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Original Article

Beyond Mentoring: What Medical Students Learned from an Intervention Program with Teen Mothers Experiencing Homelessness

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Abstract

Background: Toxic stress from childhood trauma increases risk for chronic diseases such as heart disease and cancer. Prior studies show that trauma's effects can be buffered by compassionate caregiving. This study aimed to bring trauma-sensitive care to Worcester, train medical students as advocates for underserved groups, and assess how an intervention might influence biological and psychological stress in young mothers experiencing homelessness. **Methods:** Medical students, trained by a parenting coach, delivered an evidence-based parenting and mental health curriculum to teen mothers in a shelter. Data came from surveys, focus groups, and hair cortisol samples, with twelve women in the intervention and six in a comparison shelter. **Results:** Surveys, focus groups, and interviews suggested that mothers in the intervention felt more prepared to be supportive caregivers than those in the comparison group. Hair cortisol samples showed no significant changes. A focus group with medical students highlighted increased passion and confidence in advocating for young mothers. **Conclusion:** This pilot demonstrated feasibility and acceptability of workshops and mentoring for young women in shelters. Preliminary results suggest positive shifts in how unhoused mothers viewed parenting and mental health. Although the small sample limited statistical significance, the findings indicate promise for future studies exploring biopsychosocial impacts of such programs. Importantly, educating medical students may generate a ripple effect, as they carry forward skills and commitment to advocating for this diverse and often overlooked population in medical training.

Introduction

Toxic stress from childhood trauma has been associated with an increased risk of heart disease, depression, cancer, and a reduction in life expectancy by 20 years.[1, 2] Although there are correlations between stressful circumstances and increased substance use, these correlations only begin to explain why children who experience toxic stress have poorer health outcomes; in fact, regardless of high-risk behavior, individuals who experience adverse events are more likely to have chronic illnesses.[3] Previous works have discussed that the body has evolved to respond to acute stress by activating the sympathetic nervous system and hypothalamic-pituitary-adrenal (HPA) axis, which cause stress hormones to be released and mediate the fight-or-flight response.[4] Historically, this response was beneficial in the acute setting when, for example, a person may have needed a boost of adrenaline to run from a tiger.[3] However, more common today, the tiger metaphorically is the stress of living in a community with poverty; this constant fear causes a child's body to marinate in stress hormones, creating a shift in the effects of the sympathetic nervous system from protective to maladaptive, resulting in a cascade of mediators and complex metabolic, immune, neurologic, cardiovascular, respiratory, anthropometric, and even epigenetic changes.[3, 4].

The biopsychosocial effects of childhood trauma seep into adulthood and plague generation after generation due to the permeating nature of Adverse Childhood Experiences (ACEs). Specifically, ACEs include emotional, physical, and/or sexual abuse; exposure to domestic violence; or living with someone who has experienced substance use disorder, mental illness, suicidal thoughts, or imprisonment among others.[5]

Fortunately, strong evidence has shown that childhood trauma and its sequelae can be buffered, treated, and prevented with a compassionate caregiver.[6,7] However, in Worcester, Massachusetts, despite the existence of parenting classes, optimal mentoring with potential to break intergenerational trauma is currently lacking. Furthermore, Worcester parenting

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classes fill up quickly, are challenging to attend via public transportation, and are not specifically designed for teenagers.[8]

In hopes of addressing the lacking support for young mothers in Worcester, for years, UMass Medical School students have partnered with two shelters via a school-sponsored group, Mentors for Young Mothers (MFYM), with the goal of creating a two-way learning opportunity for both medical students and the young mothers experiencing homelessness. The shelters are funded by You Inc., a non-profit dedicated to helping families in Central Massachusetts.

Prior to this pilot study, medical students designed health classes, but they did not feel comfortable addressing parenting or trauma, topics that can help buffer against the intergenerational transmission of trauma.[7] Medical students previously received no training for working with this special population.[8]

With funding from the Remillard Family Community Service Fund, a parenting educator designed a curriculum and trained medical students from Mentors for Young Mothers to bring evidence-based, trauma-informed workshops directly to the group home during scheduled visits from Mentors for Young Mothers. The medical students delivered the curriculum to teen mothers in a group setting and also met monthly one-on-one with the mothers to provide additional support.

The overall aim was to bring high-quality, trauma-sensitive care to the greater Worcester community, train the next generation of physicians as advocates for underserved communities, and examine how an intervention may affect the biological and psychological stress response in an often-overlooked population. Efficacy of the intervention was evaluated through surveys, cortisol levels, and focus group data.

