



## Paediatric cardiology training: burnout, fulfilment, and fears

## Original Article

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**Abstract**

**Background:** Burnout is well characterised in physicians and residents but not in paediatric cardiology fellows, and few studies follow burnout longitudinally. Training-specific fears have been described in paediatric cardiology fellows but also have not been studied at multiple time points. This study aimed to measure burnout, training-specific fears, and professional fulfilment in paediatric cardiology fellows with the attention to time of year and year-of-training. **Methods:** This survey-based study included the Professional Fulfillment Index and the Impact of Events Scale as well as an investigator-designed Fellow Fears Questionnaire. Surveys were distributed at three-time points during the academic year to paediatric cardiology fellows at a large Midwestern training programme. Fellow self-reported gender and year-of-training were collected. Descriptive analyses were performed. **Results:** 10/17 (59%) of fellows completed all surveys; 60% were female, 40% in the first-year class, 40% in the second-year class, and 20% in the third-year class. At least half of the fellows reported burnout at each survey time point, with lower mean professional fulfilment scores. The second-year class, who rotate primarily in the cardiac ICU, had higher proportions of burnout than the other two classes. At least half of fellows reported that they “often” or “always” worried about not having enough clinical knowledge or skills and about work–life balance. **Conclusions:** Paediatric cardiology fellows exhibit high proportions of burnout and training-specific fears. Interventions to mitigate burnout should be targeted specifically to training needs, including during high-acuity rotations.

Professional burnout among healthcare providers has been a growing concern even before the COVID-19 pandemic and continues to be widely recognised as a pervasive problem in the healthcare system. Burnout is defined as a psychological syndrome in response to chronic on-the-job stressors that includes three key components: overwhelming exhaustion, feelings of cynicism and detachment from the job, and a sense of decreased efficacy.<sup>1</sup> There have been many proposed strategies to combat burnout; however, intervention efforts are limited by individual and systemic barriers with limited effectiveness.<sup>2</sup>

While burnout is widespread in medicine, some risk factors for increased burnout have been identified, including being a trainee. About half of the physician residents endorse burnout symptoms, as compared to about one-third of age-matched controls in the general population.<sup>3</sup> Multiple studies have shown resident physicians have increased rates of burnout as compared to attending physicians.<sup>4–7</sup> Known risk factors for burnout include limited control/flexibility in schedule, documentation and prior-authorization burdens, and workload demands,<sup>8</sup> all of which exist in medical training and fellowship programmes. In contrast to burnout, professional fulfilment is used to describe physician wellness which includes happiness, self-worth, self-efficacy, and satisfaction with one’s work.<sup>9</sup> Given associations between burnout and professional fulfilment, it has been suggested that increasing and strengthening professional fulfilment may be a way to mitigate physician burnout.<sup>10,11</sup>

Although the experiences of medical residents have been well studied,<sup>3,12</sup> burnout and professional fulfilment among physician fellows are less well understood. Moreover, few studies have examined these constructs longitudinally. A past study on the experiences of advanced paediatric cardiology trainees identified training-specific fears that may contribute to burnout.<sup>13</sup> We hypothesised that burnout and training-specific fears are prevalent among paediatric cardiology fellows, and that longitudinal evaluation of these constructs may identify targets for intervention. With an overall objective of informing interventions to mitigate burnout in physician paediatric cardiology fellows, this study aimed to characterise professional fulfilment, proportions of burnout, and training-specific fears in paediatric cardiology fellows over the course of their training.

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## Materials and methods

### Participants and methods

This study was conducted at a large categorical paediatric cardiology fellowship program for graduates from residencies in paediatrics or medicine-paediatrics. Fellow responsibilities vary widely through the 3 years of training: the first-year fellows care for most patients on the general cardiac ward, the second-year fellows care for patients in the cardiac ICU, and the third-year fellows individualise their year to their career goals. Table 1 describes the breakdown of the 3 years of fellowship. While the first and second years of training are both clinically rigorous, the second year of training is unique in the amount of time spent in the cardiac intensive care unit. Fellows spend about 4 months cumulatively in the cardiac ICU on day service alone, with additional overnight and weekend call coverage divided among the six fellows, resulting in the second-year class caring for ICU patients consistently throughout the academic year regardless of their rotation.

