

EMOTION REGULATION STRATEGIES AND MENTAL HEALTH SYMPTOMS DURING COVID-19: THE MEDIATING ROLE OF INSOMNIA

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Abstract

Objectives: COVID-19 has become a major source of stress for people around the world. Stressful life events play a role in the pathogenesis of sleep disorders such as insomnia which is considered a risk factor for anxiety and depression. Emotion regulation is an important factor linked with sleep and mental health problems. Therefore, the main goal of the present study was to examine whether insomnia could constitute a mediation mechanism that explains the relationship between emotion regulation strategies (rumination, reappraisal, suppression) and stress-induced mental health outcomes during the COVID-19 pandemic. **Material and Methods:** The cross-sectional study was conducted among young ($M \pm SD$ 24.8 ± 2.24) individuals ($N = 281$, 85.4% women) during the time of the third wave of infections in Poland. Data were collected by means of self-report questionnaires, including the *Emotion Regulation Questionnaire*; *Cognitive Emotion Regulation Questionnaire*; *Athens Insomnia Scale*; *Depression, Anxiety and Stress Scale*. The direct and indirect effects of emotion regulation strategies on depression, anxiety, and stress were calculated using a bootstrap estimation technique. **Results:** All analyzed indirect effects were significant. The results show that insomnia mediates the relationships between all 3 emotion regulation strategies and stress, anxiety and depression. **Conclusions:** The presented results shed the light on the role of insomnia on the relationships between emotion regulation strategies and emotional states experienced during the COVID-19 pandemic. Additionally, the present study suggests that educational and therapeutic interventions aimed at improving emotion regulation might be useful for improving symptoms of insomnia and, through it, symptoms of affective disorders. *Int J Occup Med Environ Health.* 2023;36(1):151–59

Key words:

depression, insomnia, anxiety, stress, emotion regulation, COVID-19

INTRODUCTION

The novel coronavirus (COVID-19) disease began threatening the health of millions of people worldwide, starting in late 2019 and quickly spreading. To prevent the contagion and limit the outbreak, governments and public health systems adopted extraordinary measures that disrupted daily life. These preventive regulations included travel restric-

tions, closure of schools, public institutions and businesses, home quarantine, social distance, and even social isolation. Therefore, not only the coronavirus itself but also social and economic consequences of widely implemented prevention measures altered the psychological well-being and caused stress for millions of people [1]. This unprecedented situation caused by the COVID-19 pandemic proved to

Funding: this work was supported by a grant from the budget under the program “Excellence Initiative – Research University” at the Jagiellonian University (grant manager: Justyna Mojsa-Kaja).

Received: January 18, 2022. Accepted: October 13, 2022.

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be related with increased risk of mental health problems related with stress such as depression and anxiety [2]. Life stressors play a role in the pathogenesis of sleep disturbances. During times of stress, existing sleep problems may increase and new ones may emerge. It is thus not surprising that a growing number of studies shows escalation of sleep problems and places them among common negative consequences of the COVID-19 pandemic [3]. Of particular concern is insomnia which is both a common symptom of and risk factor for a range of psychiatric disorders including anxiety and mood disorders [4]. Thus, although the relationship between sleep problems and mood disorders is complex and likely bi-directional, at least to some extent sleep problems precede depression [4]. It also has been suggested that treating insomnia might alleviate many of the mental health problems, and furthermore, addressing sleep disturbances at their earliest stages might in fact prevent the onset of some of the clinical mental health disorders [5].

The role of emotion regulation in anxiety, depression, and stress

Emotion regulation is an ability to monitor and modify emotional reactions towards goals of greater well-being (making ourselves feel better) or instrumental goals (doing better on a task at hand). Emotion regulation enables people to adjust the intensity, timing, and the way emotions are experienced and expressed [6]. Successful emotion regulation requires understanding potential consequences of emotions, as well as knowledge of strategies to effectively influence the course of emotions. This ability to regulate emotions is vital to mental well-being and effective social functioning.

