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Analysis of predictors of stress during confinement by COVID-19 in Spain

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ABSTRACT

Introduction. Confinement has had a great emotional impact on the population, especially in terms of stress. Factors such as the presence of previous mental or physical illness, resilience or emotional intelligence may influence the occurrence or increase of stress. The aim was to assess predictors of stress by comparing two statistical methodologies (one linear and one non-linear).

Method. 802 Spaniards (65.50% women) who completed the questionnaires autonomously after signing the informed consent form participated. Stress (PSPP), COVID-19 threat perception (BIPQ-5), resilience (CD-RISC-10) and emotional intelligence (TMMS-24) were assessed. Descriptive statistics, hierarchical regression (HRM) and fuzzy set comparative qualitative analysis (fsQCA) were conducted.

Results. Data obtained by HRM showed that the presence of previous mental illness, low resilience and emotional clarity, high emotional alertness and COVID-19 threat perception predicted 51% of the variance in stress. On the other hand, the results of the QCA showed that different combinations of these variables explained 71% of high stress and 56% of low stress. Pointing out how the presence of previous mental illness, high resilience, high emotional clarity and repair, low emotional alertness and low COVID-19 threat perception play a key role in explaining stress.

Conclusions. These aspects will help to promote personal resources to buffer stress in confinement situations.

ANÁLISIS DE LOS PREDICTORES DEL ESTRÉS DURANTE EL CONFINAMIENTO POR COVID-19 EN ESPAÑA

RESUMEN

Introducción. El confinamiento ha supuesto un gran impacto emocional en la población observándose, especialmente, el padecimiento de estrés. Factores como la presencia de enfermedades mentales o físicas previas, la resiliencia o la inteligencia emocional, pueden influir en la aparición o el aumento del estrés. El objetivo fue evaluar los predictores del estrés mediante la comparación de dos metodologías estadísticas (una lineal y otra no lineal).

Método. Participaron 802 españoles (65,50% mujeres), que rellenaron de manera autónoma los cuestionarios tras la firma del consentimiento informado. Se valoró el estrés (PSPP), la percepción de amenaza del COVID-19 (BIPQ-5), la resiliencia (CD-RISC-10) y la inteligencia emocional (TMMS-24). Se llevaron a cabo estadísticos descriptivos, regresiones jerárquicas (MRJ) y análisis cualitativos comparativos de conjuntos difusos (fsQCA).

Resultados. Los datos obtenidos por MRJ evidenciaron que la presencia de una enfermedad mental previa, una baja resiliencia y claridad emocional, una alta atención emocional y percepción de amenaza del COVID-19, predijeron el 51% de la varianza del estrés. Por su parte, los resultados del QCA mostraron que las diferentes combinaciones de estas variables explicaron el 71% de los casos de altos niveles de estrés y, el 56%, de los bajos niveles de

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estrés, señalando como la presencia de una enfermedad mental previa, la alta resiliencia, la alta claridad y reparación emocional, la baja atención emocional y la baja percepción de amenaza del COVID-19, juegan un papel fundamental en la explicación del estrés.

Conclusiones. Estos aspectos ayudarán a promover los recursos personales para amortiguar el estrés en situaciones de confinamiento.

INTRODUCTION

The emergence of COVID-19 at the end of 2019, its rapid spread and high morbidity and mortality caused the World Health Organisation (WHO) to declare a Public Health Emergency[1]. With no known treatment or cure, governments worldwide declared the State of Emergency in March 2020 and implemented social isolation measures of varying degrees of restrictiveness[2].

Confinement has had a significant socio-economic and psychological impact on society[3,4]. Social changes, ongoing uncertainty, fear of contagion of oneself or close relatives, and concern about a worsening of the health and economic situation have led to the emergence or aggravation of stress and psychological problems[2,5–7]. Stress has been identified as one of the most relevant symptoms suffered during confinement. In fact, the possibility of the appearance of the COVID-19 Stress Syndrome has been postulated[8]. In this regard, the perceived threat that the person has about COVID-19[9,10]. has been identified as particularly relevant. It should be noted that the emotional impact has been more significant in people with previous physical or psychological health problems[11,12].

However, factors such as resilience or emotional skills can buffer the impact of stressful life events associated with confinement[9,13–15]. Resilience refers to the capacity to overcome and thrive in the face of adverse situations[16]. This ability has been identified as fundamental towards the emotional adjustment of the general population during the COVID-19 pandemic, especially in Spain[16,17]. On the other hand, emotional intelligence has also been identified as a relevant factor in protecting against stressful life events. Thus, proper emotional regulation is associated with a lower emotional impact in the face of the pandemic[14,18].

