

**The Role of Emotion Regulation in Mental Health during the COVID-19 Outbreak: A
10-Wave Longitudinal Study**

Brenning, K.

Waterschoot, J.

Dieleman, L.

Morbée, S.

Vermote, B.

Soenens, B.

Van der Kaap-Deeder, J.

van den Bogaard, D.

Vansteenkiste, M.

Ghent University, Belgium

Department of Developmental, Personality and Social Psychology

Henri Dunantlaan 2

Ghent, Belgium

Corresponding author:

Katrijn.Brenning@Ugent.be

Phone: 003292646415

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Abstract

The COVID-19 pandemic elicited a lot of concerns among citizens, thereby potentially compromising their well-being. This study sought to examine the role of individuals' emotion regulation styles (i.e., emotional dysregulation, emotional suppression, and emotional integration) in handling these concerns and their experiences of well-being (i.e., satisfaction with life and sleep quality) and ill-being (i.e., anxiety and depressive symptoms). The study had a unique 10-wave longitudinal design ($N = 986$; $M_{\text{age}} = 41.28$; 76% female) and was conducted during the outbreak of the pandemic in March-May 2020. Multilevel analyses showed, first, that weekly variation in COVID-19 related concerns related negatively to weekly variation in well-being and positively to weekly variation in ill-being. Second, at the between-person level, emotional dysregulation and suppression related positively to between-person vulnerability in ill-being and lower well-being (across all waves). Third, between-person differences in emotional dysregulation amplified the strength of the within-person association between concerns and depressive complaints and lowered life satisfaction. Unexpectedly, integrative emotion regulation amplified the strength of the within-person association between concerns and anxiety. The discussion focuses on the critical role of emotion regulation in handling the uncertainty elicited by the pandemic and provides directions for further research.

Keywords: emotion regulation, COVID-19 concerns, psychological well-being

Introduction

The COVID-19 crisis is a historical period characterized by a variety of stressors and accompanying risks for psychological difficulties (Torales et al., 2020), such as anxiety (Roy et al., 2020), depressive symptoms (Huang & Zhao, 2020), reduced life satisfaction (Satici et al., 2020), and poorer sleep quality (Altena et al., 2020). The COVID-19 pandemic raises many concerns for people in various areas of life, including health, finances, and uncertainties about the future (Carroll et al., 2020). These concerns can come with a psychological cost, thereby negatively affecting individuals' psychological well-being (Panchal et al., 2020). Yet, these concerns may not be as salient for all people and individuals may differ in the extent to which these concerns come with poor psychological health. One critical factor that can determine to what extent COVID-19 related concerns have an influence on individuals' psychological functioning is individuals' emotion regulation. Whereas some emotion regulation styles may protect people against the ill-being cost evoked by specific concerns (Sheppes et al., 2015), other emotion regulation styles may amplify the costs. To understand how individuals cope with this crisis, several scholars have called for research that examines the role of emotion regulation in individuals' psychological well-being during this period (e.g., Restubog et al., 2020). The overall aim of the present 10-wave longitudinal study, conducted during the first lockdown in Belgium in 2020, was to investigate whether different emotion regulation styles predict individuals' psychological functioning during the COVID-19 crisis (as reflected in main effects) and whether these emotion regulation styles affect the degree to which experienced concerns relate to mental health problems (as reflected in moderator effects).

Handling COVID-19 Related Concerns

The COVID-19 outbreak in March 2020 in Europe elicited a lot of uncertainty and concerns with respect to various issues. Because little was known about the contagious nature

of the virus and the effectiveness of health measures, many people were concerned about their health, either because they felt uncertain to be infected themselves or because close relatives may get infected (Carroll et al., 2020). Many people also expressed concerns about the overall situation. For instance, it was unclear whether the health care system would have sufficient capacity in intensive care to provide adequate treatment to infected persons. Also, because it was unclear how long the installed lockdown would last, many people felt insecure about the broader situation, with some of them hoarding food or medication in the first weeks of the lockdown (Vermote et al., 2021).

Yet, at the same time, people likely differed in the way they handled these concerns, resulting in differences in the extent to which people's concerns come with a cost in terms of reduced well-being and elevated ill-being. Whereas uncertainty may elicit anxiety, depressive symptoms, and reduced life satisfaction in some people, other people may not suffer from these concerns to the same degree. Herein, we sought to examine whether differences in emotion regulation styles could account for overall individual differences in psychological well-being during the COVID-19 lockdown and whether these differences in emotion regulation could also play a role in the impact of the situation (i.e., COVID-19 related concerns) on psychological well- and ill-being.

Emotion regulation can affect psychological well-being in at least two different ways. First, emotion regulation can have main effects, meaning that, independent of the amount of perceived stress or concerns experienced, people with more adaptive emotion regulation styles may have access to a richer set of psychological resources (e.g., seeking social support) and thus experience more psychological well-being and less ill-being (Salovey et al., 1999). In contrast, maladaptive emotion regulation would have an overall negative effect on mental health. Indeed, several reviews showed that adaptive emotion regulation styles yielded a negative association with symptoms of depression and anxiety whereas maladaptive emotion

regulation styles yielded a positive association (e.g., Schäfer et al., 2017).

Second, apart from the main effects of emotion regulation, different emotion regulation styles can also affect the way people handle encountered concerns during the crisis. Emotion regulation can moderate the effect of a stressful event, either by buffering or amplifying its negative consequences (Wranik et al., 2007). Specifically, the positive association between experienced COVID-19 related concerns and maladjustment would be less profound for individuals possessing more adaptive emotion regulation styles. Consistent with this reasoning, Extremera and Rey (2015) found that among males who reported a high level of perceived stress, those with better emotion regulation abilities reported higher subjective happiness and lower depression symptoms than those with poorer emotion regulation abilities. Further, the amplifying role of maladaptive emotion regulation has been documented for the association between several stressors (e.g., community violence, rejection, and bullying) and diverse adjustment outcomes including internalizing symptoms (e.g., Klosowska et al., 2020).

