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The Potential Effects of the Didgeridoo as an Indigenous Intervention for Australian Aborigines: A Post Analysis

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Abstract

Asthma prevalence in Australia is high by international standards. The disease is more common among Indigenous than non-Indigenous Australians. This article provides analyses of a music medicine intervention undertaken in 7 locations. Our team sought to evaluate whether a program of teaching didgeridoo playing and singing to Aboriginal people would be beneficial. Engaging community organizations, schools, and parents was met with challenges. While there were difficulties with retention of some participants, the overall results were positive. Spirometry indicated small improvements to lung function in a few participants; however, the overall value of the program's capacity to improve general well-being was considered to be high by both participants and parents. Increased appreciation of traditional culture was an additional outcome. In consideration of the program's effects and how best to sustain such health and cultural benefits to a small number of participants, its value will be weighed against the potential pragmatic problems of implementation and running costs. It is hoped that this article's reflective stance in review of outcomes will prompt further consideration of how best to develop music and medicine, music therapy, and/or educational programs that meet unique clinical and health needs through inclusion and that also address diversity. These aspects additionally offer consideration and insight into the profound effects that culture, particularly when expressed through live and active music making, may play in the health and wellness of both individuals and families of underserved communities.

Keywords

asthma, Australia, Indigenous, music

Background

Australia's Indigenous populations of Aboriginal peoples and Torres Strait Islanders comprise 2.5% of the country's 25 million residents.[1] Indigenous Australians are significantly poorer than their non-Indigenous counterparts in virtually every measure of health across all life stages. The burden of diseases and injury for Indigenous persons in Queensland for example is 2.1 times that of non-Indigenous persons.[2] The latest national statistics report a diabetes rate that is 3 times higher, a hospitalization rate for cardiovascular disease 1.7 times higher, and Indigenous young people dying at a rate 2.5 times as high as that of non-Indigenous young people.[3] These figures contribute to an estimated lower life expectancy at birth for Indigenous people of 11.5 and 9.7 years, for males and females, respectively, than that of all Australians.[3] Successive governments have pledged to make a difference under the commitment Closing the Gap.[4]

Programs specifically targeting Indigenous Australians are provided through the 6 state and 2 territory health departments. In addition, the federal government provides support through the Office of Aboriginal and Torres Strait Islander Health (OATSIH). The OATSIH directly funds Aboriginal and Torres Strait Islander Community Health Services (ATSICHS), which are community controlled or managed organizations providing an alternative choice to the mainstream public and private health sectors. The vast majority of clientele to, and medical, nursing, allied health, and administrative staff working in, the ATSICHS are people who identify as being Indigenous Australians.

Asthma is of high prevalence in Australia and even more so among Indigenous populations[5] where more than one-quarter of Indigenous Australians reported some form of respiratory disease in 2004-2005.[3] Half of the Indigenous Australians live outside of the major cities compared to only 10% of the non-Indigenous Australians.[1] Low socioeconomic, environmental, and lifestyle factors are considered major contributors to the

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prevalence of asthma; however, genetic predisposition cannot be ruled out. Asthma can usually be effectively managed; however, among Indigenous sufferers the condition is often exacerbated by low involvement with health services, culturally based opposition to nontraditional medicines, and lack of adherence to asthma management programs.

In 2008 the Centre for Rural and Remote Area Health (CRRAH) was approached by Carbal, the local ATSICHS, to assist in developing and implementing an asthma program for their clientele. The CRRAH (www.usq.edu.au/crrah) is a university-based research center with considerable experience and expertise in Indigenous health.

The primary objective of the implementation was to improve the management of asthma though increased awareness and education. A secondary objective was to increase engagement of families in health services.

An intervention that employed music combined with art and cultural awareness was designed. The music took the form of participants playing the didgeridoo (see the following discussion) or singing of traditional songs. It was believed that the novelty factor and association with cultural heritage could increase engagement and maintain retention.

