

Moral Injury and Planetary Health in Primary Care Clinicians and Medical Trainees

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ABSTRACT

Introduction: Climate change is a serious and worsening public health crisis. Primary care clinicians and medical trainees understand the health effects of climate change yet participate in a carbon-intensive industry and often maintain lifestyles linked to high carbon footprints. Moral injury occurs when individuals perpetrate, witness, or fail to prevent acts that transgress deeply held moral beliefs. We hypothesized that primary care clinicians and medical trainees experience morally injurious circumstances in response to climate change.

Methods: A cross-sectional survey was sent to University of Wisconsin family medicine clinicians and medical trainees. The survey assessed participant climate change attitudes, levels of moral injury specific to climate change (using an adapted Moral Injury Symptom Scale), and general dysphoria.

Results: A total of 131 surveys were completed (42.5% response rate). The average moral injury score was 45.5 (± 11.8); 80.2% of participants scored at or above the established threshold of 36. A significant, moderate positive correlation was found between climate change attitudes and moral injury ($r = 0.561$; $P < .0001$), as well as between moral injury and associated functional impairment and distress ($r_s = 0.463$; $P < .0001$).

Conclusions: A high rate of climate change-related moral injury was detected in this sample. The degree of moral injury appears to be associated with climate change attitudes and awareness. Family medicine clinicians and medical trainees may represent motivated agents of change in the global climate health response.

INTRODUCTION

Climate change is a serious and worsening public health crisis with substantial effects on physical and mental health.^{1,2} Health care professionals are generally aware of climate change and its effect on patient health³ but also contribute to the carbon-intensive health care industry, which accounts for approximately 4.4% to 4.6% of global greenhouse gas emissions.^{4,5} Physicians, other health care

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professionals, and trainees also have potential for relatively high incomes, which have been linked to lifestyles with large carbon footprints.⁶ Furthermore, health care professionals—specifically family medicine physicians—have reported uncertainty regarding their role in addressing the climate crisis.³ This combination may be a recipe for climate change-related moral injury in primary care clinicians, other health care professionals, and trainees.

Moral Injury

Moral injury can be described as the phenomenon or syndrome that occurs “when we perpetrate, bear witness to, or fail to prevent an act that transgresses our deeply held moral beliefs.”⁷ The phenomenon was first assessed in military veterans who may have witnessed events or been required to act in ways that violated their values during war⁸ and has been quantified using the Moral Injury Symptom Scale-Military

Version.⁹ Moral injury commonly manifests with psychological symptoms such as shame, grief, remorse, a sense of meaninglessness, and even a loss of faith or spirituality.¹⁰

Moral Injury in Health Care

Recently, moral injury has been assessed in health care, where morally injurious circumstances are common.^{10,11} These circumstances include balancing conflicting priorities such as quality patient care, electronic health records tasks, productivity targets, insurance policies, and hospital interests.⁷ In 2020, the Moral Injury Symptom Scale-Health Professionals (MISS-HP) was adapted from the military version to evaluate the degree of moral injury experienced among health care professionals.¹⁰ In

one study, 47.5% of health care professionals scored above the cutoff for clinically significant moral injury.¹⁰ Moral injury in this population is associated with increased clinician burnout and medical errors.¹¹ Therefore, it is important to understand moral injury in health care professionals, including contributing factors such as climate change.

This Study

To our knowledge, moral injury has not yet been assessed in the context of climate change. The aim of this exploratory study was to evaluate climate change-related moral injury experienced by primary care providers and medical trainees. Given the dissonance between recognizing the health effects of climate change and personal contributions through profession and lifestyle,⁵ we hypothesized that (1) primary care clinicians and medical trainees would have elevated levels of moral injury related to climate change, and (2) this moral injury would be correlated with climate change attitudes and awareness.

METHODS

Study Population and Setting

This unfunded, exploratory study was conducted within the University of Wisconsin Department of Family Medicine and Community Health (DFMCH). To expand the sample size and exploration of climate change-related moral injury, University of Wisconsin School of Medicine and Public Health (UWSMPH) medical and physician assistant (PA) students were included in addition DFMCH clinicians. Data were collected via a cross-sectional survey sent in June and July of 2023. All DFMCH clinicians with a valid email address—including physicians, advanced practice providers (APPs), and residents—received an email invitation via Qualtrics (Qualtrics) to participate. In total, 251 DFMCH clinicians were sent the survey. Because a complete list of student email addresses was unavailable, a mass email was sent to all active medical and PA students to solicit interest. Fifty-seven students expressed interest and were subsequently sent the survey. Participation was voluntary and responses were anonymous.

