Evaluation of a cognitive-behavioural program for the management of chronic tic and habit disorders

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Abstract

The aim was to evaluate the efficacy of a manualized cognitive-behavioural program based on habit reversal for the management of chronic tic disorder (CTD) and habit disorder (HD). Forty-seven CTD and 43 HD received a 4-month treatment program. Thirty-eight (22 CTD, 16 HD) were placed on a waitlist control group, which subsequently received treatment. The treatment approach combined awareness training, relaxation (including modification of a tension-producing style of action), and habit-reversal training, with more general cognitive restructuring of anticipations linked to ticcing. Sixty-five percent of completers reported between 75 and 100% control over the tic. At 2-year follow-up, 52% rated 75–100% control. There were also significant changes post-treatment in measures of self-esteem, anxiety, depression and style of planning action. Successful tic/habit modification was associated in CTD and HD groups with successful change in style of planning action. There were no consistent differences in any outcome measures between CTD and HD groups. © 2001 Elsevier Science Ltd. All rights reserved.

Keywords: Tics; Habit disorders; Cognitive behavioural treatment; Habit reversal

1. Introduction

Tics are defined as recurrent involuntary contractions of functionally related groups of skeletal muscles in one or more parts of the body. The DSM-IV distinguishes between chronic tic disorder (CTD) and transitory motor and vocal tics depending on whether the tics have been present for more or less than 1 year. Tics may be simple or complex. Simple tics include blinking, cheek twitches, head or knee jerks and shoulder shrugs. Tics are mainly confined to the upper body and the most common occur in the eye, head, shoulders and face. Tics can also be vocal and include...
coughs, tongue clacking, sniffing, throat clearing, hiccing, barking and growling. Some recurrent involuntary somatic sensations are classified as sensory tics. These are rare and are identified as heavy, light, warm or tingling sensations, often muscle focussed and causing the muscle to be tensed or released as a relief (Lohr & Wisniewski, 1987; Shapiro, Shapiro, Young & Feinberg, 1988).

Tics are classified as complex if there is a contraction in more than one group of muscles (Comings & Comings, 1984). Complex tics and habit disorder (HD) may take the form of self-inflicted repetitive actions such as nail biting, hair pulling, head slapping, face scratching, teeth grinding, tense-release hand gripping cycles, or finger twiddling. Complex vocal tics take the form of repeated phrases or swear words. In Gilles de la Tourette’s syndrome (TS), multiple tics, repetitive movements and compulsive rituals are frequently found together with other behavioural and attentional problems. TS is recognized in the DSM-III-R and IV as a distinct diagnostic category with multiple tics including vocal tics (Leckman & Cohen, 1999). Psychosocial distress in both CTD and HD can be considerable and can involve secondary phobias, depressions, social anxieties, low self-esteem, interference in daily activities and quality of life (see Green leaflet series, Canadian Tourette Association).

1.1. Treatment of tic disorders and habit disorders

Double-blind placebo-controlled designs have found tic frequencies reduced by about 50% using neuroleptics such as haloperidol or pimozide (Sallee, Nesbitt, Jackson, Sine & Sethuraman, 1997). Unwanted side effects occur in about 80% of individuals and Peterson, Campise and Azrin (1994) estimate that only about 20–30% of clients continue their medication for an extended period of time. Successful pharmacological treatment of habit disorders with clomipramine or fluoxetine has been reported in individual cases (Peterson et al., 1994).

Many psychological treatment techniques have shown some success with tic management, including hypnotism, relaxation, muscle feedback, awareness training, negative reinforcement, response prevention and massed practice (Azrin and Peterson, 1988a). But the most compelling treatment medium for managing the tics themselves seems to be behavioural treatment, in particular ‘habit reversal’ (HR) (Azrin & Nunn, 1973). This package involves multiple stages, including relaxation, awareness, contingency training for positive reinforcement of not ticcing and the crucial element of practice of a competitive antagonistic response. This latter technique involves tensing the muscle antithetical and incompatible with the tic-implicated muscle. Awareness training and competing response training seem the most crucial elements of the program (Miltenberger, Fuqua & McKinley, 1985). Azrin and Petersen (1988b) report an improvement of between 64 and 100% in several studies using this method in populations with both simple tics and/or TS syndrome. Peterson and Azrin (1992) compared the efficacy of awareness, relaxation, and HR in six participants using a within participants design. HR produced the largest overall reduction in tics (55%) and led to the largest reduction in total tics (95%) for any individual, but there was no significant difference between treatments. Habit reversal has also been found effective for habit disorders such as: nail biting, hair pulling and oral habits, again with small scale uncontrolled studies and variable treatment and follow-up periods (Peterson et al., 1994).