Methods

A Child Protection Program educator adapted The National Child Traumatic Stress Network guidelines to focus on trauma-informed parenting and mental health in adolescents. Fifteen students, MFYM members selected from applications and interviews, were trained to lead eight trauma-sensitive parenting workshops in one shelter; the comparison shelter received traditional MFYM curriculum, which included nutrition and sexual health education. To assess the impact of the non-randomized community trial, with Institutional Review Board (IRB) approval (#H00018725), participants from both shelters completed surveys,[9,6] provided hair cortisol samples (a biological indicator of chronic stress.[7,8]) and engaged in focus groups. Specifically, these women were selected based on their current living arrangement at the shelters during the time of the trial and willingness to be involved. No women declined the intervention. Eighteen adolescent mothers participated in the program from October 2019 to February 2020.

I. Intervention

Trained medical students provided the eight trauma-sensitive parenting workshops to the young mothers over the course of ten weeks. Workshops began with mothers sharing highlights/lowlights; the remainder of each session varied with a range of activities, demonstrations, and discussions related to trauma-informed parenting.

The first workshop, Goals, Guiding Principles and Self Care, discussed system-induced trauma and microaggressions, followed by the Hand Activity, where mothers listed a trustworthy person/organization on each finger and reflected on how the group might foster a deep sense of trust. Trauma 101 covered parenting efficacy, guilt, and resilience, which was emphasized in the featured film, Remembering Trauma. How My Own Childhood Trauma May Be Impacting My Decision Making and Parenting explored developmental trauma disorder, depression, and the potential dangers of psychiatric labels. Afterwards, the Rock Activity, where women placed a pebble in a cup for each traumatic event the facilitator read, emphasized the importance of helping others carry the load. In Understanding Trauma's Effects, adverse childhood experiences, protective factors, and attachment theory were discussed, followed by activities that mothers could mimic to help build secure attachments. In Feelings and Behaviors, common myths regarding parenting styles were discussed. In Safety, practical mindfulness techniques, such as grounding, were taught through the Glitter Activity, where mothers swirled glitter in a jar of water and were asked to tease out the colors. Unable to assess until the water settled, the mothers recognized the analogy to their feelings, highlighting the need to sometimes pause before reacting. In Advocacy, the term was applied in the context of team-based therapy. Through vignettes, the group discussed how to advocate for themselves and their children. The final workshop, Connections and Healing: Closing Thoughts, featured the Rubber Band Activity. Mothers placed a rubber band around their four fingers and thumb. Participants were asked to spread their fingers and recognize that when one finger (i.e., person) strains the others (i.e., close family/friends), tension can build. As a review, participants summarized knowledge on healthily handling and/or helping others with life tensions.

Outside of the group sessions, for the intervention, medical students were given $35 per month for one-on-one outings with their individual mentees, who were matched based on shared interests. During these sessions, medical students debriefed on the group sessions and tailored their mentorship depending on their mentee's preferences.

II: Procedure overview

The University of Massachusetts IRB approved the protocol, and verbal informed consent was obtained from all participants. One week prior to the first workshop, baseline demographics, surveys, and hair samples were obtained from all study participants. A week after the conclusion of the workshops, surveys and hair samples were recollected. In addition, for the participants in the

intervention arm, the medical students led a focus group at this time. One week later, medical students took part in a separate focus group.

Both surveys and samples prior to and following study participation took place at the shelter to mitigate any transportation-related costs that may have precluded the mothers from participation, as this has been described as a potential barrier to participation in similar studies.[12] Furthermore, the collection team consisted of the same four people in order to promote trust between the collection team and the participants.

Mothers were compensated for their time with grocery store gift cards for ten, ten, and fifteen dollars for pre-surveys, post-surveys, and focus group participation, respectively. Women who completed all aspects of data collection, including providing hair samples, received an additional fifteen-dollar grocery store gift card.

III. Survey design

Validated pre- and post-educational surveys were used to assess changes in these mothers' caregiving styles and mental wellness. To assess knowledge of trauma informed parenting and parenting self-efficacy, an eight-question scale adapted from a National Child Traumatic Stress Network Pre-Workshop Knowledge Beliefs Survey was used.[9] Summative trauma-informed parenting scores were calculated by adding questions one through six of the Survey 1: Knowledge and Health Beliefs listed under APPENDIX I. Self-efficacy scores were calculated from the sum of questions seven and eight of this survey. Perceived stress scale scores were calculated from a separate survey, shown in Survey 2: Perceived Stress Scale in the appendix.[11] A summary stress score was calculated.

