Comparative Effectiveness Research Review Disposition of Comments Report

Research Review Title: *Breathing Exercises and/or Retraining Techniques in the Treatment of Asthma: Comparative Effectiveness*

Research Review Citation: O'Connor E, Patnode C, Burda BU, Buckley DI, Whitlock EP. Breathing Exercises and/or Retraining Techniques in the Treatment of Asthma: Comparative Effectiveness. Comparative Effectiveness Review No. 71. (Prepared by the Oregon Evidence-based Practice Center under Contract No. HHS-290-2007-10057-I.) AHRQ Publication No. 12-EHC092-EF. Rockville, MD: Agency for Healthcare Research and Quality. September 2012. Available at: www.effectivehealthcare.ahrq.gov/reports/final.cfm.

Comments to Research Review

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The tables below include the responses by the authors of the review to each comment that was submitted for this draft review. The responses to comments in this disposition report are those of the authors, who are responsible for its contents, and do not necessarily represent the views of the Agency for Healthcare Research and Quality.

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Commentator & Affiliation	Section	Comment	Response
Reviewer 1	General	The report is flawed by basic inaccuracies of some of the studies and mistakes in the data synthesis.	No changes made.
Reviewer 1	General	Trials that have identical interventions are classed in different sections of the review.	No response to our query to the author, but we believe he is saying that both of his trials used the same intervention approach and should be group together. We moved Thomas 2003 into the hyperventilation reduction group.
Reviewer 1	General	The time of final assessment is mistaken in more than one case (e.g. Thomas, 2009, in which the follow up was 6 months rather than 4 weeks as stated), and in the numbers of subjects (e.g. Holloway, 2007, where the numbers in the 2 arms is stated as 30/0 and in fact was 78/72).	Query to author to clarify this criticism was not responded to. However, we believe that assessment time was not mistaken, but the table emphasized the 4-week results over the 26-week since more results were only reported at 4 weeks. His article suggests that his main outcomes were reported at 26 weeks, however, so we modified the table to emphasize the 26-week outcomes.
Reviewer 1	General	Also in outcomes- e.g. in the summary Table 1, it is stated that there was no assessment of QOL, whereas this was the primary outcome and was positive. many flaws like this.	Author never responded to our query on this, we assume that he is referring to the Holloway study. We added the missing QOL outcome to the report.
Reviewer 1	General	The assessment of the quality of the studies seems mistaken to me also, with flawed papers being commended and good ones criticized.	We reviewed the quality ratings of included studies and did not change our rating of quatliy for studies after the re-review. We also contacted author for more detail regarding his comment but did not get a response.
Reviewer 1	General	Was there any attempt to contact the authors re outstanding issues?	We attempted to contact authors in the following situations (see Methods section): (a) We had insufficient information to assess the quality of a study and would have had to exclude it without further information (b) We identified something we believed to be an error and wanted to confirm that we hadn't misunderstood what was written in the article before making a correction (or leaving something blank in our evidence table because we believed it to be incorrect). (c) When we did not understand methods or results to the extent that we could not abstract results of primary outcomes or follow their methods.
Reviewer 2	General	This review is an important contribution to the published literature on breathing techniques for the treatment of asthma.	No changes made.

Commentator & Affiliation	Section	Comment	Response
Reviewer 2	General	While the report is well conceptualized and thorough it would benefit from clearer organization (e.g., tables, formatting) and further development in key areas (e.g., future directions, cross-cultural applicability, clinical implications/bottom-line). Specific suggestions for strengthening the review will be detailed below.	(see specific comments before for changes made)
Reviewer 3	General	Yes, I believe this report will be useful to individuals making clinical decisions for individuals with asthma.	Thank you.
Reviewer 3	General	The target population and audience is clear.	No changes made.
Reviewer 3	General	Yes, the key questions seem appropriate for their intended purpose.	No changes made.
Reviewer 4	General	This is a comprehensive review on specific, complimentary behavioral modifications in the treatment of asthma that have not yet been extensively researched and thus I believe that this review will be a nice addition to the growing literature in the field.	No changes made.
Reviewer 4	General	I believe that this manuscript will be invaluable for any investigator who is interested in studying this interesting area of breathing/asthma therapies.	No changes made.
Anonymous 3	Executive Summary, Introduction, Methods and Results	We acknowledge the submission of comments from this individual who writes to express his/her personal frustration and discontent with his/her personal experience of care and concern over the state of health care system.	We recognize and acknowledge the importance of individual patient's perspective, this systematic review that reports on evidence from research literature unfortunately is not an adequate venue for properly addressing those individual concerns and experience. Thank you.
Anonymous 1	Executive Summary	Contact the Buteyko Breathing Educators Association, BBEA www.buteykoeducators.org for a list of Buteyko Practitioners in the US.	Added text describing the estimated number of practitioners in the U.S. and related issues surrounding certification.
Barnett Weiss	Executive Summary	Several research studies have shown the effectiveness of the Buteyko Breathing approach in significantly decreasing asthma symptoms, need for relievers and need for preventers. Quality of life was also seen to improve significantly in all studies.	No changes made, this is what our review addressed.
Charles LaBarre	Executive Summary	To all concerned parties; My name is Charles W.LaBarre, and I am a New York Licensed Acupuncturist in practice for over twenty years, and more recently, have become an Advanced Specialist in the Buteyko Method and Life Style Training for the remediation of asthma and other ailments. This is a hyperventilation [HV] reduction method, and has, in the Soviet Union where this method originated, been shown to positively affect many different classes of ailments.	No changes made.