During the COVID-19 pandemic, researchers also pointed to the critical role of emotion regulation in individuals' psychological well-being (e.g., Restubog et al., 2020). A cross-sectional study by Xu et al. (2020) provided evidence for the beneficial effects of cognitive reappraisal (i.e. reframing emotional events to change their emotional valence or meaning) for symptoms of anxiety (i.e., direct effect), as well as for the attenuating role of reappraisal on the association between stress and anxiety. Other studies made use of composite scores of adaptive emotion regulation styles (e.g., acceptance and cognitive reappraisal), thereby reporting a negative association with COVID-related anxiety (Jungman & Witthöft, 2020). Whereas previous research generally focused on one specific emotion regulation style (e.g., cognitive reappraisal) or made use of composite scores for different maladaptive or adaptive styles, the present study examined the unique roles of specific

adaptive and maladaptive emotion regulation styles. For this purpose, we relied on Self-Determination Theory (SDT; Ryan & Deci, 2017) as it provides a conceptually grounded and multidimensional perspective on individuals' emotion regulation styles (Roth et al., 2019).

Emotion Regulation from a Self-Determination Theory Perspective

Within SDT, a distinction is made between one potentially adaptive and two more maladaptive ways of handling emotions (Roth et al., 2019). Integrative emotion regulation is considered a healthy and high-quality style of emotion regulation. The fairly recent introduction of this emotion regulation style meshes with a contemporary trend in the emotion regulation literature to advocate the use of an accepting and mindful attitude towards emotions (Chambers, Gullone, & Allen, 2009). Indeed, based on SDT's organismic view on human development, integrative emotion regulation means that both positive and negative emotions are seen as valuable sources of information concerning one's own functioning. Individuals high on emotional integration are open and receptive towards emerging emotions, such that emotions are accessed nonjudgmental and in fuller awareness (Roth et al., 2009). Although this concept is strongly linked to constructs such as acceptance and mindfulness, integrative emotion regulation is conceptually and empirically distinct (see Roth et al., 2019). Specifically, integrative emotion regulation goes beyond awareness and involves also an action-oriented attitude. Through a receptive and accepting attitude towards emotions, individuals become able to make informed decisions on how to respond to various situations (Ryan & Deci, 2017). Translated to the COVID-19 context, when individuals experience concerns with respect to their health situation, they attend to the informational role of these negative feelings, with people potentially taking action to handle the uncertainty they experience. For instance, to keep the uncertainty under control, people can find out which actions are needed (e.g., limiting their social contacts).

Next to integrative emotion regulation, SDT distinguishes between emotional

dysregulation and suppression as two more maladaptive ways to regulate one's emotions (Roth et al., 2009, 2019). Emotional dysregulation refers to individuals' tendency to be overwhelmed by their emotions, with emotions being expressed in an impulsive and disorganized way. Dysregulation is harmful to people's personal well-being and social relations because it involves a lack of control over negative emotions. Applied to the COVID-19 context, health-related concerns are uncontrollable for individuals high on emotional dysregulation. They may get stuck in ruminating and catastrophizing about the implications of the virus and the impact of the situation for themselves and their relatives which eventually disrupts their concentration and restful sleep. Next, suppressive regulation involves the avoidance or minimization of negative emotional experiences. Individuals high on suppressive regulation tend to either block negative emotional experiences from awareness by distancing themselves from the emotion or by hiding the behavioral expression of emotions to maintain the image of a strong and resilient person (Roth et al., 2019). Translated to the COVID-19 context, individuals may pretend for themselves and others that they are not worried about the public health threat, or they may keep their concerns for themselves. Yet, the lack of attentiveness and processing of these concerns may cause worrying later on (e.g., right before falling asleep). In this way, the suppression of uncertainty can drain people's energetic resources, thereby causing ill-being (Gross, 2015).

Empirically, all three emotion regulation styles have been studied in relation to a variety of mental health outcomes. Recent research has begun to corroborate the benefits of integrative emotion regulation, thereby showing positive associations with personal well-being (Benita et al., 2020; Philippe & Houle, 2020). Longitudinal research indicated that emotional integration even predicts improved mental health across time among adolescents (Brenning et al., 2015). Experimental studies further demonstrated causal effects of situationally induced emotional integration on the processing of threatening stimuli (e.g., Roth

et al., 2014). Specifically, participants instructed to engage in emotional integration when watching a fear-eliciting movie displayed less anxiety and stress (in comparison to participants instructed to suppress or minimize their emotions) when confronted again with this movie on another occasion (Roth et al., 2014). In contrast, emotional suppression and dysregulation were found to relate to a greater risk for ill-being (Benita et al., 2020; Gross, 2015; Houle & Philippe, 2020), associations which have also been confirmed in longitudinal (e.g., Brenning et al., 2015) and experimental research (e.g., Gross, 1998).

To date, only one study examined the potential role of the emotion regulation strategies as conceptualized in SDT in relation to individuals' adjustment to the COVID crisis. Using cross-sectional data, Waterschoot et al. (2021) showed that individuals who combine the two maladaptive emotion regulation styles (suppression and dysregulation) in handling COVID-19 related uncertainty were most at risk for ill-being and poorer sleep quality. People relying predominantly on integrative emotion regulation fared better than people relying on a combination of maladaptive emotion regulation styles, yet somewhat worse than people who relied on low overall levels of emotion regulation (presumably because they encountered few concerns and stressors). Although these findings yielded initial evidence for the differential role of SDT's emotion regulation styles in adaptation to the COVID-19 crisis, this cross-sectional study did not allow to examine effects of emotion regulation in individuals' variability across time in terms of concerns and associated mental health problems.

