

Community-Based Randomized Controlled Trial of Psychological First Aid With Crime Victims

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Objective: The first randomized controlled trial of psychological first aid (PFA) was conducted, using crime victims as participants. For study Aim 1, investigators tested whether paraprofessional victim advocates could be trained to deliver PFA to crime victims. For study Aim 2, investigators tested the effect of PFA delivery on victims' psychiatric (i.e., symptoms of PTSD, somatization, depression, anxiety, and substance use) and adaptive functioning outcomes. **Method:** Two law enforcement agencies served as study sites. A dynamic wait-listed design included a phase when advocates at both sites delivered usual services (US) to victims, a phase when one site was randomly selected to deliver PFA while the other delivered US, and a phase when both sites delivered PFA. Across all phases, 172 crime victims (mean age = 36.4 years; 81% female) were recruited, and a battery assessed their psychiatric symptoms and adaptive functioning at baseline and 1, 2, and 4 months postbaseline. **Results:** From the US to PFA phases, advocates' PFA adherence (i.e., their delivery of PFA components) increased significantly. PFA did not outperform US with regard to improvement on victims' individual psychiatric and adaptive functioning outcomes. However, on a composite global functioning outcome created for this trial, PFA yielded significantly greater improvement relative to US. **Conclusion:** Paraprofessional victim advocates have the capacity to deliver PFA. Conclusions regarding the effectiveness of PFA for crime victims vary depending on the nature of the scored outcome variable (individual vs. global), highlighting the importance of careful outcome measurement considerations in future research on PFA.

What is the public health significance of this article?



Paraprofessional victim advocates can feasibly deliver psychological first aid (PFA) to crime victims, and this brief intervention might yield improvement in victims' global functioning. PFA is designed for delivery soon after a traumatic event, with the goal of minimizing acute suffering and preventing future problems.

Keywords: victimization, crime, trauma, psychological first aid, early intervention

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This article reports results from a randomized controlled trial of an acute preventive intervention, psychological first aid (PFA),

implemented with victims of violent crime. Violent crime (defined as rape/sexual assault, physical assault, or armed robbery) is a

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serious public health problem. More than six million violent crimes were committed against U.S. citizens aged 12 years and older in 2018 (Morgan & Oudekerk, 2019). Fortunately, many victims experience only transient distress in the aftermath of a traumatic event (Bonanno, Westphal, & Mancini, 2011). However, a sizable minority (i.e., 6–13%) develop serious psychiatric problems (Breslau, 2009; Kilpatrick et al., 2013). The most common psychiatric outcomes of crime victimization include symptoms of posttraumatic stress disorder (PTSD; Dworkin, Menon, Bystrynski, & Allen, 2017; Santiago et al., 2013); somatization, depression, and/or anxiety (Eberhard-Gran, Schei, & Eskild, 2007; Taft, Resick, Watkins, & Panuzio, 2009); and substance use (Hedtke et al., 2008; Nayak, Lown, Bond, & Greenfield, 2012). When victims develop these problems, their symptoms tend to follow a chronic course and cause impairment in functioning (Hanson, Sawyer, Begle, & Hubel, 2010). One study reported that over 50% of adults with PTSD remained symptomatic over 3 years (Perkonig et al., 2005). Likewise, 50% of adults with a major depressive episode will have one or more recurrent episodes during their lifetime (Eaton et al., 2008). Further, individuals with PTSD and other psychiatric problems exhibit reduced work productivity and elevated unemployment (Greenberg, Fournier, Sisitsky, Pike, & Kessler, 2015; Zatzick et al., 2008), creating an obvious economic burden for individuals, families, and society.

The risk for negative outcomes among crime victims underscores the need for preventive interventions to mitigate that risk. For trauma victims who have already developed serious psychiatric problems, there are well-validated treatments available to trained clinicians (e.g., prolonged exposure, cognitive processing therapy; see Foa, Keane, Friedman, & Cohen, 2009). In addition, a few brief cognitive-behavioral interventions (containing elements of relaxation training, imaginal/in vivo exposure, and/or cognitive restructuring) have shown promise for victims who show persistent distress for several weeks postincident but who have not yet met the duration criterion for PTSD (see Agorastos, Marmar, & Otte, 2011; Forneris et al., 2013). In contrast, research has not yet validated any acute preventive interventions for use with crime victims prior to their development of significant problems. Such interventions would be implemented in short temporal proximity to a traumatic event with the aim of reducing risk for long-term psychiatric outcomes and costs (Roberts, Kitchiner, Kenardy, & Bisson, 2009).

The need for preventive interventions is particularly high given crime victims' underutilization of formal services. Próspero and Vohra-Gupta (2008) noted that only 16% of adults exposed to intimate partner violence sought help from a mental health professional. Sabina, Cuevas, and Schally (2012) reported a similarly low rate of help seeking in their representative sample of victimized Latino women, with only 10% reporting contact with social service professionals following the crime. In another study, Jaycox, Marshall, and Schell (2004) assessed service utilization among men hospitalized for an injury secondary to community violence. Although 34% of the sample had elevated PTSD symptoms at a 12-month follow-up, only 15% sought mental health treatment. Thus, despite availability of effective treatments for PTSD and related problems, few crime victims engage in formal services. As noted by McCart, Smith, and Sawyer (2010), barriers to service utilization include factors at the level of the individual (e.g., low perceived treatment need, limited transportation), com-

munity (e.g., few treatment programs available in proximity to victim), and service system (e.g., limited supply of trained clinicians, high cost of services). Considering these barriers, validation of acute preventive interventions seems critical. Further, even when treatments are readily available, preventive interventions might serve an important public health function. Specifically, symptoms might be easier to prevent than treat. In addition, preventive interventions could avert suffering and impairment during the time that victims spend with symptoms prior to accessing treatment.

Pertinent to the absence of acute preventive interventions for crime victims, researchers in the National Child Traumatic Stress Network (NCTSN) and at the National Center for PTSD developed PFA for individuals exposed to natural disasters or other catastrophic events (Brymer et al., 2006). PFA is comprised of eight components delivered by paraprofessionals soon after a traumatic event. The components are contact and engagement, stabilization, information gathering, safety and comfort, practical assistance, connection with social supports, information on coping, and linkage with collaborative services. PFA is rooted in research indicating that practical/social support soon after trauma exposure reduces distress and buffers against development of long-term problems (Brymer et al., 2006). Important for present purposes, experts assert that PFA likely has relevance for all types of trauma victims, including victims of crime (Gray & Litz, 2005; McNally, Bryant, & Ehlers, 2003). Further, unlike the treatments for already established psychiatric problems, PFA can be delivered by a paraprofessional workforce without specialized clinical training. Thus, PFA might fill the need for an acute intervention that reduces the severity and duration of crime-related distress. However, as described next, PFA's effectiveness has never been tested with any trauma-exposed group, highlighting the importance of the current study.

Leading experts (Gray & Litz, 2005; McNally et al., 2003) and several public health agencies, including the American Red Cross (*Lessons From Katrina and Other Major Disasters*, 2009) and the World Health Organization (2003), advocate for delivery of PFA to acute trauma victims. In addition, to facilitate dissemination of the model, the NCTSN developed a web-based PFA training course (NCTSN, 2019). Nevertheless, reviewers have noted that PFA's effectiveness has never been empirically tested (Dieljtens, Moonens, Van Praet, De Buck, & Vandekerckhove, 2014). At present, PFA is simply the "best guess" at what works. This lack of formal testing might be due to the logistical challenges with conducting intervention research in the context of unpredictable natural disasters (e.g., time invested waiting for event to occur, need for researchers that can travel to a disaster site at a moment's notice). However, in contrast to disaster victims, crime victims are a larger and more readily accessible population for research. Thus, an examination of PFA with crime victims might provide a unique opportunity to evaluate this promising, but currently untested, acute preventive intervention.