Although HR has shown startling success in individual selected cases and in small scale controlled studies, there have been no large scale random controlled studies of the efficacy of HR.
Also, the comparative efficacy of HR across types of tic is unclear (Miltenberger, Fuqua & Woods, 1998). The operational components and treatment parameters of HR are also equivocal and vary over studies (Miltenberger et al., 1998) and the impact of HR on other aspects of behavioural, cognitive, emotional and social functioning remain uncertain.

The present waitlist control study evaluates the efficacy of a manualized cognitive behavioural treatment program based on the habit reversal package and administered under standardized conditions to a large sample of both HD and CTD recruited from the general population. In order to identify sample characteristics and the impact of treatment on different aspects of psychological functioning, measures of psychopathology and cognitive and psychosocial functioning were taken pre- and post-treatment.

2. Method

2.1. Participant recruitment

One hundred and twelve participants were recruited from announcements in the local and metropolitan journals in the Montreal area. Participants were initially screened by telephone for suitability in terms of: (1) geographical accessibility/motivation to attend; (2) absence of grave psychiatric or medical history; (3) no current psychotropic medication or other psychotherapy; (4) no current behavioural or social or familial problems; and (5) abuse of alcohol or drugs. Criteria for inclusion were: (1) age 18–60; and (2) presenting a simple/complex tic or habit disorder for at least 1 year and occurring daily. Exclusion criteria were: (1) any major medical problem or other psychiatric problem on Axis I or II: TS severe or extreme; (2) neurological problems (e.g., Parkinson’s disorder, hemifacial spasms; Meige syndrome, sclerosis; Huntington’s disease); (3) currently receiving treatment from psychiatrist, psychologist, acupuncturer, hypnotherapist, massotherapist; (4) currently receiving anxiolytic, antidepressant, antipsychotic medication; and (5) abuse of alcohol or drugs. Those included had a diagnosis of either CTD (simple or complex) or HD as the principal presenting problem. Subsequent to passing the telephone screening, an appointment was made with one of the clinical psychiatrists (FB, ES) collaborating on the project for psychiatric screening. The standard psychiatric interview assessed participants according to DSM-III-R criteria and on personal history of tic disorder and severity of TS symptom rating (if applicable) using the Tourette Syndrome Global Scale (Harcherik, Leckman, Detlor & Cohen, 1984). After confirmation that the person met the inclusion criteria for the study (and none of the exclusion criteria), the participant received a psychological assessment. Only if there was agreement between psychiatrist and clinical psychologist on diagnosis was the person accepted in the study. Psychological criteria for exclusion were: (1) any severe stressor (e.g., marital rupture); (2) lack of motivation; (3) time availability; or (4) any other psychological problems requiring attention. The intensity of recognized habit disorders (bruxism, onychophagia, trichotillomania) were assessed according to recommendations in the literature (bruxism: Lavigne & Montplaisir, 1994; onychophagia: Hadley, 1984; trichotillomania: Rothbaum & Ninan, 1994; Minichiello, O’Sullivan, Osgood-Hynes & Baer, 1994). Bruxers represented a special case in that teeth clenching generally occurs at night. However, it can also occur in milder form during the day, and self reported stress and tension during the day have been linked to intensity of teeth clenching during the night.
The cases included in the present study all had a daytime clenching component. After a person attended the psychiatric and psychological screening interview and s/he was accepted onto the study, and signed the consent form, s/he was counted as a participant. If thereafter any participant abandoned the study for whatever reason s/he was considered as a drop out. The participants received two further psychological evaluations: one, to discuss more fully the implications of the tic/habit problems (on video) and to video record the actual tic or habit, the other to complete a battery of neuropsychological tests. During this baseline period, participants also completed the series of 10 questionnaires (see later), and were instructed in completing the daily diary.

Of the 112 participants initially recruited, eight dropped out in the preliminary stages of evaluation and a further 14 at different stages during the clinical program including six on the waitlist (four of whom none-the-less completed the battery of post-waitlist questionnaires). There were no substantial differences between those completing the program and refusers and dropouts either in demographic or clinical characteristics. Of the eight refusers, five were HD and three CTD. Of the 14 dropouts, nine were HD and five CTD. However, of the nine HD dropouts, five had bruxism.

