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Social connectedness, emotional regulation, and health behaviors as correlates of distress during lockdown for COVID-19: A diary study

Amanda M. Muñoz-Martínez | **Iona Naismith**

Department of Psychology, University of the Andes, Bogota, Colombia

Correspondence
Amanda M. Muñoz-Martínez, Department of Psychology, Universidad de los Andes, Colombia, Cra 1 # 18A–10. Ed G/208.
Email: am.munozm@uniandes.edu.co and amandamile@gmail.com.

Abstract

Mass lockdowns are a powerful infection-reduction strategy but are a significant stressor. This study aimed to explore whether various factors known to predict distress in normal contexts (e.g. social connectedness, emotional-regulation strategies, and health-related behaviors) are associated with daily distress under lockdown conditions. A time-based diary study evaluated how perceived social connectedness, health-promoting, and risk behaviors predicted within-person and between-person psychological distress. One hundred and nine adults completed surveys on these variables daily for 15 days while under stringent COVID-19 lockdown in Colombia. Emotional suppression and reappraisal were measured at the start of the study to explore whether they predicted distress. Distress was lower on the days that people experienced greater social connectedness (within-person analyses) but was not significantly predicted by between-participant differences in emotional regulation. Health-promoting behaviors such as exercising and meaningful activity were associated with lower distress, while watching COVID-19 news and eating high-calorie food were associated with higher distress. Looking at individual dynamics provides meaningful insights on daily behaviors associated with distress that might improve

people's wellbeing during lockdown, such as social connectedness, meaningful activity, nutrition, exercise, and minimizing news exposure. Future research with alternative designs will enable causal conclusions to be drawn.

KEYWORDS

COVID-19, diary study, health-related behaviors, lockdown, psychological distress, social connectedness

INTRODUCTION

Following the 2019 outbreak of COVID-19 (SARS-CoV-2), many countries worldwide were placed under mass lockdown, an infection-reduction strategy involving restriction of people's movement. In Colombia, the first nationwide lookdown initiated on March 25, 2020, (rated 87/100 on the Oxford COVID-19 government response Stringency Index; Hale et al., 2021). During this period, individuals could only leave their homes to visit supermarkets or for health emergencies, except for essential workers (e.g. health providers and grocery workers). Other outdoor activities such as exercise were prohibited, and schools, shops, and restaurants were closed. The present study was conducted under these conditions.

Lockdowns can lead to negative psychological effects, including low mood, anger, fear, confusion, post-traumatic stress, and increased suicidal ideation and behavior (Brooks et al., 2020). Lockdowns are distinct from other more commonly experienced stressors such as unemployment or loss of loved ones, since under lockdown, typical coping mechanisms may be limited and unhealthy behaviors may be easier to engage in. For example, in-person socializing is reduced, sporting facilities are closed, time outside is restricted, and routines may require more self-initiative to maintain. Screen-time, alcohol, and unhealthy food may increase (Chodkiewicz et al., 2020; Schmidt et al., 2020). As a result, lockdown increases psychological distress, defined as a "discomforting, emotional state experienced by an individual in response to a specific stressor or demand that results in harm, either temporary or permanent, to the person" (Ridner, 2004). Distress during lockdowns tends to increase with longer lockdown duration, higher infection fears, more restricted activity, inadequate supplies (e.g. food, accommodation, or protective equipment), inadequate information from authorities regarding what to do and why, and financial loss (Brooks et al., 2018), as well as having a history of psychiatric illness (Jeong et al., 2016).

Most studies conducted on the psychological effects of lockdown have been cross-sectional (Brooks et al., 2020; Islam et al., 2020; Rodríguez-Rey et al., 2020; Twenge & Joiner, 2020). A few studies have performed longitudinal assessments during COVID-19 lockdowns, exploring changes in psychological symptoms over time and between-person predictors of these changes. Studies of lockdowns over 2 to 5 weeks in Argentina, Japan, and Italy found worsening depression, loneliness, stress, anxiety, and/or life satisfaction (Canet-Juric et al., 2020; Ruggieri et al., 2021), especially for individuals with low-income or preexisting physical health problems (Kikuchi et al., 2020). In contrast, other studies of early COVID-19 lockdowns in China and the United States did not detect significant changes in distress or loneliness (Luchetti et al., 2020;

Xu et al., 2020). This variation may in part reflect differences in government stringency (Hale et al., 2021). Studies on the effects of infectious disease outbreaks (e.g. Ebola and SARS) have identified higher risk of distress in those with perceived health risks, lower-income, and changes in personal or professional life (Brooks et al., 2018; Vyas et al., 2016).

Although these group-based longitudinal studies have provided important information on understanding the psychological impact of lockdown, there is still a lot to be learned regarding which factors predict changes in distress during lockdown. Current studies are limited by only having a few repeated measurements of symptoms. Furthermore, between-group designs are typically used, which correlate participant characteristics (e.g. demographics and self-reported behavior) with participant outcomes measured at one time-point. Methodologies such as daily diary designs that measure both independent and dependent variables daily offer important insights regarding (1) to what extent distress and potentially relevant behaviors fluctuate over time, (2) whether day-to-day fluctuations in behaviors correlate with day-to-day variations in distress (using within-participant analysis), and (3) identifying which between-participant factors predict fluctuations in distress. Daily measurement avoids threats to validity such as confounding effects (since individuals act as their own controls) and recall bias. Furthermore, analysis via multilevel modeling enables the researcher to control for autocorrelation effects, the correlation between responses from the same participant at different times (Mehl & Conner, 2011; Strahler et al., 2020).

Given these considerations, evaluating the relationship between daily distress and daily engagement in behaviors is crucial to help people better manage distress. The literature on distress and well-being spans a huge range of different predictors, including demographics, aversive experiences (e.g. abuse), social support, and healthy lifestyle behaviors (e.g. nutrition, exercise and sleep). However, Layard et al. (2014) found that emotional well-being and self-reported general health are the strongest proximal correlates of life satisfaction in UK adults. In the present study, we were interested in variables amenable to short-term psychological interventions, and therefore focused on health behaviors, social behaviors, and emotional-regulation strategies.

Impact of emotion-regulation strategies on distress

Emotional regulation strategies, referring to techniques that can be employed to influence and manage one's emotional responses (effectively or not), are a common target of psychological interventions. While many have been extensively studied in typical (non-lockdown) contexts, the present study aimed to explore to what extent the employment of common strategies is associated with distress during lockdown.

Two key strategies to regulate emotional responses are cognitive reappraisal and expressive suppression (Gross & John, 2003). Cognitive reappraisal refers to changing one's interpretation of a potentially emotion-eliciting situation and occurs early in the process of emotion-generation. Expressive suppression refers to the attempt to hide, inhibit, or reduce ongoing emotion-expressive behavior and occurs after the behavioral responses have already been fully generated. Suppression is relatively ineffective and consequently associated with lower life satisfaction, self-esteem, and social support. In comparison, reappraisal is an adaptive strategy associated with lower depression, higher self-esteem, and better interpersonal relationships (Boyes et al., 2016; Cutuli, 2014). However, it remains to be determined to what extent these strategies can affect distress during lockdown. Reappraisal may be harder to do effectively

during lockdown, perhaps because perceived threats are new or feel more out of control. Additionally, people have less social contact with people outside their household, which normally supports reappraisal by reminding us that there are others in worse situations or showing us how others are coping with a situation (Hofmann et al., 2016). Some evidence suggests that distress during lockdown is predicted by higher suppression (Jiang et al., 2020; Pérez et al., 2021) and lower reappraisal (Jiang et al., 2020), but repetition is warranted. As existing measures of suppression and reappraisal are designed to measure tendencies rather than be sensitive to change, the present study explored these factors as a between-person predictor only.

