High-risk victims of intimate partner violence within the Integrated Safety Response pilot: An examination of psychosocial stressors and repeat victimisation

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Abstract

Intimate partner violence (IPV) is a serious social issue in Aotearoa New Zealand, especially for victims at high risk of experiencing ongoing harm–or even death–as a result of IPV. Yet there is relatively limited empirical research that quantifies the stressors faced by high-risk victims, nor investigates whether these factors predict IPV recurrence. Using Dutton's (2006) nested ecological theory to frame this longitudinal study, we[1] examined 165 high-risk IPV cases from the Integrated Safety Response (ISR) pilot. With a primary focus on victims, we manually coded 39 baseline variables across the individual, relationship and community ecological levels; recorded initial engagement with ISR interventions; and examined IPV recurrence reported to police during the 12-month follow up. Results demonstrated that extensive stressors were experienced by these victims and that most victims had at least one IPV recurrence reported to police during follow up. Whilst only a modest number of variables significantly predicted IPV recurrence, physical IPV recurrence or offence detection; we identified that nonfatal strangulation, victim fear, relationship status and the victim's initial engagement with ISR interventions all uniquely predicted these outcome measures across multivariate analyses. Theoretically, we found empirical support for Dutton's (2006) nested ecological framework, although the explanatory mechanisms for the four key predictors need to be examined in future research. Practically, improved awareness of high-risk victims' needs can guide collaborative support responses and, among a group with several possible risk factors, identifying predictors of repeat victimisation can inform risk assessments and prevention strategies for high-risk IPV cases. Finally, we consider limitations of the current research and make several important recommendations for future research.

[1] Please note: This thesis contains my own work but I use the term "we" throughout to reflect that my study was part of a larger programme of family violence research conducted within the Polaschek lab and that I received advice from my supervisor (Professor Devon Polaschek) and lab manager (Apriel Jolliffe Simpson).

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The first person to teach me the importance of social justice. You would be so proud.

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Introduction

Imagine being physically, sexually or psychologically abused by the very person you chose as a partner or spouse. Horrifically, it is estimated that one in every three women will experience such abuse at some point in their lives, both in Aotearoa New Zealand (Fanslow & Robinson, 2011) and numerous countries worldwide (Yakubovich et al., 2018). Intimate partner violence (IPV) is a pervasive social issue with wide-ranging negative consequences, though IPV-related harm is not experienced equally by all victims. Within Aotearoa New Zealand, harm is concentrated within an extremely small group of adults: 60% of IPV and other family violence affects only 1% of victims (New Zealand Crime and Safety Survey, 2014). At the most extreme end, IPV can also result in death: there were 92 IPV-related deaths nationwide between 2009 and 2015 and two thirds of the deceased victims were women (Family Violence Death Review Committee, 2017). To help prevent similar tragedies and ongoing cycles of serious abuse, we need to better understand the typical features of high-risk IPV cases. We also need empirical evidence around the predictors of repeat victimisation, which refers to a victim's experience of more than one IPV episode within a specific time period (Hester & Westmarland, 2005). To date, a substantial proportion of the empirical research predicting IPV has been aggressor-focussed (Cattaneo & Goodman, 2005). Although necessary, such research cannot tell us the full picture of high-risk cases; more diverse research approaches are needed that improve our understanding around victim, aggressor, dyadic and wider community factors within the context of ongoing abuse (Foa et al., 2000; Kuijpers et al., 2012a). Research that yields greater insights about high-risk cases of IPV and repeat victimisation will support ongoing policy and frontline efforts to improve the safety of the most vulnerable families and whānau in our community.

In order to meaningfully investigate issues relating to repeat IPV victimisation, we will firstly present broad information about this topic, including how IPV is defined and the

typical multi-agency responses. We will predominantly focus on an Aotearoa New Zealand context and discuss the Integrated Safety Response (ISR) pilot due to its local significance and relevance to this thesis. Next, we will highlight the key theoretical perspectives that underpin our approach to understanding repeat IPV victimisation; before reviewing empirical literature that investigates possible predictors of repeat IPV for victims. Based on this literature review, we analyse some of the most relevant methodological limitations in research predicting repeat IPV victimisation, before outlining details of the current study.

Definition of IPV

In Aotearoa New Zealand, IPV is defined as physical, sexual or psychological abuse against a former or current intimate partner; the latter includes behaviours like intimidation, harassment, property damage, harm to animals, threats, coercive control and financial abuse (Family Violence Act 2018, s. 9). In practice, this legislative framework means that criminal justice and social support agencies respond to a much wider range of IPV behaviours than just physical or sexual violence. Increasingly, IPV has therefore been operationalised as a myriad of harmful behaviours that together form a cumulative pattern of harm over time (Family Violence Death Review Committee, 2014). In fact, many IPV-related calls for service to police in Aotearoa New Zealand are recorded as comprising exclusively of verbally inflicted harm; criminal offences are largely not committed or detected (Jolliffe Simpson et al., 2020). Although IPV-related calls for service to police yield more comprehensive data than reliance on offence rates, it is estimated that only 24% to 37% of all IPV is reported to police (New Zealand Crime and Safety Survey, 2014; New Zealand Crime and Victims Survey, 2018, 2019). The Aotearoa New Zealand definition of IPV, and nature of police involvement in IPV episodes, therefore differs from many other jurisdictions and research contexts, providing an opportunity to examine and better understand a broad range of harmful behaviours between intimate partners.

Within the context of this IPV definition, it is useful to further outline other specific terminology. Labels like ‘perpetrator’ or ‘offender’ have connotations of criminal offending, so we instead use the term ‘aggressor’ to refer to the person predominantly using IPV behaviours within the dyad and to reflect that such behaviours can be relatively minor (e.g., verbal abuse) through to extremely harmful (e.g., serious physical or sexual violence). The label ‘victim’ refers to the person predominantly experiencing abuse within the dyad. The use of the word predominantly for both victims and aggressors is used purposefully to flag that although victim and aggressor labels recorded by police may overlap across episodes, one party will be the most significant aggressor within the dyad over time (Family Violence Death Review Committee, 2014). Furthermore, IPV victimisation and repeat victimisation may imply criminal incidents only, so we instead use IPV occurrence and recurrence to reflect the full range of IPV episodes that are reported to police.

Multi-Agency Responses to IPV

With a basic understanding of what constitutes as IPV, it is also useful to consider some of the formal responses for addressing this problem. Focussing on victims, advocacy has historically been the most common intervention: key services provided by advocates include safety planning advice, IPV-related psycho-education and support to engage with other community agencies around issues like housing, substance abuse, finances, counselling, Family Court, criminal proceedings, parenting and mental health (Arroyo et al., 2017; Rivas et al., 2016). Over time, advocacy has been increasingly adopted as one part of a larger multi-agency response. Multi-agency responses now typically involve formal partnerships between criminal justice, social welfare and community organisations to facilitate inter-agency communication about IPV cases; mobilise frontline resources more effectively and efficiently; and improve risk assessment, case management and intervention processes for both victims and aggressors (Klevens et al., 2008; Mossman et al., 2019; Rivas et al., 2016; Robinson,

2006). This type of multi-agency response first emerged during the 1980s in America, with the well-known Duluth Domestic Abuse Intervention Project. Formal responses have become increasingly collaborative and sophisticated due to intensified awareness about the complex, deleterious and often recurring nature of IPV (McGarry & Ali, 2020).

Multi-agency responses to IPV are often victim-centric, prioritising the needs of victims to improve their safety and wellbeing (Robinson, 2006). However there is growing consensus about the importance of aggressor interventions, including the use of graduated supervision, accountability measures and treatments to constrain their use of IPV and promote positive behaviour change (Family Violence Death Review Committee, 2020; Morgan et al., 2020). Multi-agency responses therefore increasingly intervene with both aggressors and victims, with the aim of preventing IPV recurrence and ongoing harm. However, despite the proliferation of multi-agency responses to IPV, there is a lack of robust evidence about their impact on IPV outcomes (Klevens et al., 2008; Robinson, 2006; Trimboli, 2017).

To more fully understand multi-agency responses to IPV, we consider specific examples. Multi-Agency Risk Assessment Conferences (MARACs) are conducted in the United Kingdom and focus on high-risk cases only. Established in 2003, MARACs involve specialist victim advocates, police, probation, health services, housing agencies, children's services and other relevant support services to assess risk, develop safety plans and provide case management (Robinson, 2006). Robinson's (2006) evaluation, based on nearly 150 high-risk victims, found that 34% had IPV recurrence reported to police in the six months following their MARAC referral. These results purportedly reflected the model's success, but a matched comparison group was not used, and it was unclear what proportion of victims would have reported IPV recurrence without MARAC involvement.

Next, we consider the ISR pilot in Aotearoa New Zealand. This multi-agency response launched in 2016 and operates in Christchurch (and surrounding environs) and the Waikato

Police District. All IPV episodes[2] reported to police within these areas–irrespective of the episode outcome and the police responses–are reviewed by the ISR pilot within 24 hours at a Safety Assessment Meeting (SAM) and entered into a purpose-built database, known as the Family Safety System (FSS). In response, the ISR-affiliated government agencies (e.g., New Zealand Police, the Department of Corrections, Oranga Tamariki, Ministry of Justice and Ministry of Social Development) and community agencies (e.g., specialist family violence non-government organisations, local iwi and kaupapa Māori services) collaborate and share information to complete risk assessments, manage cases and organise victim and aggressor-specific interventions (Mossman et al., 2017). Based on the estimated likelihood, rapidity and severity of future IPV recurrence, the ISR pilot assesses and labels each case as low, medium or high risk. Interestingly, only 3% of cases in 2017/18 were assessed as high risk, which means the ISR pilot has predicted another IPV episode is likely to happen imminently and that the victim could suffer serious psychological trauma, physical injury or even death (Mossman et al., 2019). Specialist victim and aggressor support staff are assigned to high-risk cases, with their allocation intervention time averaging 40 hours over 12 weeks (Mossman et al., 2019). High-risk cases also receive additional, ongoing multi-agency reviews through the intensive case management (ICM) process. In comparison, 51% of cases were assessed as medium risk and 46% as low risk during the same time period; the former had an average of 4.5 hours intervention time and the latter 1.25 hours intervention time (Mossman et al., 2019).

Relevant Theories of IPV

Within the IPV research literature, several single-factor theories have attempted to explain what causes intimate partners to act abusively. More exhaustive information on the feminist, behavioural, biological and psychological explanations for IPV can be found elsewhere (see Ali et al. [2020] and Heyman et al. [2013], for example). However, there is

[2] During 2017/18, approximately 70% of all ISR-referred cases involved IPV, with the remainder non-IPV family violence (Mossman et al., 2019).

increasing consensus that multi-factorial theories are more useful than single-factor theories in attempting to explain this complex phenomenon (Ali et al., 2020; Capaldi et al., 2012; Dutton, 2006). We will therefore examine Dutton's (2006) nested ecological theory. Compared to other multi-factorial theories, such as the Dynamic Development Systems approach (Capaldi et al., 2005) or the I^3 model (Finkel et al., 2012; Finkel & Hall, 2018); we believe that nested ecological theory aligns best with the scope of this thesis due to resource constraints and the available data.

Nested Ecological Theory

Dutton's (2006) nested ecological theory provides a 'bottom up' framework for conceptualising the most common psychological and social factors hypothesized to interact to cause IPV. It is one of the most comprehensive and widely used frameworks within the IPV literature (Ali et al., 2020). Originally, ecological theory was developed within the area of developmental psychology, with the current version building on earlier ecological models by Belsky (1980) and Bronfenbrenner (1979). Dutton's (2006) nested ecological theory asserts that several factors–both within and across–multiple levels of analysis contribute towards the onset and maintenance of IPV. These ecological levels include the ontogenetic or individual level; the microsystem or relationship level; the exosystem or community level; and macrosystem or socio-cultural level. Together, individual variables are 'nested' within the relationship level, with individual and relationship variables both then 'nested' within the broader community and socio-cultural levels.

To extend our understanding of Dutton's (2006) theory, we examine the ecological levels in more detail. The individual level focuses on a victim and aggressor's personal characteristics, such as psychological attributes, demographic characteristics or developmental experiences in one's family of origin. These factors shape an individual's response to stressors at all other levels. Next, the relationship level attends to the relationship

characteristics of a victim, aggressor and their immediate family. Variables at this level can include relationship status, cohabitation, dependent children or conflict management patterns. The community level refers to the broader social setting upon which the victim and aggressor's relationship exists. Community variables can include their informal or formal support network, employment status and interactions with community structures (e.g., the criminal justice or social welfare system). From an Aotearoa New Zealand perspective, it is worth nothing that variables relating to the whānau are not clearly identifiable as relationship or community level variables based on Dutton's (2006) explanations. Finally, the socio-cultural level refers to wider beliefs and norms in the victim and aggressor's culture and society. Socio-cultural factors that may be especially relevant to IPV include beliefs and norms around families, relationships, gender and violence. Overall, this theory provides a useful template for examining numerous possible predictors of IPV recurrence.

An important critique of this approach relates to it being better conceptualised as a theoretical framework. Theoretical frameworks provide a structure for organising variables and examining statistical relationships; but do not explain the causal mechanisms linking predictor variables to each other or to outcomes (Ward & Hudson, 1998). Nested ecological theory does not explain the mechanisms of IPV onset or recurrence, nor how variables are related within or across different ecological levels (Birkley & Eckhardt, 2015). To remain cognisant of this limitation, we henceforth refer to Dutton's (2006) nested ecological theory as the nested ecological framework; whilst also flagging the lack of truly explanatory theory as a wider issue within IPV research, as highlighted in the Capaldi et al. (2012) review.

Previous Empirical Research

To provide a clear platform for our literature review, we firstly outline the key parameters. Most research was not explicitly dyadic in nature, so studies examining whether aggressors behaved abusively over time differed from those focusing on whether victims

continued to experience IPV. Given our primary focus on high-risk IPV victims, we only included the latter within the scope of this literature review. As outlined below, the empirical research predicting IPV recurrence for victims is limited. To provide a more in-depth knowledge base, we have also included some studies in the literature review that focussed on IPV occurrence, although they are clearly labelled as such. More explicitly, IPV occurrence refers to a 'catch-all' term for cross-sectional studies that examined occurrence in the general population or did not clearly delineate whether they were predicting IPV onset or recurrence for victims. Instead, IPV recurrence refers to longitudinal studies with samples of IPV victims that examined whether victims experienced repeat IPV victimisation during the follow-up period. Accordingly, in these latter studies: IPV recurrence refers to any repeat IPV episode, in line with Aotearoa New Zealand's definition and irrespective of the harm level (i.e., including episodes with 'verbal harm only'); physical IPV recurrence refers only to repeat IPV episodes involving physical harm to the victim.

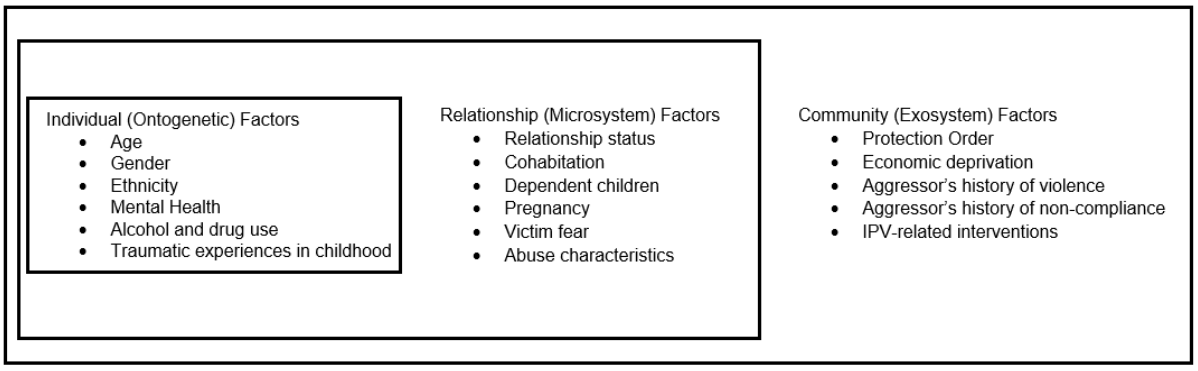
To further facilitate clear and consistent terminology use within our literature review, we simply use the term predictors to include possible risk factors, risk markers or protective factors for IPV recurrence outcomes (see Lösel and Farrington [2012] and Gondolf [2002] for more information). To that end, it is also necessary to outline common interpretations of statistical relationships. Based on Cohen's (2013) criterion, small effect sizes corresponded with r = .10; medium effect sizes with r = .30; and large effect sizes with r = .50 or above. However, within forensic psychology research, Hanson (2000, as cited in Stith et al., 2004) has endorsed slightly less conservative interpretations, with effect sizes less than r = .10 considered too small to be meaningful; effect sizes between r = .10 and r = .20 interpreted as small; effect sizes between r = .20 and r = .30 interpreted as medium; and effect sizes over r = .30 interpreted as large. Accordingly, we use the latter interpretation. Additionally, Rice and Harris (2005) provide an interpretive criteria for the area under the receiver operating

characteristic (AUC): AUC = .56-.63 correspond to small effect sizes; AUC = .64-.70 correspond to medium effect sizes; and AUC = .71-1.0 correspond to large effect sizes.

Finally, Figure 1 presents the structure of our literature review, informed by Dutton's (2006) nested ecological framework, with possible predictors examined at the individual, relationship and community levels. Please note, the socio-cultural ecological level was not examined further within the scope of this thesis. Although we review each variable separately, the likely interactive nature of these possible predictors cannot be overstated; given the causes of IPV recurrence outcomes are complex, multifactorial and cumulative in nature (Gulliver & Fanslow, 2016). Variables relating only to aggressors are clearly part of the ecology of IPV but, due to our primary focus on victims and the scope of this thesis, we have only included a limited selection of aggressor-specific predictors. Taken together, this information provides useful background for our literature review.

Figure 1

Possible Predictors of IPV Recurrence



Note. Figure adapted from the Stith et al. (2004) study.

IPV Recurrence Patterns

We firstly anchor the literature review by summarising the overall patterns evident for IPV recurrence outcomes. What proportion of victims typically experience IPV recurrence and physical IPV recurrence? Ringland's (2018) study analysed almost 19,000 female victims in Australia with an index IPV episode reported to police: 35% of victims had at least one

IPV recurrence recorded in a 12-month follow up, whilst 10% of victims had physical IPV recurrence recorded. Using a similar approach, Mele (2006) examined over 4,400 IPV victims and found that only 19% sampled had an IPV recurrence reported to police within 12 months. A large-scale study examined over 23,000 dyads and showed that 27% of dyads had at least one IPV recurrence reported to police during a four-year follow up (Kerr et al., 2017). Other studies showed IPV recurrence proportion rates increased when victim self-reported data and high-risk samples were used. The Sonis and Langer (2008) study, which analysed over 300 high-risk IPV victims, found that 51% disclosed physical IPV recurrence across a highly variable follow-up period (i.e., most participants tracked for between four and 15 months). Finally, a study with 100 high-risk IPV victims leaving refuge safe houses showed that 79% disclosed IPV recurrence within six months (Perez et al., 2012).

The timing of IPV recurrence outcomes is also important. Seminal research by Gondolf (2002) showed that approximately one third of IPV recurrence was recorded within three months of an index episode and 75% was recorded within six months. Survival analysis conducted in Mele's (2009) study found that, based on over 800 repeat IPV victims, there was a median number of 62 days between an index episode and the first IPV recurrence reported to police. A longer study, where approximately 23,000 dyads were tracked for four years, showed that a mean number of 270 days was recorded between an index episode and the first IPV recurrence reported to police (Kerr et al., 2017). Taken together, prior research indicates that between one fifth to four fifths of victims experience IPV recurrence within 12 months and that the first instance of IPV recurrence mostly occurs in the short to medium term.

Individual Level Predictors

Victim Age, Gender and Ethnicity. Population-level research has found useful findings about the basic demographic characteristics associated with IPV occurrence in Aotearoa New Zealand (New Zealand Crime and Safety Survey, 2014; New Zealand Crime

and Victims Survey, 2019). These results showed women were significantly more likely than men to experience IPV throughout the life course; as were people who identified as Māori (compared to Pākehā/New Zealand European). Such findings are consistent across a range of studies: being female (e.g., Kerr et al., 2017; Romans et al., 2007) and of ethnic minority status (e.g., Capaldi et al., 2012; Heckert & Gondolf, 2004; Kerr et al., 2017; Romans et al., 2007; Walton-Moss et al., 2005) is associated with IPV occurrence and recurrence. Crime survey results from Aotearoa New Zealand also found that young people, aged 15-29 years, were at significantly higher risk of IPV victimisation compared to all other age groups (New Zealand Crime and Safety Survey, 2014). Most research has similarly shown that IPV occurrence and recurrence is associated with younger victims (e.g., Capaldi et al., 2012; Fanslow & Gulliver, 2015; Heckert & Gondolf, 2004; Kerr et al., 2017; Romans et al., 2007; Stavrou et al., 2016; Stith et al., 2004; Walton-Moss et al., 2005; Yakubovich et al., 2018).

Victim Mental Health. As a possible predictor of IPV occurrence and recurrence, victim mental health has received relatively extensive research attention. Mental health measures differed across studies, but usually related to a formal diagnosis, specific symptoms or general emotional ill-health. Meta-analytic results found medium associations between IPV occurrence and victim depression (r = .28, p < .001, k = 85), post-traumatic stress disorder (r = .35, p < .001, k = 53), anxiety (r = .21, p < .001, k = 31), antisocial PD (r = .28, p < .01, k = 8) and borderline personality disorder (r = .20, p < .001, k = 3), respectively (Spencer et al., 2019). The Stith et al. (2004) meta-analysis showed similar results between depression and physical IPV occurrence (r = .28, p < .001, k = 6, n = 899).

More relevant studies have focussed on victim mental health and IPV recurrence outcomes. Based on a study with over 150 IPV victims, victims' borderline traits and anxiety at baseline did not significantly predict physical IPV recurrence or psychological IPV recurrence at the bivariate level after a six-month follow up (Kuijpers et al., 2012b). Victims'

PTSD arousal and avoidance symptoms, measured two months into the follow up, also did not significantly predict physical IPV recurrence or psychological IPV recurrence after six months; although victims' PTSD reexperiencing symptoms predicted physical IPV recurrence (*OR* = 1.11 [1.02-1.21], $p < .05$) and psychological IPV recurrence (*OR* = 1.09 [1.01-1.18], $p < .05$) based on bivariate analyses. Additionally, this study found victims' borderline traits ($r = .48$, $p < .001$), anxiety ($r = .34$, $p < .001$), re-experiencing symptoms ($r = .27$, $p < .01$), arousal symptoms ($r = .23$, $p < .05$) and avoidance symptoms ($r = .29$, $p < .01$) all predicted the severity of psychological IPV recurrence. Similarly, a study with almost 400 IPV high-risk victims found that a victim's overall PTSD at baseline uniquely predicted physical or sexual IPV recurrence (*OR* = 1.49 [1.01-2.20], $p < .01$) over a six-month follow up, when controlling for length of relationship, IPV severity at baseline and childhood abuse severity (Krause et al., 2006). Finally, Sonis and Langer (2008) found that baseline PTSD on its own predicted physical IPV recurrence (*OR* = 1.93 [1.16-3.21], $p < .01$); although it was a nonsignificant predictor at the multivariate level, controlling for multiple other variables[3].

Aggressor Mental Health. In relation to IPV occurrence, meta-analytic findings[4] showed mostly medium associations between aggressor mental health and IPV occurrence perpetration, including depression ($r = .21$, $p < .001$, $k = 52$), anxiety, ($r = .14$, $p < .001$, $k = 23$), PTSD ($r = .22$, $p < .001$, $k = 24$), antisocial personality disorder ($r = .26$, $p < .001$, $k = 29$) and borderline personality disorder ($r = .36$, $p < .001$, $k = 17$), respectively (Spencer et al., 2019). Similarly, the Stith et al. (2004) meta-analysis showed a medium association between depression and physical IPV occurrence perpetration ($r = .23$, $p < .001$, $k = 14$, $n = 2720$).

[3] Variables included abuse characteristics experienced by victim in relationship (frequency of prior IPV episodes; severity of prior IPV episodes; recent IPV episodes; harassment; coercive control), relationship dynamics (pregnancy; completed separation; attempted but unsuccessful separation), victim-specific stressors (ethnicity; unemployment; social support; depression; PTSD: access to help in emergency) and aggressor-specific stressors (access to weapons; history of previous non-IPV violence; unemployment).

[4] Please note, the cited studies were found through the lens of IPV victimisation: we did not conduct searches specifically for predictors of IPV perpetration and so have omitted several perpetration-focussed studies.

Turning to IPV recurrence outcomes, Robinson (2006) assessed nearly 150 high-risk cases within the MARAC process and found that 21% of aggressors had mental health problems recorded at baseline. Mental health was then combined with alcohol or drug problems to form an aggressor-specific 'aggravating problems' variable. This combined variable significantly predicted IPV recurrence reported to police over a six-month follow up; but was not significantly predictive in multivariate analysis, when controlling for 14 other variables[5]. Ringland (2018) found that aggressor mental health issues predicted IPV recurrence (*AUC* = .52 [.52-.53], $p < .001$) and physical IPV recurrence (*AUC* = .51 [.50-.52], $p < .05$) reported to police; but did not uniquely predict either outcome, when controlling for all other Domestic Violence Safety Assessment Tool (DVSAT) items[6]. The Robinson and Howarth (2012) study, based on over 2,000 IPV victims supported by specialist victim advocates in the United Kingdom, showed aggressor mental health did not uniquely predict physical IPV recurrence during an approximately two-year follow up (*OR* = 0.84 [0.57-1.24. $p = 0.37$), when controlling for several other variables[7].