Survey Instrument and Delivery

The cross-sectional survey consisted of 4 sections and 23 items (Appendix A). The first section included a 3-item climate change attitude (CCA) assessment, a condensed version of a survey previously used to evaluate climate change attitudes and awareness.¹² Items were rated on a scale of 0 to 5; individual scores were summed for a total CCA score ranging from 0 to 15.

The second section contained the 10-item Moral Injury Symptom Scale for Climate Change (MISS-CC), adapted for use in this study from the previously validated MISS-HP.¹⁰ The adaptation included adjustments or additions of minor phrases such as, “when it comes to planetary health” to help identify

	No. of Participants (%)
Role	
Family medicine physicians	54 (41.2)
Family medicine resident physicians	12 (9.2)
Family medicine APPs	11 (8.4)
MD students	48 (36.6)
PA students	6 (4.6)
Age (years)	
26 and under	39 (29.8)
27–42	56 (42.7)
43–58	24 (18.3)
59 and older	12 (9.2)
Gender (self-identified)	
Men	50 (38.2)
Women	78 (59.5)
Nonbinary, other gender, or nondisclosed	3 (2.3)
Race and ethnicity (self-identified)	
White, non-Hispanic	96 (73.3)
Other races or ethnicities	34 (26.0)
Parental status	
Have children	59 (45.0)
Do not have children	70 (53.4)

moral injury specifically related to climate change. The 10 items assessed feelings of betrayal, guilt, shame, moral concerns, loss of trust, loss of meaning, unforgiveness, self-condemnation, feeling punished, and loss of faith in the context of climate change. Responses used a 10-point Likert scale ranging from 1 (strongly disagree) to 10 (strongly agree). To prevent response bias, 6 items (questions [Q] 4-7, 11, 12) were worded negatively (higher values indicated higher moral injury), and 4 items (Q 8-10, 13) were worded positively (higher values indicated lower moral injury). After re-scoring the 4 positively worded questions, individual items were summed to get a total moral injury score ranging from 10 to 100. Participants with scores ≥ 36 were considered morally injured, consistent with previously established cutoffs.^{10,11} The final question (Q14) assessed the significant distress and functional impairment at work, in relationships, or other areas of life caused by the moral injury indicated by the previous 10 questions. Responses used a 5-point Likert scale ranging from 1 (not at all) to 5 (extremely).

To assess dysphoria, the third section used the 2-item Patient Health Questionnaire (PHQ-2) and the 2-item Generalized Anxiety Disorder survey (GAD-2), a tool used in a previous study to evaluate the relationship between symptoms of anxiety and depression with attitudes and awareness of climate change.¹² Individual scores were summed for a general score ranging from 0 to 12. A threshold score of 5 identified individuals with dysphoria, indicating a positive screen (score ≥ 3) on either the PHQ-2 or GAD-2.^{12,13} The final section collected participant demographics by role/profession, age, gender identity, race, and ethnicity, and whether participants had children.

The web-based survey remained open for 2 weeks, with up

to 4 email reminders. The study protocol was deemed exempt by the University of Wisconsin Minimal Risk Research Institutional Review Board (protocol 2023-0767).

Data Analysis

Descriptive statistics were used to analyze initial response results from various sections of the survey, including the CCA, MISS-CC, functional impairment or significant distress (Q14), and dysphoria. Individual item responses in the MISS-CC section were also evaluated using descriptive statistics. Pearson correlation determined relationships between CCA and MISS-CC scores. Due to skewed distributions, Spearman rank correlation was used to determine relationships between MISS-CC and general dysphoria or functional impairment. Subgroup analyses compared medical trainees and family medicine clinicians. For incomplete responses median values from the total population were imputed.

RESULTS

Response Rate and Demographics

Of 308 eligible participants, 131 completed the survey (42.5% response rate). Of these, 125 were entirely complete. Responses for 11 individual items were imputed. Sample demographics are shown in the Table.

