, 1999).

As an alternative, ocean drum was replaced by a *djembé* in the center of the room. Using a beater, each participant reached for the instrument and reproduced his own sound message. This ritual was an important moment of mutual listening in respect of each prisoner's turn. By gathering the emotional experiences of all participants, the music therapist calibrated the subsequent music therapy activities to be provided during the remaining time of the ongoing music therapy session.

Improvisation was one of the most creative music therapy experiences for prisoners. Its initial, "warm-up" phase usually started through the "body percussion": a body that is too often forgotten, unheard, immobilized in prison, also due to psychotropic therapy (Bruscia, 1987). The improvised music therapy proposals (both structured and semi-structured) aimed to rediscover the prisoners' lost inner pulse, reactivate their cognitive and emotional abilities, and make them feel part of a collective rhythmic structure. Thanks to this personal musical experience, the prisoners returned to expressing their most intimate emotions and experiencing true interpersonal communication (Wigram, 2004). The body percussion was usually accompanied by background music with a regular 4/4 structure. Specifically, it started from the research for the pulsation and developed through a more complex rhythmic organization involving the chest, thighs and feet. Subsequently, improvisation evolved using specific musical instruments, some of which were rhythmic (such as classic guitar, metallophone, woodblock and claves, drums, maracas, flute, cymbals, and harmonica). During the initial meetings, improvisation took place in a more directive way and with "exploration games" that were functional to mediate interpersonal interactions, prepare mutual listening, and enhance each single sound production. As the sessions progressed, improvisation took place in a more freely way, with an initial moment of silence and then the possibility of expressing what the words did not say (e.g., the most intimate thoughts and feelings). After each improvisation activity, a group verbal discussion was also conducted to stimulate the prisoners' awareness and process the emotions experienced during the instrumental performance.

Another relevant music therapy activity at the PPI was the listening and/or the performance of *songs* proposed by the therapist or belonging to the sound biographies of prisoners. Songs and lyrics gave participants the opportunity to evoke affectionate gestures towards loved ones, their "heartfelt place" (e.g., their hometown), moments of love with their partners, and their mother's indulgent gaze. Songs were important mediators for processing personal memories, rediscovering their emotional life, and rebuilding a sense of identity/belonging to their intramural and extramural communities (Cattaneo, 2009).

The new song creation process

Starting from this experiential background, in November 2019, F. (the youngest participant) confided in the group that he wrote autobiographical recitatives and asked the music therapist to read them in the following session. Both the group and the therapist welcomed his proposal enthusiastically.

F. was a 23-year-old man recently incarcerated for common crimes (i.e., robbery and drug dealing) related to his substance use disorder. He was an only child and dropped out of high school very early. He currently was not in education, in employment, or in training.

This songwriting process was the first unplanned initiative for the PPI music therapy workshop, but the entire group was positively involved. Indeed, there were no prior conflicts among members, and the group included non-conflictual peers, without a clear leader, all highly motivated to participate in music therapy activities and experience positive relationships.

In a very engaging session, F. read his text, inspired by the rap music background. Initially, the group discussed the relevance and content of the text, also making partial changes to improve its pacing. Then, all group participants began an instrumental improvisation after reaching a stable pulsation with a regular 4/4 rhythmic structure, while the music therapist performed a simple chord round in F major. Meanwhile, F. was invited to rap his lyrics following this rhythm and the other members accompanied the lyrics by playing metallophone (S.), maracas (R.), cymbal (G.), woodblocks (M.) and claves (A.). In the next three sessions, this singing experience was repeated several times, so that the group became familiar with its rhythmic and harmonic structure. The music therapist consistently supported this creative process, implementing sessions dedicated to expressing the prisoners' emotions and thoughts at the end of each music therapy activity.

In January 2020, shortly before the COVID-19 pandemic and the resulting lockdown (Pelizza & Pupo, 2020), the new song was recorded. The recording sounded noisy and imperfect, but it had not been refined to exactly reproduce the acoustic authenticity of the PPI setting. F. and the group entitled the song "I ask for forgiveness" ("Chiedo perdono"). The text is reported in Table 1. Although group participants could not obtain copies of the recording, they subsequently performed the song during an open conference on intramural rehabilitation activities at the PPI.

