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Time to Relapse Questionnaire (TRQ): A Measure of Sudden Relapse in Substance Dependence

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Abstract

Background—Relapse may occur suddenly, following a short period of craving, or after extended consideration. The time to relapse may reveal underlying mechanisms of relapse and have important implications for treatment.

Objective—The Time to Relapse Questionnaire (TRQ), a self-administered questionnaire, was designed to assess the time from the initial thought of drug use to actual use.

Methods—Psychometric properties of the TRQ were evaluated in two distinct populations ($n = 183$ and 194) with DSM-IV primary substance use disorders.

Results—Factor analysis and item refinement led to a 9-item TRQ with a three-factor solution accounting for 63% of the total variance. Three discrete types of relapse style were identified: Sudden Relapse, Short Delay Relapse, and Long Delay Relapse. The TRQ demonstrated good construct validity and adequate internal consistency for the total ($\alpha = .61$) and individual factor ($\alpha = .64-.75$) scores. Measures to assess convergent validity of the TRQ suggest that Sudden Relapse may not reflect more generalized deficits of inhibitory control.

Conclusions and Significance—The TRQ may provide a useful self-report measure to discriminate between addicted patients who relapse without forewarning compared to those with a period of delay. Clinical interventions may be targeted towards different relapse styles.

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Declaration of Interest

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Keywords

impulsive behaviour; questionnaires; recurrence; substance-related disorders

INTRODUCTION

Relapse to substance use following treatment typically reaches 75% in the 3- to 6-month period following treatment (1). Various concepts have been posited to explain the return to substance use in the addicted population, including cognitive and situational factors (2), self-efficacy (3), stressor intensity (4), and craving (5). However, recent anecdotal and empirical evidence suggests that relapse may also spontaneously strike, resulting in a return to drug use that seems to come out of the blue and is unassociated with life stressors, cravings, or an intention to use (6). This process may underlie the experience recounted by Bill W. in the Big Book (7), “Someone had pushed a drink my way, and I had taken it” (p. 5) and may be due to either deficits in inhibitory processes (6) and/or automatic behaviors (8).

Given the unique causal precipitants and underlying biologic processes of what we herein refer to as “sudden relapse,” preventive clinical interventions may differ from those presently employed for stress- or cue-induced relapse. For example, cognitive-behavioral interventions largely focus upon techniques that require the implementation of specific skill sets when a patient is in a vulnerable situation; community reinforcement approaches emphasize drug refusal techniques, support systems, and contingency management interventions. These techniques would have limited utility when relapse occurs too quickly for the implementation of learned skills.

The biological underpinnings of sudden relapse (6) and the development of behavioral and pharmacological interventions to address this relapse style have been the focus of increasing research over the past few years. However, the empirical exploration of the tendency to rapidly relapse has been seriously hampered by the absence of a valid measure. Existing self-report instruments of relapse assess cues and triggers (9), cravings (10), obsessional thoughts (11), affect (12), premeditation (13), and loss of control over drinking (14), but none have sought to identify individuals who have a sudden or rapid return to drug use in the relative absence of cognitive control. The present study was, therefore, designed to develop and validate a self-report measure that assessed sudden relapse in a drug and alcohol dependent population, using time to relapse as the critical assessment item.

METHOD

Participants

The development of the TRQ occurred in three stages using three different populations (see Table 1). Subjects were adults with primary DSM-IV substance use disorders recruited from the Dallas VA Medical Center and Homeward Bound, Inc. Diagnostic and descriptive data was obtained through the medical records. The project was approved by the Dallas VA Medical Center and UT Southwestern Medical Center Institutional Review Boards. All participants provided written informed consent. Subjects in Group 2 were compensated for their participation. Subjects had completed detoxification prior to the assessment period and were in active substance abuse treatment.