All categorical paediatric cardiology fellows in the 2021–2022 academic year (six fellows/year,  $n = 18$ ) participated in a 9-month “Mental Health for Pediatric Cardiology Fellows” didactic curriculum. This novel curriculum is a series of nine lectures focused on educating fellows on mental health care of their patients, as well as select sessions on provider wellness, resilience, and coping. As part of this educational series, fellows were eligible to participate in the present study; participation in the study portion of the curriculum was optional. One fellow who participated in the design of the study was excluded. Although the study was deemed exempt by the Institutional Review Board, informed consent was obtained from all participating fellows. Given the sensitive nature of the questions asked, a psychologist was involved in study design and fellows were reminded of available psychological support throughout the curriculum. Fellows completed electronically administered surveys via Qualtrics at three-time points: September 2021, February 2022, and June 2022, which were the beginning, midpoint, and end of the curriculum, respectively. Two reminders were sent for survey completion through the Qualtrics software at 1 and 2 weeks post initial request. Responses were excluded if the surveys were more than 30% incomplete. While the survey data were anonymised, each fellow’s surveys were linked throughout the three-time points.

## Measures

### Background information

Fellow self-identified gender and year-of-training was collected.

### Professional fulfillment index

The Professional fulfillment index is a validated 16-item instrument of three domains: professional fulfilment, work exhaustion, and interpersonal disengagement. A burnout composite scale is calculated by averaging the work exhaustion and interpersonal disengagement domain scores. Items are scored using a 5-point Likert scale ranging from 0 (not at all) to 4 (completely true/extremely). A score of 3 or greater (range 0–4) has been used to indicate very good professional fulfilment. A score greater than 1.33 is used to indicate burnout. The Professional fulfillment index has been used widely to measure professional fulfilment and burnout in medical professionals including residents and trainees.<sup>14</sup>

**Table 1.** Paediatric cardiology fellowship by year

1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year
Cardiology Wards (2 months)	Cardiac ICU (4 months)	Back Up Fellow
Consults (2 months)	Interventional Cardiology	Interventional Cardiology
Interventional Cardiology	Electrophysiology	Adult Congenital
Echocardiography/MRI	Echocardiography	Heart Failure/Transplant
Electrophysiology		Research
Heart Failure/Transplant		
Night/Weekend Call: Home Call	Cardiac ICU night float, Weekend ICU call	Night/Weekend Call: Urgent echo/catheterizations

### Impact of events scale

The impact of events scale is a 15-item, self-reported questionnaire developed to measure subjective distress related to a specific event recently experienced by the participant and has been widely used to measure post-traumatic stress symptoms. The impact of events scale has been used in similar studies of paediatric clinician burnout.<sup>15</sup> It includes both intrusion and avoidance subscales and is sensitive to change over time. It is suggested that the cut-off point is 24 for moderate-severe impact of distress.<sup>16–19</sup> This scale has been used in previous research to measure the impact of paediatric patient deaths on clinicians.<sup>15</sup>

### Fellow fears questionnaire: development

The investigator-designed “Fellow Fears Questionnaire” was developed after discussion with an experienced survey researcher. Published measures of job satisfaction and professional fulfilment were reviewed. Additionally, survey items were informed by a prior qualitative study that inquired about fears related to paediatric cardiology training.<sup>13,20,21</sup> Final items were selected by a paediatric cardiology fellow who was excluded from participating in the study, and items were additionally reviewed by an expert in medical education (Table 2). Possible responses for each item were ‘Never’, ‘Rarely’, ‘Sometimes’, ‘Often’, or ‘Always’.

### Data analysis

Survey responses overall and by year-of-training were summarised and presented descriptively at each time point, using frequencies with percentages (%) for individual items and mean scores for professional fulfilment, burnout, and post-traumatic stress. Pearson correlation coefficient,  $r$ , was calculated to examine correlations between 1) the burnout and professional fulfilment subscales of the PFI and 2) the PFI subscales and impact of events scale score. Due to small sample size, a statistical significance across time point or among year-of-training was not determined. Instead, Cohen’s  $d$  effect size for changes in overall mean scores for professional fulfilment, burnout, and post-traumatic stress was calculated as mean difference between the two-time points divided by the pooled standard deviation of the two-time points, indicating small (.20), medium (.50), and large (.80).<sup>22</sup>