Starting in 2009 the designed intervention was tested on adult, teenage, and preteen Indigenous Australians in 3 locations in the regional town of Toowoomba, Queensland. There are approximately 3000 Indigenous Australians who are resident in Toowoomba (population 100 000).[1]

In 2010, the program was repeated in Dalby, a rural town 100 km west of Toowoomba, where it was run under the auspices of Goondir, another ATSICHS. Dalby (population 10 000) has an Indigenous population of 1000.[1]

In 2011, the intervention was taken up by Doutta Galla Community Health, an Indigenous community health organization, in the State of Victoria, where it was run in an urban environment and then in 2012 repeated in 2 other urban locations. Australian Bureau of Statistics data report that less than 1% of the population in those locations identify as Indigenous Australians.[1]

In all of the 7 locations the Indigenous populations are heterogeneous, with individuals coming from many of the nation's 300 Indigenous language groups. This differs from the communities in the Aboriginal and Torres Strait Islander homelands (predominately in the more remote areas of central and northern Australia), where Indigenous people within a community are more likely to be from an individual clan from the same "nation" and language group.

Some of the results of those studies have been published elsewhere.[6,7] This article presents a summary of the findings from all 7 locations in the 2 states and the reflections, insights, and lessons learned from the activity.

The Didgeridoo

The didgeridoo is a long wooden wind instrument played by some Aboriginal tribes of Australia (Figure 1). Authentic didgeridoos are fashioned from termite-hollowed hardwood branches. Carrying strong symbolic ties to Indigenous culture, the instrument produces a "low-pitch, resonant sound with complex rhythmic patterns."[8]

Figure 1. Painting cultural motifs.

No two authentic didgeridoos are the same with length, width, internal bore, and sound all dependent upon the piece wood from which it is formed. The irregular shape of the internal bore means that the frequencies of the resonances are not harmonically spaced. The pulsed droning sound of the instrument is produced by lip vibration and manipulations of the tongue, throat, and diaphragm. Circular breathing, a technique by which air is exhaled from the mouth and simultaneously inhaled through the nose, enables accomplished players to produce continuous sounds for periods of up to an hour.

Interested readers may see and hear more of the instrument and music by typing "didgeridoo" into a search engine. Although commonly stated that females are not permitted to hold or play the didgeridoo, detailed study suggests that there may be little historical substance to this belief.[8]

Methods

Recruitment of participants for the 4 school-based interventions was through the schools themselves. The 4 schools on the program were all multicultural with the proportion of students who identified as Indigenous Australian equivalent to that of the general population. Each school had an Indigenous person in the position of Indigenous liaison officer, and they, along with the school nurses, facilitated the advertising and parental consent process.

Recruitment of adults and all participants to the 3 health center and community center interventions was undertaken by the individual health services who advertised to their clients, the local schools, and the wider community. Potential participants were screened by medical staff for eligibility, that is diagnosis of chronic asthma based on an asthma assessment questionnaire, medical history, previous diagnosis, current medication use, and spirometry.

Figure 2. Telling their stories during a boomerang throwing session.

In recognition of the preferential customary use of the instrument with this culture, the males used the didgeridoo as a breathing intervention, while percussive clap sticks, mp3 players containing backing tracks, and voice exercises combined with singing lessons were provided for the females. The intervention varied slightly across locations, reflecting the individual circumstances offered by the school terms, facilities, teachers, and budgets. All of the study periods consisted of one lesson each week, and the duration of the intervention itself varied between 17 and 26 weeks. Within the schools, lessons were for 1 hour, but in the 3 programs outside of the school facilities, weekly lessons occurred for up to 2 hours and included other activities such as storytelling, dance, boomerang throwing, and painting (Figure 2); all activities intended to expand cultural knowledge and focus.

In the community center programs, parents and extended family were encouraged to attend; and in Dalby, the Asthma Nurse from Goondir was present at every lesson. In all of the programs, educational materials on asthma and other programs such as smoking cessation and domestic violence were made available. Food and transport were provided at all the nonschool-based sessions.

Didgeridoos, clap sticks, and boomerangs were all made by, and purchased from, local Indigenous artists. The didgeridoos were in an unfinished form so that participants could create their own personalized design based on their own clan's culture (Figure 1).

Of the 6 teachers who were employed across the studies, 5 identified as being an Aboriginal Australian. All were professional artists and music teachers experienced in performing and teaching their area of expertise in school environments as well as privately.

In Toowoomba, a non-Indigenous teacher (the vocal coach) was also employed. She was a university music academic, artist, and professional coach involved in many school-based programs. She copresented the lessons to female participants.

