

Psychological Trauma: Theory, Research, Practice, and Policy

Effects of a Psychological First Aid (PFA) Based on the SIX Cs Model on Acute Stress Responses in a Simulated Emergency

Moshe Uriel Farchi, Lorin Bathish, Naomi Hayut, Shaked Alexander, and Yori Gidron

Online First Publication, July 25, 2024. <https://dx.doi.org/10.1037/tra0001724>

CITATION

Farchi, M. U., Bathish, L., Hayut, N., Alexander, S., & Gidron, Y. (2024). Effects of a psychological first aid (PFA) based on the SIX Cs model on acute stress responses in a simulated emergency. *Psychological Trauma: Theory, Research, Practice, and Policy*. Advance online publication. <https://dx.doi.org/10.1037/tra0001724>

Effects of a Psychological First Aid (PFA) Based on the SIX Cs Model on Acute Stress Responses in a Simulated Emergency

Moshe Uriel Farchi¹, Lorin Bathish¹, Naomi Hayut¹, Shaked Alexander¹, and Yori Gidron²

¹ Department of Social Work, Research Center for Innovation in Social Work, Tel-Hai Academic College

² Department of Nursing, University of Haifa

Objective: The SIX Cs model, a neuropsychological framework for psychological first aid, addresses acute stress responses that may lead to functional failure and heighten the risk for posttraumatic stress disorder. Unlike emotional interventions, this model prioritizes Cognitive Communication to diminish emotional overwhelm and bolster cognitive functioning. It introduces a Challenge for active engagement, Control for cognitive management of situations, Commitment from the helper to reduce loneliness, and Continuity to ensure narrative coherence. This study evaluates the SIX Cs model's effectiveness in an experimental setup to alleviate acute stress reaction symptoms. **Method:** Sixty-three participants voluntarily participated. They were randomly assigned to the SIX Cs intervention (experimental) or to supportive emotional expression (control). They listened to a 3-min audio recording of a real emergency 911 phone call. Interventions were provided before and after listening to the recording. Before, immediately after, and 5 min later (recovery), participants' anxiety, heart rate variability, and mental resilience levels were measured. **Results:** For all three outcomes, the Time \times Group interactions were statistically significant. Follow-up analyses revealed that the SIX Cs participants showed lower anxiety and less reductions in heart rate variability and resilience than controls immediately after the stressor. Furthermore, the SIX Cs participants recovered faster on all three outcomes compared to controls. **Conclusions:** The results demonstrate the superior effect of the psychological first aid based SIX C's protocol over control in all outcomes, immediately after a simulated stressor and 7 min later as well as possible contribution for posttraumatic stress disorder risk reduction.

Clinical Impact Statement

The study introduces the SIX Cs model, offering simple guidelines to reduce acute stress reactions (ASR). Its unique attributes include simplicity, scientifically proven efficacy, quick recovery, and accessibility to the public. By reducing reliance on professionals during acute stages, the model facilitates faster assistance, lowers the risk of posttraumatic stress disorder, and contributes to community resilience by empowering individuals to cope effectively with acute stress responses symptoms.


Keywords: psychological first aid, acute stress reaction, posttraumatic stress disorder risk reduction, crisis and emergency interventions, community resilience

Exposure to potentially traumatic events such as earthquakes, wars, and terror, has been on the rise in past decades. These, in addition to traffic accidents, domestic violence and pandemics call for developing and testing effective evidence-based psychological first aid (PFA) methods. Due to the overwhelming potential number of people in need during mass events, there is a need to develop PFAs, which can be provided by nonprofessionals. In addition,

during such events, communities and infrastructure (e.g., phone communications, buildings) may collapse and lead to physical isolation of people. All these call for an immediate form of PFA to help individuals and communities maintain functioning and prevent psychiatric morbidity.

The first 48 hr after a traumatic event can result in acute stress reaction (ASR) symptoms, which include cognitive signs (e.g.,

Moshe Uriel Farchi  <https://orcid.org/0000-0003-3041-4872>

Yori Gidron  <https://orcid.org/0000-0003-4565-4561>

The authors have no known conflicts of interest to disclose.

This work is licensed under a Creative Commons Attribution-Non Commercial-No Derivatives 4.0 International License (CC BY-NC-ND 4.0; <https://creativecommons.org/licenses/by-nc-nd/4.0>). This license permits copying and redistributing the work in any medium or format for noncommercial use provided the original authors and source are credited and a link to the license is included in attribution. No derivative works are permitted under this license.

Moshe Uriel Farchi played a lead role in conceptualization, formal analysis,

investigation, methodology, supervision, and writing—original draft. Lorin Bathish played an equal role in conceptualization, data curation, investigation, and project administration. Naomi Hayut played an equal role in conceptualization, data curation, investigation, and project administration. Shaked Alexander played an equal role in conceptualization, data curation, investigation, and methodology. Yori Gidron played a lead role in conceptualization, data curation, and formal analysis and an equal role in investigation, methodology, supervision, validation, writing—original draft, and writing—review and editing.

Correspondence concerning this article should be addressed to Moshe Uriel Farchi, Department of Social Work, Research Center for Innovation in Social Work, Tel-Hai Academic College, Upper Galilee 1220800, Israel. Email: moshefar@telhai.ac.il

confusion), emotional signs (e.g., anxiety, sadness), behavioral signs (e.g., aggression), and physiological signs (e.g., sympathetic arousal). The ASR is itself a risk factor for posttraumatic stress disorder (PTSD; Koren et al., 1999), pain, psychiatric morbidity, and even mortality (Garfin et al., 2018).

