

ARTICLE

Impact of executive function on efficacy obtaining resources following intimate partner violence

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Abstract

Following intimate partner violence (IPV), women risk losing resources needed to meet their basic needs, such as food and housing. To identify potential points of community intervention, the current study examined the role of executive function (EF) in women's efficacy to obtain resources following a police-reported physical IPV incident. Participants were 199 women from diverse, urban, and largely lower-income backgrounds. As predicted, greater physical abuse was associated with worse EF performance and worse EF was associated with less efficacy in obtaining resources 1 year later. Greater physical abuse was indirectly related to less efficacy in obtaining resources via EF, even when controlling for income. Results provide information regarding EF as a potential link in the relationship between IPV and obtaining resources among women of lower-income backgrounds. In the context of limited resources, preparing community service professionals to use EF-focused interventions (e.g., to structure tasks, repeat instructions) may support women's efforts to access resources.

1 | INTRODUCTION

Intimate partner violence (IPV) affects approximately 25%–30% of women in the United States (Black, 2011; Campbell, 2002; Coker et al., 2002). Following IPV, women are at risk for multiple social and economic challenges including losing access to resources needed to meet basic needs (e.g., housing, food, and finances; Browne & Bassuk, 1997; Menard, 2001; Weinbaum et al., 2001). Several factors have been linked to women's efficacy to obtain resources: characteristics of the IPV (e.g., frequency of violence); individual differences (e.g., cultural identity); and social isolation (Belknap, Melton, Denney, Fleury-Steiner, & Sullivan, 2009; Bosch & Schumm, 2004; Cunradi, Caetano, & Schafer, 2002; Davies, Block, & Campbell, 2007; Fleury, Sullivan, Bybee, & Davidson, 1998; Hollenshead, Dai, Ragsdale, Massey, & Scott, 2006).

Although IPV can include different forms of abuse (physical, sexual, and/or psychological; Black, 2011; Campbell, 2002; Coker et al., 2002), physical abuse in particular is linked with efficacy to obtain resources following IPV. For instance, women who experience physical IPV report having or anticipating significant housing concerns, material hardship (e.g., related to food or clothing), and financial struggles (Adams, Sullivan, Bybee, & Greeson, 2008; Tolman & Rosen, 2001).

Cognitive factors may also influence women's efficacy to obtain resources following IPV. Securing resources can require complex cognitive and organizational skills—skills that are central to executive function (EF). As we will review, IPV has been linked with poorer EF performance (e.g., Stein, Kennedy, & Twamley, 2002). Because EF potentially plays a critical role in obtaining resources, the current study tests whether EF indirectly links the relationship between physical abuse in IPV and later efficacy to obtain resources to meet basic needs. Given the importance of income for accessing resources, we tested an alternate model that included income to evaluate whether EF could explain a unique variance in efficacy to obtain resources.

1.1 | IPV and resources needed to meet basic needs

Physical abuse in IPV is associated with challenges of obtaining resources needed to meet housing, material, and financial needs (Beeble, Bybee, & Sullivan, 2010; Menard, 2001; Weinbaum et al., 2001). Women who experience physical IPV report experiences of eviction, home foreclosure, and homelessness; difficulty securing or maintaining affordable housing (Adams et al., 2008; Baker, Cook, & Norris, 2003); and material hardships such as food insufficiency (Corcoran, Heflin, & Siefert, 1999), which can increase their risk of physical health problems (Vozoris & Tarasuk, 2003). Women who experience physical IPV may lose financial security because of loss of work, lowered work performance, or leaving the abusive partner (Adams et al., 2008; Moe & Bell, 2004).

When faced with difficulty obtaining resources essential for meeting their basic needs (e.g., housing, food, finances), women may be forced to stay with or return to their abusive partners (Davies, Lyons, & Monti-Catania, 1998; Raphael & Tolman, 1997). In contrast, greater efficacy to obtain basic resources following IPV is associated with better outcomes across multiple domains, such as experiencing better psychological outcomes, increased quality of life, and less violence over time (Beeble et al., 2010; Bybee & Sullivan, 2002, 2005; Clough, Draughon, Njie-Carr, Rollins, & Glass, 2014; Sullivan & Bybee, 1999). Given the importance of obtaining resources essential for women's well-being, the current study examines EF—a factor that may link physical abuse with efficacy to obtain resources over time.

