

■ “Ripple effect”: Psychological responses and coping strategies of Italian children in different COVID-19 severity areas

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Abstract

COVID-19 has affected learning and the outdoor activities of more than 862 million children or adolescents worldwide. This study investigated the mental health of Italian children and explored their psychological response and coping strategies in different COVID-19 epidemic severity areas, with the aims of alleviating the impacts of COVID-19, promoting targeted intervention, and reducing the risk of future psychological problems. 1074 parents of children aged 6 to 12 years old participated in an ad-hoc online survey. Among them, 40.3% were from the high-risk areas in the North, and 59.7% were from the medium/low-risk areas in the center of Italy. The results showed that, compared to the children in medium- or low-risk areas, children in the North scored significantly higher for symptoms of anxiety, moods, and cognitive changes, showing a “ripple effect” trend. Moreover, children in the northern areas used fewer task-oriented strategies and more emotion- and avoidance-oriented strategies than those in the central areas. Specifically, children in the northern areas were more likely to show acceptance and seek affection from others, while those in the central areas used more humor when their parents talked about quarantine or coronavirus. These findings provide relevant evidence and a reference point for crisis management in children’s mental health.

Keywords: psychological response; coping strategies; children; ripple effect; COVID-19.

Resumen

El COVID-19 ha afectado el aprendizaje y las actividades al aire libre de más de 862 millones de niños o adolescentes en todo el mundo. Este estudio investigó la salud mental de los niños italianos y exploró su respuesta psicológica y las estrategias de afrontamiento en diferentes áreas de gravedad de la epidemia de COVID-19, con el objetivo de aliviar los impactos de la misma, promover la intervención específica y reducir el riesgo de futuros problemas psicológicos. 1074 padres de niños entre 6 a 12 años de edad participaron en una encuesta ad-hoc online. De ellos, el 40,3% procedían de las zonas de alto riesgo del norte y el 59,7% de las zonas de riesgo medio/bajo del centro de Italia. Los resultados mostraron que, en comparación con los niños de las áreas de riesgo medio o bajo, los niños del norte obtuvieron una puntuación significativamente más alta en cuanto a los síntomas de ansiedad, cambios cognitivos y de estado de ánimo, mostrando una tendencia de “efecto dominó”. Además, los niños de las zonas del norte utilizaron menos estrategias orientadas a las tareas y más estrategias orientadas a las emociones - y la evitación - que los de las zonas centrales. Concretamente, los niños de las zonas del norte eran más propensos a mostrar aceptación y a buscar el afecto de los demás, mientras que los de las zonas centrales usaban más el humor cuando sus padres hablaban de la cuarentena o del coronavirus. Estos hallazgos proporcionan evidencia relevante y un punto de referencia para el manejo de crisis en la salud mental de los niños.

Palabras clave: respuesta psicológica; estrategias de afrontamiento; niños; efecto dominó; COVID-19.

The coronavirus 2019 (COVID-19) pandemic was declared as an international public health emergency on January 30, 2020 (World Health Organization, 2020), and the virus rapidly spread to countries around the world. On January 31, the Italian government declared a state of emergency. On February 21, a 38-year-old man living in Lombardy was confirmed as the first local human-to-human transmission case in Italy. On the same day, two positive cases were occurred in

the Veneto region. The following day, the government announced the blockade and isolation of towns around those areas in the North, and restrictive measures in the first “red zone” were implemented. On February 23, schools were closed in six regions, all in northern Italy. On March 4, schools and universities closed. The quarantine zone was expanded on March 8, and it was announced that quarantine measures were implemented in 14 regions, covering the vast majority of

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northern Italy. The next day, the government issued a Decree to extend the restrictions that had taken effect locally to include the rest of Italy, and in which the outdoor activities of residents were limited across the country. With the exception of shops selling the basic necessities and basic services, all other shops were closed, all sports activities were cancelled, and unnecessary or strategic production activities were halted; almost everyone was required to work from home, and schools and universities across the country suspended classes, resulting in children having to stay at home (Government, 2020).

Since COVID-19 usually presents as a mild disease for children, and the mortality rate of children is relatively low in comparison to that of the elderly (Götzinger et al., 2020), children were often ignored during the outbreak. UNICEF stated, “The COVID-19 pandemic has caused the poorest and most vulnerable groups in society to suffer the most serious impact” (United Nations News, 2020), reminding everyone that children may be the most affected group. This effect not only occurs during the pandemic but may remain after it has ended.