Perceived social connectedness and distress

Another factor inversely associated with distress is social connectedness, defined as "the subjective awareness of being in close relationship with the social world" (Lee & Robbins, 1998, p. 338). This includes structural (e.g. social network size/density and living arrangements) and functional characteristics of social relationships (e.g. perceived availability, accountability, and quality of social support), both of which are strongly related to mental well-being, stress, and low mood (Holt-Lunstad et al., 2017). During lockdown, socializing occurs predominantly with household members, if applicable, rather than with self-selected contacts, and moves from in-person to largely virtual (Fu & Lee, 2020). Consequently, the impact of social interaction under lockdown merits further exploration.

Studies during prior lockdowns have identified that social support and living with family protect against distress (Brooks et al., 2018; Vyas et al., 2016). One recent study found that controlling for connection pre-lockdown, connectedness during lockdown was higher when living with a partner but was not predicted by household size (Okabe-Miyamoto et al., 2021). To our knowledge, to date, only one diary study has explored daily social interaction under lockdown. Fu and Lee (2020) found that people under lockdown reported fewer face-to-face contacts and more text, voice-only, or video contacts compared to pre-lockdown. People under lockdown reported "greater benefit" from daily contacts; however, this study's analysis did not distinguish between virtual and face-to-face contacts nor use a standard measure of distress or well-being. For the present study, we decided to collect data on both structural (interaction occurrence) and functional connection (perceived interaction quality) during virtual and face-to-face contact during lockdown and explore how this correlates with fluctuations in distress.

Healthy lifestyle behaviors and distress

While healthy lifestyle behaviors such as exercise, healthy eating, and sleep have long been promoted for their impact on physical health markers (e.g. cholesterol or blood pressure), there is increasing recognition of their importance for mental well-being too (Strahler et al., 2020). The present study focused on widely studied health behaviors that have established associations with mental well-being, and which could be targeted by short-term psychological interventions, namely, sleep, physical activity, work and leisure activity, consumption of high-calorie food, and alcohol and nicotine use (Strahler et al., 2020).

Sleep of sufficient amount and quality is associated with lower depression, and higher life satisfaction (Pilcher et al., 1997). Physical activity is a well-established predictor of mental well-

being when done at an appropriate duration and intensity (Penedo & Dahn, 2005). Well-being is associated with engagement in work and leisure activities, especially when these are absorbing and identity-affirming and not of excessive duration (Haworth & Lewis, 2005). Longitudinal studies have identified problematic alcohol use as a risk factor for depression (Fergusson et al., 2009). In the short-term, alcohol can lead to an increase *or* decrease in stress response, depending on dose (Kokavec et al., 2009). Nicotine use is highly correlated with stress, although evidence suggests that this is because stress leads to nicotine use, not vice versa (Kassel et al., 2003). Intake of calorically dense food is often preceded by negative affect and can produce increases in both negative and positive affect (Tomiyama et al., 2011). However, the impact of these behaviors on distress under lockdown needs to be established.

Several studies have reported decreases in exercise, sleep quality, and increased alcohol and smoking use during the COVID-19 pandemic, with accompanying increases in anxiety, depression, and stress (Stanton et al., 2020; Trabelsi et al., 2021). Finally, during community crises, consumption of media about the crisis increases drastically and has been theorized to impact well-being (Garfin et al., 2020), although its impact during lockdown has not been explored empirically until now. The present study's main objective was to explore whether daily distress under lockdown conditions was associated with social connectedness and health-related behaviors (e.g. exercise; Level 1 and Level 2) and with emotional-regulation strategies (Level 2 only) during COVID-19 lockdown. Regarding demographics, we hypothesized that mean distress would be higher in participants with lower household income and higher perceived risk of health complications associated with COVID-19 (Hypothesis 1). Regarding socioemotional factors, Hypothesis 2 was that mean distress would be higher in participants with lower reappraisal, greater suppression, smaller household size (i.e. fewer members), and lower perceived connectedness in daily social interactions (Level 2), and that on days that participants reported higher levels of perceived social connectedness their levels of distress would be lower (Level 1). Finally, regarding health behaviors, Hypothesis 3 predicted that daily and mean distress would be associated with lower daily and average levels of exercise, work, and leisure activities; poor sleep; greater COVID-related media consumption, and greater intake of calories, alcohol, and nicotine (Level 1 and Level 2). These hypotheses were based upon previous literature from non-lockdown contexts, which is outlined above.

METHODS

Participants and procedure

The study was approved by the institutional review board of the university where the study took place. Inclusion criteria were being 18+ years old and living in Colombia. Exclusion criteria were reporting high-risk behaviors such as self-injury or suicidal intent (these individuals were signposted to further support) and spending more than 2 hours outside of the home daily to attend a job in essential services (since such individuals are exposed to different challenges compared to individuals under normal lockdown conditions). Participants were recruited online via social media (Facebook) and snowball methods over 2 days. Recruitment ended at this point in accordance with the study timeline, guided by study budget limitations and the study's exploratory nature. A recruitment flyer provided information on study objectives, conditions of participation, and compensation (a $13 USD groceries voucher contingent on study completion).

Potential participants were asked to sign an informed consent and complete a battery of questionnaires to collect data on inclusion and exclusion criteria, sociodemographics, and baseline distress and emotional regulation with the Depression Anxiety Stress Scale (DASS-21; Ruiz et al., 2017) and Emotion Regulation Questionnaire (ERQ; Gross & John, 2003). The study itself began on day 15 of the national lockdown in Colombia. Eligible participants agreed to report information on psychological, behavioral, and social functioning for 15 days in a row. An end-of-day assessment based on an interval-based sampling was conducted. Each day, participants received prompt via email and/or text message (according to participant preferences) at 5:00 p.m. and one-reminder at 8:00 p.m. with a link directing them to a Qualtrics website where they completed a 5-min once-daily questionnaire about the day's experiences, which closed at midnight. Daily diaries involved administration of six items from the DASS-21 (see Section 2.2), a health behaviors inventory, and the Friendship Scale for virtual and in-person interaction (Hawthorne, 2006). Participants were invited to contact a research assistant for troubleshooting or addressing questions on the study completion. At the end of the study, the full DASS-21 and the ERQ were readministered.

Of the 146 individuals who completed the initial screening, 128 met criteria and were invited to participate and 122 completed the first diary. Of these, 109 participants completed at least 12-daily diaries and a post-test battery so were included in analyses. The final sample of 109 (78 females, 71.6%) ranged in age from 18 to 60 years ($M = 26.39$, $SD = 9.50$). Forty-three (39.5%) held an undergraduate degree or higher; 50 (45.9%) were current undergraduates, and the remainder had no higher education. Employment status before lockdown starting day was most often studying (38.5%); followed by unemployment (20.2%), full-time employment (14.7%), or self-employment (11.9%), with smaller rates of part-time/informal employment or homemaking. The mean monthly wage just prior to lockdown was US$282 (range 0 to US$2.290). Seven participants (6.4%) lived alone.