Past forms of early interventions included psychological debriefing, which includes going over an event's details, normalizing and legitimizing reactions, providing support and empathy, and encouraging emotional expression. However, five meta-analyses have clearly shown that this method is ineffective and may even increase the risk of PTSD (e.g., Bastos et al., 2015; Mayou et al., 2000). Debriefing may not provide skills for regulating excessive emotional distress driven by sympathetic arousal and limbic brain activity (e.g., amygdala hyperactivity), which increase the risk for PTSD (e.g., Chen et al., 2018; Shin et al., 2004).

Other forms of early preventative interventions include eye movement desensitization and reprocessing given days after traumatic events, recently found to be effective in reducing distress and risk of PTSD (Yurtsever et al., 2022). Finally, another type of intervention, developed for humanitarian settings, is the Problem Management Plus (PM+), which includes stress management, behavioral activation, and enhancement of social support (Dawson et al., 2015). PM+ was found to reduce anxiety and depression after a war conflict (Hamdani et al., 2020). Finally, another method derived from the neuroscience of trauma encoding is the memory structuring intervention (MSI), which recently included also vagal breathing (VB). The MSI + VB was found to reduce objective and subjective signs of the ASR, and the MSI may even prevent PTSD (Gidron et al., 2018).

Certain challenging situations such as violence in hospitals and schools call for immediate interventions. However, eye movement desensitization and reprocessing, PM+, and MSI are meant to be provided by mental health professionals. Yet, the reliance on professionals may be impossible during the immediate phase of such mass traumatic events. Hence, there is a need to develop effective, brief, and evidence-based PFA, which can be provided immediately by nonprofessionals.

All these led to the development of the SIX Cs method, which is based on related theoretical concepts, namely, hardiness (Kobasa et al., 1982; Maddi, 2006), sense of coherence (SOC; Antonovsky, 1987), and self-efficacy (Bandura et al., 1988). Hardiness includes commitment to a person in need, to challenge a person toward effective responding, and to provide a person with a sense of control over a stressful situation. These three factors were found by Kobasa to be essential for seeing a threat as a challenge that encourages personal growth. SOC developed by Antonovsky (1979) includes comprehensibility (perceiving events in an orderly and predictive manner), manageability (having control and managing various stressful events), and meaningfulness (believing that one's actions have meaning). Self-efficacy (Bandura et al., 1988) reflects a person's confidence in their ability to influence the events that affect life. Multiple studies show that the resource variables of hardiness, SOC, and self-efficacy all correlate inversely with depression and PTSD and predict better quality of life (Bartone et al., 2022; Peters et al., 2021; Pooley et al., 2013; Schäfer et al., 2019).

During the ASR, people may experience strong negative emotions. Translating knowledge from neuroscience, regulation of negative emotions by cognitive strategies (e.g., reappraisal of events) activates prefrontal cortical regions (e.g., medial prefrontal cortex, ventromedial prefrontal cortex), which modulate activity in limbic regions including

the amygdala (Nelson et al., 2015; Steward et al., 2022). Furthermore, children who develop normally compared to those with PTSD show increases in the connectivity between the amygdala and frontal cortex and between the hippocampus and frontal cortex over time (Heyn et al., 2019). Finally, resilience, the ability to respond and recover from adversity, is inversely correlated with activity in the amygdala (Leaver et al., 2018). Thus, PFA should aim to regulate distress by prefrontal activation to modulate amygdala activity.

From all this converging evidence, we developed the SIX Cs method (Farchi et al., 2018), which aims to help people shift from helplessness to active and effective coping, within a very short time. This method is typically conducted in the zone where a traumatic event occurs. The method includes the six following components aimed at reducing common ASR symptoms (Farchi et al., 2018; Maercker et al., 2013; see Table 1): Cognitive Communication, Challenge and Control, Continuity, and Commitment.

Cognition and verbal Cognitive Communication aim to modulate emotional and limbic hyperactivity by asking short cognitive and factual questions about the event (e.g., "Tell me what happened"). The main goal is to make a person think more clearly, set priorities, and make effective decisions. Challenge aims to reduce helplessness by providing people with simple tasks that are within a person's ability at that moment. This aims to increase self-efficacy. Concerning control, we provide a person with simple options to choose from, related to the event (e.g., "Do you want to talk to your parents or your teacher first?").

While both Challenge and Control, as logical functions, contribute also to strengthen the dominance of the prefrontal cortex (Farchi et al., 2018; Sugisawa et al., 2021), the need for communication like positive feedback and eye contact is crucial for one's collaboration with the helper (Sacre et al., 2022).

Commitment aims to reduce a sense of loneliness: The helper states his or her commitment to the person's safety. This could be, for example, done as follows: "We're here with you, we're not going anywhere until you're safe again." Continuity aims to reduce confusion concerning the chronological order and time perception of an event's segments. Recalling a traumatic event in its chronological order predicted reduced PTSD symptoms (Foa et al., 1991). This process also aims to help the person see the end of the event. For example, the helper can say:

A few minutes ago you were involved in a car accident, we just arrived and we are transporting the injured. In the next 2–3 minutes we will go to the ambulance and you will be taken to the hospital for further tests. The accident is over.