Victim Alcohol and Drug Use. Within the context of substance use and IPV occurrence and recurrence, substance measures tended to assess alcohol or drug consumption,

[5] Specific statistical results not provided by authors. Variables included abuse characteristics experienced by victim in relationship (physical assault causing injures; weapon use; coercive control; nonfatal strangulation; threats to kill; abuse frequency/severity escalation; sexual abuse), relationship dynamics (pregnancy; separation; child custody issues), victim-specific stressors (suicidal ideation), and aggressor-specific stressors (criminal convictions; family violence convictions; financial problems; 'aggravating problems' – alcohol, mental health or drugs; suicidal ideation).

[6] Risk assessment used by police in New South Wales, Australia. Other items include abuse characteristics experienced by victim in relationship (threats to kill; physical IPV; nonfatal strangulation; weapon use; harm against animals; noncompliance with protection order; coercive control; stalking; financial abuse; threats to harm children; sexual abuse), relationship dynamics (separation; pregnancy; child custody conflict; dependent children from previous relationship) and aggressor-specific stressors (unemployment; financial difficulties; substance abuse problems; suicide attempts or threats; history of previous convictions for violence; access to weapons; previous arrest for sexual assault).

[7] Variables included total risk score, abuse characteristics experienced by victim in relationship (physical assault causing injuries; weapon use; coercive control; threats to kill victim; threats to kill children; threats to kill other partner; threats to kill other party; nonfatal strangulation; recent IPV escalation; sexual abuse; stalking), relationship dynamics (pregnancy; separation; child custody conflict; victim fear; victim fearful of further injury; victim fearful of children being killed; victim fearful of children being harmed; dependent children), victim-specific stressors (immigration issues; ethnic minority status; age; isolated; suicide threats), aggressor-specific stressors (criminal conviction history; family violence convictions; financial problems; alcohol use; drug use; suicide threats).

abuse or formally diagnosed substance disorders. Several studies examined IPV occurrence. For example, one review summarised that alcohol and drug use are both related to IPV occurrence, with drug use showing the strongest relationship across individual studies (Capaldi et al., 2012). The Stith et al. (2004) meta-analysis found a small association between victims' lifestyle alcohol use and physical IPV occurrence (r = .13, p < .001, k = 11, n = 7084). A recent meta-analysis yielded more nuanced findings (Cafferky et al., 2018). Firstly, they found small to medium associations between IPV occurrence and victims' lifestyle substance use (r = .21, p < .001, k = 262), lifestyle alcohol use (r = .18, p < .001, k=162) and lifestyle drug use (r = .26, p < .001, k=90). Secondly, victims' problematic alcohol dependency (r = .20, p < .001, k = 113) was a significantly stronger correlate (Q^b (1) = 10.97, p < .001) of IPV occurrence than lifestyle alcohol use (r = .14, p < .001, k =100); whereas no significant differences (Q^b (1) = 0.83, p = .362) were evident between lifestyle drug use (r = .24, p < .001, k = 98) and problematic drug dependency (r = .21, p < .001, k = 51). Finally, their results showed no meaningful differences (Q^b (1) = 1.20, p = .272) between drug type and IPV occurrence; specifically stimulants (cocaine and amphetamines; r = .25, p < .001, k = 28) and non-stimulants (heroin, marijuana and other drugs; r =.20, p < .001, k =47).

Very few studies have focussed explicitly on victim substance use or dependency and IPV recurrence. Across a 12-month follow up, a study with over 700 IPV victims found IPV victims' lifestyle drug use predicted both minor (r = .19, p < .001) and severe (r = .18, p < .001) physical IPV recurrence; whereas 'heavy episodic drinking' was not significantly related to minor or severe physical IPV recurrence (Testa et al., 2003). Furthermore, their results demonstrated that 'hard' drug use (i.e., all illicit drugs except cannabis) uniquely predicted minor (OR = 2.41, p < .01) and severe (OR = 2.87, p < .01) physical IPV recurrence, when controlling for victim ethnicity, age, relationship type, living status and IPV severity at baseline.

Aggressor Alcohol and Drug Use. Similarly, meta-analytic results showed medium associations between aggressors' lifestyle substance use (r = .23, p < .001, k = 399), lifestyle alcohol use (r = .22, p < .001, k = 277), lifestyle drug use (r = .24, p < .001, k = 103) and IPV occurrence perpetration (Cafferky et al., 2018). Furthermore, their results showed no meaningful difference (Q^b (1) = 3.57, p = .059) between aggressors' problematic alcohol dependence (r = .22, p < .001, k = 195) and lifestyle alcohol use (r = .19, p < .001, k = 175); whereas aggressors' problematic drug dependence (r = .30, p < .001, k =42) was a significantly stronger correlate (Q^b (1) = 9.30, p < .01) of IPV occurrence perpetration than lifestyle drug use (r = .20, p < .001, k =110). Similarly, there were no meaningful differences (Q^b (1) = .06, p = .802) between drug type and IPV occurrence perpetration, specifically stimulants (r = .21, p < .001, k = 31) versus nonstimulants (r = .21, p < .001, k = 46). The Stith et al. (2004) meta-analysis also showed a medium relationship between lifestyle alcohol use and IPV occurrence perpetration (r = .24, p < .001, k = 22, n = 14,541).

Of direct relevance, several studies specifically examined aggressor alcohol and drug use or dependency in relation to IPV recurrence. Robinson (2006) highlighted that 51% of aggressors sampled had alcohol-related problems and 36% had drug-related problems: recall that both alcohol, drug and mental health issues were captured in an overall measure of aggressor-specific 'aggravating problems'. This combined variable was a univariate predictor of IPV recurrence but was not uniquely predictive in the multivariate analysis. Ringland (2018) found that an aggressor's substance abuse 'problem' predicted both IPV recurrence (*AUC* = .55 [.54-.56, p < .001) and physical IPV recurrence (*AUC* = .55 [.54-.56], p < .001); it also uniquely predicted of IPV recurrence (*OR* = 1.16 [1.08-1.24], p < .001) and physical IPV recurrence (*OR* = 1.16 [1.04-1.30], p < .01), when controlling for the aforementioned DVSAT items. However, based on Robinson and Howarth's (2012) multivariate analysis: aggressor

alcohol use (*OR* = 1.29 [0.80-2.07], *p* = .30) and drug use (*OR* = 0.84 [0.51-1.38], *p* = .49) were not unique predictors of physical IPV recurrence.

Traumatic Experiences in Victim's Childhood. Exposure to violence in childhood may be a distal predictor of IPV occurrence and recurrence in adulthood. A meta-analysis found no significant association (*OR* = 1.30 [0.93-1.80], *k* = 4, *n* = 1397) between childhood abuse and IPV occurrence in adulthood (Yakubovich et al., 2018). One review outlined individual studies typically showed small, significant relationships between several childhood trauma variables and IPV occurrence in adulthood (Capaldi et al., 2012). Based on a retrospective population study, childhood experiences of sexual abuse (*r* = .21), physical abuse (*r* = .20), psychological abuse (*r* = .19) and neglect (*r* = .17) were all significantly associated with experiencing physical IPV occurrence in adulthood (Bender et al., 2003). Furthermore, population-level research from Australia found IPV occurrence within the last two years was more likely for participants with a history of physical or sexual childhood abuse than participants without such a history (*p* < .001); childhood abuse also uniquely predicted recent IPV occurrence (*OR* = 2.30 [1.70-3.10], *p* < .001), when controlling for victim age, ethnicity, education level, disability or health issues, household type, relationship status, income source, financial stress, social support, previous psychological IPV and geographic area of residence (Stavrou et al., 2016). Finally, childhood abuse severity did not uniquely predict IPV recurrence (*OR* = 1.52 [0.95-2.44], *p* > .05), when controlling for IPV severity at baseline, relationship length and PTSD symptoms (Krause et al., 2006).

Relationship Level Predictors

Within Dutton's (2006) nested ecological framework, recall that the relationship level focusses on the relationship structure and patterns between the victim and aggressor, as well as their immediate family.

Relationship Status. A fundamental consideration for IPV relates to the status of the intimate relationship. Are the victim and aggressor current or former partners, or do they cycle in and out of the relationship? There is very limited empirical research relating to the latter, but the term 'relationship churning' was coined to acknowledge the complicated status whereby the victim and aggressor repeatedly terminate and resume the relationship (Halpern-Meekin & Turney, 2018). Relationship churning may be more common within the context of IPV, in that victim self-reports indicate that the average number of attempted separations–for dyads that eventually do separate–is five attempts (Logan et al., 2008). Of note, one study suggested relationship churning may involve particularly unhealthy dynamics (Halpern-Meekin & Turney, 2018).

Research attention has typically focussed on imminent or recent separation. The time immediately before and after separation is considered a high-risk time for IPV victims (Capaldi et al., 2012; Ministry of Justice, 2017). For example, in Aotearoa New Zealand, victim reports suggest that approximately one quarter of IPV and non-IPV family violence episodes are triggered by separation-related issues (New Zealand Crime and Victims Survey, 2019) and 67% of the IPV homicides between 2009-2015 occurred during an impending or recent separation (Family Violence Death Review Committee, 2017). In relation to IPV recurrence outcomes, a recent separation predicted significantly greater IPV recurrence reported to police over a six-month follow up, compared to victims who remained in a relationship with the aggressor[8] (Dowling & Morgan, 2019). Similarly, Ringland (2018) found that imminent or recent separation predicted IPV recurrence (*AUC* = .52 [.51-.53], $p < .001$) but did not significantly predict physical IPV recurrence. Furthermore, imminent or recent separation did not uniquely predict IPV recurrence or physical IPV recurrence in their multivariate analyses. Robinson (2006) similarly found that imminent or recent separation

[8] Specific statistical results not provided by authors

was a significant univariate predictor of IPV recurrence; but did not uniquely predict IPV recurrence within multivariate analysis. In the Robinson and Howarth (2012) study, an imminent or recent separation uniquely predicted physical IPV recurrence (*OR* = 2.42 [1.19-4.95], $p < .05$) in their multivariate analysis.

On the other hand, the separation variable used by Sonis and Langer (2008) examined separated dyads, irrespective of when that separation had occurred (i.e., not restricted to imminent or recent separation). Their separation variable was associated with reduced likelihood of physical IPV recurrence (*OR* = 0.48 [0.27-0.85], $p < .05$) but predicted greater likelihood of harm severity if a further episode did occur during follow up (*OR* = 2.06 [1.03-4.12], $p < .05$), compared to the victim remaining in a relationship with the aggressor. Their findings also showed that separation uniquely predicted reduced odds of physical IPV recurrence (*OR* = 0.30 [0.16-0.57]) within multivariate analysis. Taken together, this evidence strongly indicates that separation predicts IPV recurrence, although the direction of this statistical relationship may depend on how the relationship status variable is measured.

Cohabitation. Given the above information about relationship status, investigation of the cohabitation status of victims and aggressors may initially appear unnecessary. However, living arrangements can be particularly complex within the context of abusive relationships, with dyads sometimes cohabitating irrespective of relationship status due to economic deprivation factors and limited social supports (Klein et al., 2019). Reviews have typically summarised that cohabitation is significantly associated to IPV occurrence (Capaldi et al., 2012; Cattaneo & Goodman, 2005). A recent, albeit small, meta-analysis found no significant association (*OR* = 1.52 [0.90, 2.55], $k = 2$, $n = 1231$) between cohabitation and IPV occurrence (Yakubovich et al., 2018).

Turning now towards the longitudinal studies, Mele (2006) showed that cohabitation did not significantly predict IPV recurrence reported to police, based on bivariate and

multivariate analyses. However, Mele (2009) found cohabitation was associated with a decreased survival time for IPV recurrence reported to police ($p < .05$). Cohabitation was also a unique predictor variable in this study, when controlling for employment, dependent children and a protection order; whereby the odds of survival time decreased by 1.37 times ($p < .05$) for victims that cohabitated with aggressors. In another individual study, cohabitation uniquely predicted both minor ($OR = 2.57$ [1.69-3.88], $p < .001$) and severe ($OR = 1.71$ [1.00-2.92], $p < .05$) physical IPV recurrence, over and above ethnicity, age and marital status (Testa et al., 2003). Overall, this research suggests cohabitation, as distinct from relationship status, may be a relevant variable to examine when predicting IPV recurrence outcomes.

Dependent Children. Within the context of IPV occurrence and recurrence, there are several different types of variables about dependent children used across the literature. Meta-analytic results from Stith et al. (2004) found a very small association between the number or presence of children and physical IPV occurrence ($r = .06$, $p < .001$, $k = 22$, $n = 4774$).

In focussing on children, some studies explicitly considered shared, biological children between the victim and aggressor. For example, Mele (2006) found that parenting shared children (compared to either having no children or the victim having children from a different relationship) was a univariate predictor of both IPV recurrence ($p <.001$) and a higher number of repeat episodes ($p <.05$). Shared children also uniquely predicted IPV recurrence, when controlling for victim age, gender, ethnicity, a protection order, cohabitation with aggressor and employment status; with the odds of IPV recurrence increasing by 1.61 times ($p < .05$) for victims co-parenting with aggressors. However, shared children did not significantly predict IPV recurrence survival time based on bivariate or multivariate analyses in the Mele (2009) study. The Ringland (2018) study instead focussed on the victim's children from previous relationships, which predicted IPV recurrence ($AUC = .52$ [.51-.52], $p < .001$) and was also uniquely predictive in multivariate analysis ($OR = 1.20$ [1.10-1.32], p

< .001); but did not significantly predict physical IPV recurrence in bivariate or multivariate analyses.

Other recurrence studies that focussed on dependent children did not specify their relationship to aggressors. Having children in the home uniquely predicted IPV recurrence in multivariate analysis (OR = 1.51 [1.21-1.88]), after controlling for relationship status, the victim's health, gender, age, ethnicity, education status, income levels and religiosity (Romans et al., 2007). However, the victim having children did not uniquely predict physical IPV recurrence (*OR* = 1.22 [0.70-2.14], *p* = .48) in Robinson and Howarth's (2012) multivariate analysis.

Victim Pregnancy. Within Aotearoa New Zealand, prevalence estimates suggest that 9% of ever-pregnant women have experienced IPV during pregnancy (Fanslow et al., 2008) and frontline practitioners typically consider pregnancy a high-risk time for IPV occurrence and recurrence (Ministry of Justice, 2017). International research also suggests IPV during pregnancy is associated with increased IPV homicide risk (Campbell et al., 2003; Domestic Violence Death Review Team, 2017; Taillieu & Brownridge, 2010).

With this broader context in mind, we now focus explicitly on studies that examined whether pregnancy predicted recurrent IPV. Sonis and Langer (2008) found that the victim being pregnant in the 12 months preceding the baseline assessment was a univariate predictor of physical IPV recurrence (*OR* = 1.93 [1.16-3.21], *p* < .01) but was not significantly related to the severity of physical IPV recurrence. Their multivariate analysis also showed that pregnancy uniquely predicted physical IPV recurrence (*OR* = 2.11 [1.21-3.67]). Similarly, victim pregnancy in the 12 months preceding baseline assessment was significantly associated with a greater likelihood of IPV recurrence reported to police, compared to non-pregnant victims (Dowling & Morgan, 2019). Ringland (2018) found that the victim being pregnant during the index episode was a univariate predictor of IPV recurrence (*AUC* = .52 [.51-.52], *p*

<.001) and physical IPV recurrence (*AUC* = .52 [.52-.53], *p* <.001); as well as uniquely predicting IPV recurrence (*OR* = 1.36 [1.21-1.52], *p* <.001) and physical IPV recurrence (*OR* = 1.61 [1.37-1.88], *p* <.001) in multivariate analyses. Furthermore, this study also showed that the victim having previously experienced IPV during pregnancy (at any point in the relationship) predicted IPV recurrence (*AUC* = .51 [.50-.51], *p* <.001) and physical IPV recurrence (*AUC* = .52 [.51-.52], *p* <.001) by itself; but did not uniquely predict either outcome in multivariate analyses. The victim being pregnant during the baseline assessment similarly did not uniquely predict physical IPV recurrence (*OR* = 1.36 [0.51-3.60], *p* = .54) in the Robinson and Howarth (2012) study.

Victim Fear. There is increasing awareness about the benefits of attending to victims' appraisals of their own IPV risk and their level of fear about the aggressor; with such assessments shown to be as accurate as formal risk assessment tools (Heckert & Gondolf, 2004; van der Put et al., 2019). The Stith et al. (2004) meta-analysis found a medium relationship between victim fear and physical IPV occurrence (r = .27, p < .001, k = 5, n = 4388). Interestingly, victim fear was not included in most of our frequently cited studies (e.g., Mele, 2006; Mele, 2009; Ringland, 2018; Robinson, 2006; Sonis & Langer, 2008); yet one review strongly recommended that victim fear be incorporated into IPV recurrence research (Kuijpers et al., 2011). Robinson and Howarth (2012) found that victim fear did not uniquely predict physical IPV recurrence (*OR* = 1.43 [0.70-2.93], *p* = .33) in their multivariate analysis.

Victim Use of IPV. Meta-analytic results indicate that, for around 50% of IPV victims, there may be some evidence of bidirectional physical violence within the dyad (Langhinrichsen-Rohling et al., 2012). In considering how the presence of this variable may contribute to IPV prediction, the Stith et al. (2004) meta-analysis found a medium association between victims' use of physical violence and physical IPV occurrence as the victim (r = .41, p < .001, k = 5, n = 652). Preliminary Australian research has suggested that women's use of

physical IPV is linked to greater IPV recurrence and IPV-related injuries (Boxall et al., 2020). However, limited studies have examined the predictive validity of victims' use of IPV on IPV recurrence outcomes. The victims' previous use of psychological abuse against the aggressor was a univariate predictor of them experiencing physical IPV recurrence ($r = .47$, $p < .001$) in the follow up (Kuijpers et al., 2012a). A related study found that victims' previous use of both physical ($OR = 3.30$, $p < .05$) and psychological ($OR = 5.40$, $p < .001$) abuse against the aggressor predicted physical IPV recurrence after a six-month follow up; but these variables did not uniquely predict physical IPV recurrence in multivariate analyses, when controlling for the aggressor's physical and psychological violence use, victim mental health-related variables and the victim's quality of life (Kuijpers et al., 2012b).

Aggressor's History of IPV Against Victim. The ways in which the aggressor has previously psychologically, physically or sexually abused the victim have been widely used to predict IPV recurrence outcomes. Several studies used overall frequency or severity measures to measures the aggressor's history of IPV against the victim. Ringland (2018) demonstrated that the aggressor's previous physical IPV throughout the relationship was a univariate predictor of both IPV recurrence ($AUC = .54$ [.53-.54], $p < .001$) and physical IPV recurrence ($AUC = .54$ [.53-.55], $p < .001$) at follow up; but did not uniquely predict either outcome in multivariate analyses. Robinson (2006) found that recent escalation of IPV severity or frequency at baseline significantly predicted greater IPV recurrence at follow up; but this variable was not a unique predictor within multivariate analysis. Another individual study showed that, based on bivariate analyses, the aggressor's previous use of physical IPV predicted psychological ($OR = 3.86$ [1.64-9.10], $p < .01$) and physical ($OR = 6.65$ [2.99-14.82], $p < .001$) IPV recurrence at follow up; whilst the aggressor's previous use of psychological IPV also predicted psychological ($OR = 5.33$ [2.64-10.74], $p < .001$) and physical ($OR = 4.77$ [1.86-12.22], $p < .001$) IPV recurrence at follow up (Kuijpers et al.,

2012b). The Sonis and Langer (2008) results showed that frequency of physical IPV in the 12 months preceding the baseline assessment was a univariate predictor of physical IPV recurrence (*OR* 1.66 [1.35-2.04], $p < .001$) but not physical recurrence severity at follow up. Their study also found that the severity of previous physical IPV at baseline was a univariate predictor of physical IPV recurrence severity (*OR* 1.36 [1.11-1.65], $p < .01$) during follow up, but not physical IPV recurrence itself. Of these two previous IPV measures, only frequency of baseline physical IPV uniquely predicted physical IPV recurrence (*OR* 1.57 [1.24-1.99]), based on multivariate analyses. Similar patterns were evident in other individual studies (e.g., Krause et al., 2006; Testa et al., 2003).

Other studies examined the specific abuse characteristics of the aggressor's previous IPV against the victim. Robinson (2006) found coercive control at baseline significantly predicted IPV recurrence at follow up, whilst physical violence resulting in victim injuries at baseline uniquely predicted IPV recurrence in multivariate analysis. Based on bivariate analyses, Ringland (2018) showed that previous threats to kill at baseline predicted IPV recurrence (*AUC* =.53 [.52-.54], $p <.001$) and physical IPV recurrence (*AUC* =.52 [.51-.53], $p <.001$) at follow up; previous nonfatal strangulation predicted IPV recurrence (*AUC* =.51 [.51-.52], $p <.001$) and physical IPV recurrence (*AUC* =.52 [.51-.53], $p <.001$); previous IPV involving a weapon predicted IPV recurrence (*AUC* =.51 [.51-.51], $p <.001$) but not physical IPV recurrence; and previous coercive control predicted IPV recurrence (*AUC* =.53 [.52-.53], $p <.001$) and physical IPV recurrence (*AUC* =.52 [.50-.53], $p <.01$). However, based on multivariate analyses, none of these variables uniquely predicted IPV recurrence or physical IPV recurrence at follow up. Based on multivariate analyses, Robinson and Howarth (2012) examined the aggressor's previous IPV behaviours towards the victim pre-baseline assessment: results showed nonfatal strangulation (*OR* = 1.99 [1.16-3.40], $p = .01$), sexual violence (*OR* = 1.79 [1.05-3.05], $p = .03$), IPV causing significant injuries (*OR* = 3.64 [2.14-

6.19], $p < .01$), use of weapons (*OR* = 3.35 [1.83-6.10], $p < .01$), stalking (*OR* = 4.45 [2.55-7.78], $p < .01$) and coercive control (*OR* = 1.79 [1.10-2.91], $p < .01$) all uniquely predicted physical IPV recurrence; whilst threats to kill the victim did not uniquely predict physical IPV recurrence (*OR* = 1.18 [0.68-2.06], $p = .55$).

Community Level Predictors

Remember that this ecological level of Dutton's (2006) framework examines the ways in which the victim or aggressor interact with their wider community; including the material resources available, their informal support system, formal help seeking behaviours and interactions with the criminal justice or social welfare systems.

Protection Orders. In Aotearoa New Zealand, protection orders are an intervention for IPV that legally direct an aggressor to stop all psychological, physical or sexual abuse against the victim (Family Violence Act 2018); the majority of applicants are women and most respondents are men (i.e., approximately 90% for both; New Zealand Family Violence Clearinghouse, 2017). International equivalents include restraining orders and domestic violence orders, which vary across jurisdictions in terms of scope and consequences for noncompliance (Dowling et al., 2018). We conceptualise protection orders as a community level variable because they reflect formal help seeking behaviours by the victim (i.e., disclosing their IPV experiences within the Family Court processes) and, as a result, additional options are available to the criminal justice system when responding to IPV.

One meta-analysis found that IPV victims with protection orders were less likely to experience IPV recurrence (*OR* = 0.59 [0.47-0.73], $p < .001$) and physical IPV recurrence (*OR* = 0.58 [0.36-0.95], $p < .05$) than victims without protection orders (Dowling et al., 2018). Mele (2006) showed that a protection order between the victim and aggressor was associated with both higher IPV recurrence ($p < .001$) and frequency of IPV recurrence ($p < .001$), than for victims without protection orders. Furthermore, these results showed that a protection

order also uniquely predicted IPV recurrence, when controlling for victim age, gender, ethnicity, dependent children, cohabitation with aggressor and employment status; with the odds of IPV recurrence 3.72 times ($p < .001$) greater for victims with a protection order. Of note, even when protection order violations were removed from the outcome measure, the odds of IPV recurrence were then 3.61 times ($p < .001$) greater for victims with a protection order. Additionally, Mele (2009) showed a protection order between the victim and aggressor was associated with decreased survival time for IPV recurrence ($p < .001$), compared to victims that had not obtained a protection order. However, these results showed that a protection order did not significantly predict IPV recurrence in multivariate analysis, when controlling for cohabitation, employment status and dependent children between the victim and aggressor. It is worth nothing that these latter two studies did not account for relationship status, which may contribute to the discrepancy in statistical relationship direction, as compared to the meta-analytic findings outlined.

Economic Deprivation. Several studies have examined economic deprivation through considering victim or dyad unemployment, financial stress and housing instability. Economic deprivation is one of the few variables explicitly identified by Dutton (2006) at the community level. Firstly, in relation to IPV occurrence: the Stith et al. (2004) meta-analysis showed a small association between physical IPV occurrence and victim income level ($r = -.04$, $p < .001$, $k = 10$, $n = 4097$); but no meaningful association with victim employment status ($r = .01$, $p > .05$, $k = 6$, $n = 2979$). One review highlighted that unemployment and low income tend to be positively related to IPV occurrence (Capaldi et al., 2012). Population-level research in Aotearoa New Zealand revealed a wide range of economic factors positively and significantly associated with IPV occurrence: victim unemployment, low annual income for the victim (i.e., less than $30,000 per annum), self-reported financial stress, living in a rental or social housing, and living in deprived geographical areas (New Zealand Crime and Safety

Survey, 2014). An Australian study found that several deprivation variables uniquely predicted IPV occurrence in multivariate analysis: victim has difficulty paying rent (*OR* = 2.63 [1.72-4.02], $p < .001$), pawned items for fast cash (*OR* = 2.45 [1.29-4.80], $p < .01$) and went without meals (*OR* = 3.18 [1.47-6.90, $p < .01$); when controlling for victim age, education levels, country of birth, disability or physical health issues, relationship type, household type, social support and childhood abuse (Stavrou et al., 2016). Housing instability has similarly been shown as significantly related to IPV occurrence across several studies (Klein et al., 2019), although a small meta-analysis found a nonsignificant relationship between housing instability and IPV occurrence (Yakubovich et al., 2018).