Measures

Sociodemographic survey. At the beginning of the study, data were collected on age, sex, sexual orientation, education level, occupational status (current and just prior to lockdown), income level, change in income since the start of lockdown, household size, number of close friends, COVID-19 status (active diagnosis, diagnosed and recovered, suspected, or not diagnosed or suspected), perceived risk of health complications should one develop COVID-19, and whether they were currently receiving psychological/psychiatric services.

The **Depression Anxiety Stress Scale (DASS-21) Colombian-Spanish validation (**Ruiz et al., 2017) was used in this study. DASS-21 items ask respondents to state to what extent various negative emotional states applied to them during the past week. Items are rated from 0 (*did not apply to me at all*) to 3 (*applied to me very much or most of the time*). Factor analysis supports the interpretation of the total score as a single dimension of "distress" (Ruiz et al., 2017), with excellent levels of reliability (Cronbach's $\alpha = .93$). The full DASS-21 was administered at the start and end of the present study. To reduce respondent fatigue, daily measure only included the 6-items with the highest factor loadings (10, 14, 15,16, 18, and 20; Ruiz et al., 2017), and instructions were adapted to ask respondents to describe their emotional state "throughout the day today." These items were summed to produce a total daily distress score, which produced acceptable internal consistency ($\alpha = .76$). A reliability change index (Cranford et al., 2006) found that the DASS-6 has a good reliability ($R_c = .99$).

Various **Health and Risk Behaviors,** referring to activities that can have beneficial or detrimental effects on health, were daily measured using a series of items utilized by Strahler et al. (2020). Those included in this study were: exercising (physical activity), using tobacco-related products, drinking alcohol, eating high-calorie food, engaging in work/homework/chores, and engaging in leisure activities. One additional item, "Watching and searching for COVID-19 news" was included given the present context. Following Strahler et al. (2020), participants rated to what extent they had engaged in these behaviors during the present day from 1 (*not at all*) to 4 (*very much*). We did not specify exact presentation of each behavior (e.g. duration of the activity, number of alcohol units/cal) for two reasons. First, we aimed to identify day-to-day variation within the individual rather than objective amounts of each behavior. Second, daily reporting of every health-promoting behavior using different scales per item would likely increase participant burnout and therefore dropout. Each item was analyzed separately. Perceived quality of sleep (1 = *good*, 0 = *bad*) was also measured daily. Each behavior was measured with a single item; thus, the reliability of change index could not be calculated (Mehl & Conner, 2011).

The **Friendship Scale** (FS; Hawthorne, 2006) was administered daily to evaluate perceived quality of social connectedness. This is a 6-item questionnaire that measures people's perception of relationship availability (Appendix B). Items are rated from 0 (*not at all*) to 4 (*almost always*), producing total scores from 0 to 24 for each scale, with higher scores representing more perceived social connectedness. The FS has a good construct validity and good reliability according to Cronbach's alpha ($\alpha = .83$). A backward-and-forward translation to Spanish was used in this study. Instructions for answering the scale were adapted to assess connectedness with virtual (FS-V) or in-person (FS-P) relationships separately. Both FS-V ($\alpha = .81$) and FS-P ($\alpha = .90$) showed high internal consistency.

Occurrence of social interaction was also measured. Participants reported daily whether or not they had virtual (text messages, chat, video chat, etc.) and in-person interactions with other people (1 = *yes*; 0 = *no*).

The **Emotion Regulation Questionnaire** (ERQ; Gross & John, 2003) consists of two 5-item scales that measure people's tendency to engage in cognitive reappraisal and expressive suppression respectively. The ERQ is rated on a Likert scale from 1 (*strongly disagree*) to 7 (*strongly agree*). A Spanish back-and-forward translation was conducted to adapt the ERQ to Colombian-Spanish speakers. An EFA was performed with 133 respondents who completed the ERQ at baseline with acceptable levels of reliability for cognitive reappraisal ($\alpha = .72$) and expressive suppression ($\alpha = .78$) according to Cronbach's alphas. A version of the ERQ was validated in Colombia recently (Vélez-Ocampo & Canales-Ramírez, 2020) with pre-lockdown data in which they found similar psychometric properties to our study, a two-factor structure, and good levels of reliability for cognitive reappraisal ($\alpha = .72$) and expressive suppression ($\alpha = .77$).

Data analysis

The current study used daily data of social and health behaviors to predict psychological distress, applying a Multilevel Modeling (MLM) using the SPSS MIXED procedure (Version 26; syntax available in Appendix A). Three models were tested: (a) Model 1: Socioemotional variables and psychological distress, (b) Model 2: Health Promoting Behaviors and Psychological Distress, and (c) Model 3: Health Risk Behaviors and Psychological Distress. MLM is a good fit for diary data as it allows nesting daily observations within-participants (Level 1) and clustering

data between-participants (Level 2). MLM provided information on fixed and random effects. At Level 2, fixed effects estimated the average effects of socioemotional and health behaviors on distress. At level 1, daily associations among predictors and outcomes were assessed. Time was also introduced as a predictor of psychological distress and was measured as a linear variable (1 = *first diary day*; 15 = *last diary day*). This variable was included in the analysis because we hypothesized that distress would incrementally augment by each day spent in lockdown. In sensitivity analyses, time variable was introduced to test its contribution to the between and within levels, showing no significant changes in the model originally established (see Appendix C, Tables C1 to C3).

Random effects evaluated the individual differences within the fixed effects, indicating whether the within-person variance explained between-person changes when random effects were significant.

In this study, Level 1 data (day-level) were centered on each person's mean, and Level 2 (person-level) data were centered on the grand mean. At the day-level, the coefficients for social connectedness, health-promoting behaviors, and health risk behaviors represent the variation of an individual around their own mean across days. At the person-level, the significant coefficient represents how a person's mean of socioemotional and health behaviors varies around the grand mean of all individuals' means of these variables. In order to control for effects of time on distress, fixed and random effects of this variable were performed. To identify whether time was a source of non-independence in Level 1, the residual autocorrelation (ρ) was calculated. Interclass correlation (ICC) between- and within-levels was calculated for each model to identify the proportion of variance accounted for at each level (random effect size; Lorah, 2018). ICC for MLM models indicated that within-person variability was above 55% in all of them, therefore, both levels of analysis were important to understand how the relation of people's daily distress with socioemotional and health-related factors during lockdown. Effects sizes for fixed effects were calculated by multiplying each regression coefficient by the standard deviation of X and dividing it by the standard deviation of Y (Lorah, 2018).

Independent t-tests were performed to evaluate whether those with preexisting health conditions had significantly higher distress than those without such conditions (Hypothesis 1). In post hoc t-tests, we explored (1) whether students, an overrepresented subgroup in our sample, were significantly different to other subgroups; and (2) whether ERQ mean scores in this sample differed from that of other samples, in order to determine generalizability of results.

In order to increase fidelity and generalization of the analysis of a participant's typical day in lockdown, we established a compliance threshold of 80% of daily reports a priori (see Trull & Ebner-Priemer, 2020); therefore, data analysis was only conducted with those who completed at least 12 end-of-day reports. Consequently, the number of diaries available for the analysis ranged between 12 and 15 per person. Missing data was minimized due to forced-response option on questionnaires and was handled using Restricted Maximum Likelihood. Consequently, models 2 and 3 used the full sample of $n = 109$ while Model 1 had $n = 97$.

