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**Disentangling facets of emotion regulation in relation to problematic substance use and
impulse control: Need satisfaction and frustration as mediators**

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Abstract

From the perspective of self-determination theory, the present study aimed to differentiate various facets of emotional regulation (ER) in relation to substance abuse. Suggested was a “positive” protective process of integrative emotion regulation styles (i.e. mindful observation, non-judgmental awareness and intentional exploration) predicting delayed gratification, with need satisfaction as a mediator. Furthermore, a “negative” undermining process was put forward with the maladaptive emotion regulation styles (i.e. dysregulation, suppressive emotion regulation) on substance use with need frustration as a mediator. Data was collected via an online questionnaire consisting of 82 items. A total of 141 participants were analyzed by means of a multiple linear regression and a mediation analysis using the PROCESS model of SPSS. Participants consisted of 82 men and 58 women. Results showed the “positive” process of integrative emotion regulation styles to have positive relations with basic need satisfaction and delayed gratification. Results of the “negative” process showed maladaptive emotion regulation styles to have positive relations with need frustration but not substance abuse. Need satisfaction, but not frustration, was found to mediate these processes. Results indicate for a need of an integrative therapeutic approach, where all facets of emotion regulation are addressed.

Keywords: emotion regulation, substance use, delayed gratification, self-determination theory, basic psychological needs

Introduction

Substance abuse not only inflicts serious negative consequences in an individual lives, but also puts them at risk of death by a possible overdose and irreversible neurological damages (Knight, 2001; Rahmati et al., 2019; Welch, 2011). Furthermore, substance abuse shows to be highly comorbid with other mental disorders, with a prevalence of 44% in German individuals having a comorbid alcohol abuse disorder (Jacobi et al., 2004). Comorbid substance abuse disorder has been shown to increase treatment resistance in depression and reuse after treatment (Brenner et al., 2020; Grella et al., 2001). Protective factors for substance abuse seem to be the ability to delay gratification (self-control), which in turn is influenced by mindfulness and integrative ER (Tice et al., 2000). Mindfulness is closely related to ER and self-control and shows several positive effects on the human psyche, increasing quality of life and decreasing depression, drug abuse and several other mood disorders related to ill-being (Koszycki et al., 2007; Khoury et al., 2015; Tang et al., 2016; Parto & Besharat, 2011). As there are several proven positive effects, many new treatments implement mindfulness practices and healthy ER into therapy, such as mindfulness-based interventions to enhance emotional regulation and mindfulness based cognitive therapy (Baer et al., 2006).

As comorbidity does not only predict outcomes of treatment but is also associated with the severity of mental disorders, it is necessary to look for transdiagnostic factors to generate an integrative therapeutic approach, including the development of protective factors (Coriale et al., 2019).

Recently, a growing amount of research in the tradition of Self-Determination theory (SDT) has found frustration of basic psychological needs to act as a transdiagnostic process in the development of several mental disorders (Brenning, et al., 2019; Ryan & Deci, 2017; Vansteenkiste & Ryan, 2013). Another concept suggested as a transdiagnostic factor is ER, a broad concept integrating many different facets. Maladaptive ER has shown to enhance and lead to possible psychopathologies, whilst integrative ER has been related to well-being (Brenning et al., 2015; Roth et al., 2019). Research suggest a possible interaction of transdiagnostic factors, hinting towards a mediation effect of need frustration and need satisfaction on the effect of emotion regulation on psychopathology and well-being (Benita et al., 2020; Borsboom, 2017; Brenning et al., 2019; Rodríguez-Meirinhos et al., 2020). However, in many different psychopathologies, such as substance abuse, the possible interplay have not yet been researched.

This paper will be one of the first to aim to separate the relations of several emotion regulation facets, including mindfulness related ER facets, and need satisfaction/frustration with substance

use, both assessing a positive framework of suggested protective factors and a negative framework of risk factors. Knowing the different influences and effects could lead to a better understanding of mental health and the effect of both protective factors and risk factors. Furthermore, looking at different facets of emotion regulation could lead to a holistic therapeutic approach for addiction and a possible deeper understanding of the role of mindfulness and ER in therapeutic approaches.