IV. Hair cortisol collection

Previous research suggests that hair cortisol can approximate persistent stress (versus blood cortisol levels, which vary dramatically based on time of day).[11,6] However, prior studies have not yet definitively determined how hair cortisol levels might change with added supports, particularly in post-partum adolescents. Hair samples for cortisol were collected from the mothers before and one week after the program's completion in both comparison and intervention groups. A written survey regarding hair care and chemical treatments, based off of the work of prior hair cortisol studies, was administered to each mother prior to hair cortisol collection.[10] This survey is listed under Survey 4: Questions for Hair Cortisol Data Collection in ***Supplementary Material.*** To familiarize mothers and children with the procedure of hair cortisol sampling (and to ensure participants fully understood the procedure), a hairstyling doll was used to demonstrate the collection technique.

Hair samples were folded in tin foil and sealed in a labeled envelope. Collaborators at the University of Massachusetts in Amherst determined the hair cortisol levels using previously validated laboratory techniques.[12] Hair cortisol data were not collected for mothers who were living in the group home for less than one month (given hair grows ~one cm per month).

V. Focus groups

In one focus group, mothers were asked how they enjoyed the sessions, their key take-aways, how (if at all) the experience affected parenting styles, how (if at all) their feelings or attitudes about parenting and/or trauma changed, recommendations to improve the curriculum, and additional comments (***Supplementary Material,*** Focus Group 1: Young Mothers' Questions).

In a separate focus group with the medical students, the mentors and workshop leaders were asked what they gained from the sessions and additional recommendations (see specific questions in ***Supplementary IMaterial,*** Focus Group 2: Medical Students' Questions).

VI: Data analysis

Women who completed four or more workshops were included in the analysis; this broad inclusion/exclusion criteria was used in this initial community trial because the starting sample of women in the shelters was already small.

Quantitative data was analyzed on Excel and verified in SPSS. Trauma-informed parenting, self-efficacy, and perceived stress scale scores obtained at the beginning of the intervention were subtracted from the end of the intervention scores in both the comparison and intervention groups.

Due to the small sample size and non-normalized data, non-parametric tests were utilized. The Mann Whitney U test was used to compare the change in hair cortisol levels for the intervention and comparison groups. The Wilcoxon Sign Rank test helped to assess the summary of the scores before and after the program in the intervention arm. An alpha of 0.10 was used as a significance level for the one-tailed tests.

For qualitative analysis, transcripts were analyzed by noting key words and grouping based on themes. In hopes of highlighting potential similarities and differences, analysts examined transcripts from the mothers and medical students together.

Results

Results: Quantitative Data

I. Study population

The women's ages ranged from 17 to 20 and 21 years-old in the comparison and intervention groups, respectively. Across both shelters, the majority of the women had completed some high school, all of high school, received a GED or HiSET, or had a vocational certificate. Mothers had 1-2 children ages four months to three years. The majority identified as Latina. No major differences were obvious between the comparison and intervention shelters (***Table 1:*** Baseline Data; ***Supplementary Material,*** Survey 3: Demographics). Women were not asked to

provide post survey data if they attended fewer than four workshops.

Results: Qualitative Data

Four themes were prevalent across focus groups: content, connectivity, confidence, and inspiration.

I. Content:

Both medical students and mothers noted that they learned about how trauma affects health, the importance of coping with trauma and caring for oneself in order to be a compassionate caregiver, how to approach parenting with a trauma-sensitive lens, and vocabulary for challenging conversations. Direct quotes are noted below:

> *"You learned different things about trauma that may not have learned before…It opened my eyes." – mother.*

> *"I learned that the whole talking about the trauma helped me realize it wasn't my fault…It would help me be a better parent emotionally." – mother.*

> *"I realized I'm too busy. I need to take time for myself to be a better parent to my child…It helped me realize I need to give time for myself and cope with what I went through." – mother.*

> *"Once you learn something, you can't unlearn it. Once you see…how trauma affects your child, you look at them through a different lens…they are not the same person they were before when the learned how trauma affects their child. A little education goes a long way." – mother.*

> *"I gained a better understanding of cycles of intergenerational trauma. I learned how these patterns can repeat themselves but also that they can be broken. I learned about various medical diagnoses in children that really are the effects of trauma masked as a diagnosis." – medical student.*