**Table 2.** Fellow fears questionnaire

When thinking about paediatric cardiology fellowship, how often do the following statements apply to you?
1. I worry that patients will suffer because I have more clinical responsibility
Never
Rarely
Sometimes
Often
Always
2. I worry that I do not have enough clinical knowledge or skills to take care of patients
Never
Rarely
Sometimes
Often
Always
3. I worry that I will not pass my boards
Never
Rarely
Sometimes
Often
Always
4. I worry that I will not complete the required research
Never
Rarely
Sometimes
Often
Always
5. I worry that I cannot adequately teach residents and medical students
Never
Rarely
Sometimes
Often
Always
6. I worry that I do not know what I want to do with my life
Never
Rarely
Sometimes
Often
Always
7. I worry that I will disappoint faculty, loved ones, or myself.
Never
Rarely
Sometimes
Often

(Continued)

**Table 2.** (Continued)

When thinking about paediatric cardiology fellowship, how often do the following statements apply to you?
Always
8. I worry that I am not smart enough to be a paediatric cardiologist
Never
Rarely
Sometimes
Often
Always
9. I worry that I will not be home enough for my loved ones or family
Never
Rarely
Sometimes
Often
Always
10. I worry that I will not be able to balance my personal life and work demands
Never
Rarely
Sometimes
Often
Always
11. I worry that I will be overwhelmed by work
Never
Rarely
Sometimes
Often
Always
12. I worry that I will miss out on professional or personal opportunities due to the demands of fellowship
Never
Rarely
Sometimes
Often
Always
13. I worry that being in a new place and new hospital will be overwhelming
Never
Rarely
Sometimes
Often
Always
14. I worry that I will be judged for asking for help too often
Never
Rarely

(Continued)

Table 2. (Continued)

When thinking about paediatric cardiology fellowship, how often do the following statements apply to you?
Sometimes
Often
Always
15. I worry I will be judged for not asking for help enough
Never
Rarely
Sometimes
Often
Always
16. I feel accomplished matching into paediatric cardiology fellowship
Never
Rarely
Sometimes
Often
Always
17. I enjoy helping paediatric patients with congenital heart disease
Never
Rarely
Sometimes
Often
Always
18. I think my friends and family are proud of me as a paediatric cardiology fellow
Never
Rarely
Sometimes
Often
Always
19. I am proud to tell others I am a pediatric cardiology fellow
Never
Rarely
Sometimes
Often
Always
20. I feel appropriately compensated for my work
Never
Rarely
Sometimes
Often
Always

(Continued)

Table 2. (Continued)

When thinking about paediatric cardiology fellowship, how often do the following statements apply to you?
21. I believe three years is an appropriate amount of training
Never
Rarely
Sometimes
Often
Always
22. I am satisfied with my work scheduling flexibility
Never
Rarely
Sometimes
Often
Always

## Results

### Sample characteristics

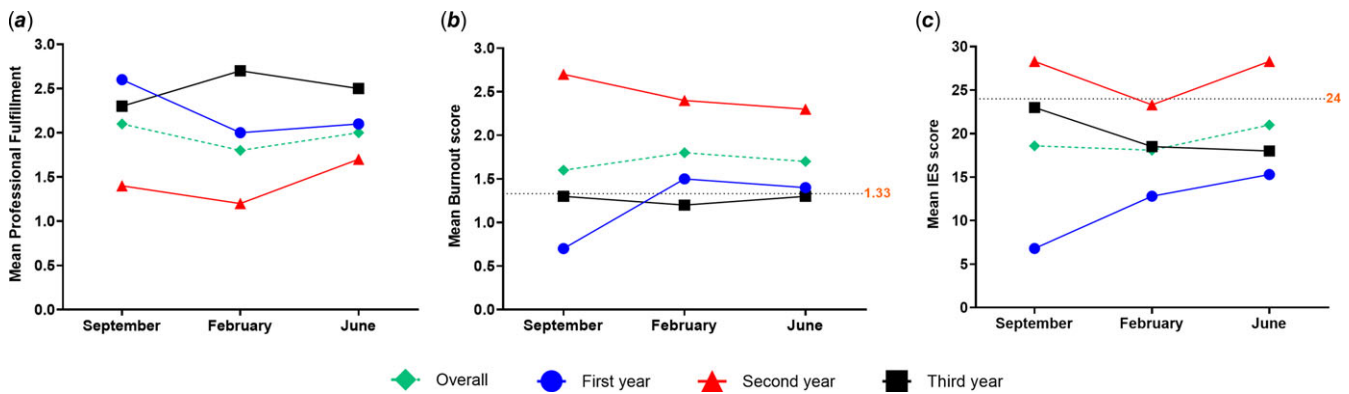
A total of 10 fellows completed all three rounds of surveys (59% participation rate). Three fellows did not consent for participation. Four fellows consented but did not complete all surveys. For fellows who completed surveys at only one or two time points, survey responses were reviewed and found to be incomplete and were excluded. Participants were predominantly female (60%) with stronger representation in the first 2 years of fellowship (40% first year, 40% second year, 20% third year).

