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# EMDR Therapy Reduces Intense Treatment-Resistant Cravings in a Case of Gamma-Hydroxybutyric Acid Addiction

**Rouhollah Qurishi**

*Novadic-Kentron Addiction Care Network, Sint-Oedenrode, The Netherlands*

**Wiebren Markus**

*IrisZorg, Institute for Addiction Care and Sheltered Housing, Arnhem, The Netherlands*

*Nijmegen Institute for Scientist-Practitioners in Addiction, Radboud University, Nijmegen, The Netherlands*

**Maaïke M.J. Habra**

**Bibi Bressers**

*Novadic-Kentron Addiction Care Network, Sint-Oedenrode, The Netherlands*

**Cornelis A.J. De Jong**

*Nijmegen Institute for Scientist-Practitioners in Addiction, Radboud University, Nijmegen, The Netherlands*

This article presents the first experiences of using eye movement desensitization and reprocessing (EMDR) therapy to aid in the treatment of gamma-hydroxybutyric acid (GHB) dependency. A case presented itself as a result of intense, treatment-resistant cravings despite pharmacological treatment. The patient received 7 weekly sessions using a subset of the palette of EMDR interventions in addiction (PEIA; Markus & Hornsveld, 2017) targeting both negative and positive valenced addiction-related memory representations from the past, present, and future. Patient-reported GHB craving showed a gradual and prolonged reduction. Urine samples showed that the patient remained abstinent during and at least 6 months after EMDR therapy. Further research regarding the effectiveness of EMDR therapy in this particularly challenging group of substance users is warranted.

**Keywords:** EMDR; craving; addiction; working memory; treatment-resistant; gamma-hydroxybutyric acid (GHB)

**G**amma-hydroxybutyric acid (GHB) is a central nervous system depressant (van Noorden, van Dongen, Zitman, & Vergouwen, 2009) that is synthesized in human cells (Kemmel et al., 1998). Synthetically manufactured GHB is used in the treatment of narcolepsy (Boscolo-Berto et al., 2012) and alcoholism (Keating, 2014). Systemically administered GHB is able to pass the blood-brain barrier, leading to central nervous system-mediated effects such as sedation, sleep, abnormal electroencephalogram, and anesthesia (Cash, 1994). It is quickly absorbed with peak blood concentrations within one hour. GHB tolerance builds up quickly when patients use it regularly every day, resulting in physical dependence, which can generate severe withdrawal symptoms which may be life-threatening

at higher doses (Zvosec, Smith, Porrata, Strobl, & Dyer, 2011).

## Gamma-Hydroxybutyric Acid Addiction

The average user of GHB is fairly young, and many start using aged 15–22 years old (Gonzalez & Nutt, 2005). Others start later in life, depending on their prior drug history, peer group influences and economic situation. GHB is considered a “club drug” along with ketamine and Rohypnol (Johnston, O’Malley, Bachman, Schulenberg, & Miech, 2013). There are hot spots of GHB abuse in the Western world (e.g., London, United Kingdom), and it is more popular among certain subpopulations than among the general drug-using population, especially among

those who frequent rave parties and gay nightclubs (Talbert, 2014).

Although GHB dependency constitutes a relatively small but growing public health concern in several Western countries, such as The Netherlands (European Monitoring Centre for Drugs and Drug Addiction, 2015), GHB and its precursor gamma-butyrolactone (GBL) have a high dependence liability, and its misuse has resulted in many fatalities (Brennan & Van Hout, 2014). Among drugs of abuse GHB is an especially alarming substance because it can easily and inexpensively be self-prepared, and adverse interaction effects with other sedative drugs are common (Nicholson & Balster, 2001; Timby, Eriksson, & Boström, 2000). Mortality rates after abuse of GHB are high because there is only a narrow safety margin between a recreational dose and a lethal dose. After recreational use of the drug, it is not unusual that people subsequently overdose and all of a sudden become incapacitated with reduced levels of consciousness requiring emergency hospital treatment. However, there are no effective antidotes that can reduce the sedative effects of a GHB overdose. Acute treatment is fundamentally supportive because rapid recovery follows as the drug is metabolized and blood concentrations are reduced.

## Treatment of Gamma-Hydroxybutyric Acid Addiction

Data in The Netherlands shows that 45% of GHB-dependent patients has a history of repeated addiction treatment (Wisselink, Kuijpers, & Mol, 2014). Treatment of GHB dependency has proven to be difficult with high chances of a quick relapse following detoxification (Kamal, Schellekens, De Jong, & Dijkstra, 2015). This is thought to be related to high levels of craving and psychiatric comorbidity. Currently, there are no evidence-based treatments for GHB dependency. In clinical practice, GHB dependency is treated with a combination of “treatment as usual” (TAU) and off-label use of certain medication (Kamal, Loonen, Dijkstra, & De Jong, 2015).

The effect of relapse prevention training and baclofen on the course of GHB dependency after detoxification has been examined in a large randomized controlled trial (RCT) in The Netherlands (Kamal, Schellekens, et al., 2015). Baclofen is a gamma-aminobutyric acid (GABA)-B receptor agonist (Agabio, Preti, & Gessa, 2013). Its relatively long half-life may give it potential in substitute therapy by replacing GHB, which has a much shorter half-life. In addition, baclofen is thought to possess anxiolytic (Cryan &

Kaupmann, 2005) and anticraving (Cruz et al., 2004; Terrier et al., 2011) properties. Experimental research in mice suggests that baclofen reduces GHB use (Fattore, Cossu, Martellotta, Deiana, & Fratta, 2001). The case we present here took part in the aforementioned study by Kamal, Schellekens, and colleagues (2015) but kept reporting high levels of craving after GHB detoxification, despite prolonged use of baclofen. Therefore, alternative treatments for craving reduction were considered.