The focus for both singing and didgeridoo lessons was inclusive of breathing techniques. None of the participants in the intervention had played the didgeridoo previously and lessons started by teaching them to how to place their lips, mold the wax mouthpiece (Figure 3) to obtain a custom fit and seal, and then simply to produce sounds through exhalation. They then experimented in changing the sound by manipulation of their tongues. Players initially breathed as they would for other wind instruments with sound production interspersed with breaks for intake of air. Deep breathing and even exhalation were practiced to increase the period of sound production relative to pauses.

The technique of circular breathing was soon introduced. Each of the music teachers had a slightly different approach for teaching this technique. One included the utilization of a water bath to assist (Figure 4) the flow of continuous breath. The end of the didgeridoo was immersed in water, and the player had to maintain a constant stream of bubbles while inhaling air through his nose.

There were no prescribed lesson plans; however, uniformly each didgeridoo lesson started with breathing and then circular breathing exercises before practicing mimicking the sounds and rhythms made by the teacher (see Appendix A).

Music lessons inclusive of singing consisted of breathing exercises and vocal lessons (eg, scales). Both modern and traditional music were used in the lessons (see Appendix A). For the former, backing tracks were purchased and loaded onto the mp3 player given to each female participant and lyrics were provided in paper form. Traditional songs were taught in the traditional oral manner, with the background to the songs explained. In the group sessions, the songs were sung accompanied by didgeridoo and clap sticks.

Participants were encouraged to practice their singing and didgeridoo playing at home. At the end of the intervention periods for the school-based groups, a concert was staged attended by the children's families, sponsors of the project, and partner organizations.

The objectives of the intervention required a variety of qualitative and quantitative methods to monitor outcomes. These included attendance records, peak flow meters to record morning and evening peak expiratory volume (PEF); asthma diaries to record daily PEF, medications, and symptoms; preinterventional medical review; spirometry preintervention, midintervention, and postintervention; quality-of-life assessment[9]; and feedback from participants, parents, and teachers. Dissemination of results and awareness of the program were achieved through the media (Figure 5) and scientific publications.[6,7,10,11]

The research received approval from the relevant Human Research Ethics Committees and was endorsed by Elders within each community.

Results

Enrollment and Attendance

Details are given in Table 1. A total of 99 participants enrolled on the programs. One participant identified as having dual

Figure 3. Preparing the mouthpiece with beeswax.

Figure 4. Learning to circular breathe by blowing a continuous stream of bubbles.

Figure 5. News articles and a television report created national awareness.

identity of Torres Strait Islander and Aboriginal, and the remainder identified as being Aboriginal persons. All participants were English speaking and for all but a couple of the adults English was their first language.

Retention rate was 75% (n = 75). Of the 24 losses from the programs, 10 were as a result of children leaving their schools due to graduation or family relocation. Ten adults dropped out for reasons of ill health or change in their employment circumstances. To our knowledge lack of interest or enjoyment was not a factor in anyone withdrawing from the program.

Attendance of those retained on the program within the school environments was excellent at over 90%, with participants only missing classes due to illness (colds and flu). In the community settings, attendance was generally good; in Dalby, it was more than 80% of classes, while in the urban settings weekly attendance averaged 50%. Unreliability of transport accounted for some of the attendance issues in Victoria. In Dalby and Toowoomba, several of the adult participants had additional health issues that prevented regular attendance.

Monitoring of Outcomes

There was mixed success with monitoring methods. In study 1, the participants were all provided with peak flow meters and diaries to record daily readings, medication, and their general health. The carbonless duplicate diary pages were collected weekly; however, despite constant urging response was mixed with fewer than 50% of the sheets recovered. However, results from the diaries indicated regular use of the peak flow meters, and this was confirmed verbally by the participants. The main purpose of the meters and the request for regular usage was to maintain awareness of their asthma and to this end had some success.

In studies 1 and 3, Juniper's Quality of Life Questionnaires[9] were used. Questionnaires were self-administered by adults and teenagers during class time. However, from our perspective, these did not provide interpretable results. Inconsistencies suggested lack of interest in completion; perhaps they are not culturally suitable.

The nurse-administered questionnaires to the younger children were also problematic with evidence of lack of

Table 1. Enrollment and Retention of Participants in the Programs.