### Fellow professional fulfillment

Across the time points, professional fulfillment was below the recommended cut-off of 3<sup>14</sup> with only one third-year fellow reporting a professional fulfillment score above the cut-off. However, when considered by class, the second-year class had lower mean scores of professional fulfillment when compared with the first-year and third-year classes. Additionally, mean scores of professional fulfillment in the first-year class were higher in September when compared with the February and June time points (Fig 1A). The overall mean scores of professional fulfillment were decreasing ( $d = -0.30$ ) in February and stable ( $d = -0.08$ ) in June compared to those in September.

### Fellow burnout

Mean burnout scores ranged from 1.6 to 1.8, which is above the cut-off score of 1.33,<sup>14</sup> indicating clinically significant levels of burnout. At least half of the fellows endorsed burnout symptoms at each time point, which increased throughout the year. When considered by class, the second-year class had the highest mean scores of burnout when compared to the first-year and third-year classes. Mirroring the professional fulfillment trends, the first-year class had lower mean burnout scores in September, with mean



**Figure 1.** Mean PFI and IES Scores over time in overall group and by year-of-training.

scores increasing and stable across the February and June time points (Fig 1B). The overall mean burnout scores were slightly increasing ( $d=0.18$ ) in February and stable ( $d=0.08$ ) in June compared to those in September. Burnout and professional fulfilment scales were inversely correlated at each time point ( $r=-0.84$  in September,  $-0.72$  in February, and  $-0.55$  in June).

#### Fellow post-traumatic stress symptoms

The mean scores for the impact of events scale ranged from 18.1 to 21.0, which is in the mild range for post-traumatic stress symptoms.<sup>16</sup> When considered by class, the first-year class had mean scores consistent with mild post-traumatic stress symptoms that increased across the time points while the third-year class had higher mean scores also in the mild range. The second-year class, when considered alone, had more moderate post-traumatic stress symptoms above the cut-off of 24<sup>16</sup> (Fig 1C). The overall mean impact of events scale scores were consistent ( $d=-0.03$ ) in February and increasing ( $d=0.16$ ) in June compared to those in September. The mean impact of events scale scores were negatively correlated with professional fulfilment scales at each time point ( $r=-0.73$  in September,  $-0.48$  in February, and  $-0.71$  in June), while they were positively correlated with the burnout scale ( $r=0.70$  in September,  $0.53$  in February, and  $0.62$  in June).

#### Fellow training specific fears

When considered together, at least half of fellows reported that they worried about the following subjects “often” or “always” at least at one time point: not having enough clinical knowledge or skills to take care of patients, not being home enough for their loved ones or family, not being able to balance personal life and work demands, being overwhelmed by work, and missing out on professional or personal opportunities due to the demands of fellowship (Supplemental Table). Three of these items had the highest proportion of fellows endorse “often” or “always” worrying about the topic during the February time point. At least 30% of fellows reported “often” or “always” worrying about these additional subjects: not passing boards, not completing the required research, not knowing what they want to do with their lives, disappointing faculty, loved ones, or themselves, and not being smart enough to be a paediatric cardiologist. When divided by fellowship class, it was noted that the second-year class endorsed many more of the worries than the other two classes.

Despite these worries, most fellows across all classes reported that they “often” or “always” thought that the following statements

applied to them: I think my friends and family are proud of me as a paediatric cardiology fellow, I enjoy helping paediatric patients with congenital heart disease..

#### Discussion

This is the first longitudinal study of burnout, professional fulfilment, and training-specific fears in paediatric cardiology fellows. In our single centre sample, findings suggest burnout is prevalent and professional fulfilment is at times low. While burnout, lower professional fulfilment, and training-specific fears occurred in all three fellowship classes, the highest prevalence of burnout was found in the second-year fellows who spend a significant amount of their training year in the cardiac ICU. We also identified several common training-specific fears among individuals in 1 year of their training at three separate time points within that year, including not having enough clinical knowledge or skills to take care of patients, not being home enough for their loved ones or family, not being able to balance personal life and work demands, being overwhelmed by work, and missing out on professional or personal opportunities due to the demands of fellowship.

