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The Effects of Lock-down 2020 on the Behaviour and Mood of Children Aged Three to Six in Italy

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GLI EFFETTI DEL LOCK-DOWN 2020 SUL COMPORTAMENTO E L'UMORE DEI BAMBINI DAI TRE AI SEI ANNI IN ITALIA

Abstract

The aim of this research was to trace an association between the lock-down caused by the Covid-19 pandemic in Itlay (March-May 2020) and possible short- and long-term behavioral and mood changes in 1,000 children aged three to six years. With the data collected through the administration of two questionnaires, an account of the psycho-attitudinal performance of the subjects examined during the aforementioned period was obtained. The results showed that during the lock-down nearly 60% of the sample exhibited negative feelings; 11.2% of the sample also exhibited symptoms attributable to situational depression. With the return to normalcy, the percentage of negative feelings recorded in the sample decreased to 11%; a significant association was also found between the mood state and temperament of the subjects. Behavioral changes such as increased onychophagy and eating changes during lock-down were recorded, which can be associated with stress. It was possible to reveal problems in the long term, such as difficulty in modulating anxiety, controlling aggression, and social adjustment.

Keywords: Anxiety; Behavioural; Covid-19; Emotional dysregulation; Lock-down; Mental health.

1. Introduction and review of the literature

With the aim of countering and containing the health emergency caused by the Coronavirus, the Italian government has decided to: suspend all types of activities deemed unnecessary, allow only travel motivated by proven needs work or situations of necessity, maintain a distance of at least one meter between people and impose the requirement of a mask in open and closed places. For two months the Italians were forced to remain in isolation in their homes. Starting on 5 March 2020 also ordered to suspend all educational services (in attendance) for children, schools of all levels, institutions of higher education including universities. The question that led to the development of this research arose on the basis of the situation experienced at that time, and concerned, as the title suggests, children from three to six years of age. During the sixty days of isolation, the subjects were not allowed to go out freely, were not were able to meet their peers and/or relatives, were not allowed to go to school; this wiped out any possibility for the children to relate to each other and to have stimuli other than the familiar ones. For two entire months, the potential children's developmental development, forced to have to reorganize their usual internal and external patterns to adapt to the demands of their environment. The ways in which children react to certain stimuli are subjective. Thomas and Chess in 1977 defined temperament (temperament) as a style peculiar to behavior and identified temperamental dimensions including: activity level, regularity, reaction to novelty, ease of adaptation to new situations, energy level, distractibility, attention span, which emphasize the existence of different ways of approaching and responding to new stimuli. Those who adapt with difficulty to novelty may exhibit major irregularities in their routine (feeding, aggression, onychophagy, etc.). Knowing the temperament of a child can help predict and understand the ways in which he or she reacts to and handles new developmental experiences in relation to his sensitivity. Children are much more vulnerable to environmental stressors than adults, because they are in formation and require, for successful development, affection, security and cognitive stimulation (Siegel, 2001). In fact, during the gestation period, the brain human does not complete its development; the psychophysical characteristics peculiar to the human species are completed in the first two decades of life. The period of infancy is

characterized by a phase of great biological plasticity that favors the progressive acquisition of psychomotor, emotional and cognitive skills; these skills are influenced by both genetic and environmental factors (Kandel *et al.*, 2015). The enormous plasticity of this developmental period means that children are very vulnerable to adverse environmental events to the extent that it affects their development (Galimberti, 2018). Modern neuroscience emphasizes with epigenetics the possibility of the environment to leave significant traces on the genotype (Puterman *et al.*, 2010). Routines and especially proper care allow the child to remain within what Siegel (2001) calls a «window of tolerance» thereby providing safety and homeostasis. Environmental stressors strain the autonomic nervous system by producing high levels of cortisol (Porges, 2014). I messages of danger conveyed, during the lock-down, by the news, the social distancing were conveyed to children not only through the mass media but also and especially by parents, who were themselves frightened. Normally the impact of the environment on children is «filtered» through the parents' ability to cope with adversity. Events such as the pandemic, however, pose a threat to the entire social system and therefore of greater impact on the individual. A child who grows up facing developmentally appropriate challenges overcomes crisis developmentally by adapting to the environment without presenting any particular dysfunctional symptoms. In contrast, when stressors within the environmental niche are overpowering, children may make explicit their difficulty and distress through manifestations such as onychophagia, alterations in behaviour, alterations in eating routines, aggression (DSM.5, APA, 2013). In fact, children express themselves through their behaviors; they are not yet adequately able to verbally explicate their suffering and it is the adult who reads and interprets the level of distress. The trauma of the pandemic has happened to all children in Italy and elsewhere. If one refers to the ACES study (Adverse Childhood Experiences) which correlates childhood traumatic experiences with somatic diseases said trauma could have an impact on the future physical health of these children (Felitti *et al.*, 1998). The detector that may represent a measure of how traumatic the pandemic in the form of lock-down was for children is determined precisely by the symptomatic manifestations described above. The period of the pandemic could be considered for all intents and purposes a period of events traumatic events that could have affected children's development both in a directly with the limitations that occurred to them and indirectly through the stress of the caregivers and both in the short term and in the long term. In addition, according to the World Health Organization, mental well-being is an essential component of the definition of health, and it is certainly influenced by environmental as well as individual factors,

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and of course this applies to both adults and children; for all these reasons, it was important to set up a useful research design to record and study the response patterns implemented by children aged three to six years with respect to lock-down (March-May 2020).

2. Aims and hypotheses of the study and variables considered

The research hypothesis is: there is an association between lock-down and any short- and long-term behavioral and mood changes. To corroborate or refute the hypothesis, it was necessary to search for variables useful in pursuing the research objective, namely: to search for and possibly highlight a behavioral change in a sample of 1,000 children aged three to six years that can be associated with the lock-down (March-May 2020) and to study its trend; in addition, traces of behavioral changes were also sought long after the lock-down. The variables considered were: subjects' temperament; mood state before, during and after the lock-down; changes in typical eating habits during and after the lock-down; increase or decrease in tantrums during and after the lock-down; increase or decrease in aggression during and after the lock-down; changes in how the subjects examined responded to separation from their parents; the appearance of symptoms attributable to depressive disorder; and the appearance/permanence of difficulty in social adjustment, anxiety modulation and in controlling aggression, in the long term.

