# Analyzing resilience in a sample population as a novel qualifier for triage in psychological first aid

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## SUMMARY

**The human capability to adapt in response to disaster is remarkable. Psychological first aid (PFA) is a method to preserve and nurture resilience after a disaster or traumatic experience and is a comparable first response strategy to medical first aid. Contrary to medical first aid, however, studies suggest that Rapport/Reflective listening, Assessment, Prioritization, Intervention, and Disposition-based PFA, or RAPID-PFA, the most prominent method of PFA today, does not utilize a system of triage, where degrees of urgency are assigned to victims during care. Understanding whether different people experience resilience differently is necessary in understanding whether triage could benefit PFA's application in the field. Using data from 281 participants, we calculated resilience using a novel quantitative method of resilience analysis: a formula-based resilience index. We hypothesized that 1) younger individuals would be less resilient than older ones, 2) women would be more resilient than men, and 3) individuals of different races would be equally resilient. Our results showed that, while race did not affect resilience, people of different ages and different legal sexes do exhibit different levels of resilience. Children and adolescents scored lowest of all age subcategories and – contrary to our hypothesis - women scored lower on the resilience index than men. These findings suggest that age and sex may act as predictors of vulnerability for use in PFA triage. To supplement these findings before applications in the field, we should conduct further longitudinal studies with larger sample populations using the same methodology.**

## INTRODUCTION

Resilience is a subtle quality upon which societal progress rests (1). Psychological first aid (PFA), or acute intervention post-trauma, is increasingly used in disaster response efforts as a source of humanitarian aid to foster resilience during what may be the most difficult time in a survivor's life (2). Emergency management efforts contribute to a community's ability to rebound after a disaster with disaster preparedness and emergency response providing a tandem support approach to help communities recover (3, 4). For the purposes of this paper, we have defined resilience as the capability to cope with and recover from trauma. The most critical and accurate predictor of either a community's or an individual's capability to recover from a disaster of any scale is their resilience (1). Though responses to disasters vary dramatically, having resilience contributes to positive experiences of recovery (5). The importance of mental and emotional resilience has been felt as a result of community disasters, such as the COVID-19 pandemic, when feelings of insecurity, fear, and anxiety were more pronounced during imposed quarantine and social isolation. When sufficient support and connection is wanting, large-scale disasters such as war, disease outbreaks, and natural disaster can induce significant distress (5). In a calamity of any scale, resilience plays a vital role in the mitigation of stress (1). The recovery process in the aftermath of disaster depends on aid during or immediately after trauma, or the acute moments of distress (5).

Conditions such as the SARS outbreak in 2003, a major stress event for healthcare workers and impacted individuals, first emphasized the potential for mental health first aid to mitigate the negative impacts of such trauma, and PFA was subsequently developed (5). One example of PFA deployment during a disaster in recent history is the highly successful, pivotal PFA response to the 2014 Ebola virus disease (EVD) outbreak affecting Sierra Leone and Liberia; a train-the-trainer method of teaching PFA allowed communities to quickly care for mental health, by mobilizing healthcare workers, teachers, and community leaders (5).

Briefly, PFA can be described as a framework that attends to mental health as first aid treats medical health (6). PFA is a two-pronged treatment with goals to decrease symptoms of stress and encourage positive coping mechanisms while also connecting survivors with support in the recovery process, decreasing risk of long-term cognitive conditions such as post-traumatic stress disorder (PTSD) and depression. At its core, PFA is a form of crisis intervention created to nurture human resilience (7). Contrary to medical first aid, PFA does not utilize a system of triage, , which is the practice in medical first aid of assigning degrees of urgency to victims during care (7). Triage is a critical emergency management function in diverse sectors, including, for example, airplane safety: in the case of an emergency, flight passengers are instructed to put on their safety masks first before assisting others. Since no concept of triage exists in PFA, PFA responders are unable to prioritize patients to care for in the field and recipients of PFA are treated without any particular order of severity. However, different people can experience similar situations

very differently. Human perception is diverse, and thus, responses may be varied and distinct in different situations (8). Such differences must be explored further to determine if any specific demographic or individual conditions would necessitate prioritization in PFA treatment (8).

Today, one of the most prominent and widely-practiced methodologies of PFA is the Rapport/Reflective listening, Assessment, Prioritization, Intervention, and Disposition (RAPID) Model (2). RAPID is a concise, five-step approach to psychological intervention during crisis that has been designed as a fluid framework with the sole purpose of fostering resilience (2). Though RAPID-PFA has been in practice for almost 16 years, triage in PFA is only a brief assessment of urgency. While medical triage prioritizes severity of wounds or trauma, psychological triage would prioritize vulnerable populations.

