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Virtual Delivery of Stress Management and Resiliency Training (SMART) During the COVID-19 Pandemic to Hematology/Oncology Fellows: A Pilot Study

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ABSTRACT

Introduction: Medical trainees experience a high degree of stress that predisposes them to burnout. This pilot study tested a scalable approach to deliver a validated resilience program (Stress Management and Resiliency Training (SMART)) among Hematology/Oncology fellows at an academic medical center.

Methods: This was a mixed-methods, prospective, single-arm clinical trial involving Hematology/Oncology fellows at Mayo Clinic in Rochester, MN, USA. Four one-hour training sessions were conducted virtually with 26 fellows. Stress, burnout, and emotional resilience were measured at baseline, three months, and six months post-intervention using the Perceived Stress Scale (PSS-10), Maslach Burnout Inventory (MBI-HSS), and Connor-Davidson Resilience Scale (CD-RISC2). Changes in mean scores were assessed using paired t-tests. Feasibility and acceptability data were obtained during a virtual focus group.

Results: Statistically significant improvements in mean stress ($p = 0.004$) and professional achievement ($p < 0.001$) were seen at three months post-intervention. At six months post-intervention, mean stress ($p < 0.001$) and professional achievement ($p = 0.032$) continued to improve, while improvements in emotional exhaustion ($p = 0.001$) and depersonalization ($p < 0.001$) also became significant. Focus group participants found the program beneficial and reported improved stress and work performance as a result of participation.

Conclusion: Virtual implementation of the SMART program is feasible and resulted in improvements in stress and burnout. Focus group participants found the training beneficial, reporting lower stress and improved work performance.

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INTRODUCTION

Work-related stress and burnout among professional medical care providers have been identified as topics of great concern by the American Medical Association [1]. Approximately half of practicing physicians experience excessive stress and burnout [2]. Work-associated stress is believed to be the precursor to burnout, identified as emotional exhaustion, a sense of low personal accomplishment and inefficacy, and depersonalization, which is often displayed by cynicism [3]. Although stress and burnout can affect providers in any specialty of medicine, medical oncology providers are especially vulnerable given the frequency of discussions surrounding disease progression, end-of-life and quality of life decisions, and toxicities experienced by oncology patients. A study completed by Shanafelt et. al in 2014 found burnout rates among medical oncologists exceeded 45% [4].

Moving beyond historical trends, recent data have shown that physician burnout increased steeply during the COVID-19 pandemic [5-9]. In a survey of 2440 US physicians across multiple specialties, burnout increased from 38% pre-pandemic to 62% in 2021 [8]. Medical trainees appear particularly susceptible to worsened burnout, with one study completed at a tertiary teaching hospital reporting a 2.5-fold higher risk of burnout among residents compared to other healthcare staff [6]. These concerning findings highlight the growing importance of identification, early prevention, and mitigation strategies for student, trainee, and attending physician burnout.

The Stress Management and Resiliency Training (SMART) program was designed as a simple and scalable approach to reduce stress and anxiety and improve resilience and quality of life. The program includes instruction on the neuroscience of stress and resilience and how to foster skills focused on five core evidence-based resilience principles: gratitude, compassion, acceptance, forgiveness, and higher meaning [10]. Multiple pilot studies have found the program to be effective in reducing stress levels in professional medical caregivers [10-15]. A study completed in 2017 found significant improvements in happiness, life satisfaction, gratitude, mindfulness, spirituality, and

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stress among employees who completed a 12-week work-based SMART program [16]. While these studies do show improvements in short term outcome measures, it is unclear if they are sustained over time and whether they are applicable to medical trainees.

In this study, we completed a mixed-methods, prospective, open-label, single-arm clinical trial among Hematology/Oncology fellows at Mayo Clinic in Rochester, MN, USA to determine 1) if the SMART program would provide improvements in stress and burnout for trainees similar to its reported findings among attendings, patients, and caregivers, 2) if these changes in stress and burnout are sustained over six months, and 3) whether a virtual implementation of this program is feasible and acceptable.