The most widely studied emotion regulation strategies are cognitive reappraisal, suppression and rumination [6]. Cognitive reappraisal involves reevaluating an emotional event in order to modify its impact. Using cognitive reappraisal means changing the way one thinks

about potentially emotion-eliciting events, such as focusing on potentially positive aspects of difficult events or considering what one can learn in a challenging situation. Reappraisal is generally considered an effective strategy to reduce negative emotions related to stressful events [7]. Because the subjective experience of stress depends on appraisal of the triggering situation, reappraisal has the ability to change the psychological meaning of the situation and consequently whether it is experienced as stressful and threatening or it is considered a challenge one can adequately address. While cognitive reappraisal ability does not predict depressive symptoms at low levels of stress, at high levels of exposure to stressors cognitive reappraisal ability becomes a significant predictor of depressive symptoms [8]. Similar effect has been found during the COVID-19 pandemic, with reappraisal predicting lower anxiety at high, but not low levels of perceived stress [9].

In contrast, suppression refers to attempts to minimize visible signs of an emotion (e.g., facial expressions). Suppression is largely maladaptive and tends to result in increased or prolonged negative emotions [7]. Individuals diagnosed with depression or anxiety disorder endorsed more frequent use expressive suppression as compared to never-disordered controls [10].

Finally, rumination refers to a cognitive process in which individuals perseverate on their mood and related thoughts, causes, and potential consequences. Rumination has been linked to increases in symptoms of several mental health disorders, including anxiety and depression [11].

Difficulties in regulating negative emotions have been closely tied to psychopathology. Problems with employing cognitive reappraisal and eliminating rumination or expressive suppression are considered to be a core mechanism in the maintenance of psychopathology in anxiety and mood disorders [10]. Supporting this, interventions that teach the use of cognitive reappraisal show

improvements in subjective experience of stress (meta-analysis: [12]), as well as depressive symptoms [13]. Similarly, cognitive behavioral therapy builds an ability to re-appraise threat in people with primary anxiety disorders (including panic, generalized anxiety disorder, and social anxiety disorder [14]).

Emotion regulation and insomnia

From the clinical perspective, inability to regulate emotions is a diagnostic feature of many mood disorders [7] which show strong comorbidity with disturbed sleep [4]. There has been a growing body of evidence suggesting that emotion regulation is an important factor that could help explain the link between sleep and mental health problems [15]. The relationship between difficulties in emotion regulation and sleep problems is a vicious circle in which sleep deficit influences emotion regulation and deficits in emotion regulation impact sleep and create a risk of insomnia [16]. Those suffering from insomnia have difficulties in emotion regulation and such difficulties predict incidence of insomnia and its persistence [17].

International research projects on the impact of COVID-19 outbreak on quality of life showed increased emotion regulation problems and higher levels of stress [18]. In South Korea, >20% of participants reported depressive symptoms and sleep problems and nearly 30% of participants experienced anxiety disorders [19]. Sleep problems were associated with anxiety and stress among individuals who self-isolated during the pandemic [20]. In Europe, participants also reported elevated levels of psychological distress during the pandemic [21], and those with higher levels of depression and anxiety symptoms reported lower sleep quality during the initial weeks of lockdown [22].

The authors of the present study hypothesize that insomnia explains associations between the use of different emotion regulation strategies and symptoms of stress, depression and anxiety during the COVID-19 pandemic.

Given the fact that younger age predicted both greater frequency and severity of sleep problems [3], as well as the negative psychological impact of the COVID-19 pandemic [2], the authors focus on this population during the third wave of the pandemic.

MATERIAL AND METHODS

Participants and procedure

An anonymous online questionnaire was distributed via a mailing list and social media posts; also, participants were asked to share the link with other adult individuals. Data was gathered between late March and April 2021 (third wave of infections). There were 281 respondents (85.4% women; age: $M \pm SD$ 24.8 \pm 2.24) in Poland. The study was performed in accordance with the Declaration of Helsinki. The participants were provided with information about the aim of the study, provided their written informed consent to participate and were informed about the possibility of withdrawing from the study at any stage.

The calculation of the sample size was based on the following assumptions: a 95% (0.95) confidence level and a fraction size of 0.5 with a maximum estimation error of 6%.