Baseline clinical and questionnaire data was available on a maximum of 105 (54 CTD, 51 HD) participants. At the end of pre-post waitlist/treatment, questionnaire data was available on a maximum of 90, although missing values reduced this number on some items. These 90 broke down into 47 chronic tics and 43 other habit disorders. The sites of the simple tics broke down further according to principal tic causing distress as: eye (15); head/shoulders/neck (19); face (6); hands (2); abdomen (2); legs (1); vocal tics, including respiration-related tics (2). The type of habit disorders included: trichotillomania (13); onychophagia (12); scabionia, scratching/skin pulling (6); bruxism (4); complex finger/hand routines (3); other body movements (5).

Thirty-eight people were placed on the waitlist and this included 22 CTD and 16 HD. The intention-to-treat waitlist period was designed to control for the initial effect of volunteering, the passage of time and the spontaneous variations in tic severity (tics may wax and wane over time). The treatment or waitlist period lasted 14–16 weeks. After retest, those on the waitlist then received the cognitive-behavioural treatment package and follow-up procedures. Follow-up contact was made at 2, 6 months and at 2 years where possible.

2.2 Clinical measures

Questionnaire measures to assess psychosocial function and psychopathology included: The Social Self-esteem Inventory (SSI) (Lawson, Marshall & McGrath, 1979), the Life Experience Survey (LES) (Sarason, Johnson & Siegel, 1978), the Spielberger State-trait Anxiety Inventory (STAI) (Spielberger, Gorsuch & Lushene, 1970), the Beck Depressive Inventory (BDI) (Beck, 1970), the General Health Questionnaire (GHQ) — 12-item version (Goldberg, 1972), the Maudsley Obsessional–Compulsive Inventory (MOCI) (Rachman & Hodgson, 1980), the Eysenck Personality Inventory (EPI) (Eysenck & Eysenck, 1980).

O’Connor, Gareau and Borgeat (1997) have previously noted that relaxation difficulties in CTD were accompanied by a premeditated style of action involving a tendency to attempt too much at once, premature abandonment of tasks, unwillingness to relax, and pace action appropriately. This style of action was measured by a 30-item Style of Planning Questionnaire (STOP) and
whilst resembling hyperactivity and/or type A behaviour seems driven by perfectionist beliefs about: personal organization, the need to be over-prepared, always on the move, and to accomplish as much as possible. Previous CTD samples have scored high on the personal organization and personal standards subscale of the multidimensional perfectionism scale (O’Connor et al., 1997), so the Multi-dimensional Perfectionism Scale (MPS) (Frost, Marten, Lahart & Rosenblate, 1990) was also administered.

The clinical measures included a daily tic diary which recorded frequency (total number per period), intensity (weak 1–strong 5) and degree of control over the tic (none 0–complete 100) on a daily basis in a specially prepared booklet. The participants was trained in the use of the booklet and a unit of tic (tics) or habit was defined at the beginning of the evaluation. Twelve diaries from the waitlist (including six who abandoned) were not completed adequately from a research point of view, leaving a maximum of 24 post-waitlist and 80 pre- and post-treatment. The 12 diaries excluded from waitlist were six F, six M; seven CTD, five HD; with demographic and clinical variables comparable to the rest of the sample. Two-month follow-up data was available on a maximum of 74 participants.

The importance of situational factors in tic and habit onset has been revealed by functional analysis in other clinical studies (Carr, Taylor, Wallander & Reiss, 1996; Scotti, Schulman & Hojnacki, 1994; Christenson, Ristvedt & Mackenzie, 1993). O’Connor, Gareau and Blowers (1993) looked at situations likely to provoke tics and found these were not necessarily related to anxiety but rather to frustrating thoughts or events. A separate situational grid identified the high and low risk situations for tic occurrence and it also measured the probability of the tic occurring in each high and low risk situation. Differences in the way high and low risk situations were appraised and anticipated were prioritized and addressed when devising competing cognitive-behavioural responses to the tic/habit high risk situations. The differences in these cognitive evaluations were rated across high and low risk situations pre- and post-treatment. A reduction in the mean and variance of such ratings post-treatment indicated less distinction between high and low risk tic situations. Videos were recorded for all participants pre- and post-treatment/waiting list for 10 min in a conversation with the therapist about the tic problem and for 10 min during recreation of a high risk situation likely to provoke the tic. If the high risk situation proved difficult to re-create, it was simulated with the participants’ collaboration. This video was scored separately for frequency and intensity of tic/habit by two trained raters who were independent of the study and were also blind to order of video sequence (pre-treatment/waitlist or post-treatment/waitlist). As recommended by Peterson and Azrin (1992), inter-observer agreement was obtained by the frequency ratio method (Kazdin, 1982, pp. 52–53) whereby comparisons were made between the totals of the two observers. Raters recorded the number of habit/tic units during each 5-min phase. Inter-observer agreement was calculated by dividing the lowest rating by the highest rating and multiplying by 100. Inter-rater reliability initially varied between 0.46 and 1.00 ($\bar{x}=0.76$). Where reliability was initially below 0.80, the videos were reviewed following a discussion to ensure a consensus on the definition of the tic. The videos were also used clinically as feedback to improve client’s awareness, and definition of their problem and enable participants to examine and describe their tic in greater detail. A final measure of clinical change (where available) was the external rating of a close other on the change in frequency, intensity and other relevant aspects of behaviour (e.g., overall style of action).

