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Relapse and Craving in Alcohol-Dependent Individuals: A Comparison of Self-Reported Determinants

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ABSTRACT

Background: Negative affective states and alcohol-related stimuli increase risk of relapse in alcohol dependence. In research and in clinical practice, craving is often used as another important indicator of relapse, but this lacks a firm empirical foundation. **Objectives:** The goal of the present study is to explore and compare determinants for relapse and craving, using Marlatt's (1996) taxonomy of high risk situations as a template. **Methods:** We conducted semi-structured interviews with 20 alcohol-dependent patients about their most recent relapse and craving episodes. Interview transcripts were carefully reviewed for their thematic content, and codes capturing the thematic content were formulated. **Results:** In total, we formulated 42 relapse-related codes and 33 craving-related codes. Descriptions of craving episodes revealed that these episodes vary in frequency and intensity. The presence of alcohol-related stimuli ($n = 11$) and experiencing a negative emotional state ($n = 11$) were often occurring determinants of craving episodes. Both negative emotional states ($n = 17$) and testing personal control ($n = 11$) were viewed as important determinants of relapses. Craving was seldom mentioned as a determinant for relapse. Additionally, participants reported multiple determinants preceding a relapse, whereas craving episodes were preceded by only one determinant. **Conclusions:** Patient reports do not support the claim that craving by itself is an important proximal determinant for relapse. In addition, multiple determinants were present before a relapse. Therefore, future research should focus on a complexity of different determinants.

KEYWORDS

Alcohol; craving; relapse; determinants; interviews

Introduction

Despite years of research, levels of relapse in individuals with alcohol dependence remain high, and 45–75% of patients relapse within one year after treatment (Boothby & Doering, 2005). Several theories and models have been developed to explain why relapse occurs, and craving is an important causal factor in many of these models (Franken, 2003; Garland, Boettiger, Gaylord, Chanon, & Howard, 2011). The Incentive Sensitization Theory (Robinson & Berridge, 1993), which adopts a neurocognitive perspective to relapse, claims that incentive salience is attributed to stimuli that have been accompanied by repeated alcohol use in the past. As a result, the individual becomes sensitized to the incentive salience of the stimuli and wanting drugs or alcohol is transformed into excessive craving. Craving, in turn, can initiate addictive behavior such as compulsive drug/alcohol seeking and drug/alcohol taking.

Witkiewitz and Marlatt (2004) present a broader, dynamic model of relapse. According to this model, various factors elevate the risk of relapse in high-risk

situations, and relapse is due to the interaction between determinants. Relapse determinants fall into five categories: affective states; coping skills; physical withdrawal states; cognitive processes such as craving and motivation; and background factors such as family history, and years of dependence. The authors distinguish between tonic processes and phasic responses. Tonic processes, which determine the individual's chronic vulnerability to relapse, include background factors, cognitive processes and physical withdrawal states. These processes often accumulate and provide the foundation for relapse. In the dynamic model, the phasic response is the critical point at which behavioral responding due to affective state or coping behaviors influences substance-using behavior.

Thus, whereas Incentive Sensitization Theory emphasizes craving, the dynamic model of relapse only regards craving as one of many possible determinants in the phasic response of relapse. Nevertheless, the phenomenon of craving is one of the most researched concepts in addiction (Addolorato, Leggio, Abenavoli, & Gasbarrini, 2005; Franken, 2003; Tiffany & Wray, 2012). The goal of the

present study is to explore the determinants for relapse and craving, and the role of craving in relapse.

One issue with the concept of craving is the lack of a clear consensus regarding its definition (Kozlowski & Wilkinson, 1987). Marlatt and Donovan (2005) define craving as the subjective desire to drink and urge as the behavioral intention or impulse to drink. In contrast, Robinson and Berridge (1993) define craving as intensely wanting drugs. In the present study, we adopted a broad definition of craving: a phenomenon that continuously varies in intensity, frequency and duration (Kavanagh et al., 2013; Kavanagh, Andrade, & May, 2005).