II. Connectivity

Both the medical students and the mothers reported that they grew closer in their paired relationship with each other as a result of the sparked conversation surrounding trauma, mental health, and parenting, along with the longitudinal nature of the mentorship. Interestingly, despite not being an explicit goal at the start of the project, the mothers also noted that they grew closer to each other. In multiple sessions, the young women shared stories of intimate partner violence and struggles with familial or significant-other substance use. The women encouraged each other with words as well as non-verbal cues. Beyond the group sessions, almost every medical student could recall times that their mentees had texted them. Outside of the workshops, during one-on-one outings, some of the medical students recalled providing advice regarding resumes, doctors' appointments, interview preparation, and study strategies. In addition to increasing connectivity among mentees and mentors, one participant shared that after learning about the intergenerational effects of trauma, she contacted her own mother, to whom she

Table 1. Baseline Data.

Sample size	**Total**	**Intervention**	**Comparison**
Number	**18**	**12**	**6**
Age	Total	Intervention	Comparison
Mean	19.4	19.9	18.3
Median	20	20	18
Max	21	21	20
Min	17	17	17
Education (# of mothers)	Total	Intervention	Comparison
8th grade or less	0	0	0
Some high school	7	3	4
Graduated high school / received a GED or HiSET / vocational certificate	10	8	2
Some college / associate's degree / graduated college	1	1	0
Employment (# of mothers)	Total	Intervention	Comparison
Employed full-time (and not student)	0	0	0
Student with full time job	0	0	0
Employed part time (and not student)	3	3	0
Student with part time job	2	2	0
Student without job	8	4	4
Unemployed and not in school	5	3	2
Age of children	Total	Intervention	Comparison
Mean	1.6	1.4	1.9
Median	1.3	1.1	2
Max	3	3	3
Min	0.3	0.3	0.5
Health insurance	Total	Intervention	Comparison
None	0	0	0
Private through work	0	0	0
Private through family member	0	0	0
MassHealth	17	11	6
Other	0	0	0
Unknown	1	1	0
Race	Total	Intervention	Comparison
Asian / Asian American / Pacific Islander	0	0	0
African American / Black	1	0	1
Caucasian / White	1	0	1
Latina / Latino / Latinx	15	11	4
Native American / American Indian / Alaskan Native	0	0	0
Multiracial	1	1	0
Not listed	0	0	0
Prefer not to answer	0	0	0

had not spoken in years. Below, a medical student shares her thoughts:

> *"I feel honored to be someone [my mentee] trusts – she will text me whenever she has important news – getting her driving permit, finally getting her own housing, when her daughter was sick and in the hospital. I enjoy being someone she feels she can share these moments with." – medical student.*

III. Confidence

Both mothers and medical students gained confidence upon completion of the program. Asking for a completion certificate highlighted the confidence and pride the women gained by completing the curriculum. Medical students also gained confidence as future providers by learning how to approach sensitive topics (including trauma and mental health), prioritize listening over advising, build relationships (especially with people who have had dramatically different experiences, for none of the medical students had children themselves), and provide education in a way that avoids medical jargon. Medical students are quoted below:

> *"The mom wanted a certificate [upon completion of the workshops] to show that she had learned. It showed me that she felt proud. A lot of women in these situations are not celebrated for their accomplishments. They are not necessarily adding to their resume or getting degrees or good grades, so this certificate to them meant something." – medical student.*

> *"I was thinking about how I can be more trauma informed when I am seeing patients when I am thinking about how their health may be impacted by trauma. I got to see another side of the story. This will help me as a provider." – medical student.*

IV. Inspiration

While the authors' hope was to inspire the young women living in the shelter, inspiration was a larger theme in the medical student focus group. The student doctors were inspired by their mentees, who demonstrated great resilience. Interestingly, all medical students agreed that this program likely impacted themselves, particularly their outlooks towards their future patients, more than the initially intended audience, the young mothers. Reflections from medical students include:

> *"I have been really inspired by [my mentee] for what she has been able to accomplish despite the obstacles she has faced. It has given me a different perspective on my own life." – medical student.*

> *"The group sessions were humbling…I gained an awareness of the kind of things they've been through and the things that they value having been through those things." – medical student.*

Table 2.1. Summary of Trauma-Informed Parenting Scores.