2.1. *Selection of variables*

An explanation of why these variables were chosen is next. Regarding the variable *temperament*, it is recalled that the ways in which children react to certain stimuli are subjective; however, it is possible to distinguish these ways into three distinct temperamental dimensions. According to Thomas and Chess (1977), it is possible to define temperamental character (temperament) as a peculiar style of behavior. By identifying and measuring the combination of temperamental dimensions, such as: activity level, regularity, reaction to novelty, ease of adaptation to new situations, energy level, distractibility, and attention span, it is possible to define three different temperamental categories in children, which in this study were defined as: extremely lively child, the one who is open and positive toward new stimuli and people; lively child i.e., the infant who being confronted with novelty

is initially fearful but then gets unstuck and is courageous and sociably easy-going; and quiet child, the one who hardly accepts novelty, and prefers to remain quiet with parents rather than expose himself to others. Covid-19 and lock-down was a completely novel challenge for the children, and it was important to take into account the temperament of the subjects examined to try to trace similarity in response to this novel environmental stimulus among those with the same temperament. Another variable considered was the *humor* of the subjects. During the lock-down, all Italians were forced indoors, away from normalcy and for the first time facing a global pandemic. According to the UN Convention on the Rights of the Child (1989), in general, a child is «well» if he or she lives in harmonious, reassuring, stimulating, and genuine settings. Children at that particular point in history, however, were in limiting and repressive environments, which may have prevented the development of their developmental potentials and may have confronted them with a negative psychological, physical, or social condition, leading to the onset of stress symptoms or *depression*. Generally, the symptoms found in the presence of sources of stress are precisely the appearance or increase of onychophagia, changes in eating habits, increase or appearance of tantrums, aggression, difficulty in coping with separation from parents; i.e., the variables sought with the first questionnaire. Attention was also paid to the issue of depressive disorder, which as is known is also present in developmental age and is manifested by a co-presence of symptoms accompanying mood alteration such as: loss of pleasure/interest in activities, dietary variations such as increased or decreased appetite, lack of energy or sense of fatigue, irritability, reduced ability to think or concentrate; again, these variables were sought within the first questionnaire. As for the second questionnaire, the variables considered were selected to give a way to verify the presence or absence of some long-term problems attributable to experienced stressful events, and they are: the appearance/permanence of the difficulty in social adaptation, modulation of anxiety and in the control of aggression. In fact, the presence of this symptomatology could show that the subjects have lived in the presence of stressful factors potentially detrimental to the typical development of their psychological health.

3. Measuring instruments

The research instrument used to collect the statistical data through which the phenomenon under study was analyzed was the questionnaire. Two dif-

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ferent questionnaires were administered for this research, the first one eight months after the period examined (March-May 2020) and the second one seventeen months after the lock-down (March-May 2020).

	When	Object	Subject
Questionnaire 1 (Q1)	Administered eight months after lock-down	Behaviors/habits and mood before, during and after the lock-down	Children aged three to six years
Questionnaire 2 (Q2)	Administered seventeen months after lock-down	Difficulties encountered in the long term	Children aged four/ five to seven

The questionnaires were created with Google Forms, which allows one to submit and then carry out a questionnaire through a link (easy transmission). In fact, the collection of units for both samples was done by posting the questionnaires on different social platforms such as Facebook and Whatsapp, on groups and pages created by parents; they were the ones who answered the questions regarding their children. The administration of the questionnaires through a link allowed for the selection of units not to occur arbitrarily, but randomly within what could be called a set quota; and made the samples composed of subjects distributed heterogeneously throughout Italy. Moreover, thanks to the use of Forms, the anonymity of the subjects who participated could be guaranteed; in fact, no sensitive data were requested. Specifically, Q1 was used to take a picture of the situation experienced by the subjects examined, that is, children aged three to six, during the lock-down period; trying to know what their mood was, what their habits were and how some of them changed from the period before to the period after lock-down. Q2, on the other hand, was administered seventeen months after the lock-down (March-May 2020) to report the presence or absence of any detectable long-term problems associated with it. Precisely because Q1 was conducted completely anonymously, it was not possible to recontact the parents who had responded in the beginning; in fact, it would have been useful and interesting to view the detectable long-term problems of the same sample analyzed with Q1.

Consequently, the administration of Q2 was carried out in the same way and again on the same platforms, specifying, however, this time that the children to whom it was addressed had to be between five and seven years old, since 17 months had passed since Q1.

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3.1. *Construction of questionnaires*

Google Forms allowed for a choice of response type to the questions included in the two questionnaires (*Fig. 1*).

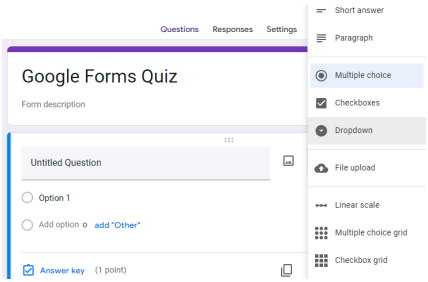

Figure 1. – Types of questions/answers.

Q1 was divided into seven macro-areas, totaling 72 questions with different types of answers: open, multiple choice, linear scale, and checkboxes, while Q2 consisted of only multiple-choice questions. The «Results» chapter will view all responses in the form of graphs. The linear-response questions were useful for comparing values assigned by the parent on a scale of one to five, as in *Figure 2*, while the checkbox questions were used to be clear about what kind of feelings the subjects examined were experiencing.