1.2 | EF

EF involves cognitive skills that control complex, goal-directed behavior such as planning, attending to a task, holding information in working memory, and ignoring distractions. These EF abilities are important for functioning across multiple areas, such as academic, interpersonal, and psychological well-being (Bull, Espy, & Wiebe, 2008; Fossati, Ergis, & Allilaire, 2002). Given the importance of EF skills for executing general tasks, EF may also influence women's efficacy to obtain resources following IPV. For instance, securing resources essential for housing, material goods, and financial needs requires planning (e.g., developing a strategy to look for housing or secure needed material goods); prioritizing and inhibiting distracting information (e.g., prioritizing securing housing over less essential demands); holding information in working memory (e.g., lists of needed material goods); and attention (focusing and maintaining attention to the resource problems at hand).

Several theories support links between IPV and EF deficits. Chronic stress models (e.g., McEwen, 2004) have led researchers to examine relationships between EF performance and trauma exposure, given the impact that stress hormones have on regions of the brain responsible for EFs, such as the prefrontal cortex. Additionally, cognitive models of coping with abuse by a close other, as is the case with IPV, implicate disruptions in information processing and EFs (e.g., DePrince, Weinzierl, & Combs, 2009; Freyd, DePrince, & Gleaves, 2007).

Consistent with these models, impaired EF performance has been linked to trauma exposure generally and IPV specifically (Aupperle, Melrose, Stein, & Paulus, 2012; El-Hage, Gaillard, Isingrini, & Belzung, 2006; Navalta, Polcari, Webster, Boghossian, & Teicher, 2006; Stein et al., 2002). For example, women with histories of IPV perform worse on tests of EF relative to peers without histories of IPV (Stein et al., 2002; Twamley et al., 2009). A similar pattern emerges in childhood, in which familial violence (relative to other kinds of trauma) is linked with worse EF performance (DePrince et al., 2009).

Building on this body of work that has largely treated IPV (and other trauma, such as familial violence) as a categorical variable (present vs. absent), the current study focuses on the severity of physical abuse in IPV. Given existing literature linking trauma exposure (including IPV and physical abuse) with EF deficits, we predicted that more severe physical abuse would lead to worse EF performance among women who experience IPV.

1.3 | Current study

EF skills are critical for obtaining resources; poor EF performance has been linked to trauma generally and IPV specifically. Following IPV, women can have difficulty obtaining needed resources. Integrating findings from the literature on resources, EF, and IPV, we predicted that more severe physical abuse would be negatively associated with EF performance and the efficacy to obtain resources one year later among women who experienced police-reported IPV. In turn, worse EF performance would be associated with less efficacy in obtaining resources, and physical abuse would indirectly affect efficacy in obtaining resources through EF. To assess EF, we followed common approaches that use multiple indicators that are combined into a single score (Espy et al., 2004; Miyake et al., 2000; Miyake, Friedman, Rettinger, Shah, & Hegarty, 2001). Rather than relying on an average across EF measures, we took a principal components analysis approach to assign weights to original variables according to their contribution in explaining variance.

2 | METHOD

2.1 | Participants

Participants who had experienced a police-reported IPV incident were recruited as part of a larger study on community coordinated response programs (see DePrince, Belknap, Labus, Buckingham, & Gover, 2012; DePrince, Labus, Belknap, Buckingham, & Gover, 2012). Participants were recruited within a median of 26 days after the incident was reported to the police (Time 1 [T1]), and then interviewed again 6 months (T2) and 12 months later (T3). Retention rates from T1 to T2 and from T1 to T3 were 81% and 80%, respectively. Retention rate for *either* T2 or T3 from T1 was 84%.

Participants were 236 women with a mean age at T1 of 33.4 years (standard deviation [SD] = 11.0; range 18 to 63 years). Geocoded data of women's residences at T1 indicated that the women were recruited from spatial locations that were diverse with regard to income, socioeconomic status, and ethnic composition (for additional information on geocoded data, see DePrince et al., 2012). Women's racial/ethnic identifications were 39% Hispanic/Latina, 47% White, 30% African American, 11% Native American/Alaska Native, 2% Asian American, 1% Native Hawaiian or Pacific Islander, and 6% other (including more than one race/ethnicity). The highest levels of education completed were 3% through to the eighth grade, 27% some high school, 26% high school degree, 25% some college, 8% associate's degree, 7% 4-year college degree, 2% some postgraduate education, and 2% other (e.g., trade school). Women's median income was US\$7,644, ranging from \$0 to US\$108,000, which included both salary and nonsalary sources (e.g., disability income). Complete data for key variables (physical abuse, EF, and efficacy to obtain resources) were available for 199 women. Demographic data for these 199 women did not significantly differ from the overall sample of 236 women.