## EMDR Therapy

Eye movement desensitization and reprocessing (EMDR) therapy (Shapiro, 2001) is an evidence-based intervention for the treatment of posttraumatic stress disorder (PTSD; Bisson et al., 2007). As such, EMDR therapy has been applied in addicted patients with PTSD-addiction comorbidity (Abel & O'Brien, 2010; Brown, Gilman, Goodman, Adler-Tapia, & Freng, 2015; Kullack & Laugharne, 2016; Marich, 2009; Perez-Dandieu & Tapia, 2014; Rougemont-Bücking & Zimmermann, 2012; Shapiro, Vogelmann-Sine, & Sine, 1994; Zweben & Yeary, 2006; see Markus & Hornsveld, 2017, for an in-depth discussion of this literature). Although EMDR therapy seems to have good results regarding comorbid PTSD symptoms, it seems to have mostly limited effects on addiction outcomes. The recent study of Brown and colleagues (2015) whereby additional trauma-focused EMDR therapy was provided to participants of a court program, shows promise, however. It was associated with significantly improved program outcomes, even if symptoms were below PTSD-threshold.

Increasingly, research suggests that EMDR therapy also provides relief from various other psychological and somatic symptoms related to adverse life experiences (Shapiro, 2014). This is in accordance with the adaptive information processing (AIP) model (Solomon & Shapiro, 2008) that posits that psychopathology is driven by memories of distressing life events. In the case of PTSD, it is thought that when an event evokes a high level of arousal, the memory is stored dysfunctional with associated information available during the event such as the emotions, physical sensations, and beliefs. When triggered, the activation of this memory may lead to maladaptive affective, somatic, and cognitive responses, unsuited for the current situation. According to the AIP model, desensitizing such salient memories with EMDR therapy integrates the dysfunctional stored memory with existing networks containing adaptive information.

EMDR therapy is characterized by eight phases designed to access and process such memories: (a) history taking, (b) preparation (education about symptoms and applying stabilization techniques if necessary), (c) assessment (activation) of target images (causative events, current triggers and anticipated future challenges), (d) desensitization using bilateral stimulation (induced eye movements), (e) installation of a positive cognition (PC), (f) body scan (identifying and processing residual distress), (g) proper closure of sessions, and (i) reassessment (during the next session; Solomon & Shapiro, 2008).

Research has demonstrated that EMDR therapy may not only be used to desensitize distressing memories such as in PTSD but also positively valenced (Engelhard, van Uijen, & van den Hout, 2010) and fantasy images (Logie & de Jongh, 2014) such as those typically seen in impulse control disorders, eating disorders, and addiction.

### Addiction Treatment With EMDR Therapy

The treatment of addiction is, in many ways, much more complex than PTSD. For instance, both classical and operant conditioning play an important role in the genesis and continuation of addictions. Classical conditioning refers to learning by association. In the case of addiction this can be the association of (in itself neutral) cues and contexts such as a bar, seeing someone drinking, and so forth, with the taste of beer (the unconditioned stimulus). After a while, the previously neutral stimulus becomes a predictor of drinking beer and elicits a conditioned response: craving. Operant conditioning refers to learning by reinforced behavior. In the case of addiction, drinking behavior which is motivated by the wish to reduce experienced tension is reinforced by its effectiveness in doing so (negative reinforcement or reinforcement by relief or avoidance of something unwanted). Similarly, drinking behavior aimed at inducing a euphoric mood is also reinforced by its effectiveness in reaching this goal (positive reinforcement or reinforcement by reward). An intriguing phenomenon is that a mix of negative and appealing consequences may create avoidance and approach tendencies at the same time. Behavior associated with addiction is also, by its very nature, often and willfully repeated in many different contexts. Research on adverse childhood experiences (ACE) has also shown that many addicted patients have a history of emotional, physical, and sexual neglect or abuse (Dube et al., 2003). Although this may or may not lead to PTSD in a strict sense, the relationship between these ACEs and the development

of addiction later in adolescence has shown higher correlations than with other categories of psychiatric problems (McLaughlin et al., 2012).

Shapiro and colleagues (1994) were the first to publish an article on EMDR therapy in traumatized addicts. Ahead of their time, they used EMDR therapy to work on trauma-, coping-, and addiction-related (relapse prevention) goals. However, regarding the latter goal, research using EMDR therapy to influence addiction is still limited. The evidence base consists mainly of anecdotal reports, case or multiple baseline studies of substance use (e.g., Abel & O'Brien, 2010; Tsoutsas, Fotopoulos, Zakyntinos, & Katsaounou, 2014) and behavioral addictions (e.g., Bae, Han, & Kim, 2013; Bae & Kim, 2012; Cox & Howard, 2007; Miller, 2010, 2012). Although most reported positive findings, others reported equivocal or negative findings (e.g., Cecero & Carroll, 2000). The interpretation of results is further complicated by the fact that different EMDR approaches have been developed, most notably the desensitization of triggers and urge reprocessing (DeTUR; Popky, 2005), craving extinguished (CravEx; Hase, 2010), and feeling-state addiction protocol (FSAP; Miller, 2010). Others have documented approaches which are not publicized in a detailed or scripted format which hampers their usefulness in both practice and research (Barbieri, 2008; Omaha, 1998). A review of the work of the pioneers of EMDR and addiction is described in more detail elsewhere (Markus & Hornsveld, 2017).