Measures

Emotion regulation strategies were measured with *Emotion Regulation Questionnaire* [6] and the rumination subscale from the *Cognitive Emotion Regulation Questionnaire* [23].

Emotion Regulation Questionnaire includes 10 items rated on a 7-point scale (“strongly disagree” to “strongly agree”). Six items measured reappraisal ($\alpha = 0.83$, e.g., “I control my emotions by changing the way I think about the situation I’m in”) and 4 assessed suppression ($\alpha = 0.78$, e.g., “I control my emotions by not expressing them”).

The 4-item rumination subscale from the *Cognitive Emotion Regulation Questionnaire* [23] was rated on a 5-point

scale (e.g. “I am preoccupied with what I think and feel about what I have experienced”; “almost never” to “almost always”; $\alpha = 0.79$).

Insomnia was measured by the 8-item *Athens Insomnia Scale* [24], which measures the severity of insomnia based on the ICD-10 criteria (e.g., “awakenings during the night”; $\alpha = 0.82$). Items are rated on a 4-point scale (“no problem at all” to “very serious problem”).

Mental health symptoms were assessed with the 21-item *Depression, Anxiety and Stress Scale* [25]. Three 7-item subscales measure symptoms of depression ($\alpha = 0.89$), anxiety ($\alpha = 0.87$), and perceived stress ($\alpha = 0.86$). Participants responded using a 4-point scale (“did not apply to me at all” to “applied to me very much, or most of the time”).

RESULTS

Data were analyzed using SPSS v. 26 and AMOS v. 26.

Table 1 shows descriptive statistics and intercorrelations among study variables.

Most participants reported elevated symptoms of depression, anxiety, and stress (Table 2). Staggering 77.2% of participants reported above normal depression symptoms, 71.2% reported above normal anxiety symptoms, and 75.5% reported above normal stress. Moreover, between 1 in 4 and 1 in 5 participants experienced severe or ex-

tremely severe levels of depression (25.6%), anxiety (34.9%) and stress (19.2%) during the third wave of the COVID-19 pandemic. Similarly, 63.7% reported some insomnia, with 4.3% experiencing severe insomnia.

Emotion regulation strategies were correlated with insomnia and negative emotional states. Specifically, cognitive reappraisal correlated with fewer insomnia symptoms ($r = -0.22$, $p < 0.001$), while suppression and rumination correlated with more insomnia symptoms ($r = 0.18$ and 0.37 , $p < 0.001$, respectively). Additionally, insomnia correlated with depression, anxiety, and stress (0.55–0.59, $p < 0.001$).

Relevant tests were carried out to examine the probable existence of multicollinearity. The degree of multicollinearity of the study variables was found to be acceptable, with all tolerance values shown to be higher than 0.81, and the VIF values lower than 1.25.

The significant correlations between emotion regulation strategies, insomnia, depression, anxiety, and stress enabled the following mediation models to be tested:

- the mediating role of insomnia on associations between each emotion regulation strategy and depression;
- the mediating role of insomnia on associations between each emotion regulation strategy and anxiety;

Table 1. Descriptive statistics of the variables and correlations between emotion regulation strategies (suppression, reappraisal, rumination), insomnia, depression, anxiety and stress in 281 individuals measured by the online questionnaire in 2021, Poland

Variable	M	SD	Correlation						
			1	2	3	4	5	6	7
1. Suppression	13.25	4.96	–	–0.16**	–0.01	0.18**	0.27**	0.15*	0.12*
2. Reappraisal	28.02	6.37		–	–0.12*	–0.22**	–0.28**	–0.21**	–0.23**
3. Rumination	13.64	3.73			–	0.37**	0.46**	0.45**	0.46**
4. Insomnia	7.44	4.24				–	0.56**	0.55**	0.59**
5. Depression	9.49	5.48					–	0.63**	0.70**
6. Anxiety	7.75	5.67						–	0.75**
7. Stress	11.4	5.14							–

* $p < 0.05$; ** $p < 0.01$.