An evaluation of PFA is especially important given the negative effects associated with another once-advocated and widely disseminated preventive intervention, critical incident stress debriefing (CISD; Mitchell & Everly, 1996). CISD was initially developed for emergency service personnel who had experienced a traumatic event but was later applied to other trauma-exposed groups, including victims of crime (Marchand et al., 2006). The intervention

traditionally consists of a single group meeting where victims are encouraged to discuss their trauma-related cognitions and emotions. Although early studies suggested CISD held promise as an acute preventive intervention (Amir, Weil, Kaplan, Tocker, & Witztum, 1998; Yule, 1992), those studies suffered from methodological problems. More rigorous studies showed CISD was not effective at reducing acute psychiatric symptoms (Marchand et al., 2006; Mayou, Ehlers, & Hobbs, 2000). Moreover, in two randomized controlled trials, individuals assigned to receive CISD exhibited significantly higher levels of psychiatric symptoms at follow-up assessments relative to individuals assigned to the control group (Bisson, Jenkins, Alexander, & Bannister, 1997; Hobbs, Mayou, Harrison, & Worlock, 1996). PFA takes a different approach relative to CISD. Indeed, PFA reflects a form of robust case management with a focus on as-needed and individualized practical/social support. In contrast, CISD is more of a clinical intervention that encourages emotional processing in a group setting. Nevertheless, as revealed in the evaluations of CISD, rigorous testing of PFA is crucial in determining its safety (i.e., ruling out its potential to yield a paradoxical worsening of psychiatric symptoms) and effectiveness.

Thus, this study involved the first empirical test of PFA, using a sample of violent crime victims as participants (clinical trial registration NCT01934348). The project was conducted in collaboration with law enforcement agencies, the most common entry point for crime victims receiving acute services. Most law enforcement agencies in the United States employ paraprofessional law enforcement victim advocates (LEVAs) to provide victims with immediate assistance and support. LEVAs do not have a standardized intervention protocol. However, their services are characterized by key elements, such as addressing victims' basic needs, promoting safety, and serving as a resource for community referrals. Given the timing and nature of this interaction, LEVAs were selected as ideal providers of PFA for this study. That being said, the capacity of LEVAs to deliver PFA has not yet been empirically established. Hence, this trial had two aims. Aim 1 was to test whether LEVAs, as paraprofessionals, could be trained to deliver PFA. A key consideration was that LEVAs were likely to deliver—as part of their standard practice—some general components of PFA (e.g., assessing needs, making referrals for services). Likewise, LEVAs could not be required to deliver PFA, and the expected level of adoption was unknown. However, delivery of PFA was expected to increase following structured training. Aim 2 was to test the effect of PFA on key psychiatric (i.e., symptoms of PTSD, somatization, depression, anxiety, and substance use) and adaptive functioning (i.e., problems related to one's primary role [worker/student/homemaker] and social/leisure activities) outcomes in a sample of crime victims. The study hypotheses were as follows:

1. Following training in PFA, LEVAs will deliver more components of PFA relative to a usual services (US) control phase.
2. From baseline to a 4-month follow-up, crime victims receiving PFA will exhibit greater reductions in symptoms of PTSD, somatization, depression, anxiety, and substance use relative to crime victims receiving US.
3. From baseline to a 4-month follow-up, crime victims receiving PFA will exhibit greater reductions in problems related to their primary role and social/leisure activities relative to crime victims receiving US.

Method

Design

A start-up period involved development of PFA training and adherence monitoring protocols. Two law enforcement agencies (i.e., "sites") participated in the trial. With two sites, an important consideration was the method to allocate participants to intervention conditions. Randomization of crime victims was problematic due to contamination risk, specifically, from both services being delivered within each site (whether by a single or multiple LEVAs). Likewise, sites could not be randomized to *only* deliver PFA or US because, with site and condition being singular, the effect of PFA could not be disentangled from differences between sites. As illustrated in Figure 1, this challenge was addressed with a simplified version of a dynamic wait-listed design (Wyman, Henry, Knoblauch, & Brown, 2015). The design had three phases, each lasting 8 months. In the first phase, both sites delivered US, and crime victims were recruited and assessed at baseline and 1, 2, and 4 months postbaseline. At the beginning of the second phase, one site was randomly selected to be trained, monitored, and supported in the delivery of PFA, while the second site continued delivering US. At both sites, additional crime victims were recruited and assessed (baseline and 1, 2, and 4 months postbaseline). In the third phase, the second site was trained, monitored, and supported in the delivery of PFA. At both sites, additional victims were recruited and assessed, all receiving PFA. With this design, each crime victim received a single intervention, but the two sites, and all LEVAs, had longitudinal data for victims receiving either US or PFA. This has several benefits, the most important of which is the possibility to evaluate PFA's effect while controlling for site-specific effects.

Site and LEVA Characteristics

Site 1 was a county sheriff's office, and Site 2 was a police department in a nearby city. In the first calendar year of the trial, the violent crime rate was higher at Site 2 (182 victims per 100,000 residents) relative to Site 1 (134 victims per 100,000 residents). However, Sites 1 and 2 had similar annual operating budgets, and each site employed three LEVAs. All six of the LEVAs participated in the trial. They averaged 55.8 years of age ($SD = 4.1$, range = 50–60); 100% were female; 67% were White, and 33% were Black. In terms of education, one LEVA had a high school diploma only, one had an associate degree, one had a bachelor's degree, and three had master's degrees, all in criminal justice or related fields. LEVAs averaged 8 years of victim advocacy experience ($SD = 7.4$, range = 1–16).

Participants and Recruitment

Participants met the following criteria: (a) were aged 18 years or older; (b) were the victim of a recent rape/sexual assault, physical assault, and/or armed robbery; (c) sustained a physical injury or

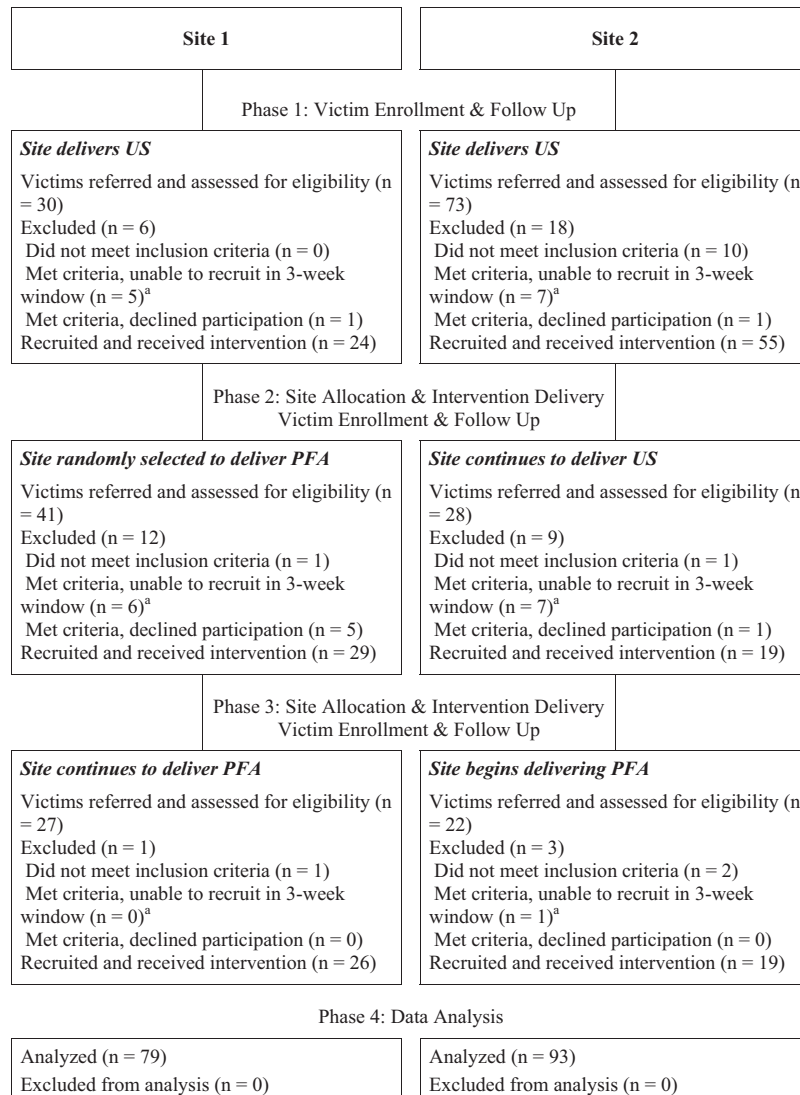


Figure 1. Dynamic wait-listed study design and participant enrollment. US = usual services; PFA = psychological first aid. Phases 1–3 were each 8 months in duration. ^a To ensure this study's focus on an acutely victimized sample, recruitment and baseline assessments needed to occur within a 3-week period following the index crime. The most common reason for being unable to recruit during that time frame was missed/canceled appointments (i.e., victim not attending a scheduled recruitment visit and then being unable to reschedule before the end of the 3-week window).

