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Life-event-induced changes in daily routines: Their association with the manifestation of dysphoric emotions

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ABSTRACT

Life events are usually followed by significant changes in the everyday routines of the affected individuals. In this study, we investigated the association of the changes in daily activities caused by the strict COVID-19 lockdown measures adopted in Greece to people's psycho-emotional adjustment. A new measure, the everyday life change index (ELCI), was administered to 853 adults, while their psychological distress was measured with the depression-anxiety-stress scale (DASS-21). Results showed that the greater the changes a person experienced in their daily life due to lockdown, the higher the symptoms of depression, anxiety, and stress they manifested. We suggest that life-event-induced changes in routine activities could be a meaningful measure for clinical practice.

Keywords: life-event, routine changes, dysphoric emotions, psychosocial adjustment, DASS-21, ELCI

INTRODUCTION

Psychological research has long studied people's responses to major life events and has defined their impact on their psychological functioning and well-being. Being adverse or positive (e.g., a marriage, the death of a 'significant other', the change of place of residence, or a professional change), life-changing events have been found to be stressful experiences often associated with mental health implications.

Despite their well-demarcated nature and duration, life events are usually followed by significant changes in the everyday routines of the affected individuals, which may vary in extent depending on the particular circumstances of each individual. Although the impact of various dimensions of life-changing events on well-being and mental health has been extensively studied (e.g., their characteristics or their perceived psychological impact), to our knowledge, no study has previously measured and reported on whether the extent of perceived changes in everyday routines caused by a life event can be associated to a person's psycho-emotional adjustment.

In this study, using data collected during the COVID-19 lockdown period -a stressful and life-changing event globally- we aimed to measure the extent of change in each individual's daily activities and to detect potential associations with the levels of depression, anxiety, and stress.

Life-Changing Events, Their Measurement, & Impact on Well-Being

The impact of stress-inducing life events on well-being and mental health has been extensively reported in the literature. The occurrence of an adverse life event has, for instance, been examined for its relationship with mental health and, in particular, with the onset of psychopathology issues in healthy populations. A meta-analysis by [1] found that adverse life events experienced during childhood were associated with substance abuse and the onset of psychopathology disorders, such as psychosis, depression, and anxiety disorders, in adulthood. Even minor life-changing events, such as experiencing difficulties in the workplace or the family context, might lead to the onset of depressive symptoms [2, 3], whereas major or even traumatic events are associated with the onset of major or even life-threatening disorders, such as suicidal ideation [4]. It also appears that mental health deterioration after a life event occurs not only in healthy but also in psychiatric populations. For instance, the study in [5] found that, in patients diagnosed with schizophrenia, the experience of a stressful life-changing event may trigger the occurrence of acute psychotic episodes.

The association of adverse life events with mental health issues has also been studied in children and adolescents. In particular, researchers have recently studied the role of factors such as academic stress, punishment, and bereavement and found that such stressful events were associated with more socioemotional difficulties as mediated by lower resilience [6].

Furthermore, the same adverse events in adolescence were found to be associated with problematic Internet use [7], particularly for adolescent boys [8]. Adverse life events, such as the loss of a loved one or parental divorce in adolescence, were also associated with the onset of internalizing problems, i.e., the onset of depression and anxiety symptoms [9].

Finally, the effect of the COVID-19 crisis, its lockdown, and related stress-inducing events has been investigated in terms of its association with both mental health and other dimensions of well-being. In particular, COVID-19-related adverse events, such as hospitalization or job loss due to the pandemic, were associated with psychological distress as manifested by feelings of helplessness and hopelessness [10]. Age was found to be inversely related to the occurrence of emotional disorders, such as depressive and anxious feelings, with older people appearing more emotionally resilient than younger ones [11]. At the same time, gender was found to predict the impact of life- events on mental health. Specifically, women were more affected than men during the pandemic response period by life- events related to socioeconomic issues - isolation from family, participation in social activities, loss of employment [12], and health issues [13]. Finally, pandemic-related life events were also examined for their association with adolescents' mental health. Thus, changes in family life, financial difficulties, learning difficulties, and tense relationships with parents were found to be associated with the onset of psychopathological symptoms; in those cases, resilience or good relationships with peers were found to act as compensatory factors [14].