Though resilience is a nuanced quality, the qualities of hope, help, safety, connectedness, calmness, and self-efficacy may be used to gauge a survivor's stage of recovery (1). Most existing research measuring resilience applies the latent class or profile analysis; these are long-term, qualitative research methods observing subjects over time to categorize them into various classes based on variables and protective factors, including personal competence, social competence, and family cohesion. A 2022 study used latent class analysis to study resilience in German, Greek, and Swiss adolescents. Based on responses to the Resilience Scale for Adolescents (READ), participants were graded as non-resilient, moderately resilient, or untroubled with regards to their qualitatively-determined resilience (9). Another 2022 study examined resilience in parents of children with cancer through a latent class analysis method, placing participants in four resilience classes, and identifying women and single parents as the lowest tenacity groups (10). A 2013 study similarly classified students, a younger demographic group (independent of gender and cultural background), as a vulnerable resilience group due to self-regulation playing a large role in their tenacity (11). Current quantitative research in the field validates this study's purpose of addressing the gap in understanding between multiple demographic categories in resilience.

The effects of determining and qualitatively grading resilience in populations of different demographics are not yet understood. Through this research, we hope to fill the existing gap in knowledge and add to the scholarly conversation regarding psychological first aid and the effects of different determinants on distinct demographic populations using a cross-sectional community-based survey study and to validate results of the survey using statistical data analysis. We have designed a formula for the resilience index (RI) – a more objective measure of resilience in survey participants. The purpose of the survey was to collect quantitative data for each determinant value in people of a variety of different demographics in order to compare this data between the categories of sex, age, and race, by use of descriptive statistics. Given adults tend to be more resilient than adolescents and that life experiences influence an individual's resilience, we hypothesized that 1) younger individuals would be less resilient than older ones, 2) women would be more resilient than men, and 3) individuals of different races would be equally resilient. We found that adolescents were the most vulnerable age group, that women tended to be less resilient than men, and that race did not act at all as a predictor of resilience. We believe that conclusions from this study and better understanding of resilience will impact the world of emergency management and disaster response in a meaningful way.

## RESULTS

We defined resilience quantitatively by designing the resilience index (RI), a measure of resilience averaging numerical values for all six PFA determinants (safety, connectedness, calmness, hope, help, and self-efficacy). We sought to compare resilience among different demographic groups by trying to identify whether there was a difference between each group's average resilience index.

To gather results as reliably as possible, we created a survey with Likert scale questions based on six resilience determinants and sent it to a demographically diverse sample population. We distributed the survey in the Merrimack Valley of New England. Likert scale scores were averaged to assign each participant a resilience index (RI) score (**Figure 1**). A total of 281 participants answered the survey. Results tended in a distinct way between all three variables based on means alone as a measure of central tendency.

### Legal Sex

60% of respondents identified as women, and 40% identified as men. Men and women exhibited different levels of resilience with a significant difference in mean RI score between men (M = 3.91, SD = 0.481) and women (M = 3.70, SD = 0.553, $p < 0.001$)and the average female RI presenting lower than the average male RI (**Figure 2**).

### Age

38% of respondents were between ages 13-19, 17% were between 20-39, 34% between 40-59, 9% between 60-79, and 1% were aged 80 and above. Mean RI increased with participant age from the adolescent to 80+ category (**Figure 3**). A one-way ANOVA and Tukey post-hoc test revealed statistically significant differences in mean RI between age group 13-19 and age group 40-59 ($p = 0.0008$), age group

$$RI = \frac{\text{Total Determinant Score}}{\text{Number of Situations}}$$

**Figure 1: Resilience Index formula.** Formula to determine individual resilience index (measure of resilience) which is calculated by dividing the total determinant score (total survey score) by number of situations (number of resilience questions an individual answered).
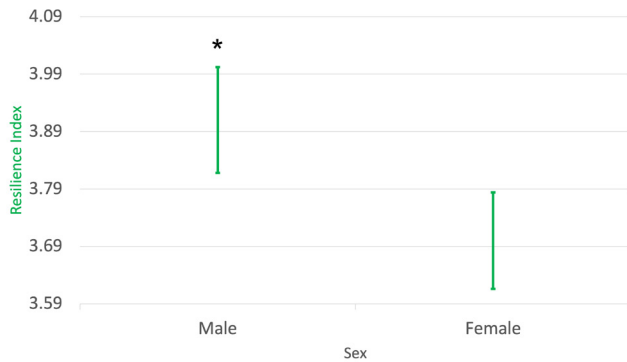
**Figure 2: Male respondents scored higher resilience indices on average than female respondents.** Graph showing mean ± 2 Standard Error of the Mean (SEM) resilience index. *Two-sample t-test, $p < 0.05$.

