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Negative and positive life events and their relation to substance and behavioral addictions

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ABSTRACT

Background: Research has shown that negative life events (LEs) may be connected to the development and maintenance of addictions. However, few studies have examined the potential relationship between positive events and addictive disorders, and even fewer studies evaluated the subjective perception of LEs that may underlie these relationships. Importantly, addictive disorders include both substance-related and behavioral addictions, but the relative relationship of each type of addiction with LEs remains unclear.
Methods: The present study compared 212 participants suffering from an addiction (drugs, alcohol, gambling, and sex) and 79 controls on self-report measures of negative and positive LEs.
Results: Compared with controls, individuals with an addiction reported experiencing a larger number of both negative and positive LEs and also tended to be more influenced by negative LEs. Findings also demonstrated differential patterns across addiction types, such that participants with compulsive sexual behavior (CSB) reported experiencing less negative events than those with drug use disorders (DUD) and were less influenced by these events than participants with alcohol use disorder (AUD). Finally, analyses within each group further revealed differences in the way each group experienced negative compared to positive events. Controls and participants with CSB reported experiencing a similar number of positive and negative events, whereas participants with DUD, AUD, and gambling disorder reported more negative events in their lives.
Conclusions: These findings suggest a unique profile among different types of addictions, which should be taken into account when planning personalized prevention and intervention approaches.

1. Introduction

The views regarding addictive disorders changed over the years, and today there is a general agreement that there are both substance- and non-substance-related addictions, the latter referred to as "behavioral addictions" (Albanese and Shaffer, 2012). This is due to many similarities between behavioral and substance addictions (Grant et al., 2010; Zilberman et al., 2018a), which have even led to the inclusion of gambling disorder (GD) as the first behavioral addiction in the DSM-5 (American Psychiatric Association, 2013). These similarities notwithstanding, it remains unclear why different people develop different addictions. To answer this, it is necessary to examine the differences, and not only the commonalities, among addiction types. Moreover, it is necessary to examine several different substance and behavioral addictions within the same study, an approach that enables a comparison

among addictions without the confounding effects of differences in study design (Zilberman et al., 2019). Despite this, few studies to date have embraced this approach.

Accumulating research suggests a relationship between exposure to early and lifetime negative experiences and a variety of mental health problems, including addictive disorders (Brewerton and Brady, 2014; Enoch, 2011), resulting from the inherent stress in these events (Holmes and Rahe, 1967). For example, studies found that exposure to negative life events (LEs) is a predictor of future alcohol and drug use problems (e.g., Enoch, 2011; Pilowsky et al., 2009), is related to poor treatment outcomes (Krenek and Maisto, 2013), and to greater risk of relapse (Rosenberg, 1983). These findings can be explained according to the "self-medication" theory of addiction (Khantzian, 1985), which states that the drug of choice is taken in order to escape from the negative emotions and other consequences of stressful LEs (Taber et al., 1987). In

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this sense, substance use disorders are seen as a maladaptive coping mechanism for dealing with life stress (Nordfjaern et al., 2010). The relationship to negative LEs has also been reported in behavioral addictions, where the behavior provides the needed escape (Jie et al., 2014). This has been found in GD (e.g., Godinho et al., 2018; Kausch et al., 2006; Petry and Steinberg, 2005; Scherrer et al., 2007), internet addiction (e.g., Hsieh et al., 2016; Jie et al., 2014), and compulsive sexual behavior (CSB) (e.g., Efrati and Gola, 2019; Odlaug et al., 2013). However, research regarding behavioral addictions and LEs is much scarcer. Moreover, as most research to date has focused on a single addiction at a time, it remains unclear whether and how LEs may have differential patterns of relationships with different addictions.

It is widely accepted that stress can be brought about not only by negative events, but also by positive ones (Holmes and Rahe, 1967). Based on this view, one might also predict a positive association between addictive disorders and positive LEs. On the other hand, it is reasonable that positive events ought to provide a buffer against stress, thereby increasing one's coping abilities (Cohen and Hoberman, 1983), which would be reflected in a negative relationship between positive LEs and addictive disorders. These competing hypotheses have not been tested to date, as most studies did not include positive events (Nordfjaern et al., 2010), and those that did were conducted only on substance-related addictions and found mixed results (see a review by Krenek and Maisto (2013)). Thus, additional research is necessary to disentangle these findings.

In any meaningful discussion of the impact of stressful LEs, it is necessary to distinguish between objective stress (e.g., the number of stressors in one's life) and subjective stress (e.g., how the individual perceives these events) (Cole et al., 1986). According to Rose and Bond (2008), the perception of stress includes an appraisal of the personal resources that are available to deal with the stressor. These resources may be depleted in those suffering from addictive disorders, substance or behavioral, leading them to a more stressful perception of events in their lives (e.g., Odlaug et al., 2013; Tavolacci et al., 2013). This perception can even be more influential than the number of stressors experienced (Rose and Bond, 2008). Therefore, studies that examine the impact of LEs on addictive disorders should also take into consideration the subjective experience of the particular event and its influence on the person's life.