Relevant studies usually assess life events through questionnaires that list the different types of events and yield quantitative estimates of their psychological impact. Probably the most known instrument in this field is the *social readjustment rating scale* [15]. 43 life events are listed (e.g., marriage, death of a spouse), and participants are asked to rate these life events as to the relative degrees of necessary readjustment. As defined in the written instructions on the tool, "social readjustment measures the intensity and length of time necessary to accommodate to a life event, regardless of the desirability of this event" [15]. Consequently, it is an instrument assessing the meaning of stressful events, either socially undesirable or not, in the individuals' lives.

Many related scales have subsequently been developed in an attempt to assess the impact of life events on various life domains. *Impact of event scale* was one of the first scales developed to study subjective distress related to a specific event [16]. Specifically, items for this self-report instrument were derived from statements most frequently used to describe episodes of distress by people who had experienced recent adverse events (e.g., "I had bad dreams related to the event" [16]. Conversely, the *perceived benefit scale* [17] assesses the different types of self-reported positive life consequences of adverse events (e.g., "because of this event, I show more caring to others").

"FILE"–*family inventory of life events and changes* [18] is a "yes or no" answering instrument aimed to record if several stressful life events happened during the past 12 months (e.g., increased conflict between husband and wife, a family member had an abortion, etc.). Similarly, the *life events checklist* [19] is another scale that records exposure to potentially traumatic events. In a list of such stressful events (e.g., natural disasters, fire or explosion, assault with a weapon), participants answer if they have experienced them personally, if they witnessed them, if they heard about them, if they are not sure, or if these do not apply to them. Finally, "ALCES"–*adolescent life change event scale* [20] is a scale specifically developed for adolescents in which they can rate how "upsetting" they find adverse life events (e.g., being arrested by the police, losing a favorite pet) and how many of these events they have experienced.

During the COVID-19 period, several more specific scales related to life changes due to the pandemic were developed. For example, the *child COVID-19-negative and positive life events scale* [21] assessed whether children experienced COVID-19-related life events, positive (e.g., finding ways to help people and more time for hobbies) or negative (e.g., school stress, illness concerns, and isolation), and if they found them to be desirable. Similarly, the *parent pandemic life events and distress scale* [21] assessed whether parents had experienced COVID-19-related events, positive (e.g., "found greater meaning in work" or "volunteered time to help people in need") or negative (e.g., "increased workload" or "laid off from job").

As far as adolescents are concerned, the *stressful life events during COVID-19 scale* [14] assessed adolescents' experiences of stressful life events during the COVID-19 pandemic (e.g., "my family experienced financial pressure during the COVID-19 pandemic" and "during COVID-19 virtual learning, I had conflicts with my parents because I cannot balance virtual learning and entertainment").

Finally, the *negative life events list* is part of an online questionnaire distributed during COVID-19 pandemic [10]. Participants were asked to report the number of adverse life events they were exposed to, during COVID-19, on a 23-item negative life events checklist (e.g., "hospitalization due to coronavirus" and "job loss due to COVID-19").

This brief review of several instruments used in the study of life events reveals that these cover two main dimensions: the type and amount of life events that took place in an individual´s life and the subjective distress these events may produce to them.

Daily Routines, Their Measurement, & Their Impact on Well-Being

Changes in everyday routine have been widely acknowledged as a factor that can deregulate peoples' lives, perhaps to a larger extent than one demarcated adverse event per se. For instance, routine is reported as critical for children's sense of predictability, stability, feeling of security, confidence, gaining of self-control and, thus, a factor that can also indirectly affect the parents by keeping children calm and relaxed and decreasing parent-child conflict [for a review, see 22]. Furthermore, family routines might protect the health and well-being of the whole family system by achieving stability and continuity during periods of stress and by promoting the family's strength, solidarity, and cohesion [23]. However, despite the general acknowledgment of the protective role attributed to daily routines in stressful periods, to our knowledge, there have been no studies measuring the *extent of the changes* in adults' everyday lives caused by life events.

The tools available for measuring everyday routines, as far as we know, consist of routine inventories, where one has to mark those that apply to one's everyday life *in the present moment*. For instance, the *family routines inventory* [24] was developed to measure routines in families. It contains a list of highly valued family routines that cover a wide range of day-to-day family functioning. It includes, among others, workday routines such as "parent(s) have certain things they do every morning while getting ready to start the day", weekend and leisure time such as "family goes someplace special together each week", children's routines such as "children take part in regular activities after school" as well as meals related routines, such as "family eats at the same time each night" [24].