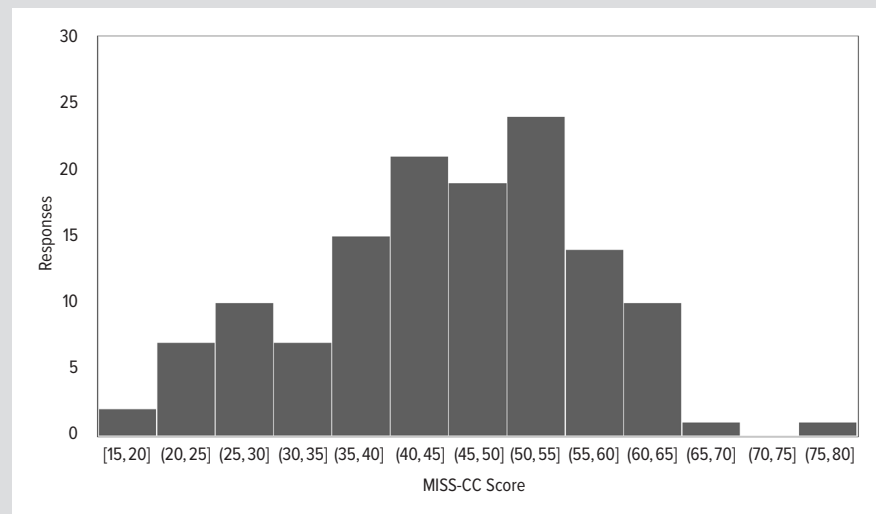
Moral Injury and Impairment

MISS-CC scores ranged from 15 to 76 (mean \pm SD, 45.47 \pm 11.77; median, 47) (Figure 1); 80.2% of participants scored at or above the moral injury threshold of 36. Differences across demographics were minimal. Medical trainees (MD and PA students) had a mean score of 45.81, compared to 45.22 for family medicine clinicians. Q14 scores (functional impairment) were skewed toward low impairment (Figure 2), ranging from 1 to 4 (mean \pm SD, 1.42 \pm 0.62; median, 1). Notably, 35.9% of participants reported some functional impairment (score \geq 2), but only 5.3% reported moderate or worse impairment (score \geq 3). A significant, moderate positive correlation ($r=0.463$; $P<.0001$) was found between MISS-CC and functional impairment.

Individual MISS-CC Questions

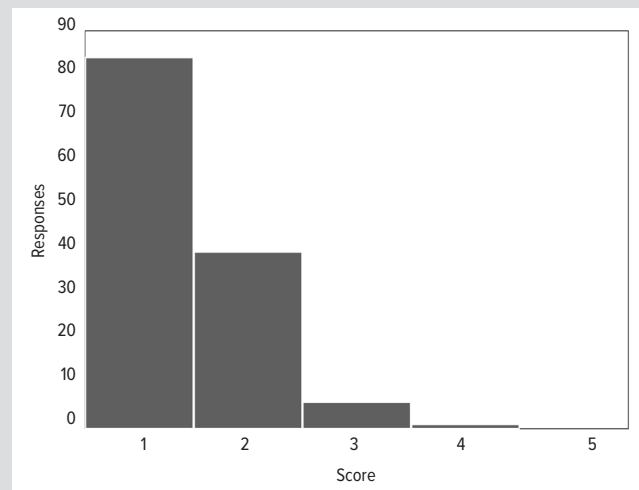
Average individual MISS-CC item scores ranged from 2.3 (Q12, feeling punished) to 7.8 (Q13, loss of faith). Q13 scored noticeably higher than the other questions (Figure 3). While faith may decline due to climate change, the wording of this question may create artificially inflated values for participants who do not consider themselves religious or spiritual. When Q13 was excluded,

Figure 1. Moral Injury Symptom Scale for Climate Change (MISS-CC) Scores



Frequency histogram of the total score for the moral injury symptom scale for climate change (MISS-CC) of 131 surveyed participants. Scores at or above 36 were considered morally injured.

Figure 2. Functional Impairment on the Moral Injury Symptom Scale for Climate Change (MISS-CC)