The present study aimed at comparing the relationship between LEs and different substance and behavioral addictions. We evaluated both negative and positive LEs and explored not only the overall number of events experienced, but also their subjective perception. The following between-group hypotheses were examined: (1) participants suffering from an addiction, especially those with substance-related addictions, will report more negative LEs than healthy controls; (2) participants suffering from an addiction, especially those with substance-related addictions, will have a more extreme perception of the influence of negative events on their lives than healthy controls. In addition, we explored the relationship between the number and influence of positive LEs and substance and behavioral addictions, as previous studies did not provide definitive conclusions regarding this relationship. Finally, in order to more fully comprehend and contrast the relationship of LEs and unique addictions, we also analyzed the differential impact of the number and influence of negative versus positive LEs separately in each group.

2. Methods

This study was part of a larger experiment conducted on the same population, consisting of a number of personality and environment-related self-report questionnaires. Therefore, some of the methods are similar to the ones reported in Zilberman et al. (2018b).

2.1. Participants

Overall, 319 participants were recruited for the study: 58 with drug use disorders (DUD), 50 with alcohol use disorder (AUD), 48 with GD, 65 with CSB, and 98 healthy controls. Participants with addictions were recruited through self-help groups and private and public rehabilitation centers throughout the country. Controls were recruited through adds posted at the university and on the internet. Nine CSB participants were excluded for not meeting addiction criteria according to addiction assessment questionnaires (see section 2.2.1), and 17 controls were excluded for meeting addiction criteria. Additionally, 2 controls were excluded for failing to complete LE questionnaires. The final sample included 212 participants with an addiction and 79 controls.

2.2. Instruments

Original English self-report questionnaires were translated and back-translated to Hebrew by two English-Hebrew speakers.

2.2.1. Addiction assessment

Each addiction was assessed using standard questionnaires designed to measure the level of that specific addiction. DUD was assessed using the Drug Abuse Screening Test (DAST; Skinner, 1982), which has an internal consistency reliability of 0.92 and a cut-off score of 6 (Yudko et al., 2007). AUD was assessed using the Michigan Alcoholism Screening Test (MAST; Selzer, 1971), which has an average reliability of 0.75 (Gibbs, 1983) and a cut-off score of 5. GD was assessed according to the South Oaks Gambling Screen (SOGS; Lesieur and Blume, 1987), which has shown good reliability and validity with DSM-IV criteria (Stinchfield, 2002) and has a cut-off score of 5. Lastly, CSB was assessed using the Hebrew Individual-Based Compulsive Sexual Behavior (I-CSB) questionnaire, with a reliability of 0.94 and a cut-off score of 98 (Efrati and Mikulincer, 2018).

2.2.2. Life events assessment

The Life Experiences Survey (LES), which has adequate reliability and validity (Sarason et al., 1978), was used to assess number and influence of LEs. This questionnaire contains 46 items that represent major negative and positive LEs experienced by the general population (e.g., divorce, retirement, death). We incorporated 5 additional items which are relevant to life in Israel, including military service, terror-related events, and immigration experiences. Additionally, the questionnaire includes space to supply up to 3 other events which are not listed. Participants were asked to identify events that occurred throughout their lives, and to rate the perceived influence of each event on a 7-point Likert scale ranging from -3 (extremely negative) to +3 (extremely positive), with 0 indicating a neutral event. Four scores were obtained from this questionnaire: number of negative events (number of items rated from -3 to -1); number of positive events (number of items rated from +1 to +3); influence of negative events (mean rating of negative events); and influence of positive events (mean rating of positive events).

2.3. Procedure

After receiving an explanation regarding the experiment according to procedures approved by the Institutional Review Board, participants gave written informed consent. Participants from the addiction groups completed the questionnaires in their rehabilitation centers, with the exception of 28 CSB participants who completed the questionnaires online, as they preferred to stay anonymous. They completed only the addiction questionnaires that were pertinent to their addiction, and in the case of several comorbid addictions were asked to identify their primary addiction. Control participants completed the questionnaires in-person at the university or online. They were asked to complete all addiction questionnaires in order to confirm they did not meet criteria

Table 1
Group comparison among number and influence of life events.