Focusing specifically on IPV recurrence: an early review indicated that victims' low-income levels predicted ongoing abuse (Cattaneo & Goodman, 2005). Ringland (2018) found that financial issues was a univariate predictor of IPV recurrence (*AUC* = .53 [.53-.54], $p < .001$) and physical IPV recurrence (*AUC* = .52 [.51-.53], $p < .001$); but did not uniquely predict either outcome based on multivariate analyses. Low income levels for victims also significantly predicted IPV recurrence across a five-year follow up (*OR* = 1.34 [1.03-1.75]), when controlling for victim gender, age, relationship status, children, ethnicity, education levels, religiosity and health status (Romans et al., 2007). However, victim unemployment did not significantly predict physical IPV recurrence or recurrence severity, based on Sonis and Langer's (2008) bivariate or multivariate analyses.

Aggressor's History of Violence Perpetration. The aggressor's general history of physical, sexual or family violence perpetration–as per police, court or correctional records–has relatively frequently been analysed within the IPV recurrence literature. We examined this variable at the community level because it reflects the aggressor's previous interactions with the criminal justice system for antisocial, harmful behaviours and how such a history may influence the system's further responses to any future violent behaviour by the aggressor. The

Stith et al. (2004) meta-analysis demonstrated that the aggressor's complete history of (any) partner abuse was associated with physical IPV occurrence against their current partner (r = .24, p < .001, k = 8, n = 1567).

Turning again to the longitudinal studies, Robinson (2006) found that 84% of aggressors sampled had a previous criminal conviction and 35% had a family violence-related conviction, but neither variable significantly predicted IPV recurrence at the bivariate or multivariate level. Sonis and Langer (2008) showed that the aggressor's history of violence outside of the relationship was a univariate predictor of physical IPV recurrence (*OR* = 1.82 [1.16-2.83], p < .05) and physical recurrence severity (*OR* = 2.24 [1.27-3.93], p < .01); and uniquely predicted physical recurrence severity (*OR* = 1.98 [1.12-3.52]) in multivariate analysis. Similarly, Ringland (2018) showed that the aggressor's previous violent charges or convictions predicted IPV recurrence (*AUC* = .55 [.55-.56], p < .001) and physical IPV recurrence (*AUC* = .55 [.54-.56], p < .001) by itself; and uniquely predicted IPV recurrence (*OR* = 1.43 [1.31-1.57], p < .001) and physical IPV recurrence (*OR* = 1.30 [1.14-1.49], p < .001) in multivariate analyses. Interestingly, Robinson and Howarth (2012) found that the aggressor's criminal history–but not their criminal history for IPV offending (*OR* = 1.10 [0.61-1.99], p = .75)–uniquely predicted physical IPV recurrence (*OR* = 3.12 [1.66-5.87], p < .001) in multivariate analysis.

Aggressor History of Noncompliance with Court Orders. Although there are few studies that examine IPV occurrence or recurrence by aggressors who breach the conditions of their protection orders, bail requirements, probation sentences or other court orders; the preliminary evidence indicates it may be a useful variable for predicting IPV recurrence outcomes. For noncompliant aggressors, it suggests that criminal justice sanctions have not been effective and that the 'system' may continue having difficulties constraining the aggressor's behaviour and may respond in different ways due to the aggressor's previous

disregard for the rules. Hence, we analyse aggressor noncompliance as a community level variable. Noncompliance is more commonly analysed as risk factor in perpetrator-specific studies that focus on re-offending (e.g., Dowling & Morgan, 2019; Henning et al., 2009). However, specifically relating to IPV recurrence for victims: Ringland (2018) found that aggressor noncompliance with domestic violence orders was a univariate predictor of IPV recurrence (*AUC* = .51 [.54-.55], $p < .001$) and physical IPV recurrence (*AUC* = .51 [.53-.55], $p < .001$). Aggressor noncompliance also uniquely predicted IPV recurrence (*OR* = 1.41 [1.28-1.55], $p < .001$) and physical IPV recurrence (*OR* = 1.28 [1.11-1.48], $p < .001$) in this study's multivariate analyses.

IPV-related Interventions for Victims. Interventions are conceptualised as a community level variable because they reflect formal help seeking behaviours by the victim, with the responses and support provided by professionals. Specific interventions for IPV victims typically include safety-planning services, counselling and support to access other community resources; with the latter including legal advice, emergency and longer-term housing, financial support, mental health services, drug and alcohol services, parenting support, psycho-education programmes, interventions for dependent children and so on (Arroyo et al., 2017; Rivas et al., 2016). The key goal of such interventions is to prevent IPV recurrence for victims. Meta-analytic results found interventions predicted reductions in IPV recurrence after treatment (Hedge's g = 0.35 [0.09-0.61]), with IPV recurrence reductions of 14% for treatment completers compared to those receiving no intervention (Arroyo et al., 2017). Another meta-analysis showed advocacy interventions for IPV victims predicted reductions in both physical (*Std. Mean Difference* = -0.13, *Z* = 2.00, $p < .05$, *k* = 5) and psychological (*Std. Mean Difference* = -0.19, *Z* = 2.77, $p < .01$, *k* = 4) IPV recurrence for up to 12 months[9] (Tirado-Muñoz et al., 2014). A review of 16 individual studies highlighted that

[9] Statistics reported as provided by authors.

only 40% empirically analysed the relationship between interventions and IPV recurrence; but suggested victim interventions predicted reduced IPV recurrence (Eckhardt et al., 2013).

Robinson and Howarth (2012) showed the frequency of support uniquely predicted reduced physical IPV recurrence (*OR* = 0.29 [0.18-0.48], $p < .001$) in multivariate analysis. Similarly, Howarth and Robinson (2016) found a significant dose-response relationship between intervention sessions completed and IPV recurrence cessation during a three-month follow up. More specifically, IPV cessation was uniquely predicted by victim completion of two to five intervention sessions (*OR* = 2.00 [1.32-3.07], $p < .001$), six to ten sessions (*OR* = 2.45 [1.51-3.97], $p < .001$) and more than ten sessions (*OR* = 4.34 [1.62-11.80], $p < .001$), when controlling for a comprehensive history of the IPV within index relationship, financial stress for the aggressor, separation status and the victim's fearfulness for self and children. However, it is important to note that almost half of their original baseline sample was lost to follow up and did not complete the intervention in this study, yet non-completion was not controlled for in the statistical analyses. Taken together, IPV-related interventions for victims consistently predicted reduced IPV recurrence, although it is unclear how this finding may differ if treatment non-completers were included in such analyses.

Methodological Limitations

There were some key methodological limitations across the outlined studies. Firstly, there were issues regarding independent variables. Some studies analysed too few variables and therefore likely overstated their influence in multivariate analyses; Mele (2006, 2009) only used seven and four independent variables respectively in multivariate analyses, whilst Kuijpers et al. (2012a, 2012b) similarly only used 11 and six. Other studies did not include variables from all ecological levels. For example, the community level was not used in some studies (Krause et al., 2006; Kuijpers et al., 2012a, 2012b; Robinson, 2006) or victim-specific variables were lacking at the individual level (Ringland, 2018; Robinson, 2006).

Secondly, there were also issues regarding outcome variables. Some studies focussed exclusively on physical IPV recurrence (Howarth & Robinson, 2016; Robinson & Howarth, 2012; Sonis & Langer, 2008); yet researchers have suggested that using blunt outcome measures hinders our ability to comprehensively understand repeat IPV victimisation and that it downplays the wide range of verbally, psychologically or sexually abusive behaviours experienced by IPV victims (Capaldi et al., 2012; Cattaneo & Goodman, 2005; Foa et al., 2000). Within an Aotearoa New Zealand context, it is especially important to consider IPV recurrence as an outcome measure (as some studies did; e.g., Ringland, 2018; Robinson, 2006), due to our relatively broad definition of IPV and the considerable proportion of IPV reported to police that does not involve physical violence. Additionally, outcome data sources varied across previous studies. Outcomes were typically based on victim self-reported data (Kuijpers et al., 2012a, 2012b; Robinson & Howarth, 2012; Sonis & Langer, 2008) or IPV-related episodes reported to police (Kerr et al., 2017; Mele, 2006, 2009; Ringland, 2018; Robinson, 2006); again, making direct comparisons difficult. Finally, assessment time periods varied across the longitudinal studies reviewed, ranging from three months to four years; again, making direct comparisons difficult. Seminal research by Gondolf (2002) suggests a 12-month follow up sufficiently captures IPV recurrence. Taken together, these methodological limitations point to some improvements, relating to the variables used and the study design, that can be incorporated in future studies of IPV recurrence.

The Current Study

The current study focusses on high-risk IPV victims processed through the multi-agency ISR pilot in Aotearoa New Zealand. Given the grave consequences predicted for these victims–recall that ISR risk assessments consider them very likely to experience imminent, severe IPV recurrence that may result in serious physical injury, psychological trauma or death–we believe urgent research attention needs to better understand this specific group.

Accordingly, our study focuses on examining high-risk victims' psychosocial stressors and identifying the possible predictors of IPV recurrence, physical IPV recurrence and offence detection. Structured using Dutton's (2006) nested ecological framework, we draw on research-derived variables from the above literature review and other exploratory variables based on the ISR risk assessment and management practice guidelines (Integrated Safety Response, personal communication, December 2, 2019) and available ISR data. More specifically, our approach involved coding as comprehensive a range of research-derived and exploratory variables as we could from the ISR data, before tracking dyads for 12 months to assess engagement with ISR interventions, subsequent IPV recurrence reported to police, and the variables that predicted IPV recurrence outcomes during follow up. Ultimately, we hope that research insights from this study will inform and support frontline harm prevention efforts for high-risk IPV victims; an endeavour that may prove especially impactful given the high harm, high frequency IPV experienced by these victims.

Overall, there are relatively few studies that focus explicitly on predicting IPV recurrence for victims. It is therefore difficult to draw clear conclusions about which variables consistently predict IPV recurrence, based on the limited empirical literature available; and especially given the variability in predictive validity when included in multivariate designs. Accordingly, we do not hypothesise a priori about which variables will significantly predict IPV recurrence outcomes at the bivariate or multivariate levels, nor the relationship sizes. We also do not hypothesise a priori about the ecological levels that may be most relevant in predicting IPV recurrence outcomes, as recommended by Dutton (2006).

In attempting to overcome some of the previous methodological issues, we have used the best elements from three key studies to guide the design of our study: including the specific focus on high-risk IPV victims (Robinson, 2006; Sonis & Langer, 2008); consideration of a multi-agency response system (Ringland, 2018; Robinson, 2006); a

longitudinal design, as used in all three studies; the 12-month follow-up period used by Ringland (2018); and, finally, the use of an IPV recurrence outcome measure that captures all episodes reported to police, irrespective of harm level or episode outcome (Ringland, 2018; Robinson, 2006). With this background in mind, we have four key research aims:

1. Describe the psychosocial stressors facing high-risk victims.
2. Summarise victims and aggressors' engagement with IPV-related ISR interventions.
3. Outline the prevalence of IPV recurrence reported to police over a 12-month follow up.
4. Identify the predictors of IPV recurrence, physical IPV recurrence and offence detection for high-risk victims; at the individual, relationship and community ecological levels.

Method

Our study used a pseudo prospective, longitudinal cohort design based on archival data to examine the stressors facing high-risk victims and identify predictors of IPV recurrence outcomes within an index relationship. This research had ethical approval from the University of Waikato and agreement from the ISR national board.

Sample

Our sample was a case cohort drawn from all IPV episodes between female victims and male aggressors that were reported to police in ISR areas and assessed by the ISR pilot as high risk between 1 November and 31 December 2018. More specifically, we retained episodes where police recorded 'Harm Between Partners' or 'Harm Between Ex-Partners'. Episodes were also filtered based on the police-recorded 'Person Role' variable; we retained episodes where women were classified as the 'Victim' or 'Primary Victim' and men were classified as the 'Suspect' or 'Perpetrator'; as well episodes where both parties were labelled as a 'Mutual Participant', but only if the man was classified as the 'Person Posing Risk' and the woman as the 'Person at Risk'. Finally, some dyads had multiple IPV episodes together during the sample period, which were assigned different risk levels by the ISR pilot. We therefore labelled the 'index episode' as the first (or only) episode that was assessed as high risk during this period[10]. Using these requirements to guide sample selection, index episodes were initially identified for 171 unique dyads. Accordingly, we use the term *case* to cover both the specific victim and aggressor within each dyad and to reflect our wide use of episode and case-level information (see Data Sources section below).

Each case was assigned a unique identifier to ensure participant anonymity and facilitate data matching across time points. However, a small number of cases were removed

[10] For example, a dyad may have an IPV episode on 10/11/2018 that was assessed by ISR as medium risk and then a further IPV episode on 01/12/2018 that was assessed as high-risk. We would ignore the first episode, take the second episode as the 'index episode' and track that case until 01/12/2019.

due to duplication errors (n = 4), missing data (n = 1) and being incorrectly classified by police as IPV (n = 1). A final sample of 165 cases therefore remained. Our sample was initially developed from a larger study on family violence perpetration; however, due to our primary focus on victims and the specific sampling criteria outlined above, there is some–but not complete–overlap with the Jolliffe Simpson et al. (2020) sample.

We present basic information about sampled cases and index episodes in Table 1, using police-recorded variables (see Appendix A for more information). Relating to the sample, over 50% of victims were aged under 30 years old at the index episode, with a median age of 29 years (M = 31.9 years, SD = 10.5 years). The median age of aggressors was 34 years (M = 35.4 years, SD = 10.9 years). Victims and aggressors predominantly identified as Māori or European (i.e., Pākehā, British, Scottish, Irish or European). Other ethnicities represented in the sample included Pasifika (n = 3 victims; 6 aggressors), Asian (n = 4 victims; 4 aggressors), Latin American (n = 1 aggressor), Middle Eastern (n = 1 aggressor) or unspecified (n =4 victims; 2 aggressors). The 'Other' category thus lacked statistical and clinical meaningfulness due to the small number of cases and heterogeneity within the category. To maintain sample size, we did not remove cases where victims or aggressors were listed as 'Other' ethnicity; instead, we removed the ethnicity variable from statistical analyses.

Turning now to index episodes. Physical violence was evident in around three fifths of these episodes; and around one fifth involved verbal abuse only, suggesting police sometimes responded to relatively minor IPV within the context of a high-risk case. Offences were only detected by police in one quarter of cases, with the most serious offence recorded as grievous assault (n = 6), serious assault (n = 18), sexual violence (n = 2), breach of an order (n = 10), intimidation/threats (n = 2), minor assault (n = 1), theft (n = 1) or wilful damage (n = 2). Interestingly, the majority of index episodes were not reported to police by the victim; these third-party reports were most frequently made by members of the public or family/whānau.

Table 1

Basic Characteristics of Victims, Aggressors and Index Episodes

Variable	*n*	*%*
Victim ethnicity		
Māori	76	45.2
European	78	47.0
Other	11	7.8
Aggressor ethnicity		
Māori	88	53.0
European	63	38.7
Other	14	8.3
Victim age (years)		
18-24	44	26.7
25-29	41	24.8
30-39	46	27.9
40-49	21	12.7
50-59	10	6.1
60+	3	1.8
Aggressor age (years)		
18-24	24	14.5
25-29	37	22.4
30-39	52	31.5
40-49	32	19.4
50-59	16	9.7
60+	4	2.4
ISR pilot area		
Christchurch and environs	108	66.1
Waikato city	32	19.0
Waikato rural	25	14.9
Location of index episode		
Dwelling	142	85.7
Public Place	23	14.3
Harm evident in index episode^		
Verbal Harm Only	39	23.6
Threats of Harm	37	22.4
Property Damage	19	11.5
Physical Harm	97	58.8
Sexual Harm	3	1.8
Offence detected	42	25.6
Index episode reported by:		
Victim	74	44.0
Family Member	26	16.1
Member of the Public	42	25.6
Professional Agency	11	7.1
Other	12	7.1

Notes: *N* = 165. See Appendix A for variable information. ^Variable was multiply coded, does not sum to 100%.

Data Sources

Raw data was extracted from the ISR database, FSS. We used two key data sources: episode reports completed by police and ISR case plans.

Episode Reports

Person Characteristics. Basic demographic information was recorded about the victim and aggressor, including age, gender and ethnicity.

Episode Characteristics. Relevant summary information was recorded about the episode, including the ISR region, date the episode was reported to police, who reported the episode to police, person roles in the episode, whether the episode occurred in a public place or private dwelling, the harm types evident, and the offence classification code/s.

Episode Narrative. This section of the episode report recorded free text completed by attending police officers, which typically included information about the episode context; the victim, aggressor and any witnesses' perspectives; any dependent or present children; the episode scene and any evidence; and any police actions that were taken or recommended.

Dynamic Risk Assessment (DYRA). The DYRA is a brief risk assessment tool that contains 12 mandatory questions, with four extra questions if children live with the victim or aggressor. The DYRA assesses the aggressor's recent harmful behaviours, including nonfatal strangulation, coercive control, AOD use, suicide or self-harm, non-compliance with orders and abuse towards other family/whānau. The DYRA is usually administered by the police officers attending the episode, then collated and scored on a police smartphone application. It may not be administered if a victim is unwilling or unable to engage with the process (e.g., already left the scene, uncontactable, highly intoxicated or incapacitated due to injury). In these circumstances, police officers may complete DYRA from the information available.

ISR Case Plans

Case Plan Notes. Most multi-agency information relating to the victim and aggressor is collated in the case plan notes, providing a depth of data not available from our first source. The case plan is typically updated after every recorded episode involving the victim and aggressor and after every multi-agency risk assessment or case review.

Risk Assessment Notes. After each episode, a 'risk string' is entered, which lists the key concerns flagged in the ISR risk assessment processes (i.e., the SAM and ICM assessments conducted most proximally after an episode[11]). For example, the following abridged 'risk string' came from the index episode of a sampled case, with all identifying details removed to ensure anonymity: *She is fearful of him, physical assault in public, MH for both, his controlling behaviour, he threatens suicide to manipulate*. A rationale is also entered here about any risk tier changes (e.g., a medium-risk case increases to high risk), if relevant.

Support Service Notes. This section of the plan provides information about the interventions allocated to a victim and aggressor. The type of intervention is recorded (i.e., Independent Victim Specialist, Perpetrator Outreach Specialist, Whanau Support Worker and kaupapa Māori equivalents), the allocated agency and practitioner, the start and completion dates, notes recorded by the allocated practitioner and an overall outcome comment. There is also an engagement summary field with pre-population outcome options: 'Actively engaged and accepted further support', 'Engaged though agreed no further support required from agency', 'No contact achieved' or 'Did not engage'.

Task Details. Every time a case is reviewed, relevant case management or response actions are tasked to specific ISR-affiliated agencies. These tasks provide information about the requirements of an action, the allocated agency and practitioner, the start and due date, notes recorded by the allocated practitioner and an overall outcome comment.

Plan Outcome and Involved Support Service Notes. Upon closing a case plan, a summary of whether the plan outcome was 'Positive', 'Neutral' or 'Negative' is recorded. Additionally, there is a free-text box where the plan lead can comment on key outcomes for a case. Each allocated 'Support Service' records overall comments about the intervention provided and rates their outcome as 'Positive', 'Negative' or 'Neutral' overall.

[11] In a very small number of cases, there was information relating to an IPV recurrence captured before the next risk assessment, due to repeat episodes happening in very quick succession.

Measures

As Table 2 outlines, these data sources were used to code or collate three categories of data: (a) *baseline* data associated with, or preceding, the index episode, (b) *intervention* data after the index episode, and (c) *IPV recurrence* outcome data during follow up.

Baseline Variables

Most research-derived and exploratory baseline variables were manually coded, using two different time parameters. For most variables, the timelines included the relevant ISR case plan data in the *six months* preceding the index episode and including the most proximal ISR risk assessment after the index episode. Over and above these timelines, a small number of variables also included the relevant data *ever recorded* in the full ISR case plan (i.e., not limited to six months but prior to the index episode). See Appendix B for more information.

Intervention Variables

Information about the ISR interventions for all victims and aggressors was initially downloaded by an ISR employee from the support services section of the dyad's FSS case plan. However, due to the poor quality of non-engagement data, further manual checking and updating of data was required to more accurately quantify ISR initial service provision and victim/aggressor engagement. The specific issues and actions are detailed in the Data Preparation section below. As such, information about the intervention data sources in Table 2 is based on the updated intervention data.

IPV Recurrence Outcome Variables

For recurrence data, the follow up period was between 1 November and 31 December 2019; 12 months on from each case's specific index episode date. We used three outcome measures. Firstly, *IPV Recurrence* was recorded dichotomously based on whether a further episode of IPV was reported to police involving the index victim and aggressor in the same roles. If IPV recurrence was recorded, then we also examined the presence of two secondary

outcome measures. *Physical IPV Recurrence* was recorded dichotomously depending on whether the police-recorded 'Physical Harm' variable was selected for any repeat episodes during follow up. *Offence Detection in IPV recurrence* was recorded dichotomously depending on whether a police-recorded 'Incident Code' for a specific offence was entered for any repeat episodes during follow up, irrespective of whether the aggressor was then formally arrested or charged with the said offence. It is important to note that because of the way we examined the secondary outcome measures, the recurrence episodes used for these two latter measures may differ from each other in some cases (e.g,, a single episode of recurrence may result in all three outcome measures being coded as 'present'; in other cases, there might be different episodes informing physical IPV recurrence and offence detection).

Table 2

Data Sources Informing Measures

Data Source	Police-recorded Baseline data[A]	Manually-coded Baseline data[B]	Intervention data	Recurrence data
Episode report				
Person characteristics	X	X	-	X
Episode characteristics	X	X	-	X
Episode narrative	-	X	-	-
DYRA	-	X	-	-
ISR case plan				
Case plan notes	-	X	X	-
Risk assessment notes	-	X	X	-
Support service notes	-	-	X	-
Task details	-	-	X	-
Plan outcome/involved support service notes	-	-	X	-

Notes: [A] = see Appendix A for variable information. [B] = see Appendix B for variable definitions.

Data Preparation

Coding Protocol and Interrater Reliability

To add to the police-recorded baseline variables, we created a coding protocol to capture the widest possible range of research-derived and exploratory baseline variables that could be manually coded from our data sources. Broadly, this coding protocol included victim

and aggressor-specific variables at the individual, relationship and community levels. To ensure these variables were coded consistently, we created a data dictionary and agreed upon guidelines for administering and scoring this protocol. Once drafted, we reviewed common understanding for this protocol by having a second team member code five practice cases as part of the training process. The second coder and I then separately coded 33 randomly selected cases (i.e., 20% of sample) to facilitate interrater reliability testing. A single-rater absolute-agreement, 2-way random effects model was selected for the intraclass correlation coefficient (ICC) analysis; with coefficient values less than 0.50 indicating poor interrater reliability, values between 0.50 and 0.74 indicating moderate reliability, values between 0.75 and 0.90 indicating good reliability, and values above 0.90 indicating excellent reliability (Koo & Li, 2016). This analysis highlighted several items included in a draft protocol that could not be reliably coded (i.e., coefficients less than 0.70), so these variables were removed from the final protocol. Several research-derived variables, especially at the individual level, were among those deleted (e.g., victim alcohol use, victim non-IPV trauma history, and aggressor drug and alcohol use). Revisions to the draft protocol were based on both group consensus for combining conceptually similar variables and the ICC results. Appendix B fully details our final coding protocol and Table 3 presents the ICC results; showing mostly good to excellent interrater reliability across all 39 retained items. I then administered the protocol to the remaining sample. For context, each case took an average of about 25 minutes to code.

Table 3

Interrater Reliability Results for Coding Protocol

Variable	Intraclass Correlation Coefficient	95% Confidence Interval
Individual level		
Mental health^{V}*	0.85	[0.72, 0.92]
Drug use^{V}*	0.73	[0.52, 0.86]
Mental health^{A}*	0.71	[0.48, 0.85]
Relationship level		
Relationship status	0.74	[0.54, 0.86]
Cohabitation	0.88	[0.77, 0.94]
Shared children*	0.88	[0.78, 0.94]

Non-bio children[V]*	0.79	[0.61, 0.89]
Pregnancy[V]	1.00	-
Fear[V]	0.94	[0.88, 0.97]
Custody issues	0.85	[0.71, 0.94]
Infidelity issues	0.70	[0.48, 0.84]
Denial around separation[A]	0.88	[0.76, 0.94]
Violence use[V]	0.74	[0.52, 0.86]
Physical harm	0.88	[0.76, 0.94]
Injuries sustained	0.70	[0.49, 0.84]
Threats to kill	0.85	[0.71, 0.92]
Stalking	0.79	[0.62, 0.89]
Weapon use/access*	0.94	[0.88, 0.97]
Nonfatal strangulation*	0.88	[0.77, 0.94]
Other threats	0.81	[0.64, 0.90]
Items thrown	1.00	-
Property damage	0.94	[0.88, 0.97]
Verbal harm	1.00	-
Coercive control	1.00	-
Prolonged duration	0.84	[0.70, 0.92]
Physical harm to others	0.72	[0.51, 0.85]
Sexual harm*	0.75	[0.55, 0.87]
Community level		
Protection order*	0.84	[0.70, 0.92]
Unemployment[V]	0.70	[0.48, 0.84]
Housing instability[V]	0.71	[0.52, 0.86]
History of violence[A]*	0.77	[0.59, 0.88]
Non-compliance[A]*	0.87	[0.75, 0.93]
Gang affiliated[A]*	1.00	-
Criminal history[V]*	0.94	[0.88, 0.97]
CPS history[V]*	0.94	[0.87, 0.97]
Police FV history[V]*	0.85	[0.71, 0.92]
Non-engagement history[V]	0.71	[0.47, 0.85]
Uncooperative with police[V]	0.82	[0.67, 0.91]
Unreported IPV	0.88	[0.78, 0.94]

Notes: n = 33. 'Ever-recorded' variables marked with an asterisk; See Appendix B for variable definitions. [V] = victim variable, [A] = aggressor variable, CPS = Child Protection Services, FV = Family violence, including but not limited to IPV.