The Present Study

Given that the COVID-19 pandemic threatens individuals' psychological health (Torales et al., 2020), it is imperative to examine both sources of resilience and vulnerability that could affect individuals' abilities to deal effectively with COVID-19 related concerns. Relying on the broader emotion regulation literature and the framework of SDT in particular,

the main goal of the present 10-wave study is to examine the role of emotion regulation in the link between COVID-19 related concerns and psychological difficulties during the first ten weeks of the pandemic. The current study was unique because of its longitudinal design and timing. During the first weeks of the COVID-19 outbreak, individuals' uncertainty was peaking because there were many 'unknowns' with respect to the virus and the most effective way of dealing with the situation from a policy perspective. The study thus offered a unique opportunity to test key assumptions regarding the differential role of emotion regulation styles during a moment when the population as a whole was subjected to a common stressor.

Figure 1 provides a graphical overview of the key hypotheses. We sought to address three research questions and associated hypotheses with respect to a broad variety of mental health outcomes. We include a balanced set of well-being (i.e., life satisfaction, sleep quality) and ill-being (i.e., symptoms of anxiety and depression) indicators to shed light on the robustness of the findings.

Using multilevel modeling, we began by examining the associations between weekly variation in COVID-19 related concerns (concerning health, financial situation, how the situation would evolve, the availability of supplies and medication) and weekly variation in the mental health outcomes. Technically, Research Question 1 dealt with within-person associations, thereby examining whether a person who experiences more concerns on a given week than he or she usually does reports more ill-being and less well-being that same week than he or she usually does. We hypothesized that weekly ups and downs in individuals' COVID-19 related concerns would relate positively to weekly variation in symptoms of anxiety and depression within individuals, and would relate negatively to weekly variation in life satisfaction and sleep quality within individuals (Hypothesis 1).

Next, we considered the role of emotion regulation from two different angles. We expected between-person differences in emotional dysregulation, emotional suppression, and

emotional integration to relate to between-person differences in psychological health *across* the ten-week period. Research Question 2 thus dealt with main effects at the between-person level, thereby investigating whether individuals who usually make use of a more adaptive or a more maladaptive emotion regulation style relative to others, report respectively more and less overall psychological adjustment across the 10-week period. Specifically, dysregulation and suppressive regulation were expected to relate positively to ill-being and negatively to well-being. In contrast, integrative emotion regulation was expected to relate negatively to ill-being and positively to well-being (Hypothesis 2).

Apart from these main effects, individuals may also react differently when the encountered uncertainty rises above their intra-individual average in a given week. Technically, Research Question 3 addressed the question whether between-person differences in emotion regulation would amplify or attenuate the strength of the within-person associations between concerns and psychological adjustment (i.e., a cross-level interaction). Specifically, the costs of such an increase in uncertainty for individuals' ill-being could be amplified among individuals high on either dysregulation or suppression and may be attenuated among individuals high on integrative emotion regulation (Hypothesis 3).

Method

Procedure and Sample

This study was part of a broader study conducted during the COVID-19 crisis in Belgium. From March 19th 2020, two days after the start of the stay-at-home lockdown, Dutch-speaking citizens were recruited through an advertising campaign on social media, as well as by contacting different organizations (e.g., cultural associations) and media (e.g., online newspapers) and provided with a link to the questionnaire. From the total sample of participants during the first week of the lockdown ($N = 3284$), 1367 participants (41.6%

response rate; 76.5% female; $M_{\text{age}} = 39.64$; range = 18 – 82 years) gave their informed consent for a longitudinal follow-up study. In the next months, these participants were invited through their e-mail address in time windows of exactly 7 days so that all participants who completed the first questionnaire on Thursday, for instance, received a new invitation each Thursday in the next upcoming weeks. In this invitation, each participant received a unique code which was used to link all the questionnaires. In total, ten waves of data were collected. In each wave, it was emphasized that participation was voluntary, e-mail addresses would only be used to contact participants, and withdrawing from the study could be done at each moment. Additionally, we provided contact information at the beginning and the end of the questionnaire in case of questions or psychological concerns. Of the initial 1367 participants, 60.9% participated on T2, 53.8% on T3, 52.5% on T4, 47.0% on T5, 45.9% on T6 assessment, 42.7% on T7, 35.2% on T8, 37.2% on T9, and 36.5% on T10. Except if the participants chose not to participate anymore, no one was excluded from the dataset when a questionnaire would be skipped in a certain week.

To ensure that parameters could be estimated at the level of within-person variations across weeks, participants were only included in the data analysis if they participated at least twice or more. The final sample of this study included 986 participants (72% of the original sample; 76% female; $M_{\text{age}} = 41.28$; range = 18 – 82 years). Drop-out analyses indicated that only participants' age and having a partner were related to retention in the dataset.

Participants who participated twice or more were more likely to be older (odds ratio = 1.03, $p < .001$) and to have a partner (odds ratio = 1.35, $p < .05$) than participants who participated only once. None of the other background variables nor the substantive study variables (measured during the first assessment) were related to drop-out.

In the final sample, 14.7% of the participants reported having one or more chronic diseases. One-third (34.3%) reported not having a partner. Regarding educational status,

16.6% did not attend higher education, 35.2% had a bachelor's degree, and 43% had a master's degree. Participants were informed about possible resources for psychological counseling and were given the opportunity to receive a summary of the study results. The procedure used in this study was approved by the ethical committee of Ghent University Belgium (nr. 2020/37).

Measures

Emotion Regulation. Emotion regulation styles were assessed at Wave 1 only using the Emotion Regulation Inventory (ERI) developed by Roth et al. (2009). Besides demographics, this was the only measure that was only included once. The ERI contains three subscales, that is, integrative emotion regulation, dysregulation, and suppression, with each subscale containing six items. In the instructions, participants were asked to rate the items regarding negative emotions they encountered during the COVID-19 crisis such as worry, fear and uncertainty. Sample items read “During the past week during the corona crisis...It was hard for me to control my negative emotions” for dysregulation, “...I tried to hide negative emotions from others” for suppression, and “...I tried to understand where negative emotions come from” for emotional integration. Using a 5-point response scale (1 = *Totally disagree*; 5 = *Totally agree*), participants indicated the extent to which they believed that each of the statements was true for them. Previous research has provided evidence for the internal structure and validity of this scale (e.g., Brenning et al., 2015). In the current study, all subscales had good internal consistencies with the following Cronbach's alphas: $\alpha_{\text{dysregulation}} = .82$, $\alpha_{\text{suppression}} = .85$, and $\alpha_{\text{integration}} = .75$.

