Shorter communication

Behavioral activity associated with onset in chronic tic and habit disorder

Kieron O’Connor *, Hélène Brisebois, Mathilde Brault, Sophie Robillard, Josée Loiselle

Centre de recherche Fernand-Seguin, 7331 Hochelaga St., Montréal (Québec) H1N 3V2, Canada

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Abstract

Seventy-six people (aged 18–62 years) diagnosed with either a chronic tic disorder or a habit disorder, entering a treatment study, kept a baseline daily diary for at least ten days, noting tic frequency and activity at time of onset. Together with an evaluator, participants completed a form ranking three high-risk activities where the tic or habit was likely to appear, and three low-risk activities where the tic was absent or barely present. Subjective appraisals distinguishing the two types of activities were also elicited and their relevance to the tic was measured on a seven-point scale using an adaptation of Kelly’s repertory grid technique. Overall, the most frequent high-risk and low-risk activities were, respectively, passive attendance and physical activity. There were, however, significant differences in types of high-risk activities amongst the tic and habit disorders. Conversely, appraisals of the high-risk activities seemed to center on negative evaluations of tenseness, boredom, dissatisfaction, and disinterest.

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1. Introduction

Both tics and habit disorders have been considered part of the obsessive compulsive disorder spectrum (OCD), characterized, according to Hollander (1993), by an inability in delaying or inhibiting repetitive behavior. Tics take the form of simple or complex non-voluntary contractions (in one or more muscle groups) or phonic utterances. Tics may be transitory or form part of chronic tic disorder (CTD) or Tourette syndrome (TS) which includes multiple tics plus phonic tic. Habit disorders (HD) is a term covering a variety of destructive impulsive habits including:
trichotillomania, bruxism, onychophagia, scabiomania. CTD, TS and to a lesser extent HD are viewed as the impulsive end of an impulsive (tension reduction)-compulsive (harm avoidance) dimension of the OCD spectrum.

Despite attempts to adapt OCD evaluation instruments to CTD and HD, there are a number of cognitive, behavioral and clinical differences between both CTD, HD and OCD. Both CTD and HD, for example, are preceded by premonitory sensory urges rather than obsessional thoughts, and respond to distinct pharmacological and behavioral interventions. Although CTD and HD have been compared independently with OCD, there has been little systematic enquiry into the common or distinguishing features between CTD and HD. There are similarities between the two disorders in the egosyntonic/dystonic cycle of motor action, and in a similar beneficial response to behavioral treatments of habit reversal. In addition there seems a high covariation between the two disorders and similar comorbidity (Woods, Miltenberger, & Lumley, 1996; Miltenberger, Fuqua, & Woods, 1998). On the other hand, the reflex-like nature of tics encourages research into the aetiology of CTD and TS to focus on neurobiological sources. Whereas, in HD, the complex, if automated, motor actions more obviously resemble a learned response (Miltenberger, Fuqua & Woods, 1998). Also, different states, moods, activities and background personality attributes seem to characterize CTD and HD (Dean, Nelson, & Moss, 1992). Although tics and habits have been classified together as nervous habits, emotions associated in both cases with onset of the habit and with its consequences seem complex. The consequences of ticing may be tension reduction, but HD may also serve a mood regulation function. Christenson, Ristvedt and Mackenzie (1993) have previously reported cue profiles in HD related primarily to negative affect and sedentary activities and associated with an history of depression. Equally other authors have noted that in HD the habits accompany negative states, including depression, lack of self-worth and boredom (Dean, Nelson & Moss, 1992).

Exploration of the cue profiles and situations likely to evoke tics in CTD has tended to reveal less uniform patterns. In a clinical context, functional analysis has revealed the idiosyncratic antecedents and consequences reinforcing a particular tic and habit behavior (e.g. Carr, Taylor, Wallander, & Reiss, 1996; Fuata & Griffiths, 1992; Scotti, Schulman, & Hojnacki, 1994). O’Connor, Gareau, & Blowers (1993, 1994) monitored high-, medium- and low-risk situations and found that tic clients showed idiosyncratic situation profiles, even though the accompanying thoughts and feelings most frequently concerned impatience and frustration.

The experimental literature, however, suggests that both CTD and HD involve problems in regulating motor activity (O’Connor et al., 2000). TS also show higher levels of motor activation (Biswal et al., 1998) and so, background activity levels may affect tic or habit onset. Behavioral analysis might then focus on activities during which tics or habits occur rather than focus exclusively on external cues or situations. The motivational state driving the (apparently pointless) tic or habit movement may be clearer if considered in the context of the goal directed activities against which it takes place, e.g., what the person is doing or what actions s/he is intending to carry out at the time of ticcing. This approach situates the tics and habits within the person’s overall telic action plan rather than as just an isolated (meaningless) response or reflex.