When an individual perceives a threat in the environment, this automatically triggers the individual’s stress responses, such as tension, anxiety, and depression (Cohen et al., 2007). The negative emotional state caused by stress directly affects the individual’s physiological processes and behavioral response patterns (Koolhaas et al., 2011). Children are mostly in an important phase of their development during which they undergo psychological growth and the formation of their personality, and this is a sensitive stage during which to respond to stressful events. During the COVID-19 quarantine, the implementation of school closure measures reduced children’s information sources; parents and social media became their main sources of information (Saxena & Saxena, 2020). Furthermore, the quality and quantity of information provided about the epidemic may affect their disaster responses and ability to recover (Pfefferbaum et al., 2015). As keen observers, children readily experience the pain, fear, and anxiety of those around them (Bartlett et al., 2020). However, they do not have the levels of maturity to understand and balance their negative emotions, and they are easily overwhelmed by the reactions of those around them (Saxena & Saxena, 2020). Parents are their closest companions, and the parental response is a powerful predictor of children’s post-disaster adjustment (Pfefferbaum et al., 2015). How the information is imparted to children about the pandemic relates highly to the child’s fear, suggesting that if parents provide information about a threat, the fear levels in their children increase (Remmerswaal & Muris, 2011). Pfefferbaum et al. (2015) believed that besides parents, media coverage (especially TV) might constitute the primary contact between unexposed children and disasters. The dissemination of information on COVID-19 via the media or other informal channels may have a “magnification” effect (Wen et al., 2020; Xu et al., 2020). In particular, sometimes incorrect information is transmitted through the traditional mass media (Zarocostas, 2020), creating a host of secondary issues for children, leading to confusion, panic, and other negative symptoms. It is evident that the types and sources of information about COVID-19 have become important factors that influence children’s psychological responses.

Long-term isolation at home, reducing the scope of interpersonal communication and activities, and breaking the normal rules of life and learning; these stressful events may lead to emotional and behavioral problems in children (Brooks et al., 2020; Jiao et al., 2020; Orgilés, Morales, Delvecchio, Mazzeschi, & Espada, 2020a). Remaining in this state of stress for an extended period may even lead to posttraumatic stress disorder (PTSD). Sprang & Silman (2013) investigated the psychosocial responses of children and their parents to

pandemic disasters (such as the H1N1 and SARS-CoV viruses), and found that parents reported that nearly one-third of children who had experienced isolation or quarantine showed symptoms that met the PTSD criteria. Three years after the Wenchuan earthquake in China, a survey showed that around 30% of children had PTSD symptoms, and this continued into their junior high school years (Pan et al., 2015). Recent studies have shown that COVID-19 causes children to experience different degrees of negative emotions (such as tension, anxiety, irritability, and depression) and results in negative cognitive assessments (Brooks et al., 2020; Jiao et al., 2020; Orgilés et al., 2020a; Wang et al., 2020), which are typical symptoms leading to PTSD. Moreover, Li et al. (2020) measured the levels of PTSD and generalized anxiety disorder (GAD) in 1172 Chinese children and adolescents aged 8–18 years during the COVID-19 pandemic and found that children and adolescents may be displaying PTSD and GAD symptoms. Therefore, it is particularly important to pay attention to- and understand children’s psychological responses and to intervene to try and recover their physical and mental health.

In the face of stressful events, individuals consciously adjust their emotions, behaviors, cognition, and environment through voluntary efforts, and this is known as a coping strategy (Compas et al., 1999). When encountering different stressful events, the coping strategies of individuals usually differ, due to the interactions between themselves and the environmental characteristics (Orgilés, Morales, Delvecchio, Francisco, Mazzeschi, Pedro, & Espada, 2020b). Positive coping strategies can promote emotional rehabilitation, while negative coping strategies may bring higher psychological distress (Wang et al., 2020). Identifying children’s coping strategies during stressful situations can promote early and effective interventions to reduce the risk of future psychological problems (Orgilés et al., 2020b). Based on the coping strategies adopted by children in the face of stress, VanMeter et al. (2020) proposed three general dimensions of coping: task-oriented coping, emotion-oriented coping, and avoidant coping strategies. A task-oriented coping strategy is defined as guiding the positive response to the stressor, i.e., reducing or eliminating the stressor by finding a solution and taking action; the main aim of emotion-oriented coping is to relieve the emotions caused by the stressors and seek support from others. Avoidance-oriented coping strategy refers to a type of disengagement, rejection or withdrawal to avoid the sources of stress or the emotions- and thoughts caused by the stressors. In general, children with task-oriented strategies showed more adaptive behaviors (VanMeter et al., 2020), while children with emotion-oriented and avoidance-oriented coping strategies were more likely to have psychological maladjustment (Carlo et al., 2012; Duan et al., 2020; VanMeter et al., 2020). However, seeking advice or support from others has been associated with a reduction in anxiety levels (Smith et al., 2006). In their COVID-19 related research, Duan et al. (2020) investigated the mental health of Chinese children and adolescents and found that a task-oriented strategy was correlated with a decrease in clinical depression, while an emotion-oriented strategy was positively correlated with an increase of depression. In addition, Orgilés et al. (2020b) showed that the emotion-oriented strategy was directly related to changes in anxiety, mood, sleep, and behavioral and cognitive functions; task-oriented and avoidance-oriented strategies were related to better psychological adaptability.

