Supplementary Material - BJPsych-18-0043 - Appendices

Appendix 1 – Formulae used

1) Converting Cohen's d to Odds Ratio:

Cohen's d = Log OddsRatio($\sqrt{3}/\prod$)

Or, OR = $e^{\prod d/\sqrt{3}}$

2) Converting correlation coefficient ('r') to Odds Ratio:**Error! Bookmark not defined.**

First r was converted to Cohen's d as follows:

Cohen's d = $2r / \sqrt{(1-r^2)}$

The Cohen's d value was then used to calculate Odds Ratio from formula:

Cohen's d = LogOddsRatio($\sqrt{3}/\prod$)

Or, OR = $e^{\prod d/\sqrt{3}}$

3) Converting Odds Ratio to Relative Risk:

RR = $OR/(1-P_0+(P_0 \times OR)$

Where P_0 = baseline risk or prevalence

4) Population attributable fraction:

PAF = $[P_0 (RR-1)]/[(1+ P_0 (RR-1)]$

Where P_0 is the proportion of exposed subjects in the study population

The above are based on reference numbers: 9, 10 and 11 in main manuscript

Appendix 2 - Risk Factors with Outcome Measures Related to Interpersonal Violence

Risk Factor	**Outcome Measure**	**Review Type**	**Summary**
Post-traumatic stress disorder [i]	Anger and hostility	Meta-analysis	Weighted mean effect size r = 0.5
Exposure to violence in the form of video games, television and film [ii]	Aggression	Meta-analysis	Overall effect size was, r = 0.1
Exposure to media violence [iii]	Aggression and criminal aggression	Meta-analysis	Authors unable to calculate effect size for criminal aggression. Effect size for aggression, r = 0.2
Exposure to violent video-games [iv]	Aggression	Meta-analysis	"Causal risk factor" – Overall r = 0.2
Genetic influences [v]	Antisocial behaviour	Meta-analysis	r = 0.3 - Variance due to additive genetic influences,
Individual gene studies [vi]	Violence and aggression	Meta-analysis	No candidate gene studies were associated with violence.
Central serotonin function [vii & viii]	Aggression and antisocial behaviour	Meta-analyses (2)	r = - 0.1 for aggression d = - 0.5 for antisocial behaviour

Low resting heart rate [ix, x,xi]	Antisocial behaviour and aggression	Meta-analyses (3)	d = -0.2 (SE 0.39, p < .0010.3-0.5) for low resting heart rate. d = 0.4 (0.3-0.5) for low resting heart rate. d = 0.1 (0.1-0.3) for resting electrodermal activity d = 0.1 (-0.0-0.2) for heart rate during stressor – Authors conclude heart rate reactivity is not significantly associated with aggression. d = - 0.4 (-.5- -0.4) for resting heart rate and levels of antisocial behaviour in children and adolescents d = - 0.8 (-0.9 - -0.6) for heart rate during stressor in children and adolescents.
Impairments in P300 event-related potential and P300 latencies [xii]	"Antisocial" or "psychopathic" behaviour	Meta-analysis	d = 0.3 (0.2-0.3) - reduced P3 amplitudes d = 0.1 (0.0-0.3) - longer P3 latencies
Increased testosterone levels [xiii]	Aggressive behaviour	Meta-analysis	r = 0.1 (-0.3 – 0.7)

References

i. Orth, U. and E. Wieland. Anger, hostility, and posttraumatic stress disorder in trauma-exposed adults: A meta-analysis. *Journal of Consulting and Clinical Psychology* **74(4**), 698 (2006).

ii. Savage, J., & Yancey, C. The effects of media violence exposure on criminal aggression a meta-analysis. *Criminal Justice and Behavio*r **35(6)**, 772-791 (2008).

iii. Ferguson, C. J., & Kilburn, J. The public health risks of media violence: A meta-analytic review. *The Journal of pediatrics* **154(5)**, 759-763 (2009).

iv. Anderson, C. A. et al. Violent video game effects on aggression, empathy, and prosocial behavior in eastern and western countries: a meta-analytic review. *Psychological bulletin* **136(2)**, 151 (2010).