Young adult routines inventory [25] is a measure of routines and time management practices in young adults on the grounds that young adulthood is characterized by important life transitions, where time management skills and routines facilitate adjustment. It is a four-factor measure reflecting daily routines, social routines, time management, and procrastination. Among other factors of the measured daily routines are: "I plan my meals/snacks", "I have a predictable schedule", and "I wake up around the same time every day" [25].

The *creature of habit scale* is a self-report measure of habitual routines and automatic tendencies in daily life [26]. It incorporates two aspects of habits, namely routine behavior and automatic responses. Items intended to measure routine behavior include: "I tend to like routine", "I find comfort in regularity", and "I rely on what is tried and tested rather than exploring something new" [26].

Many inventories have also been developed to measure children's daily routines, measuring for instance bedtime routines [27], preschool classroom routines [28], or commonly occurring routines such as "my child hugs/ kisses parent before bed" and "my child brushes teeth before bed" [22]. Recently, a study conducted in China assessed the parents' recall of their children's daily routine before, during, and after the COVID-19 lockdown, using items such as: "My child slept … hours each night on average before the lockdown" [29]. Specifically, "parents provided survey data on the amount of time their children spent daily on learning, screen devices, play and exercise, and nighttime sleep before, during, and after the lockdown" [29].

Rationale & Aim of This Study

Based on the above-summarized evidence, life events are found to produce important effects on the psychological well-being and mental health of the individuals implicated. Results of existing scales on the different types of life events and the personal meaning attributed to them by individuals have been associated with a broad spectrum of consequences in the psychological realm, both in adults and in children or adolescents.

Very few studies have explored the association of life events with subsequent changes in behavior and habits in particular domains with health implications. For example, the review in [30] highlights that in the period following life events in the occupational domain, in physical health, interpersonal relationships, family structure, or place of residence, physical activity tends to decline, resulting, in return, in health problems. Changes in these life domains were also associated with the onset of gambling in men [31]. Furthermore, in pregnant women, changes in various life domains were associated with an increased need for prescription of opioids as analgesics, a behavior that puts both the life of the mother and the fetus at risk [32].

One important dimension that appears not to be systematically addressed in the literature, however, is the extent to which these life events, independently of their valence, their severity, or the distress they cause, produce *changes* in the daily routines and activities of the individual who experiences them. We hypothesize that the changes in routines produced as a result of a life event for each individual (i.e., the same event for some people may be accompanied by a radical change in daily life, while for others not) might be one of the factors affecting the person´s adjustment and well-being. In this paper, we measure the extent of perceived changes in the daily routines of people during the COVID-19 lockdown period, and we explore its association with measures of depression, anxiety and stress.

Table 1. Distribution of sample based on age

Age	Percentage (%)
18-30	31.3
31-40	23.8
41-50	25.6
51-60	15.8
61+	3.6

METHODOLOGY

Design

We present a cross-sectional study in which a new measure, the *everyday life change index* (ELCI), has been administered to a broad sample of adult participants. In addition, depression, anxiety and stress were measured in the same population. Data were collected during the second month of the COVID-19 pandemic lockdown period in Greece (April 2020). At that time, stringent confinement measures were implemented at a national level, leaving home without a specific reason was prohibited, and all shops were closed (except for supermarkets and pharmacies). It was a very stressful period, which affected the sense of security and normality, caused an abrupt disruption to everyday life, and challenged the physical and mental health of people.

Participants

The sample consisted of 853 adults, 68% women, aged 18-78 years (mean $[M]_{age}$=40.33, standard deviation [SD]=12.88; see **Table 1**).

Participant's educational level was mostly medium to high (**Table 2**), and they had a normal distribution as for their economic level of their families (**Table 3**).

Apart from being adults (⩾18 years-old) living in Greece during the time of data collection when strict confinement measures were implemented at a national level, no other inclusion or exclusion criteria were applied.