Trauma-informed parenting: summary scores	N	Mean	Median	Standard Dev
pre intervention group	12	26.6	27.5	6.9
post intervention group	8	27.3	30	8.9
pre comparison group	6	30.8	30.5	3.2
post comparison group	3	21.3	27	13.4

Table 2.2. Comparing Trauma-Informed Parenting Score Changes.

Trauma-informed parenting: comparing changes	Test	Z score	P value
Change in trauma-informed parenting scores in intervention group (n = 8) vs comparison (n = 3)	Mann Whitney U	1.54	0.06
Trauma-informed parenting scores in intervention group before vs after program (n = 8)	Wilcoxon sign rank	0.25	0.40

Figure 1. Comparing Median Trauma-Informed Parenting Scores.

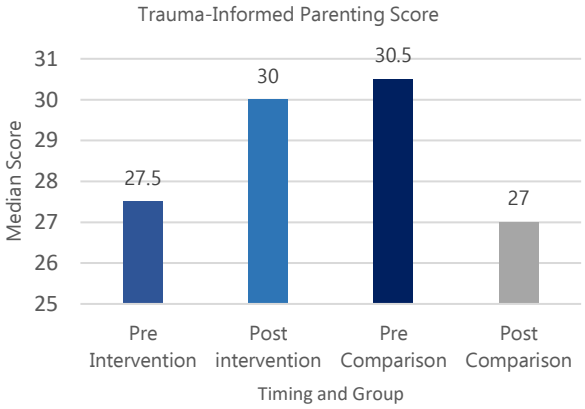

Table 3.1. Comparing Trauma-Informed Parenting Score Changes.

Self-efficacy: summary scores	N	Mean	Median	Standard Dev
pre intervention group	12	10	10.5	2.8
post intervention group	8	9.6	10	3.2
pre comparison group	6	10.8	10.5	1.0
post comparison group	3	6.7	8	4.2

Table 3.2. Comparing Self-Efficacy Score Changes.

Self-efficacy: comparing changes	Test	Z score	P value
Change in self-efficacy scores in intervention group (n = 8) vs comparison (n = 3)	Mann Whitney U	1.95	0.03
Self-efficacy scores in intervention group before vs after program (n = 8)	Wilcoxon sign rank	0.85	0.20

Figure 2. Comparing Median Self-Efficacy Scores.

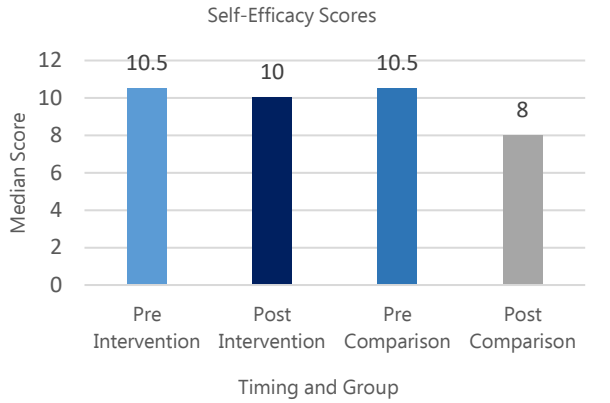

Table 4.1. Summary of Perceived Stress Scale Scores.

Perceived stress scale: summary scores	N	Mean	Median	Standard Dev
pre intervention group	12	18.7	21	7.2
post intervention group	8	15.4	17.5	6.4
pre comparison group	6	18.3	17.5	4.6
post comparison group	3	14.3	16	3.8

Table 4.2. Comparing Perceived Stress Scale Score Changes.

Perceived stress scale: comparing changes	Test	Z score	P value
Change in perceived stress scores in intervention group (n = 8) vs comparison (n = 3)	Mann Whitney U	-0.31	0.38
Perceived stress scores in intervention group before vs after program (n = 8)	Wilcoxon sign rank	-2.12	0.02

Figure 3. Comparing Median Self-Efficacy Scores.

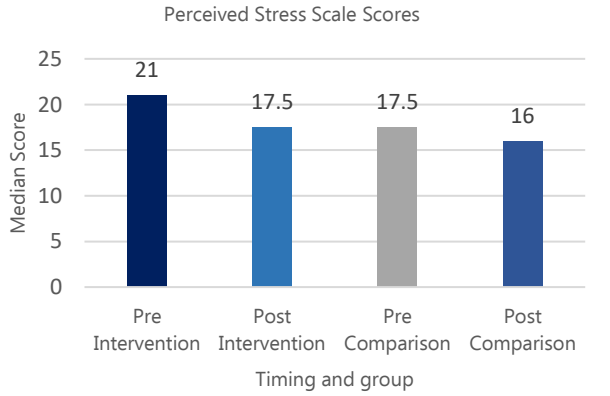

Table 5. Summary of Hair Cortisol Levels.