Delayed gratification

The ability to delay gratification entails to control ones actions and behavior, evaluating possible consequences of ones actions and possible better outcomes for oneself, reflecting behavioral self- control and self-regulation (Wills et al., 2007). Self-control and self-regulation have shown to act as a protective factor, inversely related to substance abuse, with less externalizing symptomology, less exposure to possible risk factors and a positive relation to well-being (Wills et al., 2006; Wills et al., 2010). On the other hand, the release of self-control, impulsivity, has been shown to be positively related to substance abuse (Dawe & Loxton, 2004; Kreek et al., 2005; Mitchell & Potenza, 2014; Wulfert et al., 2002).

Basic psychological needs

When looking at a more general view of human development, substance abuse often is a substitute for something that is missing: satisfaction of a basic psychological need (Chan et al., 2019). Self-determination theory identified satisfaction of three basic psychological needs as necessary nutriment for psychologically healthy functioning (Ryan & Deci, 2016). The first one of the described needs being the need for autonomy, which entails experience of the own behavior as volitional and acting out of one's own interest and/or personally endorsed values. The second one is the need of relatedness, which is the feeling of connectedness and caring from others and towards others. The third one is the need for competence, the feeling of being effective and exercise and express ones capacities (Deci & Ryan, 2002). Thwarting these needs, however, can lead to the experience of need frustration and have various negative effects on mental health. Recently, low need satisfaction is disentangled from high need thwarting, the latter specifically causing a development of psychopathological illnesses (Campbell et al., 2018; Vandekerckhove et al., 2019). Need thwarting can cause the use of need substitutes and certain compensatory behaviors, such as the release of self-control (Deci & Ryan, 2000; Ryan et al., 2006). These compensatory behaviors and the release of self-control is often associated with increased substance use, such as alcohol abuse and increased smoking (Vansteenkiste & Ryan, 2013).

Emotion regulation

Defining emotional regulation as “the ability of an individual to modulate an emotion or set of emotions,” SDT conceptualizes three different styles of ER. In *integrative emotion regulation*, one is willing to approach emotions in a fully non-biased awareness, without the minimizing or ignoring of these emotions (Roth, et. al., 2019). It consists of two facets, with the first facet of non-judging experience closely related to the concept of mindfulness, which entails an increased receptive awareness and attention (Brown & Ryan, 2003). The second facet of integrative ER is the intentional exploration of emotional experience in terms of its significance for one’s own values, preferences or needs. In *suppressive regulation*, emotions are repressed or avoided (Roth, et. al., 2009). Several forms of suppression have been suggested, with the suppression of emotional expression as one of the most researched (Aldao et al., 2010). Experiential suppression, which entails the avoidance of the feeling and sensations associated with an emotion, has recently gotten more attention and seems to have different effects than expressive suppression. (Aldao et al., 2010; Hayes et al., 2004; Roth et al, 2009). The last form of emotion regulation mentioned by SDT is dysregulation, where emotions are experienced as overwhelming and uncontrollable. Integrative ER is described as the healthy emotion regulation, showing to be closely related to general well-being and having a negative effect on ill being (Brenning et al., 2015). Suppressive emotion regulation has been widely linked with psychopathology and a range of maladaptive behaviors, such as increased substance use, impulsiveness and self-harming behavior (Aldao et al., 2010; Roth et al., 2009).