13-19 and age group 60-79 ($p = 0.00001$), and age group 13-19 and age group 80+ ($p = 0.00001$). Average RI increased from 3.409 for 13-19-year-olds to 4.245 for the 60-79-year-old category (**Figure 3**). Therefore, age, as well as sex, may impact how resilient one tends to be.
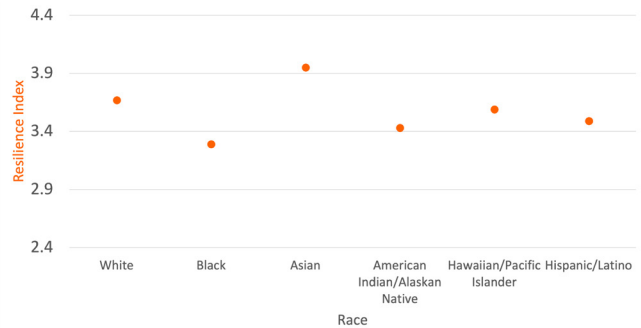
### Race

49% of respondents identified as White, 2% identified as Black, 43% identified as Asian, 1% identified as American Indian/Alaskan Native, 1% identified as Hawaiian/Pacific Islander, and 10% identified as Hispanic/Latino. Mean RI for race varies and does not correlate in any particular manner (**Figure 4**). A one-way ANOVA did not reveal a statistically significant difference in mean RI between any of the groups based on race ($p = 0.996$). There was no difference between each population of survey respondents in the six race categories. Therefore, in our study, one's race did not impact one's predicted resilience.

### DISCUSSION

The results and analysis of the resilience index tests
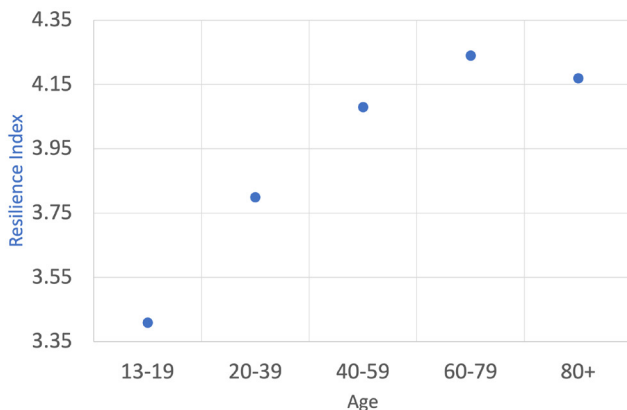


**Figure 3: Respondents aged 13-19 scored lowest among all age categories.** Graph showing mean resilience index at various age ranges of study participants.



**Figure 4: Respondents of different races did not have statistically different resilience indices.** Graph showing mean resilience index at various age ranges of study participants.

suggested that, while age and sex function as relevant factors in one's resilience, race was not associated with resilience scores. People of different races and different life experiences are not more or less resilient than others. The variables of age and sex, rather, are more consistent markers of resilience. Men scored higher, on average, than women did on the RI test in this study. Adolescents had the lowest RI of all age groups. As one gets older, one appears to grow more resilient. Understanding sex and age as predictors of resilience may impact PFA and the RAPID-PFA method in particular , providing PFA providers in the field with an assessment tool to perform triage and predict which survivors may need aid first. According to the six PFA determinants of safety, connectedness, calmness, self-efficacy, hope, and help, younger people are more vulnerable than older, and women are more vulnerable than men, thus providing an approximate order of priority for treatment.

As we hypothesized, the results of the survey demonstrated a difference among demographic groups, but this was significant only based on age and sex. The lack of statistical meaning in the difference between categories of race offers insight into implications it might have in the real world. Knowing that PFA determinants do not affect people of different races differently may mean that PFA may successfully be applied the same regardless of the treated populations racial demographics.

