Temperament profiles to differentiate between stress-resilient and stress-affected children during Covid-19 pandemic

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Abstract

Covid-19 pandemic has posed unprecedented challenges to individual resilience, especially among children who are the most affected by its psychological consequences. We aim to investigate temperament profiles that might constitute a potential risk factor for the development of psychopathology and low levels of resilience in children experiencing Covid-19 quarantine. Through a snowball sampling from the general population, we recruited parents of 158 Italian children aged 5 to 10 years (48% boys, M = 7.4, SD = 1.8). Parents completed questionnaires to assess their children's temperament, psychopathological symptoms, and resilience, respectively through the Junior Temperament and Character Inventory, the Strengths and Difficulties Questionnaire, and the Child and Youth Resilience Measure. Profile Analysis was employed to outline temperament differences between stress-resilient and stress-affected children. Results evidenced that resilient children displayed high levels of persistence and reward dependence, and low levels of novelty seeking. Behavioral difficulties were associated with low levels of persistence and reward dependence, and high levels of novelty seeking. Internalizing symptoms were more likely among children with high harm avoidance and low persistence. These findings underscore the importance of examining different temperament dimensions and their associations, especially when profiling phenotypes in trying to identify the links among temperament, vulnerability to psychopathology and resilience during stressful periods.

Keywords: Covid-19; resilience; profile analysis; temperament; psychopathology.

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Introduction

The ongoing pandemic caused by Covid-19 is posing unprecedented challenges to health and economic systems worldwide. The World Health Organization reported a growing prevalence rate (10-20%) of psychiatric disorders in childhood and adolescence (WHO, 2020). The current emergency scenario may exacerbate previous psychiatric conditions or trigger inner vulnerabilities which often turn into the precipitation of the subclinical symptomatology (Gobbi et al., 2020; Robillard et al., 2021). Therefore, collecting high-quality data on mental health effects of Covid-19 pandemic across general population and vulnerable groups is crucial to predict the demand for national clinical services and to define appropriate and targeted interventions.

Even though children are often asymptomatic and minimally susceptible to develop severe Covid-19 symptoms, they are expected to pay the highest price of this pandemic (Holmes et al., 2020; Naja et al., 2020; Pedrosa et al., 2020), with long-term consequences that are likely to persist over the years (Al-Rahamneh et al., 2021; Fegert et al., 2020). In a recent study conducted among Italian, Spanish, and Portuguese parents of children aged 3-18 years old, 85.7% of parents reported an increase in their children's irritability, restlessness, and nervousness (Orgilés et al., 2020). Similarly, a sample of Italian children aged 5-17 years old – rated by their parents – showed higher hyperactivity symptoms during quarantine (Cusinato et al., 2020).

To investigate children's specific features related to the developmental impact of adversities, the present study will focus on temperament (Goldsmith et al., 1997), whose link with subsequent onset of psychopathological problems (i.e., externalizing and internalizing disorders) is well established (Caspi & Silva, 1995; Cervin et al., 2020; Foulds et al., 2017; Henry et al., 1996; Muris & Ollendick, 2005; Newman et al., 1997). The theory of biosocial personality introduced by Cloninger (1987), includes four temperament and three character dimensions. Temperament, which describes moderately heritable and stable automatic emotional responses to experiences, includes: i) novelty-seeking: the propensity for approach and exploration; ii) harm avoidance: the propensity to withdraw and worry; iii) reward dependence: the propensity for attachment and dependence; and iv) persistence: the propensity for diligence and perseverance.

Over the years, distinct patterns of temperament proved to be linked to susceptibility to psychopathology. Rubin and colleagues (2017) found that high harm avoidance and low reward dependence were significant predictors of withdrawn behavior among 6–18 year-olds. Similarly, Kim and colleagues (2010) found that internalizing problems were significantly related to high harm avoidance and low reward dependence scores, while externalizing problems were significantly associated with high novelty seeking and harm avoidance scores, and decreased levels of persistence. Melegari and colleagues (2015) reported that ADHD children were characterized by high novelty seeking, low reward dependence, and low persistence, whereas ODD children displayed high persistence and harm avoidance, beyond high novelty seeking shared with ADHD children. These findings show significant associations between temperament and psychopathology, albeit with irregular patterns.