During a public health emergency, people’s mental health appears to be related to where they live and follows a “ripple effect”; the closer they are to the center of the crisis event, the higher their perception of risk and negative emotions about the event (Slovic, 1987; Wen et al., 2020). A “ripple” is like when a stone is thrown into calm water;

the point where it hits shows the largest fluctuation, and the degree of fluctuation in the water decreases with distance from the center (Slovic, 1987). The degree, method and nature of the risk event itself, and the way the public obtains, perceives and interprets the information, will affect the depth and breadth of the ripple (Xie et al., 2003). During the current COVID-19 pandemic, people are threatened by the epidemic to varying degrees around the world, and the severity of the epidemic varies in different areas. In existing studies, only Chinese adult samples were collected, and these only considered proximity to the high-risk area as a meaningful variable. Wen et al. (2020) investigated 4833 Chinese adults and showed that compared to mildly affected areas, residents in severely affected areas reported that they were at greater risk and had higher anxiety, which was similar to the “ripple effect”. To date, there exists no localized research that has investigated the situation in Italy. In Italy, the pandemic started in the North on February 21, and since then the northern areas have continued to show the highest rates of spread and mortality, making them high-risk areas (Pluchino et al., 2020). Relatively speaking, the number of infections and the risk coefficient in the central areas were low (Italian Ministry of Health, 2020). However, it has not been verified whether a “ripple effect” exists among the residents in the different COVID-19 risk areas. Moreover, previous study populations have tended to focus on adults who have more mature cognition and judgment. It is worth noting that as children are in the process of cognitive development, their perceptions of risk and stress are may not be consistent with those of the adults. At the same time, understanding the children’s perceptions will help to provide targeted interventions for their psychological recovery in areas where the risks differ.

Therefore, this study aimed to explore the consistencies and differences of the psychological responses and coping strategies of children in different COVID-19 epidemic severity areas and to provide relevant evidence and references for crisis management of public health emergencies. Specifically, the aim was to know; 1) What types

and sources of information about COVID-19 did Italian children receive during the quarantine period, 2) What were the psychological responses and differences between children in northern and central Italy during quarantine, and 3) What were the coping strategies of children in northern and central Italy, and how did these differ.

Methods

Participants

Parents of 1074 Italian children aged 6 to 12 years old (mean age = 8.99 years, $SD = 1.97$, 52% male) participated in our online survey. The parents’ ages ranged from 20 to 66 years old (mean age = 42.21 years, $SD = 5.420$, 89.7% mothers). Among them, 40.3% were from the northern areas, and 59.7% were from the central areas. Of the respondents, 24.1% had one child, and 75.9% had more than one child. Most of them held a bachelor degree or above (54.1%), and only 5.5% had a basic education. Around 3% of parents reported having lost their job due to the COVID-19 pandemic.

Table 1 lists the sample characteristics and differences in the sociodemographic variables of the two areas. There was a higher proportion of parents with primary or secondary education (58.3% vs 37.6%) in the northern areas, but less with postgraduate or doctoral studies than in the sample from the central areas (41.8% vs 52.4%). In the North, participants had more part-time jobs (43.6% vs 19.1%) than those from the center. However, the latter reported a higher percentage of full-time jobs (11.5% vs 31.8%) and unemployment (1.8% vs 2.6%). Compared to the central areas, participants in the northern areas reported more people at-risk living with them during quarantine (67.9% vs 39.9%), and fewer reported friends or family, not living with them, who were -at-risk (17.8% vs 44.8%). Children in the northern areas were slightly older than those in the central areas.

Table 1. Sample Characteristics and Differences in Sociodemographic Variables by Two Areas

	Total (<i>N</i> = 1074)		North (1) (<i>n</i> = 433)		Center (2) (<i>n</i> = 641)		Test ^a	Effect size ^b	Post-hoc ^c
	<i>N</i>	%	<i>n</i>	%	<i>n</i>	%			
Parents									
Mother	963	89.7	397	91.7	566	88.3	3.198	-	-
Age, <i>M</i> (<i>SD</i>)	42.21	5.42	41.84	5.30	42.46	5.49	129447	-	-
Education level							73.000***	.261	
Primary school	59	5.5	43	10.0	16	2.5			1>2
Secondary school	433	40.4	208	48.3	225	35.1			1>2
Undergraduate	405	37.8	147	34.1	258	40.2			1<2
Doctoral or master	175	16.3	33	7.7	142	22.2			1<2
Mother’s current employment situation							22.145***	.144	
Self-employed	146	13.7	57	13.2	89	14.0			
Part-time	219	20.6	79	18.3	140	22.1			
Full-time	268	25.2	121	28.1	147	23.2			
Unemployed	79	7.4	30	7.0	49	7.7			
Lost job due to COVID-19	35	3.3	10	2.3	25	3.9			
Smart-working	237	22.3	85	19.7	152	24.0			
Other	81	7.6	49	11.4	32	5.0			1>2
Father’s current employment situation							107.139***	.319	
Self-employed	269	25.6	98	22.6	171	27.6			
Part-time	307	29.2	189	43.6	118	19.1			1>2
Full-time	247	23.5	50	11.5	197	31.8			1<2
Unemployed	24	2.3	8	1.8	16	2.6			1<2
Lost job due to COVID-19	26	2.5	13	3.0	13	2.1			