Discussion

Music in therapy and rehabilitation is often considered as a means of promoting communication, with a particular focus on the exploration/expression of emotions and the improvement of interpersonal relationships (Gold et al., 2021). Specifically, the combination of verbal and nonverbal modules of communication can help particularly those patients who do not easily benefit from traditional intervention approach (Gold et al., 2013). Furthermore, making music as a social activity can also help bring out hidden strengths and develop social skills, enabling the development of socially adequate agency (Rolvsjord et al., 2005).

A combination of improvisational and recreational experiences that led to the creation of a new song proved particularly effective and meaningful for the group's participants. This process can add further aspects of creativity development to other music therapy activities usually offered (Caneva, 2007), especially in prison (i.e., an isolated environment deprived of freedom). In this regard, valuable experiences developed in US prisons have shown that the collaborative and social nature of songwriting workshops helps inmates deal with their incarceration and relationship issues (Cohen & Wilson, 2017). In this sense, it becomes a crucial vehicle for expressing emotions and enhancing self-determination and self-esteem (Baker, 2015; Baker, 2016; Hatcher, 2016).

To our knowledge, this is the first Italian paper describing the creation of a new song within a music therapy workshop in prison. In this article, we reported a process to be intended as an additional creative music activity (combined with improvisation and music listening) for prisoners with mental health problems. Although discussed in other international studies, our manuscript further extends the transcultural transition and evolution of music therapy beneficial effects (especially in terms of new song creation) within a specific therapeutic group of prisoners affected by mental disorders. In this regard, music remains one of the privileged means with which young people (including young

Table 1
The song: "I ask for forgiveness" ("Chiedo perdono").

I ask for forgiveness from my Creator, I have lost the right path.	Chiedo perdono al mio Creatore, ho smarrito la retta via.
He is the Boss, I am your servant: give me a mission, the enlightenment.	Lui è il Capo, io il tuo servitore: mi dia una missione, l'illuminazione.
I do not know what to do. I rewrote the Ten Commandments in this song.	Non so che fare. Riscrivo i dieci comandamenti in questa canzone.
I ask for forgiveness from my Creator: I am a sinner.	Chiedo perdono al mio creatore: sono un peccatore.
I ask my parents for forgiveness. I wasn't calling them, but my dealers. I've made so many mistakes.	Chiedo perdono ai miei genitori. Non chiamavo loro, ma i miei spacciatori. Ho fatto tanti errori.
I hope to be forgiven, even if I have not deserved it. I think I'm an unwanted child.	Spero di essere perdonato, anche se non me lo sono meritato. Penso di essere un figlio indesiderato.
I think they raised me, educated me. But I forgot all this. I've been too ungrateful.	Penso che mi abbiano cresciuto, educato. Ma tutto questo me lo sono scordato. Sono stato troppo ingrato.
I apologize to my father, who cares about honor. I disappointed him, he is sick. The doctor also confirms this.	Chiedo scusa a mio padre, che ci tiene all'onore. L'ho deluso, sta male. Lo conferma anche il dottore.
I've made so many mistakes. I felt like a dictator, but I'm just a servant. I shoot straight like a driverless tractor.	Ho fatto tanti errori. Mi sentivo un dittatore, invece sono solo un servitore. Tiro dritto come un trattore senza guidatore. Faccio tutto, anzi mi strafaccio di tutto. Divento sempre più brutto.
I do everything, I use all the drugs. I get uglier.	
I ask forgiveness from my Creator: I am a sinner.	Chiedo scusa a mia madre. Per i miei problemi, il suo cuore arde come una foresta bruciata, gioventù sprecata. Con tutto quello che si è fumata, ha lasciato il cervello alla prima fermata.
I apologize to my mother. For my troubles, her heart burns like a burnt forest, wasted youth. With everything she smoked, she left her brain at the first stop.	
I apologize to my uncle. I pulled him down into this oblivion. Oh, my dear, oh dear uncle, I was so wrong: the list gets longer, like an anaconda on her prey is rounded. I ask forgiveness from my Creator: I am a sinner.	Chiedo scusa a mio zio: l'ho tirato giù in questo oblio. Oh, caro mio, oh caro zio, ho sbagliato tanto: la lista si allunga, come un'anaconda sulla sua preda si arrotonda.
I apologize to my friends and brothers. I chased them away like the wolf among the lambs. They tried to get me out of my addictions, despite the circumstances. But I was always in the same rooms, where I was using drugs.	Chiedo scusa ai miei amici e fratelli. Li ho cacciati via come il lupo tra gli agnelli. Cercavano di tirarmi fuori dalle mie dipendenze, nonostante le circostanze. Ma io ero sempre nelle stesse stanze, dove mi facevo di sostanze.
I ask forgiveness from all those I have harmed. There are as many lights as at Christmas. I apologize to those who I robbed, exploited, deceived, and threatened. I am rightly condemned now and do not expect to be forgiven. I am an ex-junkie.	Chiedo perdono a tutti quelli cui ho fatto del male. Sono tanti come le luci a Natale. Chiedo scusa chi ho rapinato, sfruttato, ingannato, minacciato. Giustamente ora sono condannato e non mi aspetto di essere perdonato. Sono un ex-drogato.
Thanks to you and your love I was cured.	Grazie a voi e al vostro amore mi sono curato.
My apologies are over, but they are not definitely fake.	Le mie scuse sono finite, ma sicuramente non sono finte.
I will no longer harm, I promise you with the last act.	Non farò più del male, ve lo prometto con l'ultimo atto.

