



Maladaptive Daydreaming Among Recovering Substance Use Disorder Patients: Prevalence and Mediation of the Relationship Between Childhood Trauma and Dissociation

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Abstract

The main purpose of this paper was to examine whether patients recovering from substance use disorder (R-SUD) engage in an absorptive mental activity known as maladaptive daydreaming (MD). One hundred eighty Israeli Arab men participated in this study. Of them, 100 were R-SUD patients receiving care from a government agency and 80 constituted a non-clinical control sample. We found that individuals recovering from SUD are more likely to report a history of childhood trauma, particularly emotional neglect, as well as current dissociative experiences. Furthermore, we also provided evidence that compared to a matched control group; R-SUD patients tend more to engage in intense and immersive daydreaming that can reach pathological levels (MD). The study also showed that the relationship between traumatic emotional neglect and later dissociation is partially mediated by the propensity for extreme daydreaming. We argue that since the childhood adversities commonly characterize the histories of SUD patients, this group is at an increased risk, not only of trauma-related dissociative disorders but also of maladaptive daydreaming, a less known, distressful form of a dissociative absorption in fantasy.

Keywords Maladaptive daydreaming · Childhood trauma · Dissociation · Substance use disorder

The main purpose of this paper was to examine whether patients recovering from substance use disorder (R-SUD) engage in an absorptive mental activity known as maladaptive daydreaming (MD). Maladaptive daydreaming should be differentiated from the more familiar term of “mind wandering.” Mind wandering is a normal mental activity associated with gains

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in autobiographical memory (Smallwood and Andrews-Hanna 2013), the simulation of plausible alternatives (Gilbert and Wilson 2007), and planning for the future (Stawarczyk et al. 2011). In contrast, MD is marked by compulsive detrimental absorption in fanciful fantasy that is associated with distress, dysfunction, and a high comorbidity with DSM psychopathology (Bigelsen et al. 2016). MD has demonstrated convincing conceptual and psychometric robustness (e.g., Somer et al. 2016, 2017b; Jopp et al. 2018). In some cases, this condition seems to evolve into psychological dependence that is manifested in the compulsion to daydream extensively, sometimes for many consecutive hours every day, causing substantial distress and impaired functioning (Somer 2002). Recently published phenomenological data (Somer et al. 2016a, b) identified a number of attributes characteristic of MD: (a) individuals with MD discovered their ability to activate fanciful fantasies during childhood; (b) movement (e.g., pacing) and exposure to music are important facilitators; (c) some maladaptive daydreamers reported struggling with the outcomes of adverse childhood experiences or experiencing ongoing social and emotional difficulties; and (d) this rewarding and soothing experience can develop into a detrimental mental habit. Daydreaming scenarios are often intertwined with emotionally compensatory themes involving fantasized emotional support, competency, and social recognition. This leads to the development of a vicious cycle in which individuals use MD to seek comfort from their stressors, only to experience further distress about their time-wasting, which they alleviate with more daydreaming (Somer et al. 2016b). Sufficient evidence suggests that MD is a reliable clinical construct (e.g., Somer et al. 2016, 2017b). MD differs significantly from normative daydreaming in terms of quantity, content, experience, distress, degree of perceived control, and interference with life functioning (Bigelsen et al. 2016). A recent systematic assessment of psychiatric comorbidity in MD demonstrated that individuals meeting criteria for MD exhibited complex psychiatric problems spanning a range of DSM-5 disorders. Examples of comorbid disorders included anxiety disorders (71.8%), depressive disorder (66.7%; 28.2% have attempted suicide), and obsessive-compulsive or related disorders (53.9%) (Somer et al. 2017a).