	Total (N=1074)		North (1) (n=433)		Center (2) (n=641)		Test ^a	Effect size ^b	Post-hoc ^c
	N	%	n	%	n	%			
Smart-working	172	16.3	69	15.9	103	16.6			
Other	7	.7	6	1.4	1	.2			
If there are people at risk in my environment							93.201***	.298	
I belong to a risk group	46	4.4	18	4.3	28	4.4			
At-risk people live with me during the quarantine	538	51.5	286	67.9	252	39.9			1>2
Some friends or family are at-risk population, but do not live with us during quarantine	358	34.0	75	17.8	283	44.8			1<2
I do not know anyone who is a population at risk	111	10.5	42	10.0	69	10.9			
People who live in my house during quarantine							.019	-	-
They do not leave the house unless they have to buy groceries or other allowed activities	603	56.1	242	55.9	361	56.3			
One or both parents still work outside the home	471	43.9	191	44.1	280	43.7			
How many people live in at home during quarantine, M (SD)	4.04	.92	4.06	.90	4.02	.93	135127.5	-	-
Square meters home, M (SD)	121.82	50.92	118.48	49.88	124.07	51.53	3.113	-	-
Children									
Male	558	52	231	53.3	327	51.0	.564	-	-
Age, M (SD)	8.99	1.97	9.15	2.00	8.88	1.95	127829 [*]	.068	1>2

Note. M = Mean; SD = Standard Deviation.

^a Cross-table (χ^2) for categorical variables and Mann-Whitney U for continuous variables.

^b Effect size = Cramer's V for categorical variables and Rosenthal's r statistic for continuous variables.

^c Bonferroni correction applied to p values was used to reduce the risk of type I errors of a chi-squared test.

* $p < .05$; *** $p < .001$.

Instruments

Impact Scale of the COVID-19 and home confinement on children and adolescents (Orgilés, Morales, & Espada, 2020). The scale requires parents to rate their children's psychological responses to quarantine as assessed by 31 items ranging from 1 (*much less compared to before quarantine*) to 5 (*much more compared to before quarantine*). For the present study, we used only 24 symptoms grouped into four categories: anxiety symptoms (10 items), mood symptoms (6 items), behavioral changes (6 items), and cognitive changes (2 items).

Parents' perceptions of their children's coping strategies which were measured using a list of 11 items and included the three dimensions proposed by Parker and Endler (1992); i.e., task-oriented, emotion-oriented, and avoidance-oriented. The items required binary "yes-no" responses.

Moreover, questions about sociodemographics of the parents and children (see Table 1) and types and sources of COVID-19 information received by the children were filed in by parents.

Procedures

The current study was designed to assess the psychosocial impact of COVID-19 in children. It followed the ethical standards for research outlined in the Ethical Principles of Psychologists and Code of Conduct (American Psychological Association, 2017), and was approved by the Ethics Board Committee for Psychological Research at the authors' institution. Due to quarantine constraints, school principals and/or social networks (e.g., WhatsApp groups) were used to send out emails, using a snowball sampling strategy, to invite parents

to join in the study. Between March 26 and April 12, 2020, parents filled in all the questions voluntarily and anonymously. Confidentiality was ensured, no incentive reward was given, and all participants could withdraw at any time during the completion process. It took approximately 12 minutes to complete the survey. Inclusion criteria for participation were: a) 18 years old or over, b) having one or more children aged 6 to 12 years old, and, c) living in Italy.

Statistical analysis

The Statistical Package for Social Science (IBM SPSS Version 21) was used for all the data analyses. The sample characteristics were analyzed using descriptive statistics. According to the Kolmogorov-Smirnov test, the variables were not normally distributed ($p < .05$) and non-parametric tests were used. Differences between the northern and central areas for the sociodemographic variables, types and sources of COVID-19 information that children received, children's psychological responses, and children's coping strategies were analyzed using Chi-square (χ^2) (for the categorical variables), and a Mann-Whitney U test (for continuous variables). The 24 symptoms used to describe the children's psychological responses were coded as dichotomous variables; if parents reported that their children presented any of these responses to a greater extent (range 4-5) during quarantine (compared to before this period), these were coded as 1 ("affected"), and the rest were coded as 0 ("non-affected"). A new variable ("was affected") was created by summing the 24 dichotomous symptom variables (ranging from 0 to 24). This variable was categorized into two groups: "non-affected" (children's symptoms

Table 2. Types and Sources of COVID-19 Information Children Received in Northern Areas and Central Areas

