Behavioral interventions for rumination and operant vomiting in individuals with intellectual disabilities: a systematic review

CRD summary
The review concluded that behavioural interventions, particularly dietary manipulation, for rumination and operant vomiting in individuals with developmental disabilities can produce sustained positive effects across time and settings. Limitations to the review process and study quality and the low numbers of participants mean that the authors’ conclusions should be interpreted with caution.

Authors' objectives
To evaluate the effectiveness of behavioural interventions for rumination and operant vomiting in individuals with developmental disabilities.

Searching
MEDLINE, ERIC, PsycINFO, Psychology and Behavioral Sciences Collection were searched for studies published after a previous review in 1987 (see Other Publications of Related Interest) until March/April 2011 for studies published in English. Search terms were reported. Bibliographies of relevant articles were handsearched. Journals that contained relevant articles were handsearched from January to March 2011.

Study selection
Studies of behavioural interventions for treatment of rumination and operant vomiting in individuals with developmental disabilities were eligible for inclusion. Eligible studies needed to include at least one participant diagnosed with an intellectual disability. Relevant behavioural interventions included at least one or more of the interventions: changing the patient’s environment; programming specific contingencies of reinforcement or punishment; or altering practices or routines relevant to mealtimes or other relevant antecedent variables. Studies of medication or surgical interventions were excluded unless delivered in comparison to or in tandem with a behavioural intervention. Studies that investigated risk factors and/or describing prevalence of rumination were excluded if they did not include a behavioural intervention. Studies were excluded if the outcome combined vomiting and rumination with other problem behaviour or provided insufficient details.

All included studies had single-case research designs. Most (67%) studies were performed in residential care facilities by facility staff; others were in schools (9%), the home (6%), day treatment centres (6%) and one was in hospital. Interventions used three basic approaches: diet manipulation; sensory-based interventions; or socially mediated reinforcers. Most studies used more than one approach. The age of participants ranged from six to 59 years old and three-quarters were male. Ninety-one per cent of participants had severe/profound intellectual disability; the others were autistic with their degree of disability not stated explicitly. Participants had a range of comorbidities. Counting periods for vomiting and/or rumination varied between studies.

The co-authors independently performed the study selection. Disagreements were resolved by discussion.

Assessment of study quality
Methodological quality was assessed using the Schlosser and Sigafos classification to give three evidence levels. The lowest quality level was suggestive, the medium quality level was preponderance and the highest quality level was conclusive. Details were reported.

The authors did not report how many reviewers performed the quality assessment.

Data extraction
Intervention outcomes were summarised by calculating NAP (nonoverlap of all pairs) scores. Scores of 0% to 65% were classified as weak effects, between 66% and 92% as medium effects and between 92% and 100% as strong effects. Where NAP values could not be calculated, results were classified visually as positive, negative or mixed.
Two reviewers performed the data extraction, which was checked by the other reviewers using a checklist. Disagreements were resolved by discussion.

**Methods of synthesis**
The mean NAP across studies was calculated for the three intervention types. A narrative synthesis was provided for studies that performed a systematic functional assessment.

**Results of the review**
Twenty-one case studies were identified (32 patients, range 1 to 5). Eight studies met the suggestive quality level, 10 were at the preponderance level and three were at the conclusive level.

**Diet manipulation (15 studies):** The mean NAP across studies was 90.9%. The most common approach was increasing the amount of food consumed by providing additional food during meals and snacks during the day. Other approaches were encouraging slower eating by pacing food presentation, removing specific types of food or liquids from meals and changing the consistency or texture of food.

**Sensory-base interventions (five studies):** The mean NAP across four studies was 82.6%. Approaches included providing oral stimulation by chewing gum or a plastic chew ring (three studies), automatic reinforcement from spraying a liquid containing a preferred flavour in their mouths (one study) and visual screening for 30 seconds after vomiting (one study).

**Socially mediated reinforcers (six studies):** The mean NAP across studies was 86.3%. Approaches included attention during or following mealtimes (three studies), verbal praise for not vomiting (two studies) and escaping from the demands of staff (one study). Punishment only formed part of the intervention approach in two studies.

**Functional analysis (five studies):** Four out of five studies concluded that vomiting and/or rumination was maintained by automatic reinforcement. One study concluded that vomiting was maintained by escaping staff demands.

Details were provided of three studies that considered the mechanism of action of interventions.

**Authors' conclusions**
The review concluded that behavioural interventions for rumination and operant vomiting in individuals with developmental disabilities can produce sustained positive effects across time and settings. In comparison to previous reviews, fewer studies involved punishment-based interventions and there were increased function-based reinforcement interventions.

**CRD commentary**
The review addressed a well-defined question in terms of participants, interventions and relevant outcomes. Relevant study designs were less clear. Relevant databases were searched but only studies published in English were included so some relevant studies may have been missed. Publication bias was not assessed. Study quality was assessed using suitable criteria for case studies but case studies provide the lowest level of evidence. Study selection and data extraction were carried out with efforts to reduce error and bias but it was not reported whether this process applied to quality assessment. Relevant study details were reported.

The synthesis performed did not provide any assessment of significance, which was reported for individual studies. There were very few participants in the studies identified. The authors recognised that there was confounding, particularly due to multiple intervention components.

Limitations to the review process and study quality and design and the low numbers of participants mean that the authors' conclusions should be interpreted with caution.

**Implications of the review for practice and research**
**Practice:** The authors suggested that food satiation was a well-established approach for automatic reinforcement but input from a dietician, nutritionist or similar expert should be required before implementing any substantial diet manipulation, particularly when food satiation or calorie reduction was involved.
Research: The authors recommended that future research should identify reinforcement contingencies that may maintain rumination or vomiting that may include automatic or socially mediated reinforcement, after ruling out physical causes. Future research related to satiation should compare increased food consumption versus alternative sources of oral stimulation such as chewing gum or plastic chewing rings and may help to identify the mechanism of action of automatic reinforcement.

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.