Each of the above clinical measures had a different type of bias. However any agreement
between these measures on outcome gave some convergent validity to a finding of a clinically significant change (Kay, Guernsey de Zapien, Altamirano Wilson & Yoder, 1993).

3. Cognitive-behavioural program

3.1. Treatment package

The treatment package followed the principal stages of ‘habit-reversal’ (Azrin and Peterson, 1988b; Woods & Miltenberger, 1995). In addition, the key habit-reversal strategy of implementing a competing behavioural response to the tic/habit was developed alongside a more general cognitive and behavioural restructuring of the person’s approach to the high risk tic situation which addressed anticipations and appraisals concerning the appearance of the tics.

The treatment (supervised by KO) was individualized, manual based, and carried out by three therapists who were all licensed psychologists with prior experience of cognitive-behaviour therapy (MB, SR, JL). The program was progressive and passed through five major steps, lasting a total of 4 months: information, awareness training and constructing a situational profile, relaxation and muscle discrimination exercises and modifying a tension producing style of planning action, development of alternative competing responses using cognitive and behavioural strategies, and preventing relapse. The strategies were cumulative in the sense that each week the person built on the exercises of the previous week.

3.2. Information stage

In the information stage, the person was presented with the rationale of the program, definition of the problem habit, information on motor habits and inappropriate strategies of dealing with them (e.g., suppression), explanation of the basic mechanics of movement and the triple link between muscles, thoughts and emotions.

3.3. Awareness exercises

These involved training to observe the tic/habit and record it in the diary, but also to detect slight partial tics and tensions around the tic. The participants viewed their video and described their tic/habit in detail in order to determine the targeted tic/habit unit. The awareness stage comprised auto-observation, monitoring exercises, completing a situational profile, and identifying the cognitive factors (e.g., anticipations/expectations) associated with the high risk tic situations.

3.4. Relaxation and muscle discrimination exercises

The next stage involved psycho-physiological training exercises aimed at: (1) demonstrating, with the aid of biofeedback, how behavioural strategies induce a change in motor and autonomic arousal; (2) increasing knowledge of different tension levels (one of our previous findings has suggested that the muscles directly implicated in simple or complex tics are less flexible than
other muscles; O’Connor, Gareau & Borgeat, 1995); and (3) learning standard applied relaxation techniques based on those developed by Bernstein and Borkovec (1973) and Ost (1987).

As part of the relaxation strategy, perfectionist beliefs about personal organization were specifically addressed including: the efficacy of concentrating on one task at a time and screening out distractions; countering thoughts likely to lead to overactive performance (e.g., “if I am going downtown to pick up the groceries, I can also call in at the garage, return the book to the library, visit my friend John, get a check-up at the optician, etc.”); developing realistic expectations about performance; investing appropriate effort in performance; accepting realistic feedback on performance ability; avoiding strategies that create tension and frustration (e.g., trying always to be further advanced and ‘ahead of oneself’ in performance); establishing a right to relax and structuring a timetable efficiently.