perceived life threat during the event; and (d) had the ability to understand English. Criterion (c) was chosen because injury and life threat are risk factors for psychiatric problems among victims of crime (Jaycox, Marshall, & Orlando, 2003; Weaver & Clum, 1995). To enhance generalizability, no victims were excluded based on preexisting mental health, physical health, or intellectual difficulties.

Figure 1 depicts the flow from enrollment through data analysis. Victims learned about the research during their first contact with a LEVA. Victims expressing interest were referred to project staff for a telephone-based eligibility screen. If inclusion criteria were met, an in-person appointment was scheduled to complete informed consent and the baseline assessment. Recruitment and

baseline assessment needed to occur within 3 weeks of the index crime. Across sites and enrollment phases, 221 crime victims were referred and screened by the researchers. Of those referrals, 206 victims met inclusion criteria. Of those meeting inclusion criteria, 172 were recruited (83.5% recruitment rate).¹ All 172 were included in the data analyses.

¹ Participating victims ($n = 172$) did not significantly differ from victims who either declined participation or were unreachable during the recruitment window ($n = 34$) with regard to demographic characteristics or index crime type (all p values $> .05$).

Participants averaged 36.4 years of age ($SD = 12.9$, range = 19–65), and 81% were female. The sample was 54% Black, 41% White, and 5% multiracial; 4% were Latino (of any race). Regarding the index crime, 51% experienced domestic violence, 42% aggravated assault, 4% sexual assault, and 3% armed robbery. Aside from the index crime, most participants (94%) reported having experienced at least one other potentially traumatic event (i.e., a violent crime or another type of event such as a serious accident) in their lifetime. The average number of lifetime traumatic events reported by participants was 4.69 ($SD = 2.19$, range = 1–10). A large proportion of the sample was socioeconomically disadvantaged; the median annual household income was in the \$10,000–\$15,000 range, median educational attainment was 12th grade, and 32% of participants were either unemployed or disabled. With the exception of age, there were no significant differences on demographic variables, index crime type, or trauma history across the two intervention conditions or the two sites (all p values $> .05$). For age, there were significant differences by condition and site, with those receiving PFA ($\beta = 5.910$, $SE = 1.963$, $p = .003$) and those at Site 2 ($\beta = 5.688$, $SE = 1.950$, $p = .004$) being significantly older.

Intervention Conditions

In both the US and PFA phases, LEVAs delivered their services to crime victims over the course of two to three interactions. These interactions occurred within two months of the crime event.

US. LEVAs at the two sites followed practices recommended by the [National Organization for Victim Assistance \(2019\)](#). Specifically, police reports were provided to LEVAs following a crime, and they attempted to contact victims within 24–48 hr. Once contact was made, LEVAs provided information to victims about their legal rights and the criminal justice system. In addition, LEVAs assessed victims' acute concerns. There was no standardized format for this assessment, and questions focused on basic needs and safety. A victim's basic needs (e.g., housing, food) were addressed through referral to social service agencies. Safety concerns were addressed via criminal justice interventions, including notifying the police about the potential for harm and assisting victims in filing orders of protection. Further, LEVAs assisted victims in completing victim compensation requests to cover costs pertaining to health care and lost/damaged property. LEVAs functioned independent of police officials and were not involved in investigation of the index crime.

PFA. PFA augmented LEVAs' typical services while also providing new tools and techniques. PFA has two tenets. First, the model assumes that many victims will demonstrate resilience and that services should only be provided to victims requesting assistance after a traumatic event. Second, for individuals who ask for help, the provision of basic support might reduce their distress and minimize risk for future problems. These assumptions are supported by theory-based models of resilience (e.g., [Bonanno et al., 2011](#)) and an empirical literature showing that areas targeted by PFA have potential to buffer the negative effects of trauma exposure ([Arnberg, Hultman, Michel, & Lundin, 2012](#); [Bonanno, Galea, Bucciarelli, & Vlahov, 2007](#); [Ozer, Best, Lipsey, & Weiss, 2003](#)).

The eight broad PFA components are described next, which include some strategies that are common to different intervention

approaches and others that are specific to PFA. Victim engagement and stabilization are prioritized. Subsequent areas are targeted based on needs identified via the information gathering component. Skills are taught using forms and handouts.

Contact and engagement. As paraprofessionals, LEVAs have not had opportunities to learn skills for facilitating engagement with trauma survivors (e.g., reflective and empathic listening, open vs. closed questioning, normalization). The contact and engagement component filled this gap by providing LEVAs with training in those core engagement techniques.

Stabilization (if needed). For victims in extreme distress, LEVAs normalized their acute reactions. Then, a "grounding" exercise was used to orient the victim to the present by asking the individual to sit in a comfortable position, breathe slowly, and focus on nondistressing visual, auditory, and/or physical cues. If extreme distress persisted, LEVAs were prepared to link victims with services from a medical or mental health professional; however, such immediate linkage was never necessary for participants in the current trial.

Information gathering. In contrast to usual LEVA services, this component provided a structured form for conducting a thorough needs assessment. The PFA screening form covered problem areas common to victims of crime, including safety concerns, unmet basic needs, financial/legal issues, low social support, physical/mental health concerns, and problematic substance use. LEVAs chose which (if any) of the remaining five PFA components to deliver, based on information obtained during this structured assessment.

Safety and comfort. As needed, LEVAs worked to promote safety and reduce future victimization risk. If dangerous situations were identified, LEVAs helped victims develop safety plans. LEVAs reviewed these plans and offered visual cues (e.g., reminder card to place in purse/wallet) to increase the probability that they would be implemented at the appropriate time. LEVAs also verified that victims had a safe place to reside and referred them to relevant agencies (e.g., domestic violence shelters) as needed. Safety planning also included strategies to address suicide/homicide. If an individual was deemed at risk for suicide/homicide, LEVAs were prepared to take immediate action (e.g., facilitating the individual's transport to a hospital for a formal assessment, notifying potential victims in the event of homicidal plans).

Practical assistance. LEVAs provided victims with (as-needed) practical assistance. Such assistance included information on legal advocacy; contact information for agencies that provide short-term housing, food, financial assistance, and/or mental health/substance use counseling; information on individuals' eligibility for crime victim compensation; and phone numbers for relevant emergency and victim service agencies.

Connection with social support. This component helped victims establish contacts with primary support persons. LEVAs began by educating victims on the benefits of social support (e.g., emotional comfort, assistance with basic needs). LEVAs then determined victims' preferred sources of support (e.g., partner, family members) and assisted victims in initiating and maintaining regular contact with those individuals. When developing a plan, LEVAs helped victims consider when and how they would contact their support persons and what they would say once contact was made. Victims were encouraged to implement their social support plan once it was finalized. LEVAs contacted victims at a later date

to determine effectiveness of the plan, problem-solve barriers, and revise the plan as needed.