O'Brien and Abel (2011) suggest using the stages of change model, which reflects how people progress as they engage in behavior change (Prochaska & DiClemente, 1982, 1992), to guide clinical decision making. However, it has been argued that the problems with the model are so serious that it should be discarded, despite its intuitive appeal (West, 2005). Among others, its conscious decision-making model of behavior are seen as being too simplistic, suggesting that individuals typically make coherent and stable plans. However, research suggests considerable instability in behavioral intentions (Hughes et al., 2005). Nevertheless, the stages of change model may provide a more dynamic rather than a phased approach to clinical guidance and motivational strategies when used on a session-by-session base. The important issue is the need to tailor the treatment to the patient as O'Brien and Abel (2011) suggest.

To date, only one RCT has been conducted to study the potential of EMDR therapy when targeting addiction. Hase, Schallmayer, and Sack (2008) compared the effectiveness of two, 1-hour sessions of EMDR therapy (using the CravEx protocol; Hase,

2010) added to TAU with TAU only in a sample of alcohol-dependent inpatients following detoxification. By targeting memories of intense craving and relapse, processing commenced until targets no longer elicited craving. The group receiving EMDR therapy in addition to TAU rated their craving as significantly lower after 1 month, and showed a lower relapse rate at follow-up after 1 and 6 months. However, the sample size was relatively small and the dropout rate was very high, raising questions about the actual efficacy of this approach.

## The Palette of EMDR Interventions in Addiction

Markus and Hornsveld (2017) described a set of 15 resourcing, trauma- and addiction-focused EMDR interventions (“modules”) which are thought to be particularly useful and effective in addiction: the palette of EMDR interventions in addiction, in short “PEIA.” The set of interventions were selected based on existing protocols, theoretical considerations, and clinical experience. The set is not evidence-based nor meant as a new protocol but provides opportunities where therapists can choose from, depending on history taking and individual case conceptualization alongside treatment based on prevailing guidelines. Nevertheless, current clinical experience with the PEIA suggests that it is hard to determine beforehand which modules are most useful in a specific patient. Therefore, all modules should be considered during the assessment phase. If a module does not generate relevant targets (no images and/or no or little associated positive or negative emotionality or craving) the focus shifts to the next module. To enhance commitment, the order and relevance of the goals to achieve should be a shared decision. Worksheets for the PEIA modules can be downloaded from the Internet (Hornsveld & Markus, 2017).

Elements and ideas from the existing EMDR protocols aimed at addictions (Hase, 2010; Miller, 2010; Popky, 2005) and a protocol for dysfunctional positive affect (Knipe, 2010) were combined and revised. This was done because it was felt that the existing protocols reflect interesting albeit different and sometimes partly overlapping approaches which, taken together, provided an incomplete description of possible interventions in addiction. To complete these interventions, insights and implications from experiments on working memory theory (Hornsveld et al., 2011), desensitization of positive targets (Engelhard et al., 2010) and flash-forwards (Engelhard et al., 2011) were incorporated. Finally, Markus and Hornsveld (2017)

both used the three-pronged approach (targeting past disturbances or traumatic experiences, present triggers, and anticipated future occurrences or situations, in that order; Shapiro, 2001) as well as elements from the two-method approach (whereby memories of etiological and/or aggravating events are either specified on a time line or are accessed by the associated core beliefs; de Jongh, ten Broeke, & Meijer, 2010) to construct a framework for case conceptualization. So the PEIA encompasses, integrates, completes, and sometimes adjusts existing protocols (Hornsveld & Markus, 2017).

The first stage of the PEIA involves explaining certain rules to the patient and asking for their commitment to transparency (regarding craving and use), attendance at sessions, and substance use. Following this, the rationale for using EMDR therapy and its use in addiction is discussed with the patient. Treatment goals (controlled drinking or abstinence) may vary and are only noted. As stated earlier, the order and choice of modules depend on the case-conceptualization, so the order of modules presented here may differ from those used in treatment of a specific case. The first two modules are concerned with increasing safety, strength, and accessibility of resources by resourcing. Module 1 represents the safe place exercise (Shapiro, 2001) and resource development and installation (RDI; Korn & Leeds, 2002; Leeds & Shapiro, 2000), indicated when there is a need for preparation, enhancing skills and resources to handle forthcoming difficult situations. Module 2 represents the installation of a positive treatment goal (Popky, 2010), indicated when a motivating, achievable, personal goal needs to be strengthened. Modules 3–5 are concerned with trauma-focused EMDR. Module 3 reflects the use of the standard EMDR protocol with memory representations associated with PTSD (T-traumas; Shapiro, 2001). Module 4 reflects the use of EMDR therapy on (often preaddiction) memory representations of ACEs and t-traumas which fuel negative affect and affect intolerance (using Approach 1 of the two-method approach of de Jongh et al., 2010). In essence, it makes use of a time line to specify memories of the etiological and/or aggravating events in a meaningful way. In this module (as in the previous module), addiction is conceptualized as a self-medication strategy (Khantzian, 1985). Module 5 describes the use of EMDR therapy on memory representations fueling negative core beliefs (ACE’s, t-traumas). Here, addiction is conceptualized as maintained by low self-efficacy (e.g., regarding drinking refusal) or self-esteem and fueled by memory representations underlying dysfunctional core