The aims of the present study were to systematically examine behavioral activity during tic or habit onset in people suffering from CTD and HD; measure the subjective appraisals associated with these background activities; and compare activity profiles amongst different subgroups of CTD and HD.
2. Method

Participants were recruited from announcements in the local and metropolitan Montréal newspapers. They were initially screened by telephone for suitability, in terms of geographical accessibility/motivation to attend; absence of grave psychiatric or medical history; no current medication and other therapeutics; no current major behavioral, social or familial problems; no abuse of alcohol or drugs. Criteria for inclusion were: age 18–65; presenting a simple/complex tic disorder or habit disorder for at least one year and occurring daily. Exclusion criteria were: any major medical problem or other psychiatric problem on Axis I or II, TS severe or extreme; neurological problem (e.g., Parkinson’s disorder, hemifacial spasms); Meige syndrome, sclerosis; Huntingdon’s disease; Wilson’s disease; currently receiving treatment from psychiatrist, psychologist, acupuncturist, hypnotherapist, massotherapist; currently receiving anxiolytic, antidepressant, antipsychotic medication; abuse of alcohol or drug. Those included had a diagnosis of either simple/complex tic, or habit disorder as the principal presenting problem. Subsequent to passing the telephone screening, an appointment was made with a psychiatrist to confirm that the person met the inclusion criteria for the study and none of the exclusion criteria. Afterwards, a psychological assessment uncovered in more detail the person’s problem, history, current situation, motivation, and degree of disruption of everyday life by the tic, and other factors surrounding the problem. Participants were also asked to sign a consent form. The present study formed part of the baseline evaluation procedure prior to entering a 4-month cognitive-behavioral program based on habit reversal principles (O’Connor et al., 2001). As part of baseline recording, all participants were trained in completion of a daily diary at baseline and throughout the study. The diary rated frequency of tic, intensity of urge to tic and the activity or situation in which the tic occurred.

Seventy-six people aged 18–62 (38 male and 38 female; mean age=38.2, SD=10.0; 70% with partners) diagnosed with either chronic tic, Tourette’s, or habit disorder participated in the study. We distinguished two diagnostic categories: habit disorders, encompassing trichotillomania (n=15), bruxism (with daytime component) (n=4), scabiomania (scratching) (n=4) and onyco-phagia (nail or finger biting) (n=14); and chronic tics, comprising shoulder movement (n=4), head motion (n=16), eye blinking (n=15), and Tourette’s syndrome (n=4). Mean chronicity of problems was 24.6 years (SD=11.0).

On the basis of the daily diary kept over at least ten days at baseline, the participants completed, with an evaluator, a form ranking the three most frequent high-risk activities and the three most frequent low-risk activities linked to tic or habit onset. The evaluator sought concrete descriptions of activities during which the urge to tic or perform the habit was least or most likely to occur. Appraisals associated with the high- and low-risk activities were established by asking the person to evaluate how their reactions to any two high risk activities were similar and dissimilar to low-risk activities (triadic sorting). This procedure was continued until the person had exhausted possible appraisals. The procedure was adapted from Kelly’s repertory grid method for eliciting constructs from elements (Blowers & O’Connor, 1996). The appraisals were reactions to the behavioral activity itself, not about how the person reacted to the occurrence of the tic or habit. Establishing with the client the opposite pole of the initial appraisal, transformed the appraisal into a bipolar dimension, so permitting degrees of presence or absence of the appraisal to be assessed for each high and low risk activity, on a scale of 1 to 7. The number of appraisals varied...
across participants. The appraisals were ranked 1–7, corresponding to what degree the appraisal or its opposite applied to each individual high- and low-risk activity. The relevance of the appraisals to the division of high- and low-risk activities was inferred on the basis of a significant association between degree of high and low risk of tic onset and the degree to which the appraisal applied across the six high and low risk activities.