METHODS

The SMART project was a mixed-methods, prospective, single-arm clinical trial. Prior to recruitment and enrollment, the institutional review board (IRB) approved this study under protocol number 21-001616, having found that the Declaration of Helsinki was adequately addressed and that the standards of research ethics with human subjects were met. Categorical and Advanced Hematology/Oncology Fellows at Mayo Clinic were invited to participate. Participants were required to complete written informed consent prior to enrolling in the study. Eligibility was based on 1) enrollment in the Hematology/Oncology categorical or advanced fellowships, 2) completion of informed consent, and 3) completion of baseline instruments.

All fellows, regardless of enrollment in the study, were offered both the option to attend the virtual training as well as access to the support resources described below. However, data was only collected on the participants who completed informed consent and enrolled in the study.

Prior to attending the first session, participants were asked to complete baseline demographic information. Study data were collected and managed using REDCap electronic data capture tools hosted at our institution [17, 18]. REDCap (Research Electronic Data Capture) is a secure, web-based software platform designed to support data capture for research studies, providing 1) an intuitive interface for validated data capture; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for data integration and interoperability with external sources. Support from cooperative agreement grant UL1TR002377 from the National Center for Advancing Translational Sciences was received to utilize REDCap. Subjects were de-identified and assigned a subject number unavailable to study investigators to ensure that investigators were blinded.

Figure 1 demonstrates the study timeline. Enrollment ran from June 2021 to July 2021. The virtual training sessions were completed over eight weeks from August to September 2021. A focus group of participants took place in September 2021 to gauge the participant's perceptions of feasibility and acceptability of the program. Post-intervention measurements were assessed at three months after study initiation in November 2021 and at six-months in February 2022.

Four one-hour training sessions were conducted virtually every other week over eight weeks. The virtual training sessions were held during protected time for wellness during the standard workday so that no additional time commitment was required of the participants. The training sessions were also recorded and available online for those who could not attend the scheduled meeting time. In addition to the virtual training, participants were given access to SMART online modules via www.resilientoption.com, a copy of SMART with Dr. Sood (ISBN 978099552544), a book with similar content covered during virtual training, access to the companion resilience mobile app