Information on coping. LEVAs used structured handouts to educate victims about common reactions to trauma, which aimed to validate their experiences, normalize emotions, and dispel faulty beliefs. In addition, LEVAs provided information and instruction on adaptive coping techniques (e.g., deep breathing, prosocial activity scheduling, helpful vs. unhelpful thinking). Finally, victims were discouraged from engaging in coping methods that are potentially harmful, such as substance use and withdrawal from family and friends.

Linkage with collaborative services. If victims experienced ongoing needs (e.g., persistence of distressing emotions for several weeks following the crime), LEVAs linked victims with professional services in the community. LEVAs provided written referral information and assisted victims in making appointments.

Training and Sustaining PFA Implementation

LEVAs received a PFA intervention manual and participated in a 2-day workshop. The first workshop, at Site 1, was led by the first and third authors, with on-site support from two PFA developers (Patricia Watson and Josef Ruzek). The second workshop, at Site 2, was conducted by the first and third authors, with telephone consultation from Dr. Watson and Dr. Ruzek. Both workshops included didactic instruction and experiential role-plays aimed at orienting LEVAs to program philosophy and intervention methods.

Following each workshop, the first and third authors held bi-weekly group supervision sessions with the trained LEVAs. These sessions were 1 hr in length and provided LEVAs the opportunity to describe their efforts at implementing PFA with crime victims, problem-solve challenges, and share lessons learned. LEVAs also audio recorded a small portion of their PFA sessions with participating victims. Following qualitative review of these audio recordings, the first and third authors provided LEVAs with individualized feedback on their PFA delivery.

Instruments

Implementation outcome. A new instrument was created to measure PFA adherence. The development of this instrument was guided by the *Standards for Educational and Psychological Testing* (American Educational Research Association, American Psychological Association, & National Council on Measurement in Education, 2014) and associated recommendations based on item response theory (IRT; Wilson, 2005; Wolfe & Smith, 2007). The instrument was intended to measure the delivery of PFA components. However, an important consideration was that some components of PFA could be delivered as part of usual LEVA services. To address this, PFA adherence was measured in both the US and PFA phases. The resulting scores were used to evaluate the impact of PFA training, specifically, by comparing the standard level of delivery (i.e., US phase) to the level—among the same LEVAs—after completing structured training (i.e., PFA phase). The instrument was developed for LEVAs to self-report their use of PFA components as a formal observational coding system was beyond the resources of this project. Although this is a limitation, several strategies were implemented to attenuate the impact of self-report

bias: (a) LEVAs completed the instrument immediately following each contact with a victim; (b) a straightforward dichotomous response format was used to reflect whether each component was delivered (i.e., 0 = no, 1 = yes); (c) LEVAs were trained on the intended use of the instrument, including the definition of each item; (d) a full range of PFA components was specified, with some endorsable even for low levels of adherence; (e) reports were obtained from the same LEVAs across both US and PFA phases of the study; and (f) components specific to PFA and not available during US—such as forms and handouts provided at the time of PFA training—were not administered during US and were scored as “not delivered.”

Additional details on the instrument development procedures, the final instrument, and a description of the psychometric evaluation are provided in the [online supplemental material](#). As detailed in that material, the sample for the PFA phase was comprised of study participants, but the sample for the US phase was comprised of de-identified victims. Because it was not possible to link de-identified victims to repeated adherence reports, the analyses (across phases) were based on data from the first contact between each victim and LEVA. The final instrument was comprised of 34 items. Of these, 20 could occur in PFA or as part of US (e.g., “asked the individual about needs/concerns,” “made a referral to a service provider”), and the remaining 14 were specific to PFA (e.g., “administered the PFA screening form,” “completed one or more of the PFA safety plans”). The instrument’s psychometric performance was evaluated using IRT-based Rasch (Bond & Fox, 2015) and bifactor (Gibbons et al., 2007) measurement models. Dimensionality analyses supported a single dimension of PFA adherence. Reliability was strong, with internal consistency and Rasch person separation reliability estimates of $\alpha = .90$ and $R_p = .86$, and the items were suitable for differentiating three distinct levels of PFA adherence. Item fit statistics identified three items characterized by unpredictable responses. However, because their removal had minimal impact on the resulting scores and their content was critical to assess, these items were retained in the final model. In the models reported subsequently, PFA adherence scores are continuous Rasch-based logit scores, with higher values reflecting delivery of more PFA components, and vice versa.

Intervention outcomes. Participating crime victims completed an assessment battery measuring the psychiatric and adaptive functioning outcomes. Instruments included in this battery are described next.

PTSD symptoms. Victims’ PTSD symptoms were assessed using the National Stressful Events PTSD Survey (NSEPS; Kilpatrick et al., 2013). This 20-item instrument includes subscales corresponding to the intrusion, avoidance, cognitions and mood, and arousal clusters of PTSD, as delineated in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 2013). Respondents rate how much they are bothered by symptoms corresponding to each cluster using a Likert-type scale with the following response options: 0 = *not at all*, 1 = *a little bit*, 2 = *moderately*, 3 = *quite a bit*, and 4 = *extremely*. The NSEPS has good internal consistency (Cronbach’s $\alpha = .94$), and it correlates highly ($r = .82$) with other measures of PTSD (M. W. Miller et al., 2013).

Somatization, depression, and anxiety symptoms. Victims also completed the 18-item Brief Symptom Inventory (BSI-18; Derogatis, 2000). This instrument yields three norm-referenced

subscales: Somatization, Depression, and Anxiety. The BSI-18 is well validated, and it correlates highly ($r_s > .90$) with the longer, 53-item version of the measure (Derogatis, 2000).

Substance use. Victims' substance use was assessed using the Addiction Severity Index-Self-Report (ASI-SR; Rosen, Henson, Finney, & Moos, 2000). The 11-item Alcohol and Drug Use module yields scores reflecting problematic alcohol and drug use. The ASI-SR has strong psychometric properties, and the Alcohol and Drug Use module correlates highly ($r_s = .73-.87$) with corresponding ASI interview scores (Rosen et al., 2000).

Adaptive functioning. Victims' adaptive functioning was measured with the Social Adjustment Scale-Self Report (SAS-SR; Weissman & Bothwell, 1976). Using a Likert-type scale ranging from 1 to 5, respondents rate their perceived performance in their primary role as a worker, student, or homemaker. In addition, questions assess satisfaction with social relationships and leisure activities. Mean scores are generated for the Primary Role and Social and Leisure Problems subscales, with higher scores indicative of worse functioning. The SAS-SR has good test-retest reliability ($r = .74$; Resick, Calhoun, Atkeson, & Ellis, 1981), correlates highly with clinician ratings ($r = .70$; Weissman & Bothwell, 1976), and differentiates psychiatric and well patients (Weissman, Olfson, Gameroff, Feder, & Fuentes, 2001).

Composite global functioning. Across the abovementioned individual intervention outcomes, a combination of problem areas—or only a single area—could be applicable for each crime victim. This presented a potential challenge for evaluating PFA. For example, the interpretation of PFA's effect would differ for a victim reporting low PTSD symptoms at the final (4-month) assessment if, at baseline, the victim's PTSD symptoms had been high versus low. Likewise, victims with elevated symptoms in multiple areas likely would be more severe than victims with elevated symptoms in only a single area. To address these challenges, methods from IRT were used to develop a composite global functioning outcome to reflect overall problem severity and to apply across victims. For each abovementioned study outcome (i.e., Intrusion, Avoidance, Cognitions and Mood, and Arousal subscales from NSEPS; Somatization, Depression, and Anxiety subscales from BSI-18; Alcohol and Drug Use module from ASI-SR; Primary Role and Social and Leisure Problems subscales from SAS-SR), a clinical versus nonclinical threshold was defined, resulting in 10 dichotomous indicators. Because most crime victims were expected to present with elevated symptoms and then recover to a subclinical level of functioning, the thresholds were applied in the direction of improved functioning (i.e., 0 = clinical, 1 = subclinical). The indicators were evaluated using item bifactor measurement models (Gibbons et al., 2007; Reise, Moore, & Haviland, 2010) implemented in IRTPRO software (Cai, Thissen, & du Toit, 2015). The results determined that, when combined, the indicators measured a general construct rather than the respective source constructs. The one exception was the ASI-SR, which loaded weakly on the general construct and was removed from the model. Across measurement occasions, the resulting global functioning scores had an average reliability of .62. For analysis, the global functioning scores were logit-based expected a posteriori measures from the general dimension of the bifactor model. Additional details regarding the development and psychometric evaluation of the composite global functioning outcome are available in the online supplemental material. Table 1 presents descriptive

data for the proportion of crime victims scoring at the subclinical level on each global functioning indicator by phase, site, and time.