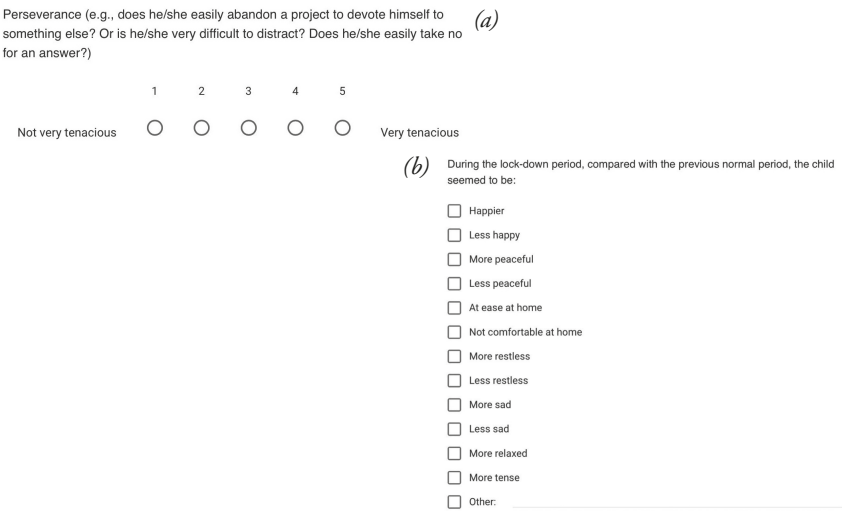

Figure 2. – Linear scale (a); checkboxes (b).

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4. Participants and data collection procedure

In this section we will analyze the data collection methodology of both questionnaires. There were 1000 participants in the first questionnaire and 1322 in the second questionnaire. Below we can see the age distribution of the participants in the first questionnaire, which as indicated is between three and six years old.

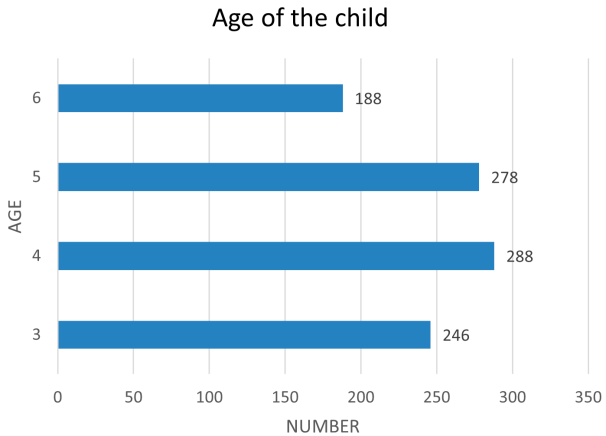

Figure 3. – Age distribution of the sample.

4.1. *Questionnaire 1*

In the first questionnaire as explained above, changes in the typical behavior of children that can be associated with lock-down were sought; for this reason, the same questions were asked in relation to different moments. Explaining further, in order to test whether the disorder of onychophagia (attributable to the presence of stress) varied with the lock-down the parents were asked whether before the lock-down their child ate nails; next they were asked whether during the lock-down his child ate nails; and finally whether with the return to normalcy he ate nails. With the help of Excel, it was possible to count the exact number of those who started or stopped eating nails during or after the lock-down and thus it was possible to measure a decrease or increase in this disorder. This method was used for other variables. *Table 1* follows that clearly shows the times (with respect to lock-down) to which the questions within Q1 refer.

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Table 1.

Mood	–	During	After and after going back to school
Onychophagy	Before	During	After
Food changes from the previous period	–	During	After
Alterations in behavior (tantrums) from the previous period	–	During	After
Increased aggression compared with the previous period	–	During	After

After clarifying why and how three different moments experienced by the subjects examined were photographed, we proceed by explaining the method of decoding and processing the data collected. In order to understand what the mood pattern of the subjects was, parents were asked to indicate the moods exhibited by their child in the three moments examined. Parents were able to choose one or more feelings to be selected in a checkboxes (*Fig. 2b*), during the data processing work all positive moods (happier, calmer, at ease, less restless, less sad, more relaxed) were collected in one word (answering the question how was the child?): GOOD; negative moods (less happy, less calm, not at ease at home, more restless, sadder, more tense) were renamed with the word BAD. Doing this simplified the reading of the data and made it possible to represent them graphically, as will be seen in the «Results» section. The decision to allow the parent the opportunity to select more than one response, however, resulted in mixed responses composed of positive and negative moods. Initially, the combined responses were discarded, as they were judged to be random errors; but, proceeding with the analysis of the results, it was noted that there were multiple instances where, for example, the child felt calmer and less restless but also less happy. Then by examining the parents' openended responses, it became clear that this was not randomness, but the actual presence of mixed feelings in the subjects. These combinations of responses were therefore grouped into MIXED. For some children, the uninterrupted presence of parents in the home caused by the lock-down was a reason for well-being, but at the same time, the estrangement from other affective figures or friends caused malaise in them. With this procedure it was possible to view the humoral changes shown by the analyzed sample in the three periods considered.

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In order to record a change in typical *eating habits*, the parents were asked whether the subjects examined showed any changes in this area; examples of dietary changes were included in the header of the macro-area of the questionnaire containing questions referring to this topic. The same method was used to record a change in *aggression* and *tantrums*.

Regarding the *temperament* variable, parents were asked to indicate their child's temperament by selecting a response from among: quiet child, lively child, amplified child (extremely lively), after explaining to them the characteristics attributable to these descriptions; but they were also asked to enter on a scale of one to five a value indicating the level of the following characteristics found in their child: activity level, regularity, reaction to novelty, ease of adaptation to new situations, energy level, distractibility, and attention span. This step allowed us to view (with spot checks) whether or not the selection regarding the temperament of the subjects by the parents, matched what should be expected. As indicated in section 2, by measuring at the combination of the temperamental dimensions it is possible to define the temperamental category.

As mentioned earlier among the various criteria for diagnosing *depressive disorder* we find: loss of pleasure/interest in activities, dietary changes such as increased or decreased appetite, lack of energy or sense of fatigue, irritability, reduced ability to think or concentrate. The questionnaire asked: «During the lock-down, after a long time locked in the house did the child/children manifest any of these characteristics?» with the following answers: «Introversion (did not seek contact and communication with you), Apathy, Loss of energy, Discouragement, Variations in eating habits, Irritability, Anger outbursts, Aggressive behaviour». Diagnosis takes place in a very thorough manner, in fact the intent of this question was not to diagnose depressive disorder to those who showed five symptoms or more at the same time; but to record the presence or absence of these. However, in this case, it would be wrong to speak of depression in general, one would have to use the definition of «reactive depression» (it's also known as reactive depression). This is a short-term, stress-related type of depression that occurs in response to a traumatic event or series of events. Situational depression is a type of adjustment disorder.

