

Didgeridoo playing and singing to support asthma management in Aboriginal Australians

Short title: Music therapy for asthma

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Abstract

Objectives: The principal objective was to determine whether Aboriginal children, adolescents and adults would engage in a music lessons to support management of their asthma. Supplementary objectives were to determine if the intervention would improve health and to expose participants to their traditional musical culture.

Design: Cross sectional study, questionnaires, self reporting.

Setting: Primary and secondary schools, Aboriginal Medical Service.

Participants: Asthmatic Aboriginal adults and junior and senior school students.

Interventions: A six-month programme of once weekly didgeridoo lessons for males and singing lessons for females.

Main outcome measures: Recruitment and retention; respiratory function; quality of life; self reporting of enjoyment and health.

Results: Recruitment and retention varied both among and within groups. High school students enthusiastically engaged and had excellent retention in what they considered to be a most enjoyable programme. Initial interest from adults within the community was good, however there was a large drop out and attendance of those retained was compromised by ill health. Primary school boys and girls had 100% and 0% retention, respectively. Respiratory function improved significantly in boys and the senior boys also reported a noticeable improvement in their health. Similar but less significant improvement was seen in the high school girls, however, like the boys, they too perceived an improvement in their asthma.

Conclusion: The project demonstrated that music has great potential for engaging and thus supporting asthma especially in adolescents. Furthermore cultural awareness was increased by those playing the didgeridoo and social skills were noticeably improved in the girls.

Key words: music, asthmatics, quality of life, respiratory function.

Acknowledgements

The project was funded by the Asthma Foundations of Australia.

What is already known on this subject?

Asthma is a major chronic disease in Aboriginal people.

Compliance in asthma management is poor.

Music therapy has been advocated for support of asthma.

What does this study add?

This study demonstrated that a programme of music intervention can engage Aboriginal adults and school students and can support their asthma management and increase their cultural awareness.

Introduction

Asthma affects between 14% and 16% of 0 to 14 year olds in Australia and is the leading contributor to burden of disease.¹ Boys have a higher rate of asthma than girls.² The disease is more common among Indigenous than non Indigenous Australians.³ People with current asthma rate their health lower than people without current asthma.⁴

Singing, breathing exercises and playing of wind instruments have been advocated for asthma management. In 1897 Elsdon wrote about singing "*There is no more perfect system..... a great adjunct to health..... the diaphragm and other important muscles which too often lie dormant are brought into action, the throat is strengthened, and every part of the torso is benefited*".⁵ Stacey cites the benefits of singing on health⁶ and a Cochrane review concluded that breathing exercises produced an encouraging trend for improvement, notably in quality of life.⁷

Research on the value of wind instruments to treat asthma was advocated in 1974.⁸ To date one single published study demonstrated fewer symptoms, an improved sense of well-being and fewer emotional swings in wind instrument versus non-wind instrument playing asthmatics.⁹ In 2005 the Louis Armstrong Center for Music and Medicine in New York opened to provide music therapy care to complement medical treatment of asthma and chronic obstructive pulmonary disease.¹⁰

This project was conceived in recognition of the need to support Indigenous asthmatics and with knowledge of the reported benefits of breathing exercises and music on asthma. Its main aim was to determine if a musical programme would engage asthmatics within the local Indigenous community. Supplementary objectives were to determine if the intervention would improve measures of health and to expose participants to their traditional musical culture.

Methods

Community engagement

Community Elders were consulted to determine appropriate methodology to meet both the aims of the study and the cultural needs of the participants.

Participants

Potential participants were identified by advertising in two schools and in the local media. The Aboriginal Medical Service (AMS) screened the candidates for eligibility. Asthma diagnosis was based on medical history and clinical assessment. Male and female groups were formed for adults and both senior and primary school students (groups = 6).

Music training

Weekly one hour lessons were held for 26 weeks. Adult lessons were at the AMS and transport was provided. Students received lessons at school. Males were each given a didgeridoo made by an Aboriginal craftsman. An Aboriginal didgeridoo player taught traditional didgeridoo sounds and melodies including the art of circular breathing. Females received an mp3 player containing backing tracks and voice exercises. Singing and breathing exercises were taught by a professional vocal coach/singer aided by an Aboriginal singer.