What is the evidence for the effectiveness of the SIX Cs method? In a sample of Israelis treated by this method under missile attacks, anxiety levels were significantly reduced, but no control group was included (Farchi et al., 2018). In a following study, high school

Table 1
SIX Cs Model Intervention Elements by Acute Stress Reaction Symptoms

Acute stress reaction symptom	SIX Cs model intervention
Amygdala hyperactivity	Cognitive Communication
Helplessness	Challenge and Control
Confusion	Continuity
Loneliness	Commitment

students trained by the SIX Cs method showed increased levels of resilience and self-efficacy and reduced anxiety compared to controls. However, that was not a randomized controlled trial (RCT; Farchi et al., 2018). For ethical reasons, it is difficult to perform an RCT in the first few minutes after a real-life traumatic event. Thus, testing the SIX Cs method needs to be done using simulations. The purpose of this study was to test in an experimental RCT the effects of the SIX Cs method on subjective and objective outcomes, by comparing it to a form of PFA which included a focus on emotional expression and introspection. Most past studies focused on self-reported outcomes. However, one important physiological marker of psychobiological resilience is the vagal nerve index of heart rate variability (HRV), which reflects fluctuations in the intervals between normal heartbeats. High HRV is associated with greater psychological resilience (Jung et al., 2021), and it predicts faster biological recovery from acute stress (Weber et al., 2010). It was hypothesized that participants randomized to the SIX Cs intervention would report lower levels of anxiety and smaller reductions in self-reported resilience and HRV than controls. Finally, it was hypothesized that these indexes would return to baseline levels faster in the SIX Cs method than in controls, reflecting better psychophysiological resilience.

Method

This study was approved by the Te-Hai College Ethics Committee (Approval No. 03-10-A-2022).

Participants

This study included 63 participants (31 women and 32 men). They were recruited by the snowball method using social media and/or by acquaintances of the experimenters.

All were older than 18 and were not with COVID-19 during the study period, which took place at the end of the pandemic (2021–2022).

Measures

Background Information

This included participants' age, gender, ethnicity, profession, and marital status.

Vagal Nerve Activity

This was measured by HRV, using the Elite HRV finger sensor. This uses photoplethysmography technology and an app installed on a smartphone. This device provides the HRV time domain parameter of root-mean-square of successive differences, a known vagally mediated index. One study validated the measurement of root-mean-square of successive differences with smartphones and found very strong correlations from the smartphone measure and another measure after the removal of artifacts (Perrotta et al., 2017).

Mental Resilience

Resilience was measured by the Connor–Davidson Resilience Scale questionnaire. The questionnaire consists of 10 statements referring to the participant's self-efficacy perception 1 month prior to the date of filling out the questionnaire. In the present study, participants were asked to fill in that questionnaire concerning this

moment, that is, using this scale as a measure of state resilience. Previous studies have assessed state resilience as well (e.g., Jung et al., 2021). For each item, participants evaluate how suitable it is for them, according to a Likert frequency scale between 0 (*not at all*) and 4 (*almost all the time*). The internal reliability in the present study was very high (Cronbach's $\alpha = .92$).

State Anxiety

This was assessed by the brief State–Trait Anxiety Inventory—State version. The questionnaire was developed by Marteau and Bekker (1992) and derived from the full 20-item original scale (Spielberger et al., 1970). The questionnaire contains six sentences assessing symptoms of state anxiety. Each item was rated on a 1 (*not at all*) to 5 (*very much*) Likert intensity scale. In this study, the statements inquired about this moment, to reflect state anxiety. In the present study, the internal reliability was adequate (Cronbach's $\alpha = .77$).

Study Design

The present study used an experimental RCT design. Participants were randomly assigned to one of two conditions: an experimental group, in which the participants underwent the SIX Cs intervention ($N = 35$), or a control group, in which the participants underwent an emotion-focused intervention ($N = 28$), as described below. Data were collected at three time points—before the intervention, immediately after the intervention, and 7 min later, to reflect recovery.

Research Process and Interventions

Time 1 participants first underwent HRV measurement and completed the two questionnaires. Thereafter, all participants, regardless of their group affiliation, received a standard description an audio file containing a recording of an 8-year-old girl calling 911, taken from YouTube. The girl was exposed to extreme danger in a situation of domestic violence and the audio ends without a clear view of what happened to the girl.

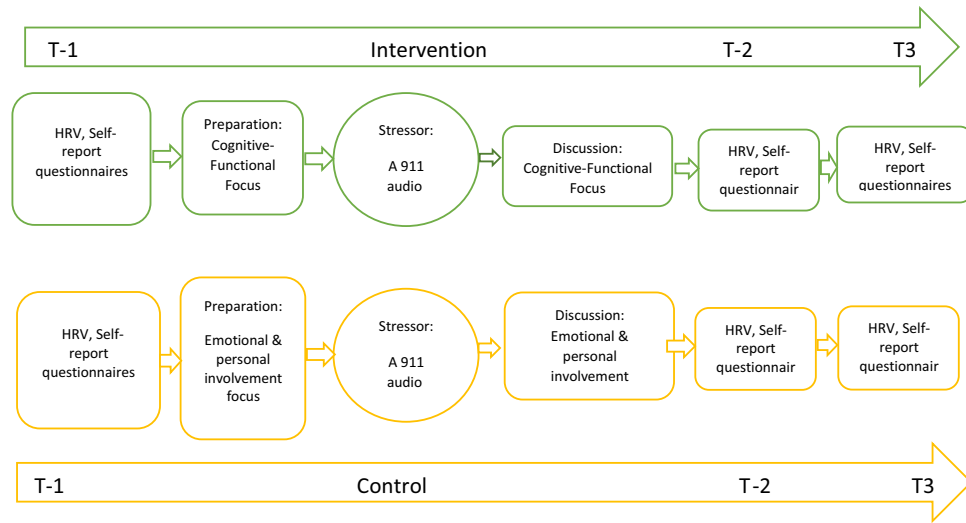
The experimental SIX Cs group was guided to listen to the audio file in active and cognitively oriented listening according to the SIX Cs model. Its participants were asked to follow instructions as following: “Write to yourself while listening to the audio whether the 911 dispatcher used cognitive and activating words (e.g., ‘tell me where you are’; ‘describe what is happening’) and to notice the girl’s responses to the dispatcher’s instructions, and whether the dispatcher provided the girl with feedback.” Finally, participants were asked to write what could be improved by the dispatcher. They were also told that the experimenter would remain there for them throughout the process.