COVID-19 related Concerns. Four items were developed to assess people's COVID-19 specific concerns during the lockdown. Following the stem “In the past week during the corona crisis...”, participants were asked to indicate their COVID-19 specific concerns (e.g., “I had concerns about...”) concerning their health, financial situation, how the situation

would evolve, and the availability of supplies and medication. Each item was rated on a scale ranging from 1 (*Not at all true*) to 5 (*Totally true*). Reliability at the between- and within-person level was assessed using a Multilevel Confirmatory Factor Analysis (MLCFA) estimated in the R-package ‘lavaan’ (Rosseel, 2012). This analysis generated both Cronbach’s alpha (α) and McDonald omega (ω) values at both levels of analysis. The reliability for the Concerns scale was: $\alpha_{within} = .65$, $\alpha_{between} = .83$; $\omega_{within} = .58$, $\omega_{between} = .95$.

Anxiety. To measure symptoms of anxiety, participants were asked to indicate on 5 items how anxious they felt. Four items were selected from the short form of the State Trait Anxiety Inventory (STAI, Marteau & Bekker, 1992) based on their relevance to the context of the COVID-19 crisis (e.g., “During the past week, I felt tense”). In addition, we added one item from the full version of the STAI to tap into anxiety in a more direct way (i.e., “During the past week, I felt anxious”). Items were rated on a scale ranging from 1 (*Seldom or never, less than 1 day*) to 4 (*Mostly or all the time, 5 to 7 days*). Reliability was as follows: $\alpha_{within} = .68$, $\alpha_{between} = .95$; $\omega_{within} = .68$, $\omega_{between} = .95$.

Depressive symptoms. People’s depressive feelings were assessed with a 6-item version of the Center for Epidemiological Studies – Depression scale (CES-D; Radloff, 1977). The same stem (e.g., “During the past week...”) and rating scale were used as for anxiety. An example item reads: “During the past week, I felt sad”. Reliability was as follows: $\alpha_{within} = .53$, $\alpha_{between} = .92$; $\omega_{within} = .54$, $\omega_{between} = .93$.

Life satisfaction. Life satisfaction was assessed with the most face valid item of the Satisfaction with Life scale (Pavot & Diener, 1993), that is “During the past week, I was satisfied with my life”. Previous research (e.g., Cheung & Lucas, 2014) indicated that one-item measures for life satisfaction correlate highly with multi-item measures and that the pattern of associations with theoretically relevant variables does not differ between a single- and multi-item assessment of life satisfaction.

Sleep quality. Sleep quality was assessed with the subjective sleep quality component of the Pittsburgh Sleep Quality Index (Buysse et al., 1989) in which participants rated their overall sleep quality during the past week with the use of the item “How would you rate your overall sleep quality over the past week?” on a scale ranging from 1 (*Very bad*) to 4 (*Very good*).

Plan of Analysis

The main hypotheses were investigated using a multilevel approach in R (R Core Team, 2021) because the measurement waves were nested within participants. We performed linear mixed regression modeling including the socio-demographical variables and emotion regulation styles as between-subject predictors and including concerns as within-subject predictors of the mental health outcomes. The coefficients estimated at the within-person level (i.e., the fixed effects) were allowed to vary between participants (i.e., random effects), which allowed to examine cross-level interactions between the emotion regulation strategies (i.e., the variables situated at the between-person level) and the within-person associations. Level 1 variables were group-mean centered, whereas Level 2 variables were grand-mean centered.

In total, there was 30.83% missing values in the current study. Analysis of missing values with Little’s (1988) test showed that data were missing completely at random (Little’s MCAR test: $\chi^2(7641) = 7760.55, p = .17$). Therefore, maximum likelihood estimation with robust standard errors (MLR) was used in the linear mixed regression analyses to deal with the missing data.

In the primary analyses, we first computed intraclass correlations (i.e., ICC) for the weekly study variables. These ICC values represent the proportion of variance situated at the between-person level and indicating to what extent multilevel modeling is appropriate. Second, we tested whether there was significant variation around the slopes of the weekly associations between concerns and the outcomes, which would indicate that there are inter-

individual differences in the strength of the weekly associations. If this was the case, we included the emotion regulation styles as between-level predictors and included the cross-level interactions between the emotion regulation styles and concerns. In all models, we controlled for relevant background characteristics and for the outcome variable (i.e., anxiety, depressive symptoms, sleep quality, or life satisfaction) as reported on the previous wave. The inclusion of the outcome variable as reported on the previous wave allowed us to examine whether concerns on a given wave (i.e., wave x) related to changes in the outcomes relative to the previous wave (i.e., changes from wave $x-1$ to wave x). Because it was not possible to control for the previous wave of the first wave, the analyses were based on a truncated dataset (i.e., only nine waves).

Results

Preliminary Analyses

Descriptive statistics and correlations between all study variables are shown in Table 1. To examine the associations between background characteristics and the study variables, we conducted a MANCOVA using aggregated scores of the weekly variables and the scores on the three emotion regulation styles. The MANCOVA indicated differences concerning age (Wilks's $\lambda = .93$, $F(8, 875) = 8.64$, $p < .001$), comorbidity (Wilks's $\lambda = .97$, $F(8, 875) = 3.04$, $p < .01$), having a partner (Wilks's $\lambda = .95$, $F(8, 875) = 5.56$, $p < .001$), gender (Wilks's $\lambda = .96$, $F(8, 875) = 4.44$, $p < .001$), and having children (i.e., none versus at least one) (Wilks's $\lambda = .98$, $F(8, 875) = 2.84$, $p < .01$). No multivariate effects were found regarding educational level (Wilks's $\lambda = .98$, $F(16, 1750) = 1.41$, $p = .13$). Given these findings, in the main analyses we controlled statistically for the effects of age, comorbidity, having a partner, gender, and having children.