Study	Group	Area	Location	Enrolled	Retained	Age range
1	1	Regional	High school	18	15	13-18
1	2	Regional	Primary school	9	5	5-8
1	3	Regional	Medical center	5	5	50-77
2	4	Rural	Community center	25	16	6-59
3	5	Urban	Community center	20	17	5-17
4	6	Urban	Primary school	15	11	5-13
4	7	Urban	High school	7	6	11-14
			Total	99	75	

comprehension. Invariably in multiple-choice questions, the last option provided by the nurse was the one selected by the child. Several of the preteen children were described by their teachers and confirmed by health staff as having learning difficulties associated with past medical conditions, and this contributed to the problem. Both diaries and questionnaires were discontinued in the other studies.

Spirometry readings were taken preintervention and postintervention and depending on the length of the intervention at 1 or 2 intervals midintervention. Results demonstrated significant changes only in study 1 where forced expiratory volume in 1 second (FEV1) and forced expiratory vital capacity (FVC) values, as standard measures of respiratory function, both increased between the first and third tests in the senior school boys. No significant improvement was found in females or in either sex in subsequent studies.

Although desirable because of its role in monitoring change in asthma, the objectives of the study did not rely on this measure to determine success. It was always known that the numbers were small and may be insufficient to demonstrate changes. Furthermore, it was soon realized that although readings were achievable in all teenagers, several of the young children had extreme difficulty in blowing for the sufficient time or to coordinate their exhaling into the apparatus. Several of the adults who had additional respiratory problems also experienced difficulty in using the equipment.

Feedback

By far the most effective method for determining the value of the program in meeting its objectives was through feedback from students, parents, and teachers, which illustrated the enjoyment that participants had in the program and their increased knowledge about asthma. Without exception, participants indicated that they would have liked it to continue and several made comment that they had also benefited from the cultural awareness of music, song, dance, and art. Most importantly views on their health and their asthma indicated a positive change which they considered to be as a result of being on the program. Table 2 indicates some of the responses that were received.

Community-Perceived Outcomes

An additional benefit of the program was the interaction with staff and the flow on effects. Once trust was established, the students and parents felt safe to discuss other significant health issues with the nursing staff. The classes also were considered to be a safe place for open discussion, with teachers noting topics of discussion included bullying, violence, family issues, and problems at home. Programs offered outside of the school environment were held in the later afternoon and early evening and offered the opportunity for attendance by family members. As one parent said to the nurse in the community center, "Now that we know you we would be happy to come and see you. We don't like to take medicine but we would be happy to talk to you."

An additional aim of the project was to further the evidence base in order to develop a music therapy program that could be transferred. This aim was achieved with dissemination of information through national and international newspaper articles, national radio and television, presentations to national and international conferences, and publications in journals, which targeted Indigenous health workers.[10,11]

Discussion

Breathing exercises, swimming, musical instruments, and singing have long been advocated for people with asthma,[12-14] and a Cochrane Review, albeit of only 7 eligible studies, concluded that breathing exercises produced an encouraging trend for improvement, notably in quality of life.[15] Benefit is attributed to better breathing control, and recently a singing therapy trial for young people with cystic fibrosis demonstrated an increase in respiratory muscle strength.[16]

Wind instruments also have been used to support respiratory issues and were advocated for that purpose by Marks 30 years ago.[13] A 2006 Swiss study reported on the use of a long pipe for treatment of sleep apnea,[17] and the didgeridoo is used by the Worldwide Sleep Apnea-Didgeridoo Network for the same condition.[18]

In relation specifically to asthma, a study by Lucia published in 1994[19] compared self-reported symptoms of 7 asthmatic teenagers who played wind instruments with 11 asthmatics who did not play any instrument. The music playing asthma patients perceived a better sense of well-being, and the author concluded that music playing did not exacerbate asthma and had beneficial effects. Griggs-Drane concluded that wind instruments may be as effective as traditional interventions for pulmonary fitness of patients with chronic obstructive pulmonary disease (COPD; including those with asthma) and provide greater benefits of treatment compliance, cost, and quality of life.[20] However, the details of these results from her master's study have not been published.

Despite the lack of scientific evidence, there are numerous anecdotes and several programs, which address asthma using wind instruments. These include The Bronchial Boogie run by the Oldham Primary Health Care Trust (UK)[21] and 2 well-

Table 2. Comments From Participants (adapted from Eley et al[7]).