The rationale guiding the present study is based on the premise that MD, described by sufferers as comparable to an addiction (Bigelsen and Schupak 2011), can serve as a source of emotional regulation, as reported by interviewed individuals with self-diagnosed MD (Somer et al. 2016b). It has been previously posited that in a certain subgroup of trauma-exposed individuals, SUD may characterize the second stage of a strategy developed for coping with painful experiences and their associated memories (Somer 2009). Although, in line with Amodeo's thinking (2015), we too do not claim the existence of an "addictive personality," we believe that when psychological dissociation is ineffective in modulating emotional pain or when substances that can rapidly produce efficient relief are available, some traumatized persons may look beyond their own mental resources for comfort. Once these individuals get access to consciousness-altering substances, they are likely to discover the immediate advantages of chemical dissociation and its rapid effect on both the body and the mind. Thus, chemical dissociation can become a self-medicating alternative for those people. In such persons, the first stage recognized as psychogenic dissociation may manifest itself in the usual way. Yet in an intoxicated state, psychogenic dissociation is more often masked by the chemical dissociation stage (Somer 2009). While the relationship between dissociation and SUD has been demonstrated (e.g., Somer 2003; Somer and Avni 2003), no research has yet addressed the relevance of MD, a newly discovered pathological form of dissociative absorption, to the lives of R-SUD patients. In the present research, we aimed to study the role MD plays in the lives of R-SUD individuals and its relationship to trauma and dissociation. In this

study, we wished to explore if compared to controls, R-SUD patients will report experiencing more childhood trauma, dissociation, and MD. We also sought to assess the prevalence of MD among R-SUD patients. Furthermore, we aimed at evaluating the association between childhood trauma and maladaptive daydreaming in the R-SUD patient sample. Finally, because daydreaming is a ubiquitous human activity, we wished to explore if its excessive form, MD, may play a partial mediating role in the relationship between childhood trauma and dissociation (a rarer form of coping) among R-SUD patients.

Method

Participants

The sample for this study comprised 180 Israeli Arab men, 100 of whom were R-SUD patients receiving care from a government agency. The average total duration of substance use for these individuals was 19.27 years ($SD = 10.94$), and their average duration of abstinence was 2.75 years ($SD = 3.64$). To avoid any data contamination by potential acute emotional reactions associated with the substance withdrawal process, we recruited R-SUD patients who had completely abstained from any illicit substances for a minimum of 2 months and were under the supervision and care of a substance use specialist. Abstinence was verified periodically by the treating agency by means of blood tests. Eighty-eight percent of the preferred substances reportedly used by our respondents were “downers” such as opiates, sedatives, and alcohol. The rest of R-SUD patients reported using stimulant and hallucinogenic substances. Members of the control group were 80 consenting Arab men with no reported history of substance use disorder. Recruitment of our control participants was unable to go beyond 80 due to logistic reasons associated with limited staff and funding resources. In addition to their identical sex and ethnicity, the two groups had similar levels of education (98% and 98.7% of the R-SUD patients and controls, respectively, had at least some high school education or had finished high school), income (e.g., R-SUD patients and controls reported below average income at 43% and 42.5%, respectively), age (mean ages of the R-SUD patients and controls were 40.2 and 41.9 years, respectively), and number of children (means were 2.1 and 2.3 for members of the R-SUD and control groups, respectively). Despite the close similarities between our research and control groups, one difference was noted in regard to participants’ marital status (i.e., single, married, divorced, widower; $\chi^2_{(3)} = 45.201$, $p < 0.01$). Specifically, compared to the control group, more respondents from the R-SUD group were single (25% and 33%, respectively) or divorced (2.5% and 10%, respectively), and fewer were married (65% and 50%, respectively).

Recruitment and Procedure

Respondents in the R-SUD group were recruited in response to a call for participants disseminated by leaflets, posters, and personal contacts with substance use rehabilitation service agencies and providers. The participants signed an informed consent form, as required by the university committee on ethics in human research. All consenting R-SUD participants were asked to complete the study’s measures in the first stage of the study. This stage was followed by recruiting the matched control sample who responded to a call for participants distributed and posted in welfare agencies and social networks and by word

of mouth. The control participants also signed an informed consent and were invited to complete the research questionnaire.