The role of temperament has been also extensively investigated in children exposed to stressful events, with studies highlighting that it may be associated with both resilience and vulnerabilities (Bowen, 2017; Job et al., 2020; Niu et al., 2019; van deer Laan et al., 2010). While most of studies analyzed single stressful events, others examined the impact of chronic or cumulative adverse events, offering interesting suggestions to understand the role of specific temperamental domains in highly stressful situations.

A less studied dimension concerns reward dependence, which resulted to be positively associated to psychological resilience in adults (Simeon et al., 2007), but whose protective role was not confirmed among adolescent victims of sexual violence (Ruchkin et al., 1998). However, more recently some studies found that high sensitivity to reward played a protective role against the development of depression in adolescents following trauma (Dennison et al., 2016). Alternatively, others suggested that disruptions in the reward process may be associated to the development of depression and social difficulties after adversities (Sheridan et al., 2018). It is not clear, however, if this extends to other types of psychopathology (e.g., externalizing problems).

Individual differences in temperament predispose children to specific regulation strategies to cope with stress (Chiung et al., 2015; Thompson et al., 2014; Wodzinski et al., 2018). However, temperament translates into higher levels of resilience also by stimulating different forms of temperament–environment interactions (Wachs, 2006).

In summary, temperament may have a direct effect on psychopathology, over and above other risk factors, may act as a moderator of the impact of stress and adversities on child development, or may even promote resilience (Lengua & Wachs, 2012).

In the present research, we sought to identify which temperamental profiles constitute a potential risk factor for the development of psychopathological symptoms in childhood and low levels of resilience, during quarantine due to Covid-19 in Italy. Due to the increased risk of psychopathological symptoms after Covid-19 restrictions, identifying distinct stress-resilient and stress-affected profiles is fundamental for targeted intervention.

Method

Participants

A sample of 158 Italian parents (148 mothers and 10 fathers, mean age 41 years, SD = 5.3 years) was recruited online in the immediate aftermath of the first national lockdown period (June 2020). With regard to parental occupation, 41.8% of the respondents were full-time employees, 32.9% were freelancers, 13.4% were part-time employees, 6.9% were full-time parents, 4.4% were in managerial positions, 0.6% were students. With regard to parental education, 76.2% of the respondents had a University degree, 20% had the equivalent of A-levels, and

3.8% had the equivalent of General Certificates of Secondary Education (GCSEs). In terms of geographical distribution, 86% of the families were from the North of Italy, 8.9% from the Centre, 5.1% from the South. As each parent completed questionnaires for himself/herself as well as for his/her child, we gathered data on 158 children between 5 and 10 years of age (48% boys, mean age = 7.4 years; *SD* = 1.8 years).

Procedure

One parent per family was asked to complete an online survey, after being informed about the study and having received their consent to participate. The survey study was advertised via University communication systems as well as social media. Inclusion criteria were living in Italy and having a child aged between 5 and 10 years of age. Exclusion criteria were not living in Italy and not having a child aged between 5 and 10 years of age.

Measures

Parents were administered an assessment protocol including the following measures.

Demographic information. A series of questions were created ad hoc to gather information on parent and child age and gender, parent education and occupation, region of residence.

The Child and Youth Resilience Measure – Person Most Knowledgeable version CYRM-PMK (Ungar & Liebenberg, 2011). The CYRM-PMK is a parent-report questionnaire measuring resources (individual, relational, communal, and cultural) available to children that may bolster their resilience. It is composed by 17 items with responses on a 3-point Likert scale. High scores indicate high resilience skills. Cronbach's alpha was 0.67 in the present research.

Junior Temperament and Character Inventory (JTCI) (Luby et al., 1999; Italian Version by Andriola et al., 2012). It assesses children's temperament and character. We used only temperament subscales: novelty seeking (NS), harm avoidance (HA), reward dependence (RD), persistence (P). An Italian study evaluated its psychometric properties supporting its

use in research and clinical practice (Andriola et al., 2012). Cronbach's alpha of the four subscales ranged between 0.43 and 0.80 in the Italian validation.

