Singing as a Music Therapy Intervention for Person's with Broca's Aphasia

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ABSTRACT

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The purpose of this paper was to explore how singing interventions may be used in music therapy contexts for persons with Broca's aphasia. Characteristics and issues concerning stroke, aphasia, and Broca's aphasia in particular were discussed. A review of the relevant music therapy literature revealed four overarching vocal intervention categories: (a) use of pre-composed songs, (b) vocal improvisation, (c) toning and chanting, and (d) singing original songs written by the client. Subcategories included in category 'a' were: singing familiar songs, Melodic Intonation Therapy (MIT), and Modified Melodic Intonation Therapy (MMIT). Research and treatment goal areas were identified and described within each of these categories. The final section of this paper will outline relevant implications for music therapy practice as well as make recommendations for research.

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Introduction and Definitions

A stroke is a sudden loss of brain function caused by interruption of flow of blood to the brain due to a blood clot (ischemic stroke) or to the rupture of blood vessels in the brain (hemorrhagic stroke) both of which cause brain cells (neurons) in the affected area to die (Heart and Stroke Foundation, 2014). The potential for having a stroke is highly related to one's physical and psychological health, lifestyle, and family history. Each year, approximately 15 million people experience strokes, 80% of which are ischemic while 20% are hemorrhagic (World Heart Federation, 2014). Statistics published by the Public Health Agency of Canada in 2011 indicated that approximately 315,000 persons were living with the effects of stroke at that time.

The National Aphasia Association (NAA) defines aphasia as an acquired communication disorder where the ability to speak, read, write, and understand is impaired temporarily or permanently because of damage to language and communication centers of the brain (2011). Aphasia usually occurs suddenly as the result of stroke or traumatic head injury, "but it may also develop slowly because of a brain tumor, an infection or dementia" (National Institute on Deafness and Other Communication Disorders, 2008, p. 1). People over 65 are more susceptible than younger persons to suffer from aphasia after a stroke (NAA, 2011). In 2012, the Canadian Stroke Network indicated that 100,000 people were suffering from aphasia, which they also described as an invisible impairment. "Invisible impairments are impairments not readily apparent to the untrained eye" (Lingsom, 2008, p. 2) which in turn, can cause frustration for those

suffering from the impairment. Furthermore, persons with aphasia may experience feelings of guilt, anxiety, self-doubt, and/or ambivalence and may also be reluctant to reveal their limitations to others (Olney & Kim, 2010). At present, there is no effective treatment to decrease the damage done to brain tissue as a result of a stroke (Studebaker, 2007); however, most stroke survivors do recover to some abilities through rehabilitative efforts (HSF, 2014).

There are two broad categories of aphasia: fluent and non-fluent (NIDCD, 2008). Fluent aphasia or Wernicke's aphasia (as it is also called) is caused by damage to the temporal lobe, which affects the understanding of speech. However, people with Wernicke's aphasia are able to speak in meaningful sentences (although these sentences may contain wrong or made up words) and usually do not suffer from body weakness. Non-fluent aphasia is the result of damage to the frontal lobe or to other parts of the brain that influence speech and motor skills. Within these two categories, there are four main sub-categories of aphasia which correspond with the injured location of the brain: (a) global, (b) anomic, (c) receptive (Wernicke's), and (d) expressive (Broca's) (NAA, 2011; National Institute of Neurological Disorders and Stroke, 2014). Broca's aphasia and global aphasia are grouped under non-fluent aphasia because persons with these types of aphasia can only speak in limited words.

All types of aphasia have some common characteristics of anomia in varying extent, as well as paraphasias. Anomia refers to the loss of ability to recall the words and names. Paraphasia refers to the wrong use of words or sounds in conversation in senseless combinations (National Library of Medicine, 2012). There are two types of paraphasias,

verbal paraphasia (inaccurate substitution of words) and literal paraphasia (misuse of sound; Brookshire, 2003).

Global aphasia is the most severe form of aphasia due to extensive damage done to the brain. Persons with global aphasia cannot comprehend or execute verbal conversations, and their speech is non-fluent. In comparison to global aphasia, anomic aphasia is the least severe form of aphasia. Individuals with anomic aphasia can produce fluent speech, but do not use the correct words for naming the places, objects or events. Receptive aphasia is similar to anomic aphasia since these persons can also produce fluent language but the words they use often do not make sense. They also have difficulty understanding conversation. Because of the damage to Wernicke's region, the left temporal lobe of the brain, receptive aphasia is also called Wernicke's aphasia (as noted above). Because of damage to Broca's region, the left frontal lobe of the brain, expressive aphasia (a non-fluent aphasia) is also called Broca's aphasia. People with Broca's aphasia have impaired spoken language although language comprehension remains intact (NIDCD, 2008; NINDS, 2104). As the current paper is only concerned with Broca's aphasia, this will now be described in more detail.