Commentator & Affiliation	Section	Comment	Response
Christine Bauman	Executive Summary	Buteyko breath retraining technique has been clinically researched extensively in the former USSR but very little research has been done on it in the West. Those studies have consistently shown the efficacy of the technique, which was developed in the first place to deal with chronic illness, not only related to respiratory distress. Yogic and other breathing traditions have been based on the basic healthiness of individuals and its relationship to yogic poses, not to deal with specific illnesses. Below is a list of medical studies that may be of interest. In my experience of over 10 years teaching Buteyko to over 1000 clients, I have consistently seen a huge improvement in symptoms, decrease and even elimination of medications and a much improved quality of life and general health.	We re-reviewed Buteyko websites where Russian literature may be found, including one that listed scores of Russian language publications by Konsantin Buteyko and his colleagues. We added more detail to the methods section to describe this process, including the specific websites examined.
Reviewer 3	Executive Summary	ES20, line 45 rewrite. Nonyoga, should be non-yoga.	Correct text.
Barnett Weiss	Introduction	The Buteyko Method has undergone many successful trials beginning in Russia in 1968 in Leningrad and again in Moscow in 1980. In both instances, all patients in the experimental group were effectively cured of all symptoms and the patients all suffered from advanced asthmatic symptoms and as many as 20 other illnesses. The patients were chosen by the authorities without any choice in the matter for Dr. Buteyko. Subsequent to the 1980 trial, the Buteyko Method achieved full endorsement by the Russian Government with aprobation for it's use by qualified clinicians. It is now insurance reimbursable in Australia for the treatment of Asthma and in some parts of the UK	We re-reviewed Buteyko websites where Russian literature may be found, including one that listed scores of Russian language publications by Konsantin Buteyko and his colleagues. We added more detail to the methods section to describe this process, including the specific websites examined.
Charles LaBarre	Introduction	For me personally, my entry into the Buteyko Method came as a result of my development of exercise-induced asthma symptoms. It appeared that I would have to give up my favorite forms of exercise- hiking, and long-distance cycling. When introduced to this HV reduction method, it all sounded counter-intuitive, but looking at the response of others, I decided to try it. My asthma symptoms started abating in two weeks, and, while not completely "cured", I have had no attacks, and only minor occasional discomfort. I followed this experience with training at Buteyko Center USA to become a Specialist, and then an Advanced Specialist in the Method.	Thank you for sharing your experience.
Reviewer 1	Introduction	OK but see above (see General comments)	No changes made.

Commentator & Affiliation	Section	Comment	Response
Reviewer 2	Introduction	The Introduction provides a nice overview of asthma and breathing techniques for treating asthma that are being considered in the review.	No changes made.
Reviewer 2	Introduction	From an organizational perspective, it is not clear to me the decision to separate out Key Questions 1 and 2 from each other. It seems throughout that the results from pulmonary function could be reported in the same place as the other heath outcomes. Similarly, it also does not seem that Key Q 1a and 1b warrant separate subsections within each Question given the limited information available in each. A more clear presentation might include: collapsing Key Q1 and Q2, keeping Key Q3 regarding adverse events, and adding another separate Key Question regarding difference in subgroups (across types of trials) and another one regarding varying by implementation or non-breathing components of intervention (across types of trials). I understand that it is complicated to decide how to most clearly present all of this data, but it seems to have much overlap currently.	Thank you for your suggestions. The organization of our report is consistent with the current guidance from the EHC program.
Reviewer 2	Introduction	On a related note, it is unclear whether the authors considered a separate section (or reviewed) the data on psychological factors and asthma with breathing retraining? Specifically, I was surprised to not find a similar section on anxiety or other mental health outcomes the way Key Qs 1 and 2 were focused on (unless psychological outcomes data is not as readily published on in these trials).	Psychological outcomes were very rarely reported (only in 2 trials) and listed under the quality of life section in the results. We added more text to the discussion to highlight psychological effects as alternate explanations for improvements in asthma.
Reviewer 3	Introduction	Very thorough. It might be helpful to include more detail in the 'Physical therapy techniques and inspiratory muscle training' section on biofeedback HRV and any other device oriented approach (more detail on the devices or processes).	Additional text was added to this section.
Reviewer 4	Introduction	The introduction was concise and was adequately addressed in all regards to the goals of this study.	No changes made.
Barnett Weiss	Methods	The Buteyko Approach is a series of techniques to train the person to voluntarily reduce their minute volume in breathing enabling their breathing center to adjust towards normal breathing subsequently with no further need for the exercises while maintaining a healthy life style of a decent basically clean balanced diet with regular physical exercise.	Believe description in the Introduction is consistent with this, no changes made.
Charles LaBarre	Methods	The training included specialized didactic work based on the teachings of Konstantin Buteyko, and continued with supervised internship working with asthmatic clients. The Method specifically is a detailed and rigorous training in breath reduction.	No changes made.