v. Rhee, S. H., & Waldman, I. D. Genetic and environmental influences on antisocial behavior: a meta-analysis of twin and adoption studies. *Psychological bulletin*, **128(3)**, 490 (2002).

vi. Vassos, E., et al. Systematic meta-analyses and field synopsis of genetic association studies of violence and aggression. *Molecular psychiatry* **19(4)**, 471-477 (2013).

vii. Moore, T. M., Scarpa, A., and Raine, A. A meta-analysis of serotonin metabolite 5-HIAA and antisocial behavior. *Aggressive behavior* **28(4)**, 299-316 (2002).

viii. Duke, A. A., et al. Revisiting the serotonin–aggression relation in humans: A meta-analysis. *Psychological bulletin* **139(5)**, 1148-72 (2013).

ix. Lorber, M. F. Psychophysiology of aggression, psychopathy, and conduct problems: a meta-analysis. *Psychological bulletin* **130(4)**, 531 (2004).

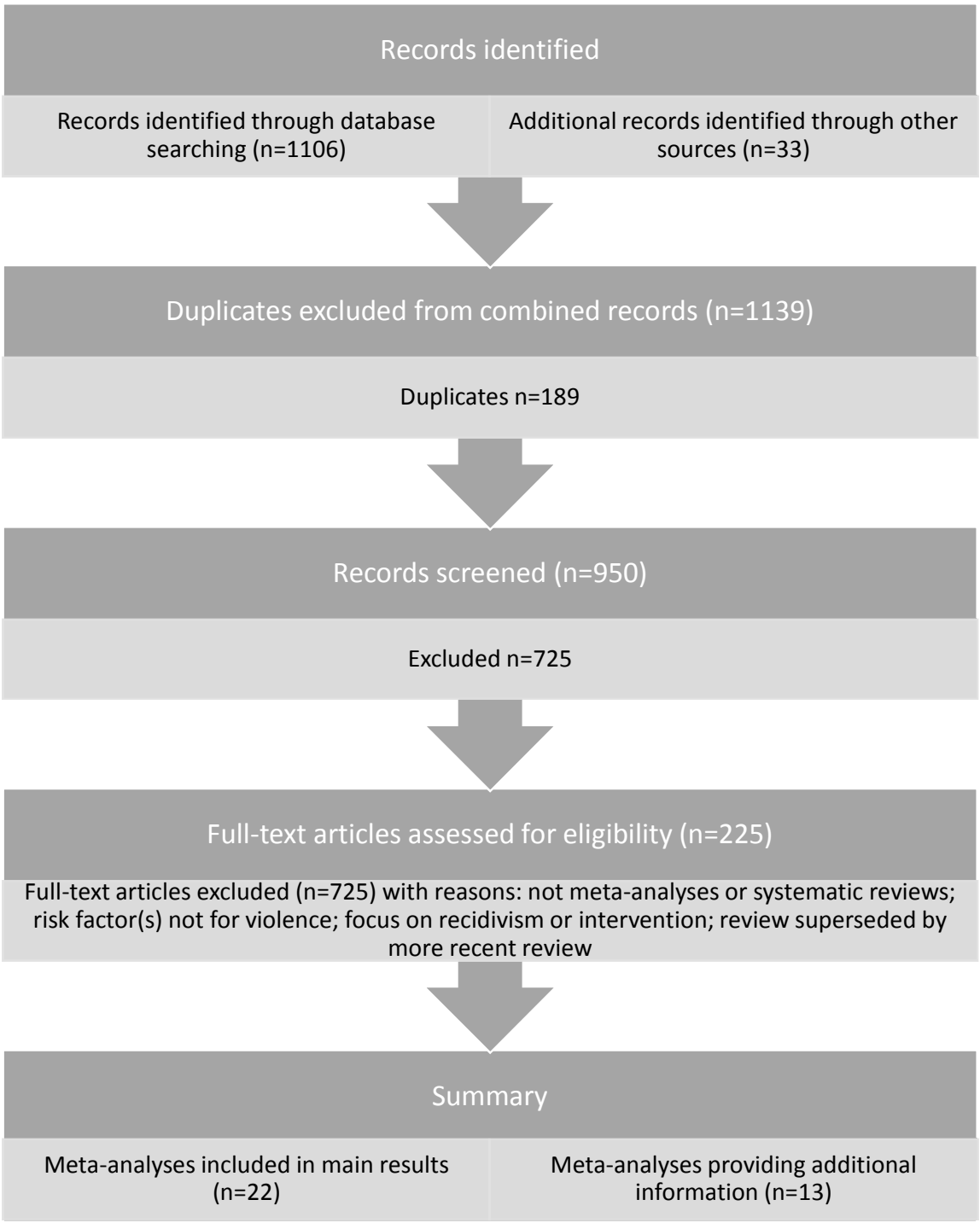
x. Ortiz, J. and A. Raine. Heart rate level and antisocial behavior in children and adolescents: A meta-analysis. *Journal of the American Academy of Child & Adolescent Psychiatry* **43(2)**, 154-162 (2004).