Clinical studies have demonstrated that most alcohol-dependent patients do not typically experience intense craving (Glöckner-Rist, Lémenager, & Mann, 2013; Oslin, Cary, Slaymaker, Colleran, & Blow, 2009). In addition, craving does not always precede or produce a relapse (Drummond, 2001). Even though the results of studies on craving as a determinant of drinking and/or relapse are inconclusive, still many neurocognitive studies include some measure of craving. For example, Holt et al. (2012) found that craving did not predict subsequent relapse in alcohol-dependent patients undergoing treatment. In contrast, other studies have found that craving predicts relapse in alcohol-dependent patients (Higley et al., 2011; Miller, Westerberg, Harris, & Tonigan, 1996). Two explanations (which are not mutually exclusive) are possible. Craving may be absent when a relapse occurs, and craving may occur without instigating a relapse. We believe that for research purposes, it is important to know whether craving is a reliable proxy for relapse. For clinical purposes, this determines the need to worry about cravings that do not instigate a relapse.

An attempt to categorize self-reported determinants of a relapse was made by Marlatt (1996). He developed a taxonomy of high risk situations for relapse into substance use. Marlatt's taxonomy distinguishes between intrapersonal and interpersonal determinants. Intrapersonal determinants are related to the individual or their reactions to environmental events, such as negative and positive emotional states or testing personal control. Interpersonal determinants involve the presence or influence of others that precipitate the relapse in the preceding 24 hours. Examples of interpersonal determinants include interpersonal conflict, and social pressure (Marlatt, Stout, & Zywiak, 1996; Marlatt, 1996). This taxonomy has been tested among alcoholics, smokers and other addicts by Marlatt (1996), and others have used it to categorize relapse determinants, both in smokers (Piñeiro & Becoña, 2013) and in depressed alcohol-dependent men (Strowig, 2000). However, to our knowledge there are no studies that have characterized determinants of craving using

Marlatt's taxonomy (1996). Doing this can offer insight in the role of craving as a determinant for relapse.

In the current study, we first identify self-reported determinants of both relapse and craving in a sample of alcohol-dependent patients. Based on that, we explore the determinants participants report as being precursors of their relapse and their craving episodes. Additionally, we determine which determinants are mentioned most often, and the extent to which craving is a determinant of relapse in alcohol-dependent individuals. Second, we investigate differences in situations in which craving triggers a relapse and those in which craving does not trigger a relapse. The present study might thereby provide an explanation for findings that craving does not invariably precede a relapse.

Method

Participants

Twenty patients were recruited from five different addiction treatment centers in the Netherlands using a criterion sampling strategy. At the time of the interview, seven patients followed an aftercare program and 13 patients were in outpatient treatment. The seven participants in aftercare completed a 20-day inpatient program based on the Minnesota Model before entering aftercare. The 13 patients participating in an outpatient program received treatment that combined cognitive behavioral therapy with motivational interviewing techniques.

All participants met the following inclusion criteria: (a) primary diagnosis of alcohol dependence, (b) a relapse to pretreatment drinking levels, (c) literacy in Dutch at the primary school level, and (d) a minimum age of 18 years. Exclusion criteria were: (a) the presence of an Axis II disorder, (b) the presence of a psychotic disorder, or (c) dependence on substances besides alcohol and nicotine. Eligibility was assessed by therapists at the participating treatment centers when a patient reported that he or she had relapsed, and reviewed by the interviewer (MS). Eligible patients were then asked to participate in the study. None of the research team members were involved in the participants' treatment and participants were told that their responses would not influence their treatment.

All participants provided informed consent before the start of the interview and received € 10 compensation for participation. The Medical Ethical Committee of the Erasmus Medical Centre indicated that the committee had no objections to the execution of this research.

Procedure

Demographic data (e.g. age, gender, education level) were obtained at the beginning of the interview. The functional analysis of relapse, a component of the Community Reinforcement Approach (Azrin, 1976), and Marlatt's (1996) taxonomy of high-risk situations served as sensitizing concept when formulating the interview questions. The interview questions focused on the following topics: patients' drinking history, treatment history, craving episodes and the most recent relapse. The topics of craving and relapse included questions concerning the patient's definition of craving and relapse, the frequency and intensity of cravings, and self-reported determinants of craving and relapse such as feelings, thoughts, or surroundings, and whether the participant had experienced craving prior to the relapse. In the interviews, we only discussed the participants' most recent relapse into pre-treatment drinking levels. Moreover, we also focused on the craving episode itself without distinguishing between craving, urge and desire.

A psychotherapist who had experience working with the target population of the study reviewed the questions. Based on her feedback, questions were simplified to make them clearer and more understandable to participants. After the first four interviews, the questions were reviewed to determine the extent to which they captured the information that we wished to obtain from the participants. Minor adjustments in wording were made, but no questions were added or removed. No new information emerged after having conducted a total of 16 interviews. At that point we decided that we would stop interviewing after a total of 20 interviews under the condition that no new information would emerge during these final four interviews.

