

MENTALIZING AND ITS RELATION TO STRESS, ANXIETY AND SOCIOEMOTIONAL
FUNCTIONING DURING COVID-19

Title

**Mentalizing and its relation to stress, anxiety and socioemotional functioning during Covid-19
in children, adults and parent-child dyads**

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The global onset of coronavirus disease 2019 (Covid-19) pandemic has been recognised as a significant threat to our physical and mental well-being. Worldwide efforts have been implemented including protective health measures intending to slow down and/or prevent the direct physical viral effects. Past and accumulating novel evidence indicates that the Covid-19 pandemic and associated restriction measures (e.g., school-closure, lock-down) have a significant effect on individuals psychosocial functioning as associated with increases in emotional distress (de Quervain et al., 2020; Kwong et al., 2020). The duration of confinement has been linked to increased stress levels (Ozamiz-Etxebarria, Dosil-Santamaria, Picaza-Gorrochategui, & Idoiaga-Mondragon, 2020). Negative effects associated with Covid-19 restrictions tend to be higher in younger individuals, those with chronic disease or pre-existing mental and physical health conditions, females, and those living alone or in socioeconomic adversity (de Quervain et al., 2020; Kwong et al., 2020). Children, parents' or families' lives are particularly impacted by confinement or lock-down orders (Wang et al., 2020). The perception of the difficulty of quarantine is a crucial factor that undermines both parents' and children's well-being, with possible mediating effects through dyadic stress (Spinelli, Lionetti, Pastore, & Fasolo, 2020). Consequences may include higher child abuse potential (Brown, Doom, Watamura, Lechuga-Pena, & Koppels, 2020), indicating urgent consideration of these effects.

Notably, a smaller proportion of individuals report increased well-being due to confinement. Such data indicates that interindividual differences in the effect of confinement on mental health have to be considered (de Quervain et al., 2020). However, data on such interindividual variations or protective mechanisms (e.g., sociocognitive skills (Fischer-Kern et al., 2013; Mascarenhas, 2016)) remain to be investigated. The development of sociocognitive skills relies on caregiver-child relationships and dyadic learning. Theory of Mind or mentalizing enables the understanding mental states, including emotions, thoughts or motives (Frith & Frith, 2005). Higher mentalizing skills (e.g., understanding and reasoning about others' intentions and feelings) are predictive for social competence (Liddle & Nettle, 2006). On a neuronal level, mentalizing includes bilateral temporoparietal junction, precuneus, medial prefrontal cortex and right superior temporal sulcus (Molenberghs, Johnson, Henry, & Mattingley, 2016). An increased understanding of protective and/or risk factors for the development of stress-related psychopathologies can deepen our knowledge of

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the impact of stress on psychosocial functioning and the development of psychopathologies, ultimately holding the potential to inform prevention and treatment.

To summarize, increasing evidence highlights the urgent need to consider indirect pandemic consequences for the physical and psychological well-being of children, families and the general population while considering individual risk or protective factors. Mentalizing skills may be one of the factors preceding individual functioning and the development of psychopathologies during periods of extended stress. Consequently, we aim at:

(Aim 1): Assessing the impact of Covid-19 related confinement on child and adult well-being measured by intraindividual variations over time. Differential effects based on subgroups of young adults (without children), parents and young children will be considered.

(Aim 2): Investigating dyadic effects in mothers and children during confinement (measured through well-being, anxiety, caregiver burden, problem behaviors).

(Aim 3): Assessment of protective factors, particularly the effects of mentalizing on psychosocial functioning and emotional distress during confinement.

METHODS

Participants and assessments. Participants that took part in a previous cross-sectional neuroimaging study investigating socioemotional functioning (2018-2020) were asked to participate. 71 participants (45 adults; 36y / 26 children; 11y (7-17y) / 21 adults were the mothers to the 26 children, resulting in 26 mother-child dyads) completed an overall of 8 testing time points. One baseline assessment prior to the onset of Covid-19 and seven time points conducted across 75 days of confinement due to Covid-19, resulted in a total of 568 individual testing time points

Baseline assessments (2018-2020). Baseline testing included a behavioral assessments (e.g., IQ, emotion regulation, empathy, socioeconomic status, medical history, well-being) and functional neuroimaging (f/MRI) during mentalizing (details in (Borbás, Fehlbauer, Rudin, Stadler, & Raschle, 2020)). The neuronal correlates of mentalizing are based on cognitive and affective Theory of Mind (experimental conditions) as compared to physical causality

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(control condition). For post-hoc region of interest analyses the mean parameter estimates during mentalizing were extracted for right temporoparietal and prefrontal areas of interest.