2.2 | Materials

We used the Revised Conflict Tactics Scale (CTS-2; Straus, Hamby, Boney-McCoy, & Sugarman, 1996) to assess Physical abuse. The CTS-2 is a self-report measure that assesses coercive behaviors (e.g., physical assault, psychological aggression, sexual coercion, and any behavior that results in injury) in resolving conflicts within a relationship. Given the focus of the current study on physical abuse relating to EF and efficacy in obtaining resources, only the physical assault items were used. Participants reported whether or not particular physical assault behaviors occurred during the police-reported IPV incident. The physical assault subscale comprises 13 items (e.g., "My partner pushed or shoved

me” and “My partner choked me”). A total physical abuse score was calculated at T1 by tallying the number of physical assault items reported, such that higher scores indicated greater physical abuse (i.e., greater number of physical assault behaviors during the police-reported IPV incident).

EF measures included the Stroop Test and two measures from the Wechsler Adult Intelligence Scale Fourth Edition (WAIS-IV; Wechsler, 2008) – Symbol Search (SS) and Letter-Number Sequencing (LNS). These tests are frequently used in neuropsychological batteries assessing EF (Daigneault, Braun, & Whitaker, 1992; Libon et al., 1994; Nelson, Yoash-Gantz, Pickett, & Campbell, 2009). Furthermore, these tests measure aspects of EFs that have been previously linked with IPV, including inhibitory function, attention, processing speed, and working memory (Aupperle et al., 2012; Litz et al., 1996; Majer, Nater, Lin, Capuron, & Reeves, 2010; Stein et al., 2002; Vasterling, Brailey, Constans, & Sutker, 1998). EF measures were administered at T2.

The Stroop color-naming task (Stroop, 1935) involves participants reading aloud a list of 50 color words (“red,” “blue”) written in the color ink of the word (congruent condition) and reading a list of 50 color words written in another color ink than the word (incongruent condition). Participants were timed while naming the color of the ink in both the congruent and the incongruent condition. Naming the color ink in the congruent condition is speedier than in the incongruent condition because the meaning of the word and the color of the ink match. Quickly naming the color ink in the incongruent task involves interference control; that is, blocking out automatic semantic reading to name the incongruent color of the ink. It also involves selective attention—attending to one stimulus (i.e., color of ink) and not the other (i.e., meaning of the word). The Stroop interference score was calculated by subtracting the time to complete the incongruent condition and the average time to complete two congruent conditions (i.e., naming color blocks and color words written in black ink). Thus, higher scores indicate greater interference and worse performance.

The Symbol Search task involves scanning rows of symbols to determine if the row contains one of two sample symbols. Performance on this task depends on processing speed and visual memory. Total score on the Symbol Search task was calculated by adding the number of correct responses within a 120-second time limit. The Letter-Number Sequencing task involves listening to a string of numbers and letters and organizing them by numerical and alphabetical order. The strings get longer and the task becomes more difficult as the participant completes each sequence. Performance depends on attention toward stimuli and manipulating information in working memory. Total score on the Letter-Number Sequencing task was the longest correct string of letters and numbers organized by the participant.

We used the Difficulty Obtaining Resources Scale (DOR; Bybee & Sullivan, 2002, 2005; Sullivan & Bybee, 1999) at T3 to assess efficacy in obtaining resources, specifically housing, material goods, and financial. We chose these three resources out of 11 resource items (social support, legal assistance, etc.) because of the fact that housing, material goods, and finances are the resources required to meet the most basic needs, particularly for women following IPV, and based on their significant correlations with the EF component score at the $p < .01$ level (see the Results section). Participants rated their responses to a question about their efficacy to obtain each of the three resources on a scale ranging from 1 (*not very*) to 4 (*very*) (“Thinking about the last year since the incident, how effective were you in getting the resources you needed in the following areas?”) Total scores for the DOR Scale were calculated by averaging responses across the three resource items, with higher scores reflecting a greater to obtain resources (Cronbach’s $\alpha = .87$).