RESULTS

Descriptive data

To contextualize the sample, data are first reported regarding baseline social and health factors that may influence participants' psychological distress during lockdown. Almost all respondents

(94.5%) reported living with other(s). As a result, in-person social contact was common throughout lockdown, being reported in 83.5% of diary records. Similarly, virtual social contact was common (reported in 71.7% of diary records). Perceived social connectedness was moderate for both in-person (M = 13.28, *SD* = 2.67) and virtual social interactions (M = 13.09, *SD* = 2.68) at the beginning of the study, based on the Friendship Scale which ranges from 0 to 24.

Regarding risks associated with the possibility of complications following COVID-19 contagion, most (81.7%) had no pre-existing conditions (such as hypertension or asthma) that could heighten risk from COVID-19. Participants perceived a low-to-moderate risk of developing health complications from COVID-19 (M = 3.73, *SD* = 1.55), rated from 1 (*none*) to 7 (*high*). Consistent with the fact that the survey was conducted early in the outbreak in Colombia, few participants had neither been diagnosed with COVID-19 (0.9%) and few suspected having it (2.8%).

Our first hypothesis predicted that higher distress would be associated with pre-existing health conditions and lower income. While pre-existing conditions were not associated with mean distress, (t (97.1) = −1.15; p = .252, CI_{95}[−0.13; 0.48]), a multilevel model including household salary and COVID-19 risk perception found that a household salary higher than double minimum wage was associated with less mean distress (t (96.1) = −2.59; p = .011, CI_{95}[−1.88; 0.25]), but COVID-19 risk perception was not a significant predictor (t (94.01) = *1.13*; p = .25, CI_{95}[−0.13; −0.47]). These factors did not interact with time.

Students were overrepresented in our sample (38.5%) and compared to non-students they had significantly higher distress (p = .013, $M_{students}$ = 41.26, $M_{nonstudents}$ = 35.98), higher emotional suppression (p = .043, $M_{students}$ = 10.31, $M_{nonstudents}$ = 9.92) and lower perceived risk of complications associated with COVID (p = .004, $M_{students}$ = 3.29, $M_{nonstudents}$ = 4.06). However, they did not significantly differ from other participants in terms of reappraisal (p =.174) or household size (p = .702).

Model 1: Socioemotional variables and psychological distress

This first MLM model (Table 1) tested hypothesis 2, which predicted that mean distress would be higher in participants with lower reappraisal, greater suppression, smaller household size, and lower perceived connectedness in daily social interactions (Level 2), and that on days that participants reported higher levels of perceived social connectedness, their levels of distress would be lower (Level 1). The intraclass correlation (ICC) indicates that 49.5% of the variability was accounted for between-person variables, while 50.5% was attributed to within-person changes. Between-person fixed effects showed that participants who reported a high mean level of perceived connectedness in virtual social interactions (t (92.15) = −5.00; p < .001, CI_{95}[−0.38; −0.16]) presented lower levels of psychological distress. Within-person effects showed that both perceived social connectedness in virtual (t (59.35) = −3.38; p = .001, CI_{95}[−0.17; −0.04]) and in-person (t (51.58) = −7.42; p < .001, CI_{95}[−0.28; −0.16]) interactions had a significant negative trend, indicating that on those days' participants felt socially connected they perceived less levels of distress. On the contrary, emotional-regulation skills were not associated with distress scores (Table 1).

Random intercept effects indicated significant variability in psychological distress among participants (Wald = 3.60, p < .001, CI_{95}[1.27; 3.78]), finding that on average people differed from each other at the starting point of the study by 2.19 points. Slope variance among participants was also significant for time in lockdown (Wald = 2.61; p = .009, CI_{95}[0.01; 0.03]) and

TABLE 1 Socioemotional variables predicting psychological distress during lockdown

Parameter	*b*	SE	df	β[a]	*t*	Sig.	95% confidence interval LB	95% confidence interval UB
Fixed effects								
Between-person effects								
Intercept	15.03	1.46	92.57		10.30	<.001	121.32	179.30
Cognitive reappraisal	0.02	0.04	91.05	.02	0.49	.623	−0.06	0.10
Expressive supression	−0.06	0.05	99.92	−.06	−1.21	.228	−0.16	0.04
Household size	−0.16	0.14	82.91	−.06	−1.14	.258	−0.43	0.12
Perceived connecteness in virtual social interactions (PC-VSI)	−0.27	0.05	92.15	−1.25	−5.00	**<.001**	−0.38	−0.16
Perceived connecteness within in-person social interactions (PC-PSI)	−0.05	0.05	94.50	−.06	−0.99	.323	−0.16	0.05
Within-person effects								
Time in lockdown	0.01	0.02	80.08	.01	0.49	.622	−0.03	0.05
Daily PC-VSI	−0.11	0.03	59.35	−.20	−3.38	**.001**	−0.17	−0.04
Daily PC-PSI	−0.22	0.03	51.58	−.27	−7.42	**<.001**	−0.28	−0.16

Random effects	*b*	SE	Wald *Z*	Sig	95% confidence interval LB	95% confidence interval UB
Psychological distress	2.19	0.61	3.60	**<.001**	1.272	3.780
Time in lockdown	0.02	0.01	2.61	**.009**	0.007	0.033
PC-VSI	0.03	0.01	2.22	**.027**	0.011	0.066
PC-PSI	0.01	0.01	1.25	.212	0.003	0.061
Distress and time in lockdown	−0.09	0.05	−1.75	.079	−0.192	0.011
Distress and PC-VSI	−0.10	0.06	−1.59	.111	−0.225	0.023
Distress and PC-PSI	−0.01	0.05	−0.25	.801	−0.117	0.090
PC-PSI and time in lockdown	0.00	0.01	−0.91	.365	−0.014	0.005
PC-VSI and time in lockdown	0.00	0.01	0.26	.795	−0.011	0.014
PC-VSI and PC-PSI	−0.01	0.05	−0.25	.801	−0.117	0.090

Notes: Akaike's Information Criterion (AIC) = 3829.568; $\rho = 0.113$, $p < .034$.

[a]Effect size for fixed effects. These are interpreted as follows: For 1 *SD* change (decrease or increase) in the covariate, it is expected that the outcome changes in the value indicated in β, controlling for associate covariates (Lorah, 2018).

daily virtual contact (Wald = 2.22; $p = .027$, $CI_{95}[0.01; 0.07]$), meaning that the relation between these variables and psychological distress did vary across participants (see Table 1). Finally, within-person variation (residuals) was significant, indicating that each participant had considerable variation in their distress throughout the study.

To review the generalizability of the present findings, post hoc one sample *t* tests that compared mean reappraisal and suppression in the present study compared to studies that had

administered the ERQ in similar contexts pre-lockdown showed that cognitive reappraisal in this study (M = 21.08, *SD* = 3.71) was significantly lower than in studies of Colombia outside of lockdown conditions (M = 29.92; Vélez-Ocampo & Canales-Ramírez, 2020), t (107) = −23.99, $p < .001$. Suppression was also significantly lower in this study (M = 10.45, *SD* = 3.39) than in studies in Colombia pre-lockdown (M = 14.53; Vélez-Ocampo & Canales-Ramírez, 2020), t (107) = −12.48, $p < .001$.

