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One-week longitudinal daily description of moral distress, coping, and general health in healthcare workers during the first wave of the COVID-19 outbreak in Italy: A quantitative diary study

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Abstract. *Background and aim of the work*: The fluctuation from day to day within a working week of moral distress, coping, and general health of frontline healthcare workers (HCWs) in facing the challenges of the COVID-19 pandemic has been poorly studied. This study described the weekly fluctuation from day to day of moral distress, coping, and general health in frontline HCWs who worked during the first epidemic wave (May-June 2020) of the COVID-19 pandemic in Italy. *Methods*: This study has an intensive longitudinal design, and a convenience sampling procedure was employed to enroll physicians, nurses, allied health professions, and healthcare assistants. Data collection was performed using diary encompassed four sections: a socio-demographic form (required only at the baseline data collection) and three scales to assess moral distress, coping, and general health. *Results:* Results confirmed poor perceived health and mild moral distress in frontline HCWs, especially in HCWs with offspring, during the initial phases of the COVID-19 pandemic and the stability of their daily perception over a working week regarding moral distress, general health, and avoidant coping strategy, while approach coping strategy reported a slight fluctuation over time. *Conclusions:* Accordingly, on the one hand, these results confirm that outcomes regarding mental health and moral distress are pretty stable and provide insights, on the other hand, regarding the possible organizational interventions to support approach coping strategy as it seems more susceptible to variation over time. (www.actabiomedica.it)

Key words: Coping, COVID-19, Diary, Pandemic, Mental health, Moral Distress, Health, Healthcare workers, Wellbeing.

Introduction

The new Coronavirus disease 2019 (COVID-19) pandemic has been described as the most serious global challenge affecting public health and welfare after the Second World War (1). In this scenario, healthcare workers (HCWs) play a crucial role in successfully responding to the challenges brought by the COVID-19 pandemic (2-4). The literature highlighted that the COVID-19 pandemic impact on HCWs' wellbeing and mental health has been alarming (5-8). In fact, the COVID-19 pandemic, especially

in its initial epidemic waves, enhanced several working and emotional demands, such as workload, fears, and uncertainty regarding the long-term strategies to manage the spread of the infection and effectively treat the most severe cases (9).

Given the high emotional demands brought by managing several patients with severe COVID-19 symptoms (e.g., progressive respiratory failure and acute respiratory distress syndrome) (10), the moral distress in HCWs working in the frontline during the COVID-19 pandemic has been defined to be a widespread and stressful feeling (11). Moral distress is a negative feeling, such as guilt and worry, that occurs in acute healthcare crises triggered by the inability to provide optimal care (11). On the one hand, moral distress of frontline HCWs during the COVID-19 pandemic has been associated with burnout, post-traumatic stress disorder, low job satisfaction, intention to leave the profession, and physical symptoms, such as sleep problems (12). On the other hand, moral distress has been described to be potentially influenced by psychological abilities, such as coping strategies (13).

Precisely, coping strategies are given by the cognitive and behavioral efforts to manage specific demands appraised as challenging (14). Broadly, coping strategies might be adaptive or functional when focused on restoring psychological equilibrium and wholeness, and dysfunctional when not focused on restoring wellbeing, such as avoiding facing specific situations (14). Theoretically, functional coping strategies might mitigate the negative effects of moral distress on the HCWs' perception of their general health, defined as the individual's perception of physical and psychological wellbeing (6, 15).

Most studies describing moral distress, coping, and health perception in frontline HCWs during the COVID-19 pandemic have been based on cross-sectional data collections, and the longitudinal descriptions are still a minority in the scientific landscape (16). More precisely, despite some prospective longitudinal studies describing the short-and mid-term trajectory of outcomes referred to the HCWs' wellbeing and mental health, there is a lack of intensive longitudinal descriptions (16). Thus far, the available longitudinal studies have mainly collected data considering the national-specific epidemic peak of waves of the COVID-19 pandemic; in this regard, the intensive longitudinal studies aimed at highlighting the fluctuation from day to day in responding to the challenges brought by the pandemic are still under-described (17). An underlying assumption in the studies performed considering large time intervals for data collection (e.g., months between an epidemic peak and the following peak) is that the investigated constructs have some stability over time. However, if behaviors might theoretically show fluctuations as strongly dependent upon situational working conditions, the overall underlying assumption of stability of constructs might be misleading for phenomena such as moral distress, coping, and general health (if not empirically corroborated), undermining the possibility to interpret the current longitudinal descriptions of these aspects adequately (18).