As our behavioral regulation influences the experiences we choose for ourselves, integrative ER is suggested to be an essential part enabling possible experiences of need satisfaction and frustration (Brenning et al, 2019). Dysfunctional and suppressive emotion regulation can lead to experiences thwarting our psychological needs, which in turn can lead to possible need substitutes. Past research has shown need satisfaction and need frustration to have a mediating effect on ER and psychopathology and psychological well-being (Brenning et al, 2019; Van der Kaap-Deeder, et al., 2020). Specifically dysregulation has been shown to be related to psychopathology, with the experience of need frustration mediating the relation of emotional dysregulation, and to a lesser degree emotional suppression, to borderline personality characteristics, including externalizing and internalizing symptomology (Brenning et al, 2019; Van der Kaap-Deeder, et al., 2020). Furthermore, the study of Benita et al. (2020) showed need frustration and satisfaction to mediate the effect of both emotional suppression and integrative ER on well-being. Taken together, past studies hinted to a mediation of need frustration and

need satisfaction of ER on well-being and ill-being, indicating both a positive pathway and a negative pathway between the concepts.

The Present study

To disentangle the different concepts, the question that is going to be asked is if and which parts of the ER facets are mediated by need frustration and need satisfaction on their effect on the protective factor of delayed gratification and substance use. To clarify and disentangle the emotion regulation facets, several hypotheses are forwarded. Hypothesis 1 will entail the effect of a “positive” framework, differentiating the integrative emotion regulation facets on need satisfaction and delayed gratification, a protective factor for substance abuse and addiction. Hypothesis 2 will ascertain the “negative” framework, looking at the possible risk factors of maladaptive emotion regulation and need frustration.

1a. Integrative emotion regulation styles (i.e. mindful observation, non-judgmental awareness and intentional exploration) will have positive relations with basic need satisfaction and delayed gratification

1b. The relation between integrative emotion regulation styles and delayed gratification will be mediated by basic need satisfaction

2a. Maladaptive emotion regulation facets will have positive relations with need frustration and substance use.

2b. The relation between maladaptive emotion regulation facets and substance use will be mediated by basic need frustration.

Methods

Participants

Participants were collected by means of a convenience sample and amounted to a total of 201 (Marshall, 1996). Sixty-one participants with missing values were taken out of the analysis. The remaining sample of 141 participants consisted of 82 men (58.2%) and 58 women (41.1%) with a mean age of 40.93 ($M=45$, $SD=15.55$, range 19-70). The majority of 92 participants came from Germany (65.2%) and 21 from the Netherlands (14.9%), however, the sample was culturally diverse with 23 participants from other countries (16.3%). Most came from an educated background, with 35.5% having completed a Master degree, 28.4% a Bachelor degree, 6.4% a Doctoral degree and 29.8 % completed a high-school degree or other.

Procedure

An online questionnaire was developed via Qualtrics (2020) and distributed through social media platforms (such as Facebook, WhatsApp, LinkedIn) and the university social and behavioral research participation system (SONA, 2020). The questionnaire started with an introduction of the purpose of the research and after giving informed consent and demographic information (age, gender and education), participants filled out questionnaires on emotional regulation, delayed gratification, need satisfaction and substance consumption. Having completed a total of 82 items, taking around 15 minutes, participants could contact the researchers for any further questions. Students via the SONA system received 0.5 credits, no other rewards were offered.

Power analysis

The power calculator by Hemmerich (2019) was used. To achieve the statistical power of .9 with an alpha of .05 a sample of $n = 130$ was needed for Hypothesis 1a, and 2a. For 1b and 2b, 114 participants were needed.

Instruments

The questionnaire was completely anonymous and available in Dutch, English and German. Back-translations of the delayed gratification questionnaire and the emotion regulation facets in German and Dutch were made by native speakers. For the delayed gratification questionnaire, the German translation of Gleitsmann (2013) was used. Translations of the ASSIST items were available.

Emotional regulation (ER)

The emotion regulation questionnaire was derived from several facets. The integrative ER facets, consisting of 18 items, ($\alpha = .76$, $M = 3.56$, $SD = .18$) consisted of *intentional exploration* (6 items, e.g., ‘When I feel negative emotions, I usually try to understand the reasons’, $\alpha = .87$, $M = 3.8$, $SD = .03$) taken out of the extended Dutch Emotion Regulation Inventory by Roth et al. (2009), selection and adaptation of *non-judging experience* (8 items, e.g., ‘I criticize myself for having negative emotions’, $\alpha = .84$, $M = 3.20$, $SD = .15$), (Baer, 2006; Bohlmeijer et al., 2011; Veehof et al., 2011) and selection and adaptation of *mindful attention* to emotion (4 items, e.g., ‘I stay aware of my negative feelings’, $\alpha = .75$, $M = 3.78$, $SD = .03$) (Baer, 2006). The maladaptive emotional regulation facets ($\alpha = .76$, $M = 2.74$, $SD = .08$) consisted of *dysregulation* (6 items, e.g., ‘When I feel negative emotions, generally I feel I have little control