	Total (N = 1074)		North (1) (n = 433)		Center (2) (n = 641)		Test ^a	Effect size ^b	Post-hoc ^c
	N	%	n	%	n	%			
Type of information									
Ways transmission	916	85.3	388	89.6	528	82.4	10.785***	.100	1>2
Symptoms	666	62.0	285	65.8	381	59.4	4.467*	.064	1>2
Protection measures	936	87.2	391	90.3	545	85.0	6.426*	.077	1>2
Why quarantined	1008	93.9	413	95.4	595	92.8	2.930	-	-
Type of information Total, M (SD), range = 1-4	3.28	1.00	3.41	.91	3.20	1.05	124113***	.099	1>2
Source of information									
Parents	1067	99.3	432	99.8	635	99.1	1.984	-	-
Other family	216	20.1	79	18.2	137	21.4	1.574	-	-
School	522	48.6	143	33.0	379	59.1	70.478***	.256	1<2
Friends	95	8.8	36	8.3	59	9.2	.254	-	-
TV	583	54.3	251	58.0	332	51.8	3.969*	.061	1>2
Internet	209	19.5	78	18.0	131	20.4	.968	-	-
Source of information Total, M (SD), range = 1-6	2.51	1.20	2.35	1.18	2.61	1.20	119466***	.123	1<2

Note. M = Mean; SD = Standard Deviation.

^a Cross-table (χ^2) for categorical variables and Mann-Whitney U for continuous variables.

^b Effect size = Cramer's V for categorical variables and Rosenthal's r statistic for continuous variables.

^c Bonferroni correction applied to p values was used to reduce the risk of type I errors of a chi-squared test.

*p < .05; ***p < .001.

Table 3. Children's Psychological Responses in Northern Areas and Central Areas

	Total (N=960)		North (1) (n=419)		Center (2) (n=541)		Test ^a	Effect size ^b	Post-hoc ^c
	N	%	n	%	n	%			
Anxiety symptoms									
My child is worried	463	48.2	239	57.0	224	41.4	23.120***	.155	1>2
My child is restless	364	37.9	161	38.4	203	37.5	.082	-	-
My child is anxious	241	25.1	118	28.2	123	22.7	3.698	-	-
My child is uneasy	297	30.9	135	32.2	162	29.9	.572	-	-
My child is nervous	353	36.8	162	38.7	191	35.3	1.146	-	-
My child asks about death	163	17.0	90	212.5	73	13.5	10.684***	.105	1>2
My child is easily alarmed	164	17.1	89	21.2	75	13.9	9.074**	.097	1>2
My child is afraid of COVID-19 infection	371	38.6	193	46.1	178	32.9	17.247***	.134	1>2
My child has physical complaints (headache, stomach ache ...)	117	12.2	51	12.2	66	12.2	.000	-	-
My child worries when one of us leaves the house	244	25.4	146	34.8	98	18.1	34.865***	.191	1>2
Anxiety symptoms Total, M (SD), range = 0-10	2.89	2.63	3.30	2.67	2.57	2.55	93963***	.148	1>2
Mood symptoms									
My child is sad	369	38.4	183	43.7	186	34.4	8.621**	.095	1>2
My child is reluctant	309	32.2	135	32.2	174	32.2	.000	-	-
My child feels lonely	434	45.2	195	46.5	239	44.2	.532	-	-
My child cries easily	194	20.2	90	21.5	104	19.2	.745	-	-
My child feels frustrated	203	21.1	89	21.2	114	21.1	.004	-	-
My child is bored	581	60.5	291	69.5	290	53.6	24.817***	.161	1>2

	Total (N=960)		North (1) (n=419)		Center (2) (n=541)		Test ^a	Effect size ^b	Post-hoc ^c
	N	%	n	%	n	%			
Mood symptoms Total, M (SD), range = 0-6	2.18	1.77	2.35	1.74	2.05	1.79	101269**	.093	1>2
Behavioral changes									
My child argues with the rest of the family	289	30.1	139	33.2	150	27.7	3.330	-	-
My child is very quiet	69	7.2	21	5.0	48	8.9	5.275*	.074	1<2
My child is angry	279	29.1	136	32.5	143	26.4	4.159*	.066	1>2
My child is irritable	377	39.3	173	41.3	204	37.7	1.270	-	-
My child is very dependent on us	198	20.6	87	20.8	111	20.5	.009	-	-
My child has behavioral problems	87	9.1	38	9.1	49	9.1	.000	-	-
Behavioral changes Total, M (SD), range = 0-6	1.35	1.49	1.42	1.50	1.30	1.48	107975	-	-
Cognitive changes									
My child is very indecisive	118	12.3	57	13.6	61	11.3	1.187	-	-
My child has difficulty concentrating	322	33.5	156	37.2	166	30.7	4.541*	.069	1>2
Cognitive changes Total, M (SD), range = 0-2	.46	.65	.51	.67	.42	.63	105596.5*	.069	1>2

Note. M = Mean; SD = Standard Deviation.

^a Cross-table (χ^2) for categorical variables and Mann-Whitney U for continuous variables.

^b Effect size = Cramer's V for categorical variables and Rosenthal's r statistic for continuous variables.

^c Bonferroni correction applied to p values was used to reduce the risk of type I errors of a chi-squared test.