Given the relatively lower reported level of education among our R-SUD and control respondents and in order to minimize reporting bias, we decided that the research questionnaire would be entirely clinician administered. All 180 participants were interviewed by the third author, a native Arabic speaker, thus guaranteeing optimal understanding of the various scale items and endorsement of the Likert-scale response options that best fit participants' responses. The data collection interviews lasted between 20 and 60 min. R-SUD respondents who were flagged as individuals with probable MD based on their responses to the research questionnaire subsequently participated in a psychodiagnostic interview conducted by the third author, who was specifically trained for this task by the first author, the co-creator of the diagnostic interview. All R-SUD participants whose scores were above the diagnostic cutoff indicative of probable MD accepted our invitation to take part in a structured diagnostic interview for maladaptive daydreaming. These interviews typically lasted no more than 15 min.

All assessment tools were translated into Arabic by the third author and two graduate students (all native Arabic speakers) and were subsequently back-translated into English and compared to the original scales by the second author, a native Arab speaker fluent in English. Differences associated with imprecise choice of Arabic words were discussed by the translating team and reconciled to obtain an optimal match with the original English version.

Measures

Study participants answered demographic questions targeting their age, marital status, number of children, number of years of education, income level, duration of past substance use, duration of abstinence, and preferred substance used. They also responded to the following measures:

Childhood trauma. Childhood trauma was measured using the Childhood Trauma Questionnaire (CTQ). The CTQ is a self-report instrument covering 28 items ranked on a 5-point Likert scale to gauge the severity of emotional abuse and neglect, physical abuse and neglect, and sexual abuse. It has been validated in terms of psychometric test properties in samples of psychiatric patients, i.e., drug and substance abusers, and yielded Cronbach's alpha scores ranging between 0.82 and 0.94 (Fink et al. 1995). Cronbach's alpha of the Arabic version of the CTQ was 0.91 in the R-SUD patients group and 0.87 in the control group.

Dissociation. The dissociative experiences scale (DES) was used to assess this construct. The DES is the most widely used self-report measure of dissociative experiences (Bernstein and Putnam 1986; Somer et al. 2001) and has excellent reliability and validity (Van IJzendoorn and Schuengel 1996). The scale includes 28 items (e.g., "Some people have the experience of finding themselves in a place and have no idea how they got there. Circle a number to show what percentage of the time this happens to you"; 0% = never, 100% = all the time, in increments of 10%). The DES overall score (ranging from 0 to 100) is obtained by averaging all responses. Cronbach's alpha of the Arabic version of the DES was 0.93 in the R-SUD group and 0.88 in the control group.

Maladaptive daydreaming. Maladaptive daydreaming was measured using three methods: a screening question, a MD scale, and a structured clinical interview. First, participants responded to a screening question intended to identify the respondents' self-

classification as meeting or not meeting the description of MD (Somer et al. 2017b). The question was worded as follows: "Daydreaming is a universal human phenomenon that a majority of individuals engage in on a daily basis. For the purposes of the study, we define daydreaming as fantastical mental images and visual stories/narratives that are not necessarily part of your life. Therefore, we are not referring to acts such as reminiscing over past events, planning for future activities such as a meeting with your boss, or thinking about your mental 'to do' list. We also do not include pure sexual fantasies in this study. Examples of daydreams that can be included would be hanging out with a favorite celebrity, winning the Nobel Prize, telling off your boss after winning the lottery, having an affair with an attractive co-worker who isn't the slightest bit interested in you, living in a parallel fantasy world, engaging in heroic or rescue actions, speaking with historical figures, etc. Any daydreams involving fictional characters or plots can also be included. MD is defined as extensive (in terms of duration and/or frequency) daydreaming that can be experienced as addictive, replaces human interaction and/or interferes with academic, interpersonal or vocational functioning and/or creates emotional distress (for example: guilt, shame, frustration, sadness, anxiety). According to this definition, is your daydreaming (a) normal or (b) maladaptive?" (Somer et al. 2017; pp. 180–181).