Data collection

Respiratory function (RF) was determined by spirometry (Microlab 3300 Micro Medical Ltd, Kent, UK) at 0, 3, 6 months. Participants used peak flow metres (AirZone, Clement Clark International, UK) to determine morning and evening peak expiratory flow (PEF). Coughing, wheezing, chest tightness and medication use were also recorded.

Quality of life questionnaires (QOLQ) were completed at the time of the RF checks. The three questionnaires were checked for cultural appropriateness, were validated for Australia and for the age group in which they were used.^{11, 12, 13}

At the end of the programme each senior student submitted a short anonymous report in which they were instructed to write anything they wanted about the programme.

Analysis

Comparisons among the three time periods were made using paired t-tests.

Ethics

The study was approved by the university Human Research Ethics Committee. Written parental consent was obtained for all students.

Results

Engagement

Recruitment and Retention

The recruitment and retention of the participants is given in Table 1.

Table 1. Recruitment and retention

	Age range	Signed on to programme	Attended first lesson	Left during programme	Retained for six months	Percent retained
Adult females	39-77	7	4	1	3	75
Adult males	41	3	1	0	1	100
Junior females	6-10	5	5	5	0	0
Junior males	7-10	4	4	0	4	100
Senior females	13-17	13	13	4	9	70
Senior males	14-17	8	6	1	5	83
Totals		40	33	11	22	66

Seven people who had “signed on” following determination of their eligibility failed to show for the first lesson. Four senior students left the school either before the first lesson (2) or during the programme (2) and three more dropped out. All junior boys were retained, however all five junior girls stopped attending classes during the second month.

School support

The senior school was supportive of the programme. The Cultural Officer reminded students of lessons and followed up on absenteeism. The junior school administration was extremely supportive during the establishment phase. Thereafter there was little support to ensure that the students attended the classes.

Support by parents

High school students were self-dependant and it is unknown how much parental support they had. However as retention was high it may be assumed that at worst there was little opposition and at best positive support. Support from the parents of juniors appeared to differ between the boys and the girls. The boys brought their lunches and their didgeridoos and two boys filled in the majority of their PEF sheets – a task that required parental support. In contrast the girls PEF diaries were rarely handed in. During their limited period of attendance the girls showed up to class without lunches, singing books and their mp3 players.

Enjoyment of the music programme

Nine of the 14 senior students wrote in their reports that they enjoyed the programme (Table 2). No-one wrote that they didn't like the programme.

Table 2 Comments received from students in their final reports

Enjoyment	Health
<i>I really enjoyed being here with the kind and lovely ladies they are cool</i>	<i>I found it rewarding and beneficial to my health.</i>
<i>Well I have really loved the group. It was really fun</i>	<i>It really helped my breathing</i>
<i>I liked the singing and some of the breathing things and I also like having [the teachers] around and it was awesome</i>	<i>The program really helped me with my asthma</i>
<i>I really enjoyed the asthma programme</i>	<i>This program has helped me with my breathing during nights</i>
<i>I enjoyed it heaps and if I could I would do it again.</i>	<i>... before [the lessons] 1km was a massive run but when I went on camp I ran 6km <u>non-stop</u> on the beach so SUCCESS</i>
<i>I loved it. To be able to sign up and have fun during school is pretty awesome</i>	<i>The medical program has helped me with my asthma because I can now run more than 100 metres before I feel like coughing</i>
<i>I would love to do it again if the opportunity arises.</i>	<i>The [IMS name] program has helped me a lot in regards to asthma</i>
<i>I liked the didge playing and practicing</i>	<i>It helped me a lot with my breathing and it was fun as well.</i>
<i>It was fun as well.</i>	<i>It helped me with my asthma</i>
	<i>It helped me to understand how my asthma works and how I can manage my asthma</i>

Socializing

Socializing was an important part of the programme especially for adults.

- *It got me out of the house and mixing with other people (77year old female).*
- *Socially each of the clients came from different tribes and they enjoyed sharing their history with each other. I encouraged this, as it is important to them (music teacher).*

Cultural awareness

An increase in cultural awareness was an important objective of the programme and one that was achieved with the males playing the didgeridoo. The didgeridoo teacher wrote:

- *These boys at the start 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. In giving Indigenous Australians back a part of their culture they may not have been able to access before, might have had a positive impact on overall stress of loss and grief they may feel.*

Health

A summary of the data collected during the course of the study is presented in Table 3.