* $p < .05$; ** $p < .01$; *** $p < .001$.

had not worsened in any category) and "affected" (children had worsened in 1–24 symptoms).

For the categorical variables, Cramer's V was calculated as a measure of the effect size, and was interpreted as follows: .25 very strong, .15 strong, .10 moderate, .05 weak, and 0 none or very weak (Akoglu, 2018). For the continuous variables, Rosenthal's r statistic was used as an effect size, which was interpreted according to the following ranges: .50 large, .30 medium, and .10 small (Rosenthal, 1991). A p-value < .05 was considered as a statistically significant difference. To reduce the risk of type I errors, Bonferroni corrections were applied to the p-values (Beasley & Schumacker, 1995).

Results

Types and sources of COVID-19 information in the northern and central areas

Table 2 lists the proportion of the COVID-19 information types and sources received by the children, as well as differences between the northern and central areas. Most parents reported that their children had received comprehensive information about COVID-19, such as the reasons for the quarantine (93.9%), protection measures (87.2%), ways of transmitting COVID-19 (85.3%), and possible symptoms (62%). Compared to the central areas, children in the northern areas received significantly more information about the protection measures (90.3% vs 85.0%), ways of transmitting COVID-19 (89.6% vs 82.4%), and possible symptoms (65.8% vs 59.4%).

In terms of the sources of information received by the children, almost all received information from their parents (99.3%), followed by the TV (54.3%), and their school (48.6%). Children in the northern areas received more information from the TV than those in the central areas (58.0% vs 51.8%), and they received less information from their schools (33.0% vs 59.1%).

Children's psychological responses in the northern and central areas

A Chi-square test was used to analyze how the children were affected in the two regions. The results showed that 89.7% of children were affected during quarantine, with significantly more children in the northern areas being affected than those in other areas (93.1% vs 87.1%; $\chi^2 = 9.245$, $p < .01$, Cramer V = .098).

Table 3 lists the parents' perceptions of their children's anxiety symptoms, mood symptoms, behavioral changes, and cognitive changes during their time in lockdown for the two regions. The symptoms of anxiety differed significantly between the two regions ($Mdn_{north} = 3$, $Mdn_{center} = 2$, $U = 93963$, $p < .001$). Children in the northern areas appeared to be more worried, more preoccupied with death, more easily alarmed, more afraid of COVID-19 infection, and more concerned when someone left the house than those in the central areas (moderate- to strong effect size). Significant differences were also seen in mood symptoms ($Mdn_{north} = 2$, $Mdn_{center} = 2$, $U = 101269$, $p < .01$). Compared to the central areas, children in the northern areas

Table 4. Children's Coping Strategies in Northern Areas and Central Areas

	Total (N = 1074)		North (1) (n = 433)		Center (2) (n = 641)		Test ^a	Effect size ^b	Post-hoc ^c
	N	%	n	%	n	%			
Task-Oriented									
Asks very often about coronavirus or quarantine	225	20.9	82	18.9	143	22.3	1.774	-	-
Highlights the pros of being at home	382	35.6	148	34.2	234	36.5	.610	-	-
Uses humor when you talk about quarantine or coronavirus	116	10.8	32	7.4	84	13.1	8.759**	.090	1<2
Collaborates with social activities	336	31.3	140	32.3	196	30.6	.370	-	-
Accepts what's going on	668	62.2	287	66.3	381	59.4	5.147*	.069	1>2
Task-Oriented Total, <i>M (SD)</i> , range 0-5	1.61	1.03	1.59	.95	1.62	1.08	138142	-	-
Emotion-Oriented									
Often talks about how he/she feels	169	15.7	59	13.6	110	17.2	2.435	-	-
Says he/she is very angry about what is happening	156	14.5	67	15.5	89	13.9	.525	-	-
Seeks affection in others	391	36.4	179	41.3	212	33.1	7.627**	.084	1>2
Emotion-Oriented Total, <i>M (SD)</i> , range 0-3	.67	.80	.70	.78	.64	.81	131008.5	-	-
Avoidance-Oriented									
Changes conversations when you try to talk to him/her about the coronavirus or quarantine	62	5.8	19	4.4	43	6.7	2.558	-	-
Acts as if nothing is happening	363	33.8	154	35.6	209	32.6	1.012	-	-
Doesn't seem worried about what is happening	378	35.2	154	35.6	224	34.9	.044	-	-
Avoidance-Oriented Total, <i>M (SD)</i> , range 0-3	.75	.83	.76	.84	.74	.83	138040	-	-

Note. *M* = Mean; *SD* = Standard Deviation.

^a Cross-table (χ^2) for categorical variables and Mann-Whitney *U* for continuous variables.

^b Effect size = Cramer's *V* for categorical variables and Rosenthal's *r* statistic for continuous variables.