Procedure

As noted previously, LEVAs completed the PFA adherence instrument following each contact with a victim. Trained researchers administered assessments to the participating crime victims. At baseline, victims completed the NSEPS, BSI-18, and ASI-SR, in addition to instruments measuring participants' demographic characteristics and lifetime traumatic event exposure.² For the NSEPS, BSI-18, and ASI-SR, the reporting window at baseline was "since the index crime." Subsequent assessments completed by victims at the 1-, 2-, and 4-month follow-ups repeated the baseline instruments, except the demographics and trauma exposure surveys, and added the SAS-SR. The reporting window at the follow-up assessments was "past 30 days." Most victims (86%) completed the baseline assessment within 2 weeks of the index crime. The mean duration between the crime and baseline assessment was 8.3 days ($SD = 6.7$). Regarding retention, 90%, 85%, and 81% of participants completed assessments at the 1-, 2- and 4-month follow-ups, respectively. Victims were compensated \$25 for completing each assessment. Researchers administering assessments were blind to intervention condition. Study procedures were approved by the institutional review board at the Medical University of South Carolina.

Data Analysis Strategy

Two types of prediction models were performed, the first evaluating the impact of PFA training on adherence and the second evaluating the effect of PFA on crime victim outcomes. Recalling that LEVAs were not required to adopt PFA and that some components of PFA could be delivered as part of usual LEVA services, tests for the impact of training on PFA adherence required consideration of PFA components delivered in both the US and PFA phases. A Rasch measurement model was formulated as a hierarchical generalized linear measurement model (e.g., Beretvas & Kamata, 2005; Kamata, 2001)—a two-level mixed-effects formulation, with item responses (Level 1) nested within crime victims (Level 2). At Level 1, dummy-coded indicators differentiated the items (with one serving as a reference item). This, combined with a Bernoulli outcome distribution and logit link function, replicates the item and person parameters of the standard Rasch model (of note, prior to analysis, the item responses were reverse-coded so the direction of item parameters matches that for IRT models). Simultaneously, the model permits inclusion and evaluation of predictor variables at the level of crime victims. In this case, a dichotomous indicator was included to reflect the intervention received (US = 0, PFA = 1). At Level 2, a dichotomous indicator differentiated victims in the PFA and US phases. The model was then extended to control for systematic differences across sites and, in a separate model, differences across LEVAs. The latter was important because LEVAs self-reported their delivery of PFA

² A demographics survey was created for this project. Lifetime traumatic event exposure was assessed using the well-validated Trauma Assessment for Adults (Gray, Elhai, Owen, & Monroe, 2009; Resnick, Best, Kilpatrick, Freedy, & Falsetti, 1993).

Table 1
Proportion of Crime Victims Scoring at the Subclinical Level on Each Global Functioning Indicator by Phase, Site, and Time

Outcome	Site 1								Site 2							
	US phase				PFA phase				US phase				PFA phase			
	M0	M1	M2	M4	M0	M1	M2	M4	M0	M1	M2	M4	M0	M1	M2	M4
NSEPS																
Intrusion	0.21	0.54	0.71	0.73	0.20	0.57	0.68	0.79	0.32	0.65	0.70	0.77	0.16	0.59	0.78	0.87
Avoidance	0.33	0.67	0.63	0.77	0.44	0.49	0.75	0.79	0.36	0.62	0.74	0.80	0.32	0.76	0.78	0.87
Cognitions	0.46	0.58	0.67	0.86	0.44	0.74	0.80	0.86	0.36	0.76	0.82	0.83	0.26	0.71	1.00	0.80
Arousal	0.33	0.54	0.58	0.73	0.42	0.55	0.70	0.79	0.39	0.64	0.75	0.78	0.26	0.59	0.89	0.93
BSI-18																
Somatization	0.67	0.58	0.71	0.82	0.58	0.85	0.82	0.83	0.72	0.82	0.84	0.83	0.58	0.76	0.83	0.80
Depression	0.63	0.71	0.71	0.77	0.60	0.85	0.77	0.81	0.58	0.79	0.75	0.82	0.58	0.88	1.00	0.93
Anxiety	0.54	0.67	0.75	0.77	0.53	0.74	0.77	0.81	0.58	0.79	0.82	0.87	0.47	0.82	0.83	1.00
SAS-SR																
Primary Role Problems		0.96	1.00	0.95		0.93	0.95	1.00		0.97	0.98	0.90		0.94	1.00	1.00
Social and Leisure Problems		0.79	0.83	0.86		0.89	0.84	0.95		0.92	0.95	0.93		1.00	1.00	1.00

Note. M = month; PFA = psychological first aid; US = usual services; NSEPS = National Stressful Events PTSD Scale; BSI-18 = Brief Symptom Inventory 18; SAS-SR = Social Adjustment Scale-Self Report.

components. This model compared the overall level of PFA adherence in the PFA phase to that, among the same LEVAs, in the US phase.

For victim outcomes, the sample included all crime victims who were study participants across the US and PFA phases. Each outcome was evaluated using a two-level mixed-effects regression model (Raudenbush & Bryk, 2002), with a maximum of four repeated measurements (Level 1) nested within crime victims (Level 2). To test for change over time, linear and quadratic polynomial terms were included at Level 1. For each crime victim, a PFA indicator was included to reflect the intervention received, as well as the site indicator, and cross-level interactions were specified between these indicators and the Level-1 time terms. Controlling for site-specific effects, this formulation tests for an overall difference between PFA and US in the initial level, early rate of change, and acceleration of change over time in victim outcomes.³ Because of the high proportion of female participants (i.e., 81%), exploratory follow-up models were performed with male participants excluded from the sample. Likewise, for the global functioning outcome, the formulation was extended to include an interaction between the PFA indicator and site indicator. This tested for (a) differences between sites in their change from the US to PFA phase, (b) change from the US to PFA phase for each site, and (c) differences between the sites in the US and PFA phases. The models were performed using HLM software (Raudenbush, Bryk, & Congdon, 2013). Random effects were specified using the deviance test, and to obtain all comparisons of interest, planned contrasts were specified using the hypothesis testing interface.

Results

Effect of Training on PFA Adherence

Controlling for differences across LEVAs, PFA adherence scores were significantly higher for crime victims in the PFA phase relative to the US phase, $\beta = 1.150$, $SE = 0.214$, $t(276) = 5.36$, $p < .001$, 95% CI [0.729, 1.570], $OR = 3.16$. In an uncon-

trolled model, as well as a model controlling for differences across sites, the estimates were highly consistent and statistically significant. A follow-up model tested whether the two sites differed on their change in PFA adherence from the US to the PFA phase. The two sites did not differ significantly during the US phase, $\beta_{\text{Site2}} = 0.079$, $SE = 0.188$, $t(280) = 0.418$, $p = .677$, [-0.289, 0.447], $OR = 1.08$. From the US phase to the PFA phase, PFA adherence increased significantly for both sites, $\beta_{\text{Site1}} = 0.935$, $SE = 0.261$, $t(280) = 3.58$, $p < .001$, [0.423, 1.446], $OR = 2.55$, $Est_{\text{Site2}} = 2.130$, $SE = 0.414$, $\chi^2(1) = 26.44$, $p < .001$, [1.318, 2.942], $OR = 8.41$, but the increase was significantly greater for Site 2, $\beta = 1.195$, $SE = 0.497$, $t(280) = 2.41$, $p = .017$, [0.221, 2.170], $OR = 3.30$. To highlight these effects, raw scores were computed. During the US phase, and for an average first contact, Sites 1 and 2 delivered 27% and 30% of the PFA components, and during the PFA phase, their delivery increased to 39% and 54%, respectively.