Group 1: Scale Development Procedures

A semistructured interview was developed that retrospectively assessed the cognitive and affective processes preceding relapse. Subjects ($n = 24$) were questioned about the timing, circumstances, and cognitive processes that occurred just prior to the onset of a return to

substance use for up to three relapse episodes over the preceding year. In general, the most critical item that distinguished between a “planned” vs. an “impulsive” relapse was the time from the initial thought of drug use to the time of actual use; the time required to obtain the drug was negligible. Approximately 60% of these subjects reported that the time from the first thought of using a drug to actual use was less than one hour; 25% endorsed a return to use in less than one minute (6).

Group 2: Initial TRQ Development and Implementation

Salient factors from the interviews described above, particularly the time factors, guided the development of item content for the TRQ1. The TRQ1 consisted of 33 items, each rated on a 5-point Likert scale (Supplement 1). Patients were asked to consider “the last few times you have voluntarily stopped using *all* drugs for at least a week.” Item content focused on the processes preceding relapse such as the level of premeditation or planning, cognitive awareness, and attempts to delay or avoid using the substance once the thought of using occurred. Additional self-report measures were obtained to assess construct validity: Temperament and Character Inventory (TCI) (15), NEO Personality Inventory-Revised (NEO PI-R) (16), and the Barratt Impulsiveness Scale (BIS-11) (17). The BIS-11 assesses three components of impulsiveness: motor, attentional, and nonplanning impulsiveness. Thirty items are rated on a 4-point scale (Rarely/Never, Occasionally, Often, Almost Always/Always).

STATISTICAL ANALYSIS

Data was managed in Microsoft Access and analyzed using SPSS-15.0 for Windows and SAS 9.1. Exploratory factor analysis was examined using the dimensional structure of the measure and to eliminate items that did not significantly contribute to the instrument’s explained variance. Missing items were imputed by mean replacement. A patient’s TRQ was discarded if more than two items were missing. The number of factors extracted was determined using parallel analysis (18). For the TRQ1, after the number of factors was established, a common factor analysis was followed by a Promax rotation to find the best simple structure. The rotation offering the simplest structure was used for the two TRQ versions. Internal consistency was assessed overall and within each factor using Cronbach’s coefficient alpha.

Concurrent validity of the TRQ was examined through multiple comparisons with other measures using Pearson’s product moment correlation coefficients. Selected summary scales and subscales from these other measures expected to correlate with a sudden and unexpected relapse were identified a priori. Both total and all three subscales were used from the BIS-11. Summary scales from the TCI included Novelty Seeking, Persistence, and Self-Directiveness factors and the Impulsiveness, Extravagance, Purposefulness, Resourcefulness, and Congruent Second Nature subscales. Subscales from the NEO PI-R included Self-Discipline, Angry Hostility, Impulsiveness, and Excitement Seeking. Statistical Significance was accepted at $p < .05$, uncorrected.

Results for TRQ1

One-hundred eighty-three TRQ1 records were entered into the analysis. Total scores were normally distributed and ranged from 49 to 139 (of a possible 33–165) (mean \pm SD, 96.9 \pm 16.09). Principal components analysis extracted four factors accounting for 44% of the variance: Sudden Relapse = 17.0%, Short Delay Relapse = 15%, Long Delay Relapse = 7%, and Denial = 5%. Factor name was determined by the questions clustered in each factor. Items were then deleted if the maximum factor loading was less than 0.40 (4 items deleted), the item factor loading was more than 0.30 on more than one factor (5 items deleted), or the

item was not conceptually congruent with the identified factor (one item deleted). The Denial factor was dropped as it consisted of only 3 items and conceptually overlapped with the other factors. A second exploratory principal component factor analysis, consisting of the remaining 20 items, yielded a similar factor structure and explained 46% of the total variance: Sudden = 21%, Short Delay = 17%, and Long Delay = 8%. The 20-item TRQ revealed adequate internal consistency for the total ($\alpha = .67$) and individual factors (Sudden $\alpha = .77$, Short Delay $\alpha = .78$, Long Delay $\alpha = .49$) scores.