3. Analysis

The individual reports on the high- and low-risk activities had enough characteristics in common to enable them to be regrouped into the 12 mutually exclusive categories on the basis of the goal of the activities as listed in Table 1. The same categorization was used for both high-

<table>
<thead>
<tr>
<th>Activity type</th>
<th>Examples</th>
<th>Habit disorders % occurrence</th>
<th>Chronic tics % occurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Low risk</td>
<td>High risk</td>
</tr>
<tr>
<td>Study activity</td>
<td>Attending class or lecture</td>
<td>8</td>
<td>58</td>
</tr>
<tr>
<td>Passive attendance</td>
<td>Watching TV, attending a hockey game</td>
<td>11</td>
<td>69</td>
</tr>
<tr>
<td>Physical exercises</td>
<td>Sport, physical training</td>
<td>50</td>
<td>0</td>
</tr>
<tr>
<td>In transit</td>
<td>Moving between appointments/coming back from work</td>
<td>19</td>
<td>39</td>
</tr>
<tr>
<td>Relaxation</td>
<td>Relaxing in bed, meditating</td>
<td>6</td>
<td>25</td>
</tr>
<tr>
<td>Socialization</td>
<td>Talking in a group or at a party</td>
<td>53</td>
<td>17</td>
</tr>
<tr>
<td>Grooming</td>
<td>Taking a shower, brushing teeth</td>
<td>19</td>
<td>8</td>
</tr>
<tr>
<td>Manual work</td>
<td>Digging, cleaning</td>
<td>28</td>
<td>3</td>
</tr>
<tr>
<td>Leisure pursuits</td>
<td>Playing board games, recreational painting</td>
<td>22</td>
<td>3</td>
</tr>
<tr>
<td>Eating</td>
<td>Having dinner or lunch</td>
<td>28</td>
<td>3</td>
</tr>
<tr>
<td>Intellectual work</td>
<td>Typing on a computer, writing reports</td>
<td>22</td>
<td>19</td>
</tr>
<tr>
<td>Waiting</td>
<td>Awaiting test results, waiting in line</td>
<td>19</td>
<td>39</td>
</tr>
</tbody>
</table>
and low-risk activities. Each activity was allocated to one category. Study referred to activity where the goal was to study, in order to selectively acquire knowledge or information. Passive attendance referred to watching or listening where the role was of spectator, not active learner or participant. Physical exercise applied when the goal of the activity was working out, or engaging in sport activity for the express purpose of exercising. Relaxation was a category reserved for resting or lying, or sitting down for the express purpose of relaxing. Socialization involved active interpersonal or group contact within a formal social occasion, such as talking to others in a social setting or a party. The goal of grooming behavior was self-care, such as showering, washing, brushing teeth, combing hair. Leisure activity involved active pleasant pursuits such as engaging hobbies, where the only goal was pleasure. Waiting was a classification which applied when the person was waiting for an appointment or an event but whilst doing no other activity. In transit applied where the goal was exclusively to move from one place or appointment to another. Manual work involved achieving a physical goal other than exercise and which was work-related. Similarly, intellectual work involved the active pursuit of an intellectual occupation other than studying, and might include computer work, accountancy, etc. Eating behavior was classified where the specific goal of the activity at the time of the tic or habit onset was to eat. Obviously, there were some borderline categorizations. For example, was eating out with a group of friends, a social or eating activity? Was a job involving active listening and processing information (working in a complaints department or as a counsellor) active study or intellectual work? But the boundary disputes were generally resolved by consensus amongst raters, based on an understanding of the principal goal of activity at the time of tic onset. If there was no consensus, the item was eliminated. A small proportion of the activities (8 out of 456) did not fit into any category and so were not included in the analysis. The test-retest reliability of the categorization assessed at two points, two months apart, was 1.00. The initial category sorting was replicated by an independent rater (S.P.). Inter-rater agreement tests conducted on a subset comprising 15 subjects yielded kappa values ranging from 0.60 (p<0.02) to 1.00 (p<0.00).

In order to compare differences in activity profiles across types of tics and habit disorders, chi-square analyses were conducted. A two-way chi-square compared the presence or absence of activity types in high- and low-risk categories between the two tic/habit disorder groups. Separate analyses were conducted for low- and high-risk activities. If the overall chi-square was significant, the adjusted residuals (non-parametric equivalent of z-scores) for the cell percentage of each subgroup were examined. An adjusted residual score greater than 1.96 for a given subgroup percentage indicated that the subgroup differed significantly (p<0.05) from the overall group percentage.

The elicited appraisals related to the high- and low-risk activities were classified into eight dimensional constructs: active–inactive; tense–relaxed; satisfying–dissatisfying; interesting–boring; in control–not in control; judged–not judged; energizing–tiring; and open–reserved. Again, a few entries (5 out of 311) did not belong in any construct category and were omitted. Interrater agreement was measured for all categories, again using 15 subjects; kappa values were between 0.53 (p<0.04) and 1.00 (p<0.00). Another two-way chi-square analysis was carried out to examine construct-related differences between the two groups of tic and habit disorders. This analysis compared the presence or absence of constructs in respective tic/habit disorder groups, and again adjusted residuals greater than 1.96 indicated significant group differences.