3.5. Incompatible competing responses

This took three forms: prevention by relaxation (localized relaxation to counteract onset of the tic in the high risk situations), normalization (a more normal response substituted for the tic or habit by pacing the overactive response, e.g., correcting excessive blinking through training in the use of correct muscles and rhythm, Azrin & Peterson, 1989), and behaviourally antagonist response in accordance with HR recommendations (Carr, 1995). Behavioural strategies incompatible with the tic were developed in line with alternative evaluations of the situation. The cognitive aspect of restructuring action aimed at introducing flexibility into judgements and anticipations about intended action, both in high risk and other situations. This flexibility was achieved by working backwards through current thoughts to find embedded judgement on what is/is not acceptable action and associated irrational expectations about outcome in the situation. Socratic dialogue and triple column technique were used to confront the unrealistic anticipations concerning the reactions of others and the client’s own performance and appearance in specific high risk situations. So for example a person who had evaluated a high risk tic situation as one to complete as quickly as possible, and who after cognitive restructuring was able to approach it in a less hasty light, was subsequently encouraged to relax muscles in accordance with the more relaxed approach. The behavioural response incompatible with the tic was then devised within a cognitive-behavioural context.

3.6. Relapse prevention and generalization strategies

These strategies (Marlatt & Gordon, 1985) included: foreseeing stressful states and excitable events likely to occur in the future; adopting a rational approach to any future relapse and not catastrophizing any recurrence of the problem; identifying why any relapse occurred, and the preventative strategy that could have been adopted, or was incompletely adopted to control the tic/habit; emphasizing the need for perseverance in the manual based exercises; and applying strategies to new situations and other habits which were not covered in the program.

The entire treatment package was administered for a standard period of 12 weekly sessions with a further 1 month home-practice and then full post-treatment evaluation. Structured follow-ups were carried out at 2 months and at 2 years post-treatment where possible. The last follow-
up was by telephone contact and was conducted according to a standard semi-structured interview format. All stages of the program were administered to all participants who did not abandon.

4. Analysis

There were no differences between either of the CTD and HD groups on sex, age, marital status, educational, income or chronicity of the problem [CTD (n=54): 33 M, 21 F; age x=39.1 (9.96); chronicity x=26.39 (11.23); HD (n=51): 31 M, 20 F; age x=37.12 (10.59); chronicity x=22.36 (11.22)]. Since there were no covariates, the main statistical analysis was a two-way repeated measures MANOVA, with two levels: groups (CTD and HD) and repeated measures (pre- and post-treatment and pre- and post-waitlist periods). Because of differences in the number of participants, separate analyses were conducted at waitlist, post-treatment and follow-up. The MANOVA was carried out separately on questionnaire and clinical outcome measures. Clinical measures included: tic diary (intensity, frequency and degree of control), situational grid (variation over high and low risk situations), video ratings (of frequency and severity of tic), evaluation of close other. Agreement between clinical measures was also assessed by computing inter-rater correlation between rating instruments on percentage improvement of individual participants.

4.1. Questionnaire data-initial values

There were no baseline differences between CTD and HD groups in: LES, STAI, SSI, MPS, BDI, GHQ, and EPI (Table 1).

Clinical status of the mean GHQ score for both CTD and HD client groups would be classified as mild-to-moderate. Both trait and state anxiety scores for both CTD and HD client groups fell below the clinical norms given in the STAI Manual (Speilberger et al., 1970). The BDI scores for both groups also fell outside the pathological range. The scores on all subscales of the MOCI were low and did not meet obsessional criteria. Both groups were within normal limits on the SSI. Overall scores of perfectionism were not high, although certain subscales such as ‘concern over mistakes’, ‘personal standards’ and ‘personal organization’ were elevated in comparison with