Broca's aphasia is the result of a lesion of the posterior inferior frontal region in the left hemisphere of the brain known as Broca's region. It was named after Paul Broca, a French physician, surgeon, anatomist, and anthropologist who discovered the speech production center of the brain in 1864 (Dronkers, Plaisant, Iba-Zizen, & Cabanis, 2007). Broca's aphasia is classified as a non-fluent type of aphasia because speech production is severely limited to less than four words of utterances (NAA, 2011), or limited to incomplete sentences that are delivered in a telegram style called agrammatism (Patel,

Iversen, Wassenaar, & Hagoort, 2008). For example, one may say "Book … book… table" instead of "There are two books on the table." Other overarching characteristics of Broca's aphasia include shortened phrases, incomplete sentences, and disturbances in prosody, rhythm, and intonation of speech (Kearns, 1997). Long pauses between words, difficulty in naming objects and word repetition are also common (Baker & Tamplin, 2006). People with Broca's aphasia usually also have weakness or paralysis of the right side of their body (NAA, 2011). The loss of independence and physical limitations combined with other cognitive, communicative, social, and vocational impairments often cause emotional turmoil for these individuals (Purdie & Baldwin, 1994).

Treating Broca's Aphasia

It is hard to imagine the feelings of those who lose their expressive language after a stroke. Simple communications often seem impossible. This, in combination with other possible consequences such as loss of mobility, motivation, job, financial security, and self-confidence, can lead to loss of physical independence as well as emotional trauma and depression (Baker & Wigram; 2004; Magee, 1999; Purdie, 1997; Purdie & Baldwin, 1994). Livneh (1991) illustrated the five stages of adjustment to physical disability: (1) the initial impact, (2) the activation of defense mechanisms, (3) the early understanding of the undesirable effects, (4) retaliation, and (5) reintegration. Stroke survivors with aphasia often go through the five phases of adjustment with additional challenges because their communication disorders may inhibit appropriate assistance (Olney & Kim, 2001). Individuals with a disability must have the opportunity to grieve losses—"loss of future plans, loss of confidence, or perceived loss of status or authority" (Olney & Kim, 2001, p. 576) as well as loss of physical function, mobility, independence, speech, employment,

financial security, and relationships (Prudie, 1997; Tamplin, 2006). Persons who suffer a dramatic loss may experience "isolation, frustration, anxiety, anger, confusion, embarrassment, grief, and the need to regain a sense of control" (Baker, Kennelly, & Tamplin, 2005b, p. 112). According to Olney and Kim (2001), adjustment to sudden and traumatic loss of current functioning requires several elements including self-acceptance, emotional maturity, and mental status.

Traditional treatments for Broca's aphasia include Speech-Language Therapy (SLT) and computer-assisted therapy (NIDCD, 2008). Language recovery through SLT usually takes place over two year period and in order for the treatment to be most effective, it should begin during the acute stroke phase (i.e., within six months after having a stroke; NIDCD, 2008). Brady, Kelly, Godwin, and Enderby (2012) conducted meta-analyses that examined the effectiveness of SLT for aphasia. They found that a high drop out rate from treatment limited the effectiveness of SLT intervention. They also noted that over time, these patients tended to withdraw from social support programs.

Computer-assisted therapy offers a flexible and cost effective alternative for patients with Broca's aphasia where they are able to practice their expressive language with the assistance of technology. However, the literature also indicated that lack of face-to-face interaction and fatigue are limitations of this type of therapy (Palmer, Enderby and Paterson, 2013). Studies also revealed that the effectiveness of computer-assisted therapy was limited solely to naming words (Fink, Brecher, Schwartz, & Robey, 2002; Mortley, Wade & Enderby, 2004). It appears that traditional treatments on their own may be ineffective in addressing all of the physical, psychological, and social impacts of Broca's aphasia.

Music Therapy, Singing, and Broca's Aphasia

Music therapy offers holistic approaches that may be of great benefit to persons with Broca's aphasia. Speech and language pathologists have acknowledged the unique power of music therapy in enhancing the speech fluency and production through melody and rhythm, and have formed new collaborative treatment programs such as "Speech-Music Therapy for Aphasia" (SMTA; Bruijn, Zielman & Hurkmans, 2011).

The literature indicates that there is particular potential for singing, when used within a music therapy context, to assist with various aspects of speech recovery (Aldridge, 2005; Baker, 2000, 2005; Hartley, Turry, & Raghavan, 2010) including: (a) clear word articulation (Cohen, 1994; Cohen & Ford, 1995; Kim & Tomaino, 2008; Racette, Bard, & Peretz, 2006; Thaut, & McIntosh, 2010), (b) improvement in speech production (Baker & Tamplin, 2006, 2011; Fox, 2007; Jungblut, Suchanek, & Gerhard, 2009; Thaut, & McIntosh, 2010; Wan, Ruber, Hohmann, & Schlaug, 2010; Wilson, Parsons, & Reutens, 2006), (c) facilitation of spontaneous speech and naming (Hough, 2010; Jungblut, 2009; Schlaug, Marchina, & Norton, 2008; Sparks, Helm, & Albert, 1973; Yamaguchi, Akanuma, Hatayama, Otera, & Meguro, 2012), (d) initiating communication (Baker, 2000; Hough, 2010; Tomaino, 2009, 2010, 2012; Jungblut et al., 2009; Pavlicevic, 2000; Rhee, 2009; Rogers & Fleming, 1981), (e) improvement of the speech fluency (Belin et al., 1996; Tamplin & Grocke, 2008; Tomaino, 2012), (f) verbal intelligibility (Cohen, 1992; Cohen & Ford, 1995; Fox, 2007), (g) rate of speech (Cohen, 1992; Cohen & Ford, 1995; Cohen & Masse, 1993), (h) auditory comprehension (Jungblut, 2009; Thaut & McIntosh, 2010; Tomaino, 2009), (i) expansion of vocal range (Cohen & Masse, 1993), and (j) prosody (Cohen, 1992, 1994; Cohen & Masse, 1993;