Burnout in graduate medical education has been well described in the literature.<sup>3,12</sup> Within paediatric cardiology, Brown et al surveyed incoming paediatric cardiology fellows and identified fear of burnout in 58% of incoming fellows.<sup>13</sup> While burnout in fellowship has not been well studied in all specialities, the Professional fulfilment index has been utilised to assess burnout and professional fulfilment in emergency medicine residents,<sup>23</sup> who reported higher professional fulfilment and lower burnout than the paediatric cardiology fellows in the present study. Given the possible variation of prevalence of burnout throughout subspecialities and even throughout training programmes, we propose that speciality-specific or even programme-specific evaluation of causes of burnout are important to best inform effective interventions.

In this study, the highest proportions of burnout and post-traumatic stress and the lowest proportions of professional fulfilment were noted in second-year fellows who, unlike the first and third year, spend their clinical service and on-call time in the cardiac ICU. A large multi-centre longitudinal study of paediatric residents identified high-acuity rotations and recent medical errors as high-risk times for burnout.<sup>24</sup> Previous studies have found high rates of burnout symptoms in paediatric intensive care.<sup>25,26</sup> High rates of post-traumatic stress symptoms have also been found in paediatric ICU.<sup>25,27</sup> These rotations have inherently higher rates of stress and high-acuity clinical situations. It is known that paediatric trainees

are at risk of post-traumatic stress after patient deaths.<sup>28–30</sup> Trainee physicians in paediatric intensive care have been found to be at higher risk of burnout than their more senior colleagues.<sup>27,30</sup> In addition to clinical skills, intensive care physicians and staff likely learn coping and resilience skills over time, allowing them to continue to practice in the high-acuity environment. While the education received in the ICU is invaluable, the findings in the present study, supported by prior studies of trainees in intensive care, underscore the need for support targeted at trainees during higher acuity rotations.

While not the first study to examine training-specific fears in paediatric cardiology fellows,<sup>13</sup> this study is the first to our knowledge to study training-specific fears longitudinally over time and across multiple training years. It is notable that the rates of some training-specific fears increased from the September survey to the February survey, specifically not having enough clinical knowledge or skills to take care of patients, not being able to balance personal life and work demands and being overwhelmed by work. The Dunning–Kruger Effect is a well-described phenomenon where learners overestimate their competence prior to being fully aware of aspects of a task.<sup>31</sup> This phenomenon has also been applied to medical trainees.<sup>32</sup> In this study, the worry of not having enough clinical knowledge or skills was highest in the February survey when compared to the other two time points, which is possibly explained by the Dunning–Kruger Effect. Also possibly contributing to this fear is imposter syndrome; the inability to internalise success and the tendency to attribute success to external causes, first described by Clance and Imes in 1978.<sup>33</sup> In a prior study of paediatric cardiology fellows, imposter syndrome was the second most frequently identified fear for incoming paediatric cardiology fellows, experienced in 62% of incoming fellows.<sup>13</sup> Imposter syndrome has been seen in all areas of graduate medical education<sup>34</sup> and high scores for imposter syndrome have been found to correlate with high scores on burnout metrics.<sup>35</sup> While burnout may also contribute to these training-specific fears, it is also possible that anxieties worsen burnout, and faculty should remind fellows that self-doubt is an important step towards improved performance.<sup>32</sup> Additionally, imposter syndrome is likely impacted by external bias and exclusion that may be experienced by trainees from underrepresented groups.<sup>36</sup> Attention to equity-focused teaching is of utmost importance to foster a sense of belonging to all residents and fellows. Finally, as this study found that these training-specific fears are very common among fellows, an open dialogue with fellows and faculty about professional fears experienced throughout their careers especially as they relate to burnout symptoms may increase a feeling of normalcy.

It is notable that this study took place during the 2021 to 2022 academic year, over a year into the COVID-19 pandemic. The COVID-19 pandemic has greatly affected the mental health of medical providers,<sup>37</sup> though a single-centre study of almost 1000 residents across multiple specialities found no difference in burnout rates before and during the COVID-19 pandemic.<sup>38</sup> It is unknown how the pandemic may have impacted the burnout levels of trainees in the present study. Further longitudinal studies of trainee burnout will be most effective at identifying changes in trends over time.

Results of this study must be interpreted with several limitations in mind. Although the training programme selected for this study is relatively large when compared to paediatric cardiology fellowship programmes in the USA, study enrolment and completion rate was limited (59%). This small sample size limited the ability to compare groups within the sample. Further, we acknowledge

that the single-centre sample limits generalisability and ability to draw conclusive findings based on current analysis. Self-selection bias may have impacted results, and this may limit the generalisability of the findings to the broader paediatric cardiology fellow population. Further, all training programmes in paediatric cardiology are not the same in structure or in clinical demands. Lastly, while the Fellow Fears Questionnaire was developed based on previously determined themes extracted from qualitative interviews of paediatric cardiology fellows,<sup>13</sup> this metric is not validated.