Follow up assessments during COVID-19 confinement in Switzerland (March-May 2020). Participants of the original study filled out biweekly online questionnaires starting on March 20th following nationwide restrictions as implemented on March 16th, 2020:

Testing for *adult participants* included the Emotion Regulation Questionnaire (ERQ), the Kessler Psychological Distress Scale (K10), the General Health Questionnaire (GHQ-12), the Center for Epidemiologic Studies Depression Scale (CESD-R) and the State and Trait Anxiety Inventory (STAI-6). *Child participants* were assessed using self-reports, (e.g., targeting children's mood and subjective ratings of well-being). Furthermore, the Strength and Difficulties Questionnaire (SDQ) and the Child Behavior Checklist (CBCL) were filled out by the parents. The Fear of Illness and Virus Evaluation (FIVE) was filled out at the end of confinement by all participants.

PRELIMINARY FINDINGS

Overall, our findings indicate significant effects across the duration of confinement on psychosocial functioning in children and adults. Socioemotional functioning in mother-child dyads is strongly correlated, indicating a positive association in well-being between parents and their children. Furthermore, neuronal correlates of mentalizing in frontal, but not temporoparietal regions, preceded the development of fear and anxiety in relation to Covid-19 across all participants (children and adults). In mothers, higher mentalizing skills as measured through temporoparietal, but not prefrontal, functioning was associated with higher reports of caregiver stress. These findings may indicate that higher mentalizing skills can be negatively associated with socioemotional functioning during stressful situations and points towards a differential involvement of prefrontal and temporoparietal regions.

Aim 1: Assessing the impacts of Covid-19 on child and adult well-being (variations within individuals over time)

Adults: Psychosocial well-being as assessed using the general health questionnaire (GHQ) varied significantly throughout confinement within the adult group, with the highest scores reflecting poorest self-reports on general well-being 5 weeks after confinement start (mean GHQ total=5.35). Similarly, self-reports of anxiety (STAI total score) showed a significant

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change during confinement with the highest scores reached in the 1st and 7th week of nationwide restrictions. Scores reflected relevant levels of moderate anxiety. There were no significant changes in self-reported distress (K10) or depression levels (CESD-r). Notably, sleep was significantly impacted over time during confinement with the highest impact reported during the 5th week of confinement. In mothers, subjective burden of caregiving across the time of confinement significantly differed across time with the highest impact at the start of confinement and around week 7. Post-hoc correlational assessments furthermore revealed that experienced burden through caregiving significantly correlated with anxiety and general well-being in mothers.

Children: Children's mood did not significantly change over time though large individual variations were observed; see **Figure 1**). Across confinement, parents reported a significant change in children's well-being and behavior (SDQ). Problem behaviors as measured by CBCL prior to and post Covid-19 did not reveal a significant change.

Further variables of interest that were obtained for *all participants* include media exposure, Covid-19 rule following, time spent outside, socioeconomic status and employment status for parents. The modulating effects of these variables will be assessed in relation to the main predictor (mentalizing) and outcome variables (psychosocial well-being and stress during confinement).

Aim 2: Investigation of dyadic effects in mothers and children during confinement

Composite scores for problem behavior in children were significantly positively correlated with mothers' general health, anxiety and experienced burden of caregiving. The assessments of fear of illnesses and disease in mothers and children were positively correlated (**Figure 2**).

Aim 3: Assessment of protective variables, particularly mentalizing, on psychosocial functioning and emotional distress during confinement

Across all participants better mentalizing skills as measured through increased hemodynamic response in the right prefrontal, but not temporoparietal region of interest, was positively correlated with fears for contamination and illnesses ($p=0.014$, $r=0.31$; see **Figure 3**). Additionally, for mothers, increased activation of the right temporoparietal, but not prefrontal, region of interest, was positively linked to experienced caregiver stress during confinement ($r=0.511$, $p=0.018$).

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Figure 1.