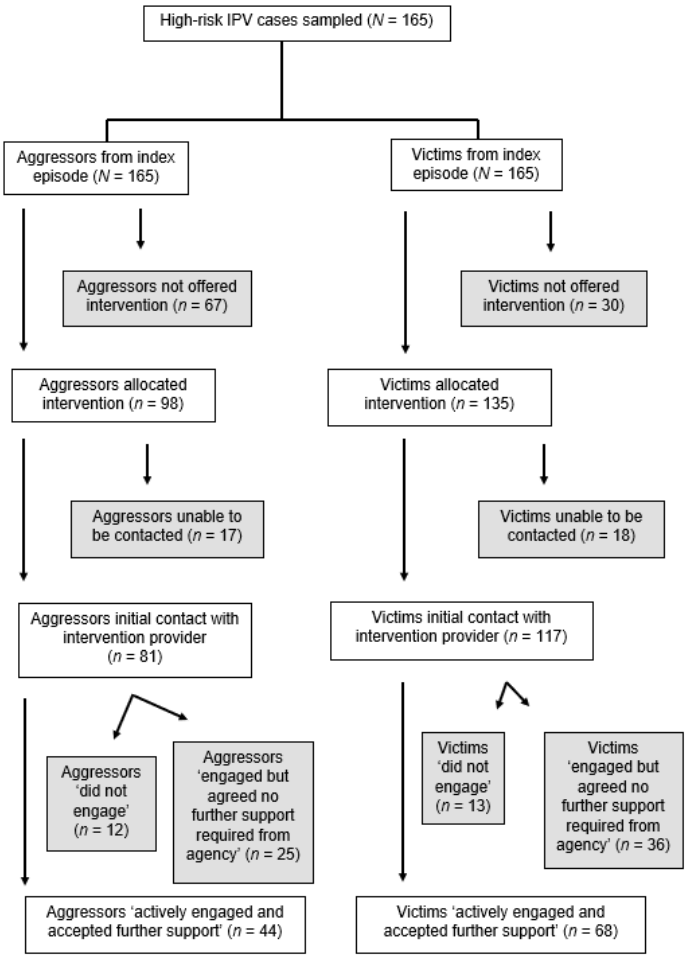
Intervention Data

Figure 2 summarises the initial findings for our sample's engagement with IPV-related ISR interventions. In contrast to the typical intervention provisions that high-risk cases should be allocated (Mossman et al., 2019), the data showed approximately one fifth of victims and two fifths of aggressors were not offered an intervention following the index episode. There also appeared to be high rates of victims and aggressors who were uncontactable or non-engaging with interventions. However, upon further inspection, several specific data quality

problems were identified. Firstly, some individuals had no data entered under the 'Support Services' tab in FSS but were recorded in the case plan notes or task details as having actively engaged with an intervention (i.e., attended scheduled individual or group IPV-related sessions). Secondly, others had 'Not offered ISR intervention', 'Unable to be contacted' or 'Did not engage' recorded for ISR intervention/s in the 'Support Services' tab during the follow-up period but relevant engagement notes relating to interventions during the follow-up period had been added into an intervention node listed as outside the follow-up period. Finally, the three non-engagement categories recorded in FSS ('Engaged though agreed no further support required from agency', 'No contact achieved' and 'Did not engage') were used inconsistently across agencies and individual practitioners.

Figure 2

Engagement Patterns for IPV-related ISR Interventions



Before we used these data in statistical analyses, we needed to more fully investigate all relevant information recorded in FSS to work around–as best as possible–the above issues. We took the following actions. We used the person IDs for individuals not showing as actively engaged based on the initial results (n = 97 victims; 121 aggressors) and then checked each case plan manually in FSS. See Table 2 for the specific data sources used to find any relevant intervention information that relates to these victims and aggressors in the 12 months after the index episode. Based on this process, we collected more accurate data on initial engagement status with interventions. If there was evidence of a victim or aggressor showing initial willingness to engage with support services and having attended at least one scheduled, face to face intervention appointment then we dichotomously scored this as 'Actively engaged and accepted further support' for that individual. If there was no such data available in the case plan records, we simply marked that victim or aggressor as 'did not engage with intervention'. Accordingly, the updated intervention data informed our statistical analyses (see results section) but is henceforth referred to as *initial engagement with ISR interventions*. This label relates to the significant data quality issues that remain; we could not reliably determine the extent to which victims or aggressors had engaged with interventions over and above initial engagement, nor calculate intervention completion rates.

Planned Analyses

All analyses were conducted in IBM SPSS Statistics Version 26. As outlined in the Method section, preliminary analyses included calculating descriptive statistics for sample characteristics, interrater reliability statistics for our coding protocol, and cleaning the intervention data. In the Results section, descriptive statistics are used to quantify the psychosocial stressors facing victims, victims and aggressors' initial engagement with ISR interventions, and overall rates of IPV recurrence outcomes during follow up. To better understand these psychosocial stressors, we conducted correlational analyses between the

baseline variables, using the Pearson's correlation option in SPSS[12]. To make reading large correlational matrices easier, we present these results grouped according to whether they related to research-derived or exploratory baseline variables; and the ecological level.

To begin examining which variables predicted the three IPV recurrence outcomes, we conducted Pearson's correlational analyses between the independent variables and IPV recurrence, physical IPV recurrence and offence detection. These variables were again grouped by their research-derived or exploratory status, as well as their ecological levels. Additionally, the correlational analyses thus far enabled us to make preliminary investigations into the suitability of these variables for multivariate analyses (e.g., examining multicollinearity, checking univariate predictive validity).

To further examine the predictive validity of the independent variables on our IPV recurrence outcome measures, we turned to binary logistic regressions. Statistical conventions for this type of analysis dictate that approximately one independent variable can only be added for every 10 participants (Pictuch & Stevens, 2016). Based on our sample size, we therefore had too many variables to enter into one single regression. Instead, we conducted a series of initial binary logistic regression analyses using all independent variables, grouped according to ecological levels. We also split analyses into separate models, based on whether they included research-derived variables or exploratory variables; which enabled us to examine the predictive contributions of these different variable types[13]. These regressions were replicated for each of the three IPV recurrence outcomes. The final three regressions to predict each IPV recurrence outcome were conducted using an entirely data-driven strategy; based on the combination of the 'best predictors' from each of the level-based regressions.

[12] For two dichotomous variables, correlation coefficients are identical whether Pearson's or Spearman's Rho options are used.
[13] We used three models at the community level: research-derived variables at baseline, research-derived variables during follow up (i.e., interventions), and exploratory variables at baseline.

Results

Psychosocial Stressors

To better understand the individual, relationship and community level stressors facing high-risk victims, we present the prevalence rates of coded baseline variables in Table 4. These results clearly quantify the considerable difficulties experienced by many victims, typically at the time of the index episode or during the preceding six months[14]. Approximately one third of victims had mental health issues recorded, used illicit drugs and faced housing instability (e.g., overcrowding, transience, pending evictions or staying in emergency accommodation). Almost half of these women received an unemployment benefit. Other community level stressors for victims included high rates of child protection services involvement for their children, criminal records and previous non-cooperation with police in an IPV context (e.g., not signing statements or behaving abusively towards police). Around one third of victims had obtained a protection order against the aggressor. Adding further complexity, most aggressors had several markers of an antisocial lifestyle; including high rates with a history of violence recorded by Police, almost three quarters had previously breached court orders and almost two fifths were either patched gang members or known associates.

These results also highlight the extremely harmful and complex nature of the relationships between victims and aggressors. As anticipated, the abuse characteristics experienced by many victims were severe. Of concern, four fifths of victims were physically assaulted; over half sustained injuries from a physical assault, expressed fear about the relationship and were nonfatally strangled; and aggressors used coercive control against the victim in nearly three quarters of cases. Almost one quarter of victims had an IPV episode recorded that was noted by the ISR team for the aggressor's prolonged, unrelenting violence.

[14] Recall also the 'ever-recorded' parameters used for a small number of variables; see Table 4 and Appendix B.

Only a small proportion of victims were subjected to homicidal threats but, when they were recorded, police episode narratives reflected these threats were particularly explicit and abhorrent. In terms of relationship characteristics, there was evidence of relationship churning in approximately one third of cases, highlighting especially chronic relationship instability for some victims and aggressors. Furthermore, almost one fifth of victims were pregnant (or had recently given birth). Around two fifths of victims and aggressors parented shared children together, whilst one quarter of victims had children from another relationship.

Table 4

The Prevalence of Baseline Stressors

Variable	*n*	*%*
Individual level		
Mental health[V]*	61	37.0
Drug use[V]*	60	36.4
Mental health[A]*	75	45.5
Relationship level		
Relationship status		
Together	75	46.1
Churning	51	30.9
Separated	38	23.0
Cohabitation	77	46.7
Shared children*	70	42.4
Non-bio children[V]*	41	24.8
Pregnancy[V]	32	19.4
Fear[V]	86	52.1
Child custody issues	21	12.7
Infidelity issues	37	22.4
Denial around separation[A]	22	13.3
Violence use[V]	42	25.5
Physical harm	136	82.4
Injuries sustained	86	52.1
Threats to kill	25	15.2
Stalking	18	10.9
Weapon use/access*	86	52.1
Nonfatal strangulation*	91	55.2
Other threats	48	29.1
Items thrown	21	12.7
Property damage	56	33.9
Verbal harm	147	89.1
Coercive control	122	73.9
Prolonged duration	38	23.0

Physical harm to others	28	17.0
Sexual harm*	21	12.7
Community level		
Protection order*	53	32.1
Unemployment[V]	75	45.5
Housing instability[V]	54	32.7
History of violence[A]	153	92.7
Non-compliance[A]*	119	72.1
Gang affiliated[A]*	65	39.4
Criminal history[V]*	87	52.7
CPS history[V]*	106	64.2
Police FV history[V]*	155	92.7
Non-engagement history[V]	73	44.2
Uncooperative with police[V]	80	48.5
Unreported IPV	95	57.6

Notes: *N* = 165. All variables based on six-month baseline period, except for 'ever recorded' variables marked with an asterisk; see Appendix B for variable definitions. [V] = victim variable, [A] = aggressor variable, CPS = Child Protection Services, FV = Family violence, including but not limited to IPV.

To better understand victims' circumstances, the correlation matrices presented in Tables 5, 6 and 7 reveal how various stressors related to each other at baseline. Overall, the results were mostly nonsignificant with very small to small effect sizes, as per Hanson's (2000, as cited in Stith et al., 2004) criterion. However, several statistically significant associations were evident, and these relationships were mostly small to medium in size. We highlight some examples of note. The victim's illicit drug use was positively associated with having a criminal record, mental health issues, unemployment and housing instability; as well as the aggressor's history of violence and noncompliance. Furthermore, a protection order between the victim and aggressor was positively associated with victim fear, parenting shared children and having custody issues with the aggressor, and previous involvement with child protection services as a parent. Victim fear was also positively related to the aggressor being gang affiliated and engaging in stalking or noncompliance behaviours; but negatively related to victims' own use of physical violence against the aggressor. Variables relating to an antisocial lifestyle for both victims and aggressors were related. Victim criminal records were positively associated with a history of previous family violence calls for service to police, a child protection services history as a parent and previous non-engagement issues with

community supports; whilst the aggressor's history of violence, noncompliance, gang affiliations and likelihood of being a protection order respondent were all positively associated. Finally, these results suggested relationship status was important. For example, verbal abuse, physical violence and injuries to the victim were positively associated with relationship churning between the victim and aggressor and negatively associated with the victim and aggressor being separated; whilst stalking and threats to kill were positively associated with separation.

Table 5

Bivariate Relationships within Research-Derived Baseline Variables

	Individual level				Relationship level							
	Age[V]	MH[V]	MH[A]	Drug use[V]	Together	Churning	Separated	Cohabitation	Shared children	Non-bio children	Pregnant	Fear[V]
Individual level												
Mental health[v]	.01	-										
Mental health[A]	.15*	.06	-									
Drug use[v]	-.01	.20**	.09	-								
Relationship level												
Relationship status: Together[1]	.04	.07	-.01	.03	-							
Relationship status: Churning[1]	-.13	.03	.02	.04	-	-						
Relationship status: Separated[1]	.10	-.12	-.01	-.08	-	-	-					
Cohabitation	.05	.06	.02	.00	.26**	-.05	-.25**	-				
Shared children	-.25**	-.12	-.02	.07	-.13	.01	.14	.01	-			
Non-bio children[v]	.02	-.06	.01	-.06	-.08	-.05	.15	.00	-.04	-		
Pregnancy[v]	-.31**	.04	-.02	-.02	.01	.10	-.12	-.09	.11	.11	-	
Fear[V]	.06	-.07	-.12	.09	-.19*	.01	.21**	-.08	-.09	.13	-.02	-
Violence use[V]	-.01	.10	.03	-.01	-.07	.00	.08	-.02	.09	-.08	-.01	-.16*
Physical harm	-.05	.02	-.03	-.05	-.05	.21**	-.16*	.11	-.06	-.07	.15	-.09
Injuries sustained	-.04	.06	-.05	.07	.03	.22**	-.28**	.02	-.11	-.12	.13	-.09
Threats to kill	.14	.10	.06	-.11	-.09	-.10	.21**	-.12	-.16*	.07	-.12	.10
Stalking	.09	.09	.03	.10	-.21**	.02	.22**	-.21**	-.06	.07	-.07	.22**
Weapon use/access	.01	.13	.17*	-.01	.01	.04	-.05	-.05	-.04	-.04	.07	-.07
Nonfatal strangulation	.07	-.02	-.08	-.03	.00	.05	-.06	.16*	-.09	-.05	.10	.01
Community level												
Protection order	.10	.20*		.02	-.14	.13	.02	-.12	.17*	-.04	-.04	.17*
Unemployment[v]	-.21**	.08	.00	.20*	.01	.02	-.04	.00	.03	.04	-.08	.02
Housing instability[v]	-.14	.08	-.05	.17*	-.07	.09	-.01	-.03	.06	.08	.02	.10
History of violence[A]	-.23**	.17*	-.04	.16*	-.07	.14	-.07	-.21**	-.04	.16*	.08	.15
Non-compliance[A]	-.16*	.03	.03	.22*	-.10	.07	.05	-.20**	.12	.08	.03	.16*

Notes: $N = 165$. [V] = victim variable, [A] = aggressor variable. [1] As relationship status was the only non-dichotomous variable, we separated each of the three relationship categories to assess dichotomously (e.g., for Together, we correlated a variable whereby 1 = Together, 0 = Separated, Churning). Pearson correlation coefficient is significant at the * $p < .05$ level (two-tailed); or the ** $p < .01$ level (two-tailed).

Table 5 (Cont.)

Bivariate Relationships within Research-Derived Baseline Variables

	Relationship level								Community level		
	Violence use[v]	Physical	Injuries	Threats to kill	Stalking	Weapons	Nonfatal Strangulation	PO	Unemployment[v]	Housing[v]	History of violence[A]
Relationship level											
Violence use[v]	-										
Physical harm	.16*	-									
Injuries sustained	.17*	.45**	-								
Threats to kill	.03	-.03	-.17*	-							
Stalking	-.07	-.15	-.02	.07	-						
Weapon use/access	.03	.00	-.07	.13	-.02	-					
Nonfatal strangulation	.08	.22*	.21**	-.03	.00	-.16*	-				
Community level											
Protection order	-.10	-.13	-.07	.07	.13	.11	-.19*	-			
Unemployment[v]	-.09	-.19*	.00	-.01	-.05	-.05	-.11	.05	-		
Housing instability[v]	-.05	-.15*	-.06	-.08	-.04	.05	-.10	.07	.32**	-	
History of violence[A]	-.10	-.01	.06	.12	.02	.11	-.11	.19*	.12	.05	-
Noncompliance[A]	-.13	-.07	-.06	.04	.09	.11	-.15*	.31**	.19*	.35**	.35**

Notes: N = 165. [V] = victim variable, [A] = aggressor variable. [1] As relationship status was the only non-dichotomous variable, we separated each of the three relationship categories to assess dichotomously (e.g., for Together, we correlated a variable whereby 1 = Together, 0 = Separated, Churning). Pearson correlation coefficient is significant at the * $p < .05$ level (two-tailed); or the ** $p < .01$ level (two-tailed).

Table 6

Bivariate Relationships within Exploratory Baseline Variables

	Relationship level										
	Custody issues	Infidelity issues	Denial of separation	Other threats	Items thrown	Property Damage	Verbal harm	Coercive control	Prolonged duration	Physical harm (others)	Sexual harm
Relationship level											
Child custody issues	-										
Infidelity issues	-.03	-									
Denies separation[A]	.23**	.13	-								
Other threats	.12	.04	.10	-							
Items thrown	.13	.06	.12	.20*	-						
Property damage	.03	-.02	.06	.25**	.26**	-					
Verbal harm	-.04	.00	.02	.01	.08	-.04	-				
Coercive control	-.15	.29**	.15	.11	.06	.05	.10	-			
Prolonged duration	.01	.26**	.12	.09	.14	.06	.05	.23**	-		
Physical harm to others	-.03	-.05	.01	.03	.07	.09	-.05	.01	.02	-	
Sexual harm	-.04	.06	.17*	.16*	.02	-.04	-.10	-.06	.05	.02	-
Community level											
Victim reported index episode	-.02	.04	.11	.09	.02	.02	.00	.15	.09	.01	-.02
Index episode in public	.11	-.09	.00	-.07	.06	-.03	-.20*	-.04	-.05	-.09	.00
Gang affiliated[A]	.06	-.05	.01	-.07	-.01	.02	-.04	-.06	.00	-.07	-.01
Criminal history[V]	-.15	-.04	-.16*	-.06	.11	.06	-.02	-.09	.09	-.02	.07
CPS history[V]	.21**	-.02	.11	.06	.21**	.08	.06	-.07	-.01	.03	-.02
Police FV history[V]	.10	-.11	.02	-.06	.10	.07	-.01	-.04	.08	.05	.10
Non-engagement history[V]	-.01	-.07	-.13	-.06	.03	.06	.04	-.03	-.05	-08	.03
Uncooperative with police[V]	-.04	.03	-.10	-.06	-.01	-.08	.03	-.06	-.04	-.02	.14
Unreported IPV	-.04	-.04	-.02	.09	.00	-.14	.05	.16*	.12	.06	.07

Notes: $N = 165$. [V] = victim variable, [A] = aggressor variable, CPS = Child Protection Services, FV = Family violence, including but not limited to IPV. Pearson correlation coefficient is significant at the * $p < .05$ level (two-tailed); or the ** $p < .01$ level (two-tailed).

Table 6 (Cont.)

Bivariate Relationships within Exploratory Baseline Variables

	Community level							
	Victim reported index episode	Public index episode	Gang[A]	Criminal history[V]	CPS history[V]	Police FV history[V]	Non-engagement history[V]	Uncooperative with police[V]
Community level								
Victim reported index episode	-							
Index episode in public	-.05	-						
Gang affiliated[A]	-.10	.14	-					
Criminal history[V]	-.15	.17*	.29**	-				
CPS history[V]	.04	.04	.11	.18*	-			
Police FV history[V]	-.03	.10	.15	.22**	.34**	-		
Non-engagement history[V]	-.14	.06	.13	.16*	.21**	.18*	-	
Uncooperative with police[V]	-.12	-.01	.19*	.04	.04	.04	.26**	-
Unreported IPV	.06	-.04	.01	.02	.00	.04	.17*	.12

Notes: N = 165. [V] = victim variable, [A] = aggressor variable, CPS = Child Protection Services, FV = Family violence, including but not limited to IPV. Pearson correlation coefficient is significant at the * $p < .05$ level (two-tailed); or the ** $p < .01$ level (two-tailed).

Table 7

Bivariate Relationships between Research-Derived and Exploratory Baseline Variables

	Relationship level										
	Custody issues	Infidelity issues	Denial of separation	Other threats	Items thrown	Property Damage	Verbal harm	Coercive control	Prolonged duration	Physical harm (others)	Sexual harm
Individual level											
Age[v]	-.26**	.03	-.08	-.04	-.03	-.10	-.03	-.03	-.03	.01	.17*
Mental health[v]	-.03	.07	.03	-.02	.12	-.07	-.09	.11	.09	-.11	.08
Mental health[A]	.05	-.05	.11	.00	-.06	.07	-.07	-.04	.05	.04	-.06
Drug use[v]	-.02	-.01	-.15	-.10	-.02	.18*	-.02	-.07	.07	-.04	-.14
Relationship level											
Together[1]	-.13	-.12	-.29**	-.08	.05	-.12	-.03	-.14	-.13	-.03	-.10
Churning[1]	-.06	.05	.12	.03	.02	.13	.19*	.07	.13	-.06	.21
Separated[1]	.23**	.09	.21**	.06	-.08	.00	-.18*	.10	.01	.10	.01
Cohabitation	-.18*	-.01	-.12	-.04	.15*	.07	.09	.08	.01	.13	-.18*
Shared children	.37**	.04	.10	.10	.08	.03	.10	-.05	.00	.20*	-.11
Non-bio children[v]	.07	-.04	.10	.13	.20**	.24**	-.07	.02	-.05	.19*	-.01
Pregnancy[v]	.13	-.04	-.10	.12	.00	.00	.02	-.13	-.05	.15	-.10
Fear[V]	.00	-.07	-.05	-.03	.07	.10	-.02	.18*	-.02	.08	.00
Violence use[V]	.03	.15	.14	.02	.07	-.01	.07	.06	.18*	.03	.03
Physical harm	-.21**	-.02	-.10	.09	.03	.03	.04	.09	.18*	.17*	-.01
Injuries sustained	-.07	.08	-.16*	.05	-.03	.05	.09	.04	.24**	-.02	.00
Threats to kill	-.01	-.02	.03	.10	.04	-.05	-.12	.14	.09	.08	.14
Stalking	-.02	.09	.15	.25**	.04	.04	-.06	.16*	-.01	.00	.22**
Weapon use/access	-.03	.02	-.02	.13	.07	.00	-.10	.07	.06	.08	.07
Nonfatal strangulation	-.13	.05	.03	-.09	.09	-.05	.08	.10	.03	.02	.05
Community level											
Protection order	.24**	.00	.15	.05	.17*	.00	-.13	.11	-.04	-.14	-.03
Unemployment[v]	.13	-.02	.04	.09	.20*	.04	.05	.10	.14	-.09	-.06
Housing instability[v]	.08	.15	-.01	-.13	.12	.07	.00	.03	.11	-.11	-.07
History of violence[A]	.11	-.24**	.04	-.03	.04	.05	-.02	-.06	.04	-.12	.11
Non-compliance[A]	.20*	-.02	.08	.04	.03	.16*	.04	.03	.05	-.01	-.01

Notes: N = 165. [V] = victim variable, [A] = aggressor variable. [1] As relationship status was the only non-dichotomous variable, we separated each of the three relationship categories to assess dichotomously (e.g., for Together, we correlated a variable whereby 1 = Together, 0 = Separated, Churning). CPS = Child Protection Services, FV = Family violence, including but not limited to IPV. Pearson correlation coefficient is significant at the * $p < .05$ level (two-tailed); or the ** $p < .01$ level (two-tailed).

Table 7 (Cont.)

Bivariate Relationships between Research-Derived and Exploratory Baseline Variables

	Community level								
	Victim reported index episode	Public index episode	Gang	Criminal history[v]	CPS history[v]	FV history[v]	Non-engagement history[v]	Uncooperative with police[v]	Unreported IPV
Individual level									
Age[v]	.14	-.10	-.28**	.02	-.14	.02	-.10	-.06	-.02
Mental health[v]	.02	.05	-.08	.17*	.00	.14	.05	-.04	.02
Mental health[A]	.03	-.12	-.09	-.09	.00	.03	.04	-.11	-.05
Drug use[v]	.05	-.09	.01	.32**	.14	.09	.09	.07	-.06
Relationship level									
Together[1]	-.12	-.02	-.10	.07	-.07	-.12	.01	.10	-.04
Churning[1]	.03	-.08	.05	-.02	.09	.17*	.09	.03	.07
Separated[1]	.11	.11	.06	-.06	-.01	-.04	-.11	-.16*	-.03
Cohabitation	-.06	-.17*	-.26**	-.04	-.09	-.17*	.17*	.06	-.03
Shared children	.11	.04	-.01	-.07	.31**	.06	-.02	-.10	-.06
Non-bio children[v]	-.07	.01	.00	.04	.20*	.15	-.12	-.11	.13
Pregnancy[v]	-.10	-.02	.11	.03	.08	.12	.00	.05	.05
Fear[V]	.13	.11	.20**	.04	.02	.11	.02	-.04	-.09
Violence use[V]	.09	.01	-.13	.00	-.12	-.03	-.07	-.04	.02
Physical harm	.00	-.14	.05	.04	-.01	.02	-.01	.07	.09
Injuries sustained	-.06	-.14	.03	.11	.07	.11	.07	.06	.23**
Threats to kill	-.01	-.02	.01	-.01	-.11	.11	-.14	.00	-.01
Stalking	.23**	.14	-.08	-.06	-.02	.01	-.08	-.11	.10
Weapon use/access	-.04	-.03	.13	.11	.02	.01	-.03	.06	.04
Nonfatal strangulation	.20**	-.17*	-.17*	-.12	-.22**	-.02	.07	.09	.14
Community level									
Protection order	.06	.10	.03	.03	.24**	.18*	-.04	-.12	-.09
Unemployment[v]	.03	.02	.14	.13	.25**	.18*	.09	.06	.09
Housing instability[v]	-.01	.13	.28**	.17*	.20*	.07	.16*	.12	-.03
History of violence[A]	-.08	.11	.18*	.30**	.33**	.71**	.16*	.04	.09
Non-compliance[A]	-.01	.02	.20*	.25**	.27**	.30**	.06	-.02	.01

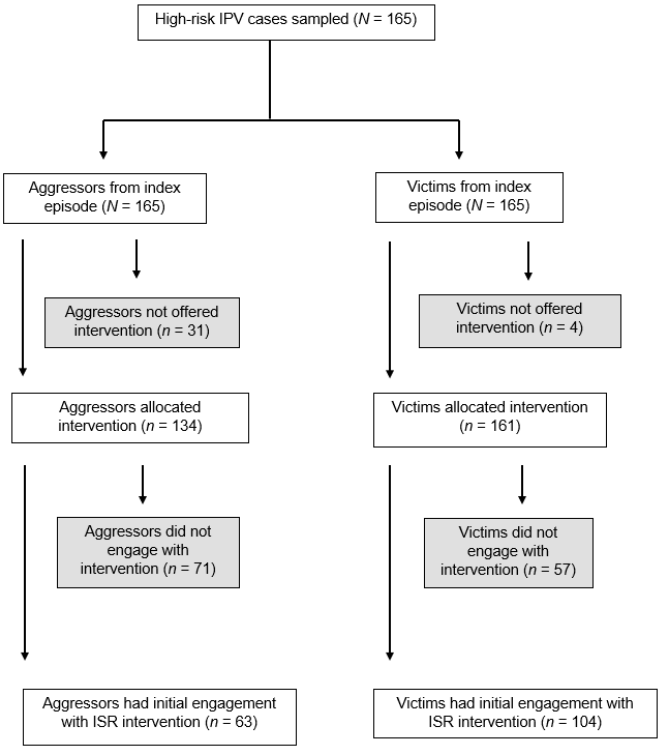
Notes: N = 165. [V] = victim variable, [A] = aggressor variable. [1] As relationship status was the only non-dichotomous variable, we separated each of the three relationship categories to assess dichotomously (e.g., for Together, we correlated a variable whereby 1 = Together, 0 = Separated, Churning). CPS = Child Protection Services, FV = Family violence, including but not limited to IPV. Pearson correlation coefficient is significant at the * $p < .05$ level (two-tailed); or the ** $p < .01$ level (two-tailed).