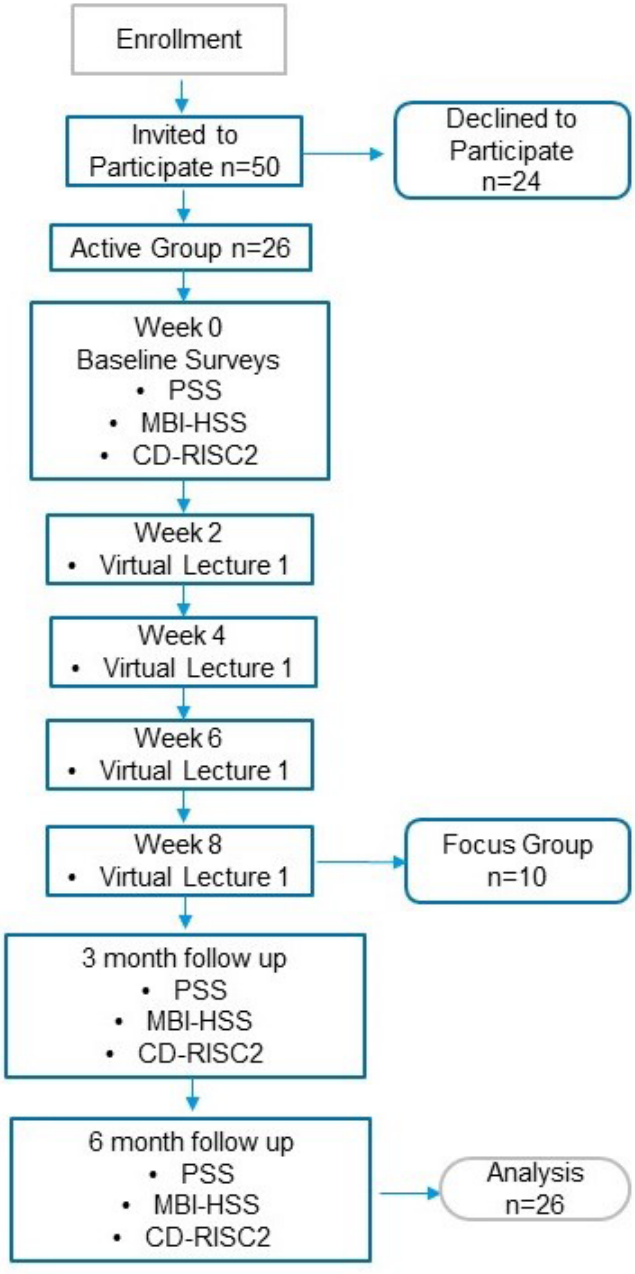

Figure 1: Study Timeline

CD-RISC2: Connor Davidson Resilience Scale 2
MBI-HSS: Maslach Burnout Inventory – Human Services Survey
PSS: Perceived Stress Scale-10

ZiZoTM, and The Resilience Journal (ISBN 9780999552520) book to catalog their experiences. Survey instruments were administered via REDCap.

Primary study endpoints were changes in stress via the Perceived Stress Scale 10 (PSS-10), changes in burnout measured on the Maslach Burnout Inventory Human Services Survey (MBI-HSS)(emotional exhaustion (EE), personal accomplishment (PA), depersonalization (DP)), changes in global emotional resiliency via the Connor-Davidson Resilience Scale 2 (CD-RISC2), and acceptability of the intervention derived from focus group feedback from a subset of the participants.

Subjects all completed the PSS-10 which contains 10 questions and is scored from 0 to 40; higher scores indicate higher levels of perceived stress. Each question is scored on a four-point Likert scale (ranging from 0 = never to 4 = always). Perceived stress level may be categorized as low (0-13), moderate (14-26), or high (27-40) based on the reference ranges provided. Examples of some of the questions from the PSS-10 include "In the last month, how often have you felt nervous and stressed?", or "In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?"

The Maslach Burnout Inventory Human Services Survey (MBI-HSS) contains 22 questions divided across three subcomponents: emotional exhaustion (EE), personal accomplishment (PA), and depersonalization (DP), each measuring a separate manifestation of burnout. MBI-HSS responses were scored on a six-point Likert scale (ranging from 0 = never to 6 = everyday) for each subcomponent, and may be grouped into three levels (low, moderate, or high) based on the reference ranges provided with the MBI-HSS: for EE, low (0–16), moderate (17–26) and high (≥27); for DP, low (0–6), moderate (7–12) and high (≥13), and finally, for PA, low (≤31), moderate (32–38) and high (≥39).

The CD-RISC2 is a two-question abbreviated version of the Connor-Davidson Resilience Scale which asks participants to reflect upon their agreement with two statements regarding their emotional resilience and adaptability. It has been shown to have internal consistency, retest reliability, and convergent validity with the full 25-statement scale [20].

Four weeks after the completion of the study intervention, program feedback and feasibility data were obtained during a virtual focus group. Data were collected using a semi-structured interview guide, which was developed based on previous pilot studies of the "on the job" resiliency programs [10-16]. The interview guide included open-ended questions to explore participants' experiences and perceptions of the effect of their participation in our study on their levels of stress and burnout. The guide addressed the following domains: overall satisfaction with the training, apparent strengths and weaknesses of the training, suggested changes for future iterations, the applicability of the training to Hematology/Oncology fellows, and the frequency of utilization of the learned skills during daily life.

The focus group experience was offered to all participants, of which 10 agreed to participate. Audio transcripts from the focus group were transcribed and analyzed using a qualitative descriptive approach as described by Sandelowski to develop an accurate account of the meaning fellows attributed to the SMART program [21]. Data were codified for thematic analysis and verified by intercoder triangulation [21, 22].