Group 3: TRQ2

To improve content validity of the 20-item TRQ1, informal feedback was solicited from several staff and patients regarding clarity of wording and ease of understanding. In response, changes were made to the instructions, thirteen questions, and the scaling. The revised questionnaire (TRQ2) (see Supplement 2) was then administered to 194 patients. Statistical analyses were performed as for the TRQ1. Following completion of the questionnaire in the last 120 subjects, the interviewer (CT) asked each subject to describe two (randomly selected in advance) of the 20 questions in their own words. Subjects were rated by the interviewer as to how well they understood the two questions (1 = not at all, 2 = barely, 3 = somewhat, 4 = mostly, and 5 = completely). Scoring was based upon the patient's ability (1) to verbalize an understanding of the amount of time implied, (2) to form synonyms for key verbs/words/phrases, and (3) to describe the sentence in context of their personal narrative/story. In addition, it was determined whether the subject's answer on the TRQ2 was consistent with their verbal understanding of the question (yes = 1/no = 2). 11.4 ± 1.31 (range 9–13) subjects were queried about each question.

Results for TRQ2

Total scores on the TRQ2 were normally distributed and ranged from 26 to 79 (of a possible 20–80) (mean \pm SD, 50.7 ± 9.8). The three factors explained 44.5% of the total variance: Short Delay = 19.7%, Long Delay = 16.5%, Sudden = 8.3%. This confirmed the three factors identified with the TRQ1, although the loading differed. To further simplify the questionnaire and equalize the number of items for each factor, only the three highest loading items (all $>.65$) in each factor were kept. The factor structure of the 9-item TRQ did not markedly differ from the 20-item version and explained additional variance: total variance = 63.3%, Short Delay = 24.7%, Long Delay = 23.7%, and Sudden = 14.9% (Table 2; see also Supplement 3). Internal consistency for the 9-question TRQ2 was: total $\alpha = .61$, Sudden $\alpha = .64$, Short Delay $\alpha = .75$, Long Delay $\alpha = .68$). A post-hoc principal component factor of the TRQ1, using only the 9 extracted questions identified in the TRQ2, explained a total variance of 59.7% and again confirmed a three-factor solution: Sudden = 27.4%: Short Delay = 20.0%, and Long Delay = 12.4%.

Cut-off scores for the three factors (one SD above the mean) were Sudden = 10.1 (7.1 ± 3.0), Short Delay = 8.8 (mean \pm SD, 6.1 ± 2.7), and Long Delay = 11.3 (8.7 ± 2.6); 34.5% ($n = 67$) of the population had a high score in a single dimension [Sudden (7.2%, $n = 14$), Short Delay (14.9%, $n = 29$), and Long Delay (12.4%, $n = 24$)]; 54.6% ($n = 106$) of the subjects did not exhibit elevations in any dimension and 10.8% ($n = 21$) revealed high scores in two or three dimensions.

Content Validity—All of the nine final questions were rated as 3.92 or greater in the subject's understanding (mean $4.13 \pm .21$); 79.9% (SD = 12.4%) of respondents "mostly" or "completely" understood the TRQ questions, while only 2.89% (SD = 4.38%) "barely" understood or "did not understand at all" the questions as written. Subjects displayed a high degree of consistency in their responding (worst score 1.20, mean $1.12 \pm .07$).

Construct Validity—The nine questions identified post-hoc in the TRQ2 were extracted from the TRQ1 to perform correlational analyses ($p < .05$, uncorrected) between the three TRQ factors and the other impulsivity measures (Table 3). Total Score ($r = .16$, $p < .04$) and Attentional Impulsiveness ($r = .16$, $p < .03$) from the BIS-11 and Angry Hostility ($r = .18$, $p < .04$), a Neuroticism subscale from the NEO-PR-I, positively correlated with Short Delay Relapse. Unexpectedly, Long Delay positively correlated with Excitement Seeking ($r = .20$, $p < .02$), an Extroversion subscale from the NEO-PR-I.