To our knowledge, few studies have been conducted in the Spanish population during confinement that assess protective factors against stress. Even fewer combine linear and non-linear methodologies. Most studies are based on linear models[19,20]. The combination of linear and non-linear associative methodologies can provide the opportunity to study the relationship between the analysed variables in depth[13]. In this way, fuzzy-set qualitative comparative analyses (fsQCA) allow observing the different trajectories or combinations that lead to the same result (equifinality). Therefore, this study aims to investigate the protective factors against stress during confinement in Spain, using linear and non-linear methodologies in their prediction.

METHODOLOGY

Participants

The questionnaire was answered by 1200 people, of which 802 Spanish participants (65.50% women) between 18 and 67 years old (M=33.44; SD= 11.45), were selected according to a series of inclusion and exclusion criteria. Of those surveyed, 35.80% were single, 37.50% had a partner, 21.30% were married, and 5.40% were divorced. In terms of employment status, the majority were self-employed (59.20%), a high percentage were students (28.80%) and, to a lesser extent, unemployed (9.70%), retired (1.60%) or on disability (0.60%). Regarding the level of education, 79.60% of the sample had university studies, and the rest (19.50%) had high school studies. 26.60% of the sample showed a previous physical health problem, and 23.2% a previous mental health problem. The study included: a) people with Spanish nationality, b) who completed all questionnaires, and c) gave informed consent correctly, and excluded: d) people who reported having a severe physical or mental illness (such as oncological or neurological illness, personality disorders or psychotic disorders) via the online survey.

Instruments

- Socio-demographic variables: to analyse the study variables, an *ad hoc* questionnaire was used to collect information on socio-demographic aspects, obtaining data on: sex (male, female or intersex), age, marital status, level of education, employment status and the presence of a previous physical or psychological illness.

- *Perceived Stress Scale* (PSS-14)[21] adapted to Spanis[22]. The PSS-14 assesses perceived stress through 14 items in a Likert-type response format ranging from 0 "never" to 4 "very often". The Spanish version of the scale shows appropriate psychometric characteristics[22]. In the current sample, an excellent internal consistency was obtained (α=,90).

- *The Brief Illness Perception Questionnaire* (BIP-Q5)[23], Spanish adaptation[24] and COVID-19 adaptation[10]. The BIP-Q generally assesses the perceived threat towards an illness; the COVID-19 adaptation assesses the degree

of threat people perceive towards the virus without the need to suffer from it. The instrument comprises five items whose response ranges from 0 "minimum" to 10 "maximum". It has shown adequate psychometric properties[10]. In the present study, an acceptable internal consistency was obtained (α=,67).

- *Trait Meta-Mood Scale* (TMMS-24)[25] adapted to Spanish. This scale assesses emotional intelligence through 24 items that give rise to three subscales (emotional attention, clarity and repair). It has a Likert-type response format ranging from 1 (Strongly disagree) to 5 (Strongly agree). Previous studies showed adequate psychometric properties[26,27]. In the present study, reliability indices were adequate: emotional attention α=.91, clarity α=.93 and repair α=.86.

- *The Connor-Davidson Resilience Scale* (CD-RISC)[28] in its reduced version[29] adapted to Spanish. The CD-RISC assesses resilience through 10 items with five response options (0 "not at all", 4 "always"). Scores <27 are considered low resilience and scores >36 high resilience[29,30]. The scale has good psychometric properties in previous studies[9,30]. In the present study, it showed adequate internal consistency (α=,88).

Procedure

Participants were contacted online through social networks, which were the only possible means of access as we were under confinement in Spain during the evaluation. After signing the informed consent form, participants completed the survey using a Google Forms online form. A fundamental requirement for inclusion in this study was that they had to be 18 years of age or older, a condition that was made explicit in the informed consent form, which had to be signed. Before starting the aforementioned socio-demographic interview, they were provided with an informed consent form containing the basic information they needed to know before agreeing to participate in the research. The self-administration lasted approximately 20 minutes. The study was conducted following the Declaration of Helsinki[31].

Data analysis

First, the descriptive analyses of the participants were estimated, then the calibration values for the fsQCA were calculated, followed by hierarchical regression models (HRM) and a fuzzy-set qualitative comparative analysis (fsQCA). IBM SPSS Statistics v26 (IBM Corporation) software was used to perform the descriptive, correlational and hierarchical regression

analyses. On the other hand, fsQCA 2.5 software[32] was used to perform the fsQCA.