All 20 interviews were administered by the same researcher (MS) and were audiotaped. Interviews lasted from 30 to 50 minutes and were transcribed verbatim. Another member of the research team (TS) reviewed all of the transcripts to provide feedback on the interview content and process and to determine the extent to which topics or questions should be modified. No questions were modified, added or removed during the review process.

Data analysis

After transcription, the interviews were independently coded by two researchers (MS, JE) under the supervision of a third researcher (TS), using QualiCoder, a web-based analyzing program ("Qualicoder", 2013). The first round of coding consisted of open coding, which involved

reading the transcripts sentence by sentence and using *in vivo* codes (i.e., specific codes derived from the participants' terminology) to capture relevant information. The coding of the two researchers was then compared with each other to identify overlap and discrepancies in coding. After in-depth discussion, the codebook was finalized, containing 42 unique codes related to relapse determinants and 33 codes related to craving determinants. The final codebook was then used to recode all of the interviews, and inter-rater reliability was calculated. Two researchers independently coded two randomly chosen interviews using the final coding scheme. The initial inter-rater agreement was 72.6%. Discrepancies were carefully reviewed and resolved, and the results of the review process were integrated in the coding of all interviews. The aforementioned steps were all carried out using Qualicoder (2013).

After reviewing the codebook we investigated how we could compare the determinants of craving and relapse. The reported determinants of both relapse and craving showed many similarities with the categories of the taxonomy of high risk situations developed by Marlatt (1996). We decided to use this taxonomy as a template for comparing the determinants of relapse and craving since all determinants fit the framework (see Tables 1 and 2).

The codes from the final codebook were categorized using Marlatt's (1996) taxonomy. We distinguished between codes related to relapse and codes related to craving, following the indexing rules provided by Marlatt and colleagues (1996) in classifying each code into one of the taxonomy categories. However, we were not as strict as Marlatt and colleagues in only selecting the determinants that were reported as the main reason for relapsing. We included all determinants reported by the participants in order not to miss any valuable information.

To classify codes involving craving into the categories in Marlatt's taxonomy, the labeling of categories and sub-categories was modified to reflect the craving situation (see Table 2).

Category labels for the craving taxonomy that included the phrase 'coping with ...' (e.g., coping with anxiety) were changed into 'confronted with ...' (e.g., confronted with anxiety) because this phrase was more appropriate for craving (i.e., craving is not a way to cope with anxiety, but can occur when one is anxious). Additionally, we changed the IE category of 'giving in to temptation or urges, in the presence [IEi] or absence [IEii] of substance cues' to 'craving in the presence of external substance cues'. This category included the codes related to craving that mentioned an external cue that triggered a craving episode. Because all craving episodes triggered by internal

Table 1. Marlatt's taxonomy applied to relapse determinants.

I. Intrapersonal-environmental determinants

A. Coping with negative emotional states (*n* = 17)

i. Coping with frustration and/or anger
Frustration prior to relapse
Relapse due to frustration and dissatisfaction with work

ii. Coping with depression
Unhappy prior to relapse
Feeling sad prior to relapse
Relapse due to loss of contact with one's son
Relapse due to a divorce

iii. Coping with anxiety
Feeling anxious prior to relapse

iv. Coping with other negative emotional states
Being emotional prior to relapse
Feeling helpless prior to relapse
Feeling not so well prior to relapse
Feeling bad prior to relapse
Feeling lonely prior to relapse
Hopeless situation of unemployment prior to relapse
Disappointment about theft of one's stepson prior to relapse
Not talking about feelings prior to relapse
Stress prior to relapse
Leaving one's former residence prior to relapse

B. Coping with negative physical-physiological states (*n* = 2)

i. Coping with physical states related to prior substance use
—

ii. Coping with other negative physical states
Being tired prior to relapse
Having trouble sleeping prior to relapse

C. Enhancement of positive emotional states (*n* = 3)
Feeling cheerful prior to relapse
Feeling sociable prior to relapse
Being fed up with everything prior to relapse

D. Testing personal control (*n* = 7)
Consciously starting to drink
Consciously giving in to an impulse to drink
Drinking the first glass
Allowed to drink again
Wanting to engage in controlled drinking
Drinking leftovers
'Your brains tell you to drink'