beliefs (e.g., “I am spineless”; using Approach 2 of the two-method approach of de Jongh et al., 2010). The remaining modules are concerned with addiction-focused EMDR. Modules 6–8 aim to reduce the impact of change-blocking fears. Module 6 describes the use of EMDR on negative flash-forwards of prolonged abstinence which is important when there is a fear of sobriety. Module 7 describes the use of EMDR on negative flash-forwards of relapse. In contrast, Module 8 is focused on memories of relapse which may induce feelings of powerlessness regarding the ability to control oneself when tempted. It resembles Hase’s (2010) approach. Modules 9–13 aim to reduce the attractiveness of the addictive behavior. Module 9 reflects EMDR on memories of craving (also resembling Hase’s, 2010, approach) and is useful in cases of high levels of craving and corresponding relapses. Module 10 describes EMDR on positive memories (resembling Knipe, 2010, and Miller, 2010, associated with the addiction which is useful when the patient wants to reach an unrealistic or dysfunctional goal. Module 11 reflects Miller’s (2010) FSAP approach regarding memories linking substance or behavior with underlying healthy needs. Module 12 describes the use of EMDR on positive flash-forwards about “dry use” (anticipated use or carrying out the behavior, e.g., gambling). Module 13 describes the use of EMDR on positive flash-forwards about a desired goal or outcome (the desired outcome of the substance use or the behavior itself, e.g., winning the jackpot). Modules 6, 7, 12, and 13 are novel applications of EMDR therapy. Modules 14 and 15 aim to increase the stability of treatment effects. Module 14 is focused on the desensitization of trigger situations in the present (as described by both Hase, 2010, and Popky, 2010), whereas Module 15 describes future templates regarding present situations that may trigger relapse (Hase, 2010; Shapiro, 2010).

There are some important deviations from the standard EMDR protocol (Shapiro, 2001) and other documented approaches (Hase, 2010; Miller, 2010; Popky, 2005). First, depending on the nature of the target “subjective units of distress” (SUD), the “level of urge” (LoU) or the “level of positive affect” (LoPA) may be used to identify suitable targets and monitor progress. Second, the LoU may still be rated 1–2 after successful processing because the real aim here is to maximize experienced control over craving. Third, in the case of targets that primarily elicit craving instead of distress, a threshold-lowering cognition (e.g., “One drink is ok”) is used instead of the negative cognition (NC), thus maximizing craving. Similarly, in the case of targets that primarily elicit a positive feeling instead

of distress, a cognition that maximizes the positive feeling (e.g., “I’m on top of the world!”) is used instead of the NC. Although images that elicit positive feelings or craving may be associated with dysfunctional cognitions, Markus and Hornsveld (2017) believe NCs are not useful with these kinds of images. Because the overall goal is to increase the positivity and/or craving associated with the image before desensitization commences, a threshold-lowering thought is used to induce this. Finally, following Hornsveld and colleagues’ (2011) recommendation, no bilateral stimulation is used when using additional techniques such as RDI (Leeds & Shapiro, 2000) or strengthening positive goal-related imagery (Popky, 2005).

In summary, the ongoing development and research in the field of EMDR opens up new and intriguing possibilities for the treatment of addiction. Regrettably, thus far, only the CravEx protocol (Hase, 2010) has been evaluated in an RCT which was unfortunately relatively small, whereas the DeTUR protocol (Popky, 2010) was used in a few case studies and a multiple baseline study was published using the FSAP (Miller, 2010) in several patients with behavioral impulse control problems (Miller, 2012). A large subset of the PEIA is currently being investigated in a large RCT in alcohol-dependent outpatients in The Netherlands (Markus, de Weert-van Oene, Becker, & De Jong, 2015). What follows is a documented case that presented itself and was treated with a subset of the PEIA (Markus & Hornsveld, 2017).

## Case History

The individual, who will be henceforth referred to as A., was at the time of treatment a 23-year-old woman who presented herself for treatment of GHB and amphetamine dependence at Novadic-Kentron, an addiction care center in The Netherlands. When she was 14 years old, she started using amphetamine, and this quickly developed into a daily habit when she felt that it numbed her emotions effectively. In 2013, out of curiosity A. combined her amphetamine habit with GHB. It helped her to stop worrying and made her feel “very happy.” However, her GHB use also quickly developed into a daily habit whereby she had to use a dose of GHB every 2 hours to avoid withdrawal symptoms. Over the 2 years of using GHB and amphetamine, she developed the conviction that only GHB could help her to “feel happy” and make her “a nicer person to be with.” These convictions as well as feelings of worthlessness, withdrawal symptoms, and particularly psychotic symptoms (visual hallucinations and paranoia) that arose when she used less or tried

to abstain from GHB drove her continued use. A. increased her GHB use over time to keep feeling happy.