To conduct the fuzzy-set qualitative comparative analysis, the raw data from the answers of participants were transformed into fuzzy-set answers. For this purpose, missing data were removed, and all constructs (variables) were recalibrated. The fsQCA 2.5[32] programme recalibrated the values of perceived stress, perceived threat from the COVID-19, the emotional intelligence subscales and resilience[33]: 10% (low agreement or totally out of the set), 50% (intermediate level of agreement, neither in nor out of the set), and 90% (high agreement or totally in the set).

Following the above, necessary and sufficient conditions tests were conducted to assess the effects on stress of COVID-19 threat perception, emotional intelligence and resilience. To identify sufficient conditions, the fsQCA analysis performs a truth table algorithm, i.e. it transforms the fuzzy-set membership scores into a truth table that lists all logically possible combinations of causal conditions and the empirical outcome of each configuration[33]. Moreover, it generates three possible solutions; a complex solution, a parsimonious one and an intermediate one. The latter (the one presented here) is recommended[34]. The analysis of sufficiency considers that the solution's coverage refers to the variance explained (the number of observations that a specific combination of conditions can explain), while the consistency of the solution expresses the model's reliability.

RESULTS

Descriptive statistics and relationship between variables

Descriptive statistics

Moderate levels of perceived stress (M=25.19; SD= 9.14) were observed, which were associated with low levels of perceived COVID-19 threat (M=5.11; SD= 1.15) and low levels of resilience (M=26.78; SD= 6.59). In fact, only 7.90% of the sample showed high levels of resilience. In terms of emotional skills, we observed that participants showed adequate emotional attention (M=26.81; SD= 6.82), clarity (M=26.17; SD= 6.95) and repair (M=25.17; SD= 6.43).

Hierarchical regression models vs QCA

Firstly, the main descriptive and calibration values for the variables under study are presented (Table 1).

Table 1	Main descriptive and calibration values

	TMMS-24			CD-RISC-10	IPQ-5	PSPP
	Emotional Attention (EA)	Emotional Clarity (EC)	Emotional Repair (ER)	Resilience	COVID-19 Threat perception	Stress
M	47322.37	45703.66	32102.09	1043101.24	10885.11	138597773.822
SD	82214.48	81167.92	64253.16	1733944.25	17039.42	1021324538.08
Min.	2.00	1.00	1.00	5.00	3.00	1.00
Max.	390625.00	390625.00	390625.00	9765625.00	161051.00	9531250000
P10	297.60	288.00	192.00	10368.00	506.40	9216.00
P50	12219.00	11907.00	5832.00	432000.000	4572.00	2239488.00
P90	150000.00	123500.00	96000.00	2560000.00	2905200	172860480.00

Note: M=mean; SD=standard deviation; Min: minimum; Max: maximum; P10: 10th percentile; P50: 50th percentile; P90: 90th percentile.

Hierarchical regression model

Subsequently, the predictive power of the variables under study was analysed using a hierarchical regression model (HRM), with the criterion variable being perceived stress and the predictor variables being: the presence of a previous physical or psychological illness, resilience, the dimensions of emotional intelligence (EA, EC, ER) and the perceived COVID-19 threat. Three distinct steps were established in the model (Table 2): first, variables related to the presence of previous physical or psychological illness were included, then the variables considered protective (resilience and the emotional intelligence subscales) were introduced, and finally, the perceived threat of illness. In the first step of the prediction model of perceived stress, the presence of a physical or psychological illness prior to confinement significantly increased the variance ($\Delta R2$ =0.15, p≤0.001), in the second step, protective variables (resilience and emotional intelligence) increased 34% of the variance ($\Delta R2$=0.34, p≤0.001) and, in the last step, perceived COVID-19 threat significantly increased the variance of perceived stress ($\Delta R2$ =0.04, p≤0.001). In this last step, the presence of a previous mental health problem (β=0.17, p≤0.001), low resilience (β=-0.44, p≤0.001), low emotional clarity (β=-0.23, p≤0.001) and high emotional attention (β=0.18, p≤0.01) and perceived COVID-19 threat (β=0.21, p≤0.001), showed a significant beta coefficient. Overall, the model composed of: presence of pre-confinement mental illness, low resilience, low emotional clarity, high emotional attention and high perceived COVID-19 threat explained 51% of the variance in perceived stress.