Primary Analyses

To examine whether there was significant variability in the weekly variables, we

estimated intercept-only models, which allow for an estimation of ICC (see Table 1). The ICCs indicated that the variance situated at the within-person level varied between 22% and 38%.

Next, we tested whether there were significant associations between concerns and the mental health outcomes at the within-person level and whether there was significant variation around the slopes of these weekly associations. If this was the case, the emotion regulation strategies were entered as between-person level predictors and moderators. Regarding anxiety (see Table 2), the within-person associations indicated that weekly variation in concerns related positively to the weekly variation in anxiety, an association that emerged after controlling for anxiety as reported on the previous wave. There was significant variation around the weekly association between concerns and anxiety ($b = .07, SE = .01, p < .001$). At the between-person level, dysregulation and suppression both related positively and uniquely to anxiety (across all waves), whereas emotional integration yielded a non-significant association. Further, there was a significant moderating effect of emotional integration on the association between concerns and anxiety. As shown in Figure 2a, this effect indicated that the positive within-person association between concerns and anxiety was more pronounced among participants scoring higher on emotional integration. Finally, it is worth noting that the concerns by dysregulation interaction was marginally significant. Although we refrain from probing this interaction in a figure, the association between concerns and anxiety tended to be more pronounced among participants scoring higher on dysregulation.

After controlling for depressive symptoms on the previous wave, there was evidence for a positive within-person association between weekly concerns and weekly depressive symptoms (Table 2). There was significant variation around this weekly association between concerns and depression ($b = .04, SE = .01, p < .001$). Further, dysregulation and suppression yielded a unique positive relation with depressive symptoms (across all waves) at the

between-person level, whereas emotional integration yielded a null-relation. Dysregulation moderated the within-person association between concerns and depressive symptoms. As shown graphically in Figure 2b, this cross-level interaction indicated that the positive within-person association between concerns and depressive feelings was stronger among participants scoring higher on dysregulation.

Regarding sleep quality, there was a significant (negative) within-person association with concerns, indicating that weekly variations in concerns related negatively to the weekly variation in sleep quality after controlling for sleep quality on the previous wave (Table 2). There was significant variation around this association between concerns and sleep quality ($b = .08$, $SE = .01$, $p < .001$). At the between-person level, dysregulation and suppression related negatively to sleep quality (across all waves). There was no evidence for significant cross-level interactions.

Finally, concerning life satisfaction, weekly variation in concerns again yielded a significant and negative association with weekly variation in life satisfaction, an effect that emerged after controlling for life satisfaction on the previous wave. Again, there was significant variation around this slope ($b = .14$, $SE = .02$, $p < .001$). At the between-person level, dysregulation and suppression both yielded a negative association with life satisfaction (across all waves). Dysregulation moderated the within-person association between concerns and life satisfaction such that the negative within-person association between concerns and life satisfaction was stronger among participants scoring higher on dysregulation (Figure 2c).

Discussion

The present study aimed to investigate the importance of emotion regulation in psychological adjustment during the COVID-19 pandemic. The pandemic engendered many concerns in several important life domains, including health and finances (Carroll et al., 2020), which may have affected individuals' psychological well-being (Panchal et al., 2020;

Vermote et al., 2021). Indeed, when concerns are not handled appropriately, they can lead to reduced levels of well-being (Schiffrrin & Nelson, 2010). The current study examined week-to-week variation in individuals' concerns and its link with individuals' psychological well-being and ill-being during the COVID-19 pandemic. Further, grounded in Self-Determination Theory (Ryan & Deci, 2017), the role of emotional integration, suppression and dysregulation was investigated, thereby considering both their role as between-person predictors of adjustment across the first ten weeks of the pandemic and their role as a moderator in handling the encountered uncertainty during a specific week of the pandemic.

Weekly Concerns and Psychological Adjustment during COVID-19 times

Although there are substantive individual differences in the extent to which individuals report COVID-19 related concerns (Lippold et al., 2020), individuals' encountered uncertainty also varies from week to week, as a function of the unfolding of different events during the pandemic. During the first ten weeks, new information regarding the contagiousness of the virus, the number of infected and hospitalized individuals and the pressure on the health care system became available on a daily basis. Depending on the access to and salience of such information, citizens may experience varying levels of uncertainty on a week-to-week basis. The results of the present study indicate that a substantial amount of variance (about 25 to 30%) in concerns during the COVID-19 pandemic is indeed situated at the within-person level, as reflected in the intra-class correlation coefficients (ICC). A similar percentage of intra-individual variation was also observed for the various indicators of psychological well-being and ill-being. These findings are in line with previous studies on intra-individual variation (e.g., Genet & Siemer, 2012) pointing to the importance of studying within-person dynamics. Trait measures may indeed fail to capture intra-individual variability, whereas a diary or week-to-week approach that measures real-life worrying and well-being across multiple time points does allow for an assessment of state-like variations

across time (Bolger et al., 2003).

Consistent with Hypothesis 1, we found that people reported lower mental health compared to their own intra-individual average in weeks when they experienced more COVID-19 related concerns compared to their own intra-individual average. These findings appear pretty robust as they emerged across different indicators of ill-being (i.e., symptoms of anxiety and depression) and well-being (i.e., sleep quality and life satisfaction) and as they were obtained after controlling for the outcome on the preceding wave. The latter finding indicates that weekly concerns and weekly adjustment do not simply covary, but that concerns in a given week predict increased ill-being and decreased well-being compared to individuals' functioning the week before. These within-person associations mesh with previous between-person research documenting associations between COVID-19 related concerns and reduced well-being (e.g., Mortazavi et al., 2021). Importantly, we also observed significant variation in the strength of the within-person association between concerns and the mental health outcomes. This observation raises the question why some people are more susceptible to the effects of concerns than others. Herein, we considered the role of emotion regulation.