DISCUSSION

To our knowledge, the TRQ is the first empirical measure to specifically assess the time factors involved in relapse. Three factors were identified: Sudden Relapse, Short Delay Relapse, and Long Delay Relapse. The 9-item TRQ demonstrates content validity and strong overall and within factor consistency.

Factor labels were chosen to be descriptive only, although they may guide factor-specific clinical approaches. Items composing the Sudden Relapse factor describe an unexpected and rapid (e.g., a few seconds) return to drug use, unaccompanied by planning or a conscious awareness of the impending relapse. This factor is similar to Tiffany's (8) concept of "autonomy," reflecting rapid, well-learned, routinized behaviors that are carried out "without initiation through intention" (p. 153). These patients may benefit most from behavioral interventions that focus on the avoidance of stimuli or situations that provoke relapse. Subjects scoring high in Short Delay Relapse endorse a return a substance use without protracted consideration of use but deny the very rapid relapse identified in the Sudden Relapse subjects. Cognitive and behavioral interventions may include previously rehearsed techniques, such as visualization of outcome, progressive muscle relaxation, distractions, and/or calling therapist or 12-step sponsor. Long Delay Relapse suggests significant cognitive control and reflection that buffers the time to relapse and may indicate a greater ambivalence towards using. Relapse in these subjects may be more influenced by other factors, such as craving, environmental stressors, and overwhelming mood states. In addition to techniques already mentioned, these patients might have sufficient time to attend a 12-step meeting or meet with their therapist.

Other self-report questionnaires in addiction may be viewed as having overlapping constructs with the TRQ. A validation study of the Obsessive Compulsive Drinking Scale (OCDS) (19) included an "automaticity" factor. However, item content in this factor reflected active efforts to resist thoughts, consumption, or cravings, a construct dissimilar to the concept of Sudden Relapse proposed by the TRQ. Furthermore, Bohn and colleagues (19) suggest that for the OCDS to better assess automaticity, additional items would need to be added that assessed constructs such as *speed* of drinking and the degree to which drinking was intentionally *planned*, both of which are addressed by the TRQ. Recently, Guardia et al. (20) has published a 16-question Impaired Response Inhibition Scale for Alcoholism (IRISA) that assesses impaired inhibition to relapse in alcohol-dependent patients. However, the IRISA identifies only a single factor (impaired inhibition) and is specific to alcohol relapse.

Measures of convergent validity suggest, albeit weakly, that Short Delay shares similarities with other measures of impulsivity. The absence of such associations with Sudden Relapse may indicate that this measure taps into a process distinct from generalized disinhibition. This may reflect different biological processes, i.e., disinhibition is primarily mediated by prefrontal cortical structures (6) whereas automatic process are largely localized to basal ganglia, particularly the dorsal striatum (21).

Both TRQ versions utilized a large sample size and included a wide-age range of non-Hispanic whites, African-Americans, and both sexes. The questionnaire is self-administered, non-intrusive, face valid, quick, and easily understood, suggesting it is appropriate for use in patient care settings. Elevated scores in a single dimension identified a third of the population and were equally distributed across the three dimensions. As with all questionnaires regarding prior relapse experience, the TRQ assumes the accurate recollection of cognitions and behaviors prior to relapse. Previous studies have suggested acceptable levels of reliability in patients' recall of previous substance use (22, 23), albeit with some under reporting (24, 25). Similar moderate to high levels of reliability were also reported in ex-smokers recalling smoking behaviors several years previous (26). Nevertheless, the reliability of recall of relapse behaviors is uncertain. However, the results from our self-administered questionnaire were similar to those obtained during our more focused and comprehensive interview in Group 1. As the predictive utility of the TRQ has also not been assessed, prospective studies utilizing this measure should assess the extent to which individual factor scores correlate with treatment outcome. The current instrument study is a necessary first step in the development of a clinical and research measure that empirically assesses automaticity in relapse.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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TABLE 1

Demographic characteristics of TRQ1 and TRQ2 patient sample.