Enjoyment
I enjoyed it heaps and if I could I would do it again.
Well I have really loved the group. It was really fun.
I liked the singing and some of the breathing things; it was awesome
I loved it. To be able to sign up and have fun during school is pretty awesome.
I would love to do it again if the opportunity arises.
I feel good that I have participated in this program.
I really enjoyed being in the asthma music program.
I liked the didge playing and practicing.
I really enjoyed being here with the kind and lovely teachers they are cool.
I liked throwing boomerangs, eating food and playing the didge.
I would definitely partake in another project with the same amount of enthusiasm.
I liked the food, the juice and playing outside
I just like it! I really like doing the peak flow and getting a high score.
Education and Awareness
It brought awareness of asthma.
I have learned a lot about asthma and medications and when to use them.
I have better awareness of using medicine, regular breathing, and learn what stimulates asthma.
The asthma action plan has been very helpful and clear cut.
This has enabled the medications to be tailored to my needs.
This programme has helped me understand asthma better.
Regular use of the peak flow meter was an eye opener; what affect medication has on my breathing.
I have learnt about the asthma action plans.
Also be aware that exercise should be part of their life and will help their health.
I have learnt more about asthma and have my own asthma action plan.
This program has helped us understand asthma better.
It helped me to understand how my asthma works and how I can manage my asthma.
I didn't know so many people had asthma.
During the project I met other people with asthma just like me.
We've learnt better skills for managing asthma.
Health Benefits
I found it rewarding and beneficial to my health.
I think learning the didgeridoo has helped my asthma.
It really helped my breathing.
I don't get so puffed now when I'm running or playing.
I feel healthier- not so puffed.
The didgeridoo increased my respiratory capacity and control.
I could inhale bigger breaths and then exhale out through the didgeridoo for longer; the sound of the instrument was an incentive to exhale longer.
I feel like I can breathe better and run further.
This program has helped me with my breathing during nights.
1 km used to be a massive run but when I went on camp I ran 6 km non-stop on the beach so success!
It helped me with my asthma and I can now run more than 100 metres before I feel like coughing.
The program has helped me a lot in regards to asthma.
It helped me a lot with my breathing and it was fun as well.
It helped me with my asthma.
I think it must have helped as I haven't been sick yet and I would normally have been sick by now.
Usually we have been sick by now but we haven't this year.
I like the rhythm, and can feel my breathing in my diaphragm.
My child has had fewer asthma attacks and is feeling more confident. [parent]
I don't know how much if helped their lung function but they haven't been sick yet. [parent]

established programs run by the Louis Armstrong Center for Music and Medicine in New York. The latter, Music for Advances in Respiration (AIR) and the Asthma Initiative Program (AIP), are designed as complementary interventions that provide music therapy including use of recorders to enhance breathing capacity and quality of life.[22,23] At the time of writing of this article, these studies' results were not published, although the programs have indicated success in the descriptive analyses.[22,23]

Internet searches also reveal support for the use of wind instruments. For example, a blog on the exam board of Royal School of Music[24] extols the virtues of woodwind playing by bloggers with asthma.

In all the aforementioned literature, the deep breathing techniques are attributed as being the catalyst for positive change. In our study, the controlled breathing used in singing and the controlled and circular breathing while playing the

didgeridoo, may have assisted in improving lung function. It certainly influenced adherence. We speculated while reporting the first study[6,7] that the strengthening and better perceived control of respiratory muscles may have occurred, as has been reported in other studies using breathing exercises.[25,26] We offered the explanation that the greater effect seen with some males could be as a result of the deeper breathing required for playing of the didgeridoo.

However, a small and significant improvement in respiratory function as measured by spirometry was found. Although these changes were only in a few participants and this is the first study of its kind, the use of Indigenous instruments seemed to have intrinsic values. The lack of controls or removal of confounding variables such as seasonal effects is another important consideration. Here, it did not allow for a definitive conclusion that the didgeridoo improves lung function. Consequently, unlike the popular press who picked up on the positive implications of our results, we did not suggest that playing the didgeridoo cures or even directly relieves asthma. However, what we can say with confidence is that an Indigenous music intervention that includes didgeridoo playing was considered by the participants to coincide with an improvement in their perceived respiratory health.

Consequently overall, despite a number of constraints to project implementation around recruitment of participants and engagement with schools and community organizations, the program achieved success in realizing its objectives. Furthermore, the results have demonstrated that the intervention has benefit in both rural and metropolitan environments.