Hair cortisol levels (pg/mg)	N	Mean	Median	Standard Dev
pre intervention group	6	56.8	3.6	130.6
post intervention group	6	26.6	4.3	52.4
pre comparison group	2	3.8	3.8	3.0
post comparison group	2	28.8	28.8	39.6

Discussion

I. Themes

The program goals were to provide lessons in education, young mother support, and research. General quantitative data trends and focus group quotes suggest that trauma-informed parenting scores and confidence increased in the intervention group. In both the comparison and intervention arms, the perceived stress scale scores decreased; however, the intervention group did not show a significant decrease in stress scores versus the comparison. Regardless of the trauma-sensitive curriculum, perhaps by having the support of the women's shelter and its accompanying resources such case managers, the overall stress levels decreased in both groups. Given that the intervention group stress scores did not significantly decrease with respect to the comparison group, the workshops and additional mentorship from medical students likely did not directly lower perceived stress at this time. Since the workshops improved trauma-informed parenting, stress levels are expected to decrease in the future in part due to the improved parenting and self-care skills.

Hair cortisol levels did not significantly decrease, and in the majority of cases, hair cortisol levels surprisingly increased (explaining the decreased mean but increased median), despite most mothers' perceived stress scale scores lowered, hinting a posible assay error. Furthermore, HPA axes can be impaired due to severe stress related to prior trauma, experiencing homelessness, and raising small children as young mothers.[3] In the case of impaired HPA axis, cortisol levels would decrease. If this were true, decreased stress levels would lead to increased cortisol levels. Also, the use of hair products, hormonal contraception, and other medications were not taken into account due to a small sample size; these variables may have contributed to the high cortisol levels measured .[12]

The focus groups showed that both medical students and participants gained confidence by learning about how trauma affects health, parenting with a trauma-sensitive lens, discussing sensitive topics, and connecting with people of varying backgrounds. Even more salient than the lessons learned by the mothers were those learned by the medical students, who gained inspiration from their mentees' resilience, practiced having difficult conversations surrounding trauma and mental health, experiences in active listening and teaching, and windows of the lives of homeless adolescent mothers, an often-stigmatized group that is typically left out of formal medical school curriculums, which often lack lessons on cultural humility. Although previously noted, it is worth emphasizing that the medical students all agreed that the program likely affected their own trajectories as student doctor more than the initially intended audience, the young mothers, who ultimately became the budding physicians' teachers. Our findings suggest that other medical schools would benefit from involving students in similar programming to benefit both learners and the community.

II. Limitations

Limitations include a small sample size, hair cortisol collection methodology, and potential bias introduced in the focus group.

Given the small sample size and transient population, further research is needed to provide statistically significant findings and generalizability. In the case of self-efficacy, for example, a statistically significant increase was noted in the intervention versus the comparison group, but one of the three participants in the comparison group showed a drop in eight points, causing the analysis to favor a relative increase in the scores of the intervention group. This statistical significance may be questionable because when comparing solely pre and post data in the intervention, the changes were not significant. Alpha levels were also relatively high, as noted in the methods section as 0.10, which may have generously increased the power. Furthermore, if the sample size were larger, the analysis could have taken into account the effects of chemical hair treatments and hormonal contraception, which also affect cortisol levels.[12] A larger sample size would have made it possible to analyze hair cortisol levels and surveys only from women who completed all eight workshops. Due to the small sample, the authors felt the need to include women who had attended four or more workshops in order to avoid reducing the number of data points. However, the varying participation may have led to fewer changes noted.

In addition to a small sample size, hair specimens were taken from scalp to tip for both pre and post collection. These long strands contained hair cortisol from the last several months as opposed to the last three months, the duration of the intervention. Furthermore, prior studies have found that samples of 6 cm or greater have a decreased reliability of cortisol measurement.[10] In the future, sample lengths should reflect the time period being investigated. Likewise, there may not have been enough time between collection and post-intervention for hair cortisol changes. Less than three months, which would correlate to approximately three centimeters of hair, had elapsed during the study. On average, roughly ten-centimeter hair strands were collected, meaning that changes to the last few centimeters of hair would be difficult to detect.