The Strengths and Difficulties Questionnaire (SDQ) (Goodman, 1997). This questionnaire assesses mental health problems and psychological adjustment in children aged 3 to 16 years. It consists of 25 items on a 3-point Likert scale describing: emotional symptoms, conduct problems, hyperactivity-inattention, peer problems and prosocial behaviour. Higher scores on the prosocial behaviour subscale reflect strengths. Higher scores on the other four subscales reflect difficulties and can be summed to obtain a total difficulties score. Moreover, emotional symptoms and peer problems can be summed to obtain internalizing symptoms score; and conduct problems and hyperactivity-inattention can be summed to obtain externalizing symptoms score. Normative data for the Italian population are available and the Italian version has good psychometric properties, with Cronbach's alpha of the five subscales ranging between 0.73 and 0.89 (Marzocchi et al., 2002).

Results

Preliminary analyses

Table 1 shows descriptive statistics with mean values for each variable included in the study. Independent-samples t-tests showed no significant gender differences in the study variables.

Correlations were run among all the variables considered in the study as a prelude to our model testing. As shown in Table 2, novelty seeking (NS) showed a positive correlation with Strengths and Difficulties Questionnaire (SDQ) total score, SDQ internalizing symptoms and SDQ externalizing symptoms, whereas NS showed a high negative correlation with child resilience. With regard to harm avoidance (HA), significant positive correlations were detected with SDQ total score and SDQ internalizing symptoms. Reward dependence (RD) was negatively correlated with SDQ total score and SDQ internalizing symptoms, and positively correlated only with child resilience. Finally, negative significant correlations were

Tab. 1. Descriptive Statistics and T-tests for Gender Differences in the Study Variables (M = males, F = females)

Variable	M mean (SD)	F mean (SD)	t	df	p	Cohen's d
Child age	7.184 (1.794)	7.585 (1.721)	-1.432	153.857	0.154	-0.228
Parent age	40.421 (6.137)	41.488 (4.417)	-1.246	135.412	0.215	-0.201
Child resilience	29.868 (3.121)	30.000 (2.880)	-0.275	152.277	0.784	-0.044
Total difficulties SDQ	10.355 (6.457)	9.707 (5.581)	0.672	148.771	0.502	0.108
Novelty seeking JTCI	8.197 (3.529)	7.476 (3.875)	1.225	155.954	0.222	0.194
Harm avoidance JTCI	9.013 (4.386)	9.268 (4.470)	-0.362	155.482	0.718	-0.058
Reward dependence JTCI	5.855 (2.146)	6.085 (1.989)	-0.697	152.471	0.487	-0.111
Persistence JTCI	2.566 (1.700)	2.671 (1.722)	-0.385	155.371	0.701	-0.061

Tab. 2. Correlations Among the Study Variables

	2	3	4	5	6	7	8	9	10	11	12	13
1. Total SDQ	.783**	.884**	-.367**	.657**	.630**	.787**	.791**	.544**	.172*	-.242**	-.442**	-.579**
2. Int SDQ	-	.402**	-.216**	.867**	.769**	.400**	.327**	.192*	.395**	-.277**	-.276**	-.547**
3. Ext SDQ		-	-.379**	.316**	.350**	.859**	.918**	.658**	-.043	-.148	-.444**	-.442**
4. Prosocial SDQ			-	-.033	-.363**	-.383**	-.304**	-.328**	.060	.214**	.100	.374**
5. Emotional SDQ				-	.348**	.287**	.279**	.103	.397**	-.157**	-.238**	-.336
6. Peer SDQ					-	.384**	.258**	.228**	.285**	-.318**	-.214**	-.597**
7. Conduct SDQ						-	.587**	.609**	-.045	-.245**	-.283**	-.454**
8. Hyperactivity SDQ							-	.570**	-.033	-.044	-.484**	-.348**
9. NS JTCI								-	-.288*	-.240**	-.455**	-.381**
10. HA JTCI									-	-.079	.018	-.147
11. RD JTCI										-	.024	.311**
12. P JTCI											-	.412**
13. PMK												-