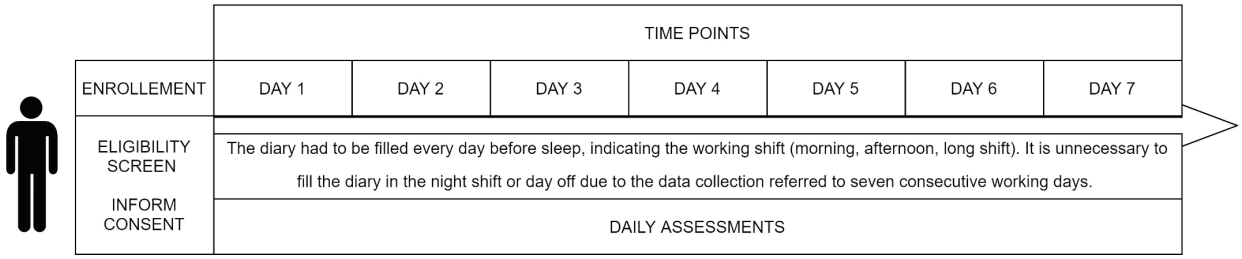
Therefore, to test the hypothesis that moral distress, coping, and general health are generally perceived as stable over a short period, such as a working week, and then describe their fluctuation from day to day, the quantitative diary methods might be adequate (18). In other words, diary studies allow researchers to daily describe feelings and behaviors within the natural work context for detecting possible fluctuations and determining associations between work context or specific individuals' characteristics and fluctuations/stability. For this reason, this study sought to describe the weekly fluctuation from day to day of moral distress, coping, and general health in frontline HCWs who worked during the first epidemic wave (May-June 2020) of the COVID-19 pandemic in Italy.

Methods

Design

This study has an intensive longitudinal design for understanding within-subject processes of moral distress, coping, and general health in everyday work contexts, employing a convenience sampling procedure of frontline HCWs (Figure 1). As per recommendations for longitudinal analysis (19), the sample size was estimated considering 30 participants per measured construct as a threshold to allow researchers to

Figure 1. Study timeline



detect fluctuations/stability of the measured constructs within a routine working week. Therefore, acknowledging that the constructs assessed in the study were three (i.e., moral distress, coping, and general health), the estimated sample size in the study protocol encompassed 90 HCWs. The study was approved in April 2020 by the Ethical Committee of Ospedale San Raffaele (prot. n. 71/INT/2020). The 'STrengthening the Reporting of Observational studies in Epidemiology' (STROBE) checklist for cohort studies was used to guide the study's reporting.

Context

The study was designed during the first epidemic wave of COVID-19 in Italy (end of March and first weeks of April 2020); the ethical approval was obtained on 22nd April; participants were enrolled in the last week of April 2020. Finally, data were collected in May-June 2020 (20). The first lockdown was implemented as of 9th March 2020; at the first week of April 2020, when the study protocol was defined, 135,000 diagnosed cases were reported with 17,000 deaths (20). The spread of the infection forced health authorities to take further urgent measures for flattening the epidemic curve. In fact, the COVID-19 spread was particularly challenging in the greater district of Milan (Lombardy, Italy), where the study was drafted to involve frontline HCWs employed in three major hospitals facing the pressure on the healthcare system of the disease spread in Lombardy. In the three hospitals of the greater district of Milan involved in the study, several COVID-19-dedicated wards were progressively activated from March to May 2020.

Sampling strategy and procedure

A convenience sampling procedure was employed to enroll physicians, nurses, allied health professions, and healthcare assistants. The inclusion criteria were (a) professional role (physician, nurse, allied health professional, healthcare assistant), (b) working in a COVID-19 unit for at least one month (the beginning of the epidemic in Italy), (c) availability of fit to work certificate, (d) willing to participate in the study. The exclusion criteria were part-time job contracts and concomitant university educational courses (e.g., residents or nurses under training). Ninety frontline HCWs were identified as eligible from the staff repository available from the directions of three involeved hospitals. Then, the eligible 90 HCWs were invited to participate in the study. 17 HCWs refused to participate as they were not interested in the study after evaluating the protocol and the required commitment for adequately completing data collection; then, 73 HCWs were enrolled and signed a written informed consent form (response rate=81%).