over my behavior', $\alpha = .77$, $M = 2.76$, $SD = .15$) and *emotional suppression* (8 items, e.g., 'I try to ignore negative feelings', $\alpha = .86$, $M = 2.71$, $SD = .05$) (Roth et al, 2009). All questions ranged in a 5 point likert scale from "strongly disagree" to "strongly agree".

Delayed gratification

To assess the outcome variable of delayed gratification ($\alpha = .59$, $M = 3.79$, $SD = .23$), we used the 10 item short delayed gratification questionnaire by Hoerger et al. (2011), shown to have good reliability and validity. It assesses five domains of gratification delay, (1) food (e.g. "I would have a hard time sticking with a special, healthy diet"), (2) physical pleasures (e.g. "I have given up physical pleasure or comfort to reach my goals"), (3) social interactions (e.g., "I do not consider how my behavior affects other people"), (4) money (e.g., "I try to spend my money wisely") and (5) achievement (e.g., "I have always felt like my hard work would pay off in the end"), and was specifically designed as an internet administered questionnaire (Hoerger et al., 2011). Questions range in a 5 point Likert scale from "strongly disagree" to "strongly agree". In this sample, Cronbach's alpha indicated an insufficient reliability of .59 (Taber, 2018).

Psychological needs

The basic psychological need satisfaction and frustration scale (BPNSFS; Chen et al., 2015) was used to measure the mediation variables *need satisfaction* (12 items, e.g., 'I have a sense of choice and freedom in the things I do', $\alpha = .87$, $M = 4.17$, $SD = .07$) and *need frustration* (12 items, e.g., 'I feel disappointed in many of my achievements', $\alpha = .89$, $M = 1.98$, $SD = .19$). The BPNSFS has shown good reliability and validity in a variety of research, and is available in several languages (Chen et al., 2015). The questions ranged in a 5 point Likert scale from "not true at all" to "completely true" in both subscales.

Substance use

The use of a variety of substances, in our study alcohol, cannabis and illicit drugs, was measured by the culturally neutral Alcohol, Smoking and Substance Involvement Screening Test (ASSIST, Humeniuk et al., 2010). Developed by the world health organization to determine a risk score for several substances and suggest following intervention measurements, it showed good to excellent test-retest reliability in a variety of research (Group, 2002; McNeely, et al., 2014). The ASSIST consists of 8 items assessing a variety of problems associated with substance use, such as regular use (e.g. "In the *past three months*, how often have you used the substances you mentioned (alcohol, weed, illicit substances)?"), dependent use and

consequences of use (e.g. “During the *past three months*, how often have you failed to do what was normally expected of you because of your use of (alcohol, weed, illicit substances)?”) (M= .70 , SD = .95). Answers for regular use included 5 options of: “1. *Never*; 2. *Once or twice*; 3. *Monthly*; 4. *Weekly*; 5. *Daily or almost daily*”. Answers for consequences consisted of: “1. No, never; 2. Yes, but not in the past 3 months; 3. Yes, in the past 3 months”. In this sample, the Cronbach’s alpha of the Substance use scale was .74, indicating a good reliability (Taber, 2018).

Data analysis

For the data analysis, the program IBM SPSS Statistics 24 was used (IBM, 2020).