	TRQ1		TRQ2	
	N (183)	%	N (194)	%
Age (mean±SD)	46.07	6.8	36.2	10.2
Sex:				
Male	175	95.6%	109	56.1%
Female	8	4.3%	85	43.9%
Ethnicity:				
African American	102	55.4%	64	33.0%
Caucasian	75	40.3%	112	57.8%
Hispanic	3	1.6%	15	7.7%
Other	3	1.6%	3	1.5%
Education (years):				
Less than high school	9	5.0%	62	32.0%
High school graduate/GED	117	64.0%	68	35.1%
Some college	42	23.0%	53	27.3%
College graduate	15	8.0%	11	5.6%
Primary Substance Use Disorder:				
Alcohol abuse/dependence	82	44.6%	49	25.3%
Cocaine abuse/dependence	70	38.2%	64	32.5%
Opioid dependence	8	4.3%	25	12.9%
Amphetamine dependence	3	1.6%	30	15.5%
Tetrahydrocannabinol (THC)			23	11.9%
Polysubstance dependence	15	8.10%		
Other	6	3.2%	3	1.5%
Co-occurring Non-Substance Use Mental Disorders:	81	44.1%		
Depression	39	21.2%		
Bipolar	16	8.6%		
PTSD	17	9.2%		
Schizophrenia/Schizoaffective	4	2.1%		
Other disorders	5	2.7%		
Co-occurring Impulse Control Disorder:				
ADHD			28	14.4%
Gambling			21	10.8%
Obsessive Compulsive Disorder (OCD)			14	7.7%
None			141	72.7%

TABLE 2

Factor structure of 9 items from the 20-item TRQ2.

Item#	Item Content	Factor Loading
<i>SUDDEN RELAPSE (14.9%)</i>		
5	I never know ahead of time if I'm going to start using again.	.68
16	I never know I will be using drugs again until it happens.	.80
18	When I start using drugs again, it's not planned.	.79
<i>SHORT DELAY RELAPSE (24.7%)</i>		
6	I crave for less than one hour before I start using drugs again.	.82
9	I crave for less than one day before I start using again.	.78
12	I think about using drugs for less than an hour before I start using again.	.84
<i>LONG DELAY RELAPSE (23.7%)</i>		
10	I plan for several days before I use.	.66
17	I think about using drugs for more than a day before I start using again.	.88
20	I think a lot about using before I start using.	.81

TABLE 3Correlations (Pearson's r) between TRQ factors and other measures of impulsivity.

	Sudden	Short Delay	Long Delay
BSI-11 ($n = 180$)			
Total	.00	.16*	.03
Motor impulsiveness	.01	.13	.04
Non-planning impulsiveness	-.02	.12	.05
Attentional impulsiveness	.01	.16*	-.05
TCI ($n = 150$)			
Novelty Seeking (NS)	.02	.03	.12
Impulsiveness (NS2)	.05	.06	.08
Extravagance (NS3)	-.04	.08	.07
Persistence (P)	.09	-.10	-.08
Self-directness (SD)			
Responsibility (SD1)	-.01	-.15	.04
Purposefulness (SD2)	-.02	-.13	.01
Congruent second nature (SD5)	.02	-.13	.02
NEO-PR-I ($n = 141$)			
Conscientiousness			
Self-discipline (C5)	.17	-.11	.07
Neuroticism (N)			
Angry hostility (N2)	.03	.18*	.10
Impulsiveness (N5)	-.06	.05	.14
Extroversion (E)			
Excitement seeking (E5)	-.04	.01	.20*

* $p < .05$, uncorrected.