This project was guided by historical failures and successes in Indigenous-directed interventions by ensuring that all components were addressed with regard for accepted practices. To this end, prior to the recruitment of the participants, community endorsement was sought and received through consultation with elderly individuals. In addition, the didgeridoos and clap sticks used were purchased from local sources and with one exception the teachers were Indigenous musicians. This recognition of cultural requirements is an essential but often overlooked component of research and even of health provisions made to Indigenous participants. Lack of engagement of community is recognized as a key factor in the frequently cited failure of such programs.[27]

Engagement by Indigenous Australians in projects and programs has historically been low. This has resulted from combination of factors including lack of awareness of cultural sensibilities and manifested by lack of consultation with the intended participants. Marginalized communities have often spurned generally well intentioned, although many times politically motivated, activities rather than having the will of "mainstream" Australia imposed upon them. Any project requires buy-in and support from the local Indigenous population, and our protocol followed this process. Consultation with community organizations were generally positive about what we were trying to achieve although some were unable to offer much time or assistance due to their own priorities and workloads. Their advice was very helpful and their endorsement validated the program. Nevertheless, it must be mentioned that not all community organizations chose to promote the program. They were opposed to the project being run by a non-Indigenous organization (ie, the university) and in one case by a local Indigenous organization that was perceived as representing another language group or clan.

Schools appeared to be an ideal location for the program as they provide not only facilities but also a "captive" audience. However, for projects such as these to succeed, schools have to be supportive, ideally with a champion within the school. This was the case in 3 of the 4 schools; in the fourth a change in personnel was followed by a noticeable loss in support. It was however difficult to engage other potential schools in the program. In our environment, the number of other programs supporting Indigenous students may have influenced commitment.

Recruitment within the participating schools was affected by the low number of potential participants who would be eligible to enter into the program. Despite high asthma prevalence even in the largest schools, the pool of eligible Indigenous children was relatively small. Combining several schools together was impractical because of travel and timetabling differences. It was for that reason that community settings were tested, although they sometimes suffered from having to run the program at times which conflicted with preferred extracurricular activities such as football.

Retention on the project was excellent with dropout owing to factors other than lack of interest or enjoyment. However, based on our experiences, we are hesitant about advocating this intervention for adults, without very careful selection of participants as other health issues often afflict older participants.

Despite their identity, hardly any of the participants had much familiarity with the didgeridoo and none could play. Although recognized worldwide as an Indigenous Australian musical instrument, its use other than as a tourist attraction and for ceremonial purposes is quite limited geographically. The novelty of the intervention and the participants' progressive interest in their culture of stories and art played a major contribution to retention. As one of the music teachers noted, "at the start [they] were disrespectful to their Indigenous heritage, however the more they were told about the cultural side of the didgeridoo (the laws, mythology and significance of the didgeridoo to us as Australians), the more they became intrigued and interested to learn as many aspects of their culture and heritage as they could, which in turn has increased their confidence level."

To achieve success of an intervention support from parents is essential. This did not happen universally; in 2 cases mothers of subjects took the mp3 players for their own personal use and the subjects subsequently stopped attending. Ultimately, however, success of this type of program comes down to a demand for change among those who are affected (both sufferers and their carers). Attitude to asthma is somewhat of an enigma. Despite the debilitation, discomfort, and anxiety it can cause, asthma nurses in the study reported that in their opinion some parents did not appear to be sufficiently concerned about their children's asthma. It is probable that the potential severity of

the disease is not recognized, while use of "puffers" is seen to be effective and this leads the belief in some individuals that the child "will grow out of it."

This attitude is not confined to the Indigenous population but is exacerbated in a culture that can be wary of nontraditional medicines and has access constraints to health services.

Across the entire population in Australia, availability of puffers may also be a contributing factor to this observed attitude. The puffer has become a ubiquitous item and Ventolin (Albuterol) has become the generic name for puffer-dispensed bronchodilators. Puffers can be purchased without prescription. The consequence could promote a less-than-ideal attitude to asthma management.