Future studies of speciality-specific training fears and burnout should be conducted at a national or international level to better ensure generalisability to the larger trainee population. These larger studies may allow evaluation of variables that put trainees at risk or that are protective against burnout, including presence of local support systems like family and a spouse, life stressors-like caregiver responsibilities at home or divorce, and personal factors like a history of mental illness.

Best practices for effective interventions aimed at burnout and professional fulfilment in physicians<sup>39</sup> and resident physicians<sup>40</sup> remain unclear. While interventions at the institutional or even departmental level are important,<sup>2</sup> findings here demonstrate that intervention needs likely differ at individual and career stages, training, and career time points, and for rotation/speciality areas of focus. This study, like others, suggests the need for targeted interventions for trainees during high-acuity rotations.<sup>41,42</sup> In addition to targeted interventions, we must continue to decrease stigma around physician mental health and normalise the need for support, especially given the high prevalence of burnout seen in this study and others. A recent study of paediatric fellows found that those with burnout symptoms sensed more workplace-based.<sup>43</sup> Lastly, further research in interventions to foster resilience and increase professional fulfilment may be protective against trainee burnout. A longitudinal study of radiology residents found while rates of burnout fluctuated, trainees with higher resilience had lower rates of burnout over time.<sup>44</sup>

While fellowship training inherently comes with work that may be perceived as more or less meaningful, helping fellows to increase their meaningful work, showing appreciation and gratitude for their contributions, and fostering a supportive learning environment are important intervention targets. It is also notable that the professional fulfilment and burnout subscales of the Professional fulfilment index were inversely correlated at each timepoint. While the directionality of this correlation cannot be determined in this study, interventions to increase professional fulfilment may be a strategy to improve trainee burnout. It is an important finding that despite high levels of burnout, most fellows reported that they “often” or “always” thought their friends and family were proud of them for being a paediatric cardiology fellow, and that they enjoyed helping children with CHD. Helping trainees remember the values and strengths that brought them to the field of paediatric cardiology throughout the rigours of advanced medical training may also be an effective strategy to mitigate burnout.

Trainee and provider wellness is a priority within our fellowship programme. We continue to trial initiatives to support our trainees throughout the course of graduate medical education. Prior to this study and especially considering the findings reported here, multiple interventions targeted at decreasing fellow burnout and increasing fellow wellness have been implemented. Needs assessments are performed monthly in small group discussions and at least annually by anonymous survey to identify specific stressors as intervention targets. Action items have included debriefing at an individual and unit level following patient deaths, coverage

of fellow call by faculty for fellow retreats, and a division-wide wellness retreat. The ICU is piloting a fellow-initiated night float system rather than continuous schedule of 24-hour call, which promotes sleep, protects duty hours, and improves positive experience on daytime rotations. In addition, we have conducted at least quarterly “Humanism Rounds” with protected time for fellows to discuss particularly stressful or challenging situations and causes of moral distress. During these sessions, there is a didactic curriculum encompassing such topics as imposter syndrome, burnout, gratitude, and resilience, and fostering post-traumatic growth. These sessions are generally moderated by the same 1–2 attending cardiologists and have received consistently positive feedback from fellows. Further initiatives targeting the ICU experience will be enacted as a result of the present study.

In summary, this first longitudinal study of burnout, professional fulfilment, post-traumatic stress, and fellowship training-specific fears among paediatric cardiology fellows highlights that paediatric cardiology training can be both fulfilling and traumatic. The risk of burnout occurs throughout paediatric cardiology training but may be highest during high-acuity rotations. Post-traumatic stress is also present, and trainees may benefit from additional support after patient losses and challenges cases. As a field, we continue to seek best practices in optimally training the next generation of paediatric cardiologists,<sup>45</sup> we must not only educate our trainees to take the best care of their patients but also support our trainees and each other through advocating for physician wellness.

**Supplementary material.** To view supplementary material for this article, please visit <https://doi.org/10.1017/S1047951123000148>

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**Conflicts of Interest.** None.

**Ethical standards.** The study was reviewed by the Institutional Review Board of the University of Michigan and deemed exempt.