The control group was guided before listening to the audio file to try to sense the girl’s feelings and the dispatcher’s feelings and try to notice their own feelings toward this girl and toward this event.

Immediately after listening to the audio file, a short discussion was held with each participant, where those in the SIX Cs group discussed the facts, lessons learned, and operative suggestions for future events, while participants in the control group discussed their feelings about the situation.

Time 2 and Time 3 measurements included HRV as well as the self-report questionnaires, taken immediately after the brief discussion, and 7 min later (see Figure 1).

Figure 1
Description of Study Design: Statistical Analyses



Note. T = time; HRV = heart rate variability. See the online article for the color version of this figure.

Statistical Analysis

First, we compared groups on baseline measures, using *t* tests for continuous data and chi-square tests for categorical data. Second, the main analysis was a mixed-design analysis of variance (ANOVA) where the between-subjects factor was group (experimental, control) and the within-subjects factor was time (T1, T2, T3). To examine the main study hypothesis, we focused on the Time \times Group interaction. If significant, this was then followed by a series of *t* tests comparing the two conditions in the difference scores of each outcome between T1 and T2 and between T1 and T3.

Results

This study included 32 men (50.8%) and 32 (49.2%) women. Their age ranged between 21 and 74 years with a mean of 41.78 ($SD = 14.37$) years. Table 2 depicts the means and standard deviation of the main study variables per condition, during T1, T2, and T3.

First, no significant differences were found on background and on baseline measures, except for anxiety levels—participants in the experimental group initially reported significantly higher levels of anxiety than controls, $t(61) = 2.8, p < .01$. Gender and age were unrelated significantly to all outcomes except with gender predicting anxiety at T3 (recovery). When adding gender into the ANOVA for anxiety, the main result (Time \times Group interaction) was still significant. Thus, age and gender were not added as covariates. Thus, we ran the following main ANOVAs with and without controlling for baseline anxiety and the patterns remained very similar. As also shown in Figure 1, though significantly different, practically the group differences in baseline anxiety are minimal. Thus, we report the following analyses without controlling for baseline anxiety.

Concerning HRV, the Time \times Group interaction was significant, $F(2, 106) = 4.32, p = .02$.

The decrease in HRV from T1 to T2 was significantly smaller in the experimental group than in controls, $t(53) = 2.20, p = .032$. Furthermore,

the change in HRV from T1 to T3 was significantly smaller in the experimental group than in controls, $t(54) = 3.17, p = .003$.

Concerning anxiety, the Time \times Group interaction was significant, $F(2, 104) = 17.63, p = .000$. The increase in anxiety from T1 to T2 was significantly smaller in the experimental group than in controls, $t(54) = 5.09, p = .000$. The change in anxiety from T1 to T3 was significantly smaller in the experimental group than in controls, $t(52) = 5.51, p = .000$.

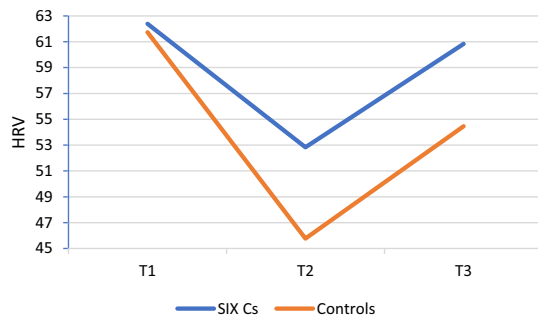
Finally, concerning resilience, the Time \times Group interaction was significant, $F(2, 102) = 8.61, p = .000$. The decrease in resilience from T1 to T2 was significantly smaller in the experimental group than in controls, $t(40.2) = 3.23, p = .002$. Furthermore, the change in resilience from T1 to T3 was significantly smaller in the experimental group than in controls, $t(52) = 3.50, p = .001$. Figures 2–4 present these findings.

Table 2
Means and Standard Deviation of the Main Study Variables per Condition, During T1, T2, and T3

Variable	Experimental N = 35		Control N = 28		<i>t</i>	Significance
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
HRV T1	60.9	12.1	60.6	8.3	.28	.780
HRV T2	52.8*	12.6	45.8	7.9	2.45	.018
HRV T3	60.5*	14.3	54.5	7.1	2.05	.046
Anxiety T1	11.2**	3.3	8.8	3.2	2.83	.006
Anxiety T2	18.9***	6.5	25.8	4.5	4.66	.000
Anxiety T3	12.6***	5.0	17.1	3.8	3.67	.001
Resilience T1	34.4	7.9	33.9	5.9	.26	.794
Resilience T2	34.7*	8.8	29.6	9.0	2.12	.038
Resilience T3	36.6*	9.2	32.1	7.8	1.94	.058

Note. T = time; HRV = heart rate variability.
* $p < .05$. ** $p < .005$. *** $p < .000$.