Table 2. Levels of depression, anxiety, stress, and insomnia symptoms in 281 individuals measured by the online questionnaire in 2021, Poland

Severity label	Depression		Anxiety		Stress		Insomnia	
	questionnaire point range	participants [%]						
Normal	0–9	22.7	0–7	28.8	0–14	24.5	0–5	36.3
Mild	10–13	12.5	8–9	5.3	15–18	13.2	6–9	32.7
Moderate	14–20	23.5	10–14	20.3	19–25	17.4	10–15	26.7
Severe	21–27	15.6	15–19	10.7	26–33	25.6	16–24	4.3
Extremely severe	≥28	25.6	≥20	34.9	≥34	19.2		

Cut-off scores based on [25] and [35].

Table 3. Effects of emotion regulation strategies on emotion symptoms mediated by insomnia in 281 individuals measured by the online questionnaire in 2021, Poland

Dependent variable	Effect					95% CI	Indirect/ total ratio
	IV on M	M on DV	direct: IV on DV	total: IV on DV	indirect: IV on DV via M		
Depression ($R^2 = 0.43$, $F(4,276) = 54.02$, $p < 0.001$)							
suppression	0.16*	0.38*	0.18*	0.24*	0.06*	0.03–0.11	0.25
reappraisal	–0.15*	0.38*	–0.13*	–0.19*	–0.06*	–0.11–(–0.02)	0.32
rumination	0.35*	0.38*	0.31*	0.44*	0.13*	0.09–0.19	0.30
Anxiety ($R^2 = 0.37$, $F(4,276) = 42.04$, $p < 0.001$)							
suppression	0.16*	0.41*	0.07	0.14*	0.07*	0.03–0.11	0.54
reappraisal	–0.15*	0.41*	–0.08	–0.14*	–0.06*	–0.17–(–0.12)	0.43
rumination	0.35*	0.41*	0.29*	0.43*	0.14*	0.10–0.20	0.33
Stress ($R^2 = 0.42$, $F(4,276) = 51.06$, $p < 0.001$)							
suppression	0.16*	0.47*	0.03	0.10*	0.07*	0.03–0.13	0.70
reappraisal	–0.15*	0.47*	–0.09	–0.16*	–0.07*	–0.14–(–0.02)	0.44
rumination	0.35	0.47*	0.28*	0.44*	0.16*	0.12–0.22	0.36

DV – dependent variable; IV – independent variable; M – mediator.

Indirect/total ratio – ratio of the indirect effect to total effect (c') indicating a magnitude of mediated effect.

* $p < 0.05$.

– the mediation role of insomnia on associations between each emotion regulation strategy and stress.

The direct and indirect (via the mediator) effects of emotion regulation strategies on depression, anxiety, and stress were calculated using a bootstrap estimation technique with 1000 samples [26]. If the (bias-corrected)

confidence intervals did not include zero for an indirect effect, results were considered significant.

All analyzed indirect effects were significant (Table 3). Insomnia mediated the effect of suppression, reappraisal and rumination on depression, anxiety, and stress. The ratios of indirect to total effect show that insomnia explained:

- 25% of the relationship between suppression and depression, 32% of the relationship between reappraisal and depression, and 30% of the relationship between rumination and depression;
- 54% of the relationship between suppression and anxiety, 43% between reappraisal and anxiety, and 33% of the relationship between rumination and anxiety;
- 70% of the association between suppression and stress, 44% of the association between reappraisal and stress and 36% of the relationship between rumination and stress.

DISCUSSION

The present study assessed the use of emotion regulation strategies, insomnia symptoms, and symptoms of depression, anxiety and stress during the third wave of the COVID-19 pandemic. Results showed that the frequency with which 3 major emotion regulation strategies are used predicts COVID-related depression, anxiety, and stress in part through their effect on insomnia symptoms. While cognitive reappraisal is related to lower insomnia and mental health symptoms, suppression and rumination are related to higher insomnia and mental health symptoms.

Although the mean levels of depression, anxiety and stress are similar to levels shown in previous research conducted in Poland during the first wave of COVID-19 pandemic [27], there was a higher number of participants reporting severe levels of depression and anxiety in this study. One possible explanation may be that the sample was composed mainly of young adults, who are more vulnerable to negative mental health consequences of the pandemic [2]. The other explanation may, to some extent, stem from the differences in value of the cut-off points which differs between studies using the DASS-21 questionnaire.