4.2. *Questionnaire 2*

Recall that Questionnaire 2 was administered 17 months after the lock-down. In this questionnaire, parents were explicitly asked to indicate the presence or absence of any problems they found in their children, in the

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long term, that could be associated (in their opinion) with the two months of lock-down (March-May 2020). They were able to indicate whether their children showed difficulties: in social adjustment, anxiety modulation, and in controlling aggression; being able to indicate the answers: never, yes before (from the period after the lock-down to a time less than seventeen months after it) or yes even now (after seventeen months after the lock-down).

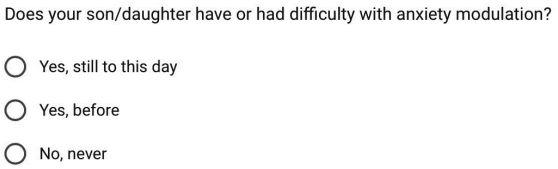

Figure 4. – Sample question in the second questionnaire.

5. Results

This section contains all the data collected using the two questionnaires, will be discussed in the following chapter.

5.1. *Temperament and mood*

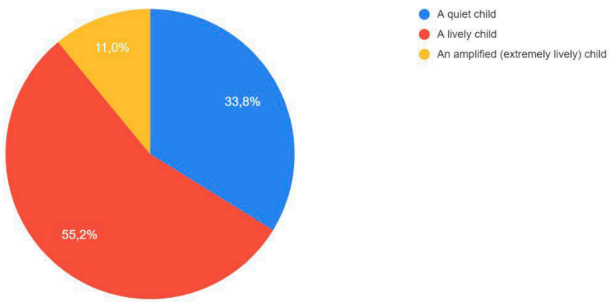

Figure 5. – Children's temperament.

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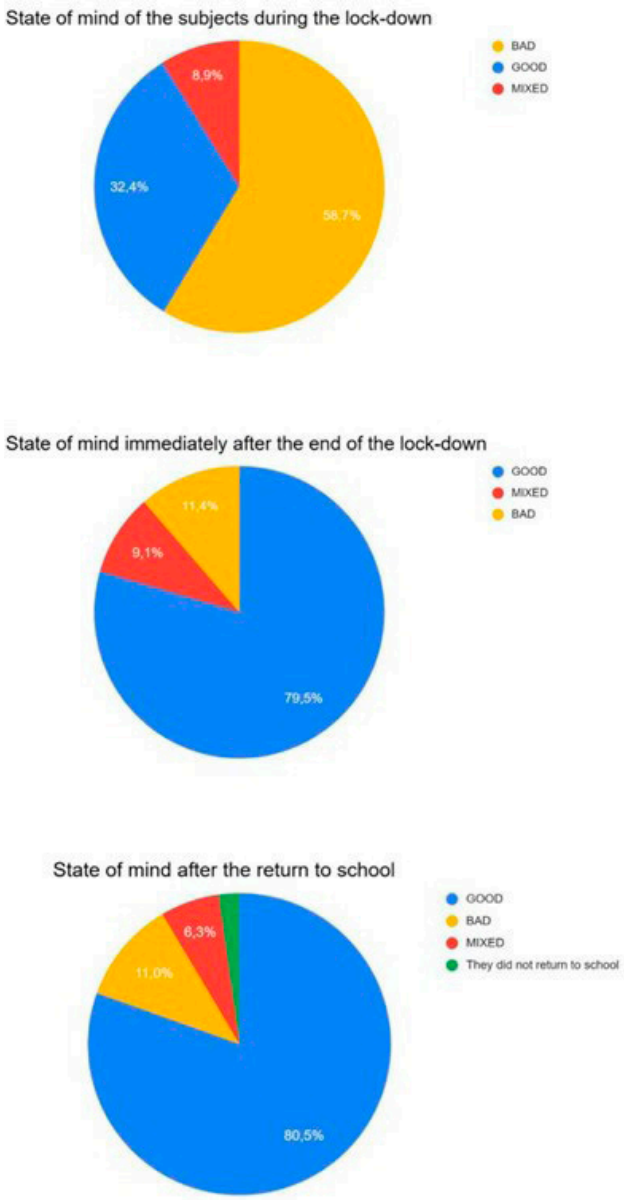

Figure 6. – Mood of the subjects during and after the lock-down.

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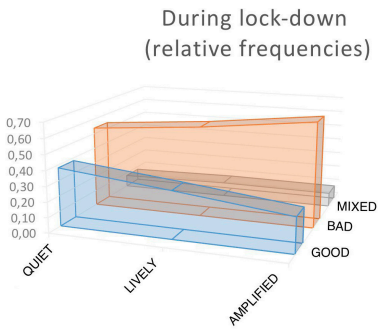
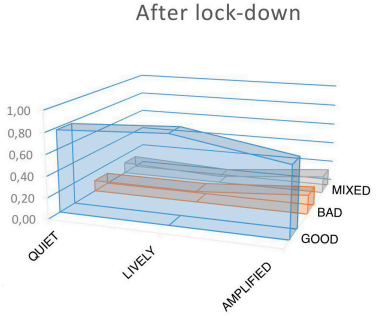


Temperament * Mood during lock-down

			Mood during lock-down			
			GOOD	BAD	MIXED	Total
Temperament:	A quiet child	Count	129	182	27	338
		% Temperament bambino:	38,0%	54,0%	8,0%	100,0%
		% Mood during	38,7%	32,1%	28,1%	33,9%
		% of Total	12,9%	18,2%	2,7%	33,8%
	A lively child	Count	170	330	52	552
		% Temperament bambino:	31,0%	60,0%	9,0%	100,0%
		% Mood during	53,5%	54,4%	66,3%	55,1%
		% of Total	17,0%	33,0%	5,2%	55,2%
	An amplified (extremely lively) child	Count	25	75	10	110
		% Temperament bambino:	23,0%	68,0%	9,0%	100,0%
		% Mood during	7,7%	13,4%	5,6%	11,0%
		% of Total	2,5%	7,5%	1,0%	11,0%
Total		Count	310	588	89	1000
		% Temperament bambino:	31,0%	58,7%	8,9%	100,0%
		% Mood during	100,0%	100,0%	100,0%	100,0%
		% of Total	31,0%	58,8%	8,9%	100,0%

Figure 7. – Chi-square test for variables «Temperament» and «Mood during lock-down».