E. Giving in to temptation or urges (*n* = 6)

i. In the presence of substance cues
Presence of good quality wine
Desire to drink prior to relapse
Relapse in a restaurant

ii. In the absence of substance cues
Craving (trek) prior to relapse
Not being able to withstand drinking prior to relapse
Tunnel vision prior to relapse

II. Interpersonal determinants

A. Coping with interpersonal conflict (*n* = 4)

i. Coping with frustration and/or anger
Conflict with spouse prior to relapse
Frustration over loss of job

ii. Coping with depression
—

iii. Coping with anxiety
—

iv. Coping with other negative emotional states
Disappointed in one's stepson prior to relapse
Losing a job prior to relapse

B. Social pressure (*n* = 2)

i. Direct social pressure
Friends visiting prior to relapse
Presence of alcohol

ii. Indirect social pressure
—

C. Enhancement of positive emotional states (*n* = 1)
Relapse at a party/social gathering

Note: (*n* = ...) represents the number of codes for each main category.

Table 2. Marlatt's taxonomy applied to craving determinants.

I. Intrapersonal-environmental determinants

A. Confronted with/presence of negative emotional states (*n* = 11)

i. frustration and/or anger
craving due to frustration

ii. Confronted with/presence of depression
craving due to depressive feelings
desire due to sadness

iii. Confronted with/presence of anxiety
craving due to nervousness
craving due to agitation
craving due to fear of the unknown

iv. Confronted with/presence of other negative emotional states
chance of experiencing craving increases when in a negative mood
craving due to dissatisfaction with self
craving due to feeling bad
craving due to feeling lonely
craving due to feeling pitiful

B. Confronted with/presence of negative physical-physiological states (*n* = 2)

i. Confronted with/presence of physical states related to prior substance use
—

ii. Confronted with/presence of other negative physical states
Being tired prior to relapse
Having trouble sleeping prior to relapse

C. Confronted with/presence of positive emotional states (*n* = 3)
Craving is a thought of a pleasurable moment
Craving when feeling sociable
Craving when you want to celebrate something

D. Testing personal control (*n* = 1)
Craving after drinking the first glass

E. Craving in the presence of external substance cues (*n* = 11)
Craving due to thinking of drinking
Craving when seeing a pub
Craving when seeing a liquor store
No strong craving, but light craving when in a pub
Bottle of wine is a trigger for craving
Craving when hearing music from the eighties
Craving when seeing alcohol in the grocery store
Craving when seeing advertisements for alcohol
Craving due to nice weather
Craving after working in warm weather
Craving is stronger when engaging in controlled drinking

II. Interpersonal determinants

A. Confronted with/presence of interpersonal conflict (*n* = 3)

i. Confronted with/presence of frustration and/or anger
Craving due to arguments
Craving due to confrontation with one's father

ii. Confronted with/presence of depression
—

iii. Confronted with/presence of anxiety
—

iv. Confronted with/presence of other negative emotional states
Craving due to suffering injustice

B. Social pressure (*n* = 2)

i. Direct social pressure
—

ii. Indirect social pressure
Craving due to seeing others drink
Craving when I'm sitting at a sidewalk cafe with my partner who is drinking a glass of wine

C. Confronted with/presence of positive emotional states (*n* = 0)
—

Note: (*n* = ...) represents the number of codes for each main category.

cues (e.g., affective states) were categorized using categories IA through ID, we did not separate the IE category into two subcategories, but did retain the subcategories in the relapse taxonomy.

Table 3. Sample characteristics.

	Overall (n = 20)	
	M	SD
Age	48	12
Proportion men (in %)	75	—
Educational level (in %)		
Vocational education	25	—
Higher vocational education	20	—
University	45	—
Other	10	—
Employment status (in %)		
Employed	25	—
unemployed	75	—
Treatment goal (in %)		
Abstinence	80	
Controlled drinking	20	

Results

Sample characteristics

The sample consisted of 20 alcohol-dependent patients currently in treatment who had recently relapsed. Sample characteristics are displayed in Table 3.

Personal definitions of relapse

We asked our participants what their personal definition of a relapse is. Participants could be categorized into two groups based on their definitions of relapse. The first group (n = 7) viewed relapse as returning to the pretreatment drinking levels, as one of our participants stated: “A relapse is really starting to drink eight cans of beer overnight. Drinking really heavily”. Three participants of this group were currently abstinent, the remaining four were controlled drinkers.