It is of interest that the author recently was advised by one family physician that "we do tend to hand out puffers . . . because don't do any harm and many cases do a lot of good," and another stated that they were used for coughs and colds by her entire family, none of whom were asthmatic. This attitude was confirmed in discussion by the author with the Asthma Foundation of Queensland, who identifies problems in convincing a small proportion of people that asthma is a dangerous, potentially fatal condition that would not go away on its own and should not be ignored. The educational material provided through the study was intended to address this problem.

Future Recommendations

This study successfully demonstrated that music has a great potential for engaging participants and improving their self-reported health. The cumulative lessons included in this study were built upon recognition that the breathing activity had to be presented in an enjoyable way. Consequently, the presented activities incorporated music and eventually included other activities (storytelling, painting, and dance).

The objective was not to produce accomplished musicians but to provide engaging activities built upon a platform of asthma education and breathing exercises. Although this program was designed within the context of the Indigenous peoples of Australia, similar approaches could be adopted to suit other minority or Indigenous groups elsewhere. Ideally done in conjunction with a local health service, the program is effective.

We hoped that the intervention was one in which physical and emotional enrichment might easily and readily be transferred into other Indigenous communities throughout Australia. However, we recognize that the limiting factor for this to occur could be the access to musicians. Initially, we rather naively assumed that this would not be a problem as there are talented artists and musicians within the communities. The limitation, however, is that only professional artists could be found, all of whom commanded professional levels of remuneration. This was manageable for the research project with generous support of the sponsors; however, for wider dissemination of the program, funding may be problematic and should be strategized at the onset.

Our conclusion to the intervention is that although demonstrated to be effective in both reducing the burden of asthma and in engaging community in health, the cost of running the programs may be prohibitive to widespread uptake.

Appendix A

Music Used in the Program

Much of Aboriginal music relates to the land or "country" with sounds and lyrics associated with land, animals, occasions, and seasons. Songs were not written down but passed down from generation to generation. Many didgeridoo pieces have titles such as "Wide Open Spaces," "Buffalo," and "Black Cockatoo" and the sounds and rhythms played on the instrument mimic those of the subject. The songs are often accompanied by dance depicting the movements of bird or animal. More recently the didgeridoo has been used to accompany many genres of music, and Indigenous music encompasses folk, rock, fusion, and jazz. The reader is directed to sites such as http://www.didjshop.com/shop1/cd_list.php, where the full spectrum may be found.

For this program, each of the male participants was given a copy of *The Didgeridoo—A Beginner's Guide* by Alastair Black (1994), Windspirit Productions. The audio book's song list of "Kookaburra," "Eagle Totem," "Lizard Walk Totem," and "Cricket & Bullfrog Totem" were used for home practice to build upon the sounds taught during class time.

Females on the program were taught a few traditional songs (examples of songs may be found at http://www.thekangarooclub.com/lyrics.html) and provided with a CD and audio book (http://vanessahoffman.com/learn-to-sing-in-a-clear-and-powerful-way/) for home practice. In addition, the females were each given mp3 players containing 20 backing tracks purchased from Redwood Entertainment (http://www.cdya-stuff.com/). An accompanying book of song lyrics was also provided. Songs were from many genres including musical theater (eg, "Big Spender" by Sweet Charity), the latest charts ("Born to Try" by Delta Goodrem), pop ("Dancing Queen" by Abba), swing ("Fly Me to the Moon" by Frank Sinatra), R&B/soul ("Fell in Love with a Boy" by Joss Stone), and country ("If Tomorrow Ever Comes" by Garth Brooks).