Hough, 2010; Kim & Tomaino, 2008; Racette et al., 2006; Schlang et al., 2008; Tomaino, 2009; Wan et al., 2010; Wilson et al., 2006). This may be due in part to the fact that singing and speaking are "natural pathways for human expression" (Cohen, 1994, p. 8) and share some similarities including rhythm, pitch, and timbre (Baker, 2000; Cohen, 1994; Hartley, et al., 2010; Hurkmans et al., 2012; Patel, 2003; Schlaug et al., 2008). The melodic line of songs is similar to the contours of dialogue (Lowey, 2004; Tomaino, 2010). Furthermore, research has shown that singing functions most often remain intact after one has had a stroke and that these functions can be used for rehabilitative purposes (Baker & Tamplin, 2006; Wilson et al., 2006). This may be because the process of singing activates the right temporal lobe, which is free from the influence of the left temporal lesion and this allows the people with non-fluent aphasia to sing with little difficulty (Tomaino, 2009).

The literature also shows that singing in music therapy contexts can alleviate the negative psychosocial consequences of aphasia by: (a) improving low self-esteem (Baker, 2000; Baker & Wigram, 2004; Purdie & Baldwin, 1994), (b) reducing feelings of frustration and loneliness (Clark & Harding, 2012; Gardner-Gordon, 1993; Magee, 1999; Purdie, 1997), and (c) decreasing withdrawal from social activities which may result in isolation and depression (Baker & Ballantyne, 2013; Baker, Kennelly, & Tamplin, 2005a, 2005b; Baker & Wigram, 2004; Clark & Harding, 2012; Glassman, 1991; Magee, 1999; Wheeler, Shiflett, & Nayak, 2003). Singing promotes self-expression (Clark & Harding, 2012) and can help to divert negative thoughts (Clift, Hancox, Morrison, Hess, Kreutz, & Stewart, 2010). Yamaguchi et al. (2012) documented that singing helped to elicit positive emotional change (e.g., reduced agitation and frustration) in a patient with

chronic severe aphasia. Self-expression is also critical and helpful for individuals who suffer from Broca's aphasia as it can help them to adapt to changes in functioning and identity (Tamplin, 2006). Individuals who have lost their spoken words may not allow themselves to use spoken language to relate with others interpersonally. Singing involves "a cathartic effect" (Baker and Wigram, 2004, p. 58). As the clients' feelings of fear and frustration are released and vented out, room is left for positive feelings to emerge and rehabilitation as well as relational processes may move forward.

The current author (a music therapist), has also observed similar potentials to those outlined in the literature. When working with a client who had Broca's aphasia, she noticed that although this client's verbal communication skills were limited to the words "yes" and "no," he could sing the song "You Are My Sunshine" without any agrammatism (i.e., pauses or hesitation when singing the lyrics). Furthermore, during and after singing, the client appeared to display improved affect observed through smiling and laughing as well as improved eye contact between the client and therapist. These observations led the current author to want to know more about how music therapy and, in particular singing, could be used to help others like her client. Therefore, the purpose of this paper was to explore how singing interventions may be used in music therapy contexts for persons with Broca's aphasia. This was accomplished by reviewing relevant music therapy literature (English only) and by identifying and describing overarching vocal intervention categories found in the literature that may be used with this population. These included: (a) use of precomposed songs, (b) vocal improvisation, (c) toning and chanting, and (d) singing original songs written by the client. Relevant subcategories, research, and treatment goal areas were identified and described within

each of these categories. The author also integrated her own perspectives based on her personal experiences as a music therapy clinician when they seemed relevant to the topic at hand. Finally, implications for practice and future research are outlined.

Vocal Intervention Categories

Use of Pre-composed Songs

Singing familiar songs. Singing pre-composed songs, particularly familiar ones, can help persons with non-fluent aphasia with word retrieval and memory recall (Baker& Tamplin, 2006; Fox, 2007; Rogers & Fleming, 1981; Sparks el al., 1973; Tomaino, 2009, 2010, 2012). "Singing involves both melodic and verbal repetition [which] allows for increased chances of predicting and retrieving words" (Tomaino, 2010, p. 87). Singing familiar songs and using songs in lyric completion exercises can trigger automatic speech for use on a daily basis, such as "How are you? [and] "Good morning!" (Davis, Gfeller, & Thaut, 1999, p. 236). Persons with Broca's aphasia are often able to recall and sing the words of familiar songs without having to re-learn them. The discovery of this intact ability as well use of preferred music may motivate these individuals to practice and further develop this skill, which could have positive implications in terms of their speech recovery. Successful singing experiences can promote feelings of control and empowerment during the rehabilitation process (Hobson, 2006). Furthermore, "familiar songs become a tool for connecting to seemingly lost parts of the personality by providing a necessary link to the self" (Tomaino, 1999, p. 116).