Each enrolled HCW received the diary in a paper form (case report forms) with the instructions for facilitating data collection. The diary had to be filled every day before sleep at home (approximately 8 minutes were required), indicating the working shift (morning, afternoon, long shift) referred to each data collection time point (day). No data collection has been requested during the night shift and off days to avoid collecting data at different times during the day (data were collected only during the night time before sleeping after having worked during the day) and without having worked. After seven working days, excluding night shifts (morning, afternoon, or long shifts), the

data collection was completed, and case report forms had to be restituted to the research project manager.

Measurements

The diary encompassed four sections: a socio-demographic form (required only at the baseline data collection) and three scales to assess moral distress, coping, and general health.

The socio-demographic form collected the following variables: sex (male, female), marital status (married, unmarried, other), offspring (yes, no), profession (physician, nurse, allied health professional, healthcare assistant), intensive care unit (yes, no), specific COVID-19-related educational courses (yes, no), age (years), work experience (years).

The moral distress was assessed using the moral distress thermometer (MDT) (19). MDT is a single-item tool encompassing an 11-point scale (from 0–10) with descriptors to help anchor the degree of the distress in a subjectively meaningful way. The validation study of MDT demonstrated its validity and reliability by considering two criterion-related validity approaches, namely the convergent and concurrent validity, by testing the relationship of the MDT with the Moral Distress Scale.

Coping strategies were assessed using the Italian version of the Brief Coping Orientation to problem Experienced (Brief-COPE) (21). Brief-COPE has 16 items using a 4-point Likert scale to measure coping strategies. Emotional support, positive reframing, acceptance, religion, humor, active coping, planning, and instrumental support are the adaptive coping strategies. Venting, denial, substance use, behavioral disengagement, self-distraction, and self-blame are maladaptive coping strategies. The scoring procedure in the current study was based on the approach described for detecting avoidant coping (as a proxy assessment of maladaptive coping strategy) and approach coping as a proxy assessment of adaptive coping strategy) (22). Avoidant coping score might range from 0 to 21 and approach coping might range from 0 to 27. In both scores, higher scores indicate more frequent adoption of the coping strategy.

General health was assessed using the General Health Questionnaire-12 (GHQ-12), a self-report scale encompassing 12 questions that showed adequate evidence of validity and reliability in its Italian version (23). Responders have to rate the degree of their psychological distress on a 4-point Likert scale. The scoring procedure is based on transforming the original responses: the answers on the 4-point Likert scale scoring 1 or 2 have to be considered in the scoring procedure as zero, while answers scoring 3 or 4 as one; the sum of obtained "ones" from the coding is the GHQ-12 score where values equal or higher than 4 indicate poor health perception (psychological distress). GHQ-12 scores over four indicate the presence of psychological distress affecting general health perception; then, higher scores mean lower health perception.

Statistical analysis

This diary study included seven repeated measurements of moral distress, coping, and general health nested within each participant. Baseline characteristics and collected variables were synthesized using descriptive statistics before performing the scoring computations for each scale to identify possible errors, outliers, or missing data, exploring the skewness and kurtosis indices for the continuous variables for determining the shape of the distribution. Missing data were handled using a pairwise deletion function. After computing scores for each time point, their means and standard deviations (SDs) were calculated for synthesizing the sample statistics of normally distributed variables. The repeated measures ANOVA (within-subjects ANOVA) was used to assess whether there were differences between related population means for each self-report assessment. The *F*-statistic and the effect size using the partial eta-squared (η^2p) were used to evaluate the models. In case of lack of sphericity, the Greenhouse–Geisser correction was adopted to avoid overestimating the degrees of freedom inflating the *F*-statistics.

η^2

To compare the mean differences between within-subjects factors (scores of moral distress, coping, and general health over the weekly trajectory) and between-subjects factors, mixed ANOVA models were employed. Between-subjects factors were sex (male, female), marital status (married, unmarried), offspring (yes, no), profession (physician, nurse, allied

health professional, healthcare assistant), intensive care unit (yes, no), specific COVID-19-related educational courses (yes, no), and age (categorized in "age over the median" and "age below the median"). Once established whether each interaction was statistically significant, the data were analyzed to determine simple main effects difference between scores at each level of each between-subjects factor. All inferential tests employed two-tailed null hypotheses with alfa = 0.05 and were performed in IBM SPSS Statistics for Windows, Version 22.0 (IBM SPSS, Armonk, NY: IBM Corp.).

Results

Baseline characteristics

The baseline characteristics of the 73 HCWs are described in Table 1. They were mainly females (n=43, 58.9%), married (n=44, 60.3%), without offspring (n=42, 60%), nurses (n=32, 43.8%), having a mean age of 38.68 years (SD=9.56), working in medical wards (n=35; 50.8%), and without having attended any specific COVID-19-related educational courses at the time of enrolment (n=37; 50.7%). The mean work experience was 13.3 years (SD=9.63).