Table 2. Distribution of sample based on educational level

Education	Percentage (%)
Secondary education	32.0
University / College	34.0
Postgraduate / Master's	31.4

Table 3. Distribution of sample based on urbanity of residence

Number of inhabitants	Percentage (%)
Less than 2,000 (rural)	8.5
2,000 to 10,000 (small town)	11.6
10,000 to 40,000 (town)	12.3
40,000 to 100,000 (city)	26.6
Over 100,000 (big city)	41.1

Procedure

Participants were recruited through email messages distributed through various University mailing lists and announcements in the social media. A link to the project webpage gave them access to the platform, where the research instruments were implemented. The platform used for the online administration of the psychometric measurements (LimeSurvey) was set up and configured to respond to all data confidentiality and security conditions referring to anonymous participation and no IP address log. All necessary permissions for the online implementation of the study were granted by the Ethics Committee and Data Protection Office at Democritus University of Thrace on an examination of the entire research protocol.

Prior to responding to the questionnaires, participants were informed on the aims and procedure of the research as well as on the conditions of participation, the anonymity and confidentiality of the data, their right to stop and revoke their participation, the granted permissions by the Ethics Committee and they were provided with all necessary contact data in case of complaints or queries. After that, they were asked to declare that they were over 18 years old and give their informed consent to take part in the study. The duration of their participation was approximately 30 minutes.

Measures

A battery of questionnaires was administered to participants, which included:

ELCI questionnaire: A brief 17-item questionnaire that was developed to measure the perceived *change* in an individual's daily activities after a life-changing event, as compared to its regular daily life prior to the event.

All questions are close-ended, and participants are asked to mark on a 5-point Likert scale whether, during the last few days, they undertake the listed activities more or less often than in a typical day before the onset of the adverse event (in this case, before the implementation of the protective measures against COVID-19). Participants are offered the following options: -2 ("a lot less often or never"), -1 ("less often"), 0 ("equally often"), 1 ("more often"), 2 ("a lot more often").

Since we are interested in the *degree of change* or, in other words, the extent to which the person´s daily life is being altered after the life event as compared to their prior routine, independently of whether changes may have a positive or negative sign, the scoring of the scale focused on the distance from 0 (unchanged frequency). For that reason, -2 was equated to 2, and -1 was equated to 1. Therefore, after recoding, items were scored as 0 (no change in frequency), 1 (change in frequency), 2 (great change in frequency).

As for the 15 items that were included in the questionnaire, these were selected to reflect various domains of daily activity: professional activity, care activities (household, family, and self), outdoor entertainment activities (e.g., meeting or visiting friends, cinema-theatre-concerts, restaurants-bars-cafés, walks, and sports), and indoor entertainment or hobbies (e.g., music, artistic activities, television, social networks, and family games). The psychometric properties of this scale are reported in the results section.

Short version of depression-anxiety-stress scale (DASS-21) [33; adapted in Greek by 34]: A well-established and widely used instrument of 21 items for measuring depression, anxiety, and stress, was also administered to participants. For instance, instrument includes items for measuring depression such as "I felt that I had nothing to look forward to", anxiety such as "I was aware of dryness of my mouth", and stress "I found it hard to wind down". It is marked on a 4-point scale–"0"="did not apply to me at all" to "3"="applied to me very much or most of time". Cronbach's alpha was calculated for each factor of DASS-21, and, in all cases, it revealed very sound results concerning their internal validity (depression: α=.91; anxiety: α=.85; and stress: α=.87)

A background questionnaire: Asking participants about their demographic data (e.g., gender, age, prefecture of residence and urbanity level, educational level, or economic status).

RESULTS

Descriptive Results

In this first part of results, descriptive analyses (means and standard errors) are performed to explore the degree of change in each item of ELCI scale. Given the stringent lockdown measures, the greatest perceived changes in daily routines were detected in all outdoor activities, such as visiting restaurants, cafes and bars, as well as in professional activities. Changes were also observed in indoor activities, such as artistic/creative activities, listening to music, watching TV or interacting with family members, as well as in self-care although, as expected, these were smaller.

Functionality of "ELCI"

Several analyses were implemented in order to explore the functionality and psychometric soundness of ELCI questionnaire. A confirmatory factor analysis (CFA) was conducted first to confirm whether the groups of items included in the questionnaire could be treated as separate factors and whether a unique higher-order factor, corresponding to the total score of the scale, could be a meaningful measure of the overall change index in everyday activities. The results of CFA analysis confirmed the four factors solution with a higher-order general factor. The