The current study uses physical abuse scores collected at T1, EF scores at T2, and efficacy to obtain resources scores at T3.

2.3 | Procedure

As described elsewhere (DePrince et al., 2012), the research team retrieved publically available police reports of non-sexual IPV incidents between a female victim and male offender. The team then invited potential participants with lead letters and follow-up phone calls to be involved in a 3-hour session to answer interview questions about women’s health. While recruiting efforts specifically did not mention the IPV incident, to minimize safety risks, women learned that the study focused on IPV during the informed consent process. Participants were interviewed three times. The T1 interview occurred within a median of 26 days after the IPV incident; T2 and T3 interviews occurred 6 and 12 months,

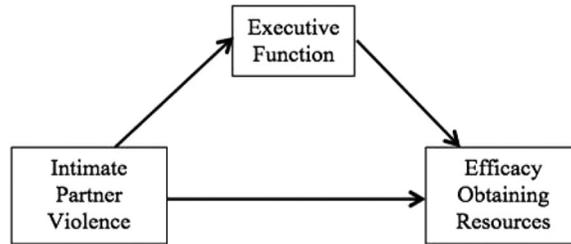


FIGURE 1 Path model for direct and indirect effects of intimate partner violence, executive functioning, and efficacy obtaining resources.

respectively, after the T1 interview. Female interviewers who reviewed consent information and administered study materials conducted interviews.

Participants were compensated \$50 for the T1 session, \$55 for T2, and \$60 for T3. Women were offered cab rides to university offices if they did not have their own transportation. Childcare was provided as needed. Participants also received a newsletter with referrals to agencies that provide services for women who experience physical IPV.

3 | RESULTS

3.1 | Descriptives

Women reported to the police an average of three types of physical assault behaviors experienced during the IPV incident (mean [M] = 3.01, SD = 2.75), as assessed by the CTS-2.

Mean standard scores on WAIS-IV Symbol Search (SS; M = 8.41, SD = 2.99) and Letter-Number Sequencing (LNS; M = 9.14, SD = 3.04) and Stroop interference scores (M = 31.85 seconds, SD = 11.38) were all significantly correlated with each other (Stroop-LNS: r = .27, p < .001; Stroop-SS: r = .22, p = .005; LNS-SS: r = .31, p < .001). Outlier scores across each measure were winsorized within three standard deviations of means. A principal components analysis was conducted on the EF measures. Scores across the three measures resulted in loadings above .65 on a single component (LNS = .74; SS = .69; Stroop = .69). An EF component score was saved and used in analyses.

A total DOR score was calculated by averaging scores for housing, material goods, and financial resources items (M = 3.09, SD = .84).

3.2 | Correlations

Bivariate correlations were conducted between all variables. CTS-2 physical assault scores were significantly negatively correlated with the EF component score (r = -.22; p < .01). The EF component score was significantly positively correlated with individual resource items on the DOR at the p < .01 level (housing: r = .23; material goods: r = .22; financial: r = .23), and the EF component score was also significantly positively correlated with the total DOR scores (r = .23; p < .01). CTS-2 physical assault scores were not correlated with DOR scores.

3.3 | Direct and indirect effects

Tests of direct and indirect effects (Figure 1) were conducted through a path analytic approach using Mplus (Muthén & Muthén, 1998–2011). Mplus was selected because it makes use of all available data by calculating maximum likelihood parameter estimates for missing values using the EM algorithm (Dempster, Laird, & Rubin, 1977). Mplus excludes cases in which data from any predictor variable (physical abuse or EF) is missing, resulting in a sample size of 199 out of 236 for analyses. Mplus, unlike other modeling software, also provides p -values for all direct and indirect paths in the model.

TABLE 1 Standardized and Unstandardized Direct and Indirect Effects of Model

Effect	β	B	SE
IPV → EF			
Direct	-.22**	-.08	.02
EF → Resources			
Direct	.25**	.21	.07
IPV → Resources			
Direct	.06	.02	.02
Indirect	-.05*	-.02	.01

Note. IPV = interpersonal violence; EF = executive function; SE standard error.