Subsequent to any significant group effect between habit and tic disorders, a further chi-square
analysis was planned to compare the eight subgroups of CTD and HD using the same indicators. The validity of the subgroup analysis is questionable, due to the small sizes of each of the eight subgroups, and it was undertaken as an exploratory exercise.

4. Results

4.1. High-risk activities

Across all tics/habit disorders, the most frequent high-risk activity category was passive attendance, with 47% of all participants citing it as a high-risk activity for their problem. Chi-square analyses of high-risk activities between groups yielded significant values for the following categories: study ($\chi^2=15.5; p=0.00$); passive attendance ($\chi^2=7.8; p=0.005$); relaxation ($\chi^2=6.1; p=0.01$); and socialization ($\chi^2=9.4; p=0.001$).

As can be seen in Table 1, study was a high-risk activity for people suffering from habit disorders (it was mentioned 58% of the time; adjusted residual=3.9), as was passive attendance (69%; adjusted residual=2.8) and relaxation (25%; adjusted residual=2.5). Socialization was a high-risk activity for tics (50%; adjusted residual=3.1).

Chi-square analyses of high-risk activities over the eight subgroups within tic and habit disorders yielded significant results for the same activities: study ($\chi^2=17.2; p=0.01$); passive attendance ($\chi^2=18.4; p=0.01$); relaxation ($\chi^2=18.4; p=0.01$); socialization ($\chi^2=19.7; p=0.01$). There were also significant differences for manual work ($\chi^2=15.4; p=0.03$).

Study activity was a prominent high-risk activity for people suffering from trichotillomania (it was mentioned 60% of the time; adjusted residual=2.2), and nail-biting (64%; adjusted residual=2.5) whereas it was notably absent from the high-risk activities recorded by people with head movements (11.8%; adjusted residual=2.3) and eye blinking (13%; adjusted residual=2.0). Passive attendance was absent from the high-risk activities of those with shoulder tics significantly more often than for the other subgroups (0%; adjusted residual=−2.2). Relaxation was a high-risk activity for scratching (75%; adjusted residual=3.5). Socialization constituted a high-risk activity for eye blinking (73%; adjusted residual=3.6) but was included significantly less often as a high-risk activity for trichotillomania (6.7%; adjusted residual=−2.5). Finally, intellectual work was a high-risk activity for people with head movement tics (47%; adjusted residual=2.6) but for no other subgroup.

4.2. Low-risk activities

The most frequent low-risk activity across both tic/habit disorders was physical exercise, occurring in 40% of all individuals. Chi-square analyses of low-risk activities yielded significant results for the following three categories: study activity ($\chi^2=11.4; p=0.001$); passive attendance ($\chi^2=10.6; p=0.001$), and socialization ($\chi^2=4.1; p=0.04$).

As can be seen in Table 1, study activity was a low-risk activity for people suffering from chronic tics (it was mentioned 43% of the time; adjusted residual=3.4), as was passive attendance (45%; adjusted residual=4.4). Socialization was a low-risk activity for habit disorder (53%; adjusted residual=2.0).
Chi-square analyses of low-risk activities over the eight subgroups yielded significant results for passive attendance ($\chi^2=17.4; p=0.02$) and eating ($\chi^2=15.6; p=0.03$). Passive attendance was a common low-risk activity for eye blinking (67%; adjusted residual=3.6) while it was ranked significantly less often as a low-risk activity for nail biting (7%; adjusted residual=−2.0). Eating was also a low-risk activity for scratching (100%; adjusted residual=3.6).

4.3. Appraisals

The tense/relaxed appraisal dimension seemed the most relevant to the manifestation of both tic/habit disorders. A tense state was associated with onset of the disorder in 64 out of 76, or 84% of participants. Chi-square analyses yielded significant results for the following four appraisals of an activity as: active ($\chi^2=7.5; p=0.006$); inactive ($\chi^2=7.4; p=0.007$); tense ($\chi^2=4.4; p=0.037$); and boring ($\chi^2=11.6; p=0.001$).

A high-risk activity was most likely to be appraised as an active one by those with tics (30%; adjusted residual=2.7), while appraisal of a high-risk behavior as inactive was most likely in habit disorder (56%; adjusted residual=2.7). Appraisal of a high-risk activity as tense was also characteristic of tics (93%; adjusted residual=2.1) whereas appraisals of boredom were associated with high-risk activities in habit disorders (44%; adjusted residual=3.4).