Daily peak flow

Compliance over the 26 week period in self-reporting PEF was mixed (Table 3). Of the 22 retained participants four returned nine or fewer weekly sheets.

Daily readings were highly variable with no significant changes over the programme. Comparison was made of the first four weeks of the study with the last four weeks for the nine

participants for whom 20 weeks or more data were recorded. Although there were small increases in four of the five males these differences were not significant ($p > .05$)

Table 3. Data collected from participants

ID	Group ¹	Sex	RF1	RF2	RF3	QOL1	QOL2	QOL3	PEF	R
266	A	F	X ²	X	Sick	X		X	12 ³	X
1495	A	F	X			X			0	
1545	A	F	X			X		X	15	X
3403	A	F	X						12	
3256	A	M	X		X	X		X	25	X
1038	J	F	X	X		X			0	
1809	J	F	X			X			1	
3735	J	F	X			X			8	
3741	J	F	X			X			2	
3779	J	F	X			X			3	
3108	J	M	X	X	X	X	X	X	3	
3736	J	M	X	X		X	X		3	
3737	J	M	X	X	X	X	X	X	15	
3740	J	M	X	X	X	X	X	X	18	
489	S	F	X	X	X	X	X	X	6	X
490	S	F	X		X	X	X	X	11	X
1030 ⁴	S	F	X				X		1	
1061	S	F	X	X		X	X		14	
1063	S	F	X	X	X	X	X	X	13	X
1605	S	F	X	X	X	X	X	X	21	X
2791	S	F	X			X			0	
3106	S	F	X	X	X	X	X	X	20	X
3405	S	F	X	X	X	X	X	X	23	X
3579	S	F	X	X	X	X	X	X	15	X
3744	S	F	X	X	X	X		X	22	X
3760	S	F	X	X	X	X		X	12	X
3767	S	F	X			X			9	
1064	S	M	X	X	X	X	X	X	26	X
3743	S	M	X			X			0	
3747	S	M	X	X	X	X	X	X	21	X
3748	S	M	X	X	X	X	X	X	20	X
3757	S	M	X	X	X	X	X	X	3	X
3758	S	M	X	X	X	X	X	X	20	X

¹A = Adult, S = Senior, J = Junior; Respiratory Function (RF); Quality of Life (QOL) at times 1, 2 & 3; Peak Expiratory Flow (PEF); Reports (R).

²X denotes data collected

³Weeks of data collected

⁴ Shaded rows denote participants who dropped out of the programme

Respiratory function

Results for FEV1 are presented in Table 4. For the male cohort the values increased between the first and third tests ($p < .01$).

The males also increased between the start and end of the study in FVC ($p < .01$) which rose from $79.3 \pm 7.4\%$ to $101.3 \pm 5.3\%$ and PEF ($p < .05$) ($67.7 \pm 5.5\%$ to $81.2 \pm 5.5\%$). The female cohort did not show any changes for FEV1 ($102.8 \pm 7.1\%$ to $112.0 \pm 4.5\%$) and FVC ($98.9 \pm 6.4\%$ to $100.3 \pm 3.0\%$), however PEF increased ($p < .01$) from $70.8 \pm 7.7\%$ to $98.4 \pm 4.9\%$.

Table 4. Forced Expiratory Volume (FEV1)

ID	Group	Sex	Time 1		Time 2		Time 3	
			FEV1 ¹	%	FEV1	%	FEV1	%
3256	Adult	Male	2.49	74			2.73	81
3108	Junior	Male	1.44	65	1.83	75	1.41	66
3737	Junior	Male	1.59	72	1.69	71	2.38	109
3740	Junior	Male	1.61	122	1.21	97	1.76	142
1064	Senior	Male	2.22	88			2.72	102
3747	Senior	Male	4.22	127	4.31	136	4.38	134
3748	Senior	Male	2.58	74	2.89	85	3.81	109
3757	Senior	Male	1.67	84	2.06	115	2.31	108
3758	Senior	Male	2.64	95	2.61	91	2.85	95
Mean			2.27	89²	2.37	95.7	2.70	108.5²
489	Senior	Female	2.31	97	2.24	103	2.24	102
490	Senior	Female	3.13	128			3.03	126
1061	Senior	Female	2.68	113	2.98	149		
1063	Senior	Female	1.92	82	1.81	83	1.95	97
1605	Senior	Female	1.47	69	2.08	103	2.22	106
3106	Senior	Female	2.35	116	2.08	107	2.12	125
3405	Senior	Female	2.72	119	2.74	126	2.73	120
3579	Senior	Female	2.64	101	3.3	158	3.3	128
3744	Senior	Female	3.85	140	3.82	121	3.83	124
3760	Senior	Female	2.69	89	2.71	105	2.82	101
Mean			2.57	105.4	2.64	117.1	2.69	114