Variable		Control (n = 79)	DUD (n = 58)	AUD (n = 50)	GD (n = 48)	CSB (n = 56)	Univariate test (ANOVA/ Welch)	Post-hoc tests, significant only (Bonferroni/Games-Howell)
Number of events	*Negative*	5.28 (3.31)	12.03 (6.73)	11.08 (6.52)	9.6 (5.27)	8.14 (5.53)	*Welch's F*(4126.041) = 20.97 $p < 0.001$	Control < DUD $p < 0.001$ Control < AUD $p < 0.001$ Control < GD $p < 0.001$ Control < CSB $p = 0.007$ CSB < DUD $p = 0.009$
	Positive	5.87 (3.27)	7.74 (6.51)	8.12 (6.52)	7.02 (5.01)	7.75 (4.93)	*Welch's F*(4126.901) = 2.86 $p = 0.026$	
Influence of events	*Negative*	1.64 (0.59)	2.28 (0.66)	2.44 (0.61)	2.17 (0.6)	2 (0.52)	F(4286) = 17.16 $p < 0.001$ Cohen's d = 1	Control < DUD $p < 0.001$ Control < AUD $p < 0.001$ Control < GD $p < 0.001$ Control < CSB $p = 0.006$ CSB < AUD $p = 0.002$
	Positive	2.17 (0.59)	2.16 (0.66)	2.4 (0.58)	2.3 (0.58)	2.17 (0.61)	F(4286) = 1.64 $p = 0.164$, *n.s.* Cohen's d = 0.3	

NN = number of negative events; NP = number of positive events; IN = influence of negative events (mean rating of negative events); IP = influence of positive events (mean rating of positive events).

for any addiction. All participants were assigned a random identification number in order to preserve anonymity.

2.4. Statistical analyses

For demographic and addiction characteristics we used a univariate ANOVA with Bonferroni post-hoc test. Where Levene test for equality of variance was significant, we used Welch test and Games-Howell post-hoc test for analyses. Categorical factors were assessed with χ^2 tests and standardized residuals (SR) post-hoc assessment, and for ordinal factors we applied the Kruskal-Wallis test and post-hoc test. Due to a small number of missing demographic and addiction related data (M = 8.6%) we used a listwise deletion method, excluding participants with missing data from the analysis.

For LEs we performed two separate analyses. First, a Pillai's MANOVA was conducted, using negative and positive number and influence of events as dependent variables and group as the independent variable. Follow-up ANOVA/Welch tests were used to examine each factor separately, with post-hoc Bonferroni/Games-Howell tests for significant factors. Next, using Paired-Samples t-tests, we examined separately for each group the differences between negative and positive number and negative and positive influence of events.

3. Results

No significant differences were found between those who completed the online questionnaires and those who completed them in-person, in both the control and CSB groups (*Wilks' Lambda* = 0.991, F(474) = 0.162, $p = 0.957$, *Cohen's d* = 0.191 and *Wilks' Lambda* = 0.835, F(451) = 2.521, $p = 0.052$, *Cohen's d* = 0.889, respectively). Consequently, participants in each group were combined for all subsequent analyses.

3.1. Addiction characteristics

All participants with an addiction passed the cut-off score of their addiction assessment (Drugs: $M = 22.19$, $SD = 0.52$; Alcohol: $M = 31.76$, $SD = 1.5$; Gambling: $M = 15.04$, $SD = 0.56$; Sex: $M = 135.59$, $SD = 2.39$). Comorbidity rates were highest in DUD (50%), followed by AUD (38%), GD (23%), and CSB (14%). There were no differences between addiction groups in withdrawal time or overall number of years the individual suffered from his/her addiction (*Welch's F*(395.857) = 0.763, $p = 0.518$ and *Welch's F*(383.287) = 1.038, $p = 0.38$, respectively). Conversely, the age at which the addiction first started for each participant varied significantly across groups (*Welch's F*(379.576) = 20.039, $p < 0.001$). CSB started at the earliest age

($M = 12$, $SD = 4.8$), followed by DUD ($M = 15$, $SD = 3.9$), with AUD and GD both starting at a similar older age ($M = 23$, $SD = 10.4$ and $M = 23.5$, $SD = 13$, respectively).

3.2. Demographic factors

Age and gender differed between groups ($H(4) = 20.454$, $p < 0.001$ and $\chi^2(4) = 86.987$, $p < 0.001$, respectively). Participants with AUD and GD were the oldest and were significantly different than the youngest control group ($p = 0.001$ and $p = 0.035$, respectively). AUD participants were further significantly older than CSB ($p = 0.016$). For gender, all addiction groups consisted of mainly male participants, whereas the control group consisted of primarily females. Significant gender differences were found between the control group and both GD and CSB ($SR = -3.4$ and $SR = -3.3$, respectively).

3.3. Life events

Due to differences in age and gender we initially conducted a MANCOVA with these factors as confounders. However, gender was not significant, and age, although significant, did not affect the pattern of results. Therefore, we conducted a MANOVA for differences in LEs according to group association, which was significant (*Wilks' Lambda* = 0.690, $F(16,865.217) = 0.162$, $p < 0.001$, *Cohen's d* = 0.625). Subsequently, separate ANOVAs were conducted that included number of negative and positive events and influence of negative and positive events (see Table 1).