The second group (n = 13) considered drinking any amount of alcohol as a relapse. This second definition is seen mostly in participants whose current treatment goal was abstinence and is illustrated by the following: “Relapsing is when you are not doing what you intended to do, and that is never to drink again”.

Personal definitions of craving

Currently there is no scientific or clinical consensus regarding the definition of craving. Therefore, we asked participants to describe their own understanding of craving. The definitions of craving provided by the participants were diverse but the definitions did share a common phenomenon: craving involves a need for alcohol. For example, one participant stated: “I think craving for me is the association of alcohol with sociability. But that’s the case with almost everything, there’s always a reason why a drink should accompany any moment”.

Another participant viewed craving as “a devil on my shoulder”. She stated: “On one shoulder, there is that little devil. The little angel is sitting on my other shoulder. Craving is when the devil gets stronger than the angel”.

The intensity of craving and frequency of episodes varied between and within participants, but the need for alcohol was always present. Reported frequencies of craving episodes ranged from once every three to four months to daily episodes. For example, one of the participants, who used to experience strong feelings of craving, stated: “Before my treatment, I had very strong cravings. You’re thinking, oh dear, I need to take a glass of wine, I really want it right now”.

In contrast, some participants reported experiencing little to no intense craving: “I could be standing in the grocery store, looking at cans of Bacardi and Coke. Then, I think, that would be nice. I don’t have that a lot, but it pops up sometimes”.

Some participants experienced different types of craving, as the following participant stated:

Craving is the beginning of desire. Craving is like the thought of a pleasurable moment. Desire is a feeling or an urge that is harder to ignore. (...) Craving is when you have brief thoughts while you’re trying really hard not to drink. (...) Then you replace these thoughts and that is not something you cannot resist. What you’re afraid of is that desire.

We included all types of craving episodes in our analyses.

Some participants experienced craving as less intrusive and transient, while others had to exert considerable effort to resist their craving, for example:

I was traveling by train, and I just craved a cigarette with a drink and a cup of coffee. I was thinking, what should I do?! Should I get out, but I thought if I’d do that, I would never reach my destination. (...) I didn’t do it, but it was really hard.

Taxonomy of relapse determinants

All 42 determinants that were related to relapse could be categorized using Marlatt’s (1996) taxonomy of high-risk situations. For the relapse taxonomy, 83.4% of the determinants were categorized as intrapersonal, and 16.6% were categorized as interpersonal determinants (see Table 4).

Most determinants involved negative emotional states, such as feeling bad, sad or anxious prior to the relapse. As one participant stated: “At one point I thought, well, if I just take a drink, I’ll lose that bad feeling for a while”.

Another category of determinants which was quite large, regarded testing of personal control over drinking

Table 4. Frequencies of determinants in percentages per category.

Situation	Relapse codes (<i>n</i> = 42)	Craving and temptation codes (<i>n</i> = 33)
I. Intrapersonal determinants	83.4	84.8
IA. Negative emotional states	40.5	33.3
IB. Negative physical states	4.8	6.1
IC. Positive emotional states	7.1	9.1
ID. Testing personal control	16.7	3.0
IE. Urges and temptations (presence of external cues)	14.3	33.3
II. Interpersonal determinants	16.6	15.2
IIA. Interpersonal conflict	9.5	9.1
IIB. Social pressure	4.8	6.1
IIC. Positive emotional states	2.4	—

alcohol. Participants would start to drink in a controlled manner, because they believed they would be able to control themselves and just drink moderately, but often this was not possible, as this participant said:

So I went from being sober to consciously starting to drink. There was no reason, just trying it because I enjoy it, and I believe it [alcohol] fits with certain things. Just seeing how things would go. But that really didn't work.

Craving did not appear to be an important determinant, since craving was present before the relapse in only four of the twenty cases. Those participants who reported the presence of craving before their relapse indicated that craving was present in the hours before the relapse. Also, only a small proportion of the determinants could be categorized under the category 'giving in to temptation or urges'. Craving could occur in both in presence of alcohol stimuli or without these stimuli. As one participant stated: "And then suddenly, I just craved a pack of wine (...). And the next day, I saw that empty pack of wine on the kitchen counter."

We did not find any determinants that would fit the taxonomy's IBi subcategory of 'coping with physical states related to prior substance use'; the absence of any withdrawal-related determinant could be explained by the fact that all our participants were abstinent for at least 14 days before they relapsed.