Note. Significance levels * p < .05, ** p < .01; SDQ = Strengths and Difficulties Questionnaire; JTCI = Junior Temperament and Character Inventory; PMK = The Child and Youth Resilience Measure – Person Most Knowledgeable version; Int = Internalizing; Ext = Externalizing; NS = Novelty Seeking; HA = Harm Avoidance; RD = Reward Dependence; P = Persistence.

also found among persistence (P) and the following dimensions of SDQ: total score, internalizing and externalizing symptoms.

Main analyses

Profile Analysis (PA) was employed to identify whether resilient or non-resilient children show distinct profiles. In our analysis, within-subjects factor is represented by the scores of the JTCI Temperament subscales, whereas levels identified the categories of resilience and symptomatology (0, 1). For SDQ Total scale, and for Externalizing and Internalizing subscales, children were grouped based on their score. The child was classified as 0 (low symptomatology) or 1 (high symptomatology) if the score was below or above the 75° percentile, respectively (Skewness coefficient .894=, Kurtosis coefficient = .792). In the case of PMK questionnaire, high scores (> 75°) indicated high-resilient children (Skewness coefficient -1.100=, Kurtosis coefficient = 1.559) (1). All the variables were z-transformed before performing analyses, and age was included in the models as covariate.

All the models (see Figure 1) showed significant differences in the profiles of high-resilient and low-resilient children (PMK: $F(3) = 9.276$, $p < .001$; SDQ Total: $F(3) = 19.950$, $p < .001$; SDQ Externalizing: $F(3) = 26.061$, $p < .001$; SDQ Internalizing: $F(3) = 11.359$, $p < .001$). Statistically significant differences emerged between high-resilient and low-resilient children in NS (High resilient: $M = 6.64$, $SD = 3.31$, $p = .001$; Low resilient: $M = 8.53$, $SD = 3.78$, $p = .001$), RD (High resilient: $M = 6.46$, $SD = 1.92$, $p = .017$; Low resilient: $M =$

5.69, $SD = 2.09$, $p = .017$) and P (High resilient: $M = 3.31$, $SD = 1.77$, $p < .001$; Low resilient: $M = 2.21$, $SD = 1.53$, $p < .001$), whereas no relevant differences were detected between the two groups in HA (High resilient: $M = 8.63$, $SD = 4.48$, $p = .238$; Low resilient: $M = 9.45$, $SD = 4.37$, $p = .238$). In particular, high-resilient children showed a peculiar temperament profile, characterized by lower NS scores and higher RD and P scores, compared to low-resilient children scores.

Profile analysis also revealed a significant distinct set of temperament profiles associated with SDQ total score. Statistically salient differences emerged in NS (High symptomatology: $M = 10.43$, $SD = 3.84$, $p < .001$; Low symptomatology: $M = 6.72$, $SD = 3.07$, $p < .001$), RD (High symptomatology: $M = 5.34$, $SD = 2.17$, $p = .013$; Low symptomatology: $M = 6.24$, $SD = 1.96$, $p = .013$) and P scores (High symptomatology: $M = 1.60$, $SD = 1.49$, $p < .001$; Low symptomatology: $M = 3.05$, $SD = 1.61$, $p < .001$), but not in HA scores (High symptomatology: $M = 9.57$, $SD = 4.58$, $p = .440$; Low symptomatology: $M = 8.96$, $SD = 4.36$, $p = .440$), between children with high or low symptomatology (classified basing on SDQ total score). In particular, children with a SDQ total score below the 75° percentile exhibited lower levels of NS and HA, and higher levels of both RD and P; whereas children with high symptomatology (SDQ total score above the 75° percentile), displayed higher NS and HA but lower RD and P.