Chi-square analyses over the eight subgroups yielded significant results for the appraisals of inactive ($\chi^2=15.6; p=0.01$) and boring ($\chi^2=19.1; p=0.01$). Appraisal of a behavioral activity as inactive was associated with high risk in nail biting (64%; adjusted residual=2.1) but appraisals of inactivity were disproportionately absent from the high-risk appraisals of those with eye blink tics (13%; adjusted residual=−2.3). Appraisals of boredom were associated with high risk in trichotillomania (53%; adjusted residual=2.7) and scratching (75%; adjusted residual=2.3), but such appraisals were most likely not to constitute a high-risk appraisal for people with a head movement tic (6%; adjusted residual=−2.2).

The appraisals of a high-risk activity as unsatisfying was cited by a large proportion of participants with head tics (88%) and bruxism (67%), and was also mentioned by 48% of the other participants. Finally, tiring was the appraisal cited most frequently in trichotillomania (73%), eye blinking (67%) and head movements (71%), but again was also cited by 52% of people in other groups.

5. Discussion

This study demonstrated the existence of an idiosyncratic pattern of high- and low-risk behavioral activities for individuals with tic and habit disorder. Moreover, there were also consistent differences in profile between habit disorders and tics. Further analyses indicated that habit disorders (especially trichotillomania, scratching and nail biting) shared common activity profiles, which distinguished them from eye tics particularly. Work activity was associated with head movements, shoulder movements and bruxism. Trichotillomania was associated with intellectual activity. Shoulder tics were associated with working activities and onset of eye tics seemed to occur more during socialization.

People with trichotillomania and nail biting seem to perceive themselves more as inactive when
they experience the urge to perform the habit. Also, people with trichotillomania and scratching habits more often feel bored during activities where their habit is likely to occur than do people with other tics/habits.

The high- and low-risk activities were not symmetrical, in the sense that the low-risk activities were not the mirror image of the high-risk activities, nor were the appraisals of the high- and low-risk activities necessarily at opposite ends of the same evaluative dimensions. This asymmetry might suggest that high- and low-risk activities signify distinct contingencies and functional relationships between ongoing telic activity and respective non-voluntary habits.

Characteristics of high-risk activities may either provide the cues or just be the occasion for the onset of the tic or habit. Somebody with nothing to do with the hands may be more likely to perform a manual habit, just because the hands are unoccupied. Likewise, performing work with the hands directly prevents a hand focussed habit. Miltenberger, Fuqua and Woods (1998) have suggested a similar contingency. Although we requested that the people describe activities associated with the urge to tic, we also cannot exclude the possibility that some low-risk activities represented activities where the person actively inhibited or had gained some control over the tic or habit so preventing occurrence. This might explain why socialization was low risk for habit disorders, since, typically, the person will not perform the habit in public. On the other hand, it is interesting that the physical location of the tic does seem to have some functional correspondence with the situational activity. Face tics seem more active during socialization where the focus is on the face. Shoulder tics are more associated with work activities. Since an hypothesized immediate result of tics is a temporary relief of tension in the specific implicated muscle groups (Evers & Van De Wetering, 1994), it may be reasonable to suppose that habitual activities influence distribution of tension and hence determine the local development of tension-releasing tic habits.

The appraisals of high-risk activities reflected dissatisfaction with the activity across both tic and habit subtypes, regardless of activity level and type of background activity. However, tic-related activities were more often evaluated as active and tense, whilst habit-related activities were labelled inactive and boring. Although in common parlance, tics and habits are ascribed to nervousness, appraisals of anxiety or nervousness did not feature as appraisals of high-risk activities in either tic or habit disorder.

The prominence of the tense–relax dimension in appraisals, in particular, supports the association of tics with tension reduction. But, in addition, the results have potentially important clinical implications in terms of relating tenseness at the time of tic onset to the context of use. If anatomical site of the tic relates, on the one hand, to the current goal directed activity, and on the other hand, to dissatisfaction with that activity, this might help explain the function of tics as part of a regulation of over-preparation or over-activity in the task-relevant muscle. The function of such a localized tense/relax/re-tense cycle of the tic might help regulate excessive tension in the muscle, but at the same time maintain focus on the muscle in case of the need for further use. Overall, the results emphasize, along with other research (Mansueto, Golomb, Thomas, & Stemberger, 1999), the importance of considering cognitive, emotional and physical aspects both in functional analysis and in treatment of tics and habits. The results further suggest that behavioral techniques might address the person’s general background level of activity, as well as reversing the muscle habit in isolation through habit reversal.
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