Familiar songs are widely used in communication rehabilitation processes because "song lyrics are often remembered [as] words within the lyrics are predictable" (Tomaino, 2009, p. 216) which in turn makes word retrieval easier. Rogers and Fleming

(1981) suggested using "carrier melodies," (p. 33) defined as songs that are learned and stored in an automatic way, to initiate speech. In a survey conducted by Fox (2007), 40% of 166 music therapist respondents indicated that they felt that singing a pre-composed song was a very effective intervention for increasing verbal responses of persons with aphasia. Baker & Tamplin (2011) suggested that singing well-known and client-preferred songs is a favorable way to start the therapy session. The therapist then highlights several target words in the songs for the client to say/sing and the client and therapist practice by singing together. Throughout this process the therapist models the target words without music, provides visual cues, and may use an accompanying instrument. Hobson (2006) proposed using lyric sheets with big print and pointing to each word while singing, as well as choosing repetitive songs with few words, simple rhythms, slow tempo, and attainable vocal range. In addition to these clinical practices, there is a significant body of empirical research that supports the notion of singing familiar songs for the purpose of speech recovery for persons with aphasia.

Half a century ago, Sparks et al. (1973) demonstrated a positive relationship between singing familiar songs and producing speech. They proposed that singing activated the non-propositional language and the undamaged right hemisphere of the brain. Magee (1999) conducted a study that investigated the strengths of different music therapeutic approaches for two clients who were non-verbal as a result of brain damage. One of the participants, Mr. A, showed significant verbal improvement through singing familiar songs. Mr. A had suffered from severe receptive and expressive aphasia after a car accident. The only expressive communication that he had was facial movements accompanied by gestures. However, after a treatment of three-month treatments period

he was able to speak three and five word phrases and use them in the appropriate context. Familiar songs and vocal improvisation (described below) also provided him with an emotional outlet. Tomaino (2010) had similar results in a study where she found that the speech recovery rate of persons with non-fluent aphasia was 50% faster for those who practiced familiar pre-composed songs on a daily basis than those who did not. Improved skills included word retrieval and speech fluency.

Lucia (1987) recommended singing familiar songs or tunes in group sessions because he observed that persons with non-fluent aphasia who did so had better therapeutic outcomes than those who did not, and that this response was positively related to the familiarity of the tunes. A number of studies were conducted in a series researching the effects of singing in groups versus speaking for the persons with non-fluent aphasia on intensity, frequency, rate and verbal intelligibility (Cohen, 1992, 1994; Cohen & Masse, 1993). The first study investigated the effect of group singing instruction on speech production on eight neurologically impaired subjects with expressive speech disorders. Results showed that higher attendance was related to improvements in speaking, fundamental frequency variability, rate of speech, and verbal intelligibility "while the two control subjects did not consistently improve in any of the speech variables" (Cohen, 1992, p. 87). Cohen and Masse (1993) examined the effect of singing and rhythmic instruction on the rate of speech, and verbal intelligibility of 32 neurologically impaired patients with communicative disorders. The subjects were randomly assigned to either a treatment group (rhythmic instruction group or singing group) or a control group. After nine weeks of treatment (twice a week, 30 minutes each), they found that the singing group made greater progress than the other groups in

both verbal intelligibility and rate of speech. The rhythmic group improved on rate of speech only while the control group showed no changes. They concluded that "the emphasis on breath support, vocal projection, expanded vocal range and pitch matching" in singing instruction might boost the verbal intelligibility (p. 92). Also, they observed that participants in the singing group expanded their vocal range after treatment and developed group cohesion through the emotional support that the group provided. In the third study, Cohen (1994) concluded that singing may increase speech production for the persons with communication disorders because singing and speaking "share the common elements of frequency, frequency range, rate, intensity and diction" (p. 8). Additionally, singing at appropriate tempos might correct the rate of speech and speech intelligibility may be improved through exaggerating consonants while pronouncing song lyrics (Cohen, 1994).

Racette et al. (2006) demonstrated that choral singing (i.e., a more formal approach to group singing that can occur within or outside of music therapy contexts) may be helpful in stimulating speech production. Eight participants with speech disorders due to brain injury were recruited and participated in three different experiments in order to compare the difference between production of sung and spoken speech. In Experiment 1, the patients were tested in the repetition and recall of words and notes of familiar material. Lyrics of familiar songs, words of proverbs and prayers were not better pronounced in singing than in speaking although notes were better produced than words. In Experiment 2, participants repeated and recalled lyrics from novel songs. Again, they did not produce more words in singing than in speaking. In Experiment 3 however, when participants were allowed to sing or speak along with an auditory model (i.e., in a choral

singing context) while learning novel songs, they repeated and recalled more words when singing than when speaking.

Finally, Tomaino (2012) created a treatment protocol consisting of the seven most effective music therapy techniques for the persons with non-fluent aphasia. Three of these techniques of the protocol involve the use of familiar songs: (a) singing familiar songs, (b) musically assisted speech, and (c) dynamically cued singing. In these components of the protocol, the client is first cued to sing along with the lyrics of a familiar pre-composed song. Second, musically assisted speech is introduced using the familiar melody to elicit "commonly used conversational phrases" (p. 314). For example, "Hello, how are you today?" paired with the tune "Swing Low, Sweet Chariot." More successful outcomes on speech production will result as the person becomes increasingly familiar with the tune. Third, dynamically cued singing is used "to facilitate interpersonal interaction and emotional expression" (p. 314) by filling the gap of the lyrics when the music therapist gives the cue.