Temperament * Mood after lock-down

			Mood after lock-down			
			GOOD	BAD	MIXED	Total
Temperament:	A quiet child	Count	264	36	38	338
		% Temperament:	78%	11%	11%	100,0%
		% Mood after	34,4%	32,7%	28,9%	33,9%
		% of Total	26,4%	3,6%	3,8%	33,8%
	A lively child	Count	459	58	35	552
		% Temperament:	81,3%	10,3%	7,8%	100,0%
		% Mood after	57,0%	50,4%	47,8%	55,1%
		% of Total	45,9%	5,8%	3,5%	55,2%
	An amplified (extremely lively) child	Count	72	20	18	110
		% Temperament:	61,8%	17,3%	19,1%	100,0%
		% Mood after	8,6%	16,8%	23,3%	11,0%
		% of Total	7,2%	2,0%	1,8%	11,0%
Total		Count	795	114	91	1000
		% Temperament:	78,7%	11,3%	9,0%	100,0%
		% Mood after	100,0%	100,0%	100,0%	100,0%
		% of Total	79,5%	11,4%	9,1%	100,0%

Figure 8. – Chi-square test for variables «Temperament» and «Mood after lock-down».

5.2. *Onychophagy*

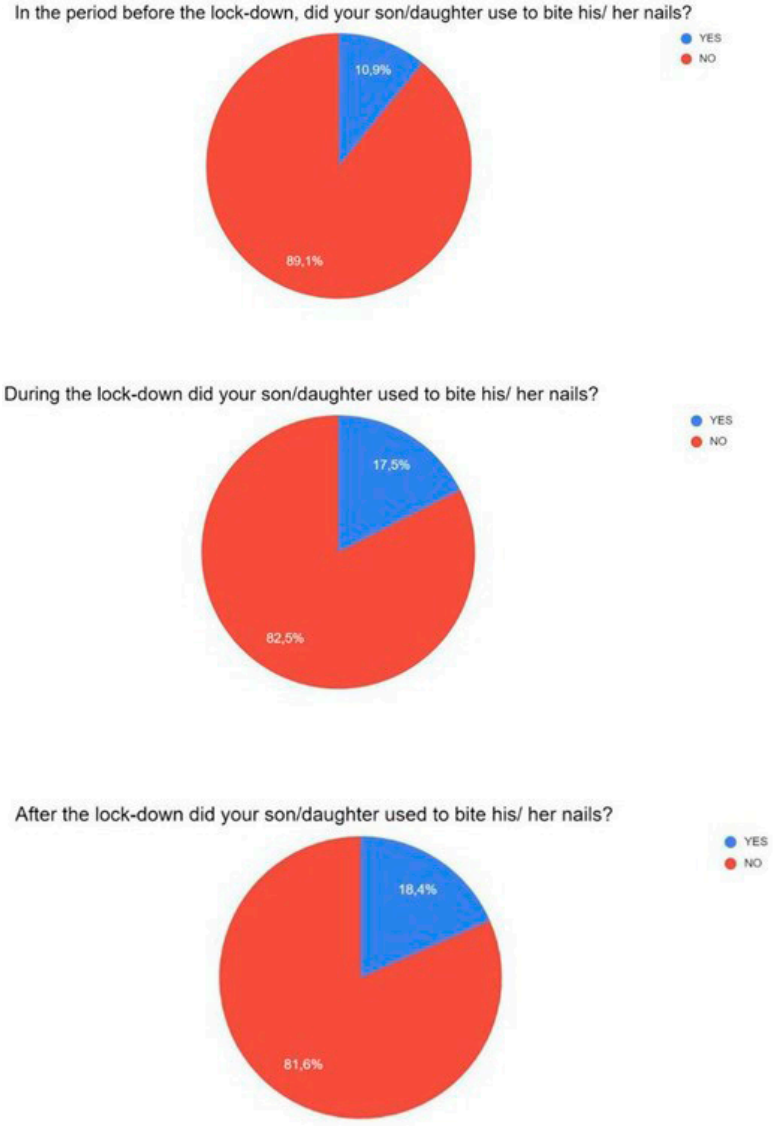


Figure 9. – Onychophagy before, during and after the lock-down.

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5.3. *Food changes*

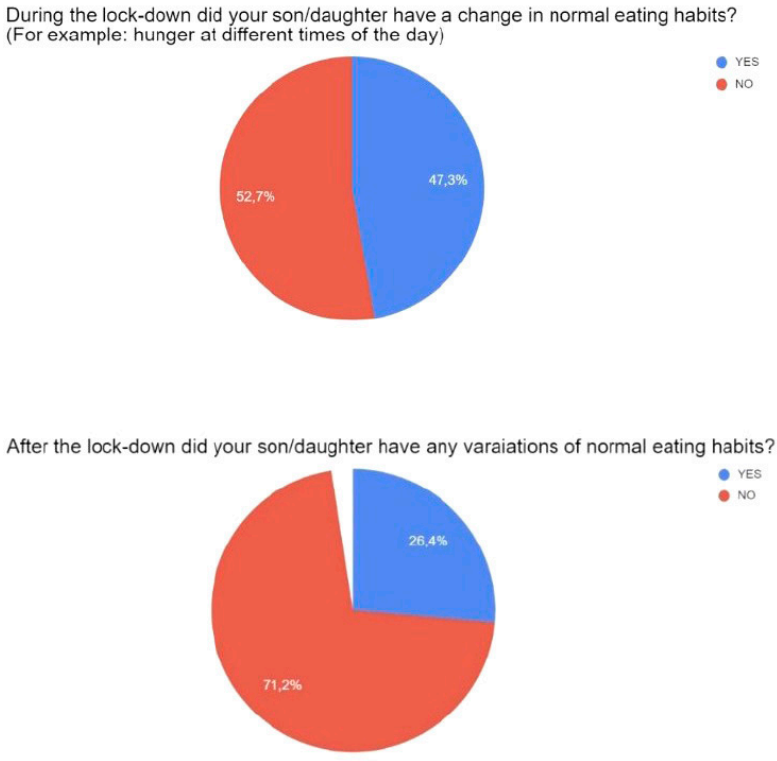

Figure 10. – Changes in typical eating habits during and after lock-down. The white segment of the graph represents the non-responses of 24 parents.