Model 2: Health promoting behaviors (HPBs) and psychological distress

Model 2 and 3 tested hypothesis 3, which predicted that daily and mean distress would be associated with lower daily and average levels of exercise, work, and leisure activities; poor sleep; greater COVID-related media consumption, and greater intake of high-calories, alcohol, and nicotine (Level 1 and Level 2). The contribution of the two-level in model 2 to explain psychological distress by health-promoting behaviors was meaningful (between-person ICC = 44.8%; within-person ICC = 55.1%). Only quality of sleep predicted psychological distress at the between-person level (t (101.85) = −3.97; $p < .001$, CI_{95}[−4.61; −15.39]). At the within-person level, all HPBs were associated with lower levels of distress. Thus, on days when participants exercised (t (77.85) = −2.59; $p = .011$, CI_{95}[−0.42; −0.06]), were involved in meaningful activities (work/study/chores; t (1194.9) = −2.11; $p = .027$, CI_{95}[−0.28; −0.02]), engaged in leisure activities (t (88.22) = −5.34; $p < .001$, CI_{95}[−0.59; −0.27]) and had a good quality of sleep (t (1416.9) = −4.34; $p < .001$, CI_{95}[−0.87; −0.33]) their distress was lower (Table 2).

Random intercept effects indicated significant variability in psychological distress among participants (Wald = 4.60, $p = .001$, CI_{95}[2.38; 5.59]) from the beginning of the study. Only the exercising slope showed significant random effects, indicating high variability among participants' exercising across the study (Wald = 2.37, $p = .018$, CI_{95}[0.12; 0.62]). Finally, a random slope effect was observed between distress and engagement in leisure activities, whereby those with lower distress at the beginning tended to increase frequency of leisure activities over time (Wald = −2.67, $p = .008$, CI_{95}[−0.93; −0.14]).

Model 3: Health risk behaviors and psychological distress

Intraclass correlation in Model 3 showed that between-person variables accounted for 39.9% of the variance of psychological distress while within-person factors explained 60.1% of the variability. None of the health-risk behaviors were associated with distress at the between-person level. However, at the within-person level, on those days in which participants ate high-calorie food (t (1464) = 2.07; $p = .04$, CI_{95}[0.01; 0.35]) and watched COVID-19 news (t (1430.74) = 2.46; $p = .01$, CI_{95}[0.06; 0.49]), they reported higher levels of distress (Table 3), while nicotine and alcohol use were not associated with daily fluctuations in distress.

DISCUSSION

In this study, distress during lockdown was predicted by social connectedness, health-promoting, and health-risk variables at both between- and within-person levels. Distress during lockdown was relatively high and showed a reduction in trend over time, reflecting within-

TABLE 2 Health-promoting behaviors predicting psychological distress during lockdown

Parameter	*b*	SE	df	β[a]	*t*	*p*	95% confidence interval LB	UB
Fixed effects								
Between-person effects								
Intercept	11.16	1.43	107.44		7.83	**<.001**	8.34	13.99
Exercising	0.05	0.31	98.78	.02	0.16	.877	−0.57	0.67
Engaging in work/study/chores	0.09	0.29	103.84	.03	0.31	.757	−0.49	0.67
Engaging in leisure activities	−0.05	0.36	105.43	−.01	−0.13	.898	−0.76	0.67
Quality of sleep	−3.07	0.77	101.89	.47	−3.97	**<.001**	−4.61	−15.39
Within-person effects								
Time in lockdown	−0.05	0.02	108.16	−.07	−2.85	**.005**	−0.08	−0.02
Daily exercise	−0.24	0.09	77.85	−.08	−2.59	**.011**	−0.42	−0.06
Daily engagement in work/study/chores	−0.15	0.07	1194.2	−.05	−2.21	**.027**	−0.28	−0.02
Daily engagement in leisure activities	−0.43	0.08	88.22	−.07	−5.34	**<.001**	−0.59	−0.27
Daily quality of sleep	−0.60	0.14	1.416.91	.10	−4.34	**<.001**	−0.87	−0.33

Random effects	*b*	SE	Wald *Z*	*p*	95% confidence interval LB	UB
Psychological distress	3.65	0.79	4.60	**<.001**	2.38	5.59
Time in lockdown	0.01	0.00	1.52	.127	0.00	0.03
Exercising	0.27	0.11	2.37	**.018**	0.12	0.62
Engaging in leisure activities	0.13	0.09	1.42	.156	0.03	0.50
Distress and time in lockdown	−0.03	0.05	−0.58	.559	−0.12	0.07
Distress and exercising	−0.26	0.22	−1.21	.224	−0.69	0.16
Distress and leisure activities	−0.54	0.20	−2.67	**.008**	−0.93	−0.14
Exercising and time in lockdown	0.02	0.02	1.12	.261	−0.01	0.05
Leisure activities and time in lockdown	0.00	0.01	−0.11	.916	−0.03	0.02
Leisure activities and exercising	−0.01	0.08	−0.08	.940	−0.17	0.15

Notes: Akaike's Information Criterion (AIC) = 7060.53; $\rho = 0.19$, $p < .001$.

[a]Effect size for fixed effects. These are interpreted as follow: For 1 *SD* change (decrease or increase) in the covariate, it is expected that the outcome changes in the value indicated in β, controlling for associate covariates (Lorah, 2018).

person differences in trends in contrast to between-person studies conducted during the COVID-19 pandemic (Rajkumar, 2020).

Neither emotional suppression nor cognitive reappraisal predicted distress between individuals, contrasting with previous research (Cutuli, 2014). As noted in results, reappraisal and

TABLE 3 Health risk behaviors predicting psychological distress during lockdown

Parameter	*b*	SE	df	*β*[a]	*t*	*p*	95% confidence interval LB	95% confidence interval UB
Fixed effects								
Between-person effects								
Intercept	6.04	1.33	104.75		4.56	**<.001**	3.417	8.672
Watching and searching for COVID-19 news	−0.17	0.39	104.07	−.04	−0.43	.667	−0.952	0.611
Using nicotine-based substances	1.91	1.05	104.12	.18	1.82	.072	−0.174	3.993
Drinking alcohol	0.31	0.79	106.33	.04	0.39	.695	−1.258	1.882
Eating high-calorie food	0.51	0.26	110.71	.15	1.95	.053	−0.008	1.032
Within-person effects								
Time in lockdown	−0.04	0.02	115.05	−.06	−2.03	**.045**	−0.071	−0.001
Daily watching COVID-19 news	0.27	0.11	1430.74	.07	2.46	**.014**	0.054	0.483
Daily nicotine-based substances use	−0.26	0.30	1410.73	−.02	−0.85	.398	−0.849	0.337
Daily alcohol drinking	0.12	0.20	1410.63	.02	0.58	.564	−0.277	0.508
Daily consumption of high-calorie food	0.18	0.09	1464.00	.05	2.07	**.039**	0.009	0.353

Random effects	*b*	SE	Wald Z	*p*	95% confidence interval LB	95% confidence interval UB
Psychological distress	3.38	0.79	4.29	**<.001**	2.143	5.345
Time in quarantine	0.01	0.00	1.57	.116	0.002	0.027

Notes: Akaike's Information Criterion (AIC) = 7151.76; $\rho = 0.18$, $p < .001$.

[a]Effect size for fixed effects. These are interpreted as follow: For 1 *SD* change (decrease or increase) in the covariate, it is expected that the outcome changes in the value indicated in *β*, controlling for associate covariates (Lorah, 2018).

suppression were lower in the present study than in non-lockdown conditions in Colombia and other countries (Spaapen et al., 2014; Vélez-Ocampo & Canales-Ramírez, 2020). This difference might reflect lockdown conditions but could also reflect the nature of our sample.