For hypothesis 1a and 2a, hierarchical multiple linear regressions have been conducted to test which emotion regulation facets should be included into a further mediation analysis done in 1b and 2b, the latter using the PROCESS tool version 3.4.1 by Andrew F. Hayes (Hayes, 2017). Hypothesis 1a tested the “positive” integrative ER model of need satisfaction and delayed gratification as outcome variables and mindful observation, intentional exploration and non-judging experience as the predictor variables. For Hypothesis 1b, facets were taken together and tested whether the relation between integrative emotion regulation and delayed gratification was mediated by need satisfaction (Field, 2014). For Hypothesis 2a, the “negative” maladaptive emotion regulation model, dysregulation and emotional suppression predicted the criterion variables of substance use and need frustration.

Results

Preliminary analysis

As Levene’s test showed that the variances for Substance use between genders were not equal, $F(1,138) = 4.60, p = 0.03$ and a Shapiro-Wilk test showed a significant departure from normality for substance use ($W(141) = .88, p = .00$), need satisfaction ($W(141) = .95, p = .00$) and need frustration ($W(141) = .92, p = .00$), models were bootstrapped by 1000 samples (Field, 2014). An independent samples t-test was conducted to measure possible gender differences in the studied variables. Compared to women, men reported to be less explorative in their emotional experience, consume less *substances*, experience less *emotional dysregulation*, less *mindful attention* and less *need frustration* than women. Results can be seen in *Table 1*. Furthermore, age showed to correlate positively with *need satisfaction* ($r = .22, p < .01$), and negatively with *need frustration* ($r = -.32, p < .01$), *substance use* ($r = -.28, p < .001$), *dysregulation* ($r = -.29, p < .01$), and *intentional exploration* ($r = -.24, p < .01$). Given these findings we controlled for both gender and age in all further regression and mediation analyses.

Table 1

Descriptive Statistics and Independent t-Test for gender

	Female (N=58)		Male (N=82)		t(138)	p	d
	M	SD	M	SD			
Intentional exploration	25.89	3.49	21.64	5.24	-5.38	.00	.95
Mindful attention	15.81	2.52	14.65	3.40	-2.19	.03	.39
Substance use	19.39	12.96	14.50	8.32	-2.72	.01	.44
Emotional dysregulation	17.56	4.54	15.81	4.58	-2.24	.03	.38
Need Frustration	26.01	8.53	22.31	7.93	-2.63	.00	.44

Note. d represents Cohen's d.

Furthermore, as seen in Table 2, a bivariate correlational analysis showed, in accordance with Hypothesis 1a, the outcome variable delayed gratification to correlate positively with the expected mediator need satisfaction and two of the predictor variables, mindful attention and intentional exploration. Furthermore, delayed gratification related negatively with dysregulation, substance use and need frustration. As suggested by the literature, the outcome variable of substance use correlated negatively with need satisfaction, but positively with need frustration and emotional dysregulation. The predictor variables showed some unexpected results: Non-Judgement showed to correlate negatively with mindful attention, although both are facets of mindfulness.

Table 2

Descriptives of and correlations between the studied variables

	1.	2.	3.	4.	5.	6.	7.	8.
1. Delayed gratification	-							
2. Substance use	-.26**	-						
3. Mindful attention	.24**	-.06	-					
4. Non-Judging	.08	-.09	-.17*	-				
5. Intentional exploration	.23**	-.03	.60**	-.15	-			
6. Dysregulation	-.33**	.21*	.07	-.24**	-.14	-		
7. Suppressive ER	-.01	.06	-.21*	-.33**	-.31**	-.05	-	
8. Need satisfaction	.55**	-.30**	.10	.29**	.02	-.38**	-.23**	-
9. Need frustration	-.39**	.28**	.06	-.33**	.15	-.49**	.18*	-.77**

* $p < .05$; ** $p < .01$.

All integrative ER facets correlated negatively with suppressive ER. Only non-judging of emotions had a significant positive correlation with need satisfaction, and negative with need frustration. Suppressive ER showed no correlations with the outcome variables, but negative with need satisfaction and integrative emotion regulation facets and positive with need frustration.