Similarly, a statistically significant interaction effect between temperament and externalizing symptoms of SDQ emerged. Multivariate ANOVA showed that a statistically significant difference exists between children with high or

Fig. 1 Temperament profiles of stress-resilient and stress-affected children
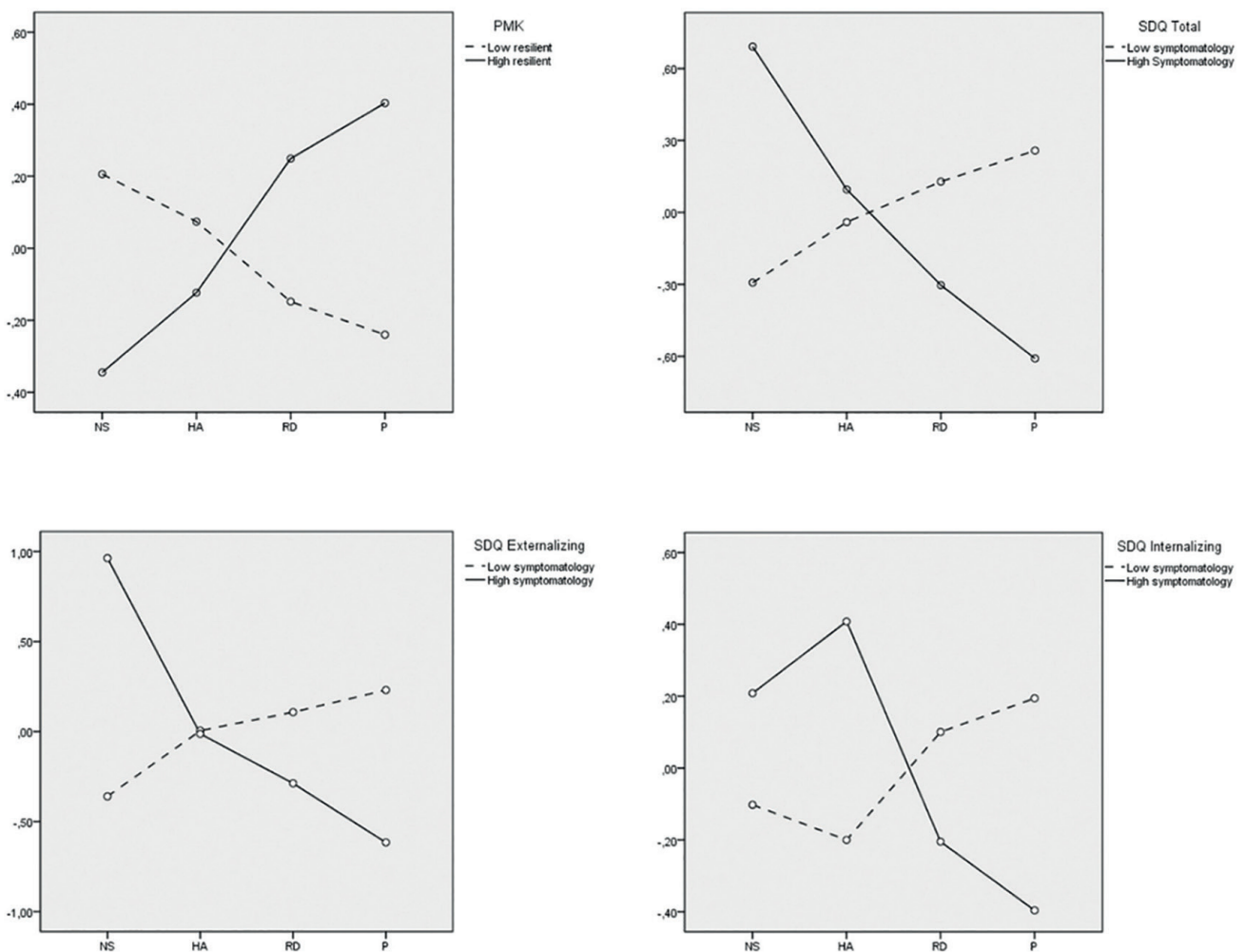
Note. PMK: The Child and Youth Resilience Measure – Person Most Knowledgeable version; SDQ Total: Strengths and Difficulties Questionnaire Total scale; SDQ Externalizing: Strengths and Difficulties Questionnaire Externalizing subscale; SDQ Internalizing: Strengths and Difficulties Questionnaire Internalizing subscale; NS: novelty seeking; HA: harm avoidance; RD: reward dependence; P: persistence.