xi. Portnoy J., Farrington D.P., Resting heart rate and antisocial behavior: An updated systematic review and meta-analysis. *Aggression and violent behavior*, 2015 – Elsevier.

xii. Gao, Y. and Raine, A. P3 event-related potential impairments in antisocial and psychopathic individuals: A meta-analysis. *Biological psychology* **82(3)**, 199-210 (2009).

xiii. Book, A. S., Starzyk, K. B. and Quinsey, V. L. The relationship between testosterone and aggression: A meta-analysis. *Aggression and Violent Behavior* **6(6)**, 579-599 (2001).

Appendix 3 – PRISMA flow diagram of systematic search strategy for risk factors for violence



Appendix 4 - Effect sizes of parental risk factors for violence

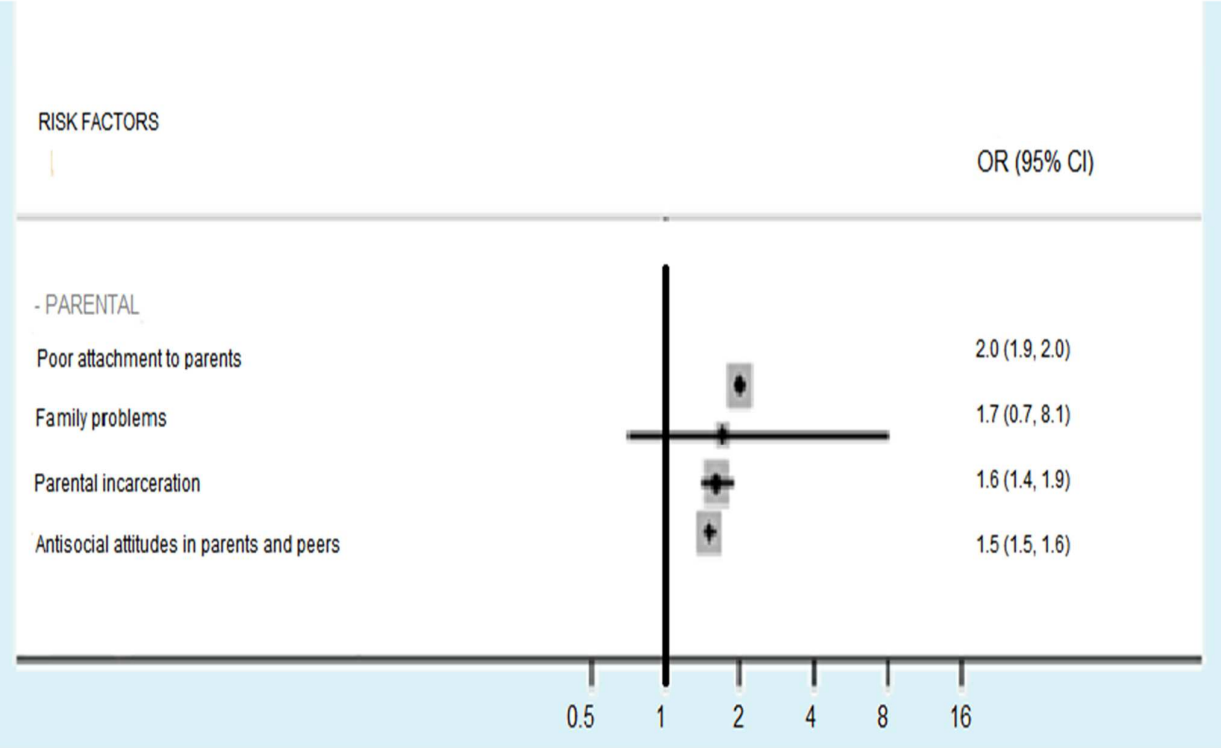


Figure – Effect sizes of parental risk factors for violence

Note: OR=odds ratio, CI=confidence interval. Adjusted ORs were used when possible.