Primary analysis

Hypothesis *1a* examined the relation of the individual integrative ER facets on delayed gratification and need satisfaction. Results of three regression analyses are summarized in *Table 3*. Analyses showed the integrative ER facets tending to relate positively to delayed gratification, however none of these relations were significant. Taking the facets together in a second analysis, we did find a significant positive relation between integrative emotion regulation and delayed gratification. Examining Hypothesis *1a* in relation with need satisfaction, the regression analysis showed only non-judgement to relate significantly positive. As integrative ER facets showed a positive relation with outcome and mediator variables, Hypothesis *1a* can be partially accepted. To assess a possible mediation in Hypothesis *1b*, all integrative ER facets will be integrated in one variable.

Table 3

Emotional regulation facets on delayed gratification and need satisfaction

Variable	Delayed Gratification ^a						Need Satisfaction ^b					
	β	B	SE	95% CI		p	β	B	SE	95% CI		p
				LL	UL				LL	UL		
Analysis 1	^a F (5,140) = 2.59, p < .05, R ² = .09						^b F (5, 140) = 4.65, p < .01, R ² = .15					
Gender	.02	-.24	1.33	-2.91	2.69	.85	-.01	-.18	1.69	-3.54	3.03	.91
Age	-.08	-.02	.03	-.09	.05	.49	.22	.09	.04	.00	.19	.05
Mindful attention	.18	.28	.15	-.01	.57	.06	.15	.32	.21	-.10	.79	.12
Non-judging	.14	.10	.06	-.03	.24	.15	.29**	.28	.08	.11	.47	.00
Intentional exploration	.13	.12	.10	-.07	.34	.21	.02	.02	.14	-.26	.31	.87
Analysis 2	^a F (3,140) = 3.77, p < .05, R ² = .08						^b F (3, 140) = 6.67 p < .01, R ² = .13					
Gender	.02	.16	1.30	-2.43	2.49	.89	.03	.38	1.68	-3.23	3.83	.82
Age	-.08	-.03	.04	-.09	.06	.48	.22	.09	.05	.00	.18	.05
Integrative ER	.26	.14	.05	.05	.24	.00	.29	.21	.07	.08	.34	.00

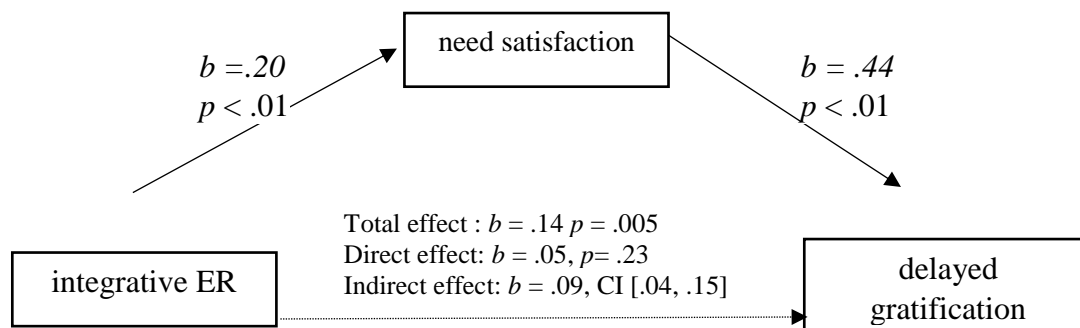
Note. total N = 141. CI = confidence interval; LL = lower limit; UL = upper limit.

^c all results are Bootstrapped by 1000 bootstrap samples

Hypothesis *1b* examined if need satisfaction would mediate the positive relation of integrative ER with delayed gratification. Results can be seen in *Figure 1*. The significant positive total effect of integrative ER turned into a non-significant direct effect once the mediator need satisfaction was entered. Moreover, we found a significant indirect effect of integrative ER on

delayed gratification through need satisfaction. Hence, accepting hypothesis 1b, the positive relation of integrative ER with delayed gratification is fully mediated by need satisfaction.

Figure 1



Hypothesis 2a examined if maladaptive emotion regulation facets of dysregulation and suppressive ER have positive relations with need frustration and substance use. Results of the individual facets are shown in *Table 4*. Analyses showed none of the maladaptive ER facets to relate significantly with substance use.