| Table 1 |
| Questionnaire data for tic and habit disorder groups |

<table>
<thead>
<tr>
<th></th>
<th>Tic disorder, x (SD)</th>
<th></th>
<th>Habit disorder, x (SD)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline (n=54)</td>
<td>Waitlist (n=22)</td>
<td>Post (n=44)</td>
<td>Baseline (n=51)</td>
</tr>
<tr>
<td>GHQ score</td>
<td>25.54 (5.46)</td>
<td>22.95 (4.94)</td>
<td>21.70 (5.77)</td>
<td>25.39 (5.93)</td>
</tr>
<tr>
<td>ASTA state</td>
<td>40.54 (9.99)</td>
<td>43.78 (13.57)</td>
<td>36.06 (9.46)</td>
<td>41.60 (13.74)</td>
</tr>
<tr>
<td>ASTA trait</td>
<td>43.31 (10.23)</td>
<td>45.26 (11.29)</td>
<td>38.68 (9.68)</td>
<td>42.60 (11.71)</td>
</tr>
<tr>
<td>MOCI</td>
<td>7.95 (4.25)</td>
<td>–</td>
<td>–</td>
<td>8.08 (3.95)</td>
</tr>
<tr>
<td>BDI</td>
<td>9.64 (6.65)</td>
<td>8.05 (5.69)</td>
<td>6.04 (5.29)</td>
<td>11.99 (8.13)</td>
</tr>
<tr>
<td>SSI</td>
<td>130.59 (26.80)</td>
<td>131.55 (22.91)</td>
<td>132.97 (26.74)</td>
<td>131.20 (29.13)</td>
</tr>
<tr>
<td>STOP</td>
<td>−3.14 (11.12)</td>
<td>−3.68 (12.89)</td>
<td>0.69 (11.10)</td>
<td>−1.52 (12.47)</td>
</tr>
</tbody>
</table>
other subscales (Frost et al., 1990). Reports of personal reactions to the tic/habit covered a variety of dimensions of concern to the client. Clients with tics generally reported more reactions to their problems. There were significant differences between CTD and HD groups in the following items: ‘Feeling more tired because of the problem’ \(t(104)=5.14; P<0.001\); ‘I am sometimes aghast at suffering the problem’ \(t(102)=1.92; P<0.05\); ‘Since my tic/habit, I find it difficult to relax’ \(t(103)=2.02; P<0.05\); ‘Since onset of my tic/habit, I’ve been exasperated’ \(t(103)=2.29; P<0.02\). In all cases, the clients with CTD showed a more severe reaction.

5. Changes following treatment

5.1. Clinical outcome

A total of 90 participants completed the program and completed the questionnaire data pre- and post-treatment. Thirty-six of the 90 completed post-waitlist questionnaire measures and subsequent treatment, and post-treatment questionnaire measures. Eighty-six participants completed diary data on pre-treatment and 80 post-treatment (44 CTD; 36 HD), 24 of these also on the waitlist (14 CTD; 10 HD).

Tic unit frequency, the degree of tic intensity and percentage control as self-rated in the daily diaries were averaged over 10 days at baseline, 10 days post-waitlist or post-treatment, and 10 days at two-month follow-up. Self-reported frequency and control were not correlated at baseline. Degree of control correlated inversely with level of intensity \(r(86)=-0.36; P<0.001\). Two-way repeated measures ANOVA comparisons between those on the waitlist and those receiving treatment indicated that those receiving treatment showed a significant change in frequency, intensity and control of tic which was not reported by the waitlist group. Respective means and standard deviations \([\bar{x}(SD_{n-1})]\) for frequency were: baseline: CTD \((n=44)\) [20.31 (35.7)]; HD \((n=36)\) [11.03 (13.0)]; waitlist: CTD \((n=14)\) [21.40 (31.23)]; HD \((n=10)\) [10.28 (11.02)]; post-treatment: CTD \((n=44)\) [7.11 (15.61)]; HD \((n=36)\) [4.62 (7.14)]; 2-month follow-up: CTD \((n=38)\) [6.69 (2.50)]; HD \((n=32)\) [2.72 (3.85)] (see Fig. 1). In both CTD and HD groups there was a significant decrease pre- and post-treatment in tic/habit frequency \(F(1,78)=11.85; P<0.001\), tic/habit intensity \(F(1,78)=70.57; P<0.001\) and an increase in degree of control \(F(1,78)=130.60; P<0.001\). These changes were maintained at 2 month follow-up: frequency \(F(1,67)=7.98; P<0.006\), intensity \(F(1,67)=132.78; P<0.001\) and degree of control \(F(1,66)=121.23; P<0.001\). CTD or HD group did not differ in response to active treatment or waitlist condition. However, there was some indication at 2 month follow-up of a group by time effect in tic/habit intensity \(F(1,67)=7.90; P<0.006\) and degree of control \(F(1,66)=5.50; P<0.02\) with the HD group showing lower intensity and higher control than the CTD group. After receiving treatment post-waitlist, the waitlist control group showed a significant increase in control \(F(2,19)=11.02; P<0.001\); and decrease in tic intensity \(F(2,19)=21.39; P<0.001\).