^c Bonferroni correction applied to *p* values was used to reduce the risk of type I errors of a chi-squared test.

p* < .05; *p* < .01.

were sadder (weak effect size) and more bored (strong effect size). There was no significant difference in behavioral changes in the two regions. However, children in the central areas were more likely to be quiet and less angry (weak effect size). There was also a significant difference ($Mdn_{north} = 0, Mdn_{center} = 0, U = 105596.5, p < .05$) in terms of the cognitive changes and children in the northern areas found it more difficult to concentrate (weak effect size).

Children's coping strategies in the northern and central areas

As shown in Table 4, the most-used coping strategy was acceptance, with over half of the parents reporting that their children use this as a coping strategy (62.2%). Other commonly-used strategies for coping during the pandemic (for at least 30% of the children) were seeking affection from others (36.4%), highlighting the advantages of being at home (35.6%), not worrying about what was happening (35.2%), acting as if nothing was happening (33.8%), and collaborating with social activities (31.3%).

In general, compared to the central areas, children in the northern areas used less task-oriented strategies, more emotion-oriented and avoidance-oriented strategies, but this was not significantly different. More specifically, children in the northern areas used less humor when talking about the quarantine or coronavirus but were more likely to accept what was happening and to look for affection from others, although the effect sizes were weak.

Discussion

The outbreak and spread of COVID-19 pose threats to the lives and mental health of people worldwide, bringing immeasurable consequences. This study investigated the psychological responses and coping strategies of Italian children in areas with different degrees of

COVID-19 risk, to provide a basis for guidelines for the recovery of children's mental health.

First, we investigated the types and sources of COVID-19 information received by the children, and whether these differed between the northern and central areas. Our results showed that children across the country have an understanding of the reasons for quarantine, the protective measures, transmission methods, and possible symptoms of COVID-19. Moreover, the volume of information received in the North was significantly higher than in the central areas. The threat of COVID-19 and the implementation of quarantine measures occurred earlier in the North than in the central areas. This resulted in the North receiving more relevant information about COVID-19 and was also the focus of more attention (not only for adults), therefore providing an effective basis for the control of the epidemic. Not long afterwards, the same quarantine measures and COVID-19 information updates covered the whole country, which may be the reason for the weak effect size for the differences between the two areas. In terms of information sources, parents were the most important sources of information for the children, followed by TV and school, and this is consistent with the results of previous studies (Michelle Drouin et al., 2020; Pfefferbaum et al., 2015; Saxena & Saxena, 2020). During the period of quarantine, and due to the closure of schools, parents were working from home, and there were restrictions on going out, which led to parents becoming the children's most enduring companions and their main supporters (Dalton et al., 2020; Holmes et al., 2020; Orgilés et al., 2020a). They were not only responsible for meeting the children's basic needs, but they also played a leading role in updating information, education, and emotional regulation (Pfefferbaum et al., 2015). Effective communication and the transmission of real information for their children helped the parents to understand their children's mental state more accurately, and prepare for any anxieties they had (Dalton et al., 2020; Saxena & Saxena, 2020).

The media, especially TV, had a large impact on the children, particularly those in the northern areas, although the effect size was weak in this study; however, previous studies showed that children might have a greater risk of adverse reactions to media reports (Pfefferbaum et al., 2015; Weems et al., 2012). TV may evoke higher risk perceptions than internet pages (Xin & Li, 2020), because media reports are exaggerated, or only negative information is reported, causing children to panic. Moreover, as the North is in a high-risk area, the number of media reports and news coverage may be much higher than in the other areas. As one of the important sources of COVID-19 information for children, TV may make northern children experience an increased level of threat, and may thus trigger more negative emotions and behavioral changes. In terms of school, our results showed that children in the central areas received more information than those in the North. This is also related to the suspension measures implemented in the North before the central areas. After this measure was implemented, the likelihood of children in the northern areas obtaining information from their schools was greatly reduced. Overall, these factors may cause children in the northern areas to be affected to a greater degree than those in the central areas, and this makes correct parental guidance particularly important. These results serve as a reminder to the government, media, parents, and schools to increase the transparency and accuracy of information relating to the epidemic, and to transmit accurate information regarding any safety measures, whilst quashing any rumors, to reduce children's panic.

In terms of the second aim of this study, the most common issues in children reported by parents were boredom, worry, loneliness, irritability, fear of COVID-19 infection, sadness, restlessness, and nervousness (above 35%). Most of these symptoms are consistent with other studies of children during the COVID-19 pandemic (Brooks et al., 2020; Jiao et al., 2020; Orgilés et al., 2020a). It is clear that COVID-19 poses a significant threat to children's mental health, and it is essential that attention is paid to this now to prevent the development of more serious mental disorders or PTSD, which will affect their psychological development and could even extend into adulthood. Moreover, children in the northern areas suffered significantly higher levels of anxiety, mood swings, and cognitive changes than those in the central areas. The perception of these negative symptoms is similar to that of the "ripple effect" (Burns & Slovic, 2012; Slovic, 1987; Wen et al., 2020). This study, therefore, provides evidence of the "ripple effect" in children.