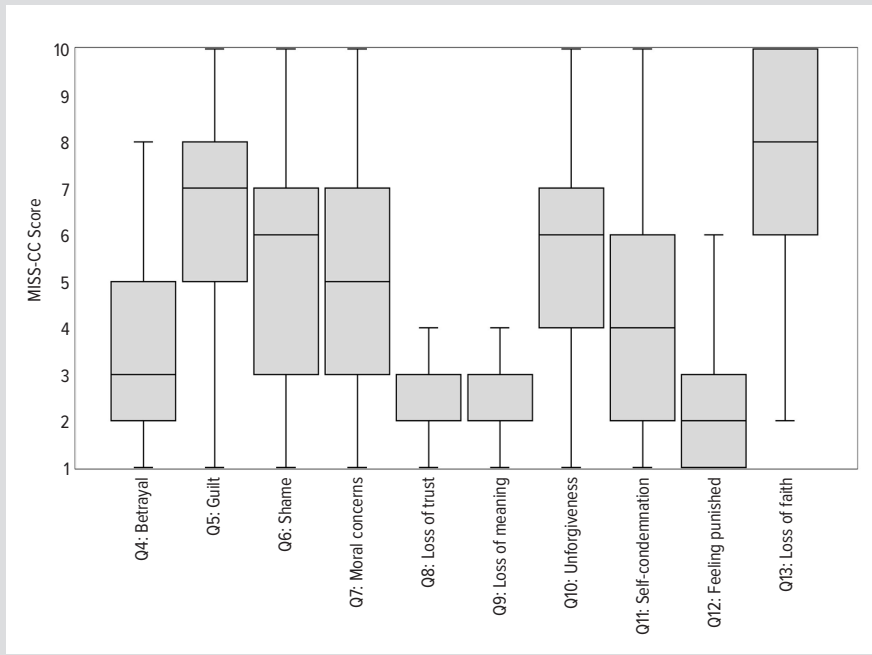
Frequency histogram of the 131 participants' scores for functional impairment or significant distress related to climate change related moral injury, as assessed by question 14 of the survey (Appendix A). Scores ranged from 1 (not at all impaired or distressed) to 4 (very functionally impaired or distressed).

59.5% of individuals still scored above moral injury threshold compared to 80.2% when Q13 was included.

Climate Change Attitude, Moral Injury and General Dysphoria

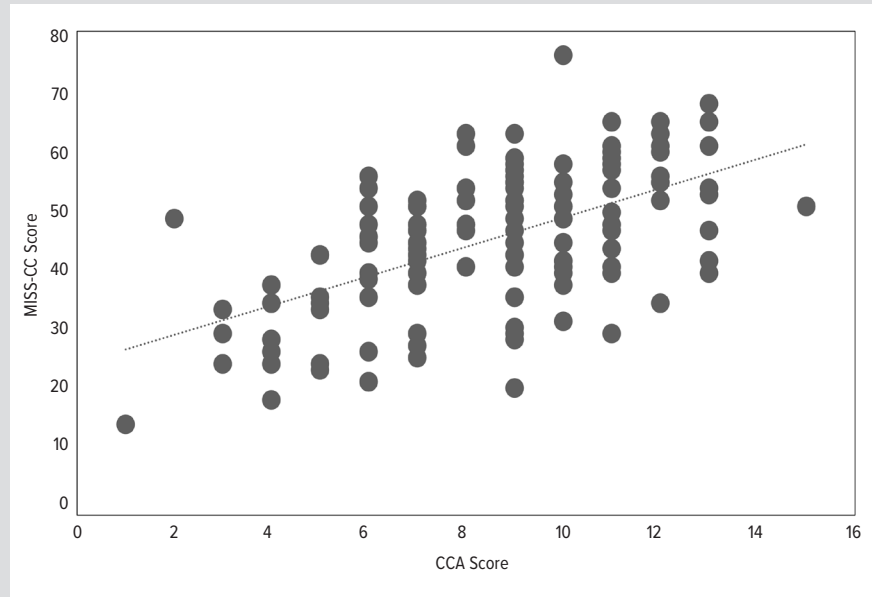
CCA scores ranged from 1 (low climate change awareness) to 15 (high awareness) (mean \pm SD, 8.47 \pm 2.73; median, 9). Pearson correlation revealed a significant, moderate positive correlation between CCA and MISS-CC scores ($r=0.561$; $P<.0001$) (Figure 4). Subgroup analysis showed similar correlations for trainees ($r=0.502$) and clinicians ($r=0.607$). Dysphoria scores (PHQ-2 plus GAD-2) ranged from 0 and 8 (mean \pm SD, 1.96 \pm 2.04;

Figure 3. Individual Questions on the Moral Injury Symptom Scale for Climate Change (MISS-CC)



The box plots display the minimum, 1st quartile, median, 3rd quartile, and maximum for each individual question of the MISS-CC. The average response scores of individual questions were as follows: Q4 (betrayal), 3.6; Q5 (guilt), 6.3; Q6 (shame), 5.4; Q7 (moral concerns), 4.8; Q8 (loss of trust), 2.6; Q9 (loss of meaning), 2.5; Q10 (unforgiveness), 5.8; Q11 (self-condemnation), 4.3; Q12 (feeling punished), 2.3; Q13 (loss of faith), 7.8.