## References

- Maslach C, Schaufeli WB, Leiter MP. Job burnout. *Annu Rev Psychol.* 2001; 52: 397–422.
- Shanafelt TD, Noseworthy JH. Executive leadership and physician well-being: nine organizational strategies to promote engagement and reduce burnout. *Mayo Clin Proc.* 2017; 92: 129–146.
- Dyrbye LN, West CP, Satele D, et al. Burnout among U.S. medical students, residents, and early career physicians relative to the general U.S. population. *Acad Med.* 2014; 89: 443–451.
- Wolfshohl JA, Bradley K, Bell C, et al. Association between empathy and burnout among emergency medicine physicians. *J Clin Med Res.* 2019; 11: 532–538.
- Beck J, Randall CL, Bassett HK, et al. Moral distress in pediatric residents and pediatric hospitalists: sources and association with burnout. *Acad Pediatr.* 2020; 20: 1198–1205.
- Jacobsen FM, Jensen CFS, Schmidt MLK, et al. Burnout among urologists from Denmark and Michigan. *Urology.* 2021; 147: 68–73.
- Ferreira S, Afonso P, Ramos MDR. Empathy and burnout: a multicentre comparative study between residents and specialists. *J Eval Clin Pract.* 2020; 26: 216–222.
- Del Carmen MG, Herman J, Rao S, et al. Trends and factors associated with physician burnout at a multispecialty academic faculty practice organization. *JAMA Netw Open* 2019; 2: e190554.
- Schrijver I, Brady KJ, Trockel M. An exploration of key issues and potential solutions that impact physician wellbeing and professional fulfillment at an academic center. *PeerJ* 2016; 4: e1783.
- Burns KEA, Pattani R, Lorens E, Straus SE, Hawker GA. The impact of organizational culture on professional fulfillment and burnout in an academic department of medicine. *PLoS One* 2021; 16: e0252778.
- Winkel AF, Tristan SB, Dow M, et al. A national curriculum to address professional fulfillment and burnout in OB-GYN residents. *J Grad Med Educ.* 2020; 12: 461–468.
- Naji L, Singh B, Shah A, et al. Global prevalence of burnout among post-graduate medical trainees: a systematic review and meta-regression. *CMAJ Open* 2021; 9: E189–E200.
- Brown DW, Binney G, Gauthier Z, Blume ED. Fears and stressors of trainees starting fellowship in pediatric cardiology. *Pediatr Cardiol.* 2020; 41: 677–682.
- Trockel M, Bohman B, Lesure E, et al. A brief instrument to assess both burnout and professional fulfillment in physicians: reliability and validity, including correlation with self-reported medical errors, in a sample of resident and practicing physicians. *Acad Psychiatry.* 2018; 42: 11–24.
- Cousino MK, Bogle C, Lim HM, et al. Burnout, professional fulfillment, and post-traumatic stress among pediatric solid organ transplant teams. *Pediatr Transplant* 2021; 25: e14020.
- Horowitz M, Wilner N, Alvarez W. Impact of Event Scale: a measure of subjective stress. *Psychosom Med.* 1979; 41: 209–218.
- Corcoran K, Fischer J. Measures for clinical practice A Sourcebook, vol. 2, 3rd edn. The Free Press, New York, 1994.
- Briere J. Psychological assessment of adult posttraumatic states. American Psychological Association, Washington, D.C, 1997.
- Weiss D, Marmar C. The impact of event scale - revised. In: Keane JWT (eds). *Assessing psychological trauma and PTSD.* Guilford, New York, 1997.
- Lloyd S, Streiner D, Hahn E, Shannon S. Development of the emergency physician job satisfaction measurement instrument. *Am J Emerg Med.* 1994; 12: 1–10.
- van Saane N, Sluiter JK, Verbeek JH, Frings-Dresen MH. Reliability and validity of instruments measuring job satisfaction – a systematic review. *Occup Med (Lond).* 2003; 53: 191–200.
- Cohen J. *Statistical power analysis for the behavioral sciences.* 2nd edn. Erlbaum, Hillsdale, NJ, 1988.
- Sakamoto JT, Lee J, Lu DW, et al. Factors driving burnout and professional fulfillment among emergency medicine residents: a national wellness survey by the Society for Academic Emergency Medicine. *AEM Educ Train* 2022; 6: S5–S12.
- Kemper KJ, Schwartz A, Wilson PM, et al. PEDIATRIC RESIDENT BURNOUT-RESILIENCE STUDY CONSORTIUM. Burnout in pediatric residents: three years of national survey data. *Pediatrics.* 2020; 145: e20191030.
- Rodriguez-Rey R, Palacios A, Alonso-Tapia J, et al. Burnout and posttraumatic stress in paediatric critical care personnel: prediction from resilience and coping styles. *Aust Crit Care.* 2019; 32: 46–53.
- Crowe L, Young J, Turner MJ. What is the prevalence and risk factors of burnout among pediatric intensive care staff (PICU)? A review. *Transl Pediatr.* 2021; 10: 2825–2835.
- Jones GAL, Colville GA, Ramnarayan P, et al. Psychological impact of working in paediatric intensive care. A UK-wide prevalence study. *Arch Dis Child.* 2020; 105: 470–475.
- Hollingsworth CE, Wesley C, Huckridge J, Finn GM, Griksaitis MJ. Impact of child death on paediatric trainees. *Arch Dis Child.* 2018; 103: 14–18.
- Ffrench-O’Carroll R, Feeley T, Crowe S, Doherty EM. Grief reactions and coping strategies of trainee doctors working in paediatric intensive care. *Br J Anaesth.* 2019; 123: 74–80.