In line with a study in Japan (Kikuchi et al., 2020), those with lower income had higher mean distress. This likely reflects the importance of financial stability for well-being. In contrast to their results, perceived risk of health complications due to COVID-19 did not significantly predict distress. This may reflect that most participants had no underlying health conditions and rated their risk as relatively low, whereas 35% of the Japanese sample reported underlying health conditions.

Within-person, both virtual and in-person perceived social connectedness were associated with lower daily distress, mirroring previous findings showing that virtual interactions produce reductions in loneliness and depression (Tsai et al., 2020). At between-person, only virtual social connectedness significantly predicted distress. This might reflect the limited effect size of in-person interactions given that in-person contact during lockdowns was not self-selected but

with household members and may therefore be less pleasant than typical in-person contact; however, this is unlikely since participants reported in-person and virtual contact as similarly pleasant. Future studies should distinguish contact with household versus non-household members and measure relationship quality.

Participants reported lower distress on days when they exercised more, ate less high-calorie food, did more work/study and leisure, spent less time watching COVID-19 news, and slept better the previous night, suggesting that these may be important behaviors for well-being. This corroborates other studies in and out of lockdown conditions supporting the psychological benefits of these behaviors, as outlined in the Introduction. None of the health behaviors measured significantly predicted between-person differences in distress, suggesting that for most behaviors, day-to-day changes are more important predictors of distress than are between-individual differences.

Clinical implications

Cross-sectional studies that identify correlations between behaviors and distress using between-person analyses have limitations because causality cannot be concluded; perhaps some third factor (e.g. personality) causes both distress and behavioral patterns. Furthermore, non-significant findings may not mean a lack of causation, since group analyses may mask differences that occur within individuals. While the present design cannot definitively determine the direction of effect, the longitudinal assessment of the numerous social and health-related variables enables us to explore predictors of within-person variation. Thus, it is plausible to conclude that perceived social connectedness and health behaviors identified in this study influence within-person daily changes in distress.

Current findings are compatible with the idea that models of emotional functioning in normal (non-lockdown) contexts are applicable in lockdown contexts. Therefore, typical interventions should be appropriate such as increasing social contact, high-quality sleep, increasing valued activities such as work, study, and leisure, limiting COVID-related news (which in this context can be categorized as an anxiety-related checking behavior), and increasing healthy eating and exercise. Individuals may change their behavior under lockdown (e.g. reducing exercise; Maugeri et al., 2020), so interventions may need to be adapted for the new context.

Between-level predictors such as lower-income fit with suggestions that people facing economic struggles may be more at risk in lockdowns and may benefit from targeted interventions (Kikuchi et al., 2020), particularly in low- and middle-income countries where many individuals did not have enough savings to fall back on during the pandemic (Henstridge, 2020).

Limitations and recommendations

Although recruitment was targeted at the general public, students were overrepresented in the sample (38.5%), perhaps due to use of social media for recruitment. Therefore, caution is warranted in generalizing findings to the wider population. Students may have specific characteristics (e.g. in Colombia, they often live with family members rather than friends or partners), which may serve as vulnerabilities or protective factors. In addition, in-person contact with household members separately from contact with non-household members was not measured; therefore, many participants reported in-person contact daily simply due to living with others.

Such contact is distinct to contact chosen voluntarily, so future studies should measure them separately. Since healthy behaviors, social connectedness, and distress levels were only measured once a day, it is hard to identify the direction of causation. Further research should consider using an ecological momentary assessment that disentangles causation through implementing multiple event-based measurements.

Some demographics were collected in this study to describe the sample (e.g. sexual orientation, education level, occupational status, and current psychological services); these were not included in the regression models due to the small sample size, in order to avoid Type 1 error. Numerous other variables could not be included in the present study due to participant time limitations. Future studies might explore the role of other evidence-based emotional regulation strategies such as problem-solving, mindfulness, motivational strategies, and exposure (Hofmann & Hayes, 2019) and include them as within-person predictors as well. Finally, future studies might explore whether phenomena identified during this initial lockdown differ from those seen during subsequent lockdowns, since some participants may eventually identify adaptive coping strategies and others may experience escalation of maladaptive strategies.

Conclusion

This study provides important insights regarding the role of socioemotional and health behaviors on people's distress during lockdown conditions. Findings suggest that while between-person factors are important, within-person variables also explain significant variability, suggesting that well-being and distress management could be partially under the control of daily behaviors. Therefore, individuals might benefit from engaging in activities such as exercising, eating healthily, limiting media exposure, maintaining work/leisure activities, and contacting friends virtually during lockdowns.

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CONFLICT OF INTEREST

The authors have no conflict of interest to disclose.

ETHICS STATEMENT

All aspects of the study were approved by the Institutional Review Board at the University of Los Andes. No ethical issues were reported in this study.

INFORMED CONSENT

Participants granted informed consent according to local IRB and APA standards. This is mentioned in Section 2.1.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available at https://osf.io/fkg3e/?view_only=41424c8927d04ec1933e8d61572f726d.

ORCID

Amanda M. Muñoz-Martínez https://orcid.org/0000-0001-5558-4355

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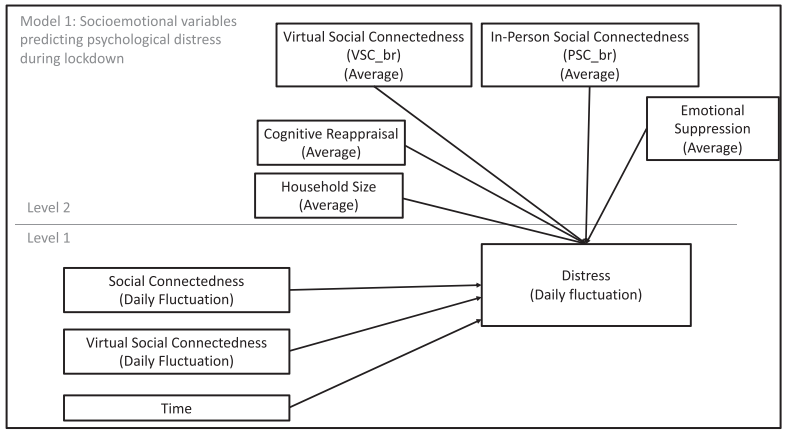
APPENDIX A: MODELS, FORMULA, AND SPSS SYNTAX

Model 1. Socioemotional variables predicting psychological distress during lockdown



Formula

Level 1

Distress (*Y*) = $\beta 0 + \beta 1$ (Virtual Social Connectedness; VSC) + $\beta 2$ (In-Person Social Connectedness; PSC) + $\beta 3$ (Time) + e.

Level 2

$\beta 0 = \tau 00 + \tau 01$ (Mean VSC_br) + $\tau 02$ (Mean PSC_br) + $\tau 03$ (Cognitive Reappraisal; CR) + $\tau 04$ (Emotional suppression; ES) + $\tau 05$ (Household size; HH) + $\tau 06$ (Time) + e.

$\beta 1 = \tau 10$.