¹ Litres/second

² Significant increase between time 1 and time 3 (p<.01)

Quality of life

There were insufficient data from the junior students and adults. Among the nine female high school students the QOL scores of five did not change, three improved and one declined. The one that declined reported a huge improvement in her long distance running ability which she attributed to the programme. Male high school students also showed a trend for improvement in QOL with three of five increasing.

Participants views on their own health

As shown in Table 2 reports were extremely positive. Ten of 14 senior students noting that their breathing had improved during the course of the programme.

Discussion

Wind instruments were advocated over 30 years ago in the management of asthma⁸ however we could find only one relevant study.⁹ Our study appears to be the first where data were collected prior to the intervention. Furthermore it is the first study using the didgeridoo and involving Indigenous Australians.

The primary objective to determine the level of engagement in Indigenous people was achieved. Furthermore we were successful in demonstrating health benefits and in increasing cultural awareness. As a result we have no hesitation in endorsing similar programmes in other school environments. Recruitment to subsequent programmes will be supported by the testimonials of our participants. Programmes for juniors will benefit from lessons learned from this study. Adult programmes will require careful selection of participants.

The study was limited by the absence of a control group to compare intervention and non intervention. Furthermore over a six month study it was not possible to determine variability

associated with environmental and season effects. These influences could not be quantified and for these further research is required.

Asthma adversely affects quality of life.^{13, 23} In our study there was a trend for increases in quality of life of our male participants and both sexes reported an improvement in their health. Other studies advocating breathing exercises have shown various degrees of success¹⁵⁻²² including an Australian study using Buteyko breathing that reported a trend for increase in quality of life without objective changes in airway calibre for subjects.¹⁷

The sex differences in respiratory function may be have influenced by the deep and circular breathing required for playing the didgeridoo which was not required of the females in their singing. To prove the effects of the didgeridoo on breathing function further research would be required with matched controls and comparing wind and non-wind instruments.

Asthma management programmes require compliance and breathing exercise per se may not promote this. We believe that enjoyment is critical in increasing compliance. It was obvious to all involved with this study that the participants enjoyed the programme and this was confirmed by their comments. The males' enjoyment could have been in part a response to the novelty factor and the cultural association. None of the students possessed a didgeridoo before and apart from "having a go" none had played the instrument previously. Owning a didgeridoo, having the instrument at school and playing it appeared to raise their status. It is unlikely that such a positive response would have resulted from a trumpet or saxophone.

Playing the didgeridoo is not culturally acceptable for most Indigenous females. Singing was the chosen alternative and was a good choice in terms of enjoyment. It is low cost and can be undertaken virtually anywhere. Consideration could be made to alternative wind instruments for females; however it would be important to determine if the fun of group singing may be replaced by the chore of music lessons.

Timing of classes was important to the success. For the senior students conflict with school assembly was to our advantage whereas conflict with sport would have been disastrous. In contrast junior classes held in the lunch break suffered from distraction by other students in the playground. Furthermore the girls would have preferred playing with their friends.

The project incurred costs that probably would not be feasible for general transfer of the activities; however alternatives could be used just as successfully. Mp3 players are not essential to the programme although many young people have these. Plastic piping is a low cost alternative to wooden didgeridoos although the lack of authenticity may reduce engagement. It is feasible for students to make their own didgeridoos with the support of a knowledgeable person. We engaged professional teachers however within many schools and communities there will be people who can provide similar services at a much lower cost.

Conclusion

The project demonstrated that music has great potential for engaging participants. Improvement in health was demonstrated in many participants. The added bonus of this type of programme is the increase in cultural awareness of the participants.