Furthermore, the focus groups were led by medical student leaders, which may have led to bias such that the interviewees may have felt pressured to share predominantly positive reactions to the program. In addition, countless factors, such as support from case workers and familial situations, contribute to stress levels and peoples' abilities to absorb information. Thus, the changes in scores have numerous potential confounding variables.

III. Conclusion

Our pilot testing with pre/post-intervention surveys and hair cortisol demonstrated that this approach is acceptable to young women in homeless shelters. Of note, this pilot is a novel approach to providing support to a local shelter for young mothers with medical students as educators, backed by an evidence-based trauma-informed curriculum newly designed specifically for teen parents. In addition to the novel curriculum, the adapted survey questions, hair cortisol level obtainment, and focus groups were innovative approaches, which we found to be feasible and hopefully lay the groundwork for future data-driven community interventions. Future studies would benefit from more participants to improve collection methodology and considering additional biomarkers of stress.[7] Further research is also needed to formally evaluate the effects of comparable interventions.

Moving forward, the physicians-in-training should translate their lessons learned to continue advocacy for special populations, which may include individuals experiencing homelessness, single parents, adolescents, self-identified women, minorities, and other groups that may benefit from additional allies and acquaintances. In the future, the mothers may co-lead workshops to utilize their experiences and empower themselves. Also, workshop teachers should always feel empowered to tweak curriculum based on the individual learners in front of them; in our own workshops, we made the lessons more interactive (with the help of our trauma educator) in the later weeks after we noticed more engagement (along with positive informal feedback) during the lessons that were more learner-centered. In addition, to improve consistent participation throughout the study, if funding allowed, the mothers could have been compensated per hour of time (rather than the pre/post tokens of appreciation given in this pilot). This additional funding may have been helpful to a mother, who shared that she was unable to attend a session due to her job. However, paying mothers hourly may cause mothers to feel pressured to stay in the trial. Thus, we would argue that what is more important than funding: building strong relationships and displaying genuine care for the mentees, so that they are intrinsically motivated to attend the sessions with their support group.

In sum, to combat the effects of intergenerational trauma, medical students were trained to deliver an evidence-based, trauma-sensitive parenting and mental health curriculum for young mothers experiencing homelessness. Students are now equipped to educate each other, such that this intervention may continue beyond a one-year project. Our hope is that our work will have a ripple effect, and future mentors will continue to advocate for a stigmatized population typically absent in medical school curricula.

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Author Contributions

Conceptualization: EA, JS, EC, JF, VP. Methodology: EA, JS, MM, MG, EC, JF, VP. Formal Analysis: EA, JS, VP. Investigation: EA, JS, MG, ZC, VP. Resources: EA, JS, EC, JF. Data Curation: EA, JS, VP. Writing - Original Draft: EA, JS, MM, ZC, VP. Writing - Review & Editing: EA, JS, MM, ZC, EC, JF, VP. Visualization: EA, JS, MM, MG. Supervision: JS, EC, JF. Project Administration: EA, JS, MM, MG, VP. Funding Acquisition: EA, JS, JF].

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Supplementary Material

Supplementary I: SURVEY QUESTIONS

Survey 1: Knowledge and Health Beliefs

The following questions will help us learn more about your experience as a parent. There are no right or wrong answers. For each question, please note your level of agreement or disagreement on a scale from 1 to 6 (where 1=strongly disagree, 2= disagree, 3= slightly disagree, 4= slightly agree, 5= agree, and 6=strongly agree).

1. Doing things for myself is an important part of being a good parent.
2. I feel confident about my ability to handle challenging behaviors.
3. I understand how traumatic events can impact the way my child's brain works.
4. I think defiant kids (i.e., kids not following the rules) need to be praised more.
5. I feel like I have the skills to help my child.
6. I know the warning signs of problems that can come from caring too much for others and not enough for myself.
7. I know I am doing a good job as a parent.
8. I know things about being a young parent that would be helpful to other young parents.

Survey 2: Perceived Stress Scale

These questions will ask about your feelings and thoughts in the last month. Please indicate how often you thought or felt a certain way using a score of 1 – 5 (where 1=never, 2=almost never, 3=sometimes, 4=fairly often, and 5=very often).