low symptomatology only in NS (High symptomatology: $M = 11.40$, $SD = 3.29$, $p < .001$; Low symptomatology: $M = 6.49$, $SD = 2.90$, $p < .001$), RD (High symptomatology: $M = 5.37$, $SD = 2.15$, $p = .030$; Low symptomatology: $M = 6.20$, $SD = 1.99$, $p = .030$) and P scores (High symptomatology: $M = 1.63$, $SD = 1.41$, $p < .001$; Low symptomatology: $M = 2.99$, $SD = 1.66$, $p < .001$). Children who scored lower in the externalizing subscale of SDQ revealed the same temperament profile as those who scored lower in the SDQ total score, with lower NS, higher RD and P and same levels of HA (High symptomatology: $M = 9.12$, $SD = 4.71$, $p = .924$; Low symptomatology: $M = 9.16$, $SD = 4.33$, $p = .924$).

Different temperament traits were related to internalizing symptoms. Children with low internalizing symptoms differed from those with high internalizing symptoms in HA (High symptomatology: $M = 10.94$, $SD = 4.06$, $p < .001$; Low symptomatology: $M = 8.26$, $SD = 4.34$, $p < .001$) and P (High symptomatology: $M = 1.94$, $SD = 1.45$, $p < .001$; Low symptomatology: $M = 2.95$, $SD = 1.73$, $p < .001$). No

differences were detected in NS (High symptomatology: $M = 8.58$, $SD = 4.19$, $p = .066$; Low symptomatology: $M = 7.45$, $SD = 3.43$, $p = .066$) and RD (High symptomatology: $M = 5.56$, $SD = 2.08$, $p = .072$; Low symptomatology: $M = 6.18$, $SD = 2.03$, $p = .072$). In particular, internalizing symptoms were more likely among children with a temperament profile characterized by high propensity for withdrawal/worry and low tendency to perseverance. A relevant interaction effect was encountered also between temperament and SDQ internalizing symptoms.

Discussion

Overall, the present study supports and extends previous findings from research conducted during non-pandemic periods and underscore the importance of examining temperament factors when children are exposed to adverse events.

In the immediate aftermath of the first national lockdown period in Italy resilient children were characterized by high persistence and reward dependence, and low novelty seeking. Conversely, children with behavior problems showed a temperament profile characterized by low persistence and reward dependence, and high novelty seeking. Moreover, children with internalizing symptomatology presented a profile defined by high levels of harm avoidance and low levels of persistence.

Findings concerning the temperamental trait of persistence are in line with the healthy and resilient personality profile reported in previous studies (Eley et al., 2016; Lee et al., 2017), also in samples of children exposed to stressful events (Wachs, 2006). In their longitudinal study, for example, Ruschena and colleagues (2005) found that persistence was significant predictor of resilient outcomes at age 17–18 in children exposed to stressful family transitions like the loss of a parent, being associated with lower levels of behavior/externalizing problems.

An explosive temperament profile with a high novelty seeking tendency, like the one exhibited in our sample by children with behavioral difficulties, is often found together with maladaptive coping styles: these children could react to daily life stress in a socially inappropriate manner, possibly exacerbating behavior problems (Cloninger, 1987; Lee et al., 2014). Our findings are in accordance with those by van deer Laan and colleagues (2010), in which High-Intensity Pleasure, reflecting the pleasure derived from activities involving high intensity or novelty, was associated with increased risk of delinquency in situations of cumulative risks.

Regarding the protective role of reward dependence, the present study shows that being "tender-hearted, loving and warm, sensitive, dedicated, dependent, and sociable" (Cloninger et al., 1994) can make children more resilient to stress. Youth with high levels of reward dependence may be motivated look for more normative rewards and positive interpersonal feedbacks in the environment (i.e., from parents or peers), reducing the tendency to engage in externalizing behaviors in situations of emotional distress. These findings are in line with the results of a recent study by Kasparek and colleagues (2020), exploring motivation for reward and behavioral sensitivity to reward value in children exposed to traumatic events: they suggest that high levels of sensitivity to reward value may moderate the association between adversities and externalizing problems.