In addition, participants completed the 16-item Maladaptive Daydreaming Scale (MDS-16). The original MDS (Somer et al. 2016) is a 14-item self-report MD questionnaire rated on a 10-point Likert scale presented as percentages (0–100%). The MDS discriminated well between self-identified individuals with and without MD (with effect sizes of Cohen's $d = 1.8$ or higher), and it demonstrated excellent internal consistency and temporal stability (e.g., test-retest reliability $r = 0.92$; average time between administrations was 21.17 weeks; $SD = 5.62$). The MDS was also previously shown to have excellent sensitivity (95%) and high specificity (89%) levels. Based on recent evidence about the important role of music in MD (Somer et al. 2016b), we used the 16-item version of the MDS that included two additional items assessing the relevance of music in the respondents' MD experience. Cronbach's alpha of the Arabic version of the MDS-16 was 0.94 in the R-SUD patients group and 0.78 in the control group.

Lastly, participants from the R-SUD group who were flagged as likely to have MD according to their MD-16 scores (i.e., MDS-16 score of ≥ 50 ; Somer et al. 2017) were further evaluated with the Structured Clinical Interview for Maladaptive Daydreaming (SCIMD). The SCIMD was developed on the basis of proposed diagnostic criteria for MD (Somer et al. 2017). It is administered by a clinician or trained mental health professional who is familiar with MD diagnostic criteria. The SCIMD consists of a ten-question probe (and subsequent additional follow-up questions) for inclusion criteria and one probe for an exclusion criterion (and its follow-up questions). A diagnosis of MD is made if participants respond affirmatively to questions pertaining to two or more of the inclusion criteria and the differential diagnosis exclusion criterion ("not due to the direct physiological effects of a substance or a general medical condition"). The SCIMD demonstrated both good inter-rater reliability and excellent agreement with a self-report measure for the disorder (Somer et al. 2017).

Data Analysis

Data were coded and analyzed using IBM SPSS software and AMOS versions 23, respectively. To explore if compared to controls, R-SUD patients will report experiencing more childhood trauma, dissociation, and MD and to assess the prevalence of MD, we conducted a

series of independent sample t tests, Fisher's exact test, and frequency analyses. To evaluate the association between childhood trauma and maladaptive daydreaming in the R-SUD patient sample, we employed Pearson's correlation. Lastly, to explore if this excessive form of daydreaming may play a partial mediating role in the relationship between childhood trauma and dissociation, we used regression mediation analyses. We verified that our data met the assumptions underlying the employed statistical tests before we executed them.

Results

Differences Between R-SUD Patients and Healthy Controls

Based on participant's reported MDS-16 interval scores, MD was higher among individuals in the R-SUD group compared to controls ($M = 23.66$, $SD = 22.31$; $M = 10.26$, $SD = 9.71$, respectively; $t_{(176)} = 5.00$, $p < 0.001$; Cohen's (1988) $d = 0.78$), with this difference being moderate according to Cohen's d score. Additionally, in response to our screening Y/N question, 14% ($n = 14$) of the R-SUD group identified themselves as meeting the description of MD, while no participant in the control group endorsed the same screening question (Fisher's exact $p < 0.001$). A further analysis revealed that 16 participants from the R-SUD patients' group (16%) obtained a mean MDS-16 score that exceeded 50, the suggested cutoff score that differentiated MDers from non-MDers (Somer et al. 2017). In contrast, no participants in the control group obtained a MDS-16 score of ≥ 50 .

We also applied the most rigorous suggested diagnostic procedure for MD by conducting a structured clinical interview (SCIMD) with those R-SUD respondents who scored a mean MDS-16 of ≥ 50 . Of these 16 individuals, 13 were available for assessment with the SCIMD. All 13 interviewees reported persistent and recurrent fantasy activity that was vivid and fanciful and experienced an intense sense of immersion that included visual, auditory, or affective properties. They also reported that their daydreaming was triggered, maintained, or enhanced by exposure to music and to repetitive movement, such as pacing (core features of MD). For these 13 individuals, the symptoms were not due to the direct physiological effects of a substance. Nevertheless, only five interviewees (5% of the total R-SUD sample) indicated that this extensive fantasy activity was associated with distress or impaired functioning, necessary prerequisites for any psychopathology. Hence, our most stringent assessment criteria suggested a 5% prevalence of MD among individuals in the R-SUD group.