Note. The song was performed by F. (voice), R. (classical guitar), M. (metallophone), S. (drums), C. (djembè), G. (cymbals) and N. (maracas).

prisoners) communicate their personal emotions, beliefs, and biographies. And this is even more true in Italy, universally known as the home of "Bel Canto", and in Parma, the birthplace of Giuseppe Verdi and the "symbolic city" of the classical opera (Marchesi, 1997).

In this intense collective experience, the autobiographical *text* was strengthened by the rhythmic and harmonic structure that the group (as a whole) repetitively played. Indeed, the repetition in music therapy produced a peculiar content transformation: it allowed prisoners internalize what they needed, abandon what could be left and wait for something else (Baker & Wigram, 2005; Pelizza & Maccaferri, 2010). At the same time, repetition induced predictability, such as in a tribal ritual in which all participants experienced sense of security, cyclic replication, containment, and strong group membership (Fraisse, 1997). Furthermore, this allowed F. to sing his story in both a creative and protected place, feeling relevant part of the group and sharing thoughts and emotions never told before. The emotional and experiential feedback by other group members was very profound. As some participants stated in a brief interview, "the music therapy workshop is above all a listening place". Most of them identified themselves in F., in his psychological suffering, in the loneliness of his substance abuse, in the need for forgiveness as a "push for change": "…first of all, we must forgive ourselves to start over"; "…crimes isolate, …suffering helps us reflect, accept ourselves, and change"; "…music is our universal language: it connects with our most intimate emotions, which we otherwise wouldn't be able to express"; "…playing music and keeping the rhythm are ways to chase away bad thoughts and feelings". Finally, the emotional resonance and commitment of everyone in accompanying and recording the song were a sort of "holding" for F.: he always felt supported by the whole group which became integral part of his song. In this respect, F. said: "Thanks to all of you, the lyrics of my song came to life, transforming my suffering into everyone's suffering. …This eased my pain. I have finally forgiven myself, thank you". Ultimately, the new song had a positive impact on his emotional well-being. He improved his ability in managing anxiety and stress due to incarceration. His sleep continuity improved, and the need for psychotropic medication decreased. These beneficial effects were both self-reported in sessions dedicated to the expression of the prisoners' emotions and thoughts at the end of each music therapy activity, and confirmed in clinical notes.

From the therapist's perspective, this new group music therapy activity was seen as an unexpected, spontaneous collective initiative. "…It was a natural product of music's intrinsic power, its ability to evoke emotions, to sublimate our deepest pain and fears. Perhaps it also was the simplest and most direct way to express oneself in a place dominated by alienation and incommunicability; …to mark a rhythm to banish frustrations, worries, and negative affect, …to rediscover memories, true identities, meanings, values, and banish anger and remorse; …to have the dignity and strength to ask for forgiveness and redemption. … All of this was profoundly moving for me".