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5.4. *Variations in aggression*

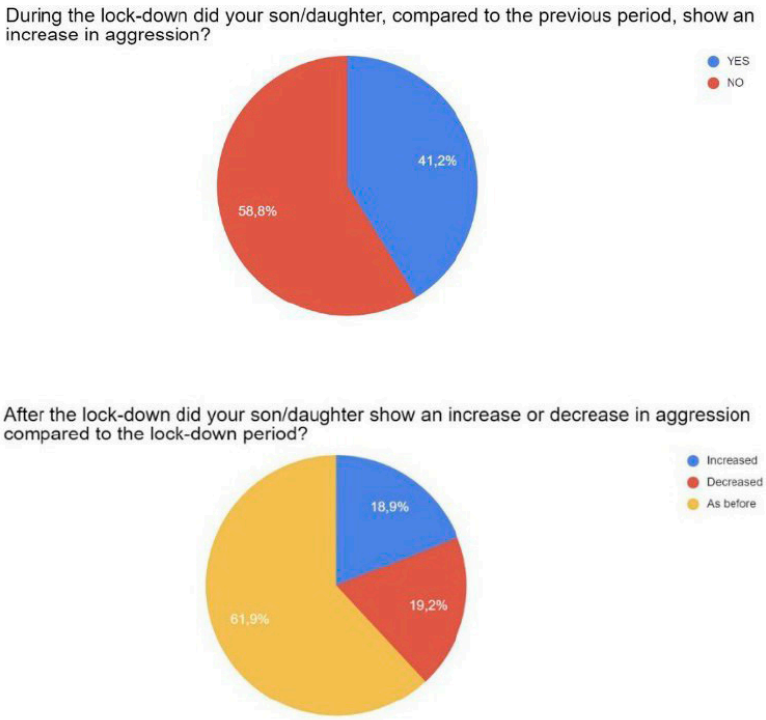

Figure 11. – Variations in aggression during and after the lock-down.

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5.5. *Alterations in behavior (tantrums)*

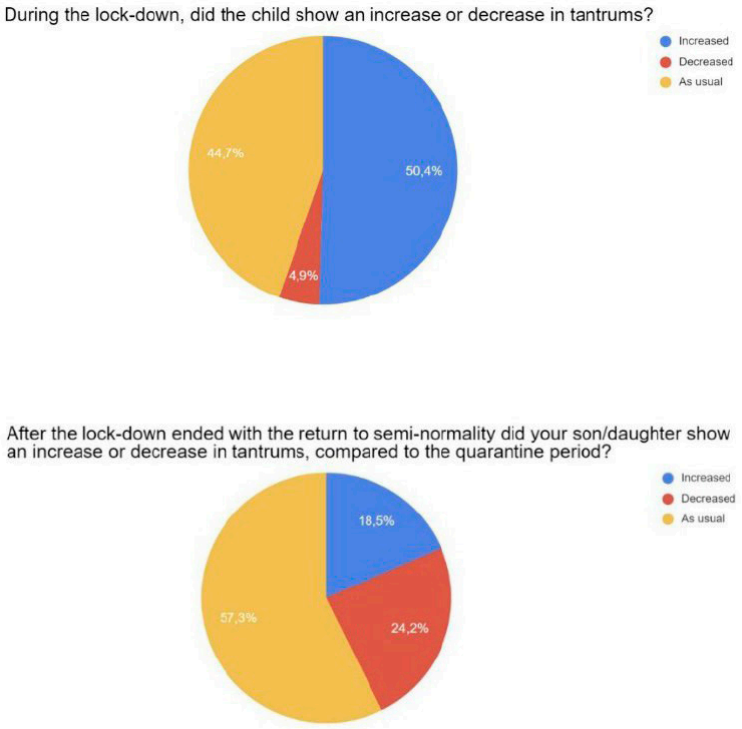

Figure 12. – Increase/decrease in tantrums during and after lock-down.

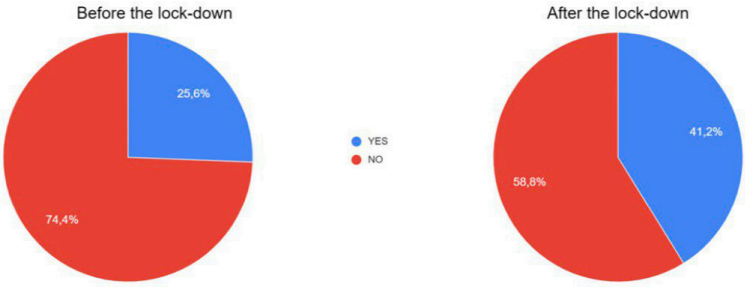

Figure 13. – Tantrums during and after the lock-down.

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5.6. *Behavioural changes*

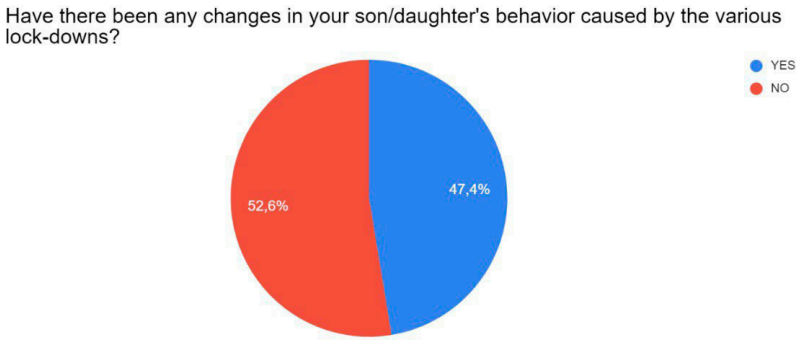

Figure 14.