Commentator & Affiliation	Section	Comment	Response
Reviewer 1	Methods	No- flaws in assessment of quality of studies and of type of intervention	No changes made.
Reviewer 2	Methods	The search strategies are well described.	No changes made.
Reviewer 2	Methods	I was curious given that AHRQ may have funded this effort, the authors statement that "institutional subscription to literature search databases expired during the time of the review, unable to perform updated literature searches." I have a similar comment regarding the Appendix B (p B-1) where the authors identified articles that could have been reviewed "if translational services were available." It seems that for a review of this magnitude and caliber, that securing some fairly small funds to a) update all lit searches and b) include non-English articles would be well worth it.	We were able to renew our access to the two databases (AMED and MANTIS); the updated search identified 45 unique citations, none of which met inclusion criteria at the abstract level. In addition, we clarified our extensive search for non-English literature in the methods, including the facts that we believe there are only two studies that might meet our inclusion criteria published in other languages. We summarize what we know about these two studies, based on English abstracts, in the discussion section.
Reviewer 2	Methods	One concern I have about the exclusion criteria is that given that many of these studies were done outside of the U.S., were any studies that were excluded because they were not written in English, particularly paramount to this report?	(see above)
Reviewer 3	Methods	The inclusion and exclusion criteria make sense for this study.	No changes made.
Reviewer 3	Methods	Search strategies appear to be appropriate, although I had two concerns. The first related to the Indian literature. I wonder to what extent that literature was fully explored (especially the grey literature) for possible materials not available in the indexes cited. The text "Yoga Research Bibliography: Scientific Studies on Yoga and Meditation" (1989), by Monro, Ghosh, and Kalish, contains over 1,000 studies. This predates the research window, but does reflect the large number of studies in India that do not get published in the West. Perhaps a quick email to NIMHANS, an Indian NIH equivalent, might be a way to see if there are other ways to access studies that might not have been located/included here. It was also unclear in reading the methods whether asthma education programs were evaluated. These programs often include a significant breath retraining component, for example, Psychological treatment of Comorbid Asthma and Panic Disorder: A Pilot Study Paul M. Lehrer, et al.	We added a search of the Indian Medical Journals (IndMED) database, and added this to the methods section. We found no new trials that met inclusion criteria in this database. We examined the included studies lists of 6 reviews of asthma education, and identified two trials that appeared to have a breathing retraining components. Examination of the full-text articles showed that the breathing components appeared to be a very small part of the interventions, and therefore did not meet inclusion criteria for this review.
Reviewer 3	Methods	Yes [answer to: are the definitions or diagnostic criteria for the outcome measures appropriate?]	No changes made.
Reviewer 3	Methods	Statistical methods appear to be appropriate.	No changes made.

Commentator & Affiliation	Section	Comment	Response
Reviewer 4	Methods	The methods were clear, the various limitations of the studied included in the analysis were highlighted as were the limitations with the authors review process. The references were timely and up to date.	No changes made.
Reviewer 4	Methods	The key questions were adequately addressed and were followed with a meaningful and clear discussion.	No changes made.
Reviewer 4	Methods	The inclusion and exclusion criteria were justified and explained in such a way that there was no confusion or misconceptions of what the study was including (or excluding).	No changes made.
Reviewer 4	Methods	Outcome measures were also well delineated and were followed for each study that was part of the analysis.	No changes made.
Anonymous 2	Results	It is important to ensure that people who are being taught the Buteyko method are trained by therapists who have taken the approved courses, as designated by the specialists in Moscow who were themselves trained by Dr. Buteyko. This is important because the outcome for the patient is highly dependent on the quality of the training, and the patient's own application of the breathing method. These factors will often determine the degree of improvement as well as its duration. As a student of the method, I have been trained by the specialists at the Breathing Center in Woodstock, N.Y., which is the only approved center of learning for the Buteyko method outside of Moscow. They have helped many people with asthma, some extremely ill and incapacitated, who have been able to improve their ability to breathe, their exercise tolerance, and the overall quality of their lives. It is remarkable to work with these gifted practitioners, and to witness the impact that the Buteyko method is having on so many lives.	We compared results for studies that used certified Buteyko practitioners vs those that did not (among the hyperventilation reduction trials). These results are reported under KQ1b and also included in the discussion, where addition certification issues are discussed.