R-SUD patients also reported significantly more childhood trauma than participants in the control group ($M = 2.18$, $SD = 0.72$; $M = 1.64$, $SD = 0.36$, respectively; $t_{(178)} = 6.09$, $p < 0.001$; Cohen's (1988) $d = 0.95$). Table 1 shows a more detailed comparison of the various types of childhood adversities. The analyses revealed that emotional and physical neglect, minimization/denial of abuse, and sexual abuse exhibited the largest effect sizes ($d = 0.99$, 0.83 , 0.84 , 0.72 , respectively). R-SUD patients also reported higher levels of dissociative experiences compared to healthy controls ($M = 28.31$, $SD = 18.03$; $M = 18.41$, $SD = 12.70$, respectively; $t_{(178)} = 4.15$, $p < 0.001$; $d = 0.50$).

Relationships Between Childhood Adversities and MD in the R-SUD Sample

Pearson's correlation between childhood trauma and MDS-16 was 0.23 ($p = 0.025$). When correlations between MD and specific childhood adversities were computed, only emotional

Table 1 Intergroup differences by childhood adversity

Trauma variable	R-SUD patients (<i>n</i> = 100)		Controls (<i>n</i> = 80)		<i>t</i>	Cohen's <i>d</i>
	Mean	<i>SD</i>	Mean	<i>SD</i>		
Minimization/denial of abuse	3.04	1.10	2.25	0.72	5.83*	0.84
Emotional neglect	2.25	1.08	1.37	0.48	6.85*	0.99
Emotional abuse	2.77	1.11	2.46	0.74	2.25*	0.32
Physical neglect	2.01	1.08	1.37	0.48	5.30*	0.83
Physical abuse	2.00	0.87	1.55	0.50	4.29*	0.63

**p* < 0.01

neglect was significantly related to MD ($r = 0.30$, $p < 0.01$), indicating that a modest 9% of MD variance among R-SUD patients could be explained by emotional neglect.

Mediation Analysis in the R-SUD Sample

A regression mediation analysis that included MDS-16 scores as a mediator of the link between childhood trauma and dissociation (see Fig. 1) shed light on the familiar relationship between childhood adversities and dissociation (e.g., Banyard et al. 2001). Preacher and Hayes's (2008) simple mediation model was used. Specifically, we employed a set of OLS regression analyses to estimate the coefficients given in Fig. 1: (a) MD was regressed on childhood trauma, and (b) dissociation was regressed on childhood trauma and MD. We also used the bootstrap approach (using 5000 re-samples) to assess the statistical significance of the mediation by means of confidence interval around the “indirect effect estimate” (Preacher and Hayes 2004, 2008). The analyses implied that MD partially mediated the relationship between childhood trauma and dissociative experiences. The “indirect effect” of childhood trauma on dissociation through the MD mediator was 0.15 [95%CI = 0.11–0.21].

Since previous analyses indicated a statistically significant relationship between MD and emotional neglect among the specific childhood adversities, a separate mediation analysis was repeated for emotional neglect. As shown in Fig. 2, the results remained similar. The “indirect effect” of emotional neglect on dissociation through the MD mediator was 0.21 [95%CI = 0.15–0.27].