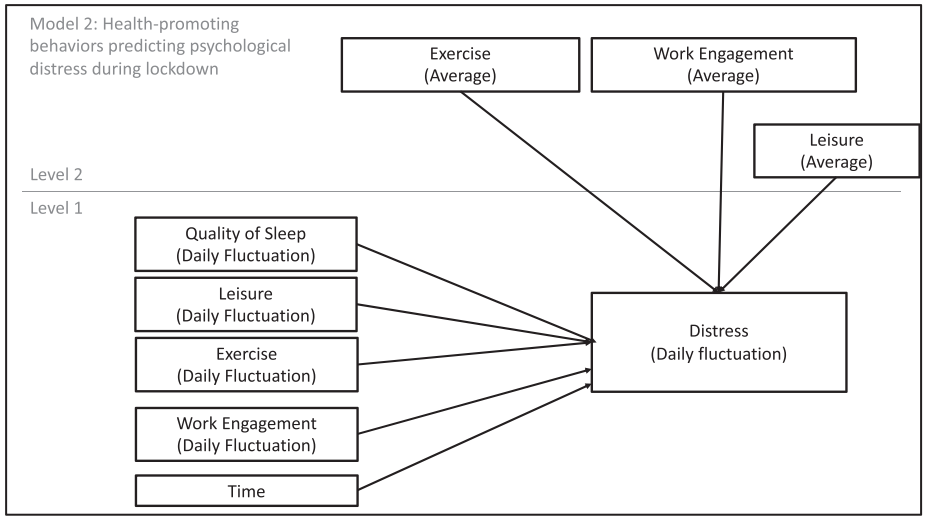
$\beta 2 = \tau 20$.

$\beta 3 = \tau 30$.

Syntax

```
MIXED Distress WITH Day CR ES HH VSC_br PSC_br VSC_wr PSC_wr
/FIXED = Day CR ES HH VSC_br PSC_br VSC_wr PSC_wr|SSTYPE(3)
/METHOD = REML
/PRINT = G SOLUTION TESTCOV
/RANDOM = INTERCEPT Day PSC_wr VSC_wr|SUBJECT (id) COVTYPE (UN)
/REPEATED=Day|SUBJECT (id) COVTYPE (AR1).
```

Model 2. Health-promoting behaviors predicting psychological distress during lockdown



Formula

Level 1

Distress $(Y) = \beta 0 + \beta 1$ (Exercise) $+ \beta 2$ (Work_Engage) $+ \beta 3$ (Leisure) $+ \beta 4$ (Quality of Sleep; QoS_Good) $+ \beta 5$ (Time) $+ e$.

Level 2.

$\beta 0 = \tau 00 + \tau 01$ (Mean Exercise) $+ \tau 02$ (Mean Work_Engage) $+ \tau 03$ (Mean Leisure) $+$ e.

$\beta 1 = \tau 10 + e$

$\beta 2 = \tau 20 + e$

$\beta 3 = \tau 30 + e$

$\beta 4 = \tau 40$

$\beta 5 = \tau 50 + e$

Syntax

MIXED Distress WITH Day Exercise_b Work_Engage_b Leisure_b Exercise_w Work_Engage_w Leisure_w QoS_Good.

/FIXED = Day Exercise_b Work_Engage_b Leisure_b Exercise_w Work_Engage_w Leisure_w QoS_Good|SSTYPE(3).

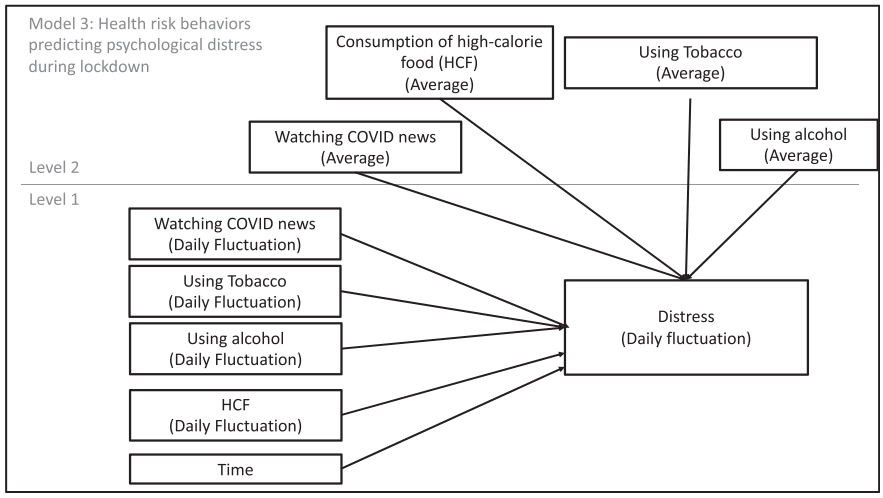
/METHOD = REML.

/PRINT = G SOLUTION TESTCOV.

/RANDOM = INTERCEPT Day Exercise_w Leisure_w|SUBJECT (id) COVTYPE (UN).

/REPEATED=Day|SUBJECT (id) COVTYPE (AR1).

Model 3. Health risk behaviors predicting psychological distress during lockdown Formula



Level 1

Distress (Y) = $\beta 0 + \beta 1$ (COVID_news) + $\beta 2$ (Tobacco) + $\beta 3$ (Alcohol) + $\beta 4$ (Consumption of high-calorie food; HCF) + $\beta 5$ (Time) + e.

Level 2

$\beta 0 = \tau 00 + \tau 01$ (Mean COVID_news) + $\tau 02$ (Mean Tobacco) + $\tau 03$ (Mean Alcohol) + $\tau 04$ (Mean HCF) + e.

$\beta 1 = \tau 10$.

$\beta 2 = \tau 20$.

$\beta 3 = \tau 30$.

$\beta 4 = \tau 40$.

$\beta 5 = \tau 50 + e$.

Syntax

MIXED Distress WITH Day COVID_news_b Tobacco_b Alcohol_b HCF_b COVID_news_w Tobacco_w Alcohol_w HCF_w

/FIXED = Day COVID_news_b Tobacco_b Alcohol_b HCF_b COVID_news_w Tobacco_w Alcohol_w HCF_w|SSTYPE(3).

/METHOD = REML.

/PRINT = G SOLUTION TESTCOV.

/RANDOM = INTERCEPT Day|SUBJECT (id) COVTYPE (UN).

/REPEATED=Day|SUBJECT (id) COVTYPE (AR1).

APPENDIX B: BACKWARD-AND-FORWARD TRANSLATION OF THE FRIENDSHIP SCALE (HAWTHORNE, 2006)

	***En contextos, interacciones, y/o conversaciones virtuales/en persona* durante el día de hoy:**					
		Casi Siempre	**La mayoría del tiempo**	**Aproximadamente la mitad del tiempo**	**Ocasionalmente**	**Para nada**
1.	Ha sido fácil relacionarme con otros.	1	2	3	4	5
2.	Me he sentido aislado/a de otras personas.	1	2	3	4	5
3.	Tuve alguien con quien compartir mis sentimientos.	1	2	3	4	5
4.	Me fue fácil poder contactarme con otros cuando lo necesité.	1	2	3	4	5
5.	Cuando estuve con otros, me sentí apartado/a de ellos.	1	2	3	4	5
6.	Me sentí solo/a y sin amigos.	1	2	3	4	5

APPENDIX C: SENSITIVITY ANALYSIS

TABLE C1 Socioemotional variables and time (at level 1 and level 2) predicting psychological distress during lockdown