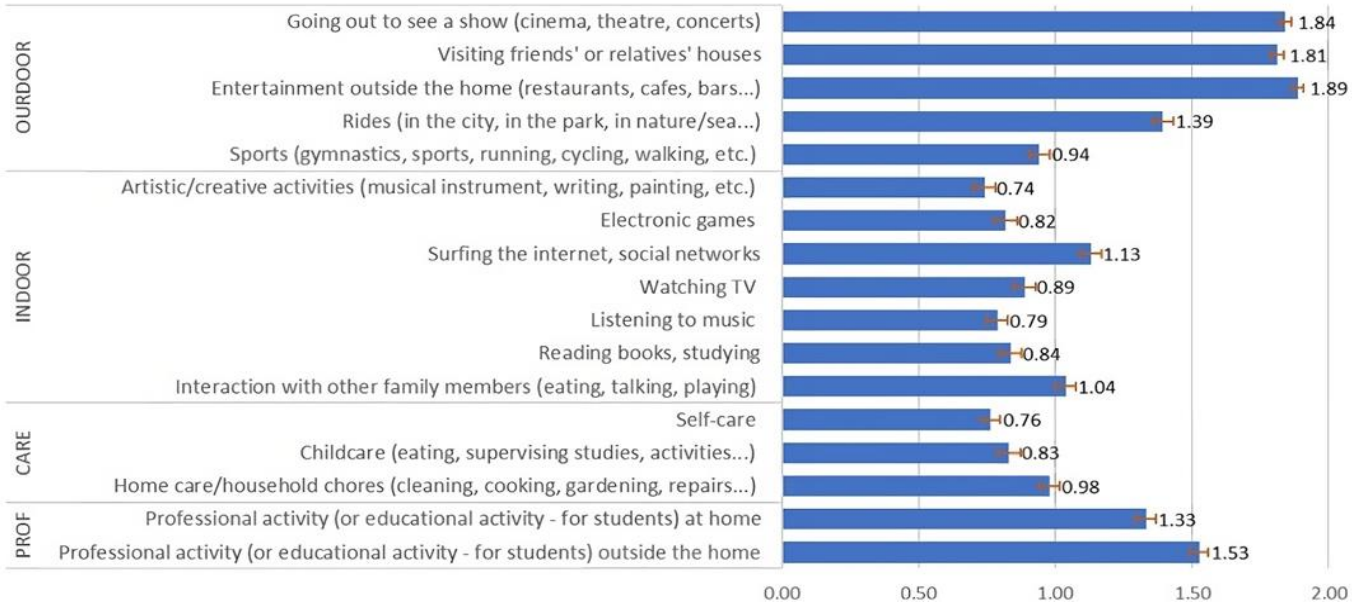

Figure 1. Degree of change (means & standard errors) in each of 17 items of ELCI (score: 0–"no change" to 2–"great change in frequency") (Source: Authors' own elaboration)

Table 4. CFA (higher order model): Fit indices[1]

Variable	Value
Chi-square (χ^2)	124.631
Degrees of freedom (df)	86
Significance (p)	.008
Comparative fit index (CFI)	.967
Tucker-Lewis index (TLI)	.965
Root mean square error of approximation (RMSEA)	.032
Standardized root mean square residual (SRMR)	.061
Adjusted goodness of fit index (AGFI)	.985

Table 5. Internal validity: Cronbach's alpha

Factor	Cronbach's alpha
Professional activities (n=2)	.71
Care activities (n=3)	.68
Indoor entertainment activities	.69
Outdoor entertainment activities	.72
Higher-order factor–Total ELCI	**.77**

factorial structure of ELCI scales is illustrated in **Figure 1** and the indices of fit of the model are presented in **Table 4**.

Figure 2 shows ELCI factorial structure and factor loadings. Next, the internal validity of each subscale was explored. Cronbach's alpha indices corresponding to the four factors and the higher-order factor of the scale were calculated, they ranged from good to acceptable (**Table 5**).

Finally, Pearson's correlations among the four latent factors, as well as their correlations with the total score of ELCI total score, are presented in **Table 6**.

The total score of ELCI questionnaire had moderate to high correlations with all its constituent factors, while intercorrelations among the various factors were also significant, although lower.