The Role of Maladaptive Emotion Regulation

Based on Self-Determination Theory (Ryan & Deci, 2017), one adaptive (i.e., emotional integration) and two more maladaptive (i.e., emotional dysregulation and suppressive regulation) emotion regulation styles were expected to play a role in the prediction of psychological adjustment during the COVID-19 pandemic (Roth et al., 2017). Consistent with expectations, individuals with higher levels of emotional dysregulation and suppression reported more symptoms of anxiety and depression, poorer sleep quality, and less life satisfaction throughout the 10-week period. These findings are consistent with prior work, both outside (Benita et al., 2020) as well as within the COVID-19 context (Waterschoot et al., 2021). Yet, this study significantly extends prior cross-sectional studies as the findings

documented herein provided evidence for a prospective (instead of merely a concurrent) association between suppression and dysregulation and diverse indicators of psychological health. Adding to increasing research on the transdiagnostic role of emotion regulation (Aldao et al., 2016), this study also showed that the costs of maladaptive emotion regulation manifest through a variety of indicators of well-being and ill-being.

Although individuals high in either emotional dysregulation and suppression report less psychological health overall, another critical issue is whether they would react differently when confronted with elevated insecurity during a given week. We found some evidence for the moderating role of dysregulation, with two of the four tested interactions being significant (and another one being marginally significant). Specifically, the associations between a peak in concerns and psychological ill-being were strengthened among those high in dysregulation. They reacted with even more elevated symptoms of depression (see Figure 2b) and lower life satisfaction (see Figure 2c) when they faced more insecurity in a given week than they did on average. In addition, and in line with abovementioned results, there was a marginally significant moderating effect of dysregulation on the association between concerns and anxiety. Also in this case, the association between concerns and anxiety was strengthened among those high in dysregulation. Presumably, individuals high in dysregulation get more easily emotionally overwhelmed by encountered concerns, which not only give rises to some heightened anxiety but even and predominantly to elevated depressive complaints and reduced life satisfaction. As such, people high on dysregulation display greater psychological problems across the board when confronted with a temporary increase in concerns. These results are in line with previous research pointing to the moderating role of maladaptive emotion regulation in the association between stressors and psychological outcomes (Klosowska et al., 2020).

In contrast with the pattern of interactions obtained for dysregulation, suppression did not play such a moderating role. This finding suggests that emotional suppression does not come with an additional cost in a week when citizens' concerns were peaking. Although individuals high in suppression reported poorer adjustment overall, the cost of uncertainty does not get amplified in the short term, presumably because individuals high in suppression are – in contrast to those high in dysregulation - less overwhelmed by negative emotions immediately. Yet, when concerns get accumulated and become more chronic, suppression may yield a disabling impact (Ryan et al., 2006). The fact that individuals feel pressured to alter, downplay, or even dismiss their concerns is energy-draining, with the costs manifesting especially when individuals high in suppression lose control over their emotions. Future research with a more extended time frame would be useful to investigate whether chronic (instead of temporary) concerns may come with an additional cost for individuals high on emotional suppression.

The Role of Integrative Emotion Regulation

Different from suppression and dysregulation, emotional integration was unrelated to any of the four indicators of psychological adjustment. Although this finding contrasts with previous research outside the context of COVID-19, where emotional integration was found to relate to greater well-being (Brenning et al., 2015), recent research conducted during the COVID-19 context (but sometimes also outside this context; Brenning et al. 2021) similarly found that emotional integration was unrelated to individuals' well-being and ill-being. Several explanations can be put forward.

First, given the plethora of challenges faced by people during the acute phase of the COVID-19 crisis, maladaptive styles may have played a more decisive role in the short run. Said differently, the benefits associated with integrative emotion regulation may only manifest across time (Waterschoot et al., 2021). Indeed, participants in the current study

reported on their psychological adjustment only during the outbreak of the pandemic. Possibly the benefits of emotional integration may only pay off over time, for instance, when the pandemic is more under control and during the post-pandemic transition (Philippe & Houle, 2020). Longitudinal research is needed to investigate this issue.

Second, the set of well- and ill-being measures used in the present study may have been too narrow. Although a mixed set of well-being and ill-being outcomes was used, we did not include more growth-related indicators, such as the experience of meaning (Steger, 2012) or self-acceptance (Ryff & Singer, 1998). Although individuals high in emotional integration are not necessarily more satisfied with their lives during the unpredictable, chaotic and even hectic weeks of the COVID-19 outbreak, they may derive a sense of meaning by attending to their concerns and come to accept themselves better in these stressful circumstances. That is, people with high levels of emotional integration may perceive the situation as an opportunity for growth, thereby allowing them to connect more deeply and authentically to close others for mutual support during the pandemic and appraising the situation as a possibility for a more varied, differentiated and richer emotional life.

Interestingly, emotional integration did not only fail to predict between-person differences in adjustment, it even amplified the within-person association between concerns and anxiety. The direction of this association was unexpected but may nevertheless make sense in the distressing context of the initial COVID-19 outbreak. Previous experimental studies also found that integrative emotion regulation does not reduce anxiety immediately after having been exposed to a fear-eliciting stimulus but does protect against anxiety upon repeated exposure to this stimulus (Roth et al., 2014). Indeed, individuals who use integrative emotion regulation may experience more anxiety in a given week characterized by increased concerns, but may still display gains in well-being in the longer run. It is possible that the benefits of integrative emotion regulation were underestimated in the present study and may

become more visible across time. The more open and interest-taking attitude that characterizes those high on emotional integration may help to explain why concerns in a given week come with higher anxiety that week. Full functioning indeed implies that emotions, even distressing ones, are authentically attended to. Interestingly, the moderating role of integration was limited to the outcome of anxiety and did not ‘radiate’ to other outcomes, including elevated symptoms of depression, poorer sleep quality or reduced life satisfaction (as was the case for dysregulation). Anxiety is the outcome related most proximally to COVID-19 related concerns. The lack of moderation for other outcomes is also in line with a recent study by Klosowska et al. (2020), who did not report evidence for adaptive emotion regulation as a significant moderator of the stressor–adjustment outcome association. Finally, it should be noted that the acknowledgement of concerns during the outbreak of the pandemic, with an associated increase in anxiety, is not necessarily maladaptive. Indeed, when concerns are attended to people may develop a more accurate estimation of their risk for infection and illness, which may stimulate adaptive behavior such as adherence to the COVID-19 measures and prosocial behavior to protect other people’s health and security (e.g., Schmitz et al., 2021). Future research should however further investigate this issue.