A. had angry outbursts from a young age. Emotions, with the exception of anger, were neither displayed at home nor discussed. Her parents often quarreled while A. displayed behavioral problems when she felt she did not get what she wanted. Although A. completed primary school without problems, she never liked school. She experienced anxiety and tension in social situations and found concentrating difficult and demonstrated impulsive tendencies. Tension often resulted in aggression and other behavioral problems, and this problematic behavior was augmented further when she started using amphetamine. She became involved in aggressive encounters and was even jailed for 24 hours after one particular incident. Although she received special education, her drug habit increased while her life deteriorated. When A. was 16 years old, her parents divorced, and this had a huge negative impact on her. A., her mother, and younger brother stayed together.

A.'s first admission for amphetamine detoxification was when she was 18 years old. Her mother issued A. with an ultimatum: either go through detoxification or leave home. Although she went through detoxification, A.'s drug use only increased afterward. In January 2015, A. was admitted to Novadic-Kentron for 3 weeks of GHB detoxification in a juvenile inpatient setting. At that time, she hardly experienced any amphetamine craving and only used occasionally, when under the influence of GHB. Psychological assessment revealed social phobia, attention-deficit/hyperactivity disorder (ADHD) and borderline personality disorder. Assessment of her IQ (using the Wechsler Adult Intelligence Scale-IV; WAIS-IV; Wechsler, 2008) showed a significant lower working memory index score than others in her age-group and a total WAIS-IV IQ score of 80. A. participated in the aforementioned baclofen study and as such was prescribed 80 mg baclofen daily to reduce her intense GHB cravings. The craving for GHB (as measured on a Visual Analogue Scale) remained very high (8–10 on a scale from 0 (no craving) to 10 (extreme craving) for weeks and resulted in a lapse during clinical treatment. After 16 weeks the baclofen was discontinued on the request of A. because she experienced no effect on craving.

During intensive, partly inpatient aftercare A. received cognitive-behavioral therapy (CBT) and psychomotor therapy aimed at her social phobia and emotion regulation difficulties. Relapse prevention training was added for obvious reasons. In addition, EMDR therapy aimed at craving reduction was suggested by the psychologist involved in her treatment

(third author; MMJH) because treatment with baclofen had not been successful thus far and currently there are no evidence-based pharmacological alternatives. A. agreed and seven weekly EMDR therapy sessions were planned and carried out by the third author (MMJH). Urine controls showed that at the start of EMDR, she had been abstinent from GHB for at least 2 weeks, and at that point, the baclofen treatment had been discontinued for 3 months.

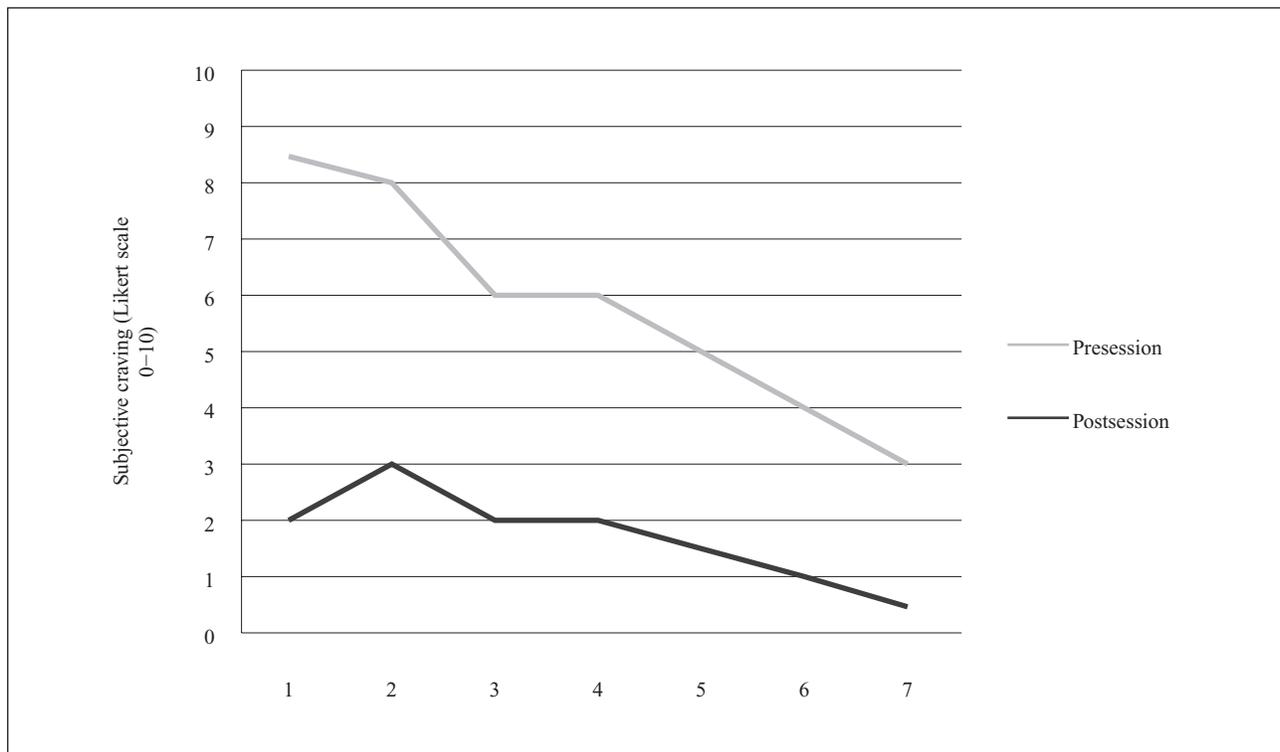
The EMDR therapist used functional analysis to guide target selection. This refers to the application of the laws of operant conditioning to establish the relationships between stimuli and responses to determine the motivations for a certain behavior. In this case, memory representations eliciting the strongest cravings were selected because they seemed to fuel the current intense GHB cravings most directly. This corresponded to PEIA Modules 7 (negative flash-forwards of relapse although this transformed into a positive flash-forward about use), 10 (positive memories associated with the addiction), 12 (positive flash-forwards about "dry use" (imagining preparatory behavior or actual use), and 14 trigger situations (Markus & Hornsveld, 2017). The other modules were explored with A. but this did not result in the identification of other suitable targets at that time.