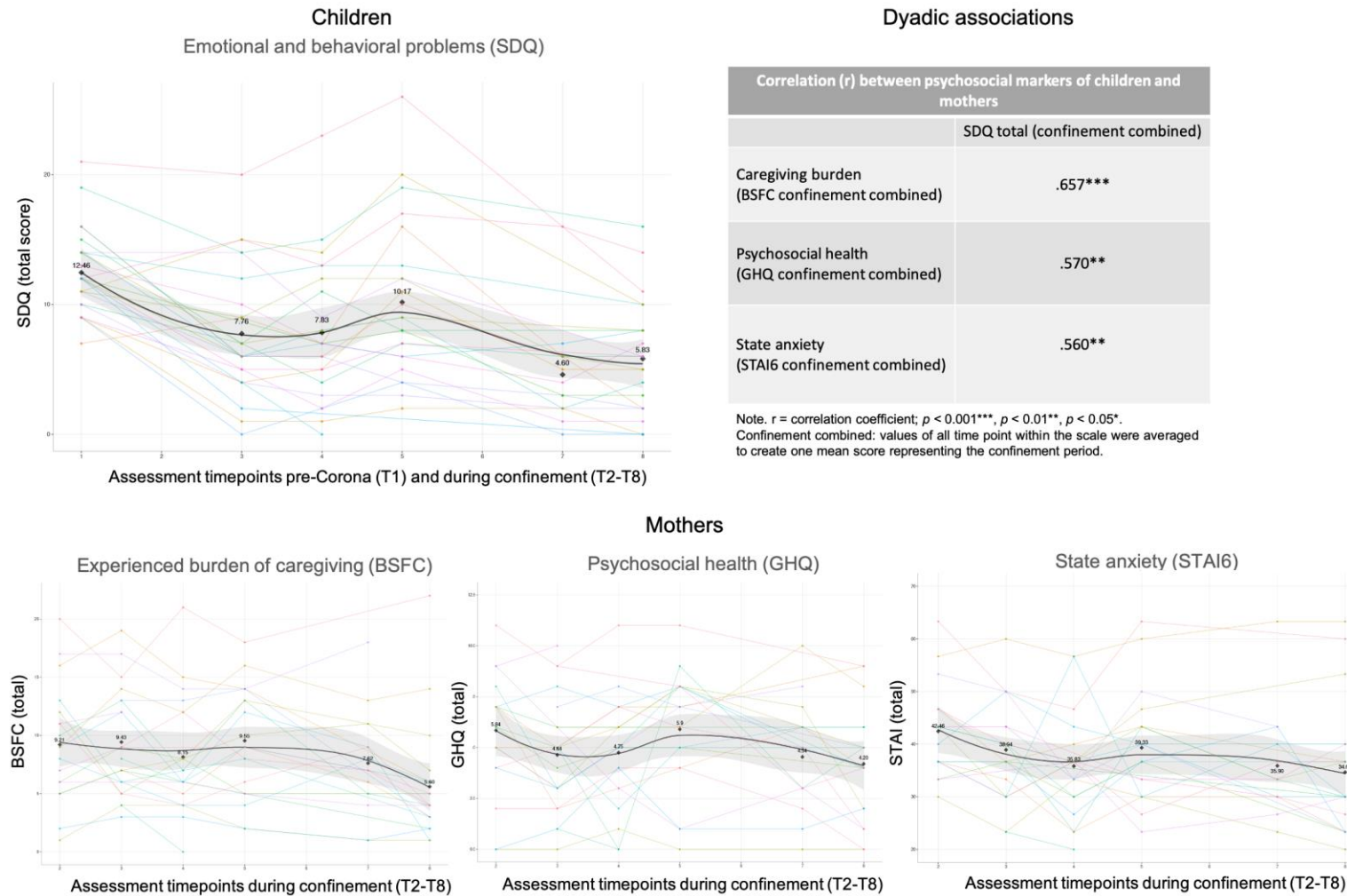
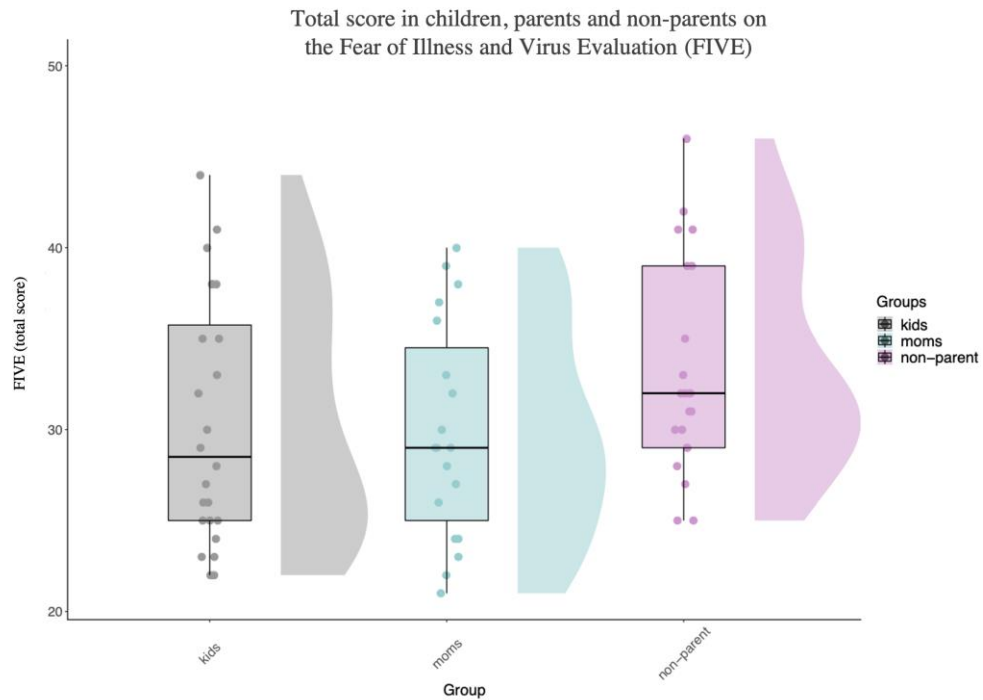
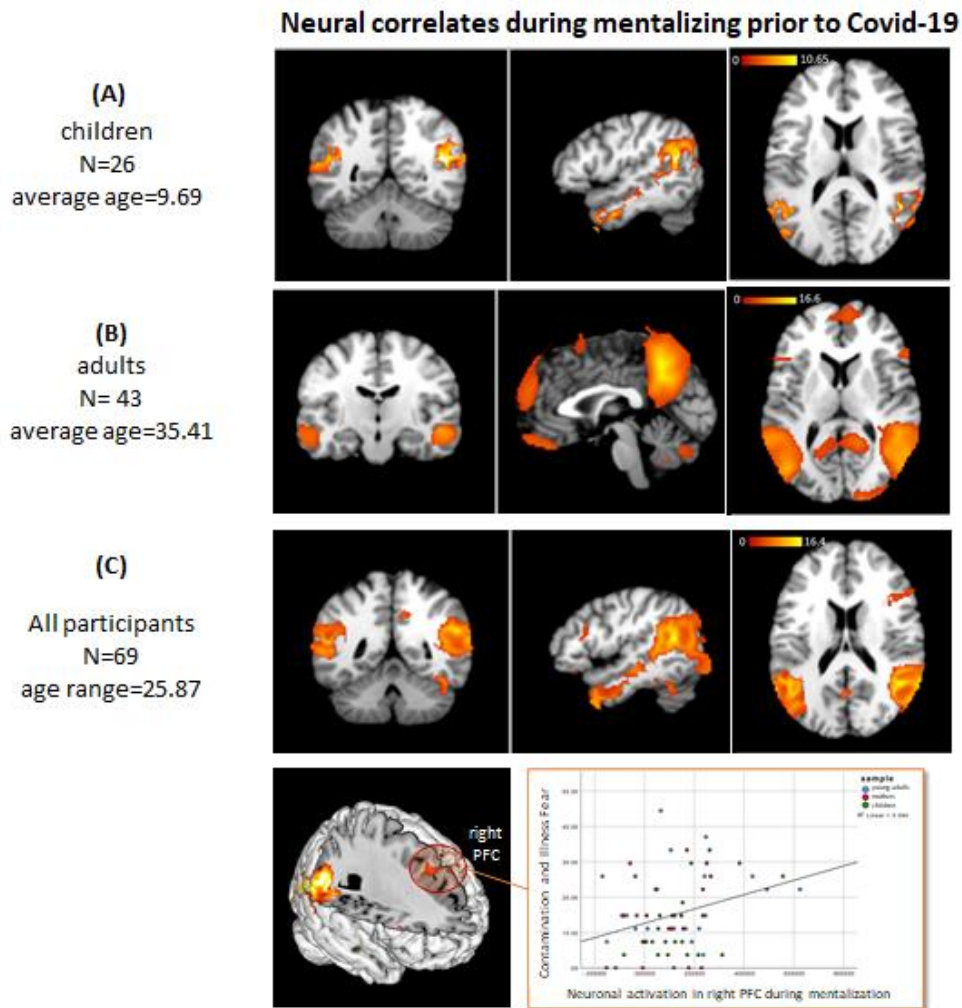


Figure 2



*Note. There were no significant difference between the three groups

Figure 3



All analyses include age and gender as covariates. Whole brain cluster-level FWE-corrected.

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