Figure 4. Correlation Between Climate Change Attitude (CCA) and Moral Injury Symptom Scale for Climate Change (MISS-CC)



Individual scores on the MISS-CC were plotted against CCA scores with associated linear trendline. A moderate correlation of $r = 0.561$ ($P < .0001$) was found between climate change attitude scores and MISS-CC scores.

median, 1); only 10.7% ($n = 14$) scored at or above the threshold of 5. No significant correlation was found between MISS-CC and dysphoria ($r_s = 0.162$; $P = .0645$).

DISCUSSION

In our sample of primary care clinicians and trainees, we found high rates of climate change-related moral injury (80.2%). Even with the exclusion of a potentially inflated item (Q13), 59.5% of participants remained above the threshold—higher than the 47.5% reported in the initial study evaluating general moral injury in health care professionals.¹⁰ Despite this, functional impairment resulting from climate change-related moral injury was relatively low. Although 35.9% of participants showed some level of functional impairment or significant distress, only 5.3% indicated moderate or worse functional impairment or significant distress. In comparison, 23.9% of health care professionals showed moderate or worse functional impairment in previous studies evaluating moral injury in health care settings.^{10,11} This suggests that while climate change creates a morally injurious environment, it may be less immediately impairing than the daily clinical challenges of modern health care. This may be due to the delayed consequences of climate change compared to direct clinical stressors.

Individual item analysis showed lower contributions to overall moral injury from factors such as feeling betrayed, losing trust in colleagues, or a loss of meaning in life or work. Participants maintained trust in those around them and a sense of what makes their lives and work meaningful. However, moral injury was driven by internal factors such as guilt, shame, feeling like a failure, violating one's own moral values, and unforgiveness of oneself in the context of climate change and planetary health. While Q13 (religious/spiritual faith) likely inflated total scores, the underlying moral injury remains substantial at nearly 60%.

Although we cannot infer causality

in this correlational analysis, the significant positive correlation between CCA and moral injury supports our hypothesis that greater awareness of climate change is associated with a higher degree of moral injury. We found an overall low level of general dysphoria (10.7%) among participants, which may reflect actual low levels of anxiety and/or depression or potential response bias from participants familiar with the PHQ-2 and GAD-2 tools. Whereas CCA was significantly correlated with dysphoria in a previous study,¹² we found no significant correlation between dysphoria scores and CCA or MISS-CC, suggesting that climate-related moral injury may be distinct from general psychological distress in this study population.

Our findings suggest that while academic primary care clinicians and medical trainees experience moral injury related to climate change, they remain professionally engaged, and previous work has shown they are interested in expanding their role in addressing the climate health crisis.¹⁴ Engaging in roles such as patient educators on climate health, advocates for sound climate policy, and leaders in climate health response may provide a pathway for moral injury healing.

Limitations

There are notable limitations to this study. Although we achieved a reasonable response rate for an email survey, this study was conducted at a single academic institution in politically liberal-leaning county, limiting the generalizability. The voluntary nature of the survey introduces volunteer bias. However, there were a wide range of moral injury scores with a roughly normal distribution (Figure 1). Additionally, the MISS-CC tool has not yet undergone full psychometric analysis, nor has a definitive quantitative cutoff been identified for moral injury specific to this adapted survey. Finally, the survey was distributed during the 2023 Canadian wildfires, which caused unprecedented poor air quality in Wisconsin and may have influenced responses.

CONCLUSIONS

We conducted this study to explore moral injury in the context of climate change among primary care clinicians and medical trainees. Although further examination is needed in larger, more representative samples, a high degree of moral injury was found in our study population and was associated with increased awareness of climate change. Despite this, the study population continued to trust their colleagues, maintained a sense of meaning, and experienced relatively lower functional impairment resulting from this distress.

As previously noted, health care professionals—specifically primary care clinicians—are aware of climate change-related health impacts but remain unsure of their role in addressing this issue. Taken together, we believe that this suggests academic primary care clinicians and medical trainees may be motivated populations with room to grow as agents of change in climate change-related

health efforts. More work is needed to explore the potential role and associated benefits—including moral injury healing—of primary care clinicians and medical trainees working as patient educators on climate-related health issues, advocates for sound climate policy, and leaders in health response.

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Appendix: Available at www.wmjonline.org

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