Commentator & Affiliation	Section	Comment	Response
Barnett Weiss	Results	Clinical Trials 1. See Ref 2 2. Cooper S, Oborne J, Newton S, Harrison V, Thompson-Coon J, Lewis S, Tattersfield A, "Effect of two breathing exercises (Buteyko and Pranayama) in asthma: a randomized controlled trial.", Thorax, VOL 58, 2003, 674-679 3. McGowan J, "Health Education: Does the Buteyko Institute Method make a difference?", Thorax, VOL 58/Sup3, December 2003, p28 see note below. 4. McHugh P, Aitcheson F, Duncan B, Houghton F, "Buteyko Breathing Technique for Asthma: an effective intervention.", The Medical Journal of New Zealand, VOL 116, 12 December 2003, see note below. 5. Opat AJ, Cohen MM, Bailey MJ, Abramson MJ, "A Clinical Trial of the Buteyko Breathing Technique in Asthma as Taught by Video", J. of Asthma, VOL 37(7), 2000, 557-564 6. Thorax Medical Journal (Dec 2003 Vol 58 Sup III) “Health Education in Asthma Management - Does the Buteyko Institute Method make a difference?” This report describes the results of the Glasgow Buteyko trial. The trial was designed for 600 adults with asthma aged between 18 and 69 years. 384 of the initial 600 participants (64%) completed the trial. The results for the Buteyko group show average reductions of over 90% for reliever medications, preventer medications and asthma symptoms after 6 months, which were maintained at 12 months. BIBH member Jill McGowan, who ran the trial, also presented these results at the British Thoracic Society Winter Conference in London on 4 Dec 2003. 7 New Zealand Medical Journal (12 Dec 2003, Vol 116 No 1187) “Buteyko Breathing technique for asthma: an effective intervention” A blinded randomized controlled trial comparing Buteyko with control was conducted on 38 people with asthma aged 18 to 70 over 6 months. The Buteyko group exhibited reductions of 85% in beta 2 agonists (reliever	Thank you fro the references. We identified these references in our original search (see below). 1. Included 2. Included 3. Included 4. Excluded, the comparator includes relaxation training, intervention does not. This study is included in the Discussion section under “Evidence in Support of Specific Techniques” 5. Included 6. Included (same reference as number 3) 7. Excluded, the comparator includes relaxation training, intervention does not (same reference as number 4)

Commentator & Affiliation	Section	Comment	Response
Barnett Weiss	Results (cont'd)	medications) and 50% in inhaled steroids (preventer medications). The conclusion was that Buteyko is a safe and efficacious asthma management technique and has the clinical and potential pharmaco-economic benefits that merit further study. The researcher on this trial was Dr Patrick McHugh from Gisborne, NZ. 8. Thorax Journal 2006 000:1-7doi 101136/thx2005 054767 CA Slader, HK Reddel, LM Spencer, EG Belousova, CL Armour, SZ Basnic-Anticevich, FCK Thien, CR Jenkins. Results after applying Buteyko techniques for 12 weeks • Reliever usage – median reduction of 86% • Preventer usage – median reduction of 50% 9. New Zealand Medical Journal Vol 119 No 1234 ISSN 1175 8716 May 2006 Patrick McHugh, Bruce Duncan and Frank Houghton, Gisborne, New Zealand. Results after applying Buteyko techniques to children with asthma for 12 weeks • Reliever usage – median reduction of 66% • Preventer usage – median reduction of 41% • 11 courses of prednisone given 3 months before the trial. • 1 course of prednisone given three months after the trial. 10. Proceedings of the American Thoracic Society, 2006;3:A530 Foothills Hospital Medical trial, Calgary, Alberta. May 2006. Robert Cowie. Results after applying Buteyko techniques for 6 months • Asthma control improved from 41% to 75%, an increase of 34% • Decrease of ICS was 39% • Elimination of ICS was 21% • " I've been astonished and also very pleased with the excellent result. There is no disruption of their life at all by their disease: normal activities; not waking at night; not needing to use any reliever medications. It's just great...75% control is about as good as anyone has got in any study of asthma. The neat thing about it is that it has no side effects. It's very safe. The Buteyko technique certainly has been shown to be an important adjunct to treatment." Dr. Robert Cowie, Resident Respirologist of Foothills Hospital in Calgary and head researcher on the Buteyko Breathing Technique Medical Trial. (October 2004 – April 2005)	8. Included 9. Excluded at title and abstract stage as it is a case series (not an included study design) 10. Excluded, we were unable to locate the full-text article, however, it is likely an abstract of another reviewed study (Cowie 2008) that is included in our review