Table 2	Hierarchical regression model

Predictor	Stress			
	ΔR^2	ΔF	β	*t*
Step 1	0,15	20,83***		
Previous physical illness			-0,01	0,28
Previous mental health problem			0,17	3,34***
Step 2 Predictor	0,48	38,53***		
Resilience			-0,44	6,67***
Emotional attention			0,18	3,47**
Emotional clarity			-0,23	4,20***
Emotional repair			0,05	0,77
Step 3	0,04	19,03***		
Threat perception COVID-19			0,21	4,36***
Durbin-Watson	1,97			
R^2_{ajd}		0,51***		

Note. ΔR^2 = change in R^2; ΔF = change in F; ß = regression coefficient; t = t-value; **p. ≤ 0.01; ***p≤ 0.01

Fuzzy-set qualitative comparative analysis (fsQCA)

Analysis of Necessity

Based on the results obtained (Table 3), there was no necessary condition for high and low levels of perceived stress, as in all cases, the consistency was <0,90[34]. However, based on the consistency values, the most relevant condition for predicting high levels of perceived stress, while not necessary, was the absence of resilience. On the other hand, the most relevant condition for predicting low levels of perceived stress, while not necessary, was the absence of a mental health problem prior to confinement.

Table 3	Need analysis for stress (PSPP)			
	High levels of stress		Low levels of stress	
	Cons.	Cob.	Cons.	Cob.
Presence of previous mental illness	0.30	0.44	0.24	0.56
Absence of previous mental illness	0.70	0.37	0.76	0.63
Presence of previous physical illness	0.35	0.59	0.15	0.41
Absence of previous physical illness	0.65	0.43	0.85	0.67
High levels of emotional attention	0.65	0.42	0.46	0.66
Low levels of emotional attention	0.63	0.54	0.72	0.76
High levels of emotional clarity	0.47	0.42	0.58	0.81
Low levels of emotional clarity	0.79	0.54	0.60	0.63
High levels of emotional repair	0.45	0.42	0.63	0.83
Low levels of emotional repair	0.82	0.55	0.60	0.63
High levels of resilience	0.42	0.37	0.63	0.87
Low levels of resilience	0.86	0.60	0.55	0.60
High levels of COVID-19 threat perceptions	0.68	0.58	0.50	0.67
Low levels of COVID-19 threat perceptions	0.62	0.43	0.69	0.78

Note: Cons.= consistency; Cov. = coverage; Necessary condition: consistency≥.90

Analysis of Sufficiency

Based on the premise that in fsQCA a model is informative when consistency is around or above ,74[34], the resulting models for stress provided the results presented below. Concerning the prediction of high levels of perceived stress, eight pathways were observed that explained 56% of the cases with high stress levels (Total consistency=0,76; Total coverage=0.56). The most relevant pathway or combination for predicting high levels of perceived stress was the result of the interaction between: the presence of high perceived COVID-19 threat and high emotional attention, with low resilience and emotional clarity (Raw coverage=0,36; Consistency=0,81), which explained 36% of the cases with high perceived stress. The second pathway was the interaction between: low levels of resilience and emotional clarity, and the presence of mental illness prior to confinement (Raw coverage=0,26; Consistency=0,78), which explained 26% of cases with high perceived stress. And finally, the third pathway was the combination of: the presence of high emotional attention, a previous mental illness, low resilience and low perceived COVID-19 threat, explaining 13% of the high levels of perceived stress (Raw coverage=0,13; Consistency=0,84) (Table 4). It was observed that in the different prediction pathways, low emotional intelligence, the perceived COVID-19 threat and the presence of a mental health problem prior to confinement were very relevant combinations of variables in explaining the high levels of perceived stress.

About the prediction of low levels of perceived stress, ten pathways were observed that explained 71% of the cases with low levels of stress (Overall consistency=,86; Overall coverage=,71). The most relevant pathway or combination for predicting low stress resulted from the interaction of the presence of resilience and the absence of previous mental illness (Raw coverage= ,57; Consistency=,89), thus explaining 56% of the cases with low stress. The second pathway was the interaction between the absence of mental illness prior to the pandemic, the absence of emotional attention and the presence of emotional repair (Raw coverage=,40; Consistency=,92), explaining 40% of the cases with low stress. And finally, the third pathway was the combination of the absence of previous mental illness, the absence of perceived COVID-19 threat and the presence of emotional repair, explaining 39% of the low levels of perceived stress (Raw coverage =,39; Consistency=,93) (Table 4). The data finally showed that several combinations of variables were important in the different pathways predicting low stress levels. Thus, the absence of a previous mental health problem was highly relevant but had to be accompanied by high levels of resilience or emotional intelligence or low levels of perceived COVID-19 threat.