Regarding negative LEs, both number and influence of events were significant across groups. Post-hoc tests revealed significant differences between controls and each of the addiction groups, such that controls reported experiencing fewer negative events and perceived them as less influential. Additionally, CSB participants reported experiencing significantly fewer negative events than DUD participants and perceived them as less influential than AUD participants. These findings emphasize that, among participants suffering from an addiction, those with CSB reported experiencing the smallest number of negative events and were the least influenced by them. Conversely, participants with DUD reported experiencing the greatest number of negative events, whereas those with AUD perceived the negative events they experienced as the most influential on their lives. There was also a significant group difference for number of positive events. Data inspection suggested that controls reported less positive LEs than participants with an addiction, although none of the post-hoc tests reached statistical significance. Alternatively, no significant differences were detected for the influence of these positive LEs, suggesting that the subjective impact of positive events was similar across groups.

Table 2
Within-group comparisons of negative and positive number and influence of life events.

Variable		Control (n = 79)	DUD (n = 58)	AUD (n = 50)	GD (n = 48)	CSB (n = 56)
Number of events	*Mean difference (negative-positive)*	−0.59 (3.35)	4.29 (9.02)	2.96 (8.13)	2.58 (4.73)	0.39 (6.78)
	Paired samples test	t(78) = -1.58	t(57) = 3.62	t(49) = 2.57	t(47) = 3.78	t(55) = 0.43
		p = 0.118, *n.s.*	p = 0.001	p = 0.013	p < 0.001	p = 0.666, *n.s.*
Influence of events	*Mean difference (negative-positive)*	−0.53 (0.69)	0.12 (0.88)	0.04 (0.79)	−0.13 (0.68)	−0.16 (0.72)
	Paired samples test	t(78) = -6.82	t(57) = 1.07	t(49) = 0.37	t(47) = -1.35	t(55) = -1.69
		p < 0.001	p = 0.289, *n.s.*	p = 0.714, *n.s.*	p = 0.184, *n.s.*	p = 0.097, *n.s.*

Note. DUD = drug use disorders; AUD = alcohol use disorder; GD = gambling disorder; CSB = compulsive sexual behavior.

In order to further understand group differences and the relationship between negative and positive LEs in this population, we examined each group separately by comparing between their negative and positive events (see Table 2). Findings revealed that controls reported experiencing the same number of negative and positive LEs but perceived their positive LEs as more influential. Participants with CSB also reported experiencing the same number of negative and positive events, but those with DUD, AUD, and GD reported experiencing significantly more negative than positive LEs. All addiction groups perceived the same influence of negative and positive events.

4. Discussion

The present study was an effort to examine potential relationships between addictive disorders and LEs. To this end, individuals with substance-related addictions (drugs, alcohol), behavioral addictions (gambling, sex), and a healthy control group were compared on measures of number and perceived influence of negative and positive LEs. Similarly, to previous research (e.g., Brewerton and Brady, 2014; Enoch, 2011; Godinho et al., 2018; Odlaug et al., 2013), we found that individuals suffering from an addiction reported experiencing significantly more negative LEs than healthy controls. Although, given the cross-sectional nature of this study, no causal inferences can be made, this finding can be interpreted within several theoretical frameworks. For example, one influential theory that may be compatible with these findings is the "self-medication" theory of addiction (Khantzian, 1985), which states that substance use disorders may develop as a way to escape from stressful life experiences. Unfortunately, it is a maladaptive coping mechanism that may lead to more stressful experiences (Krenek et al., 2017; Taber et al., 1987). Thus, a vicious circle may be created between negative LEs and addictive behaviors, in which the addiction may arise from experiencing many negative LEs or be the cause of these negative events.

An exploratory aim of the current study was to further analyze the relationship between positive LEs and different addictions. Notably, we found that individuals with an addiction also reported experiencing more positive LEs than controls. Although the study design does not allow to determine whether these events precede or follow addictive behaviors, it is reasonable to assume, according to previous research (Krenek and Maisto, 2013), that addiction does not typically lead to more positive experiences. Instead, this finding may suggest that for individuals with an addiction, positive LEs could be part of their experienced stress, which is in line with the view suggested by Holmes and Rahe's (1967). Although positive LEs have been previously shown to provide a resilience mechanism against stress (Haeffel and Vargas, 2011; König et al., 2018), several studies propose that this resilience is mediated by other factors, such as self-esteem (Brown and McGill, 1989), perceived control over the event, and expressive responses to it (Langston, 1994). Therefore, it is possible that individuals suffering from an addiction lack the ability to capitalize on the shielding potential of their positive LEs, and instead turn to their addiction in order to deal with life stressors. It is also possible, of course, that positive events are not perceived as stressful, and that there are other mediators that may explain the relationship between addictive disorders and

positive LEs. According to a review by Kuntsche et al. (2005), coping motives, or addiction as a way to deal with stressors, were reported by few as being the main motive for drinking. Enhancement motives, or addiction as a means to enhance positive mood, were a more common reason offered for uncontrollable drinking behavior and may provide an alternative explanation for the findings of more positive LEs in addicted individuals. These different types of motives have been reported across various types of addictive disorders (e.g., Bonn-Miller and Zvolensky, 2009; Stewart and Zack, 2008).