Primary Intervention Outcomes

NSEPS. Results are reported in Table 2. At baseline, PFA and US did not differ significantly on Intrusion, Avoidance, Cognition, or Arousal. Crime victims receiving US had significant early reductions (i.e., linear change) in each domain, and for Intrusion only, there was significant slowing of change over time. Crime victims receiving PFA had significant early reductions and slowing of change over time in each domain. PFA and US did not differ significantly on linear or quadratic change across the four domains. When restricting the sample to the subset of female victims, conclusions did not change.

BSI-18. Results are reported in Table 3. At baseline, crime victims receiving PFA and US did not differ significantly on any of the BSI-18 subscales. The US group had statistically significant early reductions (i.e., linear change) in Anxiety that slowed significantly over time (quadratic change), but Depression and Som-

³ Of note, preliminary models included controls for victim age; however, conclusions about the effect of PFA did not change, and for parsimony, this term was omitted from the final models.

Table 2
Results of Mixed-Effects Regression Models Testing for Differences in PTSD Symptoms by Phase and Site

Term	Intrusion			Avoidance			Cognitions			Arousal		
	Coeff.	SE	p	Coeff.	SE	p	Coeff.	SE	p	Coeff.	SE	p
Baseline												
Intercept	2.119	0.189	<.001	2.425	0.213	<.001	1.721	0.165	<.001	1.842	0.153	<.001
PFA phase	-0.042	0.198	.833	-0.148	0.214	.489	-0.076	0.178	.671	-0.089	0.163	.585
Site 2	-0.173	0.198	.383	-0.088	0.216	.685	0.001	0.177	.994	-0.181	0.162	.265
Linear												
Month	-0.860	0.154	<.001	-0.611	0.224	.007	-0.403	0.157	.011	-0.408	0.128	.002
PFA phase	0.088	0.153	.566	-0.124	0.227	.585	-0.194	0.152	.203	-0.008	0.121	.947
Site 2	0.057	0.154	.710	-0.240	0.225	.286	-0.305	0.153	.049	-0.148	0.126	.240
Quadratic												
Month	0.140	0.030	<.001	0.074	0.050	.143	0.040	0.034	.245	0.053	0.027	.050
PFA phase	-0.033	0.031	.297	0.033	0.053	.530	0.048	0.032	.138	-0.002	0.026	.922
Site 2	-0.004	0.031	.911	0.060	0.052	.247	0.077	0.033	.019	0.037	0.027	.161
Planned contrasts												
Term	Est.	SE	p	Est.	SE	p	Est.	SE	p	Est.	SE	p
PFA phase												
Linear	-0.772	0.122	<.001	-0.735	0.188	<.001	-0.597	0.116	<.001	-0.416	0.085	<.001
Quadratic	0.107	0.027	<.001	0.107	0.044	.015	0.088	0.025	<.001	0.051	0.018	.006
Variance components												
Term	Var.	SD	p	Var.	SD	p	Var.	SD	p	Var.	SD	p
Error	0.372	0.610		0.964	0.982		0.255	0.505		0.237	0.487	
Linear	0.265	0.515	.001	^a			0.352	0.593	<.001	0.186	0.431	.001
Quadratic	0.006	0.079	.082	^a			0.011	0.107	<.001	0.005	0.068	.109
Intercept	1.073	1.036	<.001	0.729	0.854	<.001	0.960	0.980	<.001	0.734	0.857	<.001

Note. PFA = psychological first aid; Coeff. = coefficient; SE = standard error; Est. = estimate; Var. = variance. Due to space limitations, 95% confidence intervals are not reported, but for each coefficient/estimate, they can be computed as coefficient \pm 1.96 \times SE.

^aThis term was modeled as a fixed effect only.

atization did not change significantly over time. In contrast, PFA had significant early reductions and slowing over time for all three subscales (with the exception of quadratic change in Somatization). PFA and US did not differ significantly on linear or quadratic change across the subscales. For the female subset, the PFA group had significantly greater early reductions in Depression ($\beta_{Lin} = -4.059$, $SE = 1.991$, $p = .043$) and Somatization ($\beta_{Lin} = -4.478$, $SE = 1.906$, $p = .020$), along with more rapid slowing of change in Somatization ($\beta_{Quad} = 0.856$, $SE = 0.411$, $p = .039$) relative to the US group.

ASI-SR. At baseline, PFA and US did not differ significantly on the log-odds of substance use ($\beta_{PFA} = -0.621$, $SE = 0.588$, $p = .293$). For the US group, linear and quadratic change over time were not significant ($\beta_{Lin} = 0.271$, $SE = 0.588$, $p = .645$; $\beta_{Quad} = -0.051$, $SE = 0.123$, $p = .680$), as was the case for the PFA group (Est._{Lin} = 0.085, $SE = 0.422$, $p > .500$; Est._{Quad} = 0.003, $SE = 0.101$, $p > .500$). PFA and US did not differ significantly on linear or quadratic change ($\beta_{Lin} = -0.186$, $SE = 0.586$, $p = .751$; $\beta_{Quad} = 0.053$, $SE = 0.126$, $p = .672$). Conclusions were consistent for the subset of female victims.

SAS-SR. As noted previously, the SAS-SR was not administered at baseline, and as such, the models tested for change across Months 1, 2, and 4. Results are reported in Table 4. At Month 1, PFA and US did not differ significantly on the Primary Role or Social and Leisure Problems subscales. For both groups, linear and

quadratic change over time were not statistically significant. Likewise, the groups did not differ significantly on linear or quadratic change. Conclusions were consistent for the subset of female victims.

Composite Global Functioning Outcome

Controlling for differences across sites, at baseline, crime victims receiving PFA and US did not differ significantly on the average level of global functioning, $\beta = -0.117$, $SE = 0.137$, $t(169) = -0.85$, $p = .395$, 95% CI [-0.386, 0.152]. For the US group, global functioning improved significantly over time, with positive linear and negative quadratic slopes, $\beta_{Lin} = 0.390$, $SE = 0.111$, $t(169) = 3.52$, $p = .001$, [0.172, 0.608], $\beta_{Quad} = -0.057$, $SE = 0.024$, $t(169) = -2.43$, $p = .016$, [-0.104, -0.010]. For the PFA group, the linear and quadratic terms also were statistically significant, Est._{Lin} = 0.632, $SE = 0.082$, $\chi^2(1) = 59.53$, $p < .001$, [0.471, 0.793], and Est._{Quad} = -0.100, $SE = 0.018$, $\chi^2(1) = 31.87$, $p < .001$, [-0.135, -0.065]. For both groups, these terms reflect rapid early gains in global functioning that slow over time. Tests for the PFA intervention effect—differences between PFA and US on linear and quadratic change—indicated that, relative to US, early gains in global functioning were significantly more rapid for PFA, $\beta_{Lin} = 0.242$, $SE = 0.110$, $t(169) = 2.21$, $p = .029$, [0.026, 0.458]. The PFA and US groups did not differ on the

Table 3

Results of Mixed-Effects Regression Models Testing for Differences in Somatization, Depression, and Anxiety Symptoms by Phase and Site