Appendix 5 - Effect sizes of risk factors for intimate partner violence

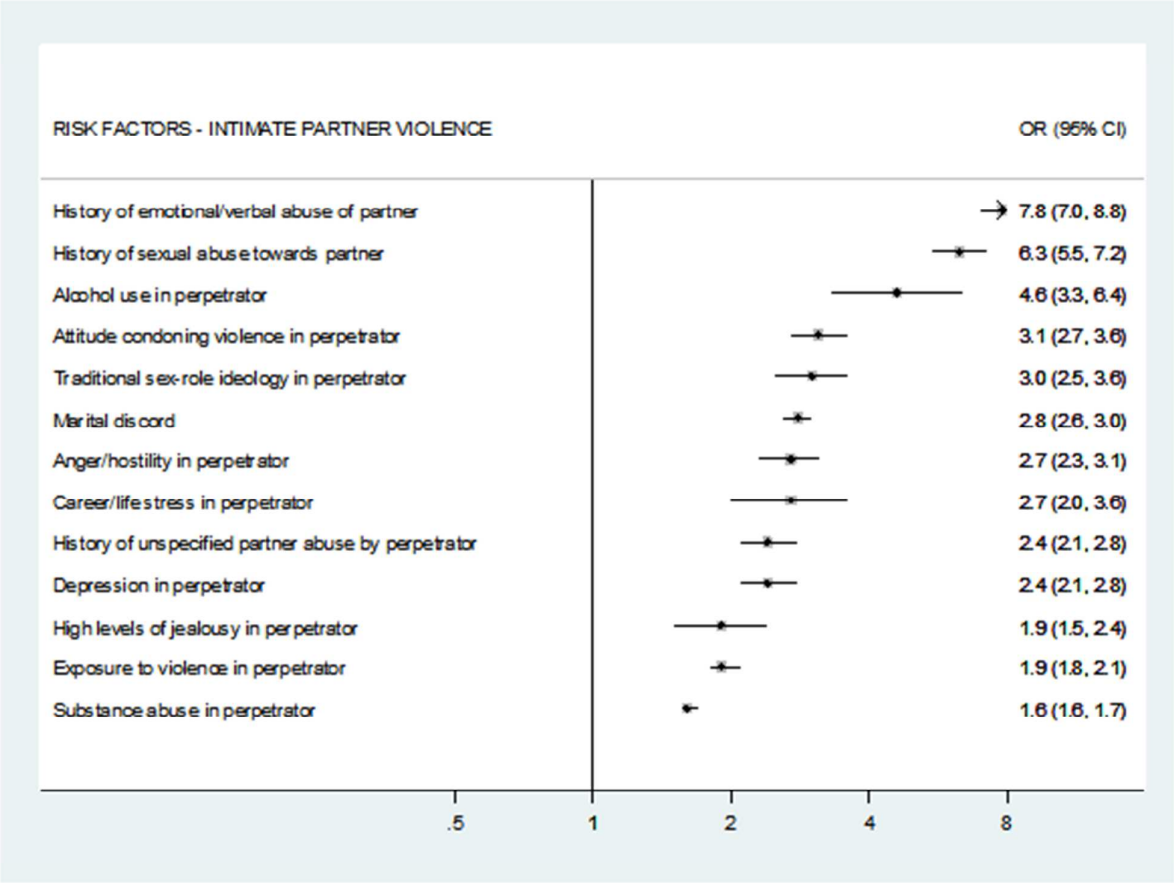


Figure – Effect sizes of risk factors for intimate partner violence

Note: OR=odds ratio, CI=confidence interval. Adjusted ORs were used when possible.