Initial Engagement with ISR Interventions

Overall, the results indicated that 63.0% of victims and 38.2% of aggressors engaged–at least initially–with IPV-related ISR interventions during the 12-month following up. An updated overview is presented in Figure 3. Interestingly, both parties had initial engagement recorded in only 28.5% of cases (n = 47), with a small association found between victims and aggressors having initial engagement with an intervention (r = .18, p < .05).

Figure 3

Initial Engagement with ISR Interventions



IPV Recurrence

To better understand repeat victimisation in the twelve months following the index episode, we firstly examined the overall prevalence rates of our three outcome measures: IPV recurrence, physical IPV recurrence and offence detection. It must be noted that one case was removed from the analyses at this point due to missing outcome data (n = 164). For IPV recurrence, the results revealed that almost two thirds of victims had a subsequent IPV episode reported to police (n =103, 62.8% of sample); with total number of recurrences

ranging from 1 through to 28 episodes recorded. For most victims, the first recurrence occurred within three months of the index episode (*n* =79, 76.7% of repeat victims, 48.2% of sample). For victims with IPV recurrence recorded over the 12-month follow up, physical IPV recurrence was evident in 57.3% of cases (*n* = 59, 36.0% of whole sample) and an offence was detected by police in 46.6% of cases (*n* = 48, 29.3% of whole sample). Physical IPV recurrence and offence detection only overlapped in 31.7% of cases (*n* = 34). The most serious offence detected typically involved physical violence (*n* = 26); other offending related to noncompliance (*n* = 15), property damage (*n* = 3), threats (*n* = 3) or theft (*n* = 1).

Predictors of IPV Recurrence Measures

Univariate Predictors

We examined the bivariate relationships between the independent variables and IPV recurrence outcomes. Overall, the results indicated that a relatively large proportion of both research-derived and exploratory baseline variables did not significantly predict IPV recurrence, physical IPV recurrence or offence detection. Based on Hanson's (2000, as cited in Stith et al., 2004) criteria: the magnitude of nonsignificant relationships was mostly very small to small, whereas the size of significant relationships were typically small to medium.

Firstly, Table 8 shows that just seven independent variables (of a possible 44) predicted any IPV recurrence. No individual-level variables were significantly associated with IPV recurrence. At the relationship level, nonfatal strangulation was negatively associated with IPV recurrence. At the community level, six variables were positively associated with IPV recurrence: the victim's initial engagement with ISR interventions and previous involvement with child protection services as a parent; a protection order between the victim and aggressor; and the aggressor's history of violence, noncompliance and gang affiliations.

Secondly, Table 8 shows that eight independent variables predicted physical IPV recurrence. At the individual level, older victims were significantly less likely to experience

physical IPV recurrence than younger victims. At the relationship level, a separated relationship status and nonfatal strangulation were both negatively associated with physical IPV recurrence. At the community level, five variables were positively associated with physical IPV recurrence: the victim's initial engagement with ISR interventions, previous involvement with child protection services as a parent and non-cooperation with police; as well as the aggressor's history of violence and noncompliance.

Finally, Table 8 shows that 12 independent variables predicted offence detection; a higher number than seen for the two previous outcomes. Again, no significant individual-level predictors were found. At the relationship level, nonfatal strangulation was negatively associated with offence detection; whereas victim fear, custody issues, infidelity issues and the aggressor not accepting the couple's separation were all positively associated with offence detection. At the community level: victim unemployment, housing instability and previous involvement with child protection services as a parent; a protection order between the victim and aggressor; as well as the aggressor's history of violence and noncompliance were all positively associated with offence detection. Of note, significant predictors were spread relatively evenly across both research-derived and exploratory variables, and the relationship and community levels, for offence detection.

Table 8

Bivariate Relationships between Baseline, Intervention and Outcome Variables

	IPV Recurrence	Physical IPV Recurrence	Offence Detected
Research-derived variables			
Individual level			
Age[V]	-.08	-.22**	-.12
Mental health[V]	.11	.01	.07
Mental health[A]	-.10	.00	.00
Drug use[V]	.03	.15	.02
Relationship level			
Relationship status			
Together	-.01	.08	.00
Churning	.08	.10	.00

Separated	-.09	-.20**	.00
Cohabitation	-.11	-.07	-.15
Shared children	-.05	-.03	.01
Non-bio children[V]	.04	.07	-.03
Pregnancy[V]	-.13	-.02	-.11
Fear[V]	.15	.03	.21*
Violence use[V]	-.07	-.09	.02
Physical harm	.11	.08	-.05
Injuries sustained	.07	.11	.00
Threats to kill	.08	.07	.06
Stalking	.03	-.06	.12
Weapon use/access	-.06	.01	.06
Nonfatal strangulation	-.17*	-.21**	-.23**
Community level			
Protection order	.15*`	.03	.27**
Unemployment[V]	.09	.14	.20*
Housing instability[V]	.13	.14	.19*
History of violence[A]	.17*	.21**	.18*
Non-compliance[A]	.22**	.19*	.25**
Initial engagement with ISR intervention[V]	.19*	.18*	.14
Initial engagement with ISR intervention[A]	.14	.01	.04
Exploratory variables			
Relationship level			
Child custody issues	-.01	.06	.20*
Infidelity issues	.05	-.01	.17*
Denial around separation[A]	.04	-.03	.22**
Other threats	-.09	-.06	.00
Items thrown	.03	.02	.03
Property damage	.08	.10	.05
Verbal harm	-.03	-.02	-.03
Coercive control	.00	.04	.11
Prolonged duration	-.01	.05	.04
Physical harm to others	.08	.03	-.04
Sexual harm	.14	-.02	.11
Community level			
Victim reported index episode	.11	.02	.13
Index episode in public place	.06	-.05	.09
Gang affiliated[A]	.16*	.09	.05
Criminal history[V]	.03	.03	-.06
CPS history[V]	.16*	.24**	.18*
Police FV history[V]	.12	.14	.11
Non-engagement history[V]	.10	.08	-.06
Uncooperative with police[V]	.10	.23**	.02
Unreported IPV	-.05	.03	-.01

Notes: n = 164. [V] = victim variable, [A] = aggressor variable. CPS = Child Protection Services, FV = Family violence, including but not limited to IPV. Pearson correlation coefficient significant at the * $p < .05$ level (two-tailed); or the ** $p < .01$ level (two-tailed).

Multivariate Prediction Models

Our previous, mostly small correlation coefficients suggested a rudimental lack of multicollinearity–a key assumption of binary logistic regressions–for our independent variables (see Tables 5, 6, 7 and 8). For confirmation, we conducted SPSS testing that showed the tolerance statistic was greater than 0.1 and the Variance Inflation Factor (VIF) statistic was less than 10.00 for all independent variables. Although inclusion of the aggressor's history of violence variable did not violate the multicollinearity assumption for binary logistics regressions, there was a large association with the victim's police records for family violence ($r = .71$, $p < .01$). Due to our primary focus on victims, the aggressor's history of violence variable was accordingly removed from the multivariate analyses.

Regression models are presented separately below, organised according to IPV recurrence outcomes. As noted earlier, analyses were conducted at the individual, relationship and community levels, with this approach used due to the number of independent variables far exceeding the desirable ratio of variables to cases for binary logistic regressions (Pictuch & Stevens, 2016). We also split analyses into separate models based on whether they included research-derived variables or exploratory variables. The final regression for each IPV recurrence outcome was conducted using an entirely data-driven strategy; based on the combination of the 'best predictors' from each of the level-based regressions. However, it is important to keep in mind that, especially in this final step, the prediction models are overfitted by definition and, thus, only exploratory in nature.

IPV Recurrence. The first set of regression analyses predicted any IPV recurrence reported to police during the twelve months after an index episode. The results presented in Table 9 indicated that individual-level variables poorly predicted IPV recurrence. The model was statistically nonsignificant overall, the variables did not uniquely predict IPV recurrence and the pseudo R^2 estimates reflected a poor goodness of fit. At the relationship level, we used

dyad characteristic variables to predict IPV recurrence (see Table 10) and then abuse characteristic variables (see Table 11). For dyad characteristics: Model 1 was significant overall and the pseudo R^2 estimates reflected a modest goodness of fit, but Model 2 was nonsignificant at the step and model levels (see Table 10). Pregnancy uniquely predicted *reduced* odds of IPV recurrence; whereas victim fear uniquely predicted *increased* odds of IPV recurrence. Relationship status was a significant predictor, with remaining in the relationship (i.e., "together") and relationship churning both indicating a higher likelihood of IPV recurrence than evident for separated dyads. For abuse characteristics: neither Model 1 nor the new block of exploratory variables added to create Model 2 were significant on their own. However, Model 2 was significant overall with an improved goodness of fit, relative to the pseudo R^2 estimates in Tables 9 and 10. These results showed nonfatal strangulation and other threats both uniquely predicted *reduced* odds of IPV recurrence, whereas sexual harm uniquely predicted *increased* odds of IPV recurrence. Finally, at the community level, Table 12 shows all models were significant at the step and overall levels, except for the incremental predictive contribution to overall fit from the block of exploratory variables added in Model 3. The pseudo R^2 estimates reflect a goodness of fit that were similar to the abuse characteristics models (see Table 11). The victim's initial engagement with interventions uniquely predicted *increased* odds of IPV recurrence.

Among this large range of research-derived and exploratory variables, we aimed to identify a parsimonious model with fewer variables, but that retained good predictive ability. The results in Tables 9 – 12 present the regression models from the individual, relationship and community levels; and identified variables that were unique predictors of IPV recurrence, when we controlled for several other variables. Recall that victim fear, relationship status (both remaining in the relationship and a churning relationship status, compared to being separated), sexual harm and the victim's initial engagement with interventions uniquely

predicted *increased* odds of IPV recurrence; whereas pregnancy, nonfatal strangulation and other threats uniquely predicted *reduced* odds of IPV recurrence. Accordingly, these seven 'best predictor' variables from the main analyses were entered into a final model, with results shown in Table 13. This model was significant overall, with similar pseudo R^2 estimates to Model 2 in Tables 11 and 12 but using fewer variables. In this analysis, fear and the victim's initial engagement with interventions still uniquely predicted *increased* odds of IPV recurrence, and nonfatal strangulation uniquely predicted *reduced* odds of IPV recurrence.

Table 9

Individual-level Variables Predicting IPV Recurrence

		Model 1[a]				
Variable	*n*	*B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*
Constant		0.91	0.55	2.76	.097	2.49
Age[V]		-0.01	0.02	.59	.443	0.99 [0.96-1.02]
Mental health[V]	61	0.53	0.36	2.19	.139	1.69 [0.84-3.40]
Mental health[A]	75	-0.44	0.33	1.71	.191	0.65 [0.34-1.24]
Drug use[V]	60	0.05	0.35	.02	.894	1.05 [0.53-2.09]

Notes: n = 164. [V] = victim variable, [A] = aggressor variable.

[a] *pseudo-*R^2 = .04 (Nagelkerke), .03 (Cox & Snell); Model χ^2 (4) = 4.81, p = .308; -2 Log Likelihood = 211.67

Table 10

Relationship-level Dyad Characteristics Predicting IPV Recurrence

		Model 1[a]					Model 2[b]				
Variable	*n*	*B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*	*B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*
Constant		0.80	0.41	3.84	.050	2.23	0.70	0.42	2.79	.095	2.01
Relationship status: Separated	38			5.44	.066				**6.12**	**.047**	
Together	75	0.97	0.48	4.04	.044	2.63 [1.03-6.74]	1.12	0.51	**4.86**	**.028**	**3.05 [1.13-8.22]**
Churning	51	1.09	0.49	4.84	.028	2.96 [1.13-7.78]	1.15	0.50	**5.22**	**.022**	**3.16 [1.18-8.47]**
Cohabitation	77	-0.71	0.37	3.80	.051	0.49 [0.24-1.00]	-0.71	0.37	3.62	.057	0.49 [0.24-1.02]
Shared children	70	0.04	0.35	0.02	.900	1.05 [0.53-2.08]	-0.01	0.37	0.00	.983	0.99 [0.48-2.05]
Non-bio children[V]	41	0.31	0.41	0.57	.448	1.36 [0.61-3.02]	0.30	0.41	0.53	.466	1.35 [0.60-3.04]
Pregnancy	32	-0.96	0.44	**4.80**	**.029**	**0.38 [0.16-0.90]**	-0.94	0.45	**4.41**	**.036**	**0.39 [0.16-0.94]**
Fear[V]	86	0.73	0.36	**4.24**	**.039**	**2.08 [1.04-4.18]**	0.81	0.36	**4.89**	**.027**	**2.24 [1.10-4.57]**
Custody issues	21	-	-	-	-	-	0.17	0.57	0.09	.769	1.18 [0.38-3.64]
Infidelity issues	37	-	-	-	-	-	0.42	0.43	0.97	.325	1.53 [0.66-3.54]
Denial of separation[A]	22	-	-	-	-	-	0.24	0.55	0.19	.659	1.28 [0.43-3.78]

Notes: n = 164. [V] = victim variable, [A] = aggressor variable.

[a] *pseudo-*R^2 = .11 (Nagelkerke), .08 (Cox & Snell); Model χ^2 (7) = 14.30, p = .046; -2 Log Likelihood = 202.17

[b] *pseudo-*R^2 = .13 (Nagelkerke), .09 (Cox & Snell); Block χ^2 (3) = 1.41, p = .703; Model χ^2 (10) = 15.71, p = .108; -2 Log Likelihood = 200.76

Table 11

Relationship-level Abuse Characteristics Predicting IPV Recurrence

		Model 1[a]					Model 2[b]				
Variable	*n*	*B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*	*B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*
Constant		0.48	0.47	1.06	.304	1.62	0.28	.76	0.14	.709	1.33
Violence use[V]	42	-0.41	0.39	1.09	.297	0.66 [0.31-1.43]	-0.43	.41	1.07	.301	0.65 [0.29-1.47]
Physical harm	136	0.82	0.51	2.64	.104	2.27 [0.84-6.12]	0.95	.55	3.01	.083	2.57 [0.88-7.49]
Injuries sustained	86	0.32	0.39	0.67	.413	1.38 [0.64-2.97]	0.43	.42	1.03	.309	1.54 [0.67-3.54]
Threats to kill	25	0.64	0.50	1.64	.201	1.90 [0.71-5.06]	0.67	.54	1.50	.220	1.95 [0.67-5.66]
Stalking	18	0.25	0.56	0.20	.655	1.28 [0.43-3.84]	0.27	.63	0.19	.665	1.32 [0.38-4.56]
Weapon use/access	86	-0.45	0.35	1.70	.192	0.63 [0.32-1.26]	-0.51	.37	1.84	.175	0.60 [0.29-1.25]
Nonfatal strangulation	91	-0.99	0.37	**7.11**	**.008**	**0.37 [0.18-0.77]**	-1.25	.40	**9.62**	**.002**	**0.29 [0.13-0.63]**
Other threats	48	-	-	-	-	-	-1.02	.44	**5.44**	**.020**	**0.36 [0.15-0.85]**
Items thrown	21	-	-	-	-	-	0.50	.58	0.77	.381	1.66 [0.54-5.11]
Property damage	56	-	-	-	-	-	0.48	.41	1.37	.241	1.62 [0.72-3.63]
Verbal harm	147	-	-	-	-	-	0.01	.61	0.00	.984	1.01 [0.31-3.31]
Coercive control	122	-	-	-	-	-	0.20	.43	0.20	.652	1.22 [0.52-2.85]
Prolonged duration	38	-	-	-	-	-	-0.28	.46	0.37	.543	0.76 [0.31-1.85]
Physical harm to others	28	-	-	-	-	-	0.34	.49	0.47	.494	1.40 [0.53-3.68]
Sexual harm	21	-	-	-	-	-	1.37	.63	**4.64**	**.031**	**3.93 [1.13-13.63]**

Notes: $n = 164$. [V] = victim variable

[a] *pseudo-*R^2 = .11 (Nagelkerke), .08 (Cox & Snell); Model χ^2 (7) = 13.12, $p = .069$; -2 Log Likelihood = 203.36

[b] *pseudo-*R^2 = .20 (Nagelkerke), .14 (Cox & Snell); Block χ^2 (8) = 12.29, p = ..139; Model χ^2 (15) = 25.41, $p = .045$; -2 Log Likelihood = 191.07

Table 12

Community-level Variables Predicting IPV Recurrence

		Model 1[a]					Model 2[b]					Model 3[c]				
Variable	*n*	*B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*	*B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*	*B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*
Constant		-0.28	0.32	0.78	.376	0.76	-1.10	0.44	6.33	.012	0.33	-1.77	0.83	4.58	.032	0.17
PO[V]	53	0.46	0.39	1.43	.232	1.59 [0.74-3.40]	0.50	0.40	1.56	.212	1.65 [0.75-3.61]	0.50	0.44	1.31	.253	1.65 [0.70-3.91]
Unemployment[V]	75	0.16	0.36	0.21	.645	1.18 [0.59-2.36]	0.39	0.38	1.05	.305	1.47 [0.70-3.08]	0.40	0.40	0.99	.320	1.49 [0.68-3.29]
Housing[V]	54	0.24	0.41	0.36	.547	1.28 [0.58-2.82]	0.22	0.42	0.27	.604	1.24 [0.55-2.82]	-0.06	0.45	0.02	.895	0.94 [0.39-2.29]
Noncompliance[A]	119	0.74	0.40	3.41	.065	2.09 [0.96-4.59]	0.75	0.42	3.25	.071	2.13 [0.94-4.82]	0.85	0.46	3.39	.066	2.34 [0.95-5.81]
Intervention[V]	104	-	-	-	-	-	0.78	0.36	**4.73**	**.030**	**2.19 [1.08-4.42]**	0.88	0.38	**5.29**	**.021**	**2.41 [1.14-5.10]**
Intervention[A]	63	-	-	-	-	-	0.62	0.37	2.81	.093	1.86 [0.90-3.86]	0.77	0.40	3.66	.056	2.16 [0.98-4.76]
Victim reported	74	-	-	-	-	-	-	-	-	-	-	0.73	0.39	3.52	.061	2.08 [0.97-4.49]
Public episode	23	-	-	-	-	-	-	-	-	-	-	0.39	0.54	0.52	.471	1.48 [0.51-4.26]
Gang affiliated[A]	65	-	-	-	-	-	-	-	-	-	-	0.63	0.41	2.40	.121	1.89 [0.85-4.21]
Criminal history[V]	87	-	-	-	-	-	-	-	-	-	-	-0.40	0.40	0.98	.323	0.67 [0.30-1.48]
CPS history[V]	106	-	-	-	-	-	-	-	-	-	-	0.35	0.42	0.71	.401	1.42 [0.63-3.20]
FV history[V]	155	-	-	-	-	-	-	-	-	-	-	-0.20	0.82	0.06	.809	0.82 [0.16-4.12]
Non-engagement[V]	73	-	-	-	-	-	-	-	-	-	-	0.27	0.40	0.45	.500	1.31 [0.60-2.86]
Uncooperative[V]	80	-	-	-	-	-	-	-	-	-	-	0.56	0.39	2.06	.152	1.74 [0.82-3.73]
Unreported IPV	95	-	-	-	-	-	-	-	-	-	-	-0.38	0.38	1.02	.312	0.68 [0.33-1.43]

Notes: n = 164. [V] = victim variable, [A] = aggressor variable. CPS = Child Protection Services, FV = Family violence, including but not limited to IPV.

[a] *pseudo-*R^2 = .08 (Nagelkerke), .06 (Cox & Snell); Model χ^2 (4) = 10.09, p = .039; -2 Log Likelihood = 206.39

[b] *pseudo-*R^2 = .15 (Nagelkerke), .11 (Cox & Snell); Block χ^2 (2) = 9.32, p = .009; Model χ^2 (6) = 19.41, p = .004; -2 Log Likelihood = 197.07

[c] *pseudo-*R^2 = .23 (Nagelkerke), .17 (Cox & Snell); Block χ^2 (9) = 11.43, p = .248; Model χ^2 (15) = 30.83, p = .009; -2 Log Likelihood = 185.64

Table 13

'Best Predictors' from Previous Models Predicting IPV Recurrence

			Model 1[a]		
Variable	*B*	*S.E.*	Wald χ^2	*p*	*OR [95% CI]*
Constant	0.47	0.42	1.26	.261	1.60
Relationship status: Separated			3.27	.195	
Together	0.70	0.45	2.39	.122	2.02 [0.83-4.92]
Churning	0.84	0.50	2.86	.091	2.31 [0.88-6.10]
Pregnancy	-0.49	0.44	1.22	.270	0.61 [0.26-1.46]
Fear[V]	0.73	0.36	**4.01**	**.045**	**2.08 [1.02-4.25]**
Nonfatal strangulation	-0.86	0.36	**5.70**	**.017**	**0.42 [0.21-0.86]**
Other threats	-0.54	0.40	1.89	.169	0.58 [0.27-1.26]
Sexual harm	1.10	0.62	3.17	.075	3.00 [0.90-10.02]
Intervention[V]	0.73	0.36	**4.12**	**.042**	**2.08 [1.03-4.21]**

Notes: n = 164. [V] = victim variable.

[a] *pseudo-*R^2 = .19 (Nagelkerke), .14 (Cox & Snell); Model χ^2 (8) = 24.13, p = .002; -2 Log Likelihood = 192.35

Physical IPV Recurrence. The next set of regression analyses predicted physical harm in any IPV recurrence reported to police in the twelve months after an index episode. At the individual level, Table 14 shows that Model 1 was statistically significant overall and the pseudo R^2 estimates reflected an improved goodness of fit (compared to IPV recurrence in Table 9). Victim age (i.e., getting older) uniquely predicted *reduced* odds of physical IPV recurrence; victim drug use uniquely predicted *increased* odds of physical IPV recurrence. At the relationship level, the dyad characteristics models were nonsignificant at the step and overall levels (see Table 15). Relationship status was a significant predictor, with remaining in the relationship and relationship churning both indicating a higher likelihood of physical IPV recurrence than evident for separated dyads. Next, Table 16 shows that using research-derived abuse characteristics, Model 1 was significant overall with similar pseudo R^2 estimates to the same model predicting IPV recurrence (see Table 11). However, in Model 2, the new block of exploratory variables was nonsignificant, as was the overall model. As with IPV recurrence, nonfatal strangulation uniquely predicted *reduced* odds of physical IPV recurrence. At the community level: Table 17 shows that Model 1 was nonsignificant, but Models 2 and 3 were significant with substantial improvements in the goodness of fit when

the intervention variables were added (see Model 2), and especially when the exploratory baseline variables were added (see Model 3). The victim's initial engagement with interventions, involvement with child protection services as a parent and non-cooperation with police all uniquely predicted *increased* odds of physical IPV recurrence.

Based on the results in Tables 14 to 17, we identified seven significant variables within their respective models for predicting physical IPV recurrence. To re-emphasise, variables that uniquely predicted *increased* odds of physical IPV recurrence included victim drug use, relationship status (both remaining in the relationship and a churning relationship, compared to being separated), the victim's initial engagement with interventions, involvement with child protection services and non-cooperation with police. Variables that uniquely predicted *reduced* odds of physical IPV recurrence included victim age and nonfatal strangulation. Accordingly, these seven 'best predictors' were analysed together. Table 18 shows that Model 1 was significant and yielded a better goodness of fit; with the pseudo R^2 statistics both considerably higher for physical IPV recurrence than for IPV recurrence (see Table 13). This final 'best predictors' analysis showed that the victim's initial engagement with interventions, involvement with child protection services and non-cooperation with police still uniquely predicted *increased* odds of physical IPV recurrence; whilst victim age and nonfatal strangulation uniquely predicted *reduced* odds of physical IPV recurrence.