Two independent coders (CW and CS) reviewed the transcripts and coded the data using a priori codes derived from the interview guide and emergent codes that arose during the analysis. Coding discrepancies were resolved through discussion and consensus. Data were managed using Excel (Microsoft Inc, USA). Reflexivity was maintained using an audit trail and research team discussions to identify and address potential biases and assumptions during the data collection and analysis processes.

Statistical Analysis

Stress, burnout, and emotional resilience were measured at baseline, three months, and six months post-intervention using the Perceived Stress Scale (PSS-10) [19], Maslach Burnout Inventory (MBI-HSS) [1], and Connor-Davidson Resilience Scale (CD-RISC2) [20], respectively.

Changes in mean scores on the PSS-10, MBI-HSS subdomains of DP, EE, and PA, and CD-RISC2 were assessed using paired t-tests, with 95% confidence intervals of the mean differences. R Statistical Software was utilized for these computations. (R Core Team (2022). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. URL https://www.R-project.org/)

RESULTS

Of 50 fellows invited, 26 participated in our study. No participants were lost to follow up. The baseline demographics are found in **Table 1**. The mean scores over time are shown in **Table 2**. At baseline, 24% of participants had moderate to high burnout in at least one domain (EE, PA, or DP) and 92% had moderate to high stress. At 3-months, the prevalence of moderate to high burnout in at least one domain remained unchanged while the number of participants with moderate to high stress decreased to 71%.

Table 1: Baseline Demographics

	Mean ± SD or N (%)
Age, years	32.2 ± 2.9
Gender	
Male	18 (69%)
Female	8 (31%)
Year of Fellowship	
PGY 4	6 (23%)
PGY 5	9 (34%)
PGY 6	7 (27%)
PGY 7+	4 (15%)
Race	
White	16 (61%)
African American	2 (8%)
Asian	6 (23%)
Other	2 (8%)

Table 2: Primary Endpoints to Assess the Effect of the Virtual SMART Program

	Baseline	3 months				6 months			
Score	**Mean (SD)**	**Mean (SD)**	**Mean Difference**	**95% CI**	***p-value***	**Mean (SD)**	**Mean Difference**	**95% CI**	***p-value***
CD-RISC2	6.1 (1.4)	6.0 (2.0)	0.1	(-0.5, 0.4)	0.83	5.8 (1.9)	-0.3	(-1.4, 0.8)	0.56
DP	6.8 (4.5)	8.0 (6.9)	1.2	(-0.2, 2.4)	0.09	5.9 (3.8)	-0.9	(-1.4, -0.5)	< 0.001
EE	24.2 (9.3)	22.8 (12.4)	-1.4	(-3.0, 0.1)	0.07	22.3 (8.1)	-2	(-3.1, -0.8)	0.001
PA	8.5 (7.9)	10.8 (8.7)	2.3	(1.7, 3.1)	<.001	9.2 (8.0)	0.8	(0.1, 1.5)	0.03
PSS-10	19.2 (4.3)	17.1 (6.7)	-2.1	(-3.4, -0.7)	0.004	16.0 (4.8)	-3.1	(-4.0, -2.2)	< 0.001

***CD-RISC2**: Connor Davidson Resilience Scale 2; **DP**: Maslach Burnout Inventory Depersonalization; **EE**: Maslach Burnout Inventory Emotional Exhaustion; **PA**: Maslach Burnout Inventory Professional Achievement; **PSS-10**: Perceived Stress Scale*

Table 2 demonstrates the primary endpoints expressed as changes in mean score on the MBI-HSS, PSS-10, and CD-RISC2. At 3 months, The PSS-10 demonstrated a decrease in mean stress (mean difference = -2.1, -10.9%, $p = 0.005$), while the MBI-HSS demonstrated somewhat decreased emotional exhaustion (EE, mean difference = -1.5, -6.0%, $p = 0.07$), an improved sense of personal accomplishment (PA, mean difference = 2.4, 28.1%, $p < 0.001$), but slightly worse feelings of depersonalization (DP, mean difference = 1.1, 16.5%, $p = 0.09$). The CD-RISC2 suggested no change in global emotional resilience (mean difference = 0, -0.7%, $p = 0.83$).