Term	Somatization			Depression			Anxiety		
	Coeff.	SE	<i>p</i>	Coeff.	SE	<i>p</i>	Coeff.	SE	<i>p</i>
Baseline									
Intercept	54.540	1.920	<.001	57.859	1.809	<.001	61.398	2.099	<.001
PFA phase	2.061	2.100	.328	0.930	1.997	.642	-0.090	2.352	.970
Site 2	0.529	2.068	.799	-0.698	1.978	.725	-1.256	2.311	.587
Linear									
Month	-0.545	1.575	.730	-2.217	1.731	.202	-7.976	1.815	<.001
PFA phase	-3.112	1.722	.073	-2.825	1.780	.114	0.070	1.906	.971
Site 2	-3.548	1.694	.038	-1.534	1.779	.390	-0.539	1.899	.777
Quadratic									
Month	-0.141	0.335	.675	0.242	0.379	.525	1.391	0.378	<.001
PFA phase	0.657	0.368	.076	0.455	0.388	.242	-0.187	0.400	.640
Site 2	0.884	0.360	.015	0.303	0.388	.436	0.080	0.395	.840
Planned contrasts									
Term	Est.	SE	<i>p</i>	Est.	SE	<i>p</i>	Est.	SE	<i>p</i>
PFA phase									
Linear	-3.656	1.292	.004	-5.042	1.356	<.001	-7.906	1.454	<.001
Quadratic	0.516	0.269	.052	0.697	0.289	.015	1.204	0.299	<.001
Variance components									
Term	Var.	SD	<i>p</i>	Var.	SD	<i>p</i>	Var.	SD	<i>p</i>
Error	37.93	6.16		36.11	6.01		40.18	6.34	
Linear	34.58	5.88	<.001	48.54	6.97	<.001	63.97	8.00	<.001
Quadratic	0.80	0.89	.055	1.58	1.26	<.001	1.79	1.34	.001
Intercept	102.36	10.12	<.001	112.97	10.63	<.001	163.32	12.78	<.001

Note. PFA = psychological first aid; Coeff. = coefficient; SE = standard error; Est. = estimate; Var. = variance. Due to space limitations, 95% confidence intervals are not reported, but for each coefficient/estimate, they can be computed as coefficient $\pm 1.96 \times SE$.

slowing of change in global functioning over time, $\beta_{\text{Quad}} = -0.043$, $SE = 0.024$, $t(169) = -1.81$, $p = .072$, $[-0.090, 0.004]$.

A follow-up model was performed with an interaction added between site and phase, testing whether slopes differed by site (across phases), by phase (across sites), or both. The results are reported in Table 5, and there were significant differences in two cases: For Site 2, the linear slope was significantly more positive in the PFA phase than the US phase (see Site 2: PFA vs. US), and in the PFA phase, the linear slope for Site 2 was more positive than the linear slope for Site 1 (at a borderline level of significance; see PFA phase: Site 2 vs. 1).

Discussion

This study represents the first empirical test of PFA, using a sample of violent crime victims as trial participants. The first aim was to test the effectiveness of a PFA training protocol with LEVAs. As noted, LEVAs were expected to deliver some general elements of PFA as part of their standard practice. However, following training in PFA, we expected LEVAs to deliver more elements of the model. Consistent with that expectation, LEVAs at the two sites delivered a significantly higher percentage of PFA components during the PFA phase (39–54%) than they did during the US phase (27–30%). To understand this modest increase, there

are important considerations. First, the adherence levels were based on a single interaction between each LEVA and victim. This was necessary because interactions in the US phase were de-identified. However, for the PFA phase, adherence data were available for multiple interactions between LEVAs and victims. Across those multiple interactions (PFA phase only), the descriptive level of overall adherence was higher at 62–68%. Second, the PFA protocol does not intend for all components to be delivered during each interaction; indeed, this would be problematic. This highlights a common challenge with measuring adherence to interventions that, by definition, are flexible in the timing and frequency of component delivery (Schoenwald et al., 2011). Third, LEVAs were not obligated to adopt PFA. On the one hand, the trial aimed to provide a rigorous test of PFA, and on the other, it occurred in a real-world setting, with the intervention delivered by paraprofessionals. LEVAs were not hired by the study, nor were they required to deliver the model. Finally, a strength of our design was that the same LEVAs had adherence data for the US and PFA phases, and as such, the observed increase in adherence was not simply attributed to existing differences across independent samples of LEVAs. Generally, these findings support the effectiveness of the PFA training protocol and indicate that LEVAs have the capacity to deliver this intervention. However, the increase in delivery of components was modest, and for future efforts, this

Table 4
Results of Mixed-Effects Regression Models Testing for Differences in Adaptive Functioning by Phase and Site

Term	Primary Role			Social and Leisure		
	Coeff.	SE	p	Coeff.	SE	p
Baseline						
Intercept	1.777	0.099	<.001	2.317	0.116	<.001
PFA phase	-0.078	0.111	.485	-0.176	0.106	.098
Site 2	-0.182	0.108	.096	-0.272	0.109	.014
Linear						
Month	-0.095	0.153	.533	-0.060	0.145	.679
PFA phase	-0.021	0.174	.904	0.026	0.139	.854
Site 2	0.027	0.174	.876	-0.013	0.142	.926
Quadratic						
Month	0.030	0.045	.502	0.007	0.043	.861
PFA phase	0.002	0.052	.964	-0.011	0.042	.789
Site 2	0.004	0.052	.941	0.015	0.043	.733
Planned contrasts						
Term	Est.	SE	p	Est.	SE	p
PFA phase						
Linear	-0.116	0.132	>.500	-0.034	0.103	>.500
Quadratic	0.032	0.039	>.500	-0.004	0.032	>.500
Variance components						
Term	Var.	SD	p	Var.	SD	p
Error	0.253	0.503		0.143	0.378	
Intercept	0.116	0.341	<.001	0.180	0.425	<.001

Note. PFA = psychological first aid; Coeff. = coefficient; SE = standard error; Est. = estimate; Var. = variance. Due to space limitations, 95% confidence intervals are not reported, but for each coefficient/estimate, they can be computed as coefficient $\pm 1.96 \times SE$.

warrants further attention to ongoing training and supervision practices as well as adherence measurement methods.

The second aim was to test the effect of PFA on crime victims' psychiatric symptoms and adaptive functioning. Across each primary intervention outcome, the PFA and US groups did not differ significantly with regard to linear or quadratic change, suggesting a lack of intervention effects. One exception is that when the sample was limited to women only, the PFA group had significantly greater early reductions in depression and somatization symptoms and a more rapid slowing of change in somatization symptoms relative to the US group. Secondary analyses examined the effect of PFA on a composite global functioning outcome. When interpreting the results for each of the primary intervention outcomes, we realized an important limitation—each outcome was potentially applicable to only a subgroup of victims. To describe the effect of PFA, or even change over time for the PFA group, our interpretations highlighted that the baseline level of each outcome could be anywhere from high to low. Further, we realized that, for a given victim, baseline levels could fluctuate from outcome to outcome. This highlighted the value of a global outcome that would apply equally across victims. Results indicated that victims receiving PFA demonstrated significantly greater linear change (i.e., early gains) in global functioning over time relative to victims receiving US. In terms of clinical significance, and as illustrated in Figure 2, both the PFA and US groups—within 2 months of the

index event—had achieved their highest levels of global functioning. However, for victims receiving PFA, the gains occurred more quickly and reached a higher level, which was maintained through 4 months postbaseline, than for victims receiving US. As an example, this is reflected by the rates of subclinical functioning on the anxiety indicator (see Table 1), which, for both conditions and sites, reflected rapid gains from baseline to Month 1. However, by Month 4 and in both sites, the rates were higher for victims receiving PFA. This pattern tends to hold, though modestly in some cases, across each global functioning indicator.