Table 14

Individual-level Variables Predicting Physical IPV Recurrence

		Model 1[a]				
Variable	*n*	*B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*
Constant		0.80	0.61	1.69	.193	2.22
Age[V]		-0.05	0.02	**7.66**	**.006**	**0.95 (0.91-0.99]**
Mental health[V]	61	-0.08	0.36	0.05	.823	0.92 [0.46-1.86]
Mental health[A]	75	0.09	0.35	0.07	.796	1.09 [0.56-2.15]
Drug use[V]	60	0.71	0.36	**3.96**	**.047**	**2.03 [1.01-4.07]**

Notes: $n = 164$. χ^2 (4) = 12.81. [V] = victim variable, [A] = aggressor variable.

[a] *pseudo-*R^2 = .10 (Nagelkerke), .08 (Cox & Snell); Model χ^2 (4) = 12.81, $p = .012$; -2 Log Likelihood = 201.47

Table 15

Relationship-level Dyad Characteristics Predicting Physical IPV Recurrence

		Model 1[a]					Model 2[b]				
Variable	*n*	*B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*	*B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*
Constant		-0.22	0.40	0.30	.581	0.80	-0.25	0.41	0.37	.545	0.78
Relationship status: Separated	38			**9.70**	**.008**				**10.22**	**.006**	
Together	75	1.58	0.54	**8.50**	**.004**	**4.84 [1.68-13.96]**	1.66	0.57	**8.52**	**.004**	**5.24 [1.72-15.93]**
Churning	51	1.58	0.54	**8.47**	**.004**	**4.86 [1.68-14.09]**	1.71	0.56	**9.29**	**.002**	**5.51 [1.84-16.50]**
Cohabitation	77	-0.63	0.36	3.02	.082	0.53 [0.26-1.08]	-0.59	0.37	2.53	.112	0.56 [0.27-1.15]
Shared children	70	0.11	0.35	0.10	.749	1.12 [0.56-2.24]	-0.05	0.38	0.02	.886	0.95 [0.45-2.00]
Non-bio children[V]	41	0.57	0.40	2.00	.157	1.76 [0.80-3.85]	0.57	0.41	2.00	.158	1.77 [0.80-3.92]
Pregnancy	32	-0.43	0.44	0.92	.336	0.65 [0.27-1.56]	-0.51	0.45	1.28	.259	0.60 [0.25-1.46]
Fear[V]	86	0.26	0.35	0.54	.563	1.29 [0.65-2.58]	0.24	0.36	0.46	.499	1.27 [0.63-2.55]
Custody issues	21	-	-	-	-	-	0.80	0.59	1.85	.174	2.22 [0.70-6.99]
Infidelity issues	37	-	-	-	-	-	0.13	0.42	0.10	.747	1.14 [0.51-2.59]
Denial of separation[A]	22	-	-	-	-	-	-0.25	0.57	0.19	.663	0.78 [0.26-2.38]

Notes: n = 164. [V] = victim variable, [A] = aggressor variable.

[a] *pseudo-*R^2 = .11 (Nagelkerke), .08 (Cox & Snell); Model χ^2 (7) = 13.13 p = .069; -2 Log Likelihood = 201.15

[b] *pseudo-*R^2 = .12 (Nagelkerke), .09 (Cox & Snell); Block χ^2 (3) = 1.92, p = .590; Model χ^2 (10) = 15.05, p = .130; -2 Log Likelihood = 199.23

Table 16

Relationship-level Abuse Characteristics Predicting Physical IPV Recurrence

		Model 1[a]					Model 2[b]				
Variable	*n*	*B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*	*B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*
Constant		-0.63	0.50	1.62	.203	0.53	-0.96	0.75	1.61	.204	0.38
Violence use[V]	42	-0.62	0.42	2.19	.139	0.54 [0.24-1.22]	-0.62	0.43	2.13	.144	0.54 [0.23-1.24]
Physical harm	136	0.51	0.54	.87	.350	1.66 [0.57-4.81]	0.56	0.57	0.98	.323	1.75 [0.58-5.35]
Injuries sustained	86	0.76	0.40	3.59	.058	2.14 [0.97-4.72]	0.81	0.42	3.77	.052	2.26 [0.99-5.12]
Threats to kill	25	0.70	0.48	2.12	.145	2.00 [0.79-5.11]	0.73	0.51	2.08	.149	2.08 [0.77-5.65]
Stalking	18	-0.46	0.58	0.62	.430	0.63 [0.20-1.98]	-0.38	0.63	0.35	.553	0.69 [0.20-2.38]
Weapon use/access	86	-0.15	0.35	0.19	.663	0.86 [0.43-1.72]	-0.13	0.37	0.12	.733	0.88 [0.43-1.82]
Nonfatal strangulation	91	-1.17	0.37	**9.94**	**.002**	**0.31 [0.15-0.64]**	-1.31	0.39	**11.09**	**.001**	**0.27 [0.12-0.58]**
Other threats	48	-	-	-	-	-	-0.77	0.45	2.94	.086	0.46 [0.19-1.12]
Items thrown	21	-	-	-	-	-	0.35	0.57	0.37	.544	1.41 [0.46-4.34]
Property damage	56	-	-	-	-	-	0.50	0.39	1.64	.201	1.66 [0.76-3.59]
Verbal harm	147	-	-	-	-	-	-0.04	0.57	0.01	.940	0.96 [0.31-2.95]
Coercive control	122	-	-	-	-	-	0.39	0.43	0.80	.372	1.47 [0.63-3.44]
Prolonged duration	38	-	-	-	-	-	-0.01	0.45	0.00	.985	0.99 [0.41-2.38]
Physical harm to others	28	-	-	-	-	-	0.12	0.47	0.07	.792	1.13 [0.45-2.81]
Sexual harm	21	-	-	-	-	-	0.21	0.56	0.14	.708	1.23 [0.41-3.67]

Notes: $n = 164$. [V] = victim variable.

[a] *pseudo-*R^2 = .14 (Nagelkerke), .10 (Cox & Snell); Model χ^2 (7) = 17.44, $p = .015$; -2 Log Likelihood = 196.84

[b] *pseudo-*R^2 = .18 (Nagelkerke), .13 (Cox & Snell); Block χ^2 (8) = 5.25, $p = .731$; Model χ^2 (15) = 22.68, $p = .091$; -2 Log Likelihood = 191.59

Table 17

Community-level Variables Predicting Physical IPV Recurrence

Variable	*n*	Model 1[a] *B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*	Model 2[b] *B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*	Model 3[c] *B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*
Constant		-1.42	0.38	13.91	< .001	0.24	-2.10	0.51	16.83	< .001	0.12	-3.57	1.22	8.54	.003	0.03
Protection order	53	-0.15	0.37	0.17	.682	0.86 [0.42-1.77]	-0.15	0.37	0.15	.697	0.86 [0.42-1.80]	-0.25	0.41	0.36	.550	0.78 [0.35-1.75]
Unemployment[V]	75	0.40	0.35	1.31	.253	1.49 [0.75-2.97]	0.55	0.37	2.23	.135	1.73 [0.84-3.57]	0.41	0.40	1.05	.306	1.51 [0.69-3.30]
Housing[V]	54	0.22	0.38	0.33	.565	1.25 [0.59-2.62]	0.19	0.39	0.24	.621	1.21 [0.57-2.58]	-0.01	0.44	0.00	.990	0.99 [0.42-2.35]
Noncompliance[A]	119	0.83	0.44	3.52	.061	2.30 [0.96-5.49]	0.83	0.45	3.45	.063	2.30 [0.95-5.56]	0.75	0.49	2.33	.127	2.11 [0.81-5.49]
Intervention[V]	104						0.92	0.38	**5.90**	**.015**	**2.50 [1.19-5.23]**	0.98	0.41	**5.81**	**.016**	**2.68 [1.20-5.95]**
Intervention[A]	63						0.05	0.36	0.02	.890	1.05 [0.52-2.13]	0.09	0.40	0.05	.820	1.09 [0.50-2.39]
Victim reported	74											0.09	0.38	0.06	.806	1.10 [0.52-2.33]
Public episode	23											-0.18	0.54	0.11	.740	0.84 [0.29-2.41]
Gang affiliated[A]	65											0.14	0.40	0.13	.723	1.15 [0.53-2.51]
Criminal history[V]	87											-0.33	0.39	0.72	.396	0.72 [0.33-1.54]
CPS history[V]	106											1.07	0.44	**5.76**	**.016**	**2.90 [1.22-6.93]**
Police FV history[V]	155											0.63	1.20	0.27	.601	1.87 [0.18-19.78]
Non-engagement[V]	73											-0.27	0.40	0.44	.507	0.77 [0.35-1.68]
Uncooperative[V]	80											1.11	0.40	**7.81**	**.005**	**3.02 [1.39-6.58]**
Unreported IPV	95											-0.07	0.38	0.03	.862	0.94 [0.44-1.98]

Notes: n = 164. [V] = victim variable, [A] = aggressor variable. CPS = Child Protection Services, FV = Family violence, including but not limited to IPV.

[a] *pseudo-R*^{2} = .07 (Nagelkerke), .05 (Cox & Snell); Model χ^2 (4) = 8.29, *p* = .081; -2 Log Likelihood = 205.98

[b] *pseudo-R*^{2} = .12 (Nagelkerke), .09 (Cox & Snell); Block χ^2 (2) = 6.49, *p* = .039; Model χ^2 (6) = 14.78, *p* = .022; -2 Log Likelihood = 199.50

[c] *pseudo-R*^{2} = .24 (Nagelkerke), .18 (Cox & Snell); Block χ^2 (9) = 16.91, *p* = .050; Model χ^2 (15) = 3.69, *p* = .007; -2 Log Likelihood = 182.58

Table 18

'Best Predictors' from Previous Models Predicting Physical IPV Recurrence

			Model 1[a]		
Variable	*B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*
Constant	-0.34	0.85	0.16	.692	0.71
Age[V]	-0.05	0.02	**5.59**	**.018**	**0.95 [0.91-.99]**
Drug use[V]	0.52	0.39	1.77	.184	1.69 [0.78-3.64]
Relationship status: Separated			4.67	.097	
Together	1.16	0.55	4.43	.035	3.17 [1.08-9.29]
Churning	1.06	0.58	3.40	.065	2.88 [0.94-8.89]
Nonfatal strangulation	-1.03	0.40	**6.84**	**.009**	**0.36 [0.16-0.77]**
Intervention[V]	1.16	0.42	**7.82**	**.005**	**3.20 [1.42-7.23]**
CPS history[V]	1.01	0.43	**5.50**	**.019**	**2.76 [1.18-6.43]**
Uncooperative with police[V]	1.00	0.39	**6.54**	**.011**	**2.72 [1.26-5.85]**

Notes: n = 164. [V] = victim variable. CPS = Child Protection Services, FV = Family violence, including but not limited to IPV.

[a] *pseudo-*R^2 = .34 (Nagelkerke), .25 (Cox & Snell); Model χ^2 (8) = 47.37, $p < .001$; -2 Log Likelihood = 166.90

Offence Detection in IPV Recurrence. The final set of regression analyses predicted offence detection in any IPV recurrence reported to police in the twelve months after an index episode. Table 19 indicated that individual-level variables poorly predicted offence detection, with similar results as seen for IPV recurrence in Table 9. The model was statistically nonsignificant overall, the variables did not uniquely predict offence detection and the pseudo R^2 estimates reflected a poor goodness of fit. At the relationship level, the dyad characteristics models in Table 20 were both significant, with considerably better goodness of fit estimates than were evident in the IPV recurrence or physical IPV recurrence analyses (see Table 10 and 15). Moreover, the goodness of fit improved substantially from Model 1 with the addition of exploratory variables in Model 2. In Model 1, cohabitation uniquely predicted *reduced* odds of offence detection and victim fear uniquely predicted *increased* odds of offence detection. Whilst victim fear remained significant, cohabitation became nonsignificant in Model 2; interestingly, relationship status then emerged as a significant predictor, with remaining in the relationship indicating a higher likelihood of offence detection than for

separated dyads[15]. Custody issues, infidelity issues and the aggressor not accepting that the couple had separated also uniquely predicted *increased* odds offence detection. For abuse characteristics: Models 1 and 2 in Table 21 were nonsignificant at the step and model levels, although nonfatal strangulation uniquely predicted *reduced* odds of offence detection. At the community level: Table 22 shows that all three models were significant overall, but Models 2 and 3 were nonsignificant at the step levels. In other words, the intervention variables added to Model 2 and the exploratory baseline variables added to Model 3 did not appreciably improve prediction; although the pseudo R^2 estimates increased with each model and goodness of fit at the community level was better than the IPV recurrence and physical IPV recurrence models (see Tables 12 and 17). A protection order between the victim and aggressor, victim unemployment, the victim's initial engagement with interventions and the aggressor's noncompliance history all uniquely predicted *increased* odds of offence detection.

Taken together, the results in Tables 19 to 22 generated 12 variables that uniquely predicted offence detection within their respective models. More specifically, relationship status (specifically, remaining in the relationship compared to being separated), victim fear, custody issues, infidelity issues, the aggressor not accepting that the couple had separated, victim unemployment, a protection order, the victim's initial engagement with interventions and aggressor noncompliance all uniquely predicted *increased* odds of offence detection. Cohabitation and nonfatal strangulation uniquely predicted *reduced* odds of offence detection. In the final analytical phase for this outcome measure, Table 23 shows Model 1 was highly significant and had the strongest goodness of fit indices of all our multivariate models (see Tables 14 and 18). Relationship status (specifically, remaining in the relationship compared to

[15] Recall that whilst Cohabitation and Separated may sound like opposing variables, living arrangements were often complex in these cases so both variables were included in analyses (and, of course, not all Together dyads cohabitated). For example, some separated dyads continued to cohabitate until permanent accommodation was arranged; a small number of aggressors who were 'no fixed abode' temporarily cohabitated with victims for short durations during the baseline period despite being separated.

being separated), victim fear, infidelity issues and aggressor denial of separation uniquely predicted *increased* odds of offence detection. Conversely, nonfatal strangulation uniquely predicted *reduced* odds of offence detection.

Table 19

Individual-level Variables Predicting Offence Detection

				Model 1[a]		
Variable	*n*	*B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*
Constant		-0.15	0.60	0.07	.799	0.86
Age[V]		-0.03	0.02	2.41	.121	0.97 [0.94-1.01]
Mental health[V]	61	0.31	0.36	0.72	.398	1.36 [0.67-2.76]
Mental health[A]	75	0.06	0.35	0.03	.857	1.07 [0.53-2.13]
Drug use[V]	60	0.03	0.37	0.01	.934	1.03 [0.50-2.12]

Notes: $n = 164$. [V] = victim variable, [A] = aggressor variable.

[a] *pseudo-*R^2 = .03 (Nagelkerke), .02 (Cox & Snell); Model χ^2 (4) = 3.34, $p = .502$; -2 Log Likelihood = 194.94

Table 20

Relationship-level Dyad Characteristics Predicting Offence Detection

		Model 1[a]					Model 2[b]				
Variable	*n*	*B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*	*B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*
Constant		-0.87	0.44	3.98	.046	0.42	-1.37	0.50	7.60	.006	0.25
Relationship status: Separated	38			2.22	.330				**6.46**	**.040**	
Together	75	0.76	0.51	2.20	.138	2.14 [0.78-5.83]	1.54	0.61	**6.45**	**.011**	**4.64 [1.42-15.19]**
Churning	51	0.55	0.52	1.13	288	1.74 [0.63-4.80]	0.84	0.58	2.67	.103	2.56 [0.83-7.91]
Cohabitation	77	-0.89	0.40	**5.06**	**.025**	**0.41 [0.19-0.89]**	-0.73	0.43	2.91	.088	0.48 [0.21-1.11]
Shared children	70	0.39	0.38	1.04	.307	1.48 [0.70-3.14]	-0.04	0.45	0.01	.937	0.97 [0.40-2.35]
Non-bio children[V]	41	-0.11	0.43	0.06	.806	0.90 [0.39-2.10]	-0.31	0.47	0.42	.517	0.74 [0.29-1.86]
Pregnancy	32	-0.96	0.53	3.28	.070	0.38 [0.13-1.08]	-0.94	0.58	2.60	.107	0.39 [0.13-1.22]
Fear[V]	86	1.11	0.39	**8.09**	**.004**	**3.03 [1.41-6.50]**	1.52	0.44	**11.63**	**.001**	**4.55 [1.91-10.88]**
Custody issues	21	-	-	-	-	-	1.48	0.65	**5.19**	**.023**	**4.39 [1.23-15.65]**
Infidelity issues	37	-	-	-	-	-	1.10	0.46	**5.74**	**.017**	**3.01 [1.22-7.41]**
Denial of separation[A]	22	-	-	-	-	-	1.46	0.58	**6.33**	**.012**	**4.30 [1.38-13.41]**

Notes: $n = 164$. [V] = victim variable, [A] = aggressor variable.

[a] *pseudo-*R^2 = .14 (Nagelkerke), .10 (Cox & Snell); Model χ^2 (7) = 16.29, $p = .023$; -2 Log Likelihood = 182.00

[b] *pseudo-*R^2 = .29 (Nagelkerke), .20 (Cox & Snell); Block χ^2 (3) = 20.36, $p < .001$; Model χ^2 (10) = 36.64, $p < .001$; -2 Log Likelihood = 161.64

Table 21

Relationship-level Abuse Characteristics Predicting Offence Detection

		Model 1[a]					Model 2[b]				
Variable	*n*	*B*	*SE*	Wald χ^2	*p*	*OR*	*B*	*SE*	Wald χ^2	*p*	*OR*
Constant		-0.67	0.48	1.95	.163	0.51	-1.18	0.79	2.23	.136	0.31
Violence use[V]	42	0.21	0.42	0.25	.616	1.23 [0.55-2.78]	0.19	0.43	0.20	.653	1.21 [0.52-2.82]
Physical harm	136	-0.11	0.53	0.05	.830	0.89 [0.32-2.51]	-0.06	0.55	0.01	.909	0.94 [0.32-2.77]
Injuries sustained	86	0.32	0.42	0.57	.450	1.37 [0.60-3.12]	0.36	0.43	0.68	.411	1.43 [0.61-3.35]
Threats to kill	25	0.35	0.49	0.51	.476	1.42 [0.54-3.72]	0.23	0.53	0.20	.657	1.26 [0.45-3.56]
Stalking	18	0.79	0.54	2.16	.142	2.21 [0.77-6.39]	0.66	0.60	1.24	.265	1.94 [0.60-6.25]
Weapon use/access	86	0.08	0.37	0.05	.818	1.09 [0.53-2.23]	0.07	0.38	0.03	.861	1.07 [0.51-2.26]
Nonfatal strangulation	91	-1.07	0.38	**8.03**	**.005**	**0.34 [0.16-0.72]**	-1.30	0.40	**10.24**	**.001**	**0.27 [0.12-0.61]**
Other threats	48	-	-	-	-	-	-0.63	0.46	1.83	.177	0.53 [0.21-1.33]
Items thrown	21	-	-	-	-	-	0.42	0.59	0.51	.474	1.53 [0.48-4.84]
Property damage	56	-	-	-	-	-	0.25	0.41	0.38	.538	1.29 [0.57-2.90]
Verbal harm	147	-	-	-	-	-	-0.01	0.61	0.00	.989	0.99 [0.30-3.29]
Coercive control	122	-	-	-	-	-	0.77	0.48	2.63	.105	2.17 [0.85-5.53]
Prolonged duration	38	-	-	-	-	-	-0.12	0.47	0.07	.798	0.89 [0.36-2.21]
Physical harm to others	28	-	-	-	-	-	-0.27	0.51	0.28	.595	0.76 [0.28-2.08]
Sexual harm	21	-	-	-	-	-	0.90	0.55	2.65	.104	2.46 [0.83-7.31]

Notes: n = 164. [V] = victim variable.

[a] *pseudo-*R^2 = .10 (Nagelkerke), .07 (Cox & Snell); Model χ^2 (7) = 11.97, p = .101; -2 Log Likelihood = 186.31

[b] *pseudo-*R^2 = .15 (Nagelkerke), .11 (Cox & Snell); Block χ^2 (8) = 6.83, p = .556; Model χ^2 (15) = 18.80, p = ..223; -2 Log Likelihood = 179.49

Table 22

Community-level Variables Predicting Offence Detection

Variable	*n*	Model 1[a] *B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*	Model 2[b] *B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*	Model 3[c] *B*	*SE*	Wald χ^2	*p*	*OR [95% CI]*
Constant		-2.52	0.52	23.78	< .001	0.08	-3.37	0.68	24.26	< .001	0.03	-4.06	1.39	8.56	.003	0.02
Protection order	53	1.01	0.39	**6.82**	**.009**	**2.73 [1.29-5.81]**	1.04	0.39	**7.09**	**.008**	**2.83 [1.32-6.10]**	0.89	0.42	**4.45**	**.035**	**2.43 [1.06-5.53]**
Unemployment[V]	75	0.68	0.39	3.08	.079	1.97 [0.92-4.21]	0.88	0.41	**1.68**	**.030**	**2.42 [1.09-5.39]**	0.96	0.44	**4.79**	**.029**	**2.62 [1.11-6.22]**
Housing[V]	54	0.37	0.40	0.82	.365	1.44 [0.65-3.18]	0.33	0.41	0.66	.416	1.40 [0.63-3.11]	0.34	0.46	0.53	.466	1.40 [0.57-3.46]
Noncompliance[A]	119	1.00	0.55	3.23	.072	2.71 [0.91-8.02]	1.07	0.57	3.55	.060	2.91 [0.96-8.84]	1.27	0.61	**4.26**	**.039**	**3.55 [1.07-11.81]**
Intervention[V]	104						0.80	0.41	3.69	.055	2.22 [0.98-4.99]	0.92	0.45	**4.24**	**.039**	**2.52 [1.05-6.07]**
Intervention[A]	63						0.40	0.40	1.02	.314	1.49 [0.68-3.26]	0.67	0.44	2.34	.126	1.96 [0.83-4.62]
Victim reported	74											0.47	0.41	1.27	.260	1.59 [0.71-3.57]
Public episode	23											0.92	0.56	2.68	.102	2.52 [0.83-7.61]
Gang affiliated[A]	65											0.03	0.44	0.00	.952	1.03 [0.44-2.41]
Criminal history[V]	87											-0.81	0.43	3.65	.056	0.44 [0.19-1.02]
CPS history[V]	106											0.55	0.48	1.28	.258	1.73 [0.67-4.44]
FV history[V]	155											0.11	1.31	0.01	.935	1.11 [0.09-14.46]
Non-engagement[V]	73											-0.64	0.44	2.12	.146	0.53 [0.22-1.25]
Uncooperative[V]	80											0.28	0.43	0.43	.513	1.32 [0.57-3.08]
Unreported IPV	95											0.10	0.42	0.06	.806	1.11 [0.49-2.50]

Notes: n = 164. [V] = victim variable, [A] = aggressor variable. CPS = Child Protection Services, FV = Family violence, including but not limited to IPV.

[a] *pseudo-R*^{2} = .19 (Nagelkerke), .13 (Cox & Snell); Model χ^2 (4) = 23.44, $p < .001$; -2 Log Likelihood = 174.85

[b] *pseudo-R*^{2} = .23 (Nagelkerke), .16 (Cox & Snell); Block χ^2 (2) = 5.36, $p = .069$; Model χ^2 (6) = 28.79, $p < .001$; -2 Log Likelihood = 169.49

[c] *pseudo-R*^{2} = .30 (Nagelkerke), .21 (Cox & Snell); Block χ^2 (9) = 10.30, $p = .327$; Model χ^2 (15) = 39.09, $p = .001$; -2 Log Likelihood = 159.20

Table 23

'Best Predictors' from Previous Models Predicting Offence Detection

Variable	Model 1[a]				
	B	*SE*	Wald χ^2	*p*	*OR [95% CI]*
Constant	-2.58	.74	12.12	< .001	.08
Cohabitation	-0.58	0.48	1.49	.222	0.56 [0.22-1.42]
Relationship status: Separated			6.78	**.034**	
Together	1.66	0.66	**6.23**	**.012**	**5.27 [1.43-19.35]**
Churning	0.70	0.63	1.26	.262	2.02 [0.59-6.91]
Fear[V]	1.28	0.47	**7.38**	**.007**	**3.60 [1.43-9.06]**
Custody issues	0.58	0.63	0.84	.360	1.79 [0.52-6.18]
Infidelity issues	1.30	0.50	**6.73**	**.009**	**3.67 [1.37-9.80]**
Denial of separation[A]	1.60	0.65	**6.09**	**.014**	**4.94 [1.39-17.55]**
Nonfatal strangulation	-1.09	0.44	**6.04**	**.014**	**0.34 [0.14-0.80]**
Protection order	0.72	0.46	2.51	.113	2.06 [0.84-5.02]
Unemployment[V]	0.83	0.43	3.72	.054	2.30 [0.99-5.37]
Noncompliance[A]	0.83	0.59	1.99	.158	2.30 [0.72-7.33]
Intervention[V]	0.64	0.46	1.98	.159	1.90 [0.78-4.67]

Notes: n = 164. [V] = victim variable, [A] = aggressor variable.

[a] *pseudo-*R^2 = .40 (Nagelkerke), .28 (Cox & Snell); Model χ^2 (12) = 53.98, p < .001; -2 Log Likelihood = 144.31

Overall Prediction Accuracy. Lastly, Table 24 presents the results from the Receiver Operating Characteristics curve analysis relating to the 'best predictors' models for IPV recurrence, physical IPV recurrence and offence detection. These results showed risk prediction accuracy was highest for offence detection and lowest for IPV recurrence; but the confidence intervals overlap for all models (i.e., none of these results is statistically better than any other). Instead, based on the Rice and Harris (2005) criteria for interpreting AUCs, we surmise that the IPV recurrence model had moderate predictive accuracy, whilst the physical IPV recurrence and offence detection models had good predictive accuracy.