In this study, we also examined the subjective perceived influence each event had on the individual. Findings showed that individuals with an addiction perceived their negative LEs as more influential (stressful) than controls. Thus, it appears that not only do individuals suffering from an addiction experience more negative LEs, but they also find them more prominent in their personal narrative, which may lead to greater stress and an increased need to engage in addictive behaviors. Previous research proposes that the individual's perception of an event is influenced by the appraisal of his or her available resources for dealing with it (Rose and Bond, 2008). It is therefore possible that the large number of stressors an individual suffering from an addiction encounters, along with other hardships brought about by years of addiction, deplete his/her perceived personal resources, leading to the interpretation of negative events as more influential and stressful (Brewerton and Brady, 2014). This may also offer a potential explanation for the large comorbidity between post traumatic stress disorder and addictive disorders (Goeders, 2003). Contrary to the differential perception of negative LEs across groups, we found positive events to be similarly influential in all participants. Although it appears from our findings that for individuals with addictions positive events may be perceived as stressful as well, these positive LEs may nonetheless exert lower stress levels than negative events, thereby demanding less personal resources. Of course, as described above, there may be additional motives that mediate this relationship between positive LEs and addictive disorders.

Importantly, we also found between-group differences across addiction types in negative LEs. Specifically, the CSB group reported experiencing less negative LEs than the DUD group and considered them as less influential than the AUD group. Thus, CSB participants seem to be most similar to healthy controls in relation to negative LEs. In our previous research (Zilberman et al., 2018b), we also found that the CSB group most closely resembled controls on socioeconomic variables, although there were substantial differences between CSB participants and controls on personality traits. Conversely, our previous study found a large resemblance on personality measures between GD and controls, but notable differences on socioeconomic variables. Taken together, these findings suggest that CSB may be more affected by personality than environmental factors (see also Efrati et al. (2019)), whereas GD is mostly related to environmental factors. Differences in number of negative LEs between CSB and DUD are also interesting in view of our previous findings, which suggested a substantial personality resemblance between these groups. Thus, the present study may provide an additional hypothesis for the development of two different addictions stemming from similar underlying personality traits, such that the trajectories toward developing DUD rather than CSB may depend on the

experience of negative LEs, although this remains to be tested in future prospective studies.

It is also important to note that, whereas DUD participants reported experiencing the largest number of negative LEs, the AUD participants regarded these events as the most influential on their lives. This may suggest that individuals suffering from AUD perceive themselves as less capable to deal with the stress in their lives than those with other addictions. According to Brewerton and Brady (2014), availability of social support may also influence the way people experience negative LEs. In our previous study, we found AUD participants to be the least extraverted and open to experience, traits that could lead to a lack of social support (McCrae and John, 1992), which may further explain this groups' depleted ability to deal with stress. It could be informative in future studies, with larger samples, to employ sophisticated analytical approaches, such as structural equation modeling, in order to examine the relative contribution of both personality and environmental factors to the development and maintenance of addictive disorders.

In order to better understand the impact of LEs on each group separately, specifically the different impact of negative versus positive experiences, we also conducted analyses of LEs within each group. Findings showed that DUD, AUD, and GD participants reported experiencing more negative than positive events throughout their lives. Conversely, CSB and controls reported experiencing the same number of negative and positive LEs, pointing to another environmental similarity between these groups. These findings suggest that the lives of individuals suffering from DSM-5-diagnosable addictions (American Psychiatric Association, 2013) are characterized by relatively higher levels of negativity. Regarding subjective influence of LEs, the distinction was only reflected in controls who, on average, perceived the positive events in their lives as more influential than the negative ones. This may imply the existence of a resilience mechanism in healthy individuals who tend to place more value on their positive experiences, thus capitalizing on the positivity in their lives and minimizing stress. Individuals suffering from an addiction may lack this ability, perhaps because the effects brought about by their many negative experiences make it harder for them to place value on, and profit from, their positive LEs (Brewerton and Brady, 2014).

4.1. Limitations

Several limitations to this research need to be acknowledged (see Zilberman et al., 2018b, for a complete discussion of potential limitations). This study is limited by its cross-sectional design. The LEs in the questionnaire encompass experiences throughout life, and so it is reasonable to conclude that at least some of the events preceded the development of the addictive behavior. Admittedly, however, other LEs may likely be the result of the difficult lifestyle of the individual with an addiction, and his/her maladaptive ways to deal with stress (Krenek et al., 2017). Therefore, the present study can only provide findings regarding the existence of different relationships between LEs and unique addiction types. Future prospective studies might prove fruitful in the investigation and disentanglement of the impact of different factors on the development and maintenance of addictive behaviors.