Melodic Intonation Therapy (MIT). Melodic Intonation Therapy (MIT) is another way in which singing is used to improve the speech production of the individuals with Broca's aphasia (Hough, 2010; Racette et al., 2006; Schlaug et al., 2008; Wan et al., 2010; Wilson et al., 2006). It was developed based on the idea of utilizing the undamaged right hemisphere of brain to enhance the expressive language through singing and was designed to improve verbal language of the individuals with aphasia by using the combination of singing and left-hand rhythmical tapping (Sparks et al., 1973). Pre-composed tunes are used to match the prosody of speech at three levels of difficulty ranging from (1) singing the tunes, (2) speaking them in rhythmical chant, and (3)

speaking them in a more natural way. MIT is most often used by speech therapists and music therapists who receive special training in this technique (Schlaug, Marchina, & Norton, 2009; Thaut, 2005).

Wilson et al. (2006) presented a case of a right-handed amateur male singer with severe Broca's aphasia, who was unable to produce grammatical structures, or produce automatic or propositional speech. He was also unable to make or discriminate complicated rhythmic patterns, and showed impaired pitch working memory that hindered his ability to imitate complex melodies. However, the client showed his ability to learn new songs and relearn the songs that he had performed before stroke. The client's protocol involved MIT (a) singing phrases with composed tunes and conversation-like rhythms, (b) rehearsing phrases using an exaggerated rhythm (verbal repetition), and (c) trying to reproduce unrehearsed phrases. Results of this case study indicated that MIT had a more durable effect than verbal repetition training as it enhanced both melodic and non-melodic elements of the client's speech production.

Schlaug et al. (2008) found that reduction of speed in singing along with other mechanisms of MIT, such as syllable lengthening, syllable chunking and hand tapping were more effective for two patients with severe Broca's aphasia in naming pictures and measures of propositional speech than mere repetition of speech. Schlaug et al. (2009) also discovered a substantial growth in the Arcuate Fasciculus (AF), a fiber bundle connects the temporal lobe and primary motor cortex, among six patients with Broca's aphasia after intensive MIT. They also found a positive correlation between the number of AF fibers and speech improvement, which was evidenced in the right hemisphere using Diffusion Tensor Imaging (DIT). Through the use of DTI, Wan et al. (2010) and

Schlaug et al. (2010) speculated that the Arcuate Fasciculus (AF) is dominant in auditory-motor mapping on the right hemisphere while left hemisphere is responsible for language processing. After intensive MIT treatment, they believed that the right AF undergoes "structural adaptations in gray and white matter" (Wan et al., 2010, p. 291) to replace the absence of left AF in the brains of patients with Broca's aphasia. In other words, MIT appears to reorganize brain functions, particularly in the right-hemisphere since the fiber number and volume of the AF increases after MIT treatment. They also speculated that increase of AF may be the only possible way to recover speech when massive damage is sustained in the left-hemisphere of the brain, which potentially makes MIT a very important treatment for persons with Broca's aphasia.

Modified Melodic Intonation Therapy (MMIT). Modified Melodic Intonation Therapy (MMIT) is a method described by music therapist Felicity Baker. She used this modification for individuals with severe non-fluent aphasia who had not benefited from the traditional form of MIT (Baker, 2000). Compared with MIT, two modifications are found in MMIT. First, MMIT uses a treatment plan that is tailor-made for individual clients (Thaut, 2005). Additionally, MMIT is more melodic in structure, and the sung phrases are expanded to include more than four notes (Baker, 2000). This modification allows more freedom for therapists in terms of being able to match novel melodic phrases with the prosody of the spoken phrases and it enables patients to sing full lines of a song (Thaut, 2005). To help clients have positive experiences with verbal output, it is recommended that the therapist invite clients to sing familiar, well-known songs as a first step in the MMIT (Baker, 2000). Familiar songs are used for several reasons which include: (a) to reward or reinforce the verbal output, (b) to distract, (c) to test the

retrieval and recall of memory, and (d) to practice the poorly articulated sounds (Baker & Tamplin, 2006).

Baker (2000) examined the effectiveness of MMIT with two individuals. These individuals were unable to speak words or dialogue independently before treatment, but both of them initiated verbal communication in varying degrees after MMIT treatment. Participant 1 was capable of stating her needs, feeling, and interests and Participant II uttered 30 words and recalled 12 family members' names.

Conklyn, Novak, Boissy, Bethoux and Chemali (2012) studied the differences between two groups of neurology inpatients—16 who had MMIT and 14 who were in a control group. Participants in the treatment group got 10-15 minutes MMIT treatment in which the music therapist modelled the sung phrase and instructed the participants to sing and tap the rhythm using their left hand. In order creates a placebo effect in the control group, these participants received 10-15 minutes discussion time with music therapist about their impairments and concerns. The researchers determined that increasing the use of full sung phrases allowed for more opportunities for the clients to sing the full lines of lyrics and the verbal phrases. Also, the higher accuracy and meaningfulness of words produced by patients through MMIT may have been helpful in eliminating symptoms of frustration and feelings of isolation.

Finally, Hough (2010) found that singing words within a MMIT protocol enhanced the verbal output of a 69-year-old male patient with chronic Broca's aphasia. Rhythmic tapping and other MIT techniques did not work with this patient and in fact, they seemed to be distracting and disruptive in producing speech. Using MMIT, the patient reached 75% and 55% accuracy on automatic and self-generated phrases respectively, and

auditory comprehension, reading and writing skills, spontaneous speech, and naming skills were enhanced.