There were no significant differences between CTD and HD groups in the mean or the variability of evaluations of high/low risk situations \([n=80]\); pre: 2.26 (0.55); post: 1.22 (0.66). The difference in evaluations between high and low-risk situations decreased post-treatment in both CTD and HD groups \(F(1,78)=132.41; P<0.001\). Change in variability of situational evaluations also decreased \(F(1,78)=134.28; P<0.001\).
Seventy-one (88%) of the completers (with diaries) showed a significant decrease in both tic/habit frequency and intensity post-treatment on diary, clinical and video measures. Fifty-two (65%) reported control between 75 and 100% over the tic/habit post-treatment, 16 (20%) reported between 50 and 75% control, and 12 (15%) reported less than 50% control. At two-month follow-up, there was no relapse. Eleven CTD and 16 HD had completely eliminated the tic/habit at two-month follow-up, and, of these, three CTD and six HD reported some degree of relapse at 2-year follow-up. Conversely, four CTD and three HD who had not eliminated post-treatment reported complete elimination at 2-year follow-up. Two-year follow-up was conducted by a structured telephone interview with a total of 56 participants who had successfully completed the program. The interview evaluated: the current frequency, intensity, degree of control over the tic; strategies used consistently to control the tic; generalization of strategies; details of difficulties encountered in controlling the tic; degree of adherence and confidence in maintaining control in the future; other life changes; changes in style of action; new activities; whether other tics had appeared. Other comments on nature and impact of the program were also solicited. At 2-year follow-up, 43 (77%) of those contacted had maintained or improved their control, and 29 (52%) still reported 75–100% control.

5.2. Participant evaluations

Of the 90% of participants who reported practising the awareness exercises, 39% found them very useful; 96% used the auto-observations (daily diary), and 70% found this very useful; 91% practised the physiological and relaxation exercises and 68% found them useful; 96% used cognitive and behavioural restructuring of whom 66% reported finding it very useful; 98% reported changing style of action at least somewhat, of whom 65% reported find it very useful; finally,
91% reported that interaction with the therapist was very useful. There were no differences between CTD and HD groups in the type and use of strategies or in strategies used or found helpful.

5.3. Convergence between self-rated diary measures, situational grid measures, close other rating and video rating

A close other was available to serve as external rater on a total of 63 of the participants with complete diaries. Of these, 66% rated the engagement of the client throughout the program on a scale of 1–5 as strongly adherent, and 33% as more or less adherent. No clients were rated as non-compliant. Amongst the external raters, 76% rated intensity of tic/habit as reduced by >50% ($t=64.7; SD=33.8$); 63% rated frequency as reduced by >50% ($t=56.6; SD=31.6$); and 64% rated duration as reduced by >50% ($t=58.8; SD=32.0$); 57% rated the client as having benefited greatly from the program, 32% moderately, 8% a little, and 3% not at all. Correlations between degree of change in client ratings of tic frequency and degree of change in close others ratings of tic were significant \(r(53)=0.30; P<0.03\). There was a significant positive correlation between the video rating in tic frequency and the corresponding diary ratings of frequency pre-treatment \(r(36)=0.36; P<0.03\) and post-treatment \(r(29)=0.43; P<0.02\). The correlation between video rating percentage change score and close other percentage change score was positive but not significant \(r(26)=0.35; P<0.08\). There was a significant positive correlation between change in diary measures and change in the overall variance of the situational rankings from pre- to post-treatment \(r(66)=0.23; P<0.05\) and between change in the variance of the situational rankings and the external raters assessment of improvement \(r(54)=0.30; P<0.03\).

5.4. Questionnaire measures pre- and post-treatment

There was a significant decrease post-treatment in both state and trait STAI [state: \(F(1,78)=8.21, P<0.005\); trait: \(F(1,77)=11.09, P<0.001\)] score and on the BDI [\(F(1,75)=31.83; P<0.001\)]. On the MPS, there was a significant decrease in the subscale: concern over mistakes \(F(1,77)=6.84; P<0.01\), but no change on other subscales. There was a significant decrease in the GHQ \(F(1,77)=32.40; P<0.001\). The SSI showed an overall significant increase post-treatment \(F(1,77)=14.05; P<0.01\). The SSI is quite diverse and when it was broken down item by item the following were found to have changed significantly post-treatment. Item 1 (difficulty speaking to strangers): \(F(1,77)=3.55, P<0.06\); Item 2 (lacking confidence with others): \(F(1,77)=3.75, P<0.05\); Item 7 (I don’t make friends easily): \(F(1,77)=3.75, P<0.05\); Item 19 (people find me annoying): \(F(1,77)=6.13, P<0.01\); Item 21 (I am nervous with people who are not my friends): \(F(1,77)=18.35, P<0.001\); Item 23 (I am embarrassed with most people): \(F(1,77)=3.78, P<0.05\); Item 28 (I am satisfied with myself as a person): \(F(1,76)=9.33, P<0.003\); Item 30 (I’m not at ease with others): \(F(1,77)=9.31, P<0.003\). These changes in measures of self-esteem related mainly to feeling at ease interpersonally, not feeling judged and feeling confident in conversation and with others who were strangers. There were no equivalent significant changes in the waitlist group.