Limitations and Suggestions for Future Research

Although this study had a number of notable strengths (including the large sample, the inclusion of several emotion regulation styles, and the within-person approach), some important limitations need to be mentioned with interesting implications for future research. First, to collect the sample we relied on a convenience sampling approach. Because participants were recruited through social media, people facing strong adversity during the COVID-19 crisis (e.g., people in very low SES conditions or confronted personally with severe health issues) may be underrepresented in this study. This is unfortunate because

contextual adversity threatens individuals' emotion regulation capacities. As such, future research would do well to actively recruit and oversample people living in at-risk conditions.

Second, as the results regarding the role of emotional integration were somewhat unexpected, further investigation is needed to shed light on these results. For example, based on previous experimental research showing promising results for inducing integrative emotion regulation through experimental instructions (Roth et al., 2014), people could be encouraged to engage in integrative emotion regulation through an on-line e-health program (e.g., Sanilevici et al., 2021). Their mental health could then be compared with a group of individuals receiving no such instructions. Such experimental manipulations of emotion regulation would also allow for more causal conclusions and may inform interventions aimed at strengthening adaptive emotion regulation. Another important avenue for future research is to assess also within-person fluctuations in emotion regulation styles. Due to practical considerations, the emotion regulation styles were measured only once at baseline. Although emotion regulation styles are expected to be relatively more stable than mental health outcomes, individuals' emotion regulation styles may fluctuate dynamically from time to time and future research would do well to assess these within-person differences in emotion regulation (see e.g., Benita et al., 2021).

Third, all measurements used in this study were based on self-report, which may have caused shared method variance and an overestimation of some of the associations. Therefore, future research should include other types of measurements and rely on multiple informants, which seems particularly important for the assessment of mental health. Another possibility is to include psychophysiological indicators of stress reactivity (Nater et al., 2005). For instance, experience sampling methodology would allow for the collection of self-report ratings and physiological indicators of stress several times during the day. Moreover, the survey used in this study had to be short in order to motivate people to participate during a challenging time

period. Therefore, the constructs were measured using a limited number of items and sometimes even with single items. Particularly with regard to the assessment of emotion regulation styles, a disadvantage of this approach was that not all facets of these rich concepts could be measured. Accordingly, future research would do well to use more elaborate and multi-dimension measures. Although the current results need to be interpreted in the context of some limitations, the findings do underscore the important role of emotion regulation in individuals' mental health during mentally challenging periods such as the COVID-19 crisis.

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Table 1.
Means, Standard Deviations, Intraclass Correlations and Correlations between the Study Variables

| | <i>M</i> | <i>SD</i> | <i>ICC</i> | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|----------------------------|----------|-----------|------------|---------|---------|---------|---------|---------|--------|---------|
| 1. COVID-19 concerns | 2.75 | 0.71 | .73 | | .34*** | .20*** | -.10*** | -.10*** | | |
| 2. Anxiety symptoms | 2.02 | 0.77 | .77 | .63*** | | .52*** | -.29*** | -.39*** | | |
| 3. Depressive symptoms | 1.59 | 0.58 | .78 | .46*** | .74*** | | -.26*** | -.36*** | | |
| 4. Sleep quality | 2.89 | 0.71 | .62 | -.38*** | -.53*** | -.46*** | | .16*** | | |
| 5. Life satisfaction | 3.00 | 0.94 | .70 | -.41*** | -.67*** | -.69*** | .42*** | | | |
| 6. Emotional Dysregulation | 2.27 | 0.75 | - | .42*** | .59*** | .54*** | -.35*** | -.44*** | | |
| 7. Emotional Suppression | 2.18 | 0.71 | - | .24*** | .31*** | .35*** | -.27*** | -.30*** | .32*** | |
| 8. Emotional Integration | 3.43 | 0.63 | - | .08*** | .10*** | .02 | -.03 | .03 | .20*** | -.25*** |

Note. Between-person correlations are presented below the diagonal, within-person correlations are presented above the diagonal. * $p < .05$, ** $p < .01$, *** $p < .001$.

RUNNING HEAD: Emotion Regulation during COVID-19 Pandemic

Table 2. Results of Linear mixed regression modelling with standardized coefficients (and eta squares)