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Charles LaBarre	Results	I have worked with twenty-five asthmatics of varying degrees of symptomatic severity. I can confidently say that, every one who conscientiously applied the method as taught experienced significant improvement in their symptoms. Due to the short notice for public comment [I just found out about this an hour ago] I am unable to provide specific statistical parameters, but I do not exaggerate when I say that most of my client became symptom-free and, not incidentally, medication-free, within a few months of practice. I also provide breath training to my private acupuncture patients as a way for them to improve their overall health.	No changes made.
Reviewer 1	Results	Flawed as above (see General comments)	No changes made.
Reviewer 2	Results	Some formatting suggestions to improve the presentation of the results	No changes made.
Reviewer 2	Results	For clarity, would suggest putting a box around and bold your key questions - rather than just enlarging the font.	Thank you for your suggestion. The format of this report will be done in a way consistent with the AHRQ Publishing Guide.
Reviewer 2	Results	Tables: I would reformat some of them to eliminate vast white space and to be consistent with whether headings go vertically or horizontally. More specifically, I don't think the "sorting" language on some of the tables' titles is necessary, and in some cases, it distracts the reader from the main points. (e.g., Table 6 on p42 I would remove the "sorted by differences in....). In addition, the sorting is not consistent between tables.	We agree that there was a considerable amount of white space in some tables, however we could find no other way to display the data that showed variables we needed shown together while maintaining 508 compliance which allows visually impaired individuals to access the written text. We removed the “sorted by…” wording from table titles.
Reviewer 2	Results	In Table 9 (p46) I would add a "# of studies used" column to give the reader a count of how many studies/authors use which measures most commonly.	We added a column of the number of studies that used a specific instrument.
Reviewer 2	Results	It is unclear where the "qualitative analyses" mentioned on p16 in the Method section are presented.	Added text to Methods to clarify that these results are discussed under kq1b and 2b. Also added text Results stating characteristics that were examined that showed no apparent relationship also.
Reviewer 2	Results	Appendix B: Consider collapsing some findings as much of the information presented seems repetitive.	We assume this comment refers to Appendix C. We recognize that there is some repetition of columns across tables, however we are concerned that the tables will be difficult to interpret if any columns are removed, so we retained all columns.
Reviewer 2	Results	Add page numbers to the Table of Contents for the Appendices.	Thank you for your suggestion. The format of this report will be done in a way consistent with the AHRQ Publishing Guide.

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Reviewer 3	Results	The information in the results section is appropriate. The only suggestion is to include information in the table legends on the meaning of the arrows used to indicate changes in outcomes.	We have added the meaning of the arrows used to indicate changes in outcomes to the table legends.
Reviewer 3	Results	Yes, [the characteristics of the studies] are fairly clearly described, could use a bit more detail.	No changes made.
Reviewer 3	Results	Yes [answer to: are the key messages explicit and applicable?]	No changes made.
Reviewer 3	Results	Yes [answer to: Are figures, tables and appendices adequate and descriptive?]	No changes made.
Reviewer 4	Results	At times the results were almost redundant but in keeping with the style and layout of the manuscript were excellent in their presentation.	We believe we need to keep KQ1 results separate from KQ2 in order to parallel the protocol, which does leave more redundancy than may be optimal.
Reviewer 4	Results	The tables, figures and other appendices were easily followed and were logical in their sequence.	No changes made.
Reviewer 4	Results	There are other areas of studies that might be considered in such a manuscript (such as tai chi) but none are large enough or have enough power to be considered in this review.	No changes made.
Barnett Weiss	Summary and Discussion	While the initial studies in Russia achieved total remission of all symptoms of disease, subsequent research outside of Russia has regularly achieved over 70% reduction of the need for relievers and nearly 50 % reduction in use of preventers after 12 weeks of the program when compared to the control groups where most often little or no significant change was noted.	We believe this is data from the Bowler trial, which we included in our review.
Charles LaBarre	Summary and Discussion	Asthma is a serious disorder. It appears that when modern medicine started medicating asthmatics, they would get worse over time, and started dying from attacks. This is, of course, anecdotal for me, but the Buteyko Method authorities in Moscow support this line of thinking based on over four decades of applying the Buteyko HV reduction system on thousands of clients. It should be said that this method is specific in its application and should be taught only by appropriately-trained practitioners. As my time for providing you with information is limited by the deadline, I encourage you to look at the website listed below in the references section, and to please look at the testimonial page, and also to see all the different formats the Center offers to potential clients. Also, please be aware that the Center is the only organization in the USA authorized by Clinical Buteyko in Moscow to teach the Buteyko Method, and to provide for the training of Specialists.	We did examine references on the website described here as part of our grey literature search. We added a list of websites used to search for non-English Buteyko trials to the Methods section.