Another limitation of our design is the retrospective self-report nature of our measures. Although self-reporting provides the most direct approach for participants' experiences, it has several disadvantages, including self-deception, subjectivity, bias, and social desirability (Ruben, 1999; Yannakakis and Hallam, 2011). It should be noted that a review by Hardt and Rutter (2004) has concluded that, despite its limitations, the retrospective adult recall of adverse childhood experiences is sufficiently valid. Similarly, a review by Enoch (2011) has shown numerous studies that demonstrate a link between retrospectively recalled childhood stressors and substance use. We further attempted to minimize bias and social desirability in our sample by ensuring the anonymity of our participants and providing an option to complete anonymous on-line questionnaires (Allen and Holder, 2013).

It should also be noted that in the present study assessments were made using standard screeners for problematic use and behaviors. Although this does not constitute a formal diagnosis, the average score on each addiction questionnaire substantially surpassed the questionnaire's cut-off score (e.g., the cut-off score on the MAST for alcohol use is 5, whereas our participants scored an average of 31.76). In addition, our participants were recruited from rehabilitation centers and groups, most of which conduct intake formal diagnostic interviews routinely, further strengthening the likely diagnosis of the recruited participants.

4.2. Conclusions and implications

The present study provided a unique exploration of the life experiences of individuals with an addiction. Findings suggest that people suffering from an addiction, substance or behavioral, encounter throughout their lives many negative events, which greatly increase their levels of stress. These events may be the initial cause for the addiction or a result of the lifestyle of the addicted individual. Although individuals with an addiction report experiencing numerous positive events as well, it appears that these do not provide the necessary impact to counteract the reported negative experiences. Hence, instead of capitalizing on their positive experiences and potentially developing a resilience mechanism to moderate the stressors in their lives, positive events may become substantial stressors themselves for those suffering from an addiction. This understanding provides an important implication for treatment of this disorder, suggesting that enhancing positive events may not be helpful for these individuals. Instead, it could be more important to focus on improving the factors that mediate the resiliency effects of positive LEs (Seeman, 2016), while reducing negative experiences.

Importantly, these findings are not manifested similarly across addiction types. Results show that CSB participants, as opposed to other addictions, experience less negative LEs and are also less influenced by them. Moreover, they seem to represent the only addiction with similar levels of negative and positive LEs. On the other end are substance-related addictions, with DUD participants experiencing the greatest number of negative events, and AUD participants reporting these events as the most influential. These differential findings across addiction types, taken together with previous personality and demographic findings from this sample, reflect a potentially unique constellation of variables representing different addictions. The current approach, where different types of addictions are compared within a single study, is required for direct comparison among addictions and could delineate more precisely their common features, as well as their differences. This, in turn, may lead to the development of personalized prevention and intervention programs which can focus on the relevant aspects of each addiction. Although further support is needed from future prospective studies disentangling the potential contribution of psychological (e.g., personality) and social (e.g., environmental) factors to addictive behaviors, the present findings may suggest, for example, that GD programs should provide prevention and intervention strategies targeted at demographic and environmental factors, whereas CSB programs could pay more attention to personality factors.

Contributors

NZ designed the study, recruited participants, conducted the study and drafted the manuscript. GY and YE assisted in recruiting participants, and GY further assisted in designing the study. YR assisted in data interpretation, and in drafting the manuscript. GY, YE and YR provided critical revision of the manuscript. All authors critically reviewed the content and approved the final version for publication.

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References

Albanese, M.J., Shaffer, H.J., 2012. Addiction: the genesis and evolution of an idea and its consequences. In: In: Shaffer, H.J. (Ed.), APA Addiction Syndrome Handbook Volume 1. Foundations, Influences, and Expressions of Addiction, pp. 3–25.

Allen, J., Holder, M.D., 2013. Marijuana use and well-being in university students. J. Happiness Stud. 1–21. https://doi.org/10.1007/s10902-013-9423-1.

American Psychiatric Association, 2013. The Diagnostical and Statistical Manual of Mental Disorders: DSM 5. Book point US.

Bonn-Miller, M.O., Zvolensky, M.J., 2009. An evaluation of the nature of marijuana use and its motives among young adult active users. Am. J. Addict. 18, 409–416. https://doi.org/10.1080/10550490903077705.

Brewerton, T.D., Brady, K., 2014. The role of stress, trauma, and PTSD in the etiology and treatment of eating disorders, addictions, and substance use disorders. Eating Disorders, Addictions and Substance Use Disorders. Springer, Berlin, Heidelberg, pp. 379–404. https://doi.org/10.1007/978-3-642-45378-6.

Brown, J.D., McGill, K.L., 1989. The cost of good fortune: when positive life events produce negative health consequences. J. Pers. Soc. Psychol. 57, 1103–1110.

Cohen, S., Hoberman, H.M., 1983. Positive events and social supports as buffers of life change stress. J. Appl. Soc. Psychol. 13, 99–125.

Cole, G.E., Tucker, L.A., Friedman, G.M., 1986. Measures of objective and subjective stress by level of income. Psychol. Rep. 59, 139–142.

Efrati, Y., Gerber, Z., Tolmacz, R., 2019. The relation of intra-psychic and relational aspects of the self to compulsive sexual behavior. J. Sex Marital Ther. https://doi.org/10.1080/0092623X.2019.1599092.