The role of low novelty seeking and high reward dependence in stress-resilient children is particularly interesting and not surprising if we consider the specific condition experienced by children during the first lockdown of this pandemic: it is possible, in fact, to speculate that children with a lower need for novel activities and with a higher tendency to rely on parental proximity/closeness, might find it easier to adapt to a situation characterized by the need to stay at home and spend more time with parents.

On the other hand, our findings on children with high internalizing difficulties are consistent with previous studies evidencing the inverse relation between harm avoidance and psychological resilience (Mathiesen & Prior, 2006; Simeon et al., 2007). Children characterized by high levels of harm avoidance are usually very cautious and present feelings of apprehension. These children could be found trapped in self-blaming thoughts causing discomfort and leading to withdraw and worry, which might in turn confirm a negative evaluation of themselves (as well as of the stressful situation they are living) in a reinforcing vicious circle (Rubin et al., 2017). The association between internalizing symptoms and withdrawal is coherent with findings by Feldman and colleagues (2013) in a study on infants and young children exposed to war violence in Israel: a diagnosis of PTSD, in fact, was associated with the temperamental factor of withdrawal and with the use of gaze aversion, no talk and self-soothing strategies to regulate emotions.

Several studies recently focused on the negative impact of the Covid-19 pandemic on the well-being of Italian children and families (Ionio, 2021; Camisasca et al., 2021; Caputi et al., 2021). The present study adds to this literature suggesting that profiling phenotypes might be extremely helpful in having a better comprehension of the factors involved in child adjustment, vulnerability to psychopathology or resilience in the context of adversity.

Clinicians may find it useful to integrate information on children's temperamental characteristics into their case conceptualization, providing more traditional treatments focusing on the response to adverse/traumatic events with a developmentally informed approach. In addition to more complete treatment plans, a focus on temperamental traits could offer interesting hints for prevention efforts.

The significant negative association found between harm avoidance and low persistence traits might help identify children at higher risk for developing internalizing symptomatology, allowing an early intervention to improve their well-being. Children with these dispositional traits should be supported with proper trainings, considering that harm avoidance was identified as a longitudinal predictor of maladaptive emotion regulation in adults (Izadpanah et al., 2016). In addition, as children exposed to stressful events are also more likely to develop behavioral symptoms, an assessment including temperamental traits such as novelty seeking, and reward dependence could be highly informative and increase the range of interventions that might be planned. Finally, the prominent role played by reward dependence in distinguishing between stress-resilient and stress-affected children, especially those presenting externalizing symptomatology, provide interesting suggestions for clinical interventions focused on interpersonal processes. It could be hypothesized that, at least in certain adverse situations, children who successfully cope have a strong disposition to social attachment, look for social approval, and are abler to keep reward expectations in a stressful milieu. As the role of temperamental factors when children are exposed to adversities and traumatic events received a limited attention in previous literature, such finding encourages future studies to further explore these traits and bring additional evidence.

Some limitations in the present study must be acknowledged. The first one concerns the sample size, that is hardly representative of Italian parents of children aged 5-10 years old. Secondly, the composition of the sample in terms of socioeconomic status and the geographical distribution prevents from reporting a clear picture of the situation in Italy after lockdown. Thirdly, the Italian validation of the measure

used in the present research to assess children's resilience is still not available. Furthermore, a multi-informant approach lacks as all the questionnaires were completed by one parent only. Finally, the cross-sectional nature of the first wave of data collection does not allow to run more informative and sophisticated analyses.

Notwithstanding these limitations, the present study extends our knowledge of the association among children's temperament traits, resilience ability and behavior in such an exceptional period. Since temperament is relatively stable over time, a timely identification of behaviors associated with these traits may pave the way for planning early preventive interventions for vulnerable targets.

Future research should adopt longitudinal design and consider the possibility of investigating temperament in conjunction with character, integrating information about personality with genetic, behavioral and neuroimaging data.

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