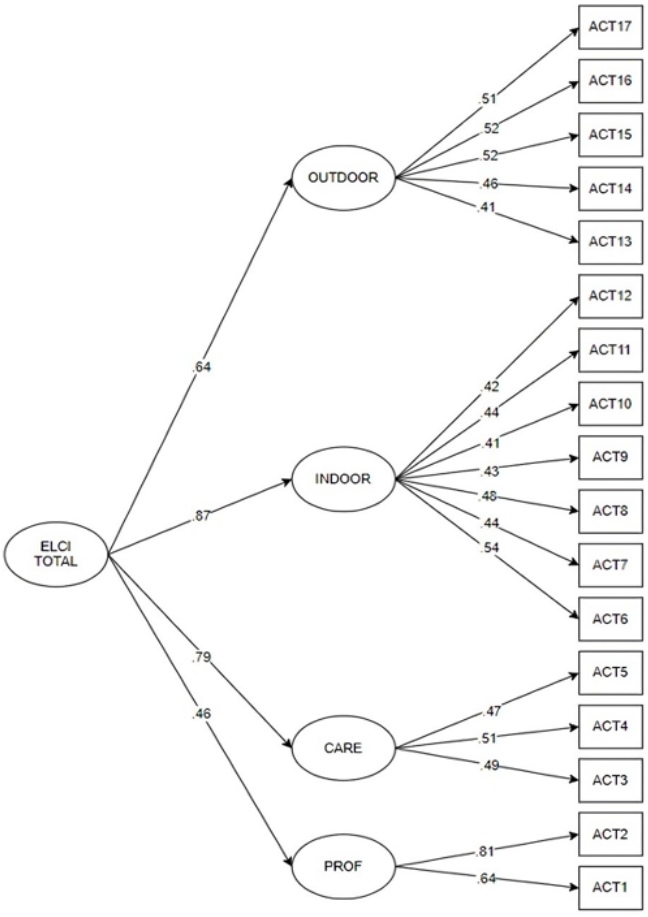

Figure 2. ELCI factorial structure & factor loadings (Source: Authors' own elaboration)

[1] Due to ordinal nature of data, WLSMV estimator was used with NLMINB optimization using lavaan 0.6.16 in R.

Table 6. Pearson's correlations among latent factors

		ELCI TOTAL	PROF	CARE	INDOOR
PROF	Pearson correlation	.513**			
	Sig. (2-tailed)	<.001			
CARE	Pearson correlation	.634**	.150**		
	Sig. (2-tailed)	<.001	.001		
INDOOR	Pearson correlation	.845**	.273**	.383**	
	Sig. (2-tailed)	<.001	<.001	<.001	
OUTDOOR	Pearson correlation	.634**	.231**	.257**	.297**
	Sig. (2-tailed)	<.001	<.001	<.001	<.001

Note. **Correlation is significant at 0.01 level (2-tailed)

Table 7. Pearson's correlations among ELCI scales & DASS-21 factors

DASS-21		ELCI TOTAL	PROF	CARE	INDOOR	OUTDOOR
DEPRESSION	Pearson correlation	.119*	.069	.038	.156**	.038
	Sig. (2-tailed)	**.012**	.146	.421	**.001**	.423
ANXIETY	Pearson correlation	.145**	.103*	.091*	.149**	.029
	Sig. (2-tailed)	**.002**	**.029**	**.049**	**.002**	.537
STRESS	Pearson correlation	.147**	.126*	.115*	.115*	.045
	Sig. (2-tailed)	**.002**	**.008**	**.015**	**.015**	.341

Note. *p<0.05 & **p<0.01

Association Between "ELCI" & Depression, Anxiety, & Stress

In the last section of analyses, we performed a series of Pearson´s correlations to explore the associations between the extent of perceived changes in the participants' daily routines and their scores at the three factors of DASS-21 scale: depression, anxiety, and stress (**Table 7**). The total score of ELCI was found to be associated with all factors of DASS-21, albeit with low correlations. This was also true for the changes in the indoor activities, as well as the professional and care routines, although the latter appeared to be significantly associated only with the anxiety and stress indicators. Finally, the extent of change in outdoor activities did not present significant correlations with any of DASS-21 factors.

DISCUSSION

In this study, we used ELCI, a new questionnaire developed to measure changes in daily routines that occur due to a life event, by asking participants to report on the perceived change in the frequency of a series of daily activities as compared to prior to the live event.

As far as we know, numerous inventories can provide information about people's everyday activities and these measures may be used effectively after a life event occurs. ELCI scale, however, by focusing on the extent of changes in daily activities, provides a new perspective concerning the impact of the life event on each individual's routines. As indicated in the theoretical review of our paper, the importance of family routines has been well documented; however, to our knowledge, adult routine changes have not been measured and, consequently, explored as a factor related to psychological well-being.