Figure 2
Changes in HRV Over Time (SIX Cs Interventions Versus Controls)



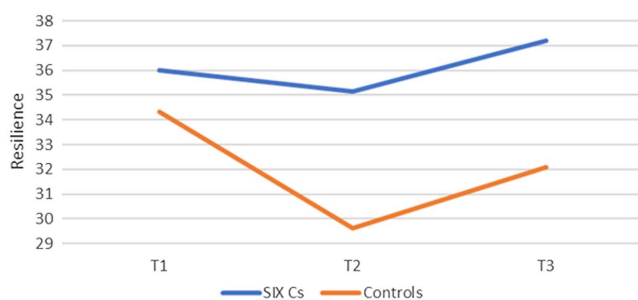
Note. T = time; HRV = heart rate variability. See the online article for the color version of this figure.

Discussion

The purpose of this study was to test and validate the SIX Cs method using for the first time an experimental study design. We exposed participants to a stressful audio recording, and they either dealt with it by focusing on the emotional, experiential, and supportive role or by focusing on the cognitive aspects while performing specific activating tasks in line with the SIX Cs method. Participants in the SIX Cs intervention showed significantly lower increases in anxiety and smaller reductions in resilience and HRV soon after the distressing audio than controls. Furthermore, participants in the SIX Cs condition showed significantly lower levels of anxiety and higher levels of resilience and HRV during the recovery period, at T3, compared to controls. The latter result reflects an essential element of mental resilience—being able to bounce back faster among participants undergoing the SIX Cs method following exposure to a potentially traumatic event (van Kessel, 2013).

These results add to existing preliminary data showing reduced anxiety levels following the SIX Cs method (Farchi et al., 2018; Hantman & Farchi, 2015). However, in the present study, we used a formal experimental design with a control group, together with subjective and objective outcome measures, and had three measurement times including recovery.

Figure 3
Changes in Resilience Over Time (SIX Cs Interventions Versus Controls)



Note. T = time. See the online article for the color version of this figure.

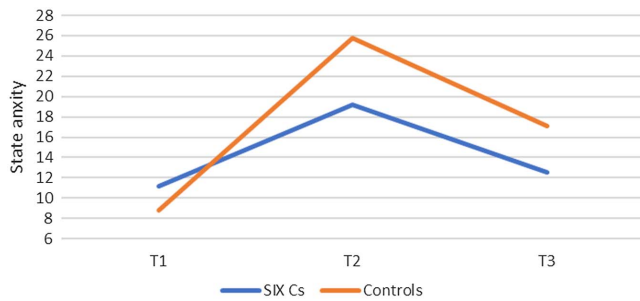
Why was the SIX Cs method better than focusing on emotional expression? First, the SIX Cs, being mainly a cognitive behavioral method of intervention, may increase activity in frontal cortical regions involved in executive functioning and activity of the default mode network (Yuan et al., 2020). Such activation is known to inhibit limbic regional activity (e.g., amygdala; Akirav & Maroun, 2007), thus modulating threat and stress responses. The SIX Cs method led to smaller reductions in HRV and to its faster recovery. These possibly happened since, by focusing on facts and providing people with more control, it enabled them to achieve emotional regulation by distancing, refraining, and minimizing the stressful event, and such cognitive emotional regulation strategies were previously found to increase HRV (e.g., Christou-Champi et al., 2015). Furthermore, by increasing HRV, the SIX Cs method may further increase activity in frontal regions because HRV correlates positively with prefrontal cortical activity (Thayer et al., 2012). Finally, increasing HRV could reduce sympathetic arousal because the vagal nerve, indexed by HRV, is the main nerve of the parasympathetic nervous system. It is crucial to reduce the sympathetic response after a traumatic event since such responses are reliably related to and predict PTSD (Pole, 2007; Shalev et al., 1998).

Though not measured in the present study, an additional critical aspect of the SIX Cs method is its potential role in regulating cortisol levels, a key biomarker of stress responses. Cortisol, known for its U-shaped relationship with stress, plays a crucial role in both the initiation and termination of the stress response. Uncontrollable stress increases cortisol (Dickerson & Kemeny, 2004). In contrast, by promoting cognitive engagement and control, the SIX Cs model could help maintain optimal cortisol levels, thus avoiding the extremes of hyper- or hypo-arousal and maintaining effective functioning during stress.

These results have important clinical and applied implications. They show the importance of activating and cognitively orienting people during the immediate aftermath of traumatic events. Furthermore, the SIX Cs method can be taught to nonprofessionals, and it only takes approximately 1 min to perform this intervention. Thus, this method can be highly time efficient and possibly of high clinical significance on a population level during severe mass incidents since it can be provided by many people. This study showed, in an experimental design, the robust effects and superiority of this new method in relation to subjective and objective outcomes, compared to a more emotion-focused method often used by providers, and calls to reconsider the trainings and practice of PFA. Furthermore, our results also demonstrate the urgent need to base PFA protocols on sound scientific evidence.

This approach not only aids in reducing the immediate psychological impact of traumatic events on victims but may also support first responders in maintaining their own mental health and resilience. The ability to rapidly apply these techniques, which can be easily taught and implemented, makes the SIX Cs model a valuable tool for first responders who often work in high-stress, time-sensitive environments (Farchi et al., 2018). Furthermore, this method's brief structure and its impact on physiological markers like HRV suggest that the SIX Cs model could help first responders maintain optimal arousal levels, crucial for effective functioning in emergency situations (Dickerson & Kemeny, 2004; Thayer et al., 2012).