5.7. *Situational depression*

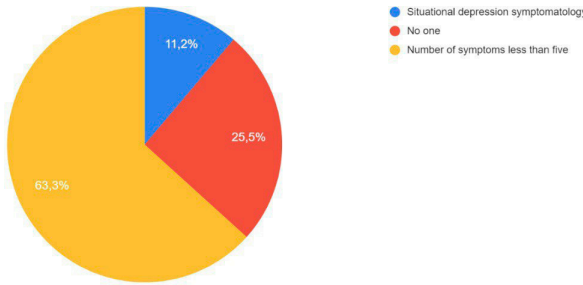

Figure 15. – Subjects who did or did not show symptoms attributable to depressive disorder.

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5.8. *Questionnaire 2*

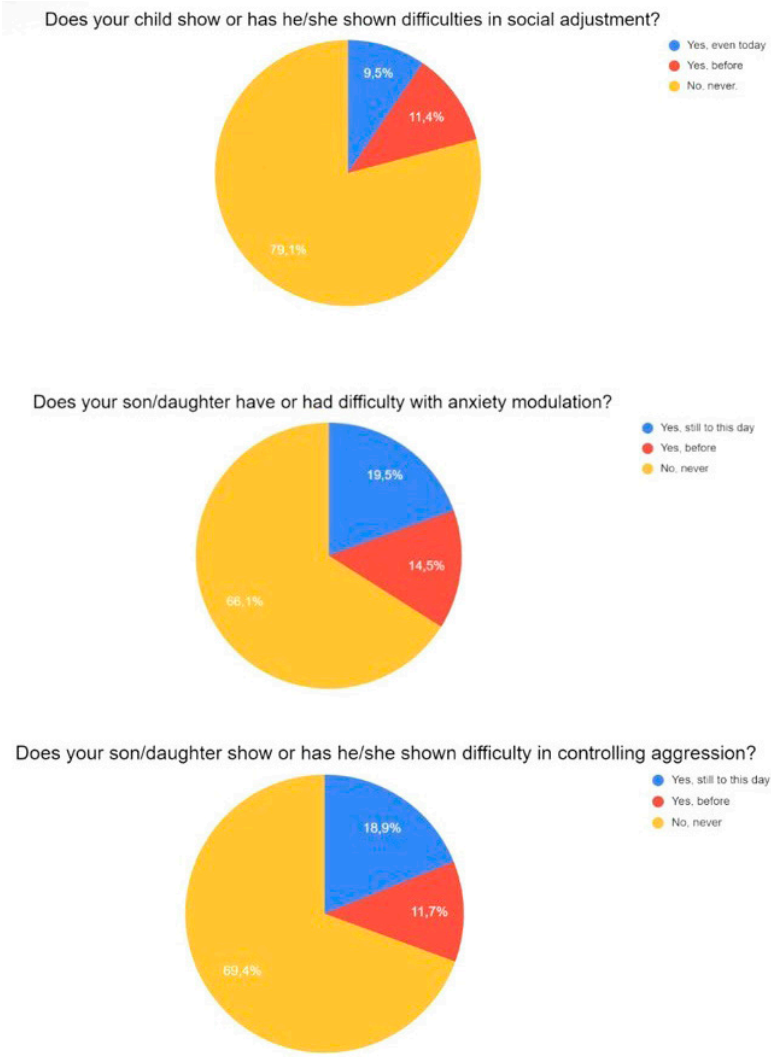

Figure 16. – Variable detected with the second questionnaire.

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6. Discussion questionnaires

Temperament and Mood. In the graphs on mood trends (*Fig. 6*) it is possible to see how those who children's state of mind and how this changed during the period examined. The selected times recorded as expected changes in the mood of the subjects. In fact, during the period of isolation 58.7% of the sample recorded negative feelings and emotions while with the return to normalcy the percentage dropped to 11 percent. These data make it possible to hypothesize the existence of an association between the lock-down and the negative moods recorded during that period, but also between the lock-down and the modification of these states. In fact, at the beginning of the period there is a peak in the number of subjects who felt bad, while at the end of the period there is a decrease in negative mood states. The results of the chi test (*Figs. 7-8*) show that the two variables show a demonstrated significant correlation between the two variables «Mood» and «Temperament» evaluated for each moment of the assessment: chi square test, P (DF; alpha) = P (2; 0.05) = 0.033 for the variable «During lock-down» P (DF; alpha) = P (2; 0.05) = 0.00002 for the variable «After lock-down», it is possible to analyze the direction of the correlation between the two variables «Mood» and «Temperament» the trend of relative frequencies. For example, regarding the variable referring to the return to normalcy, we have for subjects who were «GOOD» 129/338 = 38% for a quiet child, 31% for a lively child, and 23% for an amplified child. This shows that the temperament of the subjects influenced whether or not they found it difficult to stay indoors.

Onychophagy. Data processing showed (*Fig. 9*) that prior to the closure out of 1000 children only 10.9% had a nail-biting habit (onychophagy) and that during the March-May period the percentage increased to 17.5%. As described initially this behavior may arise or generally occurs in those experiencing particularly stressful times. What can be seen from the data processing carried out with the help of Excel is that out of 1000 children 109 were already biting their nails before the March-May period but during the lock-down 24 of them no longer exhibited this behavior, of these, 20 were defined by their parents as «calm children»; trying to interpret this data we could say that those who were defined as calm subjects responded positively to the lock-down stimulus by stopping biting their nails. This further indicates an association between the subjects' temperament and their emotional and behavioral state during the lock-down. There was also a decrease in onychophagic subjects after the lock-down ended; 8% of the sample experienced a change in this habit.