Parameter	*b*	SE	df	*t*	Sig.	95 confidence interval LB	UB
Fixed effects							
Between-person effects							
Intercept	8.32	1.52	92.41	5.48	**<.001**	5.30	11.33
Cognitive reappraisal	0.05	0.06	90.35	0.85	.400	−0.06	0.16
Expressive supression	−0.06	0.07	109.71	−0.89	.373	−0.20	0.08
Household size	−0.02	0.19	89.82	−0.10	.921	−0.40	0.36
Perceived connecteness in virtual social interactions (PC-VSI)	−0.28	0.06	143.06	−4.37	**<.001**	−0.40	−0.15
Perceived connecteness within in-person social interactions (PC-PSI)	−0.04	0.06	132.79	−0.69	.491	−0.16	0.08
Within-person effects							
Time in lockdown	0.15	0.16	96.68	0.98	.328	−0.16	0.46
Cognitive reappraisal by time in lockdown	0.00	0.01	94.71	−0.71	.480	−0.02	0.01
Expressive supression by time in lockdown	0.00	0.01	107.44	0.03	.976	−0.01	0.01
Household size by time in lockdown	−0.02	0.02	87.51	−1.03	.304	−0.06	0.02
PC-VSI by time in lockdown	0.00	0.00	459.39	0.26	.795	−0.01	0.01
PC-PSI by time in lockdown	0.00	0.00	463.16	−0.34	.736	−0.01	0.01
Daily PC-VSI	0.16	0.06	132.35	2.64	**.009**	0.04	0.28
Daily PC-PSI	−0.17	0.06	133.99	−2.82	**.006**	−0.28	−0.05

Random effects	*b*	SE	Wald Z	Sig	95 confidence interval LB	UB
Psychological distress	2.27	0.59	3.83	**<0.001**	1.36	3.79
Time in lockdown	0.02	0.01	2.82	**0.005**	0.01	0.03
PC-VSI	0.03	0.01	2.29	**0.022**	0.01	0.06
PC-PSI	0.00	0.00				
Distress and time in lockdown	−0.10	0.05	−1.94	0.053	−0.20	0.00
Distress and PC-VSI	−0.09	0.06	−1.53	0.125	−0.21	0.03
Distress and PC-PSI	−0.02	0.04	−0.49	0.626	−0.10	0.06
PC-PSI and time in lockdown	0.00	0.00	−0.61	0.545	−0.01	0.00
PC-VSI and time in lockdown	0.00	0.01	0.00	0.999	−0.01	0.01
PC-VSI and PC-PSI	0.00	0.01	0.04	0.971	−0.01	0.01

Notes: Akaike's Information Criterion (AIC) = 3872.07. $\rho = 0.079$; $p < .111$. PC-VSI = perceived connectedness in virtual social interactions; PC-PSI = Perceived connecteness within in-person social interactions.

TABLE C2 Health-promoting behaviors and time (at level 1 and level 2) predicting psychological distress during lockdown

Parameter	*b*	SE	df	*t*	*p*	95% confidence interval LB	UB
Fixed effects							
Between-person effects							
Intercept	10.71	1.68	109.72	6.38	<.001	7.38	14.03
Exercising	0.20	0.37	101.04	0.55	.586	−0.53	0.93
Engaging in work/study/chores	−0.18	0.35	107.16	−0.51	.610	−0.86	0.51
Engaging in leisure activities	0.05	0.42	107.60	0.13	.898	−0.79	0.90
Quality of sleep	−2.22	0.91	105.15	−2.44	**.016**	−4.03	−0.42
Within-person effects							
Time in lockdown	0.02	0.13	104.64	0.17	.869	−0.23	0.28
Daily exercise by time in lockdown	−0.02	0.03	102.89	−0.79	.430	−0.08	0.03
Daily engagement in work/study/chores by time in lockdown	0.04	0.03	105.42	1.50	.137	−0.01	0.09
Daily engagement in leisure activities by time in lockdown	−0.02	0.03	106.08	−0.48	.633	−0.08	0.05
Daily quality of sleep by time in lockdown	−0.13	0.07	105.01	−1.79	.076	−0.27	0.01
Daily exercise	−0.24	0.09	78.61	−2.64	**.010**	−0.42	−0.06
Daily engagement in work/study/chores	−0.15	0.07	1176.61	−2.21	**.027**	−0.28	−0.02
Daily engament in leisure activities	−0.42	0.08	88.11	−5.31	**<.001**	−0.58	−0.26
Daily quality of sleep	−0.59	0.14	14136.02	−4.29	**<.001**	−0.86	−0.32

Random effects	*b*	SE	Wald *Z*	*p*	95% confidence interval LB	UB
Psychological distress	3.67	0.80	4.60	<.001	2.40	5.62
Time in lockdown	0.01	0.00	1.31	.190	0.00	0.03
Exercising	0.27	0.11	2.35	.019	0.12	0.61
Engaging in leisure activities	0.12	0.09	1.34	.179	0.03	0.50
Distress and time in lockdown	−0.03	0.05	−0.55	.584	−0.12	0.07
Distress and exercising	−0.22	0.22	−1.00	.318	−0.65	0.21
Distress and leisure activities	−0.58	0.20	−2.89	.004	−0.98	−0.19
Exercising and time in lockdown	0.01	0.02	0.64	.520	−0.02	0.04
Leisure activities and time in lockdown	0.00	0.01	0.27	.789	−0.02	0.03
Leisure activities and exercising	0.00	0.08	0.02	.988	−0.16	0.16

Note: Akaike's Information Criterion (AIC) = 7072.88.

TABLE C3 Health risk behaviors and time (at level 1 and level 2) predicting psychological distress during lockdown

Parameter	*b*	SE	df	*t*	*p*	95% confidence interval LB	UB
Fixed effects							
Between-person effects							
Intercept	5.50	1.50	101.10	3.66	<.001	2.514	8.477
Watching and searching for COVID-19 news	−0.17	0.45	102.92	−0.38	.707	−1.062	0.723
Using nicotine-based substances	2.99	1.21	104.90	2.48	**.015**	0.596	5.377
Drinking alcohol	−0.17	0.93	113.73	−0.18	.857	−2.000	1.665
Eating high-calorie food	0.49	0.30	112.21	1.62	.108	−0.109	1.086
Within-person effects							
Time in lockdown	0.05	0.12	100.81	0.47	.637	−0.175	0.285
Watching COVID-19 news by time in lockdown	0.00	0.03	102.94	−0.01	.994	−0.069	0.069
Nicotine-based substances use by time in lockdown	−0.17	0.09	105.14	−1.82	.072	−0.355	0.015
Alcohol drinking by time in lockdown	0.07	0.07	118.14	0.99	.324	−0.072	0.215
Consumption of high-calorie food by time in lockdown	0.00	0.02	109.04	0.16	.871	−0.042	0.050
Daily watching COVID-19 news	0.27	0.11	1.43	2.49	**.013**	0.057	0.486
Daily nicotine-based substances use	−0.23	0.30	1.40	−0.77	.443	−0.828	0.362
Daily alcohol drinking	0.09	0.20	1.41	0.46	.649	−0.302	0.485
Daily consumption of high-calorie food	0.18	0.09	1.46	2.06	**.040**	0.009	0.353

Random effects	*b*	SE	Wald Z	*p*	95% confidence interval LB	UB
Psychological distress	3.38	0.79	4.29	**<.001**	2.143	5.345
Time in quarantine	.01	0.01	1.54	.123	0.002	0.028

Notes: Akaike's Information Criterion (AIC) = 7165.56. $\rho = 0.18$; $p < .001$.