Table 4

Emotional Regulation facets on delayed gratification and need satisfaction

Variable ^d	Substance ^a						N. Frustration ^b					
	β	B	SE	95% CI		p	β	B	SE	95% CI		p
				LL	UL					LL	UL	
Gender	-.09	-1.86	2.41	-6.56	2.91	.43	-.07	-1.13	.17	-4.8	2.5	.51
Age	-.17	-.12	.065	-.25	.002	.06	-.13	-.06	.05	-.17	.03	.23
Dysregulation	.15	.34	.23	-.11	.80	.15	.45	.81	.16	.50	1.1	.001
Suppressive ER	.07	.11	.14	-.14	.41	.42	.20	.26	.09	.09	.45	.008

^a $F(4,140) = 3.99$, $p < .01$, $R^2 = .10$ ^b $F(4,140) = 15.55$, $p < .01$, $R^2 = .31$

Note. total $N = 141$. CI = confidence interval; LL = lower limit; UL = upper limit.

^c all results are Bootstrapped by 1000 bootstrap samples ^d Dysreg.= Dysregulation, Suppre. =Suppression

Both facets dysregulation and suppression had a significant positive relation to need frustration, therefore hypothesis 2a can be partially accepted. Hypothesis 2b examined a possible mediation by basic need frustration in the relation between maladaptive emotion regulation styles and substance use. As none of the maladaptive ER facets in analysis 2a showed a significant individual effect with the outcome variable substance use, a mediation can be negated. Therefore, Hypothesis 2b can be rejected.

Discussion

Recently, more and more research has been looking into the possible interplay and connections between transdiagnostic concepts, some even suggesting a network interaction between these

different factors (Borsboom, 2017; Rodríguez-Meirinhos et al., 2020; Van der Kaap-Deeder, et al., 2020). Both need frustration/satisfaction and ER have both been suggested to be possible transdiagnostic factors for mental health as well as mental illness (Aldao et al., 2010; Brenning et al., 2019; Ryan et al., 2016). Predicting substance use and its protective counterpart delayed gratification, the current study sought to differentiate different facets of both integrative and maladaptive forms of emotion regulation. Different effects of the facets were expected. Moreover, a possible mediating role of need satisfaction and frustration in these relationships was expected.

Results of the “positive” adaptive framework showed integrative ER to have a positive predictive value for both need satisfaction and delayed gratification. This is in line with past research, where emotion regulation has shown contribute to self-control and self-regulative behavior (Tice et al., 2000). Furthermore, no individual effect of any of the different integrative ER facets of mindful attention, non-judgement and intentional exploration on delayed gratification was found, suggesting an interplay between all facets necessary for a positive effect on well-being and delayed gratification. The *Mindfulness to Meaning Theory* further elaborates on the possible interplay between emotion regulation facets, suggesting mindfulness to enhance emotional regulation by broadening the possibilities of cognitive reappraisal (Garland et al., 2015). As negative emotions lead to a negative attentional bias, mindfulness is suggested to widen attention to all emotion, decreasing the bias, thereby increasing the range of information available for cognitive reappraisal. Similarly, our results could indicate intentional exploration and further appraisal of emotions only to be effective when these are mindfully and nonjudgmentally attended to. Predicting need satisfaction, only non-judgement of experience had an individual effect, suggesting it to be one of the main ER strategies needed to develop need satisfaction. Need satisfaction showed to fully mediate the effect of the integrative emotion regulation facets on delayed gratification. These findings are in line with past research where need satisfaction showed to be a mediator for well-being and ER, indicating need satisfaction to be a transdiagnostic factor for protective factors and well-being (Brenning, et al., 2019; Costa et al., 2016).