There were significant pre-post treatment differences on the following STOP items: Post-treatment, both CTD and HD clients found it easier to relax (item 2) \([F(1,72)=12.44; P<0.001]\); easier to keep still for 15 min at a time (item 8) \([F(1,72)=10.34; P<0.002]\); Easier to complete a task...
under pressure (item 14) \[F(1,72)=8.06; P<0.006\]; Unnecessary to always accomplish a task in haste (item 20) \[F(1,72)=9.47; P<0.003\]; More important to take time to make a decision than to decide rapidly (item 24) \[F(1,72)=8.87; P<0.004\]; Preferable to quit or modify boring encounters than tolerate them impatiently (item 25) \[F(1,72)=10.35; P<0.002\]. The clients’ scores on the STOP questionnaire tended to revert to a less overactive and less over prepared profile post-treatment.

There were no systematic differences in STOP profiles between CTD and HD groups. Significant change on the STOP items after the return from the waitlist were confined to item 2 (finding it difficult to relax) \[t(−2.06); P<0.05\], and item 26 (obliged to play a role) \[t(−2.34); P<0.03\]. The changes in both cases were not in a beneficial direction (i.e. post waitlist, the client groups found it more difficult to relax and more obliged to play a role).

6. Discussion

The active cognitive-behavioural treatment program was more effective than a waitlist condition and was equally effective for tic and habit disorders. However, the study has a number of limitations. The client population may have been less clinically severe than a usual clinic population in two ways: firstly the majority of the participants had one principal tic or habit; secondly those with major diagnostic co-morbidity and severe-extreme TS with attentional and/or behavioural problems were excluded. The study used a waitlist rather than a treatment control and the efficacy of individual components of the package were not evaluated (except by participants). Finally, missing diary data hampered the generalizability of findings across all tic and habit sub-types.

There has been speculation that some habit disorders (e.g., trichotillomania) may form a part of the obsessive–compulsive disorder (OCD) spectrum (Stanley, Prather, Wagner, Davis & Swann, 1993) and can be evaluated using obsessional–compulsive scales (e.g., Y–BOCS). Behavioural treatments of choice regarding tics and OCD are distinct (respectively habit reversal and exposure with response prevention). But, in the present study and in our other clinical experience, clients with HD have responded well to treatment developed initially to manage tic disorders. Woods and Miltenberger (1995) and Miltenberger et al. (1998) seem of the same opinion. The manualized program was standardized and uniformly administered to ensure comparability of treatment between tic subtypes and between CTD and HD. Clinically speaking, it was clear that a more flexible period would have permitted better individual tailoring of strategies. Azrin and Peterson (1988a) have remarked on the need for an idiopathic approach to treatment strategy and duration. The mean chronicity of the tic and habit client groups was substantial (26 and 22 years, respectively) but chronicity of the habit was not associated with outcome and there seemed no other obvious clinical characteristics to contra-indicate cognitive-behavioural treatment in the current sample.

The success of HR by itself in tic management might argue against the need for considering any extra variables in therapy other than the tic behaviour itself. A strictly behavioural version of HR targets only the specific tic/habit movement and replaces this often with another tension-producing movement (e.g., fist clenching instead of hair pulling). It does not consider situational, cognitive and other background activity factors clinically relevant to tic management. The competing antagonistic action used in HR is often a more systematic extension of a strategy already
used by many clients themselves for inhibiting or suppressing the tic. This inhibition can prevent tic onset but can also lead to problems of tension and general discomfort. In fact, prevention by relaxation (where the client simply focuses on relaxing the muscle instead of ticcing) can be an efficient means of preventing the tic (O’Connor & Gareau, 1994). Although HR remains a treatment of choice, there are limitations on its use. Firstly, the selection of a socially acceptable competing response is not always evident despite the existence of excellent guides (Carr, 1995). Although dramatic reductions in tic frequency can follow application of HR procedures after very few sessions in a clinic/experimental setting, improvement is typically less marked in the home setting (Azrin & Peterson, 1988a), where perhaps other cognitive and situational factors influencing tic onset might have more impact.

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References