The hazard and the nature of the risk event itself, as well as how the public obtains, perceives, and interprets the information, have an influence on each other (Slovic, 1987; Xie et al., 2003). In other words, when individuals realize that there is a severe potential threat to life, they actively increase the availability and comprehensiveness of the information related to the pandemic situation. Wen et al. (2020) showed that residents who were closer to the severely affected areas had a higher degree of involvement and concern, and thus paid more attention to the information. Furthermore, their risk perception and anxiety were higher than those who were further away from the high-risk areas. This study showed that children in the northern areas received more information than those in central areas, and therefore, they may also have felt an increased sense of threat. Moreover, children do not have a fully developed level of cognition, making them more sensitive and intuitive to the negative changes in the information and people around them (Saxena & Saxena, 2020). It is difficult for them to control the negative aspects of their thoughts. Therefore, the anxiety, mood symptoms and cognitive changes were significantly higher in the children from the North than those in the central areas. On the other hand, while there were negative behavioral changes in

Italian children, there were no differences between two areas. A recent study found that due to differences in the rules and housing characteristics, Italian children had more opportunities to be active, and they showed better behavioral responses than those in Spain (Orgilés et al., 2020a). In Italy, the northern and central areas implemented the same isolation measures, although at different times. Moreover, there was no difference in the type of housing between the two areas, which possibly explains why there were no differences observed between the two areas in terms of changes in the children's behaviors.

Finally, this study also focused on children's coping strategies to assess the differences in how the two groups of children coped with stressors. The results showed that task-oriented coping strategies were used most often, followed by avoidance-oriented, and emotion-oriented coping strategies. Specifically, acceptance was the most common coping strategy, followed by seeking affection from others, highlighting the advantages of being at home, and not worrying about what was happening (over 35%). In terms of group differences, children in the northern areas used fewer task-oriented strategies, but slightly more emotion-oriented and avoidance-oriented strategies than those in the central areas, which was consistent with their symptoms. Task-oriented individuals tend to focus on solving stressful problems and actively respond to reduce the internal pressure. In contrast, emotion-oriented and avoidance-oriented individuals focus on using strategies such as patience and disengagement to minimize the outcomes of any problems (Duan et al., 2020). VanMeter et al. (2020) believed that although avoidance-oriented coping strategies could relieve stress in the short term, continued use of these strategies would lead to long-term negative mental health outcomes. Failure to deal with the negative impact of COVID-19 effectively, will make it difficult for children to relieve stress. Moreover, some researchers believed that children would learn from how their caregivers coped with stressful situations (Crittenden, 1992). A survey by Orgilés et al. (2020a) showed that during COVID-19, parents reported that family coexistence became difficult, and they experienced increased stress. Children in the northern areas showed more emotion-oriented and avoidance-oriented strategies, which may also be due to their parents displaying more anxiety and stress, and that this can only be dealt with through avoidance. Specifically, children in the northern areas were more likely to show acceptance and seeking affection from others, while children in the central areas used more humor when their parents talked about quarantine or the coronavirus (weak effect size), but it still attracted their attention. A possible reason for this is that compared to the northern areas, quarantine measures in the central areas were implemented later, and infection rates and deaths were much lower. It appears that children in the central areas are not fully aware of the impact of the risk to themselves, and they are still readily able to use humor to express themselves. In the northern areas, the closure of the schools, social distancing, parents working from home, and the overwhelming media reports brought confusion and a certain amount of panic, and therefore, the children required more support and protection from those close to them.

This study has some limitations. First, the quarantine measures during the COVID-19 epidemic meant that the survey had to be conducted online. For the same reason, and considering the children's cognitive levels and comprehension, this study adopted the method of using parental reports. Future research should use multiple evaluation methods, such as interviews and observations to obtain more objective and accurate research results. Second, the results of this study do show a "ripple effect", but with a weak to moderate effect size. This study focused on children's psychological responses, and relatively

speaking, adult samples are more stable in terms of their cognition and judgment (Wen et al., 2020; Xu et al., 2020), which may affect the effect size seen in our results. As the COVID-19 pandemic has not yet ended, it may be worth exploring whether children in different areas will change their perceptions of risk and stress.

To the best of our knowledge, this study is the first to explore the psychological responses and coping strategies of children in northern and central Italy during COVID-19, as well as examining the differences between the two regions. This has created a more in-depth and targeted discussion on the impact of the COVID-19 epidemic in children. The results of this study provide evidence to indicate that the children closer to the more severely-affected areas experienced more negative psychological symptoms, showing a “ripple effect” trend. Moreover, children in the northern areas used fewer task-oriented strategies and instead used more emotion-oriented and avoidance-oriented strategies than those in the central areas. This puts parents on notice that they need to provide accurate information concerning the epidemic, and provide full support and encouragement for their children. The government should also provide psychological guidance and interventions for children in the areas where the effects of the epidemic are more severe, and especially in the northern areas.

Conflict of Interest

The author(s) of this paper state that there is no conflict of interest.

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