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References

1. Australian Bureau of Statistics. *Census of Population and Housing—Counts of Aboriginal and Torres Strait Islander Australians*, 2011. Canberra, Australia: Australian Bureau of Statistics; 2012.
2. Queensland Health. *The Health of Queenslanders 2012: Advancing Good Health*. Brisbane, Australia: Queensland Health; 2012.
3. Australian Institute of Health and Welfare. *The Health and Welfare of Australia's Aboriginal and Torres Strait Islander People, an Overview* 2011. Canberra, Australia: AIHW; 2011.
4. Australian Government Department of Families Housing Community Services and Indigenous Affairs. Closing the Gap—The Indigenous Reform Agenda. http://www.fahcsia.gov.au/our-responsibilities/Indigenous-australians/programs-services/closing-the-gap. Accessed December 3, 2012.
5. Australian Centre for Asthma Monitoring. *Asthma in Australia 2011: With a Focus Chapter on Chronic Obstructive Pulmonary Disease*. Canberra, Australia: AIHW; 2011.
6. Eley R, Gorman D. Didgeridoo playing and singing to support asthma management in Aboriginal Australians. *J Rural Health*. 2010;26(1):100-104.
7. Eley R, Gorman D, Gately J. Didgeridoos, songs and boomerangs for asthma management. *Health Promot J Aust*. 2010;21(1):39-44.
8. Aboriginal Australia Art and Cultural Centre—Alice Springs. The Didgeridoo and Aboriginal Culture. http://www.aboriginalart.com.au/didgeridoo/music.html. Accessed December 3, 2012.
9. Juniper E, Guyatt G, Feeney D, Ferrie P, Griffith L, Townsend M. Measuring quality of life in children with asthma. *Qual Life Res*. 1996;5(1):35-46.
10. Eley R, Gorman D. Music therapy to manage asthma. *Aborig Isl Health Work J*. 2008;31(1):9-10.
11. Norman M, Eley R. Music therapy to manage asthma symptoms in young Indigenous people in an urban setting. *Aborig Isl Health Work J*. 2010;34(3):20-22.
12. Bolger E, Judson M. The therapeutic value of singing. *New Eng J Med*. 1984;311(26):1704.
13. Marks M. Musical and wind instruments in rehabilitation of asthmatic children. *Ann Allergy*. 1974;33(6):313-319.
14. Stacy R, Brittain K, Kerr S. Singing for health: an exploration of the issues. *Health Educ*. 2002;102(4):156-162.
15. Holloway E, Ram F. *Breathing Exercises for Asthma (Cochrane Review)*. Chichester, UK: John Wiley and Sons Ltd; 2003.
16. Irons J, Kenny D, McElrea M, Chang A. Singing therapy for young people with cystic fibrosis: a randomized controlled pilot study. *Music and Medicine*. 2012;4(3):136-145.
17. Puhan M, Suarez A, Cascio C, Zahn A, Heitz M, Braendli O. Didgeridoo playing as alternative treatment for obstructive sleep apnoea syndrome: randomised controlled trial. *BMJ*. 2006;332(7536):266-270.
18. Worldwide Sleep Apnea-Didgeridoo Network Web Site. http://sleepapneadidgeridoo.com. Accessed December 3, 2012.
19. Lucia R. Effects of playing a musical wind instrument in asthmatic teenagers. *J Asthma*. 1994;31(5):375-85.
20. Griggs-Drane E. The use of musical wind instruments in the treatment of chronic pulmonary diseases. In: Dileo C, ed. *Music Therapy & Medicine: Theoretical and Clinical Application.* Silver Spring, MD: The American Music Therapy Association; 1999:129-138.
21. Camber R. Twins' asthma is blown away. *Manchester Evening News*. *June 2, 2004.* http://menmedia.co.uk/manchestereveningnews/news/s/118/118561_twins_asthma_is_blown_away.html. Accessed December 17, 2012.
22. Azoulay R. A music psychotherapy approach for the treatment of adults with pulmonary disease. In: Azoulay R, Loewy JV, eds. *Music, the Breath & Health: Advances in Integrative Music Therapy*. New York, NY: Satchnote Press; 2009:151-168.
23. Harris B, Rondina E. The Asthma Initiative Program: Medical music psychotherapy with children and teens with asthma. In: Azoulay R, Loewy JV, eds. *Music, the Breath & Health: Advances in Integrative Music Therapy*. New York, NY: Satchnote Press; 2009:135-150.
24. Exam Board of the Royal School of Music. http://www.abrsm.org/forum/index.php?showtopic=27283. Accessed December 17, 2012.
25. Girodo M, Ekstrand K, Metiver G. Deep diaphragmatic breathing: Rehabilitation exercises for the asthmatic patient. *Arch Phys Med Rehabil*. 1992;73(8):717-720.
26. Thomas M, McKinley R, Freeman E, Foy C, Prodger P, Price D. Breathing retraining for dysfunctional breathing in asthma: a controlled trial. *Thorax*. 2003;58(2):110-115.
27. Gorman D, Best O. Multicultural issues in health. In: Rogers-Clark C, Martin-McDonald K, McCarthy A, eds. *Living with Illness: Psychosocial Challenges for Nursing*. Sydney, Australia: Elsevier; 2005:70-82.

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