| Predictors | Anxiety symptoms (wave x) | | Depressive symptoms (wave x) | | Sleep quality (wave x) | | Life satisfaction (wave x) | |
|--|---------------------------|--------------------|------------------------------|--------------------|------------------------|--------------------|----------------------------|--------------------|
| Person-level background variables | | | | | | | | |
| Age | -.18*** (.03) | -.08** (.13) | -.18*** (.03) | -.10** (.01) | .08* (.01) | .03 (.00) | .03 (.00) | -.03 (.00) |
| Gender ¹ | .16*** (.03) | .12*** (.02) | .11*** (.01) | .09*** (.01) | -.08** (.01) | -.08** (.01) | -.08** (.01) | -.06* (.00) |
| Partner ² | -.04 (.00) | -.02 (.00) | -.21*** (.05) | -.19*** (.05) | .07* (.00) | .05* (.00) | .15*** (.03) | .13*** (.03) |
| Comorbidity ³ | .06+ (.00) | .04 (.00) | .06+ (.00) | .04 (.00) | -.04 (.00) | -.02 (.00) | -.04 (.00) | -.02 (.00) |
| Children ⁴ | -.04 (.00) | -.02 (.00) | -.06+ (.00) | -.04 (.00) | .01 (.00) | .01 (.00) | .09* (.00) | .07* (.00) |
| Within-level predictors | | | | | | | | |
| Concerns (wave x) | .12*** (.07) | .12*** (.07) | .09*** (.04) | .09*** (.04) | -.06*** (.01) | -.06*** (.01) | -.06*** (.01) | -.06*** (.01) |
| Outcome (wave x-1) | .07*** (.03) | .07*** (.02) | .08*** (.03) | .08*** (.03) | .06*** (.01) | .06*** (.01) | .02* (.00) | .02* (.00) |
| Person-level predictors | | | | | | | | |
| Emotional dysregulation | | .39*** (.17) | | .31*** (.11) | | -.18*** (.04) | | -.30*** (.11) |
| Emotional suppression | | .16*** (.03) | | .17*** (.04) | | -.20*** (.05) | | -.14*** (.03) |
| Emotional integration | | .03 (.00) | | .01 (.00) | | -.03 (.00) | | .04 (.00) |
| Within- x Person-level interaction | | | | | | | | |
| Weekly concerns x Dysregulation | | .01+ (.01) | | .03*** (.03) | | .00 (.00) | | -.02* (.01) |
| Weekly concerns x Suppression | | .00 (.00) | | -.01 (.00) | | .00 (.00) | | .01 (.00) |
| Weekly concerns x Integration | | .02** (.03) | | .01 (.00) | | -.01 (.00) | | -.01 (.00) |
| Random Effects | | | | | | | | |
| σ^2 | 0.21 | 0.12 | 0.08 | 0.08 | 0.21 | 0.21 | 0.31 | 0.31 |
| τ_{00} | 0.67 _{ID} | 0.28 _{ID} | 0.21 _{ID} | 0.16 _{ID} | 0.27 _{ID} | 0.23 _{ID} | 0.51 _{ID} | 0.40 _{ID} |
| Observations | 4886 | 4886 | 4886 | 4886 | 4940 | 4940 | 4886 | 4886 |
| Marginal R ² / Conditional R ² | .100 / .785 | .301 / .785 | .142 / .771 | .290 / .772 | .033 / .580 | .127 / .583 | .058 / .648 | .192 / .650 |

¹Woman versus man. ²Life partner versus single. ³One or more comorbid diagnoses versus none. ⁴None versus at least one. Non-standardized coefficients. * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 1. Conceptual model

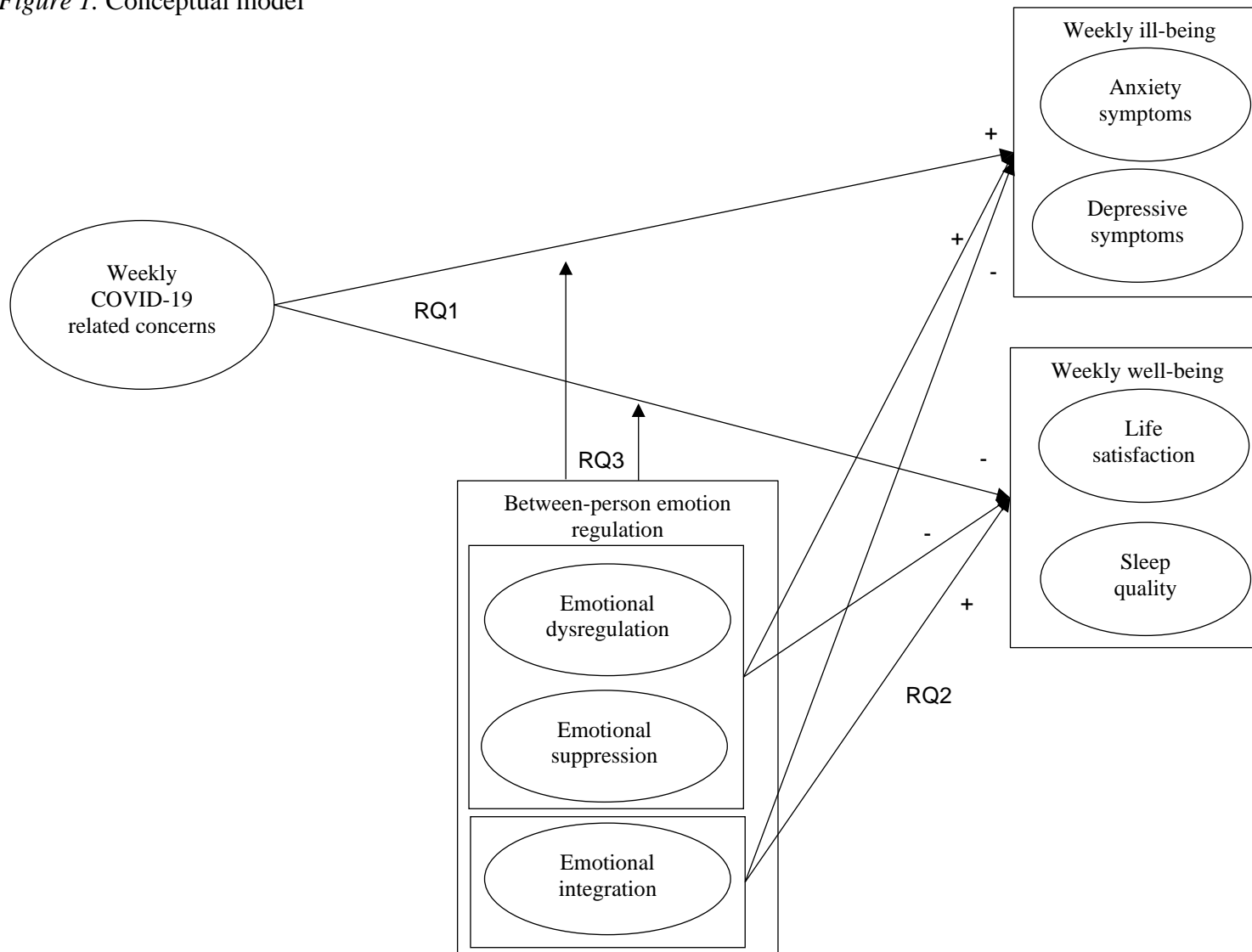


Figure 2. Moderating effects of emotion regulation on the association between weekly concerns and weekly outcomes of ill- and well-being