At the start of each session, the most suitable (most craving eliciting) memory representation to desensitize next was established by shared decision making between the therapist and patient. During reprocessing negative valenced images (about a dull future without using GHB) emerged in the association chain and were also reprocessed as a result.

Most of the sessions were concluded in 45–60 minutes because the targets identified in each session could be desensitized quite rapidly. Before and after each session, A. rated her overall level of craving on a Likert scale (0 = *no craving*; 10 = *maximum craving*; Figure 1). An overview of the EMDR sessions is provided in the following text.

## EMDR Sessions

The treatment goals for A. were to reduce GHB craving and be able to cope with residual GHB craving. The EMDR therapy rationale followed that of the PEIA (Markus & Hornsveld, 2017). In this case, the EMDR therapist decided to base the target selection on the outcome of a function analysis of GHB craving and use. This was done because A. experienced very high cravings and feared she might relapse quickly when triggered. Memory representations that elicited the greatest craving were selected for desensitization. Target specifics are listed in Table 1.



**FIGURE 1.** Changes in pre- and posttreatment levels of subjective craving over the course of seven EMDR therapy sessions.

## Session 1

The first craving-eliciting memory representation selected by A. was a very clear image of a situation whereby she dosed GHB with a syringe, anticipating subsequent GHB use (see Table 1): a positive flash-forward of preparatory behavior. During activation of the target image, A. felt a sensation in her stomach and hands similar to psychomotor unrest often experienced during GHB use. At the start of the desensitization (using eye movements) A. expressed positive associations with her GHB use. However, as it commenced, she expressed more and more thoughts about the negative consequences of her use and the positive consequences of not using GHB. Desensitization commenced, until LoU was reduced to 2. Markus and Hornsveld (2017) suggest that it is not unnatural for some images to elicit craving in most of us, and therefore such images may not need to be fully desensitized. The dysfunctionality is not so much in the craving elicited but in the fact that some of us feel we cannot control our behavior because of it. An LoU of 2 should restore this feeling of control sufficiently.

Subsequently, the PC, which had already crept up to a validity of cognition (VoC) score of 6, was installed completely (VoC score 7). A. received a homework

cue exposure assignment which was for her to buy a syringe during her next leave such as she used to dose the GHB before and she was to keep this with her until craving, if elicited, was reduced. Her father would accompany her. Otherwise, cue exposure was deemed too soon.

## Session 2

A. did well after her previous session and still abstained from drug use. However, the craving had returned to its previously high levels. She had not done her homework yet but planned to do so in the following week. The session started with one of the other positive, craving-eliciting memories identified in the first session, in this case, a positive memory associated with GHB use.

In the PEIA, the therapist focuses on reducing the highest score. In this case this was the LoPA (see Table 1). During desensitization the same pattern as in the first session emerged whereby positive associations were replaced with negative associations of GHB use. The LoPA was eventually reduced to 3. The PC was installed to VoC 7. A. received no new homework but was determined to carry out the previous session's homework assignment.

**TABLE 1. Specifics of Activated Targets During EMDR Therapy**

Session	Image	Threshold-Lowering Thought	PC	VoC (1–7)	Emotions	LoU/LoPA (0–10)	Body Location
1	Alone at home, dosing a GHB “fix”	“When I use GHB, my life is much more fun”	“I don’t need the GHB, I can handle this”	2	Unrest	9 (LoU)	Stomach and hands
2	In the living room, listening to music with friends from the drug scene. Holding a syringe, dosing the GHB before taking it	“I’m a nicer person using GHB”	“I can handle this (without GHB)”	2	Cheerful	8.5 (LoU) 10 (LoPA)	Stomach and hands
3	Sitting next to the car’s driver, having fun with friends while holding a dose of GHB, on the verge of swallowing it	“If I use GHB, I’m enjoying life more”	“I can handle this”	5	Cheerful	8 (LoU) 8 (LoPA)	Stomach and hands
4	(Going “back to target” of Session 2): in the living room, listening to music with two friends from the drug scene. Holding a syringe, dosing the GHB	—	—	—	—	8 (LoU) 6 (LoPA)	—
5	Sitting alone on the bed, listening to hardcore music whilst under the influence of GHB	“I feel great with GHB”	“I can feel good without GHB”	3	Happy and satisfied	7 (LoU) 6 (LoPA)	Hands, legs, and head
6	Sitting on a sofa with GHB on the table in front of her	“If I take GHB I feel great again”	“I can resist GHB, even when it’s in front of me”	5	Anxiety mixed with a thrill of pleasure	7 (LoU) 8 (LoPA)	Arms, hands, and legs
7	Sitting with GHB in front of her	“Using GHB would be very nice”	“I can handle this”	4	Excited but also disappointed	9 (LoU) 5 (LoPA)	Hands, legs, and stomach

*Note.* PC = positive cognition; VoC = validity of cognition; LoU = level of urge; LoPA = level of positive affect; GHB = gamma-hydroxybutyric acid.