Table 24

AUC using 'Best Predictors' to Predict Outcome Variables

Final Model	AUC [95% CI]	SE	*p*
IPV recurrence	.72 [.64-.80]	0.04	< .001
Physical IPV recurrence	.81 [.75-.88]	0.04	< .001
Offence detection	.83 [.76-.90]	0.04	< .001

Notes: n = 164.

Discussion

The overall purpose of our exploratory study was to better understand the circumstances of high-risk IPV victims and the predictors of an IPV recurrence. There is a limited body of research empirically investigating the predictors of repeat IPV victimisation; especially using a multi-factor theoretical perspective, within the context of a multi-agency IPV response system and using longitudinal data. Building on these knowledge gaps, we identified the following research aims relating to IPV victims assessed as high-risk within the ISR pilot in Aotearoa New Zealand:

1. Describe victims' psychosocial characteristics and IPV experiences.
2. Summarise victims and aggressors' engagement with IPV-related ISR interventions.
3. Outline the prevalence of IPV recurrence over a 12-month follow up.
4. Identify the predictors of IPV recurrence, offence detection and physical harm for high-risk victims; at the individual, relationship and community ecological levels.

Underpinned by Dutton's (2006) nested ecological framework, we examined a wide range of research-derived and exploratory baseline variables, basic intervention and three IPV recurrence outcomes across a 12-month follow up. Based on the various statistical analyses using these variables, we will expand on the most important empirical findings, draw comparisons to previous research and consider both the theoretical and practical implications of these findings. Finally, we will also outline the key strengths and limitations of the current study, with several recommendations for future research.

Key Empirical Findings

Psychosocial Stressors

Fundamentally, our findings draw attention to the extensive stressors faced by high-risk IPV victims. To re-emphasise: based on official records, approximately one third of victims had mental health issues, used illicit drugs and had problems with housing instability;

around half had a criminal history, were unemployed and fearful of the aggressor. Correspondingly, aggressors appeared to have antisocial lifestyles; over 90% had a history of previous violence perpetration, almost three quarters had a history of breaching court orders and over one third were gang affiliated. At the relationship level, approximately one third of dyads met the criteria for relationship churning; whilst around 50% of victims had sustained injuries from the aggressor's physical violence and experienced nonfatal strangulation.

The relationships between several baseline variables provided further insights into the adversities and interrelated challenges facing victims. For example, there were small to medium associations between victims' mental health issues and drug use ($r = .20$, $p < .01$), drug use and unemployment ($r = .20$, $p < .05$), drug use and housing instability ($r = .17$, $p < .05$), and unemployment and housing instability ($r = .32$, $p < .01$); suggesting some victims experienced a particularly complex cluster of needs, alongside serious IPV victimisation. Such issues would likely intensify the difficulties experienced and–problematically–the barriers to accessing support. Research suggests these sorts of stressors likely deepen a victim's psychological and logistical dependence on an unsafe relationship (Gondolf, 2014).

Taken together, these findings provide useful insights into victims' circumstances and support previous research. Earlier recurrence studies have similarly found that high-risk IPV victims typically experience a range of hardships (Howarth & Robinson, 2016; Robinson, 2006; Sonis & Langer, 2008). However, our study has extended previous findings by measuring a wider range of variables to better quantify the vulnerabilities of victims, their complex relationship patterns, traumatic IPV experiences and their often-fraught relationships with the criminal justice and social welfare systems.

Initial Engagement with ISR Interventions

Turning now to IPV-related interventions through the ISR pilot, we found that the initial engagement rate were considerably higher overall for victims than aggressors. This

discrepancy is likely evident due to several factors. Taking an individualistic perspective, our results showed that many aggressors were entrenched in antisocial lifestyles and conduct, so they may have been unmotivated to change and highly resistant to engaging with interventions or addressing any IPV-related support needs during follow up. Additionally, some aggressors may have purposely been 'on the run' from police or avoiding official agencies during follow up. Others may have been unintentionally difficult to contact due to transience, not having a reliable telephone number or other lifestyle instability factors.

At a more structural level, the high-risk nature of the sample saw several aggressors serving time in prison for IPV-related or other offences during the follow-up period, which impeded service provision and possibly contributed to an 'out of sight, out of mind' mentality from support agencies. Moreover, within the IPV and wider family violence sector, aggressor-specific interventions are more scarcely resourced than victim interventions across Aotearoa New Zealand (Family Violence Death Review Committee, 2020). Finally, the ISR pilot is fundamentally a victim-centric crisis response system: although it responds to the needs of both victims and aggressors, it does so within "a context where victim safety is the paramount concern" (Mossman et al., 2019, p. 4). Thus, the ISR pilot's emphasis on the immediate safety of victims may lead to the prioritisation of victim-specific interventions, at the expense of inadvertently downgrading aggressor-specific interventions as a secondary target.

IPV Recurrence

Our results revealed that 62.8% of these high-risk IPV victims had at least one further IPV recurrence reported to police across the 12-month follow up; 36% of victims sampled also had physical IPV recurrence recorded and 29.3% had an offence detected. These rates differed from previous findings. Overall, our rates of IPV recurrence and physical IPV recurrence were higher than studies that sampled low, medium and high-risk IPV victims (e.g., Ringland, 2018) or had shorter follow-up durations (e.g., Robinson, 2006); but lower

than studies that used self-reported data from high-risk victims to inform outcome measures (e.g., Sonis & Langer, 2008; Perez et al., 2012). These four previous studies were conducted in Australia, the United Kingdom and America, respectively, and three were published between eight and 14 years ago. Our findings therefore contribute a more up-to-date overview of IPV recurrence and physical IPV recurrence rates recorded officially for high-risk victims. These findings also specific to an Aotearoa New Zealand population, corresponding with other local data about the increasing volume (New Zealand Family Violence Clearinghouse, 2017, June 26) and proportion of IPV reported to police; from approximately 24% of all estimated IPV in 2014 (New Zealand Crime and Safety Survey, 2014) to 37% in 2018 (New Zealand Crime and Victims Survey, 2018).

Predictors of IPV Recurrence Outcomes

Overall, the bivariate results suggested that the majority of independent variables in our study did not significantly predict IPV recurrence, physical IPV recurrence or offence detection. Most of the nonsignificant associations had very small relationship strengths (i.e., $r < .10$). Of note, variables that significantly predicted one, two or three of the IPV recurrence outcomes were typically small to medium in size (i.e., between $r = .15$ and $r = .25$; or $r = -.15$ and $r = -.25$).

Our findings for several of the 'research-derived' predictors diverged from previous empirical research. For example: victim mental health, dependent children, the victim's use of violence and specific abuse characteristics (e.g., threats to kill, coercive control, stalking and physical assault causing injury to the victim) all significantly predicted IPV recurrence or physical IPV recurrence in earlier studies (Krause et al., 2006; Kuijpers et al., 2012a, 2012b; Mele, 2006; Ringland, 2018; Robinson, 2006; Robinson & Howarth, 2012; Romans et al., 2007; Sonis & Langer, 2008); but not in the current study. Although null findings are often ignored, such information helps to convey a more complete overview of how our findings fit

in with the IPV recurrence literature to date. Robinson (2006) similarly focussed on high-risk IPV victims with a relatively small sample size and also uncovered few statistically significant or clinically meaningfully relationships between the various baseline variables and IPV recurrence; with that author suggesting that, compared to larger studies with low, medium and high-risk victims sampled, reduced statistical variance may have partially accounted for such findings.

Instead, we focus more explicitly on the multivariate findings. Identifying predictors that survived the process of sharing variance with other variables provided a clearer picture of which variables most strongly predicted ongoing IPV in our sample. Across our IPV recurrence outcomes, these variables were nonfatal strangulation, victim fear, relationship status and the victim's initial engagement with ISR interventions. Below, we outline some possible theoretical interpretations for these findings.

Firstly, nonfatal strangulation uniquely predicted *reduced* odds of IPV recurrence, physical IPV recurrence and offence detection when analysed alongside 14 other abuse characteristic variables; and remained a unique predictor of *reduced* odds of IPV recurrence, physical IPV recurrence and offence detection after the 'cherry-picking' process for analysing the 'best predictors' for each outcome measure. It is also important to note that nonfatal strangulation was the only variable that was significantly related to all outcome measures across all analyses, at both the bivariate and multivariate levels. However, the direction of this relationship stood in contrast to previous research: Ringland (2018) found nonfatal strangulation uniquely predicted *greater* odds of physical IPV recurrence, as did Robinson and Howarth (2012). Whilst there are some methodological differences between these studies, they cannot fully account for this discrepancy.

Accordingly, we consider possible explanations our nonfatal strangulation findings. Unlike most other forms of physical harm, this abusive behaviour strongly communicates to

the victim that the aggressor can–and might–kill them, often having significant psychological consequences (Pritchard et al., 2017). Nonfatal strangulation is also associated with serious physical consequences like memory problems, loss of consciousness, brain injuries, paralysis and strokes (Pritchard et al., 2017). International research has identified nonfatal strangulation is an important risk factor in predicting IPV homicides (Campbell et al., 2003; Pritchard et al., 2017). Based on this evidence, the ISR pilot recognises nonfatal strangulation as a 'red flag' behaviour and a 'lethality indicator', with its special status prompting frontline practitioners to take this behaviour extremely seriously in risk assessments and ongoing risk management responses (Ministry of Justice, 2017). Additionally, local legislation changes at the beginning of our follow-up period resulted in nonfatal strangulation becoming a specific criminal offence (Family Violence (Amendments) Act 2018).

Due to this legislative context and the frontline practices typical within the ISR pilot, the apparently 'protective' nature of nonfatal strangulation may be due to its association effective intervention, at least in high-risk IPV cases. In other words, police and ISR-affiliated agencies may respond to disclosures of nonfatal strangulation with very intensive measures–albeit unmeasured in our study–to constrain the aggressor's behaviours and support the victim's safety, which then reduces the likelihood of the victim experiencing ongoing abuse. Alternatively, these findings could reflect victims and aggressors 'going underground', in that they try to avoid further contact with the criminal justice and social welfare systems. This latter possibility may relate to the perceived negative consequences of further reporting IPV recurrence after a disclosure of nonfatal strangulation (e.g., removal of children by child protection services or harsher criminal justice sanctions for the aggressor).

Although we hypothesize that the intervention effect rationale may be more likely, given the contextual sources lending indirect support (Ministry of Justice, 2017; Pritchard et al., 2017), we have no evidence available to empirically support or disconfirm either possible

explanation within the scope of the current study. Future research must therefore urgently examine whether the direction of this relationship is replicable and investigate the causal mechanisms for such findings. We lastly re-emphasize that, irrespective of how nonfatal strangulation performs as a risk factor for IPV recurrence outcomes, it is a very harmful behaviour in and of itself that needs to remain front of mind for safety intervention responses.

Secondly, victim fear uniquely predicted *increased* odds of reported IPV recurrence and offence detection, when analysed alongside eight other dyad characteristic variables; but it did not uniquely predict physical IPV recurrence. Furthermore, based on the final analyses of 'best predictors' from all ecological levels, victim fear remained a unique predictor of *increased* odds of IPV recurrence and offence detection. Although there was very limited previous research that explicitly analysed fear and IPV recurrence for victims, there was some alignment with the Robinson and Howarth (2012) findings, as they also found a nonsignificant relationship between victim fear and physical IPV recurrence. It may be that fear motivates victims to engage in increasingly formal responses to IPV, in attempts to constrain the aggressor's abuse. This rationale was only partially–and very indirectly–supported within our baseline data: there was a relationship between victim fear and having a protection order against the aggressor (r =.17, $p < .05$), but no significant relationship to self-reporting IPV episodes to police (r =.13, $p > .05$). More broadly, the predictive utility of victim fear on both IPV recurrence and offence detection in our high-risk sample aligns with previous research (Cattaneo & Goodman, 2005; Heckert & Gondolf, 2004; van der Put et al., 2019) and local practitioner guidelines (Ministry of Justice, 2017) that recommend using victims' appraisals of their own IPV-related danger in risk assessment processes.

Thirdly, relationship status was important. Compared to the victim and aggressor being separated, remaining in the relationship uniquely predicted *increased* odds of reported IPV recurrence, physical IPV recurrence and offence detection, when analysed alongside the

other dyad characteristic variables. In the final 'best predictor' analyses, remaining in the relationship still uniquely predicted *increased* odds of offence detection but did not significantly predict IPV recurrence or physical IPV recurrence. These findings are consistent with Sonis and Langer's (2008) study, as their multivariate analysis showed that separation uniquely predicted reduced odds of physical IPV occurrence.

As such, we present a possible explanation for these findings. Over time, a separated relationship status will typically result in severed ties between the victim and aggressor, with specific physical, emotional and practical boundaries in place (e.g., no socialising together, ceasing contact with each other's friends and families, reduced–or nil–access to physical locations like one's home and workplace, changed routines and division of relationship property). Therefore, logically, there may simply be less opportunities overall–and more effort required from the aggressor–for ongoing abuse to occur in separated relationships; compared to when the victim and aggressor remain in an intimate relationship. There was some indirect support for this rationale in our study, in that separation was associated with lower rates of physical harm (r = -.16, p <.05), injuries sustained (r = -.28, p <.01) and verbal harm (r = -.18, p <.05) at baseline. However, because there were also higher rates higher rates of stalking (r = .22, p <.01) and threats to kill (r = .21, p <.01) at baseline for separated dyads, which could indicate that if IPV recurrence persists during separation, the aggressor's tactics change in response to the lifestyle conditions of separation. It is therefore important to remember that danger to the victim does not simply disappear after separation (Family Violence Death Review Committee, 2014) and replication of these findings is needed to better understand the nuances for this complex variable.

Due to different ways of measuring separation, it is important to note the relationship status findings from most similar studies cannot be directly compared. Recall that, based on information from the index episode and the preceding six months, we operationalised

separation as the victim and aggressor being ex-partners, irrespective of when that separation occurred (but excluding relationship churners). Other studies operationalised relationship status as a point in time measure restricted to victims and aggressors with an imminent or recent separation (e.g., Dowling & Morgan, 2019; Ringland, 2018; Robinson, 2006; Robinson & Howarth, 2012). As outlined in the introduction, these studies found imminent or recent separation was positively associated with, or predicted *increased* odds of, IPV recurrence and physical IPV recurrence. This only further highlights the need for future research to better understand the predictive validity and direction of various relationship status conditions.

Finally, the victim's initial engagement with interventions during follow up uniquely predicted *increased* odds of IPV recurrence, physical IPV recurrence and offence detection, when analysed alongside the 14 other community level variables. Based on the 'best predictor' analyses, the victim's initial engagement with interventions continued to uniquely predict *increased* odds of IPV recurrence and physical IPV recurrence; but not for offence detection. Previous intervention research has consistently found that IPV-related interventions for victims are associated with significant reductions in IPV recurrence (Arroyo et al., 2017; Eckhardt et al., 2013) and physical IPV recurrence (Howarth & Robinson, 2016; Robinson & Howarth, 2012; Tirado-Muñoz et al., 2014). Yet it is important to recall the specifics of these findings, because the Arroyo et al. (2017) meta-analysis only included interventions where victims had completed eight support sessions and Howarth and Robinson (2016) showed a dose-response relationship whereby a higher number of sessions completed by victims translated into increasingly better safety outcomes. As outlined, the intervention data quality issues in FSS forced us to use a very basic intervention variable; we were therefore unable to differentiate between superficial engagement through to intervention completion[16]. This

[16] These findings may initially appear contradictory to our explanation around possible intervention effects shaping the relationship between nonfatal strangulation and repeat IPV for victims. However, criminal justice system sanctions, ISR responses and interventions factors remain almost entirely unmeasured in our study.

variable is therefore better conceptualised as the victim's initial presentation to intervention providers around willingness to engage with formal interventions, rather than intervention effectiveness. Accordingly, we cannot meaningfully compare our findings to these previous studies of IPV-related interventions.

This finding could reflect that victims who are open to engaging with ISR support services may be less likely to normalise ongoing abuse–and more likely to report IPV recurrences to police–than those victims who do not engage with ISR support. Additionally, when support services are engaged with the victim, professionals likely have an enhanced ability to detect IPV, encourage victims and their families to report episodes to police, and occasionally report IPV on behalf of victims. However, related evidence in the current study was indirect and mixed. For example: at baseline, the victim's history of non-engagement with community supports was related to being uncooperative with police ($r = .26$, $p < .01$) and the ISR team suspecting there was unreported IPV in the relationship ($r = .17$, $p < .05$); yet it was not associated with the victim reporting the index episode to police ($r = -.14$, $p > .05$). This baseline non-engagement variable also did not predict any of the IPV recurrence outcome measures, based on bivariate and multivariate analyses.

Alternatively, there could be something about the initial delivery of ISR interventions that accounts for these findings. Victims may develop, or be given, unrealistic expectations about the potential safety impacts of engaging with an ISR intervention; such expectations could then inadvertently influence the dynamics between the victim and aggressor to heighten the risk of IPV recurrence outcomes. This issue has been flagged within the context of aggressor-specific IPV treatments, with victims often overestimating the likely safety impacts of such interventions (Gondolf, 2002). Aggressors could also become more hostile due to ISR involvement and the victims' willingness to engage with 'the system'. In turn, they may escalate their abusive tactics to punish the victim for this perceived noncompliance within the

relationship. More broadly, this finding could also indicate that formal help seeking behaviours by the victim cannot fundamentally address IPV without the aggressor also engaging in interventions (recall that both parties engaged in only 28.5% of cases) and facing appropriate criminal justice sanctions.

Implications

Theoretical Implications

Overall, the current study's findings provided basic empirical support for using Dutton's (2006) nested ecological framework within the context of IPV recurrence prediction; in that there were significant predictors evident across all three ecological levels considered. Consistent with previous studies on IPV recurrence and physical IPV recurrence for victims (e.g., Ringland, 2018; Robinson & Howarth, 2012; Sonis & Langer, 2008); our significant predictors were mainly at the relationship and community levels, although future research is clearly needed with a greater number of individual level variables. This approach (i.e., simply using variables from each level of the nested ecological framework) was used to analyse IPV occurrence risk factors in the Stith et al. (2004) meta-analysis, with Dutton (2006, p. 35) stating these specific meta-analytic findings are "as close as we'll get" to an empirical evaluation of the nested ecological framework. As such, proposed causal mechanisms for how specific variables and ecological levels work together to predict IPV occurrence or recurrence–and the ability to rigorously test them–is markedly absent in this approach. Again, rather than being an indictment of the theoretical perspective selected for the current study, these issues relate to the lack of overarching, explanatory theories within the wider IPV research literature (Capaldi et al., 2012). Such issues help to contextualise why our theoretical implications are relatively limited in scope.

Briefly, our findings also lend preliminary support to using the Capaldi et al. (2005) Dynamic Development Systems (DDS) approach in future research. To summarise, the DDS

approach proposes that IPV recurrence depends on the victim and aggressor individually, their relationship stage, the relationship context and how their dyadic interactions patterns develop and change over time (Capaldi et al., 2005). Thus, a prospective multiple-point, longitudinal study design with dyadic-focussed data collection taken directly from victims and aggressors is required. With this in mind, the DDS approach would yield more nuanced findings about IPV recurrence than the nested ecological framework, but the former is considerably more difficult to incorporate into small-scale research than the latter. We could not incorporate the DDS approach within the scope of the current study, but the alignment between our relationship level findings and the core dyadic focus of the DDS approach; as well as the way it extends the nested ecological findings across all levels, suggests that this theory may be useful in guiding larger-scale IPV recurrence studies in the future.

Practical Implications

These findings also have several practical implications that are relevant for strategic, policy and frontline efforts around addressing recurrent IPV for high-risk cases. First and foremost, the complexity of these cases is clearly apparent and highlights intensive supports are needed. As expected, the IPV harm types and frequency levels were extremely serious; but there were also many other psychosocial stressors evident. Mental health issues, drug use, unemployment, housing instability, challenging family or whānau structures and interaction patterns, significant trauma and chronic antisocial behaviours were common in these cases. Research from the United Kingdom has found similar stressors facing high-risk victims and highlighted intensive, multi-agency responses are required (Howarth & Robinson, 2016; Robinson, 2006). Previous research from Aotearoa New Zealand has similarly highlighted the complex support needs of IPV victims and, in turn, advocated for integrated, wraparound interventions (Chetwin, 2013; Dobbs & Eruera, 2014; Families Commission, 2009; Herbert & Mackenzie, 2014; Taylor et al., 2014a, 2014b). Our findings extend this research by providing

updated data that focuses explicitly on high-risk cases within the context of the ISR pilot. Taken together, there is compelling evidence that high-risk IPV victims typically face a myriad of adversities that must be addressed collaboratively by statutory and community agencies–with both a crisis response focus, like the ISR pilot (Mossman et al., 2019), and longer-term interventions–to support improved safety and wellbeing.

Based on our intervention findings, there are practical implications specific to the ISR pilot around data quality problems. As outlined thoroughly in the method, there were data recording issues relating to where intervention information was entered in FSS, as well as inconsistent use of the intervention outcome labels for summarising the nature of victims and aggressors' engagement. This issue highlights a training opportunity to improve intervention data quality; but also directly impacted our ability to meaningfully and robustly assess the relationship between ISR interventions and IPV recurrence outcomes. We therefore recommend that the ISR pilot undertakes urgent assessment around the extent of this intervention data quality issue; before hopefully implementing processes to improve intervention-related data recording practices. Without such action, it will be difficult to accurately examine the efficacy of interventions within the ISR pilot or use intervention-related variables meaningfully in research with ISR data.

There are also important implications around risk assessments. Our findings empirically demonstrated the need for risk assessments to account for variables across various ecological levels. Of note, adding the relationship and community level exploratory variables improved the predictive power of models in multivariate analyses. Furthermore, the 'best predictor' models, which drew on both research-derived and exploratory variables, had moderate to good predictive accuracy. Together, these findings highlight the importance of examining a wide range of variables in risk assessments. In fact, the ISR risk assessment and management practice guidelines (Integrated Safety Response, personal communication,

December 2, 2019) reflect that ISR risk assessments draw on several variables that have not yet been empirically validated as predictors of IPV recurrence outcomes, especially for an Aotearoa New Zealand population. However, the current study provides encouraging, preliminary support that some of the exploratory variables used in ISR risk assessments contribute meaningfully to overall predictive validity in high-risk cases.

More specifically, we have also identified a small number of variables that were strong and relatively consistent predictors of IPV recurrence, physical IPV recurrence and offence detection. Namely, has the aggressor ever strangled the victim? Is the victim fearful of the aggressor? What is the relationship status between the victim and aggressor? And is the victim engaging, or willing to engage, in an IPV-related intervention? Albeit based on preliminary results that require further replication, these findings point to four key predictor variables that may be especially useful for assessing the likelihood of ongoing abuse in high-risk IPV cases, even when there is a raft of other comprehensive, multi-agency information available about the case. Whilst the latter will undoubtedly still be clinically useful for full risk assessments, response planning and ongoing case management, we propose that these four predictors may be helpful for brief or screening risk assessment processes. Given the ability for risk assessments to appropriately direct (relatively scarce) resource allocation and aid harm prevention, these findings have considerable practical importance for frontline agencies assessing and managing high-risk cases of IPV.

Furthermore, these findings can reinforce and add to IPV-related prevention messages used in Aotearoa New Zealand. Within the context of intimate relationships, such messages include publicizing the risks associated with nonfatal strangulation and encouraging women to ‘trust their gut’ if feeling fearful about their relationship and partner or ex-partner’s behaviour. Whilst the former is highly prevalent within public discourse and health promotion

material, the latter could be more widely emphasized within both education programmes about healthy relationships and public health campaigns around preventing IPV recurrence.

Finally, multi-agency collaboration is therefore needed to conduct robust assessments of high-risk cases, deliver intensive IPV-related interventions and provide holistic, wraparound support services for these victims and aggressors. Working in silos, no one agency can gather the health, child protection, unemployment, housing, family violence and so on risk-related information for a dyad, nor deliver interventions that address all such needs. It is therefore logical for agencies to combine their different speciality knowledge and skills to more holistically address the safety and wellbeing needs of high-risk victims, aggressors and their families and whānau. This kind of multi-agency collaboration was evident across risk assessment, case management and intervention processes; based on our in-depth examination of ISR data sources for the coding protocol and manual update of intervention data. As such, our research lent support to an ISR way of working in Aotearoa New Zealand for high-risk IPV cases.

Strengths

We briefly acknowledge some strengths of the current study. The FSS database has multi-agency information that is relatively comprehensive for an official data source. Particularly useful for coding the independent variables, access to ISR data from FSS meant that we had wide-ranging information relating to the victim, aggressor and any dependent children. This data included criminal justice-related information from police, the Department of Corrections and Ministry of Justice; physical and mental health information from District Health Boards and ACC; child-related information from Oranga Tamariki and the Ministry of Education; and financial and housing-related information from the Ministry of Social Development and Housing New Zealand. Although such data was not consistently shared and

recorded by ISR-affiliated agencies in all cases, and there would undoubtedly still have been data missing, it was a rich official data source.

Access to such comprehensive data also relates to the study's next key strength. We had a very thorough coding process, in terms of the wide-ranging variables included via manual coding and the multiple data sources canvassed (i.e., police episode reports and ISR case plans). We coded and analysed a much higher number of variables and used more data sources that most other IPV recurrence-related studies (Howarth & Robinson, 2016; Kuijpers et al., 2012a, 2012b; Mele, 2006; Robinson, 2006; Sonis & Langer, 2008). Accordingly, this level of coding required substantial resource investment during the data collection phase but enhanced the overall breadth and depth of our research. Finally, because there is such limited research that focuses explicitly on IPV recurrence outcomes (i.e., compared to cross-sectional studies that have examined IPV occurrence and victimisation in general), our longitudinal study design was a key strength.