1. In the last month, how often have you been upset because of something that happened unexpectedly?
2. In the last month, how often have you felt that you were unable to control the important things in your life?
3. In the last month, how often have you felt nervous and "stressed"?
4. In the last month, how often have you felt confident about your ability to handle your personal problems?
5. In the last month, how often have you felt that things were going your way?
6. In the last month, how often have you found that you could not cope with all the things that you had to do?
7. In the last month, how often have you been able to control irritations in your life?
8. In the last month, how often have you felt that you were on top of things?
9. In the last month, how often have you been angered because of things that were outside of your control?
10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

Survey 3: Demographics

Finally, we are going to ask a few questions about you and your child(ren).

1. How old are you? ___

2. How do you identify yourself? (Please check all that apply)
   a. Asian / Asian American / Pacific Islander
   b. African American / Black
   c. Caucasian / White
   d. Latina / Latino / Latinx
   e. Native American/American Indian/Alaskan Native
   f. Multiracial
   g. Something not listed here: _____
   h. Prefer not to answer

3. What is the highest level of education you have completed (Select one)?
   a. 8th grade or less
   b. Some high school
   c. Graduated high school / Received a GED or HiSET / Vocational certificate
   d. Some college / Associate's degree / Graduated college

4. Are you currently employed (Please check all that apply)
   a. Employed full-time (30 or more hours per week)
   b. Employed part-time (less than 30 hours per week)
   c. Unemployed
   d. Student

5. How many children do you have? _____
   a. How old is your child? _____ (if only one)

If more than one:
   a. How old is your second child? _____
   b. How old is your third child? _____

6. Do you currently have health insurance?
   a. Yes – GO TO Q7
   b. No – SKIP to Q8

7. If Yes, what type of health insurance do you have? (Select one)
   a. Private health insurance through work
   b. Private health insurance through a family member
   c. MassHealth
   d. Something not listed here: _____

8. Have you gotten a physical from a healthcare professional (e.g., a primary care clinician/ MD/NP) in the last 12 months?
   a. Yes
   b. No

Survey 4: Questions for Hair Cortisol Data Collection
We will be measuring cortisol (known as the stress hormone) in hair samples to give us a better idea of your stress level. We need to ask you a few questions about your hair care and health that may naturally affect the cortisol levels in your hair.

1. How frequently do you wash your hair?
Daily
3-4 times a week
1-2 times a week
2-3 times a month
Once a month
Other (please specify):_____

2. Have you used a perm or relaxer on your hair in the last 3 months?
Yes
No

3. Have you bleached, colored, or dyed your hair in the last 3 months?
Yes
No

5. Do you have hair gel, mousse, hair spray or oil on your hair right now?
Yes
No

6. Are you currently pregnant?
Yes
No

7. Have you used hormonal birth control in the past 3 months, including the Depo-Provera shot, the "pill", a patch, an implant or IUD?
Yes
No

8. Have you taken any steroids (e.g., cortisone) by mouth, cream, inhaler or shot in the past 3 months?
Yes
No

Supplementary II: FOCUS GROUP QUESTIONS
Focus Group 1: Young Mothers' Questions

1. How did you like the educational curriculum we offered over the past 8 months?

2. What were some of the take-aways for you from these sessions?
(Reminder of session titles: Goals, Guiding Principles and Self Care; Trauma 101; How My Own Childhood Trauma May Be Impacting My Decision Making and Parenting; Understanding Trauma's Effects; Feelings and Behaviors; Safety; Advocacy; Connections and Healing, Closing Thoughts)

3. Do you have any thoughts on how we should provide this curriculum differently in the future?

4. How, if at all, has this experience effected your parenting style and/or your self-care?

5. Have there been any changes to your feelings or attitudes about parenting and/or trauma after these educational sessions?

6. What kinds of monthly activities did you each do with the medical student you were partnered with? How did these events go?

7. Do you have any other feedback for us about the educational sessions or the activities you did independently with one of the medical students?

8. Are there other topics you would like us to have education sessions about in the future?

Focus Group 2: Medical Students' Questions

1. What, if anything, did you gain from the training sessions? Prompt for details.

2. What, if anything, did you gain from the group sessions? Prompt for details.

3. What, if anything, did you gain from the one-on-one sessions with your assigned mentee (mother)? Prompt for details.

4. If we were to obtain continued funding for this type of project, what would you suggest we do differently the next time? Prompt for details.

5. Ask the students to share a meaningful quote or anecdote from this project that has stuck with them. Prompt for details.

6. Is there anything else that you'd like to share either about your own participation in this project or about the needs of these mothers that we might want to consider addressing in the future?