Table 2 and Figure 2 show the 7-worked days longitudinal trajectory of moral distress, coping, and general health.

Moral distress, coping, and general health

Moral distress was perceived as mild/uncomfortable (mean scores ranged from 3.15 to 3.56), and it was stable over the data collection time ($F_{(1.39\text{-}2.96)}$=0.740, p<0.800, η^2p=0.007). The interaction of having offspring ("yes vs. "no") with scores of moral distress over time was significant ($F_{(6\text{-}42)}$=4.09, p<0.003, η^2p=0.369), where the simple main effect difference showed slightly higher scores in the group of HCWs with offspring.

GHQ-12 scores indicated a high presence of psychological distress impacting the general health (mean scores ranged from 14.55 to 15.50), which was stable over the data collection time ($F_{(5\text{-}339)}$=0.784, p<0.563, η^2p=0.012). The interaction of having offspring ("yes vs. "no") with scores of GHQ-12 (higher scores indicated poor health due to psychological distress) over time was significant ($F_{(6\text{-}42)}$=2.31, p<0.052, η^2p=0.248), where the simple main effect difference showed slightly higher scores of GHQ-12 in the group of HCWs with offspring.

The avoidant coping strategy appeared to be generally poorly adopted in daily life (mean scores ranged from 3.17 to 4.12), and its scores were stable over the data collection time ($F_{(5.1\text{-}369.1)}$=1.196, p<0.310, η^2p=0.016). No significant interactions have been detected by comparing the mean differences between avoidant coping strategy scores over time and

Table 1. Baseline characteristics

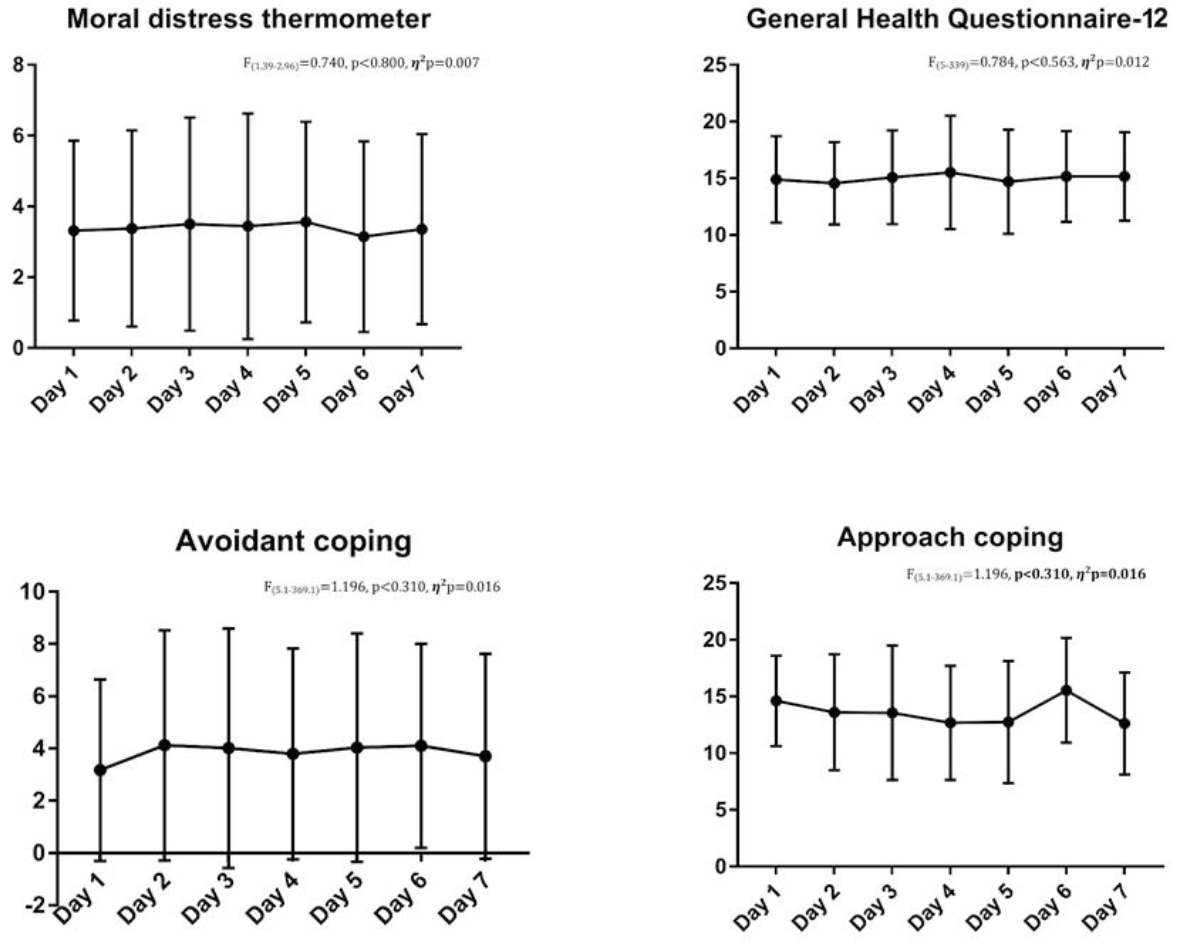
		N	%
Sex			
	Females	43	58.9
	Males	30	41.1
Age			
	Years (mean; standard deviation)	38.68	9.56
Marital status			
	Married	44	60.3
	Unmarried	26	35.6
	Other (divorced)	3	4.1
Offspring			
	No	42	60
	Yes	28	40
Profession			
	Physicians	10	13.7
	Nurses	32	43.8
	Allied health professionals	21	28.8
	Healthcare assistants	10	13.7
Ward			
	Intensive care unit	34	49.2
	Medical wards	35	50.8
Specific COVID-19-related educational courses			
	No	37	50.7
	Yes	36	49.3
Work experience			
	Years (mean; standard deviation)	13.3	9.63