Of note, follow-up models indicated that the early gains in global functioning associated with PFA were significantly greater at Site 2 compared to Site 1. Perhaps related to this, Site 2 also demonstrated a greater increase in, and a higher absolute level of, PFA adherence relative to Site 1. These findings are consistent with research on other behavioral interventions, which has demonstrated the importance of high protocol adherence in achieving good clinical outcomes (e.g., Feeley, DeRubeis, & Gelfand, 1999; Henggeler, Melton, Brondino, Scherer, & Hanley, 1997; Hogue et al., 2008). In the current study, LEVAs were observed to meet moderate levels of PFA adherence, with some variability across LEVAs and sites. However, the training and support procedures used in this trial were intensive. The initial training was conducted in a workshop format. Yet it became evident that additional training would be required to achieve proficiency with the model. This is not surprising as there is a large literature on the failure of the “train and hope” approach to teaching behavioral interventions

Table 5
Results of Mixed-Effects Regression Models Testing for Differences in Global Functioning by Phase and Site

Term	Coeff.	SE	p	95% CI
Baseline				
Intercept	-0.530	0.167	.002	[-0.857, -0.203]
PFA phase	-0.024	0.193	.900	[-0.402, 0.354]
Site 2	0.084	0.194	.665	[-0.296, 0.464]
Site \times PFA	-0.195	0.273	.476	[-0.730, 0.340]
Linear				
Month	0.419	0.143	.004	[0.139, 0.699]
PFA phase	0.200	0.169	.239	[-0.131, 0.531]
Site 2	0.184	0.165	.264	[-0.139, 0.507]
Site \times PFA	0.086	0.216	.690	[-0.337, 0.509]
Quadratic				
Month	-0.060	0.030	.052	[-0.119, -0.001]
PFA phase	-0.040	0.036	.268	[-0.111, 0.031]
Site 2	-0.044	0.035	.213	[-0.113, 0.025]
Site \times PFA	-0.005	0.047	.922	[-0.097, 0.087]
Planned contrasts				
Term	Est.	SE	p	95% CI
Site 2: PFA vs. US				
Baseline	-0.219	0.193	.255	[-0.597, 0.159]
Linear	0.286	0.135	.032	[0.021, 0.551]
Quadratic	-0.045	0.030	.128	[-0.104, 0.014]
PFA phase: Site 2 vs. 1				
Baseline	-0.111	0.192	>.500	[-0.487, 0.265]
Linear	0.271	0.140	.050	[-0.003, 0.545]
Quadratic	-0.049	0.031	.109	[-0.012, 0.110]

Note. PFA = psychological first aid; US = usual services; Coeff. = coefficient; Est. = estimate; SE = standard error; CI = confidence interval.

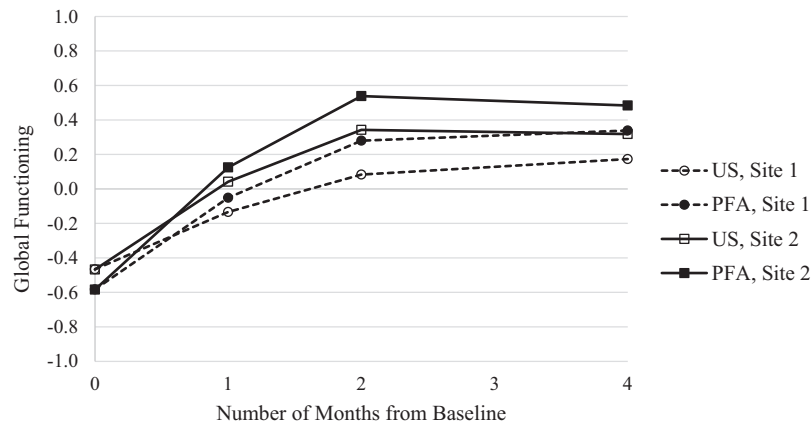


Figure 2. Predicted global functioning slopes for each site in the psychological first aid (PFA) phase versus the usual services (US) phase. Global functioning scores are logit-based expected a posteriori victim scores from the general dimension of an item bifactor measurement model. A score of 0 reflects the average level of global functioning across victims and measurement occasions, and higher scores reflect better functioning.

(see Herschell, Kolko, Baumann, & Davis, 2010), and experts have concluded that intensive training procedures are needed to support delivery of new practices in real-world settings (Beidas & Kendall, 2010; W. R. Miller, Sorensen, Selzer, & Brigham, 2006). Therefore, biweekly supervision sessions were conducted. In addition, LEVAs audio recorded a limited number of their interactions with study participants. This allowed the study team to observe LEVAs' skills and provide individualized feedback. Such supervision techniques seemed critical for promoting PFA adherence among the LEVAs. It is not clear that similar, ongoing supervision is included as part of the PFA trainings being offered nationally and internationally. However, the data from this trial, and the investigators' anecdotal experience, suggest that ongoing quality assurance procedures should be an important consideration for future research and implementation efforts involving PFA.

The strengths of this study include its use of manualized PFA and adherence monitoring protocols, high recruitment and retention rates, blinding of research staff to intervention condition, use of a real-world workforce and setting, and inclusion of all participants in the analyses even if they missed an assessment. Additionally, this study contributes to the literature by developing the first tool for measuring PFA adherence. Importantly, our PFA adherence tool was found to have good psychometric properties for the use described in this study, and it therefore might serve as a resource for others attempting to deliver PFA to victims of crime. Further, although a few items are specific to PFA delivery with crime victims, researchers might easily adapt this tool for use with other trauma-exposed groups.

This study also has some weaknesses. First, due to funding limitations, the trial had a small number of sites and LEVAs, had a modest sample size, and relied on self-report methods for quantitative measurement of LEVAs' adherence to PFA. Second, the sample is comprised primarily of women and individuals exposed to domestic violence or physical assault. This limits generalizability of the findings for men and victims of other types of traumatic events. Third, the study would have benefitted from a longer follow-up period. However, the decision to conduct a 4-month follow-up was based on research suggesting that by 4 months

posttrauma, PTSD and related psychiatric symptoms have typically become chronic and are unlikely to recover spontaneously (McFarlane, 1988; Rothbaum, Foa, Riggs, Murdock, & Walsh, 1992).

Conclusions and Implications

Several conclusions can be drawn from the findings. First, PFA seems amenable to adoption by members of the paraprofessional LEVA workforce, which has favorable implications for PFA transport. Second, results speak to the importance of a well-informed quality assurance protocol to ensure PFA is delivered as intended. Despite the simplicity of PFA, particularly in comparison to full-scale treatments for trauma victims, it is unlikely that a one-time workshop is sufficient to promote high-quality PFA delivery. Rather, ongoing supervision, including observation of delivery and associated feedback, is probably needed to ensure adequate adherence to the model. Third, PFA is likely a safe intervention for crime victims. That is, across each outcome domain, victims in the PFA group evidenced either significant improvement or no change over time. There was no evidence of symptom worsening among victims receiving PFA. This is relevant because when another acute intervention for trauma victims (i.e., CISD) was put to the test, results showed it to be potentially iatrogenic (Bisson et al., 1997; Hobbs et al., 1996). Fourth, evidence regarding the clinical effectiveness of PFA for crime victims is mixed. Indeed, the PFA and US groups did not significantly differ on any of the primary intervention outcomes. In follow-up models that excluded male victims from the sample, PFA outperformed US on two primary outcomes. Also, due to variability in participants' problem presentation at baseline, we suspected that results from analysis of the individual outcomes might tell an incomplete story. Thus, a composite global functioning outcome was created and analyzed. Over the 4-month follow-up, victims receiving PFA had significantly greater early gains in global functioning relative to victims receiving US. That being said, our decision to create this global functioning outcome was post hoc, and planned use of an existing, validated global functioning instrument would have been stronger.

Taken together, results indicate that PFA might be a useful acute intervention for victims of crime, but more research is clearly needed.

Future studies should test the effectiveness of PFA in a larger randomized trial that (a) includes more sites, LEVAs, and crime victims; (b) incorporates observational methods to measure PFA adherence; (c) uses existing and well-established global outcome instruments that consider the multitude of problem areas relevant to victims; and (d) is sufficiently powered to investigate gender as a putative moderator of intervention effects. Future research also should include more frequent outcome measurement over a longer follow-up period. Implementation outcomes such as perceived intervention acceptability, feasibility, and sustainability also would be important to measure in future studies. Additionally, the incremental costs associated with PFA seem critical to examine, especially given the intensive training and supervision efforts that might be needed to achieve and maintain high levels of adherence to the model. Finally, the results of this trial are generalizable to crime victims only, and formal testing of PFA with other types of trauma-exposed groups (e.g., victims of natural disasters) is recommended.

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