Vocal improvisation

Vocal improvisation is a term used to describe when a person makes up a song or vocalizes freely without words but in a musical manner. Pavlicevic (2000) stated that the purpose of improvisation is to establish "an intimate interpersonal relationship between therapist and client through the musical events" (p. 272). For persons who have experienced sudden and drastic changes in their lives (like persons with Broca's aphasia) vocal improvisation may serve as an effective emotional and expressive outlet. Clients with very limited words due to Broca's aphasia can use their voice to create a variety of tones in different dynamics, sounds or even use limited words with various tonalities, frequency range, and rhythm. It could be an empowering experience for individuals with Broca's aphasia to express themselves in a creative, cathartic, and/or aesthetic way (Kenny, 2003).

The aesthetic value in music therapy relies on authentic and natural expressions that take place within the music (Aigen, 2007; Kenny, 2003). Aigen (2007) believes that the aesthetic facets of the music come from three sources: (a) the musical illustrations of the human experience, (b) the safe outlet for the clients to express themselves, and (c) the music therapist's role as a non-judgmental listener for clients' voices. The music therapist's openness and non-judgmental view assist the clients "to develop a positive orientation to life" (p. 120). Aigen (2007) redefined Hospers' (1967) three modes of aesthetics as they apply to music therapy: practical, cognitive and personal. Vocal improvisation seems to address the cognitive and personal modes. In the cognitive mode,

the clients are free to sing or vocalize sounds, which fit with traditional structural or stylistic properties of music. The music therapist guides the client to explore his/her voice within a musical framework (provided by the therapist). In the personal mode, the therapist helps the client to use improvised music (and in this case improvise vocal music) to represent his/her own feelings and thoughts (Aigen, 2007). Prudie (1997) pointed the significance of improvisation that offered "the opportunity for the person to achieve something which is valued and to create something they can recognize as aesthetically pleasing" (p. 47). Therefore, participation in improvisation can help to rebuild confidence of the persons who feel inferior about themselves (as do many persons with Broca's aphasia).

Hartley et al. (2010) explored the potential for improvisation to assist with a stroke patient's self-expression. In this case, the therapist reviewed the client's favourite songs and selected ones that included long sections of nonverbal singing (i.e., using 'oo' or 'ah' sounds). The client use nonverbal singing techniques over a period of five years and eventually started to read and sound words out. This case illustrated that vocal improvisation techniques used within a Nordoff Robbins approach (referred to as Expressive Music Speech Training [MMST]) helped to establish rapport between therapist and client, improved speech production and provided an effective forum emotional expression.

Jungblut (2009) described a directed music-supported training approach (SIPARI) used to improve the speech production. SIPARI stands for six vocal elements: singing, intonation, prosody, atmung (breathing), rhythm, and improvisation. The main difference between SIPARI and MIT is the use of improvisation to practice the non-verbal

communication of individuals with speech impairments. The improvisation exercises of SIPARI include 'musical role plays, thematic improvisations, associative improvisations and musical arrangements of texts written by the patient' (Jungblut, 2009, p. 103). In addition, vocal improvisations are used under the category of singing exercises. Jungblut (2005) recruited thirteen patients with global aphasia and eight patients with Broca's aphasia to compare the effectiveness of SIPARI for each group. Patients were assigned to a therapy group or a control group. Patients with global aphasia assigned to a therapy group demonstrated a significant improvement in repetition, particularly naming. Patients with Broca's aphasia assigned to a therapy group "showed remarkable improvements on the description level of articulation and prosody" (Jungblut, 2005, p. 207). The author concluded that using SIPARI in a group context can be effective in improving the speech articulation and also addressing the emotional expression of this population.

Although a limited amount has been written on the use of vocal improvisation for persons with aphasia, it is a widely used music therapy treatment in general (Aldridge, Gustorff & Hannich, 1990; Magee, 1999; Jungblut, 2009). Vocal improvisation can help clients to feel empowered as they have the opportunity to assume a role of leadership and control during the therapeutic process. Magee (1999) used vocal improvisation to transform the screaming and yelling of a non-verbal client into a creative musical expression, which also served as an expressive emotional outlet. Hartley et al. (2010) stated that "singing songs from one's culture, the emotional act of singing, the theatrics of singing, and musical improvisation can all influence speech output" (p. 235) because of

the "music's capacity to elicit emotional memories" (p. 236). There is great potential for further development of this intervention for persons with Broca's aphasia.

Toning and Chanting

Austin (2008) described toning as "the conscious used of sustained vowel sounds" (p. 29) and stated that is an effective way "to increase awareness of the breath and bodily sensations while also providing and outlet for emotions and spontaneous vocal expression" (p. 133). Gardner-Gordon (1993) described toning as the sound created by a vowel, a consonant or both, or even "body sounds" like crying, laughing, screaming and moaning that represent the emotional expressions. Chanting is a repeated rhythmic singing of words usually on one or two pitches. Chanting is making the breath audible, involves body, mind, and intention; and does not require a lot of vocal technique (Gass & Brehony, 1999). Here, the body is viewed as a musical instrument that requires regular tuning. Individuals release their blocked feelings through emancipating their natural body sound (Austin, 2008).