Figure 4
Changes in State Anxiety Over Time (SIX Cs Interventions Versus Controls)



Note. T = time. See the online article for the color version of this figure.

Expanding the SIX Cs model training into educational settings, particularly for developing resilience and stress management skills among children and adolescents, could provide early intervention and contribute to preventing PTSD and other stress-related disorders (Dray et al., 2017). This proactive approach in schools and educational programs can equip young individuals with effective stress management skills from an early age. Additionally, the model's adaptability to diverse cultural contexts enhances its utility in global mental health strategies, particularly in regions with limited access to professional mental health services (Betancourt et al., 2013). By tailoring the model to various cultural norms and practices, the SIX Cs method can become a universal strategy in crisis intervention, bridging gaps in mental health resources worldwide.

The present study suffered from a few limitations including a relatively small sample and not using a real-life event. However, the statistically significant effects and consistent results across all outcomes attest to the effect sizes and to the robustness of this intervention. Furthermore, from obvious ethical reasons, it is problematic to conduct an RCT in the immediate aftermath of a traumatic event.

Future studies should aim to test the long-term preventative effects of the SIX Cs method in relation to preventing PTSD and maintaining self-efficacy and daily functioning in individuals and communities. Finally, future studies could also test the effects of this method on brain functions thought to mediate its effects, as discussed above.

References

- Akirav, I., & Maroun, M. (2007). The role of the medial prefrontal cortex-amygdala circuit in stress effects on the extinction of fear. *Neural Plasticity*, 2007, Article 030873. <https://doi.org/10.1155/2007/30873>
- Antonovsky, A. (1979). *Sense of coherence scale. Unraveling the mystery of health: How people manage stress and stay well*. Jossey-Bass Publishers.
- Antonovsky, A. (1987). *Sense of Coherence Scale* [Database record]. APA Psychological Tests. <https://doi.org/10.1037/t12396-000>
- Bandura, A., Cioffi, D., Taylor, C. B., & Brouillard, M. E. (1988). Perceived self-efficacy in coping with cognitive stressors and opioid activation. *Journal of Personality and Social Psychology*, 55(3), 479–488. <https://doi.org/10.1037/0022-3514.55.3.479>
- Bartone, P. T., McDonald, K., Hansma, B. J., Stermac-Stein, J., Escobar, E. M., Stein, S. J., & Ryznar, R. (2022). Development and validation of an improved hardiness measure: The hardiness resilience gauge. *European Journal of Psychological Assessment*, 39(3), 222–239. <https://doi.org/10.1027/1015-5759/a000709>
- Bastos, M. H., Furuta, M., Small, R., McKenzie-McHarg, K., & Bick, D. (2015). Debriefing interventions for the prevention of psychological trauma in women following childbirth. *Cochrane Database of Systematic Reviews*, 10(4), Article CD007194. <https://doi.org/10.1002/14651858.CD007194.pub2>
- Betancourt, T. S., Meyers-Ohki, S. E., Charrow, A. P., & Tol, W. A. (2013). Interventions for children affected by war: An ecological perspective on psychosocial support and mental health care. *Harvard Review of Psychiatry*, 21(2), 70–91. <https://doi.org/10.1097/HRP.0b013e318283bf8f>
- Chen, F., Ke, J., Qi, R., Xu, Q., Zhong, Y., Liu, T., Li, J., Zhang, L., & Lu, G. (2018). Increased inhibition of the amygdala by the mPFC may reflect a resilience factor in post-traumatic stress disorder: A resting-state fMRI granger causality analysis. *Frontiers in Psychiatry*, 9, Article 516. <https://doi.org/10.3389/fpsy.2018.00516>
- Christou-Champi, S., Farrow, T. F., & Webb, T. L. (2015). Automatic control of negative emotions: Evidence that structured practice increases the efficiency of emotion regulation. *Cognition and Emotion*, 29(2), 319–331. <https://doi.org/10.1080/02699931.2014.901213>
- Dawson, K. S., Bryant, R. A., Harper, M., Kuowei Tay, A., Rahman, A., Schafer, A., & van Ommeren, M. (2015). Problem Management Plus (PM+): A WHO transdiagnostic psychological intervention for common mental health problems. *World Psychiatry*, 14(3), 354–357. <https://doi.org/10.1002/wps.20255>
- Dickerson, S. S., & Kemeny, M. E. (2004). Acute stressors and cortisol responses: A theoretical integration and synthesis of laboratory research. *Psychological Bulletin*, 130(3), 355–391. <https://doi.org/10.1037/0033-2909.130.3.355>
- Dray, J., Bowman, J., Campbell, E., Freund, M., Wolfenden, L., Hodder, R. K., McElwaine, K., Tremain, D., Bartlem, K., Bailey, J., Small, T., Palazzi, K., Oldmeadow, C., & Wiggers, J. (2017). Systematic review of universal resilience-focused interventions targeting child and adolescent mental health in the school setting. *Journal of the American Academy of Child & Adolescent Psychiatry*, 56(10), 813–824. <https://doi.org/10.1016/j.jaac.2017.07.780>
- Farchi, M., Bergman-Levy, T., Ben-Gershon, B., Ben Hirsch-Gornemann, M., Whiteson, A., & Gidron, Y. (2018). The SIX Cs model for immediate cognitive psychological first aid: From helplessness to active efficient coping. *International Journal of Emergency Mental Health*, 20(2), Article 395. <https://doi.org/10.4172/1522-4821.1000395>
- Foa, E. B., Rothbaum, B. O., Riggs, D. S., & Murdock, T. B. (1991). Treatment of posttraumatic stress disorder in rape victims: A comparison between cognitive-behavioral procedures and counseling. *Journal of Consulting and Clinical Psychology*, 59(5), 715–723. <https://doi.org/10.1037/0022-006X.59.5.715>
- Garfin, D. R., Thompson, R. R., & Holman, E. A. (2018). Acute stress and subsequent health outcomes: A systematic review. *Journal of Psychosomatic Research*, 112, 107–113. <https://doi.org/10.1016/j.jpsychores.2018.05.017>
- Gidron, Y., Farchi, M., Eisenman, A., Husien, A., Berends, K., & Hubloue, I. (2018). Effects of a memory structuring plus vagal breathing intervention on acute stress reactions: Three controlled trials. *Mental Health in Family Medicine*, 13, 699–707.
- Hamdani, S. U., Huma, Z. E., Rahman, A., Wang, D., Chen, T., van Ommeren, M., Chisholm, D., & Farooq, S. (2020). Cost-effectiveness of WHO Problem Management Plus for adults with mood and anxiety disorders in a post-conflict area of Pakistan: Randomised controlled trial. *The British Journal of Psychiatry*, 217(5), 623–629. <https://doi.org/10.1192/bjp.2020.138>
- Hantman, S., & Farchi, M. (2015). From helplessness to active coping in Israel: Psychological first aid. In E. M. Schott, & E. L. Weiss (Eds.), *Transformative social work practice* (pp. 467–484). Sage Publications.