At 6 months, mean stress had a further absolute reduction of 16.3% lower than baseline (mean difference=-3.1, $p < 0.001$). Decreases in emotional exhaustion (EE mean difference=-2.0, -8.1%, $p = 0.001$), maintenance of an improved feeling of personal accomplishment compared to baseline (PA mean difference=0.8, 9.4%, $p = 0.03$), and improvement in feelings of depersonalization (DP mean difference = -0.9, -13.4%, $p < 0.001$) were seen. Again, the CD-RISC2 suggested no statistically or clinically significant change in global emotional resilience (mean difference = -0.3, -5.0%, $p = 0.56$)

Focus Group Feedback

Thematic analysis of the focus group data revealed that participants found the program beneficial. Main themes identified were 1) emotional resilience, 2) the effectiveness of the program, and 3) the challenges of virtual implementation. Results of the focus group are summarized in **Table 3**.

Table 3: Focus Group Themes

Theme	
Emotional Resilience	Normalization of high stress, improved connection with co-fellows, improvement in daily stress levels, cultivation of gratitude. "…we sometimes fail to realize that other people are going through the same things or that these common struggles are not really recognized as common until we all sit down and talk about them and acknowledge them. " "I know that at the end of the day I feel less burdened by approaching patients in that way [with gratitude]."
Program Efficacy	Program was a worthwhile investment of time; curriculum was germane to Hematology/Oncology fellows. "I think that, particularly people who are working in our field of oncology and hematology, it is a heavy field and in general if we don't learn some of these techniques for maintaining gratitude and positive outlook and good interpersonal skills, it can be challenging and burn out can be high."
Challenges of Virtual Implementation	Virtual delivery was effective but in person would have been preferred. Co-fellow emotional connection would have been stronger in person. "…When you are seeing people's faces and you can tell the burden of the emotions that are going along with sharing those things that do not come across virtually."

Emotional Resilience

When asked their opinions of the program overall, subthemes of improved stress, improved work performance, and destigmatization of their stress were revealed. Many participants reported that they felt normalization of their high stress and felt an improved connection with their co-fellows as a result of participation. In the words of one participant, "we sometimes fail to recognize that other people are going through the same things".

This normalization of high baseline stress, in conjunction with the content taught during the intervention, led many participants to note an improvement in their daily stress levels. Fellows commented that taking time every day to cultivate gratitude allowed them to minimize the negative emotional burden of stressful situations.

"I've started using gratitude when I am frustrated with work or when I'm tired, just practicing gratitude in those times generally recenters me and I've found that to be really useful".

This preemptive focus on gratitude both reduced the frequency of normal stressors and decreased their burden on participants when they did arise; "…it [gratitude] is helpful through the day, it reminds you of bigger picture things, the truly important things in life…it makes the stressors we encounter each day seem smaller…."

Participants reported reduced baseline stress both at home and at work. While at work, fellows found that they had more patience during challenging encounters with patients and were more satisfied with the outcomes of their patient encounters. They acknowledged a greater sense of mindfulness while in the exam room with their patients, providing the fellows with a sense that they were providing improved care.

"I know that at the end of the day I feel less burdened by approaching patients in that way [with gratitude]."

"…we all have certain patients that are more challenging for us for various reasons, challenging patients, one of the tenants of the training was wishing people well, not actually out loud but in your mind and I was kind of doing that before I would walk into the room with a couple of these patients, just to set my mind right, acknowledging the challenging position that they are in and meeting them from a positive point of view."