Efrati, Y., Gola, M., n.d. The effect of early-life trauma on compulsive sexual behavior among members of a twelve-step group. J. Sex. Med.

Efrati, Y., Mikulincer, M., 2018. Individual-based compulsive sexual behavior scale: its' development and importance in examining compulsive sexual behavior. J. Sex Marital Ther. 0715. https://doi.org/10.1080/0092623X.2017.1405297.

Enoch, M.-A., 2011. The role of early life stress as a predictor for alcohol and drug dependence. Psychopharmacology (Berl.) 214, 17–31. https://doi.org/10.1007/s00213-010-1916-6.The.

Gibbs, L.E., 1983. Validity and reliability of the Michigan alcoholism screening test: a review. Drug Alcohol Depend. 12, 279–285.

Godinho, A., Kushnir, V., Hodgins, D.C., Hendershot, C.S., Cunningham, J.A., 2018. Betting on Life: Associations Between Significant Life Events and Gambling Trajectories Among Gamblers with the Intent to Quit. J. Gambl. Stud. 34, 1391–1406. https://doi.org/10.1007/s10899-018-9767-x.

Goeders, N.E., 2003. The impact of stress on addiction. Eur. Neuropsychopharmacol. 13, 435–441. https://doi.org/10.1016/j.euroneuro.2003.08.004.

Grant, J.E., Potenza, M.N., Weinstein, A., Gorelick, D.A., 2010. Introduction to behavioral addictions. Am. J. Drug Alcohol Abuse 36, 233–241. https://doi.org/10.3109/00952990.2010.491884.Introduction.

Haeffel, G.J., Vargas, I., 2011. Resilience to depressive symptoms: the buffering effects of enhancing cognitive style and positive life events. J. Behav. Ther. Exp. Psychiatry 42, 13–18. https://doi.org/10.1016/j.jbtep.2010.09.003.

Hardt, J., Rutter, M., 2004. Validity of adult retrospective reports of adverse childhood experiences: review of the evidence. J. Child Psychol. Psciatry 45, 260–273.

Holmes, T.H., Rahe, R.H., 1967. The social readjustment rating scale. J. Psychosom. Res. 11, 213–218.

Hsieh, Y.-P., Shen, A.C.-T., Wei, H.-S., Feng, J.-Y., Huang, S.C.-Y., Hwa, H.-L., 2016. Associations between child maltreatment, PTSD, and internet addiction among Taiwanese students. Comput. Human Behav. 56, 209–214. https://doi.org/10.1016/j.chb.2015.11.048.

Jie, T., Yizhen, Y., Yukai, D., Ying, M., Dongying, Z., Jiaji, W., 2014. Prevalence of internet addiction and its association with stressful life events and psychological symptoms among adolescent internet users. Addict. Behav. 39, 744–747. https://doi.org/10.1016/j.addbeh.2013.12.010.

Kausch, O., Rugle, L., Rowland, D.Y., 2006. Lifetime histories of trauma among pathological gamblers. Am. J. Addict. 15, 35–43. https://doi.org/10.1080/10550490500419045.

Khantzian, E.J., 1985. The self-medication of addictive disorders: Focus on heroin and cocaine dependence. Am. J. Psychiatry 142, 1259–1263. https://doi.org/10.1007/978-1-4613-1837-8_7.

König, J., Block, A., Becker, M., Fenske, K., Hertel, J., Van der Auwera, S., Zymara, K., Völzke, H., Freyberger, H.J., Grabe, H.J., 2018. Assessment of subjective emotional valence and long-lasting impact of life events: development and psychometrics of the Stralsund Life Event List (SEL). BMC Psychiatry 18.

Krenek, M., Maisto, S.A., 2013. Life events and treatment outcomes among individuals with substance use disorders: a narrative review. Clin. Psychol. Rev. 33, 470–483. https://doi.org/10.1016/j.cpr.2013.01.012.

Krenek, M., Prince, M.A., Maisto, S.A., 2017. Life events and alcohol use disorder clinical course: modeling the dynamic association. Drug Alcohol Depend. 180, 137–143. https://doi.org/10.1016/j.drugalcdep.2017.08.004.Life.

Kuntsche, E., Knibbe, R., Gmel, G., Engels, R., 2005. Why do young people drink? A review of drinking motives. Clin. Psychol. Rev. 25, 841–861. https://doi.org/10.1016/j.cpr.2005.06.002.

Langston, C.A., 1994. Capitalizing on and coping with daily-life events: expressive responses to positive events. J. Pers. Soc. Psychol. 67, 1112–1125.

Lesieur, H.R., Blume, S.B., 1987. The South Oaks Gambling Screen (SOGS): a new instrument for the identification of pathological gamblers. Am. J. Psychiatry 144, 1184–1188. https://doi.org/10.1176/ajp.144.9.1184.