30. Wolfe AHJ, Hinds PS, Arnold RM, Soghier L, Tompkins R. Vulnerability of inexperience: a qualitative exploration of physician grief and coping after impactful pediatric patient deaths. *J Palliat Med* 2022; 25: 1476–1483.
31. Kruger J, Dunning D. Unskilled and unaware of it: how difficulties in recognizing one's own incompetence lead to inflated self-assessments. *J Pers Soc Psychol*. 1999; 77: 1121–1134.
32. Rahmani M. Medical trainees and the Dunning-Kruger effect: when they don't know what they don't know. *J Grad Med Educ*. 2020; 12: 532–534.
33. P.R. C, S.A. I. The imposter syndrome in high achieving women: dynamics and therapeutic intervention. *Psychotherapy*. 1978; 15: 241–247.
34. Gottlieb M, Chung A, Battaglioli N, Sebok-Syer SS, Kalantari A. Impostor syndrome among physicians and physicians in training: a scoping review. *Med Educ*. 2020; 54: 116–124.
35. Liu RQ, Davidson J, Van Hooren TA, Van Koughnett JAM, Jones S, Ott MC. Impostorism and anxiety contribute to burnout among resident physicians. *Med Teach*. 2022; 44: 758–764.
36. Salib S. On gender bias and the imposter syndrome. *J Gen Intern Med* 2022; 37: 974–974.
37. Pollock A, Campbell P, Cheyne J, et al. Interventions to support the resilience and mental health of frontline health and social care professionals during and after a disease outbreak, epidemic or pandemic: a mixed methods systematic review. *Cochrane Database Syst Rev* 2020; 11: CD013779.
38. Blanchard AK, Podczewinski J, Twiss MF, Norcott C, Lee R, Pincavage AT. Resident well-being before and during the COVID-19 pandemic. *J Grad Med Educ*. 2021; 13: 858–862.
39. West CP, Dyrbye LN, Erwin PJ, Shanafelt TD. Interventions to prevent and reduce physician burnout: a systematic review and meta-analysis. *Lancet*. 2016; 388: 2272–2281.
40. Busireddy KR, Miller JA, Ellison K, Ren V, Qayyum R, Panda M. Efficacy of interventions to reduce resident physician burnout: a systematic review. *J Grad Med Educ*. 2017; 9: 294–301.
41. Govindan M, Keefer P, Sturza J, Stephens MR, Malas N. Empowering residents to process distressing events: a debriefing workshop. *MedEdPORTAL* 2019; 15: 10809.
42. McDermott A, Brook I, Ben-Isaac E. Peer-debriefing after distressing patient care events: a workshop for pediatric residents. *MedEdPORTAL* 2017; 13: 10624.
43. Weiss AK, Quinn SM, Danley AL, Wiens KJ, Mehta JJ. Burnout and perceptions of stigma and help-seeking behavior among pediatric fellows. *Pediatrics* 2021; 148: e2021050393.
44. Perry H, Naud S, Fishman MDC, Slanetz PJ. Longitudinal resilience and burnout in radiology residents. *J Am Coll Radiol*. 2021; 18: 639–646.
45. McMahan CJ, Tretter JT, Redington AN, et al. Medical education and training within congenital cardiology: current global status and future directions in a post COVID-19 world. *Cardiol Young*. 2022; 32: 185–197.