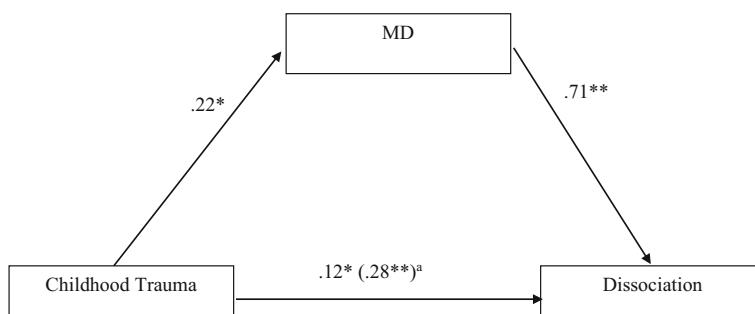


Fig. 1 Mediation analysis of the trauma (overall)-dissociation link. Values represent standardized coefficients (r_s). (a) The number in parenthesis refers to the association between dissociation and childhood trauma before the inclusion of MD in the model. **p* < 0.03. ***p* < 0.01

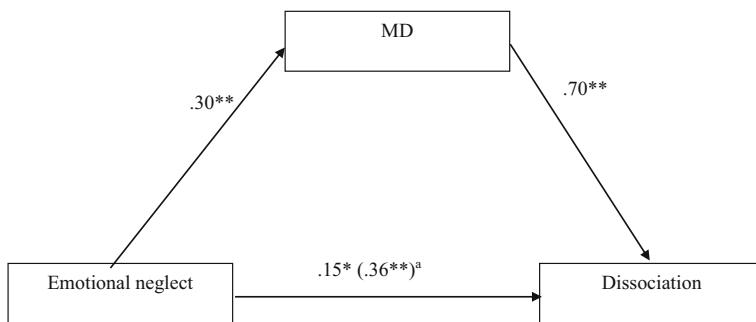


Fig. 2 Mediation analysis of emotional neglect-dissociation link. Values represent standardized coefficients (r_s). (a) The number in parenthesis refers to the association between dissociation and emotional neglect before the inclusion of MD in the model. * $p < 0.03$. ** $p < 0.01$

Discussion

MD was more prevalent among individuals in the R-SUD group. While no control participant scored 50 or more on the MDS-16, the suggested cutoff score that best identifies MDers, 16 (16%) recovering SUD patients had a mean MDS-16 score indicative of pathological daydreaming. When we interviewed the 13 available individuals using the SCIMD, our stringiest assessment criterion, we determined a minimum 5% prevalence of MD among R-SUD patients. It is interesting to note that although we expected high convergence between the MDS-16 cutoff score and a SCIMD diagnosis (Somer et al. 2017), only five of the 13 respondents suspected of having MD based on their MDS-16 scores were confirmed as meeting the diagnosis. The other eight high scorers on MDS-16 did not meet the diagnostic criteria for MD because they did not report any associated distress or maladaptation. In other words, it is conceivable that the MDS-16 captured a small group of patients possessing the capacity for immersive daydreaming, including such distinct hallmarks of MD as concomitant kinesthetic activity and exposure to music. These persons were, presumably, benefitting from their ability to become vividly absorbed in their daydreams, particularly under the duress of abstinence. Since any access to affect-regulating illicit substances was barred, the rewarding effects of this form of fanciful daydreaming likely compensated for the craved-for substances. We suspect that the other eight high scorers possibly minimized the dysfunction associated with MD because of their improved functioning and mental state associated with their sobriety. It should be noted that MD was recently suggested to be classified not only as a dissociative disorder of absorption, but also as a behavioral addiction (Somer 2018). Only subsequent follow-up on the eight high scorers can determine whether distress and maladaptation will later ensue when a behavioral addiction (MD) replaces their chemical addiction (SUD), as was the case with the other five diagnosed maladaptive daydreamers.