The COVID-19 pandemic is a major stressor, with some scholars arguing that it can constitute a source of trau-

matic stress [28]. It is thus not surprising that it resulted in increases in depression and anxiety [2] and insomnia disorder [3]. However, not everyone is equally affected. The current results are congruent with previous findings, which indicated that maladaptive emotion regulation strategies are associated with individual differences in the frequency of use of emotion regulation strategies and may be triggered by life stressors.

Those sensitive to stress-related sleep disruption are more likely to develop chronic insomnia and as a consequence depression and anxiety. The present study shows that emotion regulation in times of exposure to stressful circumstances plays a significant role in the occurrence of sleep problems. Although emotion regulation is an inherent part of emotion, there are individual differences in the ability to judge potential effectiveness of different emotion regulation strategies, as well as in the frequency with which people use strategies that tend to be more or less adaptive [7]. Those who tend to use more effective emotion regulation strategies will be more successful in influencing the course of their emotional experiences and bring themselves into states that are conducive to sleep. By contrast, those who do not tend to use effective emotion regulation strategies will be more likely to have difficulty sleeping, which continues depletion associated with mental health problems.

This study has theoretical and practical implications. Theoretically, the authors documented one mechanism that contributes to insomnia and mental health symptoms – use of ineffective emotion regulation strategies. Prior research has shown that emotion regulation (and failures thereof) plays a role in psychopathology [11]. Independently, research has shown that there are physiological and emotional conditions that contribute to sleep quality [29]. Here, the authors' connected 3 variables – ineffective emotion regulation strategies predict insomnia, which in turn predicts higher depression, anxiety, and stress symptoms.

Practically, this research has implications for treating insomnia. Despite the fact that sleep improvement by the way of cognitive-behavioral therapy (CBT) for insomnia is associated with decreases in anxiety and depression, emotion regulation was not studied in examining effectiveness of CBT on insomnia [30]. One mechanism through which CBT affects mental health outcomes is through better emotion regulation. For instance, decrease in symptoms of anxiety disorders after treatment in natural settings is mediated by improvements in emotion regulation [31]. The present study suggests that educational and therapeutic interventions aimed at improving emotion regulation hold promise for improving symptoms of insomnia and, through it, symptoms of affective disorders.

The present study has several limitations. First, the sample is one of convenience. This was necessary because of the goal to collect data during a peak of the pandemic. Also, the data is correlational in nature. Although the authors are arguing that the use of emotion regulation strategies precedes insomnia, all variables were assessed at the same time and causal claims cannot be made without additional research that would assess target variables at multiple times. Future research should assess mental health symptoms at baseline, as well as at later times, and control for baseline symptoms when examining the role of emotion regulation strategies in times of high exposure to stressors. Similarly, experience sampling studies where emotions and regulation strategies are assessed close to sleep time would enable drawing more specific conclusions about the mechanism of influence.

Finally, there is a substantial body of pre-pandemic research analyzing the links between emotion regulation strategies, insomnia and mental health problems [30]. This research shows that participants who reported greater sleep problems were more likely to meet criteria for a mood or anxiety disorder and generally reported poorer emotion regulation strategy use [32]. Thus, the examined

associations between these constructs may be observed in general, regardless of the COVID-19 outbreak, and further longitudinal research is needed to address the contextual role of the pandemic.

On the other hand, a growing body of research suggests that COVID-19 pandemic was a significant source of stress [33] and demonstrates that the prevalence rate and intensity of insomnia, depression and anxiety were significantly higher during the pandemic [34].

CONCLUSIONS

The results suggest that during the pandemic, individual differences in regulation strategy use may contribute to symptoms of insomnia, which in turn exacerbates mental health problems. Better understanding of the role of emotion regulation strategies and insomnia in the emergence of mental health symptoms during the COVID-19 pandemic could inform educational and therapeutic interventions. The conclusions stemming from present study may also be helpful in possible additional pandemic waves.

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