Gass & Brehony (1999) suggested few pointes for the practice of chanting: (1) Sitting up straight that allows us to breathe deeply and vibrate fully when chanting. (2) Keep eyes closed helps us concentrated. (3) "Practice mindfulness" and "Stay awake" (p. 123). (4) Kick away the judging mind while chanting. Breathing exercises used as a warm up can help to reduce clients' anxiety and prepare them for more complicated vocal exercises. Unfortunately, the current author found scant literature that indicates that toning or chanting (as described above) is being used with persons who have aphasia. However, these practices may have potential for use with this population based on how it is used with other populations and the general population at large.

A study conducted by Goldman (2002) indicated that people who reported toning or chanting regularly had significant improvements in mood— possibly because these practices trigger the production of endorphins in our brain, which can boost awareness, decrease pain and depression, and generate deep meditative states. Chanting can reduce blood pressure and slow down the heart rate (Gardner-Gordon, 1993). The literature also indicates that toning may be an effective medium for persons with traumatic brain injury and stroke to express their frustration and sadness due to the loss of physical independence and motivation, impaired verbal communication, and social isolation (Prudie, 1997).

Baker and Tamplin (2006) designed 'Therapeutic Rhythmic Chanting' for persons with acquired brain injuries "to improve oral motor control and coordination through the rhythmic chanting of various consonant-vowel combinations" (Baker & Tamplin, 2011, p. 194). Here, the music therapist provides the clients with different consonant-vowel combinations at the beginning according to the phonemes which the client has difficulty producing. For instance, 'me-ma-me-ma' or 'me-dah-me-dah' (p. 194). After that, the therapist demonstrates a chant of various consonant-vowel combinations using a regular 4/4 time and asks the client to imitate. When the client presents the accurate consonant-vowel combinations in 4/4 time, the therapist encourages the client to try different rhythmic patterns. Baker and Tamplin (2011) recommended this technique be used as a warm up or relaxation exercise prior to other singing interventions or as a chief therapeutic intervention. In addition, the music therapist can introduce some exercises for the client "to develop the muscle control, expand lung capacity, and increase vocal intensity" (p. 198) through experiencing the difference between chest breathing and

diaphragmatic breathing. It can be started with silent sustained exhalations like "haaa" or "shhh" and then proceed to controlled exhalations like "ha-ha-ha-ha-ha" or "sh-sh-sh-sh-sh." Next, the client is asked to inhale deeply and sing the vowel for as long as possible. There are few good phonemes for clients to begin with including "ah," "la," and "mmm." The breathing exercise is strongly recommended but should be limited to a 10-15 minute warm up done before the singing interventions (p. 199).

Chanting is also associated with the religion and the traditions of shamanism (Benenzon, 1981) and chant therapies are sometimes included as part of historical and current medical practice (Moreno, 1995; West, 2000). Moreno (1988) stated that shaman music can be considered as a stimulus to sedate and distract the left-brain and attend to the right brain. It may be important to note here that persons with Broca's aphasia usually have damage in their left hemisphere of brain, and they need to exercise their right hemisphere of brain to assist with emotional expression and speech rehabilitation.

Finally, the current author has observed in her music therapy sessions that toning and chanting can help a client to pay attention to his/her personal voice without having concern about the words. It can also elicit feelings of freedom and self-awareness. The current author has also used it as a way to help clients practice phrases for the purpose of speech recovery. There is obviously great potential for further development for the use of toning and chanting as therapeutic techniques for persons with Broca's aphasia.

Singing Songs Composed by Clients

Songwriting is "the process of creating, notating and/or recording lyrics and music by the client or clients and therapist within a therapeutic relationship to address psychosocial, emotional, cognitive, and communication needs of the client" (Baker &

Wigram, 2005, p. 16). It is an active, powerful and "empowering therapeutic medium through which clients can process thoughts and emotions, particularly in relation to trauma, grief, identity and disability" (Tamplin, 2006, p. 178). It provides a means of exploring thoughts and feelings and provides opportunities for the expression and release of emotions (Baker & Wigram, 2005). Baker and Ballantyne (2013) found that singing one's own composed songs can allow individuals "to recognize improvements in their abilities, experience accomplishment through the creation of their own songs, illustrate their increased engagement in life, and stimulate a sense of happiness and wellbeing" (p. 17). Group cohesion and social awareness can be enhanced among group members through group song writing activities.

Various authors have suggested that writing lyrics to songs offers stroke survivors a forum during the rehabilitation process through which they can approach their new reality, accept their identity, and adapt their thinking in a positive way (Baker & Tamplin, 2005b; Glassman, 1991; O'Callaghan & Grocke, 2009). Song writing provides a source for individuals with invisible impairments (like aphasia) to transfer distressing emotions into words where feelings can be resolved through verbal and written lyrical expression (Baker et al., 2005b; Glassman, 1991; Tamplin, 2006). As stroke survivors with Broca's aphasia are able to understand language, hearing their own words sung back to them can be a very validating and powerful experience.