The aim of this study was to explore how these changes in daily routines may be associated with the manifestation of dysphoric emotions. In particular, we investigated the association of the extent of changes in daily life produced by the strict lockdown measures of the COVID-19 crisis with each participant's levels of depression, anxiety, and stress, as measured by DASS-21.

Our results showed that changes in outdoor activities and work conditions (at home or in the workplace) were the most affected since all outdoor activities were prohibited at that time. Indoor activities also presented changes but as expected, to a lesser extent.

However, by measuring "changes," we were able to capture the impact of the particular conditions of the lockdown on each person as compared to their previous habits, lifestyle and conditions. For example, we assumed that working from home would require less adjustment for a person who frequently worked from home even before the onset of the lockdown; not going out would be less stressful or upsetting for a person with an introverted personality style who did not go out often anyway.

Indeed, our results showed that the greater the changes a person experienced in their daily life due to lockdown, the higher the symptoms of depression, anxiety, and stress they manifested. This is in line with the importance of routine and stability in everyday life, which is consistently highlighted in literature. As noted in [35], "routine can provide linkages between one's personal history and one's ecological, socio-historical, and cultural contexts throughout one's life and contribute to a continuous sense of self that is created and reflected through everyday practices. Routine is therefore meaningful and adaptive".

As for the specific dimensions of activities and how their change was associated with the depression, anxiety, and stress indicators, results showed that changes in the professional domain (working from home and at the workplace) are related to two of the three dimensions of mental health: anxiety and stress. Although, to our knowledge, there are no similar studies to explore the association between change in professional activity and well-being, job difficulties have been broadly related to depression, anxiety, and stress [36], while

work stress has been found to precipitate diagnosable depression and anxiety in previously-healthy workers [37].

Moreover, studies have consistently underlined that unemployment is negatively associated with an individual's psychological well-being [38]. Our results add to these findings that the abrupt change in the working conditions for the vast majority of people and the necessary adjustments they required were related to higher levels of anxiety and stress symptomatology.

Additionally, more perceived changes in care activities (for self and others), as well as in indoor activities such as reading, listening to music, and watching TV, were also related to more anxiety and stress symptoms. It seems that the disturbance of the usual indoor activities in everyday life is related to psychological imbalance. Interestingly, however, changes in outdoor activities did not appear to be significantly associated with dysphoric emotions. Although one would expect that the large degree of change caused by the radical restriction imposed on outdoor activities would be associated with high levels of dysphoric emotions, our results do not support this hypothesis. We suggest that this counter-intuitive finding can be mainly due to methodological reasons. Given the fact that practically the entire sample reported great changes in 'outdoor activities' yielded an excessively low variance in this factor (converting the variable, practically, in a constant). Therefore, the amount of variance available to account for differences in depression, anxiety, and stress symptoms was not sufficient to reach statistical significance, despite our ample sample. We hypothesize that using this tool in different life events and under different conditions that would not impose a restriction on this factor, would permit us to capture better the effect of this factor on well-being.

Apart from this limitation, we should also point out that given the unpredicted nature of a pandemic, we did not have the chance to collect data from the same participants prior to the imposition of the lockdown, the life-changing event considered in this research, so as to test the validity of the reported changes. Due to the usually unpredicted occurrence of most life events, however, a future study could focus exclusively on "planned" events, such as immigration/change of place of residence, change of work, marriage, childbirth or adoption, or surgical operation, to address this limitation.

CONCLUSIONS

Daily routines usually change as a result of a life event. The level of this change could determine each individual's ability to adjust and constitute one of the sources of psychological distress. Of course, other factors have been found to affect adjustment and wellbeing after a stressful life event. For instance, each individual's resilience levels [39], their self-efficacy [40] or their coping strategies [41], their social support network [42] are other factors consistently associated with their psychoemotional adjustment to new situations. However, as the results of this study illustrate, when studying the effect of a life event on wellbeing, it is also important to account for how it affects each individual's daily routines to fully understand the causes of potential depression, anxiety, and stress. This could be a useful source of information in clinical practice, as it could inform the design of interventions, as well as preventive measures to address potential clinical symptoms.

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Data sharing statement: Data supporting the findings and conclusions are available upon request from corresponding author.

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