Taxonomy of craving determinants

We were able to categorize all 33 determinants of craving using the taxonomy. Table 2 presents an overview of the taxonomy and the modified category labels. For craving,

84.8% of the determinants were intrapersonal, whereas the remaining 15.2% of the determinants were interpersonal. The percentages for the categories IA through IIC are displayed in Table 4.

The two largest categories were 'negative emotional states' and 'craving in presence of external substance cues'. Each category contained one third of all craving determinants. As an example of a negative emotional state as determinant of craving, one of the participants stated: "Last week I was really feeling down, everything was such a drama and then I thought, I could drink one two drinks right now". Examples of external substance cues were very diverse and included grocery stores, alcohol commercials, nice weather, seeing a bottle of wine, and watching someone else drink alcohol.

Again, we found no determinants that could be categorized under 'confronted with negative physical-physiological states'. There were also no reports of craving episodes without a clear determinant.

Comparison of the relapse and craving taxonomies

Comparison of the relapse and craving taxonomies revealed a comparable distribution of determinants across the two primary categories (intrapersonal and interpersonal). The intrapersonal category contained 83.3% of total number of relapse determinants and 84.9% of the craving determinants.

Within the intrapersonal category, most relapse determinants were classified into the categories 'coping with negative emotional states' (IA) and 'testing personal control' (ID), while most craving determinants were classified into 'coping with negative emotional states' (IA) and 'temptation or urges in the presence of external cues' (IE). The IA category (i.e., negative states) for both relapse and craving included determinants such as 'feeling bad prior to relapse/craving due to feeling bad' and 'stress prior to relapse/craving due to stress'.

There was a difference between craving and relapse in the ID category (i.e., testing control). For relapse, testing personal control indicated that an individual wanted to drink in a controlled manner but could not maintain control and relapsed. For craving, testing personal control indicated that the individual was drinking in a controlled manner, and the controlled drinking triggered craving.

The main difference between the relapse determinants and the craving determinants was related to the IE category (i.e., 'temptation and cues'). For relapse, all determinants that contained craving were assigned to this category. For craving, we assigned determinants that contained external cues for craving to this category; for example, seeing alcohol in the grocery store or viewing

an advertisement for alcohol. In the craving taxonomy, the IE category was one of the two largest categories, with one third of the cravings triggered by external alcohol-related cues. In contrast, fewer cases (14.3%) were classified in the IE category in the relapse taxonomy. These findings indicated that craving was not a necessary or an important determinant of relapse.

Comparison of relapse and craving at the case level

Another difference between relapse and craving was found when reviewing the individual interviews. All but one participant reported that a single determinant precipitated a craving episode, whereas all participants reported that two or more determinants triggered relapses. These results indicate that multiple determinants were required to produce a relapse, while a single determinant was sufficient to initiate a craving episode.

The number of determinants preceding a relapse ranged from two to six. One of the participants explicitly stated that her relapse was due to the accumulation of determinants: "Often it is, well, of course, it is a combination of factors. It never happens that you receive a phone call and then you relapse. It doesn't work that way. It is an accumulation."

Discussion

In the present study, we explored self-reported proximal determinants of relapse and craving in a sample of alcohol-dependent patients. We used Marlatt's (1996) taxonomy of high risk situations as a template to compare relapse and craving determinants. The craving determinants fit the taxonomy well, and the determinants for relapse and craving exhibited similar distributions overall across the taxonomy. Even though the taxonomy has been used in multiple studies (Marlatt, 1996; Piñeiro & Becoña, 2013; Strowig, 2000) there are signs that the reliability of the taxonomy is inconsistent for comparing results based on the taxonomy across independent studies (Longabaugh, Rubin, Stout, Zywiak, & Lowman, 1996). Therefore, generalizability of our results to other samples is difficult. However, the goal of the current study was exploratory and we sought to find self-reported determinants of craving and relapse, which in hindsight fit the taxonomy well.

The study findings indicate that patients in our sample did not consider craving by itself to be an important determinant of relapse. It was infrequently reported as a relapse determinant and was never the sole determinant of relapse, which was always associated with more than one determinant. It should be noted however, that

the interviews and analyses focused on risk factors influencing relapse and craving. Further studies may need to incorporate protective factors as well. For example, it may be that in cases where craving was present without relapse, competing desires had prevented individuals from drinking (cf. Ambivalence Model of Craving; Breiner et al., 1999; Stritzke et al. 2007) by motivating them to exert inhibitory control over their desire to drink.