- Heyn, S. A., Keding, T. J., Ross, M. C., Cisler, J. M., Mumford, J. A., & Herringa, R. J. (2019). Abnormal prefrontal development in pediatric posttraumatic stress disorder: A longitudinal structural and functional magnetic resonance imaging study. *Biological Psychiatry: Cognitive Neuroscience and Neuroimaging*, 4(2), 171–179. <https://doi.org/10.1016/j.bpsc.2018.07.013>
- Jung, S. J., Jeon, Y. J., Choi, K. W., Yang, J. S., Chae, J. H., Koenen, K. C., & Kim, H. C. (2021). Correlates of psychological resilience and risk: Prospective associations of self-reported and relative resilience with Connor-Davidson resilience scale, heart rate variability, and mental health indices. *Brain and Behavior*, 11(5), Article e02091. <https://doi.org/10.1002/brb3.2091>
- Kobasa, S. C., Maddi, S. R., & Kahn, S. (1982). Hardiness and health: A prospective study. *Journal of Personality and Social Psychology*, 42(1), 168–177. <https://doi.org/10.1037/0022-3514.42.1.168>
- Koren, D., Arnon, I., & Klein, E. (1999). Acute stress response and posttraumatic stress disorder in traffic accident victims: A one-year prospective, follow-up study. *The American Journal of Psychiatry*, 156(3), 367–373. <https://doi.org/10.1176/ajp.156.3.367>
- Leaver, A. M., Yang, H., Siddarth, P., Vlasova, R. M., Krause, B., St Cyr, N., Narr, K. L., & Lavretsky, H. (2018). Resilience and amygdala function in older healthy and depressed adults. *Journal of Affective Disorders*, 237, 27–34. <https://doi.org/10.1016/j.jad.2018.04.109>
- Maddi, S. R. (2006). Hardiness: The courage to grow from stresses. *The Journal of Positive Psychology*, 1(3), 160–168. <https://doi.org/10.1080/17439760600619609>
- Maercker, A., Brewin, C. R., Bryant, R. A., Cloitre, M., van Ommeren, M., Jones, L. M., Humayan, A., Kagee, A., Llosa, A. E., Rousseau, C., Somasundaram, D. J., Souza, R., Suzuki, Y., Weissbecker, I., Wessely, S. C., First, M. B., & Reed, G. M. (2013). Diagnosis and classification of disorders specifically associated with stress: Proposals for ICD-11. *World Psychiatry*, 12(3), 198–206. <https://doi.org/10.1002/wps.20057>
- Marteau, T. M., & Bekker, H. (1992). The development of a six-item short-form of the state scale of the Spielberger State-Trait Anxiety Inventory (STAI). *British Journal of Clinical Psychology*, 31(3), 301–306. <https://doi.org/10.1111/j.2044-8260.1992.tb00997.x>
- Mayou, R. A., Ehlers, A., & Hobbs, M. (2000). Psychological debriefing for road traffic accident victims. Three-year follow-up of a randomised controlled trial. *The British Journal of Psychiatry*, 176(6), 589–593. <https://doi.org/10.1192/bjp.176.6.589>
- Nelson, B. D., Fitzgerald, D. A., Klumpp, H., Shankman, S. A., & Phan, K. L. (2015). Prefrontal engagement by cognitive reappraisal of negative faces. *Behavioural Brain Research*, 279, 218–225. <https://doi.org/10.1016/j.bbr.2014.11.034>
- Perrotta, A. S., Jeklin, A. T., Hives, B. A., Meanwell, L. E., & Warburton, D. E. R. (2017). Validity of the elite HRV smartphone application for examining heart rate variability in a field-based setting. *Journal of Strength and Conditioning Research* 31(8), 2296–2302. <https://doi.org/10.1519/JSC.0000000000001841>
- Peters, J., Bellet, B. W., Jones, P. J., Wu, G. W. Y., Wang, L., & McNally, R. J. (2021). Posttraumatic stress or posttraumatic growth? Using network analysis to explore the relationships between coping styles and trauma outcomes. *Journal of Anxiety Disorders*, 78, Article 102359. <https://doi.org/10.1016/j.janxdis.2021.102359>
- Pole, N. (2007). The psychophysiology of posttraumatic stress disorder: A meta-analysis. *Psychological Bulletin*, 133(5), 725–746. <https://doi.org/10.1037/0033-2909.133.5.725>
- Pooley, J. A., Cohen, L., O'Connor, M., & Taylor, M. (2013). Posttraumatic stress and posttraumatic growth and their relationship to coping and self-efficacy in Northwest Australian cyclone communities. *Psychological Trauma: Theory, Research, Practice, and Policy*, 5(4), 392–399. <https://doi.org/10.1037/a0028046>