### Session 3

Although A. experienced some craving after the previous session, it was never rated higher than “6.” A. did her homework and bought the syringe, but at that point, it no longer elicited craving. A.’s next positive, craving-eliciting memory reflected a road trip whereby she drove around with some friends, listening to music, having fun and using GHB. Again, a positive memory associated with GHB. Interestingly, A. chose the moment just before she took a dose of GHB instead of the moment of actually using it. She explained how she loved the feeling of being able to give into the craving more. At first, many positive associations of GHB use came up but as LoU and LoPA ratings decreased, negative feelings and thoughts associated with earlier GHB use arose. A. realized very clearly she had become increasingly restless, anxious, and, in the end, extremely paranoid using GHB. The LoPA and LoU were eventually reduced to 2. The PC was installed to VoC 7.

### Session 4

Although A. did well since her previous session, she requested to go back to the target of Session 2 because she felt it still elicited GHB craving. One possible explanation is that although the LoPA was reduced to 3 during that session, the therapist did not check the LoU at the end of the session, which still may have been high. This poses the question whether LoPA reduction should be the primary goal in targets which also elicit strong cravings as it is possible LoU reduction is a more effective approach in such cases. Therefore, although the LoU also was not fully reduced after this session, the target no longer needed further desensitization in subsequent sessions. Desensitization occurred quickly during this session, with the LoU rated “2” within 20 minutes. Negative associations of GHB use came up quickly, and A. experienced an increased sense of confidence that she could manage life without GHB and still feel happy. The PC (“I can handle this [without GHB]”) was (again) installed to VoC 7.

### Session 5

A. experienced reduced craving following the previous session, mostly rated “5,” but never higher than “6.” A. reported that certain music reminded her of a scene (a trigger situation) set in her now ex-partner’s attic, where GHB was stored. Desensitization occurred quickly again, inducing thoughts in A. that she often did not feel well under the influence of GHB,

but instead felt anxious and physically worse. Within 30 minutes, the LoU fell to a rating of “1.5.” The VoC was already 7 after desensitization.

She received a new cue exposure homework assignment whereby she had to listen to music (the same to which she used to listen to while using GHB) daily for 15 minutes. A. felt she could handle any craving which might arise, also because she would begin the assignment by practicing in an inpatient setting.

### Session 6

The week following the last session went well. A.’s level of craving was never higher than “4” or “5” on a scale of 0–10. As per her assignment, she listened to hardcore music in different contexts. Sometimes, it elicited craving, but she could handle it well.

When A. thought back to the targets desensitized in the previous sessions, she remarked that although she still associated them with a good time, they no longer elicited strong cravings (maximum “4”). A. decided with her EMDR therapist that the sixth session would focus on strengthening her self-confidence. She described a negative flash-forward of relapse, expressing fear that if she were to be around GHB in the future, she would not be able to control herself. However, thinking about a possible relapse was also associated with expected positive effects of and strong cravings for GHB and a very uncertain situation ensued, in which craving and positive feelings prevailed. After the first 10 minutes of desensitization, a positive feeling toward GHB prevailed while A. felt a great deal of physical unrest. Thereafter, the positive feeling subsided and more negative associations of GHB use surfaced. The LoPA was reduced to “1.” The VoC was raised to 7. She expressed a sense of pride that she would be strong enough not to take GHB if made available to her in the future.

### Session 7

A. had not experienced much craving in the previous week, and it never rated above “3.” Upon A.’s request, the session focused on a memory representation of a trigger situation similar to (but not the same as) that covered in the previous session. During target activation, she felt not only excited but also disappointed because she felt it would mean she would still hang out with the “wrong” people. During desensitization, the LoPA initially rose to “9” while few cognitive associations were reported. Most associations were physical in nature, such as feelings of tension in her arms, shoulders, legs, and belly. After 15 minutes, the LoPA was reduced to “1.” A. remarked that, in her opinion,

the LoPA could not be reduced further because she found it difficult to let it go altogether. On the other hand, the physical sensations had subsided entirely. The LoU was reduced to 0.5. The VoC was raised from 6 to 7. The body scan stage revealed no craving or positive tension.

## Epilogue

Urine controls during EMDR demonstrated that A. remained abstinent from GHB over the treatment period. After EMDR therapy was finished, A. expressed that she was very happy with its outcome. The craving she experienced was much lower than at the beginning of the treatment as can be seen in Figure 1.

Although A. was still unsure whether she would successfully remain abstinent when confronted with other users, her confidence had grown. Two months later, A. moved into a sheltered housing project. Although cravings were present in the background, she said that the baseline intensity was substantially lower than before EMDR therapy (rated “4,” “at least 5 points lower than before EMDR therapy”). She was still abstinent from GHB but reported some controlled alcohol use (only during weekends, consuming 2–3 units on each occasion). Regarding the latter, this was considered a treatment success. Despite ongoing debate, a review suggests that treatments that aim for controlled use appear to be as effective as those that aim for abstinence, whereas treatment goals that are chosen by the patients themselves increase the treatment success rate (van Amsterdam & van den Brink, 2013). One month later, her cravings (now rated “2–3”) and alcohol use (now 1–2 units on each occasion) were reduced somewhat further while she still abstained from GHB. Six months following EMDR, A.’s urine control was still negative for GHB while she reported no lapses or relapses in that period. She expressed a sense of pride in her progress. A. is currently living in a housing farm where she works and receives care if necessary.