Overall, our group music therapy activities produced positive changes in the behavior and daily activities of all participants. Some prisoners decreased psychopharmacological treatment during and after participation in the music therapy workshop. Others spontaneously asked to be employed in intramural work or to return to school. Although the research used unstructured measures, these findings were supported by self-reported statements from participants during sessions dedicated to expressing their thoughts and emotions following the music therapy activities, as well as those noted by PPI staff members in medical records. Specifically, there was a decrease in the need for psychopharmacological treatment and an increase in motivation for intramural work and school. Furthermore, during the initial *improvisation* experience, the different identities and energies met and supported each other, structuring and deconstructing each other, fostering the pleasure of communication (Scardovelli, 1992). Interpersonal interaction occurred through gaze, silence, pause, tuning, imitation, mirroring, and synchronization. Music improvisation became a transformative act, a powerful means of expression in which everyone could bring into play their most fragile, hidden, and unexpressed parts (Coutinho et al., 2015). After the improvisation, a group verbal discussion was performed, aimed at expressing the emotions that were experienced in the instrumental activity, and at sharing the intensity of the lyrics.

Implication for clinical practice and future research

To our knowledge, this is the first paper describing the creation of a new song within a music therapy group of prisoners with mental health problems in Italy. This is important for a cross-cultural transition/evolution of its beneficial effects and for comparing similar music therapy interventions in different international prison contexts (including contexts with different legal and penitentiary systems).

Considering the high value of music therapy in prison and the strong experience in creating a new song within a therapeutic group of prisoners with mental health problems, which slowly structured itself and confidently created a common group identity, we finally want to mention a comment from the music therapist who recorded the song at the PPI: "…this experience was like an act of pain, a confession, a search for forgiveness, but combined with hope; …the choir of musicians accompanying the voice of F. was as beautiful and true as an ancient popular ritual, which shared emotions and sound. …When one inhabits the underworld, only God and humans remain, who may know the same pain".

In summary, the creativity of the music therapy activities (including new song creation) should be implemented in prison, especially for its high therapeutic value in expressing prisoners' subjective emotions and promoting improvement in social and cognitive skills (Albornoz, 2011; Erkkila et al., 2011; Mossler et al., 2011). In this sense, our paper confirms the cross-cultural relevance of music therapy in prison, as well as its beneficial effects also in Italian prisoners (i.e., within a European country outside the Anglo-Saxon context). However, further studies should replicate our experience and conclusions, also in an international context. Furthermore, future randomized controlled trials are needed to explore whether music therapy in prison performs better than other treatment options (such as traditional cognitive-behavioral therapy or pharmacological intervention). Indeed, some questions remain open about the effectiveness of music therapy in prison: are traditional interventions more effective than music therapy? If music therapy is not particularly effective, could it be a helpful additional component to existing treatment approaches? More knowledge is needed on this topic.

As for *limitations* arising from our experience, we acknowledged the need for more rigorous research strategies (such as quantitative and qualitative study designs). Future studies should examine specific processes and outcome indicators in music therapy interventions, also using psychometric instruments. Other important research topics should involve quality of life, daily functioning, emotion management, subjective psychopathology, and service quality. Finally, as the participants were self-selected into our music therapy group, this could impact on their personal experience.

CRediT authorship contribution statement

Simona Pupo: Writing – review & editing. **Marco Menchetti:** Writing – review & editing. **Giuseppina Paulillo:** Writing – review & editing. **Lorenzo Pelizza:** Writing – review & editing, Writing – original draft, Supervision, Methodology, Data curation, Conceptualization. **Beatrice Urbani:** Writing – review & editing, Methodology, Data curation. **Roberta Avanzini:** Writing – review & editing, Methodology, Data curation, Conceptualization. **Derna Palmisano:** Writing – review & editing. **Bruno Veneri:** Writing – review & editing, Data curation. **Teresa Placido:** Writing – review & editing, Data curation.

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