Commentator & Affiliation	Section	Comment	Response
Reviewer 2	Summary and Discussion	Given the international representation of data in this report, the section on "cross-cultural applicability" needs additional attention. For example, it would be useful to get the authors input on what they do think is translatable across countries/cultures - rather than just the more blanket statement or evaluation that these studies may not be applicable in the U.S.. What CAN a researcher or clinician be confident in from all of these studies - even given the variety of countries and health systems represented? While I realize this is a fine line to walk, this section the way it is currently written almost invalidates the findings from the report - though I do not think this was the authors' intentions.	Added more detail to the Applicability sections. However, we could not say more about cross-cultural portability of components specifically because the two interventions with the most evidence (hyperventilation reduction and yoga) had almost no overlap in terms of location.
Reviewer 2	Summary and Discussion	In the "Strength of Evidence" section (p63) and in Table 15, please define what is meant by "risk of bias, consistency, directness and precision."	These terms are defined in the Methods section, which we believe to be the appropriate place for this text.
Reviewer 2	Summary and Discussion	For a very comprehensive review, I was left somewhat disappointed by the Future Research section (pp66/67). I think more could be added to specifically guide the future research directions given the authors' extensive literature review and synthesis. For example, one area that was raised briefly but not flushed out in future directions was the potential impact on anxiety levels or autonomic arousal that these techniques may have as possible mediators of the breathing-asthma symptom relationship.	A more comprehensive treatment of future research needs will be published in a separate report. Also added further examination of the impact of targeting autonomic arousal in controlling asthma to Future Research
Reviewer 2	Summary and Discussion	While the authors do weave the scant information about children/adolescents throughout the report, I wonder if a separate (albeit short) summary section about children/adolescents is warranted given the paucity of information in this at-risk population.	Added additional information for children/adolescents (scant evidence, anecdotal evidence suggests used hyperven reduction used in children and adol) under the applicability section of the Executive Summary and the opening section of the Full Report.
Reviewer 2	Summary and Discussion	The limitations discussed were right on target.	No changes made.
Reviewer 1	Summary and Discussion	Flawed as above (see General comments)	No changes made.
Reviewer 3	Summary and Discussion	Yes [answer to: are the implications of the major findings clearly stated?]	No changes made.
Reviewer 3	Summary and Discussion	Yes [answer to: are the limitation of the review/studies described adequately?]	No changes made.

Commentator & Affiliation	Section	Comment	Response
Reviewer 3	Summary and Discussion	As mentioned above, there may be studies in the area of asthma education programs, that include relevant breathing retraining elements which were not included in this review because they did not meet established criteria. It would still be useful to note the potential significance/value of such evidence-based programs as potentially valuable public health interventions and worthy of future exploration. Two reviews provide examples of this positive benefit. Coffman et al, in Do school-based asthma education programs improve self-management and health outcomes, wrote, "Although findings regarding effects of school-based asthma education programs on quality of life, school absences, and days and nights with symptoms were not consistent, our analyses suggest that school-based asthma education improves knowledge of asthma, self-efficacy, and self-management behaviors." In another paper by Coffman et al, Effects of Asthma Education on Children's Use of Acute Care Services: A Meta-analysis, the authors stated that “Providing pediatric asthma education reduces mean number of hospitalizations and emergency department visits and the odds of an emergency department visit for asthma, but not the odds of hospitalization or mean number of urgent physician visits. Health plans should invest in pediatric asthma education or provide health professionals with incentives to furnish such education. Additional research is needed to determine the most important components of interventions and compare the cost-effectiveness of different interventions.”	We examined 6 reviews of asthma education interventions for trials with any mention of the use of breathing techniques. We found 6 trials altogether, 2 of which were published in our search window (1990). Neither met inclusion criteria upon full text revew. We added mention of examining these review to the Methods section.

Commentator & Affiliation	Section	Comment	Response
Reviewer 3	Summary and Discussion	Also, the importance of the psychological component of asthma should be highlighted as one potentially important area of continued research. This is one of the core reasons that people use alternative medicine/mind-body methods, to increase a sense of well-being and to gain a greater sense of personal mastery and self control/management. Paul Lehrer et al wrote in Psychological treatment of comorbid asthma and panic disorder: a pilot study, "We evaluated two protocols for treating adults with comorbid asthma and panic disorder. The protocols included elements of Barlow's panic control therapy and elements of Barlow's "panic control therapy" and several asthma education programs, as well as modules designed to teach participants how to differentiate asthma and panic symptoms, and how to apply specific home management strategies for each. Fifty percent of subjects dropped out of a 14-session protocol by the eighth session; however, 83% of patients were retained in an eight-session protocol. Clinical results were mostly equivalent: significant decreases of >50% in panic symptoms, clinically significant decreases in asthma symptoms, improvement in asthma quality of life, and maintenance of clinical stability in asthma. Albuterol use decreased significantly in the 14-session protocol and at a borderline level I the 8-session protocol, while pulmonary function was maintained. A controlled evaluation of this procedure is warranted."	Added additional mentions of psychological aspects of asthma and mention of this study to the Discussion