Food changes. Also thanks to the data on changes in typical eating habits, which show (*Fig. 10*) a change during the lock-down period for

47.3 percent of the sample that after the return to normalcy drops to 26.4%, we can hypothesize the presence of an association between isolation and the changes recorded. Moreover, also in this variable we measure a number of subjects (amounting to 26) who during the lock-down showed no change whatsoever but with the return to normalcy did, and again the majority of them are subjects referred to as quiet children by their parents (data obtained by processing using Excel).

Variations in aggression. Through the graphs showing (*Fig. 11*) the trend of the variable «Aggression», one can see an increase in aggression during the block for more than 41% of the children. Regarding the later period, it should be pointed out that the «EQUAL» group consists of 119 subjects who had previously shown an increase in aggression and 501 subjects who had not. The numerical total of those who thus showed an increase in aggression as a result of the March-May period is 308 subjects, or 30.8% of the sample. In the second graph, we can see that 180 children began to show an increase in aggression after the block period, with a return to semi-normality. The presence of behaviors characterized by crying, shouting, anger, and opposition are typical of children experiencing moments of stress; these behaviors may also be the sign of nervousness. These behavioral imbalances (referred to in the questionnaire as «tantrums», after appropriately indicating) were recorded during the period examined.

In the graphs regarding *behavioral alterations* (*Figs. 12-13*), there is an increase in tantrums, which could be associated along with all the other changes recorded with the lock-down period. Using Excel, it could be seen that the children included in the «As usual» unit in the second graph, the one referring to the period after the lock-down, are divided into 186 subjects who had already recorded an increase during the lock-down and those who had recorded no increase but instead a decrease both before and after. During the March-May period, 50.5% of the sample showed an increase in behavioral imbalances. This is even more evident in the graphs in *Figure 13* where we see the trend of tantrums before and after and not the increase or decrease. It can also be emphasized here that lock-down meant «change» for subjects who experienced behavioral changes.

Behavioral changes. When asked about generic behavioral changes found in their children (*Fig. 14*), 474 out of 1,000 parents responded that they had seen behavioral changes in the subjects examined that they believed were attributable to the lock-down.

Situational depression. 11% of the sample showed the presence of five or more symptoms attributable to reactive depression, while 25.5% showed (*Fig. 15*) the presence of fewer than five. This finding is impor-

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tant in understanding how much impact lock-down has had on the mental health and mood states of some Italian subjects. These 11% of units, who suffered more than others for reasons associated with isolation, may have developed issues that can be traced even after a long time. With the data from the second questionnaire (*Fig. 16*) the situation could be monitored seventeen months after lock-down, the data showed that after lock-down 21% of the second sample examined showed difficulties in social adjustment; about half recorded this problem for a period of less than seventeen months after lock-down, while the rest even after-wards. Long-term difficulties are also recorded for 19.5% in modulating anxiety and 18.9% in controlling aggression. There could be no continuity of results between the first and second questionnaires.

7. Conclusions

Through this study, it was possible to obtain an overview of the mood of 1,000 Italian children aged three to six during and after lock-down, which showed that many of them suffered as a result of forced isolation. Specifically, 11.2% of the sample experienced symptoms associated with situational depression. During the lock-down period, almost 60% of the sample showed negative feelings, but with the return to normalcy, the percentage dropped to 11%. In addition, through the administration of the first questionnaire, an increase in some behavioral changes, such as onychophagy, could be observed; there was a 7% increase in the number of children who ate their nails during the lock-down. Other behavioral alterations, such as aggression and tantrums, increased during the lock-down compared with the previous period. The study also found a significant association between the children's temperament variables and their mood state. In addition, through the administration of the second questionnaire, we identified some issues that persist in the long term and may be associated with traumatic events experienced in the past, such as difficulty in modulating anxiety (found in 19.7% of the sample seventeen months after lock-down), difficulty in controlling aggression (found in 18% of the sample in the long term), and difficulty in social adjustment (found in 9.5% of the sample). The research hypothesis presented in section 2 was that «an association existed between lockdown and short- and long-term behavioral and mood changes». The interpretation of the results obtained confirms that such an association exists between the changes recorded both in mood and behavior in children aged three to six years who participated

in the study and the period of isolation experienced in Italy from March to May 2020. The main limitation of this study is the questionnaire's structure, which did not anticipate such a high number of responses, and several nuances of such a delicate topic could not be considered. This research provides the basis for predicting future psychological risks in those who experienced the lock-down as a stressor and/or a traumatic event. Therefore, it could help mitigate the negative effects on the mental health of individuals who experienced the various lock-downs associated with the Covid-19 pandemic. Future research could investigate the same population, i.e., those aged three to six years during the lock-down, and examine other difficulties associated with the lack of social interaction or the high levels of stress experienced during this period.

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Riassunto

L'obiettivo di questa ricerca è stato quello di rintracciare una associazione tra il lock-down causato dalla pandemia di Covid-19 in Italia (marzo-maggio 2020) ed eventuali variazioni comportamentali ed umorali a breve e lungo termine in 1.000 bambini dai tre ai sei anni. Con i dati raccolti attraverso la somministrazione di due questionari si è ottenuto un resoconto sull'andamento psico-attitudinale dei soggetti esaminati nel periodo sopracitato. I risultati hanno mostrato che durante il lock-down quasi il 60% del campione ha mostrato sentimenti negativi, l'11,2% di questo ha manifestato inoltre sintomi riconducibili alla depressione reattiva. Con il ritorno alla normalità la percen-

tuale di sentimenti negativi registrata nel campione è scesa sino all'11%, è stata inoltre trovata un'associazione significativa tra lo stato umorale e il temperamento dei soggetti. Si sono registrate variazioni comportamentali come un aumento dell'onicofagia e delle alterazioni alimentari durante il lock-down, associabili a stress. È stato possibile rivelare problematiche nel lungo periodo, come la difficoltà nella modulazione dell'ansia, il controllo dell'aggressività e l'adattamento sociale.

Parole chiave: Ansia; Comportamento; Covid-19; Disregolazione emotiva; Lockdown; Salute mentale.

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