Limitations and Directions for Future Research

Given the exploratory nature of the current study, it is necessary to keep several limitations in mind when considering our key findings and implications. These limitations are also useful in signalling recommendations for future research. One such limitation was the unanticipated removal of several research-derived variables at the individual level. These variables included victim alcohol use, aggressor alcohol use, aggressor drug use and victim (non-IPV) trauma history because the police episode reports and ISR case plans often recorded such variables in haphazard and vague ways. For example, the ways in which alcohol and drug use were recorded often made it difficult to decipher whether the concerns related to the victim, aggressor or both parties; and whether there were concerns about intoxication during the episode or more chronic, lifestyle use. Research suggests such differences are highly relevant within the context of IPV (Cafferky et al., 2018; Testa et al.,

2003). Such issues then led to poor interrater reliability results for coding and the exclusion of these possibly important, individual level variables. As part of ongoing data quality assurance efforts by police and the ISR pilot, improvements in these areas would directly improve the comprehensiveness of future IPV recurrence research. Furthermore, the unanticipated removal of several variables at the individual level obstructed our ability to comprehensively compare across the levels of Dutton's (2006) nested ecological framework. Specifically, we were left with only four possible predictors to statistically analyse at the individual level, compared with 24 variables at the relationship level and 16 variables at the community level; which resulted in an unintentional emphasis on the relationship and community levels.

Related to the nested ecological framework, there is also a broader problem involving the decisions that researchers make regarding independent variables and ecological levels. To this end, there are consistencies between the current study and Stith et al. (2004) meta-analysis in matching mental health issues and substance use to the individual level; dependent children and abuse characteristics to the relationship level; and economic deprivation factors to the community level. However, there are also several inconsistences: we selected victim fear and pregnancy as relationship level variables, whereas the meta-analysis analysed these variables at the individual level; victim age is an individual level variable in our study and a community level variable in the meta-analysis. These different interpretations are possibly due to the lack of clear guidelines in Dutton's (2006) research. For example, the core explanation for the community level simply stated, "factors that could contribute to wife assault include job stress, unemployment, and the presence or absence of social support systems and peer group influence" (Dutton, 2006, p. 26). In the current study, we have therefore operationalised the community level as broader contextual factors impacting the victim or aggressor's lifestyle (e.g., unemployment and housing instability) and the ways in which the victim or aggressor interacts with the wider community (e.g., formal support

services, the criminal justice system, the social welfare system, and so on). However, to advance more consistent understandings around predictors of IPV recurrence using the nested ecological framework, it would be hugely beneficial for a large-scale study to set out clear guidelines and rationale for which factors belong at the different ecological levels.

Further relating to the nested ecological framework, there is an issue specific to research conducted in Aotearoa New Zealand. As flagged in the introduction, variables relating to the whānau do not clearly fit into this framework, at least based on Dutton's (2006) explanations. Additionally, reliance on international research, especially IPV recurrence studies from America (e.g., Sonis & Langer, 2008), Australia (e.g., Ringland, 2018) and the United Kingdom (e.g., Howarth & Robinson, 2016; Robinson, 2006; Robinson & Howarth, 2012), means that the predictive validity of whānau-specific variables is unknown. It may be that the whānau becomes recognised as a unique and additional ecological level in Aotearoa New Zealand research, distinguished from both the relationship and community levels. A recent report similarly raised this issue and recommended that the whānau should be incorporated into the relationship level for Maōri victims and aggressors (Ministry of Justice, 2017). Future research must consider how to best adapt the nested ecological model to incorporate whānau-specific variables, so that it is culturally responsive and fit for purpose in Aotearoa New Zealand.

A fundamental methodological issue was sample size. Albeit slightly larger than Robinson (2006), our sample size was small compared to similar prediction studies that analysed approximately 300 to 18,500 victims (Howarth & Robinson, 2016; Mele, 2006; Robinson, 2006; Robinson & Howarth, 2012; Sonis & Langer, 2008). The small sample size most negatively impacted the multivariate analyses. Our 'workaround' strategy, which involved separate regressions at the individual, relationship and community levels and a 'best predictors' regression for all three IPV recurrence outcomes, was useful given the constraints

of the current study. However, this analytical strategy impeded our ability to combine all variables from all relevant levels of the nested ecological framework. We therefore recommend that another local study in the future uses the same independent variables but, to comply with statistical conventions around sample sizes for binary logistic regressions, assesses ISR data from approximately 600 high-risk IPV victims. This sample size would permit a regression analysis of all individual, relationship and community level variables together in one model and enable us to draw conclusions on the predictive validity of variables from within–and across–ecological levels. A project of this size is realistic based on the available ISR data and would inform insights into key predictors of recurrent IPV and provide more thorough theoretical insights about the nested ecological framework.

There are also several limitations relating to the measurement of variables. Firstly, the coding protocol definitions for measuring our baseline variables were relatively inclusive (see Appendix B for full information). For example, our victim mental health variable included 'any mention' of current or historic mental health issues, which ranged from general issues, specific symptoms or a formal diagnosis. Positively, this approach yielded useful descriptive data for quantifying and better understanding victims' circumstances and stressors. Less positively, this approach likely 'watered down' our analyses: counting more distal or broad instances of a variable may have reduced statistical variance. This approach would logically include instances where the distal or broad variable is less meaningfully related to ongoing IPV, as compared to proximal or specific instances of that variable, so it may have obscured the empirical relationship between possible predictors and IPV recurrence outcome variables. Research showing that desistance from severe abuse tactics over time is common–despite IPV still occurring in the relationship–may be particularly relevant to this point for the more distal instances of nonfatal strangulation, sexual harm and weapons use/access captured in the 'ever-recorded' variables (Caetano et al., 2016).

A second issue was that there were noteworthy measurement discrepancies for several predictors across many of the recurrent IPV studies. Independent variables were labelled similarly across studies, but the actual inclusion and exclusion criterions often diverged. Examples include relationship status, as outlined above. Another example was weapons: this variable referred to the aggressor's access to weapons in some studies (Ringland, 2018; Sonis & Langer, 2008) or use of weapons against the victim in others (Howarth & Robinson, 2016; Robinson, 2006; Robinson & Howarth, 2012); whereas we included both considerations into our measure of weapons use/access.

There were several other inconsistencies. The baseline and follow-up assessment periods varied across studies; as did data sources (e.g., official data or victim self-reports). Outcome measures also varied in terms of whether they assessed IPV recurrence, frequency, harm type (e.g., physical violence only), severity or timing; yet all aspects are useful in more fully understanding this complex phenomenon. Accordingly, we advocate for a more unified approach to defining and measuring possible predictors within the recurrent IPV literature, which could be achieved by researchers providing more explicit coding protocols for independent variables and outcome measures to facilitate more precise replication across future studies. Importantly, greater methodological consistency around variables would enable more meaningful comparisons between studies and advance our understandings around predicting repeat IPV victimisation.

Additionally, without a severity indicator, the current study was unable to distinguish between cases where IPV recurrence outcomes signalled ongoing harm to the victim versus adherence to safety planning measures (e.g., reporting lower level IPV to police as a de-escalation tactic). This limitation is not unique to our research, with Sonis and Langer (2008) being the only study reviewed with a specific recurrence severity outcome variable. We attempted to provide more detail around IPV recurrence by adding the physical IPV

recurrence and offence detection outcome measures. Due to study constraints, we were unable to thoroughly investigate the harm types evident within repeat episodes, as this level of analysis would have required manual coding of over 350 repeat IPV episodes during follow-up. Instead, we relied on the dichotomous police-recorded variables that summarised whether physical harm and criminal behaviour were present or absent within each repeat episode (see Appendix A). A preliminary review of the first IPV recurrence episode in each case indicated that this approach underestimated the true rates of physical harm and offence detection. For example, in some episodes there was a physical assault outlined in the episode narrative, yet the physical harm variable had not been recorded by police. Similarly, at times, no offence code was entered despite the aggressor being arrested as a result of behaviours during the episode. The unreliability of these police-recorded variables was also flagged in earlier ISR-specific research; highlighted then as an important data limitation that required further attention (Mossman et al., 2017). Further work by police and the ISR pilot should therefore quantify and resolve these discrepancies as part of ongoing data quality assurances. Overall, it would be worthwhile to establish a reliable severity measure using ISR data and examine this issue in a more explicit way in future research around high-risk IPV victims.

Finally, as previously highlighted, the current study is exploratory in nature and guided by a theoretical framework rather than explanatory causal theory. This issue is part of a wider problem around the lack of coherent IPV-specific theory in studies predicting IPV recurrence outcomes. Research relating to theory construction recommends using relevant literature to guide qualitative research; which can then in turn inform the conceptualisation of possible causal models; before empirically testing said models (Jaccard & Jacoby, 2020). In the context of predicting IPV recurrence, the next qualitative phase could include interviews with high-risk victims and aggressors about their experiences of nonfatal strangulation, relationship status, victim fear and engagement with interventions and perspectives on how

these factors may relate to ongoing abuse. The findings could then inform research specifically designed to investigate the causal mechanisms around these predictors and IPV recurrence outcomes. Future research needs to urgently prioritise theory construction over ongoing exploratory data analysis.

Conclusions

To support harm prevention efforts within a multi-agency response system, the current study aimed to better understand the circumstances of high-risk IPV victims and to identify predictors of repeat victimisation. Consistent with previous research, extensive psychosocial stressors and complex, interconnected support needs were evident for these victims. From a practical perspective, high-risk IPV victims would therefore benefit from intensive, wraparound interventions to address these safety and wellbeing needs. Turning to repeat victimisation, the majority of victims had at least one IPV recurrence reported to police over a 12-month follow up. Whilst only a modest number of variables significantly predicted IPV recurrence, physical IPV recurrence or offence detection; the multivariate findings indicated that using wide-ranging, multi-agency information is useful for assessing risk. Of note, we also identified nonfatal strangulation, victim fear, relationship status and the victim's initial engagement with ISR interventions all uniquely predicted the three IPV recurrence outcome measures across multivariate analyses. Although replication is required, and it would be useful for future research to determine the explanatory mechanisms through which these variables predict IPV recurrence; there is potential predictive validity in using these four key variables in risk screening tools.

Our findings provided basic empirical support for Dutton's (2006) nested ecological framework, in that predictors were found at the community, relationship and (to a lesser extent) individual levels. However, the knowledge gaps around specific theoretical mechanisms and the lack of all-encompassing explanatory theories persist in IPV research. This study highlights important recommendations for similar research, in that greater

consistency is needed across predictor and outcome measures, as well as how the nested ecological framework is applied in empirical studies. It is also essential that future research examines IPV recurrence severity to better understand and predict patterns of harm over time. Taken together, the current study provides useful findings that can inform ongoing research, policy and frontline efforts specific to high-risk IPV victims; ultimately, to improve the safety and wellbeing of particularly vulnerable families and whānau in Aotearoa New Zealand.

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Appendix A

Police-recorded Variables

There were several variables that were recorded by Police and did not require manual coding. The police-recorded variables retained for analyses are listed below.

Variable	Additional Information
Victim age	Age of victim at index episode, entered as date of birth
Victim ethnicity	Recorded ethnicity of victim
Aggressor age	Age of aggressor at index episode, entered as date of birth
Aggressor ethnicity	Recorded ethnicity of aggressor
Who reported the episode?	Records who contacted police to report the episode; labels according to person type (e.g., victim, family member, member of the public).
Location type	Records the physical location type where an episode occurred (i.e., dwelling or public place).
Property damage	A tick box selection on the police episode report; based on the attending officers' appraisals of the abuse characteristics and whether property damage was evident.
Sexual harm	A tick box selection on the police episode report; based on the attending officers' appraisals of the abuse characteristics and whether sexual harm was evident.
Threats of harm	A tick box selection on the police episode report; based on the attending officers' appraisals of the abuse characteristics and whether threats of harm were evident.
Physical harm	A tick box selection on the police episode report; based on the attending officers' appraisals of the abuse characteristics and whether physical harm was evident.
Verbal harm	A tick box selection on the police episode report; based on the attending officers' appraisals of the abuse characteristics and whether verbal harm was evident.
Incident code	The code of the incident, which reflects if it was a call for service to police (5F, family harm investigation; or 6D, bail breach) or if there was a specific offence detected (e.g., 3852, 1453).

Appendix B

Coding Protocol and Data Dictionary

The coding protocol was applied in three distinct steps that informed the overall process. Firstly, 'risk string information' (i.e., the list of key ISR risk assessment considerations) from the index episode was coded. If a listed risk could not be applied to the below variables, it was left uncategorized. Secondly, the index episode report and the first half of the Dynamic Risk Assessment (only relating to the 'person posing risk', i.e., coding stopped before the 'Frontline Safety Plan' section) was coded. Thirdly, the victim and aggressor's ISR case plan was coded. This involved case notes from the six months prior to the index episode (e.g., if the index episode was on the 12th December 2018 then we would include ISR information dating back to the 12th June 2018), the 'risk string information' for any earlier episodes reported to police during that six-month period, and the most proximal ISR risk assessment directly following the index episode. No earlier plan information was read, except for coding variables that captured both current and historical information (marked by *). For these variables, the full case plan was searched for evidence of that specific variable. Finally, information relating to third parties (i.e., children, friends or different partners/ex-partners) was not included in data collection, unless specified by a definition below.

Variable	Definition	Example data	Coded responses
Individual level			
Mental health[V]*	Current or historic mental health or impairment issues recorded for the victim (from suspected issues through to a formal diagnosis, as well as any engagement with mental health services).	- "A is struggling with mental health and feeling depressed" - "B has a diagnosis of schizophrenia and borderline personality disorder" - "C was referred to eating disorder clinic in May 2018"	1 = Record of mental health; 0 = no record
Drug use[V]*	Current or historic drug use, drug-related intoxication and/or drug-related issues (such as convictions or accessing treatment) recorded for the victim.	- "OT has concerns re A's drug use" - "Alleged drug use due to sores noted by Police on B" - "C is a heavy meth user"	1 = Record of drug use; 0 = no record
Mental health [A]*	Current or historic mental health or impairment issues recorded for the aggressor (from suspected issues through to a formal diagnosis, as well as any	- "A has antisocial disorder and a brain injury" - "B stopped his depression medication ten days ago" - "Self-reported anxiety, insomnia and paranoia; C is concerned he has an undiagnosed disorder"	1 = Record of mental health; 0 = no record

	engagement with mental health services).		
Relationship level			
Relationship status	The police-recorded 'Relationship Attributes' variable in the index episode report will list 'Violence Between Partners' or 'Violence Between Ex Partners'. Furthermore, the episode narrative and ISR case plan may have additional information about the relationship status. - Current relationship: the index episode is listed as 'Violence Between Partners' and there is other evidence confirming a current intimate relationship between the victim and aggressor (or no further information disconfirming it). - Separated relationship: the index episode is listed as 'Violence Between Ex-Partners' and there is other evidence confirming a separated relationship between the victim and aggressor (or no further information disconfirming it). - Churning relationship: Irrespective of the police-recorded relationship attributes variable in the index episode, there is other evidence that the victim and aggressor have cycled in and out of the relationship at least once during the baseline period.		1 = Record of current relationship; 2 = relationship churning; 3 = separated relationship
Cohabitation	Victim and aggressor recorded as residing in the same house. This includes if they claim otherwise but ISR suspects they are living together.		1 = Record of cohabitation; 0 = no record
Shared children*	Victim and aggressor have shared, biological children recorded. This does not include children aged 17 years or older, or if children are in third party care.		1 = Record of shared children; 0 = no record
Non-bio children^{V}*	Victim[17] recorded as having children in her care from a different relationship (i.e., not		1 = Record of non-bio

[17] From the research and ISR data available, it appeared uncommon for the aggressor to have dependent children in his care that were not biologically related to the victim, so this was not explicitly reviewed.

	biologically related to the aggressor).		children; 0 = no record
Pregnancy	Victim recorded as pregnant or having recently given birth, miscarried or terminated the pregnancy.	- "A is heavily pregnant " - "B has a vulnerable new-born (born 10 days ago)" - "C monitored for pregnancy in hospital but has termination scheduled for next week"	1 = Record of pregnancy; 0 = no record
Fear[V]	Victim recorded as being fearful about the aggressor/relationship; includes fear for self and third parties (most typically children or family members) but does not include any third-party fear on victim's behalf.	- "A said 'he really scares me' to Police" - "B doesn't feel safe at address because he knows where she lives" - "C has extreme fear of retribution and is worried that he will kill her and the children"	1 = Record of fear; 0 = no record
Child custody issues	Child custody issues (i.e., relating to the care of shared children) were recorded as a source of relationship conflict between the victim and aggressor.	- "Child access has just been changed and this may escalate him" - "A constantly pressures me to let him see our son" - "Currently in Family Court for Parenting Order"	1 = Record of child custody issues; 0 = no record
Infidelity issues	Infidelity recorded as a source of relationship conflict; this may relate to allegations or actual instances of cheating.	- "A said relationship deteriorated when she found texts from other women on his phone" - "B accused her of sleeping with the neighbour" - "He found her having sex with another man"	1 = Record of infidelity issues; 0 = no record
Denial around separation [A]	Aggressor recorded as not accepting the possible or actual end of the relationship. This may involve denial and pressure on the victim to resume the relationship.	- "A followed her from the North Island when she tried to leave him" - "He won't accept end of relationship and is likely to pursue her"	1 = Record of denial around separation; 0 = no record
Violence use[V]	Victim recorded as using physical violence (of any kind) towards the aggressor.	- "Both pushing/shoving" - "She slapped him in an attempt to make him take the knife away" - "A punched him in the ear causing his ear to bleed"	1 = Record of violence use; 0 = no record
Physical harm	Record of any physical violence from aggressor towards victim.	- "Strikes to her face, spitting" - "A dragged her by her hair"	1 = Record of physical harm; 0 = no record
Injuries	Record of any victim injuries sustained from the aggressor's violence.	- "Significant amount of blood coming from her nose" - "visible scratch marks on neck" - "multiple fractures" - "bruising on shoulder, ribs, wrist and neck" - "black eye, black cheek… marks on the back that suggest she was stomped on"	1 = Record of injuries; 0 = no record
Threats to kill	Record of explicit threat from the aggressor to kill the victim or someone close to the victim.	- "threats to kill - knife to throat" - "threatened to burn her alive" - "he stomped on my stomach and said that he would kill the baby" - "threats to kill my new boyfriend"	1 = Record of threats to kill; 0 = no record

Stalking	Recorded pattern of aggressor stalking the victim (i.e., this does not include turning up one uninvited without a wider pattern mentioned or social media-related 'stalking').	- "He has been watching her from the neighbour's house" - "She believes that he's stalking her; he has gone to her house and attempted to enter" - "A's persistent stalking behaviour"	1 = Record of stalking; 0 = no record
Weapon use/access*	Record of aggressor using (any object as) a weapon against the victim or having access to weapons.	- "A hit around the head multiple times with a claw hammer" - "flags for carrying axe" - "Alleged burn with a cigarette" - "B held a knife to her throat"	1 = Record of weapons; 0 = no record
Nonfatal strangulation*	Record of aggressor having strangled, choked or applied pressure to the victim's neck.	- "alleged nonfatal strangulation to the point of unconsciousness" - "Serious physical assault, including him standing on her throat for two minutes" - "A grabbed B by the throat" - "C then used chord and wrapped it around her neck to strangle her"	1 = Record of nonfatal strangulation; 0 = no record
Other threats	Aggressor recorded as having made verbal threats to victim about anything other than threats to kill.	- "threats to burn her house down" - "A has threatened her, saying he will make her look like the crazy one in court" - "B said he'll smash the car"	1 = Record of other threats; 0 = no record
Items thrown	Record of aggressor throwing object at the victim or in their presence.	- "threw a vase at her" - "He chucked a can of alcohol"	1 = Record of items thrown; 0 = no record
Property damage	Record of aggressor damaging victim's property (or someone else's property in the presence of the victim).	- "A broke door to get at her" - "He punched a hole in the wall" - "B smashed her phone"	1 = Record of property damage; 0 = no record
Verbal harm	Record of aggressor verbally abused the victim.	- "A shouting and swearing at her" - "Verbal argument"	1 = Record of verbal harm; 0 = no record
Coercive control	Record of aggressor behaving in a psychologically abusive way to exert power over the victim. This may include jealousy, power and control tactics, financial abuse and so on.	- "Tracker found on her vehicle and phone. Extremely controlling… he checks the rubbish bin to see what she is eating." - "Sexual jealousy" - "He takes all the money she earns and she is not allowed access to it" - "He is openly controlling, not permitting C to speak, telling her to shut up and speaking for her "	1 = Record of coercive control; 0 = no record
Prolonged duration	An episode of the aggressor's abuse is recorded as being extended, drawn out and unrelenting in nature.	- "Extreme sustained attacks" - "Neighbour stated it had been going on for days" - "The assault was nasty and prolonged over an hour"	1 = Record of prolonged duration; 0 = no record
Physical harm to others	Aggressor recorded as having used physical violence towards a third party (i.e., a child, other family member or friend).	- "Assault on her and her manager" - "Child harmed when A threw the baby capsule through the door whilst the baby was still in it" - "12-year old was also strangled"	1 = Record of physical harm to others; 0 = no record
Sexual harm*	Aggressor recorded as having raped, sexually assaulted or sexually coerced the victim.	- "Physical assault due to A not wanting to give B sex" - "Serious sexual assault with object"	1 = Record of sexual harm; 0 = no record

		- "Debasing comments of a sexual nature"	
Community level			
Protection order*	Victim recorded as having obtained a temporary or permanent protection order against the aggressor.		1 = Record of PO; 0 = no record
Unemployment[V]	Victim recorded as being unemployed, usually taken from Ministry of Social Development information relating to their unemployment benefit type.		1 = Record of unemployment; 0 = no record
Housing instability[V]	Victim recorded as having accommodation-related issues. This includes homelessness, being of 'no fixed abode', transience, staying in emergency accommodation and housing insecurity[18] (e.g., overcrowding, possible eviction, ongoing difficulties paying rent/mortgage, waiting on a Housing NZ transfer).	- "A needs help with housing, she is moving into her mother's address, but this is overcrowded" - "Transient family as per OT" - "B is a current applicant for a HNZ home but has not been allocated one as yet. Various recent relocations." - "They are currently homeless and living in a vehicle" - "C currently in safe house"	1 = Record of housing issues; 0 = no record
History of violence [A]*	Aggressor recorded by police as having a criminal history or previous complaints relating to IPV, non-IPV family violence, general violence or sexual violence.	- "A has extensive FV history and is currently in another open high plan" - "x1 agg wounding, x3 assaults, x1 threats, x2 possession weapons, x1 abduction for sex, x2 indecent act" - "his sexual offending and extensive FH history incl stalking past partner"	1 = Record of history of violence; 0 = no record
Gang affiliated [A]*	Aggressor recorded as a patched gang member or associate.	- "Mongrel Mob flag for him" - "A is heavily gang associated" - "B is prospecting for Black Power" - "Whanau linked to Mangu Kaha"	1 = Record of gang affiliations; 0 = no record
Noncompliance [A]*	Records of aggressor behaving in ways that breach the conditions of a court order, such as breach of protection order, parenting order, bail or non-association order.	- "breach of P/Orders against previous partners" - "disregard for orders" - "Breach of community order, x4 convictions"	1 = Record of noncompliance; 0 = no record
Criminal history[V]*	Victim recorded by police as having a criminal history.		1 = Record of criminal history; 0 = no record
Oranga Tamariki history as parent[V]*	Victim has recorded history of child protection services involvement for her child/ren' includes any prior report of concern or having an open case prior to the index episode.	- "Hx with OT as parents, 4 intakes, 2006, 2014, 2017 and May 2018 concerns re alcohol abuse, fh, emotional abuse, exposure to CSOs" - "Possible 9 children not in her care, extensive history of children being removed from her care" - "OT open, awaiting FGC"	1 = Record of OT history as parent; 0 = no record

[18] As per the Klein et al. (2019) definition of housing insecurity.

Family violence history with Police[V]*	Victim has a previous IPV or non-IPV family violence history recorded with police.		1 = Record of family violence history; 0 = no record
Uncooperative with police[V]	Victim recorded as non-engaging with police, including unwillingness to call police if unsafe; refusing to provide information necessary for potential prosecution (such as photos of injuries, signed statement); being aggressive or abusive towards police; giving police false details/allegations or obstructing the course of justice.		1 = Record of uncooperative with Police; 0 = no record
Not engaging with formal supports[V]	Victim recorded as having been unwilling to attend appointments, has declined referrals, has provided misleading information and/or ISR has discussed persistent non-engagement in other forms.	- "A evasive with OT, minimal engagement with IVS, previously declined AOD support – stated she doesn't have faith in supports" - "No agency has been able to make any headway with either party" - "Frequent disengagement and re-engagement common for B"	1 = Record of non-engagement with formal supports; 0 = no record
Unreported IPV[V]	Victim recorded as having not reported IPV to police.	- ISR states 'unreported FH', 'non reporting' or 'delays in reporting' - "Child has disclosed unreported physical violence to himself and A" - "B disclosed previous physical assaults and said she had not wanted to report them"	1 = Record of unreported IPV; 0 = no record

Notes: *Variable taken from any evidence within ISR case plan (i.e., not limited to six months baseline period).
[V] = victim variable; [A] = aggressor variable.

Appendix C

Ethical Approval

The University of Waikato
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Human Research Ethics Committee
Karsten Zegwaard
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THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

18-12-2018

Devon Polasheck
By email: devon.polaschek@waikato.ac.nz

Dear Devon

UoW HREC(Health)2018#82: Understanding perpetration of family harm based on data from the Family Safety System for the Integrated Safety Response for Family Harm pilot project

Thank you for submitting your amended application HREC(Health)2018#82 for ethical approval.

We are now pleased to provide formal approval for your project within the parameters outlined within your application.

Please contact the committee by email (humanethics@waikato.ac.nz) if you wish to make changes to your project as it unfolds, quoting your application number with your future correspondence. Any minor changes or additions to the approved research activities can be handled outside the monthly application cycle.

We wish you all the best with your research.

Regards,

Karsten Zegwaard PhD
Acting Chairperson
University of Waikato Human Research Ethics Committee