- Sacre, M., Albert, R., & Hoe, J. (2022). What are the experiences and the perceptions of service users attending Emergency Department for a mental health crisis? A systematic review. *International Journal of Mental Health Nursing*, 31(2), 400–423. <https://doi.org/10.1111/inm.12968>
- Schäfer, S. K., Becker, N., King, L., Horsch, A., & Michael, T. (2019). The relationship between sense of coherence and post-traumatic stress: A meta-analysis. *European Journal of Psychotraumatology*, 10(1), Article 1562839. <https://doi.org/10.1080/20008198.2018.1562839>
- Shalev, A. Y., Sahar, T., Freedman, S., Peri, T., Glick, N., Brandes, D., Orr, S. P., & Pitman, R. K. (1998). A prospective study of heart rate response following trauma and the subsequent development of posttraumatic stress disorder. *Archives of General Psychiatry*, 55(6), 553–559. <https://doi.org/10.1001/archpsyc.55.6.553>
- Shin, L. M., Orr, S. P., Carson, M. A., Rauch, S. L., Macklin, M. L., Lasko, N. B., Peters, P. M., Metzger, L. J., Dougherty, D. D., Cannistraro, P. A., Alpert, N. M., Fischman, A. J., & Pitman, R. K. (2004). Regional cerebral blood flow in the amygdala and medial prefrontal cortex during traumatic imagery in male and female Vietnam veterans with PTSD. *Archives of General Psychiatry*, 61(2), 168–176. <https://doi.org/10.1001/archpsyc.61.2.168>
- Spielberger, C. D., Gorsuch, R. L., & Lushene, R. E. (1970). *STAI manual*. Consulting Psychologists Press.
- Steward, T., Martínez-Zalacaín, I., Mestre-Bach, G., Sánchez, I., Riesco, N., Jiménez-Murcia, S., Fernández-Formoso, J. A., Veciana de Las Heras, M., Custal, N., Menchón, J. M., Soriano-Mas, C., & Fernandez-Aranda, F. (2022). Dorsolateral prefrontal cortex and amygdala function during cognitive reappraisal predicts weight restoration and emotion regulation impairment in anorexia nervosa. *Psychological Medicine*, 52(5), 844–852. <https://doi.org/10.1017/S0033291720002457>
- Sugisawa, H., Shinoda, T., Shimizu, Y., & Kumagai, T. (2021). Cognition and implementation of disaster preparedness among Japanese dialysis facilities. *International Journal of Nephrology*, 2021, Article 6691350. <https://doi.org/10.1155/2021/6691350>
- Thayer, J. F., Åhs, F., Fredrikson, M., Sollers, J. J., III, & Wager, T. D. (2012). A meta-analysis of heart rate variability and neuroimaging studies: Implications for heart rate variability as a marker of stress and health. *Neuroscience and Biobehavioral Reviews*, 36(2), 747–756. <https://doi.org/10.1016/j.neubiorev.2011.11.009>
- van Kessel, G. (2013). The ability of older people to overcome adversity: A review of the resilience concept. *Geriatric Nursing*, 34(2), 122–127. <https://doi.org/10.1016/j.gerinurse.2012.12.011>
- Weber, C. S., Thayer, J. F., Rudat, M., Wirtz, P. H., Zimmermann-Viehoff, F., Thomas, A., Perschel, F. H., Arck, P. C., & Deter, H. C. (2010). Low vagal tone is associated with impaired post stress recovery of cardiovascular, endocrine, and immune markers. *European Journal of Applied Physiology*, 109(2), 201–211. <https://doi.org/10.1007/s00421-009-1341-x>
- Yuan, Y., Wang, Z., Liu, M., & Shoham, S. (2020). Cortical hemodynamic responses induced by low-intensity transcranial ultrasound stimulation of mouse cortex. *NeuroImage*, 211, Article 116597. <https://doi.org/10.1016/j.neuroimage.2020.116597>
- Yurtsever, A., Bakalim, O., Karaman, Ş., Kaya, S., & Konuk, E. (2022). The effect of the online eye movement desensitization and reprocessing early intervention protocol (EMDR R-TEP) for the risk groups with post-traumatic stress symptoms during the COVID-19 pandemic. *Frontiers in Psychology*, 13, Article 935782. <https://doi.org/10.3389/fpsyg.2022.935782>

Received June 23, 2023

Revision received March 11, 2024

Accepted March 20, 2024 ■