## Discussion

GHB dependency is a growing concern and high relapse rates following detoxification are seen, often quickly (Kamal, Schellekens, et al., 2015). This case study is the first account of the use of EMDR therapy for treating GHB dependency. A 23-year-old woman with a 9-year history of amphetamine dependency and 2 years of additional GHB dependency and comorbid social phobia, ADHD, and borderline personality disorder as well as a low intellectual functioning, was treated successfully regarding her persistent and intense GHB cravings. At follow-up after 6 months,

she maintained abstinence from both amphetamine and GHB and experienced little craving since the end of the EMDR therapy.

The case is interesting given the fact that no evidence-based interventions for GHB dependence currently exist. Baclofen treatment, provided as part of an ongoing study on GHB detoxification and relapse prevention (Kamal, Schellekens, et al., 2015), did not reduce intense cravings in the case described here. However, in as few as seven 45-minute sessions of EMDR therapy, the intense cravings were reduced to a manageable minimum. Although the EMDR therapist took a liberal approach to the use of the PEIA (Markus & Hornsveld, 2017), thus far, the effects (prolonged abstinence and reduced craving) seem substantial and stable. The “shared decision” approach to target selection may also have fostered treatment engagement in this particular patient. Although many authors have used a trauma-focused approach, even in non-PTSD, addicted patients (e.g., Brown et al., 2015; Henry, 1995), here, EMDR therapy was used in a strictly addiction-focused sense. We are aware that in many non-PTSD cases, the addictive behavior still may serve to avoid trauma-related affect. This seemed to be also the case here. However, given limited time before discharge from the clinic and the outcome of the functional analysis, the primary focus was on the main problem, according to A: her intense cravings related to the addiction-targets mentioned. After that, A. had moved to the housing farm and expressed that she did not feel the need for further trauma work. It is conceivable that this needs to be addressed again in the future, however.

Also of interest is that the patient no longer experienced any craving when confronted with a syringe similar to ones she previously used to dose GHB. The combination of EMDR therapy and cue exposure used here may help to identify new targets for EMDR and to gauge progress. However, cue exposure itself has been largely abandoned in addiction treatment because of a lack of proof of efficacy (Martin, LaRowe, & Malcolm, 2010).

The PEIA and its differences and similarities with other approaches (e.g., Hase, 2010; Popky, 2010) are discussed in detail elsewhere (Markus & Hornsveld, 2017). This case provides the first demonstration of the feasibility and possible effectiveness of the PEIA in clinical practice. Elements of the PEIA were well tolerated despite high levels of craving which may even be temporarily augmented further by the EMDR procedure. The EMDR therapist had no particular training in the application of the PEIA but was able to use it successfully. Because the use of the PEIA is not evidence-based, we encourage EMDR therapists who

want to use the PEIA to first gain experience with highly motivated, abstaining patients with intense, treatment-resistant cravings which challenge their abstinence. When treatment cannot be delivered in a clinical setting, some precautions are in order. The abstaining patient and its relatives should know that relapse is always possible, whether they receive treatment or not. Both the therapist and patient should not be too afraid for this to happen. If it happens, the attitude should be “what can we learn from this?.” It can also provide new targets to address. Relatives should be asked to help monitor and motivate the patient during this process. In patients who are non-abstaining, the PEIA may be considered if prolonged abstinence has not been feasible, particularly when this is the result of high cravings. A pragmatic approach is advised: what needs to be agreed on to be able to deliver the treatment? Markus and Hornsveld (2017) propose agreement on a minimal set of rules such as (a) openness about craving and substance use between sessions (to identify new targets and discuss coping strategies), (b) no substance use before EMDR therapy (no session when clearly intoxicated), and (c) no substance use immediately following the session (which to show commitment to try out alternative strategies discussed with the therapist).

There are some important study limitations that need mentioning. The patient received different forms of treatment or care before, during and after EMDR therapy. Therefore, the effects found may be attributable to other interventions. However, it seems likely that the EMDR therapy played a substantial part in the reduction of the intense cravings because EMDR therapy was the only intervention, after baclofen, which specifically targeted craving. In addition, after each EMDR session, a steady reduction in overall craving was documented. The subjective experience of the patient was also clearly in accordance with this. Another limitation is that the current case study was not designed as such a priori, so progress was not monitored using questionnaires etc.

Given the relative quick, clinically relevant and stable effects that seem to have been achieved, further research in this particularly challenging group of substance users is warranted. A multiple baseline design whereby the participants receive EMDR therapy after a specific baseline period can demonstrate more clearly whether the onset of change in craving or other addiction related symptoms or behavior can be attributed to the EMDR. Combined with the use of a diary, between sessions fluctuations can be recorded while providing insight in the contributions of specific elements of the PEIA.

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Correspondence regarding this article should be directed to Wiebren Markus, MSc, PhD candidate, IrisZorg, Institute for Addiction Care and Sheltered Housing, Kronenburgsingel 545, P.O. Box 351, 6800 AJ, Arnhem, The Netherlands. E-mail: w.markus@iriszorg.nl