The application of the RI test that we created can be replicated in other studies. The study of resilience, as mentioned previously, is an extremely nascent field, with very few published works and most works qualifying resilience through latent class analyses. The RI test can provide a quantitative measure of a subjective quality/characteristic of humanity, and this test can be adapted to any study in the field of resilience. Therefore, the demonstrated testing has the potential to verify the conclusions of future studies.

Further research must be completed before the results of this study can be translated to the real world. We were limited in the number of participants and had only 281 respondents – the majority of whom lived in the New England area. We were limited in our ability to apply a latent class analysis due

to several factors: time was restricted to one academic year, participants would be difficult to find, and a set time semi-weekly to meet with subjects would be difficult to establish. To draw conclusions with global implications, the study must be repeated with a demographically diverse respondent population from around the world. In addition, we would like to conduct this study again with equal numbers of respondents in each age category, utilizing only survey respondents who answered all of the questions. We believe using only survey responses addressing all questions will reduce any potential bias in unanswered questions. We did not have access to equal numbers of participants in this study, though we did have participants in every category. Some categories, like the 80+ age category, only had one or two respondents, upon whose RI values the whole category was based. Repetition is essential to draw serious conclusions; therefore, we believe that this study must be repeated with a much larger pool of respondents from around the world to provide more significant results, which may or may not support the conclusions we have drawn here. Altogether, we believe that our findings presented will be a valuable stepping stone for field work and future research.

## MATERIALS AND METHODS
### Resilience Index

Resilience is a trait that encompasses a variety of characteristics, such as one's tenacity, optimism, and patience (10). We sought to understand resilience through the six PFA determinants of safety, connectedness, calmness, hope, help, and self-efficacy.

To assign each determinant a value, we designed an original resilience index to fall on a scale of 1 to 5, with 1 representing a lack of resilience and 5 perfect resilience. The resilience index equation (**Figure 1**) can be used to derive the RI value for a given individual. We designed the survey to include questions that applied specifically to each of the six determinants. Survey respondents had to answer each question with a numerical value from 1 to 5, from least to highest resilience. There were 33 questions in total on the survey (**Appendix A**). The total determinant score refers to the sum of an individual's answers to all the questions. The number of situations refers to the total number of questions or situations in the study. By dividing the total determinant score by the number of situations, we calculated the resilience index that also falls between 1 and 5. Calculating an average on a defined numeric scale is more conducive to comparison than the total determinant score alone. In order to protect participants and ensure that responding was entirely voluntary, participants were reminded in the survey that all questions were optional and that no question had to be answered. Therefore, participants who answered fewer questions would have a lower total determinant score even if their average calculated RI was higher than someone who answered every question, thus resulting in a high total determinant score. For this reason, the resilience index was based on an average.

### Survey Questions

The determinants of safety, help, and self-efficacy related to 5 questions each on the survey. The determinants of calmness, connectedness, and hope were related to 6 questions each. Multiple questions applied to each determinant to minimize misinterpretation of any single question. The survey questions were designed and determinants were chosen inspired by PFA Actions and PFA Action questions of the American Red Cross (1).

Every survey question was based on the Likert scale, a linear series of options from 1(least resilient extremity) to 5 (most resilient extremity). Each survey response produced a string of numbers – one in response to each question – which could be averaged to produce an RI value which considers all six PFA resilience determinants. In some instances, the definition of 1 and 5 did not match the context of the determinant in question; in response, we added an explanation of the meaning of these two absolutes within the question.

For the variables of sex and age, participants had to select a single option for each question from a multiple-choice list; five options for the age group (13-19, 20-39, 40-59, 60-79, 80+) and two options for legal sex (Male, Female) were listed. Participants could select one or more categories from a checklist of six options of race (White, Black, Asian, American Indian/Alaskan Native, Hawaiian/Pacific Islander, Hispanic/Latino). When calculating and categorizing the resilience indices of biracial and multiracial respondents, we included their RI scores in subcategories of each race they selected in the checklist. Each variable was examined independently – e.g., the age category 13-19 was only compared to other age categories. For this study, a given individual's age, sex, and race were not considered together.

### Survey Participants

The survey was distributed in two iterations. The first was distributed among the students and faculty of our high school. Students from 63 different towns and communities in the greater Merrimack Valley attend the school. The second survey was distributed outside the school community. To ensure that consent was given by all participants, the second iteration of the survey featured an additional selection panel requesting that only those participants over age 18 proceed. In this study, we defined adolescents as individuals under age 18, and adults as those 18 years and above. Respondents' anonymity was protected as emails were not collected in the survey. Informed consent was obtained from participants and the survey was approved by an Institutional Review Board (IRB) prior to distribution.