Program Efficacy

Participants from the focus group repeatedly indicated that the program was beneficial and a worthwhile investment of their time. When asked what they liked most about the program, many participants found the variety of supplementary supporting materials (ZiZoTM app, SMART online modules, SMART with Dr. Sood, and The Resilience Journal) to be major strengths of the program. Individuals commented on how they typically only utilized 1-2 of the supplementary content sources i.e., only the companion textbook or only the mobile application, etc. During discussion, it became clear that all supplementary supporting materials were utilized, that the supplementary content was integral to reinforcing the contents covered during lecture, and that some participants may not have had as impactful of an experience if not for the supplementary content.

It was also clear from the responses that the fellows found the SMART program germane and helpful for Hematology/Oncology fellows. The participants of the SMART program reported that the program improved their emotional exhaustion, as they reported that the patient population for this subspecialty is often acutely, chronically, and gravely ill. The participants reported a high frequency of emotionally fatiguing conversations covering goals of care and the end of life.

"I think that, particularly people who are working in our field of oncology and hematology, it is a heavy field and in general if we don't learn some of these techniques for maintaining gratitude and positive outlook and good interpersonal skills, it can be challenging and burn out can be high."

Virtual Structure

The feasibility of a virtual implementation of the SMART program was a primary outcome of this study. Feedback from the focus group participants suggested that while a virtual delivery method was effective, an in-person delivery would have been preferred. Participants reported that they felt less emotional connection with other participants compared to similar previous in-person experiences.

"…When you are seeing people's faces and you can tell the burden of the emotions that are going along with sharing those things that do not come across virtually."

DISCUSSION

This study demonstrates that virtual delivery of the SMART program is feasible and produces results similar, but not identical, to those seen from traditional in-person delivery [10-13, 15, 16]. The effect size of our study, while both statistically and clinically significant, was consistently smaller than the improvements seen from in-person delivery. Nonetheless, the relatively small time commitment on behalf of the participants was rewarded with improvements in stress, emotional exhaustion, depersonalization, and feelings of professional achievement which were sustained six months post intervention.

There appeared to be a discrepancy between the focus group feedback reporting improved emotional resilience and the lack of a clinically or statistically significant change on the CD-RISC2. The abbreviated CD-RISC2 instrument was chosen to limit the time commitment to participants, as the full instrument asks participants to reflect upon 25 statements. While the abbreviated instrument has shown convergent validity with the full version, it may not have the same sensitivity to detect subtle differences in participant's mood states. The CD-RISC2 only asks participants to reflect on two statements, "I am able to adapt when changes occur" and "I tend to bounce back after illness, injury, or other hardships", while the CD-RISC includes statements such as "I have a strong sense of purpose in life", "I believe I can achieve my goals, even if there are obstacles", and "In times of stress, I know where to find help." Utilization of the 25-statement version of CD-RISC may have resulted in a clinically and statistically significant change in emotional resilience.

While burnout recognition has improved, avid solutions for trainee stress management and burnout are lagging. Several small studies have evaluated programs to promote professional caregiver wellbeing. A study completed by Perez et al. suggested that interventions that are accessible during working hours and aimed at building skills in stress reduction had the highest

impact on sustainability amongst palliative medicine providers [24]. Other experts suggest a training program focused on the development of resiliency may reduce physician stress [25]. Much of the literature evaluating burnout in oncology is centered on attending physicians. While there is a wealth of recent data examining burnout in medical students and residents, burnout in fellowship is less clearly defined. A single study from 2014 reported that burnout in medical oncology fellows is similar to that of oncology attendings [4]. Another single study investigating burnout in pediatric hematology/oncology corroborated these findings [26].

As specialty-specific data is limited, a review of the literature of closely related specialties was conducted. Unfortunately, a systematic review and meta-analysis evaluating the effectiveness of various psychosocial interventions on the psychological wellbeing of palliative medicine providers failed to show any specific interventions from methodologically strong studies that were beneficial [27]. A 2016 systematic review and meta-analysis by West et al. identified that interventions at the level of the individual physician and at the institutional level (e.g., reduced work hours, workflow changes) resulted in improved burnout, noting that institutional changes produced more substantial rates of improvement. However, of 230 studies included, only five included prolonged follow up to assess the durability of these improvements in burnout [28]. This highlights the need for future research to identify durable solutions to combat burnout.