Table 2. Longitudinal trajectories of moral distress, coping, and general health

	Day 1		Day 2		Day 3		Day 4		Day 5		Day 6		Day 7			
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	η^2p	p
Moral distress thermometer*	3.32	2.54	3.38	2.77	3.50	3.01	3.44	3.18	3.56	2.83	3.15	2.69	3.36	2.68	0.007	0.800
General Health Questionnaire-12*	14.89	3.82	14.55	3.62	15.08	4.13	15.50	5.00	14.69	4.59	15.16	4.00	15.15	3.90	0.012	0.563
Avoidant coping*	3.17	3.47	4.12	4.40	4.01	4.58	3.79	4.03	4.03	4.37	4.10	3.90	3.70	3.92	0.016	0.310
Approach coping*	14.61	3.99	13.60	5.12	13.56	5.92	12.67	5.03	12.73	5.38	15.54	4.62	12.62	4.50	**0.049**	**0.002**

*Note: *Greenhouse-Geisser correction for lacking sphericity. SD=standard deviation. P-value in bold indicates significant changes of the measured variables over time.*

Figure 2. One-week longitudinal daily description of moral distress, coping, and general health



between-subjects factors (sex, marital status, offspring, profession, intensive care unit, specific COVID-19-related educational courses, and age).

The approach coping strategy was moderately employed in daily life (mean scores ranged from 12.62 to 15.54), and its scores showed a small effect size indicating slight changes over time ($F_{(5.1\text{-}369.1)}$=1.196, p<0.310, η^2p=0.016). The interaction of having an age equal or lower 38 years (median age) with scores of approach coping strategy over time was significant ($F_{(6\text{-}46)}$=2.31, p<0.050, η^2p=0.231), where the simple main effect difference showed slightly higher scores

of approach coping strategy in the group of younger HCWs.

Discussion

To the best of our knowledge, this was the first study describing the weekly fluctuation from day to day of moral distress, coping, and general health in frontline HCWs who worked during the first epidemic wave (May-June 2020) of the COVID-19 pandemic in Italy. The emerged results provide an evidence-grounded background supporting the underlying stability assumption of the within-subjects mental health outcomes, collected in several studies using large time intervals, such as several months given by the time from an epidemic peak to the following peak in a specific context (2, 17, 24). Considering the focus on a specific short period, characterized by an unprecedented pressure on healthcare systems when HCWs had poor knowledge about COVID-19 (e.g., only 36 HCWs of 73 had attended any specific COVID-19-related educational courses at the time of enrolment), the descriptions of the trajectories regarding moral distress, coping, and general health and the interactions between HCW' characteristics and scores over time, reveal some new insights.