The results also indicate that negative emotional states are an important determinant of both relapse and craving. Differences between craving and relapse were primarily found for the determinant 'substance-related cues': Craving was triggered by external substance cues in a third of the cases, whereas relapse was triggered by substance cues in a mere 14 percent of the cases.

The finding that negative emotional states are important determinants of both relapse and craving is consistent with Baker and colleagues' (2004) Affective Processing Model of Negative Reinforcement. This model proposes that the accumulation of negative affect due to the presence of stressors elicits renewed substance use. Also, the relapse determinants resembled the phasic responses (i.e., negative emotional states) described in Witkiewitz and Marlatt's (2004) dynamic model of relapse, which is supported by the finding that multiple determinants always preceded relapses.

One limitation to the study is that due to the nature of the study, the sample size was small and heterogeneous. Therefore, it is not possible to draw firm quantitative conclusions from the study data. Further research with larger samples is required to confirm the study findings regarding the factors that trigger craving episodes and relapse. This is especially the case for craving, since to our knowledge, the present study is the first to use Marlatt's taxonomy to categorize self-reported determinants of craving.

Because the study relies upon self-report, recollection bias might have influenced study results. As a result, it is possible that the reports of craving episodes were biased because these episodes may have been less salient to participants. Memories of craving episodes might be less vivid than memories of relapse episodes because relapse episodes have a greater impact on the individual. Despite the use of self-report, the present study provides a rather comprehensive picture of the patient's perception of relapse, craving, and relapse and craving triggers. In addition, our results are in line with experimental studies showing that craving was not a proximal predictor of relapse (Cooney et al., 2007; Holt et al., 2012), making it less likely that recall bias affected the recollection of our participants regarding the presence of craving prior to a relapse.

The study is clinically relevant, since it suggests that the immediate risk of relapse from momentary or acute cravings is not necessarily high. The relationship has also been studied in research using Ecological Momentary Assessment (EMA) methodology (Shiffman, 2009). In these studies, participants' craving (and other variables) is monitored in daily life using electronic devices. Participants are prompted to fill out questions at random times throughout the day. Studies using EMA did show associations between craving and relapse in non-abstaining alcohol-dependent individuals (Fazzino, Harder, Rose, & Helzer, 2013; Kavanagh, May, & Andrade, 2009). However, in abstaining alcohol dependent patients, an association has only been found in subgroups of patients: in patients with relatively severe dependence and mood disturbance (Litt, Cooney, & Morse, 2000), and in patients with relatively high alcohol craving states that do not change during the initial period of abstinence (Oslin, Cary, Slaymaker, Colleran, & Blow, 2009). Taken together, when looking at the results of the current study and existing research on craving as a predictor of relapse, a strong focus on craving during treatment seems not always warranted.

However, craving continues to be valuable as a distal predictor, particularly in the diagnosis of alcohol dependence and the prediction of drinking behavior or relapse in the more distant future (Casey, Adamson, Shevlin, & McKinney, 2012; Connolly et al., 2013). Treatment should continue to address ways to deal with craving due to the potential future effects of craving on relapse. Because examining these distal effects was beyond the scope of the present study, future research should investigate the exact nature of these more long-range effects. Furthermore, future research on these topics should not be limited to the laboratory, but should investigate the extent to which determinants of these phenomena operate and interact in daily life. One way to accomplish this is to measure all possible proximal predictors of relapse and of craving using EMA methodology to examine under which circumstances craving indeed predicts a relapse. In our opinion, it is essential that future research use EMA to measure craving and relapse as well as craving and relapse determinants.

In summary, we found that patients did not consider craving by itself to be an important proximal determinant for relapse. Research thus should not use self-reports of craving as a proximal determinant of relapse unless relapse is also measured. Our results further indicate that relapse depends upon multiple determinants, whereas craving can be triggered by a single determinant. This suggests that craving in itself, or a single determinant of craving, does not constitute a major risk for relapse unless it coincides with other proximal risk factors.

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Contributors

Prof. dr. van de Mheen reviewed and commented on the study protocol, data analysis, and the manuscript. Dr. Schoenmakers has written the protocol, assisted with the literature selection, and reviewed the manuscript. Ms. Snelleman collected and analyzed the data, and has written the manuscript.

All authors contributed to and have approved the final manuscript.

Conflict of interest

All authors declare that they have no conflicts of interest.

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