The lack of long-term data on the durability of burnout mitigation techniques is especially worrisome as there is an anticipated 23% mismatch between total oncology provider full time equivalents of patient care compared to actual patient needs [29]. Furthermore, providers who practice during periods of burnout are at high risk for substandard job performance. Specifically, medical providers who suffer from high levels of work associated stress and burnout are at higher risk of poor personal health and substance us and provision of lower quality patient care. This includes an increase in medical errors and lower patient satisfaction, absenteeism, ineffective communication, reduced productivity, and increased job turnover, which translates into increased costs [30].

Identification, prevention, and management of work-related stress and burnout and promotion of resiliency will be vital to maintain and expand the current oncology work force. It will be important to identify effective interventions that can be replicated and implemented amongst medical oncology fellowships nationally. While our pilot study aimed to help develop a tool to combat medical trainee burnout at the individual level, we readily recognize that burnout results from complex interactions between an individual and their work environment and must be addressed as a systems issue. No amount of individual support can compensate for an unhealthy and unsupportive work environment. Now, with hopefully the worst of the COVID-19 pandemic behind us, but a growing body of medical training become remote or virtual, we urge residency and fellowship programs to recognize their inherent power in mitigating burnout through the adoption of program policies and cultures that promote trainee unity, flexibility, and healthy work boundaries.

Limitations

Limitations to this study include the small sample size, lack of a randomized control group, completion at a single site, an open-label intervention, and selection bias of already highly adaptable individuals. We considered potential confounding from national relaxation of restrictions on social distancing and masking along with the decreasing disease severity of COVID-19. Recently published data by Shanafelt et al., who surveyed 2440 US physicians during the same time period as our study, suggest the opposite: that US physician burnout has continued to worsen post-pandemic [8]. While results may have been more impactful if demonstrated in the context of randomization over multiple sites, this site was nonetheless one of the largest Hematology/Oncology fellowships nationally [23].

Finally, only approximately half of the fellows participated in our study, as it was made clear that the protected time during which the study was administered was to be used in whatever way the fellows felt would best benefit their wellness. Randomization was not performed for two reasons. Firstly, as the SMART program has already been validated [10-13], the goal of this study was to assess feasibility of virtual delivery as compared to published data from in-person delivery, rather than to further validate the SMART program. Secondly, we opted for a single arm design in order to offer participation to all fellows for this validated curriculum, superseding the priority of having a control arm. We recognize that the lack of a control arm limits the strength of the conclusions herein.

CONCLUSION

This pilot study demonstrated that virtual delivery of the SMART program was feasible and produced results similar to those seen in traditional in-person delivery [10-13, 15, 16]. A relatively small time commitment on behalf of the participants was rewarded with improvements in stress, emotional exhaustion, depersonalization, and feelings of professional accomplishment that were sustained six months post intervention. These results may help provide a framework for future studies and curricular adaptations for Hematology/Oncology fellowships in the wake of the COVID-19 pandemic.

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Conflicts of Interest: The authors have no conflict of interest to declare for this work.

ABBREVIATIONS
CD-RISC2: Connor Davidson Resilience Scale
DP: Depersonalization
EE: Emotional Exhaustion
IRB: Institutional Review Board
MBI-HSS: Maslach Burnout Inventory
PA: Personal Accomplishment
PSS-10: Perceived Stress Scale
REDCap: Research Electronic Data Capture
SMART: Stress Management and Resiliency Training

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Appendix A: Focus Interview Guide

How was your overall experience with the SMART program?
What did you like the most about the SMART program?
What did you like the least about the SMART program?
If you could make changes to the program, what would they be?
What stands out in your memory the most from the training?
When was the last time you practiced something that you learned from the SMART program?
What specific activities resonated with you?
Did you notice any changes in your co-fellows as a result of the SMART program?
Did you find the SMART program to be applicable to you as a medical trainee?