References

1. Australian Centre for Asthma Monitoring. Asthma in Australia 2005. AIHW Asthma Series 2. Cat. no. ACM 6. Canberra: AIHW, 2005.
2. Australian Centre for Asthma Monitoring. Australian asthma indicators: Five-year review of asthma monitoring in Australia. Cat. no. ACM 12. Canberra: AIHW, 2007.

3. Vos T, Barker B, Stanley L, Lopez AD. The burden of disease and injury in Aboriginal and Torres Strait Islander peoples (2003). Brisbane: School of Population Health, The University of Queensland, 2007.
4. Australian Centre for Asthma Monitoring. Asthma in Australia: findings from the 2004–05 National Health Survey. Cat. no. ACM 10. Canberra: AIHW, 2007.
5. Elsdon L. Music in its relation to health. *The Etude*. 1897; 15(12).
6. Stacy R, Brittain K, Kerr. S. Singing for health: an exploration of the issues. *Health Education*. 2002; 102: 156-162
7. Holloway E, Ram FSF. Breathing exercises for asthma. *The Cochrane Database of Systematic Reviews* 2004, Issue 1. Art. No.: CD001277.pub2. DOI: 10.1002/14651858.CD001277. pub2.
8. Marks M. Musical and wind instruments in rehabilitation of asthmatic children. *Annals of Allergy*. 1974; 33: 313-319.
9. Lucia R. Effects of playing a musical wind instrument in asthmatic teenagers. *Journal of Asthma*. 1994; 31: 375-385.
10. The Louis Armstrong Department of Music Therapy, Beth Israel Medical Center. http://www.wehealny.org/services/bi_musictherapy/AIP.html
11. Marks GB, Dunn SM & Woolcock AJ. An evaluation of an asthma quality of life questionnaire as a measure of change in adults with asthma. *Journal of Clinical Epidemiology*. 1993; 46:1103–11.
12. Rutishauser C, Sawyer SM, Bond L, Coffey C, Bowes G. Development and validation of the adolescent asthma quality of life questionnaire (AAQOL). *European Respiratory Journal*. 2001; 17: 52–8.
13. Juniper EF, Guyatt GH, Feeney DH, Ferrie PJ, Griffith LE, Townsend M. Measuring quality of life in children with asthma. *Quality of Life Research*. 1996; 5: 35-46
14. Queensland Health. *The Health of Queenslanders 2006*. Brisbane: Queensland Health.
15. Opat AJ, Cohen MM, Bailey MJ, Abramson MJ A clinical trial of the Buteyko breathing technique in asthma as taught by a video. *Journal of Asthma*. 2000; 37: 557-564.
16. Thomas M, McKinley RK, Freeman E, Foy C, Prodder P, Price D. Breathing retraining for dysfunctional breathing in asthma: a randomised controlled trial. *Thorax*. 2003; 58:110-115.
17. Bowler SD, Green A, Mitchell CA. Buteyko breathing techniques in asthma: a blinded randomised controlled trial. *Medical Journal of Australia*. 1998; 169: 575-578.
18. Fluge T, Ritcher H, Fabel H, Zysno E, Wehner E, Wagner, IUF. Long term effects of breathing exercises and yoga in patients with asthma. *Pneumologie*. 1994; 48: 485.
19. Girodo M, Ekstrand KA, Metiver GJ. Deep diaphragmatic breathing: Rehabilitation exercises for the asthmatic patient. *Archives of Physiology, Medicine and Rehabilitation*. 1992; 73: 717-720.
20. Janiszewski M, Kronenberger M, Drozd B. Studies on the use of music therapy as a form of breathing exercise in bronchial asthma. *Pol Merkuriusz Lek*. 1996; July 1(1): 32-33
21. Nagarathna R, Nagendra HR. Yoga for bronchial asthma: a controlled study. *British Medical Journal* 1985; 291: 1077–9.
22. Vedanthan PK, Kasavalu LN, Mutthy KC, Duvall K, Hall MJ, Baker S, et al. Clinical study of yoga techniques in university students with asthma: a controlled study. *Allergy and Asthma Proceedings*. 1998; 19 (1): 3–9.
23. Ampon RD, Williamson M, Correll PK, Marks GB. Impact of asthma on self-reported health status and quality of life: a population based study of Australians aged 18–64. *Thorax* 2005; 60:735-739.