The approach coping strategy, which has been used as a proxy assessment of functional or adaptative coping strategies (22), was the only within-subject measurement that showed to slightly change over time. Precisely, approach coping encompasses any behavioral, cognitive, or emotional activity directed toward managing a threat (e.g., problem-solving or seeking information) (25). The fluctuations of approach coping strategy scores within the weekly data collection might reflect the need to take appropriate actions to face working challenges after distress levels have been subsided e when appropriate actions might have the chance to produce positive effects on solving challenging tasks (25). In other words, approach coping strategy requires adequate levels of self-awareness (i.e., conscious knowledge of a specific situation and one's own feelings). These aspects suggest that positive environmental characteristics, such as high levels of interprofessional functioning, might help HCWs face challenging situations by employing an approach coping strategy (26). Therefore, approach coping strategy appears to be the coping strategy more susceptible to be sustained by organizational interventions aimed at supporting interprofessional functioning, empowering HCWs (27).

To better understand the slight trend of HCWs aged equal or under 38 years (median age of the study) in reporting little higher scores of approach coping strategy over time than HCWs aged over 38 years, further research is required to focus on the relationship between age and coping, especially considering that the research landscape presents mixed findings (28-29). Some studies found possible age-related declines in coping strategies (29); other studies found age-related enhancements of coping strategies (28). It is plausible that older HCWs might have more stressors in the current study, such as family-related commitments, compared to younger HCWs.

In fact, another interesting element confirming previously published insights (30) is given by the interaction of having offspring with moral distress and general health: HCWs with offspring tend to report slightly higher levels of moral distress and worse general health perception due to high levels of psychological distress. On the one hand, in HCWs with offspring, the feeling that their work might be dangerous for their offspring ("parenting stress") for the risk of infecting them might have triggered moral distress responses (31). On the other hand, the same feeling might enhance psychological distress, undermining the perception of an individual's health. For these reasons, during extraordinary situations such as the COVID-19 pandemic, providing organizational and personal support to frontline HCWs (e.g., nutritional support for the family at home, solving accommodation and transportation problems, providing adequate personal protective equipment for joining the family) might be considered as a strategy to support the sound management of the pandemic, as well as the other disease containment measures.

Finally, the descriptive trajectory of general health and moral distress showed an alarming situation consistent with previously published findings of studies performed in the same period (6, 11, 12, 16, 32, 33). HCWs generally reported a stable poor perceived

health over time due to the high levels of psychological distress (GHQ-12) and a stable mild moral distress (MDT). Given these results, long-term evaluations are required, and effective strategies sustaining the broad wellbeing of frontline HCWs are necessary with a long-term perspective to sustain HCWs in the current challenges, such as vaccine roll-out programs and community-based interventions to promote health literacy and adherence to health authorities recommendations (34).

Limitations

This study has some limitations that require to be acknowledged. First, the sample size was not powered to detect between-subject differences; for this reason, some detected interactions might be underestimated, such as in considering interprofessional patterns and differences. Second, some variables describing the daily organizational context, such as clinical complexity mean scores of the patients, staffing level, skill mix, task assignment, interprofessional functioning, have not been collected to avoid overwhelming participants. These variables could act as confounders if not controlled, and collecting organizational-level variables might have allowed researchers to perform multi-level analyses, which could be helpful to enrich the knowledge between theorized interaction from organizational context to approach coping strategy, the only unstable measurement over the weekly assessments, and the other measured variables. For this reason, future research should be powered for multi-level data.

Conclusions

This study confirmed poor perceived health and mild moral distress in frontline HCWs, especially in HCWs with offspring, during the initial phases of the COVID-19 pandemic and the stability of their daily perception over a working week regarding moral distress, general health, and avoidant coping strategy, while approach coping strategy reported a slight fluctuation over time. On the one hand, these results confirm that outcomes regarding mental health and moral distress are pretty stable and provide insights, on the other hand, regarding the possible organizational interventions to support approach coping strategy as it seems more susceptible to variation over time. Providing organizational and personal support to frontline HCWs should be considered a priority to sustain the sound management of the pandemic over long-term periods. Future research should be focused on describing in-depth the interactions between organizational context and approach coping strategy to detect an evidence-based framework encompassing the elements that might be enhanced to stimulating higher levels of approach coping strategy in frontline HCWs and containing adverse effects of job demands.

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Authorship statement: GV, CA, DFM, NG, and RC were responsible for the conception and design of the study. LK, FD, GG, AM, and GV conducted the literature search for defining relevant sources for writing the rationale and discussion. VM and RC were responsible for the data analysis. All the authors were involved in interpreting results, drafting the article, which was revised critically, and approving the final version.

Data availability statement: All data are available upon request.

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Conflicts of interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

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