### Data Analysis

In analyzing the resilience indices gathered for every survey respondent, we applied two descriptive statistic

tests: t-test and ANOVA. The purpose of the analysis was to determine if the differences between mean RIs were statistically significant. To compare categoric mean RIs, we first calculated each individual's RI using the determinant score sum divided by the number of situations, or the number of questions a given individual answered. Because most questions were not required, some respondents elected to leave various questions blank. To account for this, we combed through the data manually to identify which cells were left blank in each row of resilience scores. A column was added to calculate every individual's RI value, in which we applied the resilience index formula we created. We counted the number of individuals within and outside the high school who filled out both iterations of the survey, within each demographic subcategory. To find the average of all RIs, we calculated the sum of all RI values in each subcategory and divided this value by the number of individuals total within that category.

Comparing means allowed us to see a visible difference between average values – i.e., we could identify which RI average was higher in a pair and conclude as a result which group was, on average, more resilient than the other. After observing trends in all statistical means, we applied the t-test to the legal sex variable and ANOVA to the age variable and race variable. To run these tests, we used the Select Statistical Services open-access program (t-test) and the Social Science Statistics program (ANOVA). We hand-calculated derivations which were input to the digital programs.

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### APPENDIX

i. What is your age?
   a. 13-19
   b. 20-39
   c. 40-59
   d. 60-79
   e. 80+
ii. Legal Sex:
   a. Male
   b. Female
iii. What is your race? One or more categories may be selected.
   a. Caucasian White
   b. African
   c. Asian
   d. American Indian/Alaskan Native
   e. Native Hawaiian/Pacific Islander
   f. Hispanic or Latino

This survey is voluntary. The survey questions below are all asked on a scale of 1 to 5. Please observe the description of what 1 and 5 represents. Option 3 in the middle is neutral.

1. On a scale of 1 to 5, how hopeful do you feel during

difficult and stressful situations in your day-to-day life?

2. Even if the situation is grim right now, it will always get better. Do you agree with this statement?
3. During the COVID-19 pandemic, a disaster we have all experienced, I carried an expectancy that the situation would improve, and society would recover.
4. I am/believe I am able to make or encourage others to feel hopeful.
5. I believe in my ability to cope before, during, and after disasters.
6. I can access information on stress and coping when times are tough (during disasters - COVID-19 pandemic - or difficult daily circumstances).
7. How often do you watch/read/play or are you exposed to media (books, movies, video games, etc.) with horror/gore? (3 means "sometimes").
8. In reference to the COVID-19 pandemic, how confident were/are you in your ability to reduce disruption (unwelcome changes in your life)?
9. During the COVID-19 pandemic, I adjusted so that life felt normal.
10. Disasters (eg: COVID-19 pandemic) cause me to express fear and/or worry.
11. When disasters occur (COVID-19, natural disasters, etc.) I am confident that help and services are on the way.
12. I know about types and locations of government and non-government emergency management services.
13. Do you feel a sense of being able to help yourself?
14. Do you believe in a moral belief system or a particular faith? (3 is "somewhat").
15. I can meet all of my own needs (in case of disaster AND in day-to-day life). (3 means "some").
16. I understand that my emotions and feelings are normal.
17. I feel confident in my ability to make decisions for myself.
18. I have a strong support system. (3 means "somewhat (could be stronger)").
19. I can contact loved ones/family/friends.
20. I am able to stay close with family and friends during disasters (ie: COVID-19) and difficult daily life circumstances. (3 means "somewhat").
21. I believe I can establish connection with others. Do you agree with this statement?
22. Do you believe your actions lead to positive results?
23. Do you feel that other people respect your cultural norms regarding gender, age, and/or religion?
24. During stressful situations, such as any during the COVID-19 pandemic, do you feel overwhelmed or disoriented?
25. In your day-to-day life, do you regularly feel overwhelmed or disoriented?
26. There is no right or wrong way to feel. Do you agree with this statement?
27. Do you have access to an environment away from stressors (eg: exposure to loud sounds)?
28. When you are afraid or worried, do you know that help and services are available?
29. Do you have access to information on stress and coping?
30. How often do you feel stressed?
31. During the COVID-19 pandemic, were you able to reduce the threat of exposure?
32. If a disaster were to occur, do you have a plan to meet basic needs? (3 means "somewhat").
33. How resilient do you think you are?

**Appendix A: Complete list of survey questions.**