Commentator & Affiliation	Section	Comment	Response
Reviewer 3	Summary and Discussion	In describing the psychological aspects of asthma in the Journal of Consulting and Clinical Psychology, Vol 70(3), Jun 2002, Dr. Paul Lehrer writes, "Asthma can be affected by stress, anxiety, sadness, and suggestion, as well as by environmental irritants or allergens, exercise, and infection. It also is associated with an elevated prevalence of anxiety and depressive disorders. Asthma and these psychological states and traits may mutually potentiate each other through direct psychophysiological mediation, nonadherence to medical regimen, exposure to asthma triggers, and inaccuracy of asthma symptom perception. Defensiveness is associated with inaccurate perception of airway resistance and stress-related bronchoconstriction. Asthma education programs that teach about the nature of the disease, medications, and trigger avoidance tend to reduce asthma morbidity. Other promising psychological interventions as adjuncts to medical treatment include training in symptom perception, stress management, hypnosis, yoga, and several biofeedback procedures."	Re-titled a section in the discussion that covers alternate hypotheses for treatment effects "Specific and non-Specific effects of breathing techniques" and added more exploration of the effects of autonomic arousal and anxiety.
Reviewer 4	Summary and Discussion	The findings are clearly stated and are supported by the various summary tables, charts and figures.	No changes made.
Reviewer 4	Summary and Discussion	The conclusions can be used for both future studies and to some degree, practice decisions.	No changes made.
Sussana Czeranko (Key Informant)	Summary and Discussion (in Executive Summary)	"The body of evidence suggests that selected intensive behavioral approaches that include breathing retraining or exercises may improve asthma symptoms or reduce reliever medication use in adults with poorly controlled asthma. However, the overall body of evidence primarily consisted of small, methodologically limited trials with widely heterogeneous samples, settings, and treatment approaches, and incomplete and inconsistent outcome reporting. Also, primary outcomes (symptom reduction and reliever medication use) were self-reported, making them susceptible to social desirability bias. Hyperventilation reduction techniques provided the strongest evidence for improvement in asthma symptoms and reliever medication use, including the only large-scale trial,19 and the applicability to US health care systems was the best (although still limited, since **to or typo [two]** trials were conducted in the US)."	Text corrected: "to" changed to "no".

Commentator & Affiliation	Section	Comment	Response
Sussana Czeranko (Key Informant)	Summary and Discussion	"Despite the relatively positive results for hyperventilation reduction techniques and yoga breathing, improvements could not be definitively attributed to the use of the specific techniques." Definitively in what sense? Please specify.	Re-worded this sentence to talk about specific (vs. non-specific) effects of the breathing techniques, rest of paragraph develops this theme.
Sussana Czeranko (Key Informant)	Summary and Discussion	"Rather than directly improving asthma, trials might have helped participants eliminate overuse of reliever medications, which is still an important positive outcome." Buteyko breathing sessions do not instruct patients to decrease medications without physician supervision and approval. Therefore this statement that patients were not over using medications without symptomatic relief does not make sense. Why would an asthmatic reduce their medications if s/he were unable to breathe?	Modified wording to say that BTT may benefit patients by eliminating unnecessary use of reliever meds, rather than by directly improving asthma control.
Sussana Czeranko (Key Informant)	Summary and Discussion	"The trials in this review generally had low applicability to US healthcare, primarily due to the settings in which the trials took place." What does this mean: low applicability to US healthcare? Are you excluding a health care sector such as CAM and in particular, Naturopathic doctors?	Added more text to Applicability section, specifically mentioning CAM settings.
Sussana Czeranko (Key Informant)	Summary and Discussion	"These trials generally used certified Buteyko practitioners and the availability of certified Buteyko practitioners in the US is unknown." This statement betrays a flaw. The presence of certification bodies is very well known, as are data about membership criteria, training requirements, certification levels and the structure and validity of the accrediting bodies. The Buteyko Breathing Educators Association [BBEA], for example, is an organization which not only publishes such information, but does so from a position of compliance with known accreditation standards and practices. The challenge for the authors of this study is to step outside the biomedicine paradigm which affects their understanding of not only what "certified" means in this instance, but also where such agencies and groups are located in civil society. In regards to the number of Buteyko practitioners/educators in US, there are an estimated 70 of which 40 are members of the BBEA.	Added text about availability of practitioners in the U.S.

Commentator & Affiliation	Section	Comment	Response
Barnett Weiss	Appendixes	Buteyko & The British Guideline on the Management of Asthma 2008. • The British Guideline on the Management of Asthma 2008 grants permission for British health professionals to recommend Buteyko, stating that the method "may be considered to help patients control the symptoms of asthma". The guideline also grades clinical research on Buteyko with a 'B' classification - indicating that high quality supporting clinical trials are available. No other complementary therapy has been endorsed by this body for the treatment of asthma. Section 3.5.3 page 31 in British Guideline on the Management of Asthma revised edition June 2008 Breathing Exercises including yoga and the Buteyko breathing Technique. The principle of yoga and Buteyko breathing technique is to control hyperventilation by lowering respiratory frequency. A Cochrane review of breathing exercises found no change in routine measures of lung function.(259) One study showed a small reduction in airway responsiveness to histamine utilizing Pranayama, a form of yoga breathing exercise. (260) The Buteyko breathing technique specifically focuses on control of hyperventilation and any ensuing hypocapnia. Four clinical trials suggest benefits in terms of reduced symptoms and bronchodilator usage but no effect on lung function.(261-264) Buteyko breathing technique may be considered to help patients to control the symptoms of asthma.	We include the BTS recommendations in both the Introduction and Discussion, and we used the Cochrane review to identify trials for the current review, so believe those results are adequately incorporated. Added sentence pointing out great applicability of trials to Britain in discussion of BTS recommendation and additional text on similarities and differences between the BTS evidence and ours. Plus stated that their recommendation was consistent with the evidence we found.
Reviewer 1	Clarity and Presentation	Flawed as above (see General comments)	No changes made.
Reviewer 2	Clarity and Presentation	I have made suggestions in the above points to improve organization and presentation such as: collapsing some tables; deleting the "sorting by" titles in some tables; putting a box around key questions; reconsidering pulmonary outcomes as a separate section unto its own; reconsidering a separate question on subgroup analyses for each of the intervention groups, but rather collapsing that information into one section given the lack of data.	See other comments for specific changes made.
Reviewer 2	Clarity and Presentation	The policy and practice implications are more difficult to discern. Maybe this is because the authors deemed the the majority of the studies "strength of evidence" to be either insufficient or low. It may be helpful to add a "Clinical Implications" section similar to the Future Research section that is sort of the "bottom line" regarding any recommendations for clinical practice guidelines. The report would be strengthened by a "Take Home Points" message for the reader.	Added Clinical Implications section to Discussion