Table 4	Sufficiency analysis for high and low levels of stress					
Frequency cut-off 1	High levels of stress			Low levels of stress		
	Consistency cut-off poin .85			*Consistency cut-off point .90*		
	1	2	3	1	2	3
Previous physical illness						
Previous mental illness		●	●	○	○	○
Emotional care			●		○	
Emotional clarity	○	○				●
Emotional repair					●	
Resilience	○	○	○	●		
Perception of threat COVID-19	●		○			○
Gross coverage	0..36	0.26	0.13	0.57	0.40	0.39
Single coverage	019	0.09	0.01	0.09	0.01	0.01
Consistency	0.81	0.78	0.84	0.89	0.92	0.93
Consistency of the overall solution			0.76			0.86
Overall solution coverage			0.56			0.71

Note: Expected vector according to Fiss nomenclature (2010). For high levels of psychopathology: 0,0,0,0,1,1,1,1,1; For low levels of psychopathology: 1,1,1,1,0,0,0,0,0..

DISCUSSION

Few studies have assessed the impact of confinement in relation to protective factors against stress, and most studies have focused on the use of linear models[19,20]. Stress-related aspects have hardly been assessed using other non-linear relationship analyses, and the combination of two complementary methodologies, such as HRM and QCA has not been examined.

Due to the high stress that confinement has caused in the population, it is necessary to understand the variables related to their suffering and the different combinations that give rise to high and low stress levels. In this sense, this study assesses the impact of the perceived threat of illness, the presence of previous mental or physical illness, resilience and emotional intelligence on stress during confinement in a sample of the general Spanish population. Moreover, it does so by combining two complementary methodologies, such as the HRM and the QCA.

In terms of the results obtained through HRM, it is observed that the presence of mental illness prior to confinement, low resilience, low emotional clarity, high emotional attention and high perceived COVID-19 threat predicted stress. These results are consistent with previous studies, which have tested the ability of these variables to predict stress during confinement[14,18].

The results obtained from the QCA models suggest that, although none of the conditions are necessary for stress, the analysis of sufficiency shows that, in general terms, low clarity, high attention and low resilience are the variables with the most significant predictive value for high levels of stress, followed by high perceived threat of illness and the presence of previous mental illness. For low levels of stress, the different combinations showed high predictive value for the dimensions of emotional intelligence (low attention and high regulation) and high resilience, followed by the perceived threat of illness and the presence of previous mental illness, which are strong negative predictors of low levels of stress.

From the comparison of the two methodologies, it can be concluded that the presence of mental illness prior to confinement, perceived COVID-19 threat, resilience, and emotional intelligence are strong predictors of high and low levels of confinement-related stress. This result appears in both methodologies, but, in the QCA models, it is evident that resilience and emotional intelligence are particularly relevant variables in the prediction of stress. In this sense, the results obtained are encouraging, as they suggest that

positive psychological resources that can be developed could be very important protective factors against the appearance of stress derived from confinement. Previous studies have shown the relevance of these psychological strengths as protective against stress[26,35,36]. These findings raise the need to design and implement interventions based on the enhancement of positive psychological skills, to provide people with resources in the face of adversity that help them cope adaptively with the stressors derived from a crisis situation, such as the COVID-19 pandemic[37].

On the other hand, the relevance of the presence of mental illness prior to confinement in relation to high levels of stress should be noted. Once again, and in line with previous studies[11,12], it becomes evident that there is a need to pay more attention to the mental health of individuals, as this is a key trigger for other psychological problems not necessarily linked to the initial illness.

Despite the significant contributions of this study, our investigation has some limitations. It should be noted that this study uses a cross-sectional design, which complicates the generalisability of the results. However, due to the restricted research possibilities at the present historical moment, longitudinal studies may not be appropriate. On the other hand, the vast majority of respondents were university educated and female, perhaps because this population groups had greater access to the survey provided through the online modality and were more cooperative than other population groups. Furthermore, the data collection was telematic and self-administered, as this was the only possible method available due to the situation of confinement in Spain during the evaluation, an aspect that may be a limitation, especially in terms of the availability of information about medical and psychological diagnoses; therefore, future studies should have several informants and different methods of collecting the information.

If our results were supported by national and international research, it would be possible to develop protocols for detecting people in a situation of psychological vulnerability to promote and provide early attention to their mental health, preventing the increase or appearance of further problems along these lines. Likewise, intervention programmes could be implemented to provide emotional support to the population in the event of future social restriction measures.

In conclusion, it is essential to highlight the importance of protective factors and pre-confinement factors as key elements in predicting stress in adults, emphasising previous mental health, resilience, threat perception and emotional intelligence as fundamental elements for adapting to confinement.

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