* $p < .05$ ** $p < .01$

Note. The CTS-2 (Straus, Hamby, Boney-McCoy, & Sugarman, 1996) assessed IPV. A component EF score was used in analysis. The DOR Scale (Bybee & Sullivan, 2002, 2005; Sullivan & Bybee, 1999) assessed efficacy in obtaining resources.

We tested the direct effects of CTS-2 physical assault scores on both EF and DOR scores, as well as the direct effect of EF on DOR scores. We tested the indirect effect of CTS-2 physical assault scores on DOR scores via EF scores. Results (Table 1) indicate that there is a significant negative direct effect from CTS-2 physical assault scores to EF scores and a significant positive direct effect from EF scores to DOR scores. There is no significant direct effect from CTS-2 physical assault scores to DOR scores. There is a statistically significant indirect effect of CTS-2 physical assault scores on DOR scores via EF. A chi-square test of model fit indicated good fit, $\chi^2(3, N = 196) = 18.43, p < .001$; comparative fit index (CFI) = 1.00; root mean square error of approximation (RMSEA) = 0.00.

3.4 | Alternative model

An important consideration in the relationship of the current study's variables is the role of income. Lower-income individuals report more interpersonal violence and cognitive challenges and decreased access to resources needed to meet basic needs (Bosch & Schumm, 2004; Cunradi et al., 2002; Field & Caetano, 2004; Noble, Norman, & Farah, 2005). We included women's income in the statistical model to address the potential role of income in the indirect effect of IPV and efficacy to obtain resources.

Mean income for the subsample of 199 women was US\$11,263 ($SD = 13,541$). Problems with skew were noted (skewness = 2.80). Before including income in analyses, we adjusted the income variable in two ways to make the income distribution more normal. First, we calculated an upper limit ($M + 3SD = 51,885$) and replaced all values greater than this limit with 51,885. We also examined the data omitting the top 5% of income values (36,000–108,000). Both adjustments did not change pattern of results; therefore, we report results using income from the full sample.

Women's income was significantly correlated with IPV ($r = -.17, p < .01$), EF ($r = .22, p < .01$), and efficacy to obtain resources ($r = .19, p < .05$). However, including income in the model did not affect the significance of the indirect effect of IPV for accessing resources through EF ($\beta = .18, B = .21$, standard error = .10, $p < .05$). In other words, including the potential indirect effect of income on the relationship between IPV and accessing resources did not change the significant indirect effect of EF on accessing resources. Including income in the model also resulted in a statistically significant, but worse fit, $\chi^2(3, N = 196) = 16.17, p < .001$; CFI = .58; RMSEA = .14.

4 | DISCUSSION

Greater physical abuse in a police-reported IPV incident was associated with lower EF performance; in turn, lower EF performance was linked to less efficacy in obtaining resources one year later. A significant indirect effect indicated that EF was the link that connects IPV to efficacy in obtaining resources one year later, even after taking into account women's income.

Results of the current study are supported by literature connecting EF with successfully executing important life activities (Barkley & Fischer, 2011; Masten et al., 2012; McGurk & Mueser, 2003). Women who experience IPV may lose the resources needed to meet basic needs such as employment and housing as a result of IPV. To regain resources, women must effectively execute a series of tasks, such as completing paperwork for financial assistance and submitting paperwork to appropriate offices. EF skills such as planning, monitoring, and holding information in working memory are critical to navigating these complex systems.

Findings of the current study add to the literature in several ways. First, extending previous work that treated IPV as a categorical variable (present vs. absent) in studies of EF, these findings suggest that characteristics of the abuse itself—in this case, the number of physical abuse behaviors in an IPV incident—may be important to consider in terms of EF performance. We hypothesize that there may be multiple factors that contribute to the link between physical abuse severity and EF performance that should be pursued in future research. For example, more severe violence may be indicative of greater chronic stress overall that affects, over time, brain regions responsible for EFs. Alternatively, cognitive resources in the aftermath of IPV may be directed toward coping with immediate threats, psychological distress, and negative internal experiences (DePrince & Freyd, 1999, 2004; Twamley et al., 2009), leaving fewer resources available to attend to tasks that involve EF.