Commentator & Affiliation	Section	Comment	Response
Reviewer 3	Clarity and Presentation	The only suggestion would be to use more subheads to break up the content a bit more. It gets dense at times. More subtitles would help orient the reader to the key themes.	Added more subheadings to Executive Summary
Reviewer 4	Clarity and Presentation	The clarity was excellent and the organization and structure (although lengthy) was organized and the conclusions, the points of discussion and the areas of possible concern were nicely presented.	No changes made.
Barnett Weiss	References	See references above in Results	See previous response
Charles LaBarre	References	www.buteykocenterusa.com www.BreathingCenter.com	We examined this website for trials we missed (and found none) and to help us find Buteyko practitioners in the U.S.

Commentator & Affiliation	Section	Comment	Response
Christine Bauman	References	Medical Studies showing the effectiveness of Buteyko Breathing and Asthma Thorax Journal 2006 000:1-7doi 101136/thx2005 054767 CA Slader, HK Reddel, LM Spencer, EG Belousova, CL Armour, SZ Basnic-Anticevich, FCK Thien, CR Jenkins. Results after applying Buteyko techniques for 12 weeks • Reliever usage – median reduction of 86% • Preventer usage – median reduction of 50% New Zealand Medical Journal Vol 119 No 1234 ISSN 1175 8716 May 2006 Patrick McHugh, Bruce Duncan and Frank Houghton, Gisborne, New Zealand Results after applying Buteyko techniques to children with asthma for 12 weeks • Reliever usage – median reduction of 66% • Preventer usage – median reduction of 41% • 11 courses of prednisone given 3 months before the trial. • 1 course of prednisone given three months after the trial. Proceedings of the American Thoracic Society, 2006;3:A530. Foothills Hospital Medical trial, Calgary, Alberta. May 2006. Robert Cowie Results after applying Buteyko techniques for 6 months • Asthma control improved from 41% to 75%, an increase of 34% • Decrease of ICS was 39% • Elimination of ICS was 21% Thorax Journal December 2003 Vol 58 Supplement III J. McGowan. Education and Training Consultant, Acorn Nursing Agency, Glasgow. Results after applying Buteyko techniques for 6 months. • Symptoms reduction 98% • Reliever usage – median reduction of 98% • Preventer usage – median reduction of 92%	Thank you for these references. We identified these references trhough our initial search (see below). Included Excluded at title and abstract stage as it is a case series (not an included study design) Excluded, we were unable to locate the full-text article, however, it is likely an abstract of another reviewed study (Cowie 2008) that is included in our review Included

Commentator & Affiliation	Section	Comment	Response
Christine Bauman	References (cont'd)	New Zealand Medical Journal 2003;116(1187) McHugh P, Aitcheson F, Duncan B, Houghton F. Buteyko breathing technique for asthma: an effective intervention. http://www.nzma.org.nz/journal/116-1187/710/ Results after applying Buteyko techniques in Nottingham, UK • 100% reduction in reliever medication (ventolin) • 41.5% reduction in steroid medication (flovent, pulmicort)	Excluded, the comparator includes relaxation training, intervention does not
		New Zealand Medical Journal 2002 Vol 116 No 1187 ISSN 1175 8716 Gisborne, New Zealand Patrick McHugh, , Fergus Aitcheson Bruce Duncan and Frank Houghton Results after applying Buteyko techniques to children with asthma for 12 weeks • Reliever usage – median reduction of 85% • Preventer usage – median reduction of 50%	Excluded, the comparator includes relaxation training, intervention does not (same reference as the one above)
		Medical Journal of Australia 1998; 169:575-578 Simon D Bowler, Amanda Green and Charles A Mitchell Results after applying Buteyko techniques for twelve weeks: • Reliever usage - median reduction of 96% (from daily median of 943ug to 39ug) • Preventer usage - median reduction of 49% (from daily median 1500ug to 765ug) Minute Volume - median reduction of 4.6L/min (from 14 L/min to 9.6 L/min)	Included