Word substitution and song parody (altering words to an existing song) is a common lyric writing technique used in music therapy (Tamplin, 2006). Song parody is particularly suitable for persons with Broca's aphasia because it provides them with a prearranged concrete structure within which to write their songs and these clients are

generally more enthusiastic to re-write lyrics that are selected from their favourite songs rather than having to create them (Baker, 2005, p. 146). Tamplin (2006) also described "Song Collage Technique (SCT) [which] involves the use of words or phrases from existing songs as a part of the lyric formation process in creating therapeutically oriented songs" (p. 179). She presented three clinical situations where the song collage technique would be indicated for a client: (a) when the client has difficulty expressing feelings or fear due to cultural or gender issues, (b) when the client has cognitive impairments such as poor initiation, memory problems, and formation of ideas, and (c) when there are time constraints and the intervention period is not long enough to use traditional song writing approaches. SCT empowers clients by maximizing their independence and granting them ownership of the created song through song writing (Tamplin, 2006). Stroke survivors with Broca's aphasia can activate their unimpaired ability of receptive understanding to compensate for their verbal impairments through these various forms of song writing because creating song lyrics is similar as having conversation. Lyric writing can also help individuals regenerate the verbal communication skills (Baker, 2005).

Song writing not only helps persons with aphasia to work on practical speech rehabilitation goals in an enjoyable way, it also enables them to express their ideas and thoughts as well as release their emotions through singing their own composed songs.

Summary

The purpose of this paper was to explore how singing interventions may be used in music therapy contexts for persons with Broca's aphasia. Characteristics and issues concerning stroke, aphasia, and Broca's aphasia in particular were discussed. A review of the relevant music therapy literature revealed four overarching vocal intervention

categories: (a) use of pre-composed songs, (b) vocal improvisation, (c) toning and chanting, and (d) singing original songs written by the client. Subcategories included in category 'a' were: singing familiar songs, Melodic Intonation Therapy (MIT), and Modified Melodic Intonation Therapy (MMIT). Research and treatment goal areas were identified and described within each of these categories. The final section of this paper will outline relevant implications for music therapy practice as well as make recommendations for research.

Implications and Recommendations

Implications for Practice

This paper provides consolidated information to help guide music therapists in choosing suitable singing interventions for their clients with Broca's aphasia. These interventions can be adjusted and made suitable for individuals with mild to severe Broca's aphasia. Some key points (i.e., rationale) for music therapy clinicians to remember when working with this population include: (a) singing abilities are most often preserved in stroke survivors and clients with Broca's aphasia, (b) vocal interventions offer opportunities for these individuals to vent their feelings and have them validated by a music therapist with whom they have established a trusting therapeutic relationship, (c) the release of physiological tension through singing can induce relaxation which may allow people with Broca's aphasia to increase speech production, (d) group singing can facilitate verbal, non-verbal, and musical communication which in turn can reduce feelings of isolation and depression as well as facilitate a sense of belonging, (e) creativity elicited through vocal interventions is in and of itself a valid form of self expression, and finally, (f) within the context of a multidisciplinary rehabilitation

program vocal interventions can provide improved feelings of control, increased self-awareness, elicit a sense of achievement, and promote self-esteem—all of which serve as motivators for these patients to continue their participation in the rehabilitation process.

There are few overarching suggestions that music therapists should consider when working with persons who have non-fluent aphasia including: (a) use brief sentences or simple instructions, (b) break down the sentence into one or two points, (c) speak slowly and clearly, (d) say the main point only, and (e) adopt bodily, sign language, and visual aids (Baker and Tamplin, 2006). Individual music therapy sessions should be approximately 15-30 minutes in duration because clients with will be exhausted after a longer period of time (Baker & Tamplin, 2011; Purdie, 1997). Group sessions can be as long as 40 minutes (Lucia, 1987). The literature recommends that clients have at least 15 sessions (Baker & Wigram, 2004). The treatment period should be no less than 8 weeks and intensive sessions are suggested within this time span (Schlaug et al., 2009). Last but not the least, the therapist should avoid over-stimulating the client because it might induce client's frustration and fatigue (Magee, 1999).

Recommendations for Research

There is an increasing demand to examine the effectiveness and identify outcomes of different therapeutic treatments for stroke survivors with Broca's aphasia since the number of stroke survivors is rocketing and many are left permanently disabled (WHF, 2014). Although the current paper contains a summary of techniques being used as well as anecdotal and empirical evidence for the use of vocal interventions within music therapy contexts for persons with Broca's aphasia, more research is needed. This is

especially the case in the area of toning and chanting where no research was found but the potential for therapeutic application seems very promising.

It would also be interesting to know the treatment indications for the use of vocal interventions in group treatment contexts as compared to individual treatment contexts or if culture, gender, or other multicultural variables have a significant impact on the efficacy of these interventions. Identifying particular pre-composed songs that may be useful in achieving specific speech goals would also be a worthwhile endeavour. It may also be important to investigate whether or not outcomes are different when vocal interventions are implemented in the earlier versus the later stages of stroke recovery.

Finally, more interdisciplinary studies are needed to consolidate music therapy and speech therapy techniques in a way that incorporates the knowledge and expertise of both professions. Both fields need to be open to the idea that each have unique and valuable contributions to make to this area of practice and that they need to work together in order for best practices to occur. Interdisciplinary feedback breaks down when we accept the constructs of other disciplines as theory instead of discovering our own (Kenny, 2003). Equal collaboration among speech language pathologists, neurologists, and music therapists in both research and practice has the potential to make a significant difference in the efficacy of treatment for individuals with Broca's aphasia.

Conclusion

The current author was motivated to explore this topic because of her clinical experiences and more specifically, because of the profound and moving ways in which her clients with Broca's aphasia responded to music therapy intervention. It is her hope that this paper will provide helpful guidelines for therapists in using vocal interventions

for clients with Broca's aphasia, increase the use of these interventions in practice, and promote further research in this area.

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