Regarding the “negative” framework, the effect of dysregulation and suppression on substance use became insignificant when controlling for age. Age differences in both ER strategies and substance use could account for this insignificant effect. Past research hinted towards young participants showing a general increased risk taking behavior, higher substance use and a higher use of emotional suppression, whilst older adults showed a higher use of less cognitively demanding ER strategies, such as acceptance (Allen & Windsor, 2019; Hawke et al., 2018). As

the effect showed insignificant, the mediating role need frustration could not be investigated. These results were surprising, as previous research has linked suppressive emotion regulation and dysregulation with several psychopathologies, specifically substance abuse (Aldao et al., 2010; Van der Kaap-Deeder et al., 2020). This could be due to suggested different effects of experiential suppression and suppression of emotional expression on well-being. Past research hints expressive suppression to be effective in regulating emotion in short term, weather the suppression of emotional experience showed to be ineffective, increasing negative thoughts (Aldao et al., 2010; Webb et al., 2012). Furthermore, aligned with the theory of SDT, both dysregulation and emotional suppression were significant predictors of need frustration, hinting towards an interaction of these concepts.

Clinical implications

Many new treatments implement mindfulness practices and healthy ER into therapy, such as Acceptance and Commitment Therapy and Mindfulness Based Cognitive Therapy (Baer et al., 2006). The findings of this study show the importance of a holistic therapeutic approach, where different aspects of individual development should be integrated in treatment. In regard to emotion regulation treatment and education, a focus on the mindfulness aspects of emotion regulation might miss other important and necessary facets to derivate a new meaning and broaden the possibilities of emotional information. Furthermore, as need satisfaction mediated the effect of emotion regulation on delayed gratification, these results implicate the importance to integrate need satisfaction into a patient's treatment to enhance the ability of self-control. This might be specifically applicable for addiction centers, where a wide possibility exists to create a need supporting environment.

Past research has shown that need supporting environments have several positive effects, including higher treatment attendance, less dropout, less relapse probabilities, higher internal motivation and an enhanced executive control (Bernier et al., 2010; Ryan et al., 2016; Zeldman, et al., 2004). Need crafting, a practice that entails active enhancing of need satisfying experiences and minimizing of need frustrating experiences during and after treatment, has shown potential as an intervention to enhance need satisfaction in workspace (Van Wingerden, et al., 2017). Furthermore, one of the first studies to observe the effects of need crafting in a clinical setting, by Weinstein & Legate (2016), showed that a 1 week need-engaging intervention reduced symptoms of generalized stress and depression. In sum, interventions including need satisfying experiences inside and outside of treatment could benefit substance abusers beyond the increase of motivation, helping them to develop protective factors.

Limitation and future research

Some methodological limitations of this study include the number of participants collected and the use of a convenience sample. Furthermore, the sample collected did not differentiate between high substance use and low substance use population, and it is advised to repeat this research in a clinical sample. Simultaneously, the current study assessed need frustration and not need thwarting, the latter being linked to need substitutes and a release of self-control (Deci & Ryan, 2000; Ryan et al., 2006). Results hint towards the positive effects of need supporting environments for the development of protective factors, and further research on need-engaging interventions in relation to substance abuse could give more insight into its benefits in therapy. Furthermore, as this study was a cross sectional design, a longitudinal research looking at the changes in consumption of substances in relation to daily experiences of need frustration/satisfaction and ER is suggested to further elaborate on the differences of ER facets at several time points (Spector, 2019).

Summary and conclusion

The present study was one of the first to disentangle different emotion regulation facets and their interplay with basic psychological needs in relation to substance use. Suggested were a “positive” framework, observing protective factors such as self-control and integrative emotion regulation, and a “negative” framework, observing substance use and maladaptive emotion regulation. Results of the positive framework showed integrative emotion regulation to relate positively to delayed gratification. This relation was fully mediated by need satisfaction. The individual facets showed no differences, hinting towards the benefits of unified integrative ER. For the suggested “negative” framework, although the maladaptive emotion regulation facets dysregulation and suppressive emotion regulation did predict higher basic need frustration, they were not related to substance use. The results showed the necessity of a holistic therapeutic approach in which, especially for the development of protective factors against substance abuse, an integration of need supporting environments and treatment could be advantageous.

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