Second, results of the study have important implications for advocacy and support for women who experience IPV. Obtaining resources involves skills such as planning, prioritizing, and inhibitory control. For lower-income women, these skills are particularly important for obtaining vital resources such as housing, material goods, and financial security following an IPV incident. Women who experience physical IPV may require more external support around EF skills necessary for obtaining resources from practitioners and advocates. For instance, advocates may help women create lists of tasks, prioritize some tasks over others, and create concrete plans for executing tasks. With support services that target EF skills, women may be able to increase their efficacy to obtain basic resources following IPV.

Indeed, research supports the role of advocacy, particularly advocacy that caters to the individual in promoting positive outcomes among women who experience IPV (Allen, Larsen, Trotter, & Sullivan, 2012; Bybee & Sullivan, 2002). Within the Community Advocacy Project (Allen et al., 2012; Sullivan, 2003), for instance, advocates regularly met with their clients and worked on whatever needs the individual client considered most important. Usually the needs involved accessing resources essential to meet basic needs such as housing, material goods, and financial assistance. Clients reported that this type of advocacy had particular strengths in helping them work toward goals related to accessing resources. Specifically, “their advocates would research these resources, help them strategize about the best way to obtain resources, and accompany them to agencies. Thus, it was helpful to women just to have an extra set of helping hands ... this helped take the stress out of finding resources” (Allen et al., 2012, p. 11).

Obtaining resources is critical for psychological well-being, reducing revictimization risk, and engagement in criminal justice system. Efficacy in obtaining resources likely acts as a protective factor in future psychological outcomes: Successfully securing resources improves a sense of self-efficacy while also decreasing safety risks, financial stress, and other stressors. Furthermore, obtaining resources lessens the likelihood that women will have no choice but to stay with or return to abusive relationships. As demonstrated by Bybee and Sullivan (2005), obtaining resources is negatively associated with experiences of violence in the future, perpetrated by the initial offender or someone else. Successfully obtaining resources decreases the likelihood that women will engage in relationships with violent partners to secure their and often their children's livelihoods.

Finally, obtaining resources is likely important for increasing the likelihood that women will pursue higher-order needs such as engaging in the criminal justice system. Only after securing the most basic needs (e.g., housing, food, money) are individuals able to attend to tasks such as finding legal assistance, engaging in prosecution tasks (if there is a criminal case), and going to court. Without financial security, women may not be able to pay for legal assistance, find transportation to courts, or secure childcare while they are in court. Without a home address, they may not be able to correspond with lawyers and other professionals in the legal system, receive updates on their case, or complete paperwork. Thus, women's efficacy to obtain resources to meet basic needs following IPV is critical in multiple domains of their lives.

4.1 | Limitations

Several limitations should be taken into account in interpreting the current findings. Participants in the current study included diverse women of urban and largely lower-income backgrounds. To generalize findings to women and patterns of IPV more broadly, future research should recruit women of broader heterogeneous backgrounds. Further, the current study recruited women whose cases came to the attention of law enforcement; however, only a minority of IPV cases are reported to law enforcement (Felson, Messner, Hoskins, & Deane, 2002). Women seeking treatment in community-based settings (e.g., rape crisis centers or hospitals) and women who do not seek any intervention may differ in ways that are important to consider, such as the degree of resources needed. This study also focused on women who experienced physical abuse by a male offender. Future replications should consider the particular challenges of obtaining resources faced by male victims as well as victims in same-sex relationships.

Additionally, we did not have baseline measures of EF or efficacy to obtain resources at T1, prohibiting any causal claims about changes at T3. Though EF deficits have previously been linked to IPV (e.g., Stein et al., 2002), little is known about the directional influences between EF and IPV. In other words, EF deficits may result from IPV and/or pose as a risk factor for IPV.

4.2 | Conclusion

Despite these limitations, the current study makes contributions to the literature on IPV and women's efficacy to obtain resources essential for meeting their basic needs following IPV. Even after considering income, EF played a role in the efficacy to obtain resources following IPV among diverse women who were largely lower-income. Support from professionals, such as victim advocates, around EF skills required to obtain resources is likely to improve outcomes across multiple domains. For instance, women may benefit from advocates assisting in organizing tasks and avoiding distractions when trying to access resources following IPV. This kind of assistance is likely to improve multiple outcomes for lower-income women, including psychological well-being and revictimization risk, over time. These findings point the importance of developing practices to support women as they navigate complex systems following IPV, as well as continuing basic science research with diverse, lower-income women to inform advocacy and intervention.

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