As predicted and in line with previous studies (e.g., Somer 2003), R-SUD patients also reported significantly more childhood trauma and dissociation than participants in the control group, with emotional and physical neglect and minimization/denial of abuse showing the largest effect sizes. MD showed a significant relation only to emotional neglect. Our data showed that 9% of MD variance among R-SUD patients is explained by emotional neglect. This finding is in line with recent evidence (Schimmenti 2017) showing that individuals who experience emotional neglect during their childhood are likely to perceive distressful experiences as disorganized. This may be attributed to detrimental attachment experiences that

contribute to an underdeveloped capacity for reflection on mental states (Liotti 1999). Schimmenti and Caretti (2010) contended that reduced mentalizing may further deteriorate the difficulties with affect regulation experienced by individuals with traumatic childhood histories. Their conclusion was that emotional neglect may force survivors to rely on dissociative processes to cope with overwhelming feelings. Our data indicate that emotional neglect may also foster the propensity to utilize another form of dissociative experience: absorptive fantasy. Similar evidence was provided in a qualitative study of the childhood antecedents of MD. Many respondents divulged that their inner worlds were particularly rewarding during their childhoods because they provided relief from their loneliness and related emotional pain (Somer et al. 2016a). The lack of association between MD and the childhood physical and sexual abuse is intriguing. We believe that these kinds of attack on children require them to be vigilant and alert for any signs of impending threats. This form of attention to the external environment is incompatible with the internal absorption necessary for daydreaming. Conversely, physical and emotional neglect of children creates a painfully barren external environment that is highly conducive to the development of compensatory mental stimulation in the form of fantasy.

This study also showed that MD partially mediated the relationship between childhood trauma in general (specifically emotional neglect) and dissociative experiences among R-SUD patients. That is, while our data support past findings showing a positive relationship between childhood trauma (neglect in particular) and dissociation (e.g., Schimmenti and Caretti 2010), the current study provides new evidence that the childhood trauma-dissociation relationship is partially mediated by MD experiences, at least among R-SUD patients. The correlational nature of the present study limits causal inferences associated with this mediation model. Causal mediation inferences require research that investigates pathways linking developmental trauma, MD, and dissociation in a longitudinal research design.

The practical implications of the current study's findings are that since many individuals with SUD are survivors of childhood trauma, they are at an increased risk, not only of dissociative disorders (Somer 2003; Somer and Avni 2003) but also of maladaptive daydreaming, a less known, distressful form of a dissociative absorption in fantasy.

While daydreaming in itself can be a beneficial mental activity, MD has been shown to create distress and dysfunction (Somer et al. 2016b). To optimize treatment services, it is suggested that MD should be assessed in SUD treatment programs. Recent preliminary clinical evidence suggests that certain interventions may be effective in controlling MD (Somer 2018) and should, therefore, be appraised as a potential adjunct module for R-SUD patients with MD.

In conclusion, this study demonstrates that individuals recovering from SUD are more likely to report a history of childhood trauma, particularly emotional neglect, as well as current dissociative experiences. Furthermore, we also provided evidence that a subgroup of R-SUD may engage in intense and immersive daydreaming that can reach pathological levels (MD). We also showed that the relationship between traumatic emotional neglect and later dissociation is partially mediated by the propensity for extreme daydreaming.

Limitations

Several caveats associated with this study should be acknowledged. First, the generalizability of our findings is limited by the relatively small sample of Israeli Arab R-SUD patients who were respondents in this study. Stronger evidence can be attained by replicating the study

among larger cross-cultural and mixed-gender samples. Second, we did not screen the participants for the presence of other mental disorders and did not assess participant's current psychopharmacological treatments; thus, no control for these variables was possible during statistical analyses, a limitation that future research should address. Third, although we attempted to recruit a matched control group, we could not rule out the possibility that some other unmeasured major difference existed, which may have affected the estimates. Fourth, due to limited subsamples, the study did not analyze the trauma-MD-dissociation relationships according to type of substance used. Further support for the present research findings can be achieved by replicating the study across a range of SUD types. Furthermore, MD assessors in this study were not blind to the patients' substance use condition. While, the suggested MD diagnostic assessment instruments employed in this study have demonstrated psychometric robustness, including high Cohen's kappa values for the agreement rate between interviewers using the SCIMD (Somer, Soffer-Dudek et al. 2017b), future studies should apply blind evaluations to minimize potential confirmation bias. Finally, the cross-sectional design of this study is not ideal to evaluate mediation. A more rigorous evaluation of the theoretical implications derived from our mediation analysis would require a longitudinal research design.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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