McCrae, R.R., John, O.P., 1992. An introduction to the five-factor model and its applications. J. Pers. 60, 175–215.

Nordfjærn, T., Hole, R., Rundmo, T., 2010. Interrelations between patients' personal life events, psychosocial distress, and substance use. Subst. Use Misuse 45, 1161–1179. https://doi.org/10.3109/10826080903567863.

Odlaug, B.L., Lust, K., Schreiber, L.R.N., Christenson, G., Derbyshire, K., Harvanko, A., Golden, D., Grant, J.E., 2013. Compulsive sexual behavior in young adults. Ann. Clin. Psychiatry 25, 193–200.

Petry, N.M., Steinberg, K.L., 2005. Childhood maltreatment in male and female treatment-seeking pathological gamblers. Psychol. Addict. Behav. 19, 226–229. https://doi.org/10.1037/0893-164X.19.2.226.

Pilowsky, D.J., Keyes, K.M., Hasin, D.S., 2009. Adverse childhood events and lifetime alcohol dependence. Am. J. Public Health 99, 258–263. https://doi.org/10.2105/AJPH.2008.139006.

Rose, D.N., Bond, M.J., 2008. Identity, stress and substance abuse among young adults. J. Subst. Use 13, 268–282. https://doi.org/10.1080/14659890801912006.

Rosenberg, H., 1983. Relapsed versus non-relapsed alcohol abusers: coping skills, life events, and social support. Addict. Behav. 8, 183–186.

Ruben, D.H., 1999. Diagnosing alcoholism and its addictive patterns using self-report rating scales. Alcohol. Treat. Q. 17, 37–46. https://doi.org/10.1300/J020v17n03.

Sarason, I.G., Johnson, J.H., Siegel, J.M., 1978. Assessing the impact of life changes: development of the life experiences survey. J. Consult. Clin. Psychol. 46, 932–946.

Scherrer, J.F., Xian, H., Kapp, J.M.K., Waterman, B., Shah, K.R., Volberg, R., Eisen, S.A., 2007. Association between exposure to childhood and lifetime traumatic events and lifetime pathological gambling in a twin cohort. J. Nerv. Ment. Dis. 195, 72–78.

Seeman, M.V., 2016. Schizophrenia: reaction to positive life events. Psychiatr. Q. 88, 561–570. https://doi.org/10.1007/s11126-016-9478-3.

Selzer, M.L., 1971. The Michigan alcoholism screening test: the quest for a new diagnostic instrument. Am. J. Psychiatry 127, 1653–1658.

Skinner, H.A., 1982. The drug abuse screening test. Addict. Behav. 7, 363–371.

Stewart, S.H., Zack, M., 2008. Development and psychometric evaluation of a three-dimensional Gambling Motives Questionnaire. Addiction 103, 1110–1117. https://doi.org/10.1111/j.1360-0443.2008.02235.x.

Stinchfield, R., 2002. Reliability, validity, and classification accuracy of the south oaks gambling screen (SOGS). Addict. Behav. 27, 1–19. https://doi.org/10.1016/S0306-4603(00)00158-1.

Taber, J.I., McCormick, R.A., Ramirez, L.F., 1987. The prevalence and impact of major life stressors among pathological gamblers. Int. J. Addict. 22, 71–79.

Tavolacci, M.P., Ladner, J., Grigioni, S., Richard, L., Villet, H., Dechelotte, P., 2013. Prevalence and association of perceived stress, substance use and behavioral addictions: a cross-sectional study among university students in France, 2009-2011. BMC Public Health 13, 724. https://doi.org/10.1186/1471-2458-13-724.

Yannakakis, G.N., Hallam, J., 2011. Ranking vs. Preference: a comparative study of self-reporting. In: International ConfeRence on Affective Computing and Intelligent Interaction. Springer, Berlin, Heidelberg. pp. 437–446.

Yudko, E., Lozhkina, O., Fouts, A., 2007. A comprehensive review of the psychometric properties of the drug abuse screening test. J. Subst. Abuse Treat. 32, 189–198. https://doi.org/10.1016/j.jsat.2006.08.002.

Zilberman, N., Dor Ziderman, Y., Zeev-Wolf, M., Goldstein, A., Yadid, G., Neumark, Y., Rassovsky, Y., 2018a. Evidence for a differential visual M300 brain response in gamblers. Clin. Neurophysiol. 129, 2228–2238. https://doi.org/10.1016/j.clinph.2018.08.010.

Zilberman, N., Lavidor, M., Yadid, G., Rassovsky, Y., 2019. Qualitative review and quantitative effect size meta-analyses in brain regions identified by cue-reactivity addiction studies. Neuropsychology 33, 319–334.

Zilberman, N., Yadid, G., Efrati, Y., Neumark, Y., Rassovsky, Y., 2018b. Personality profiles of substance and behavioral addictions. Addict. Behav. 82, 174–181. https://doi.org/10.1016/j.addbeh.2018.03.007.