Appendix 6 - Effect sizes of risk factors for sexual violence and homicide

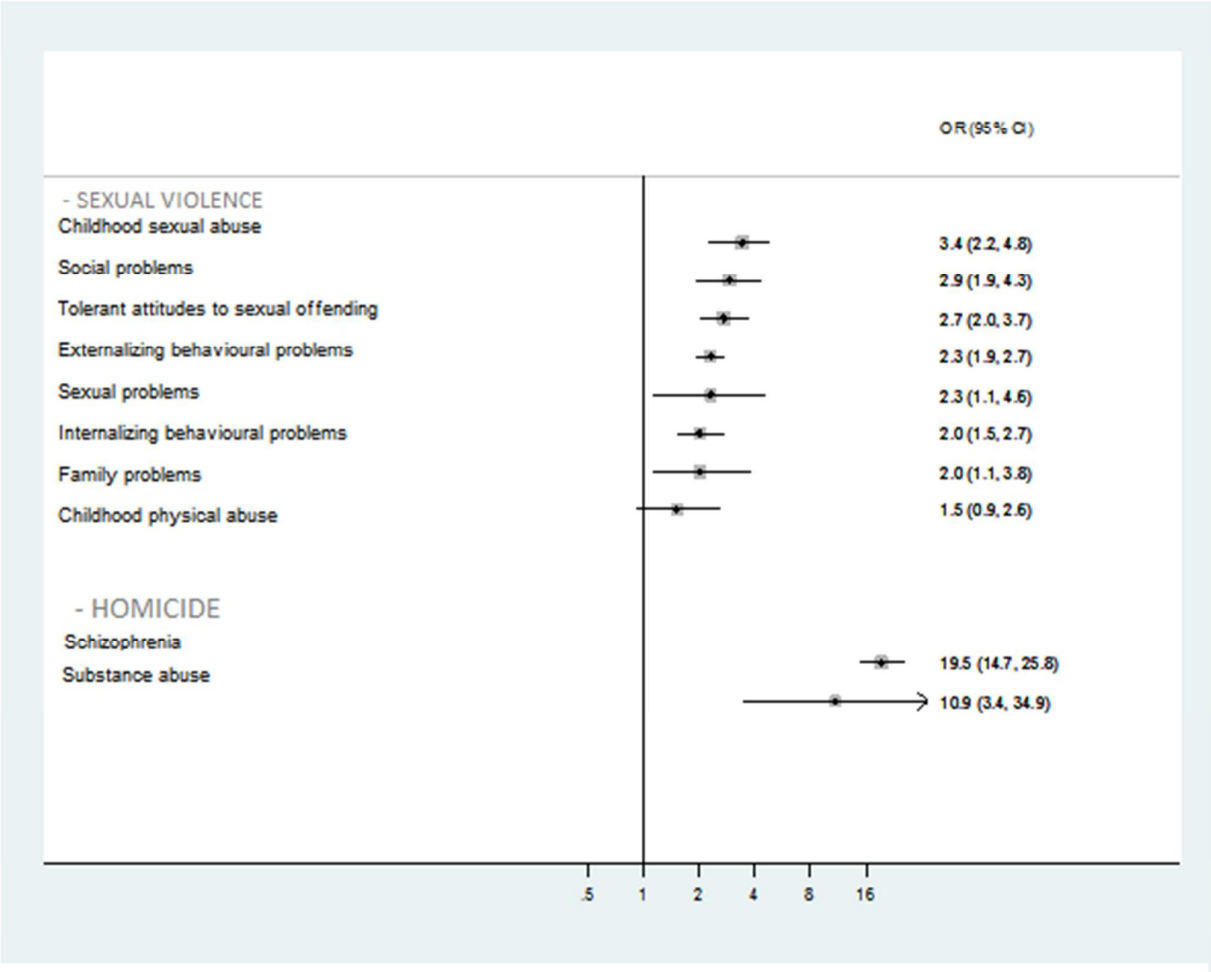


Figure – Effect sizes of risk factors for sexual violence and homicide

Note: OR=odds ratio, CI=confidence interval. Adjusted ORs were used when possible.

Appendix 7 - Meta-review of risk factors for violence stratified by gender

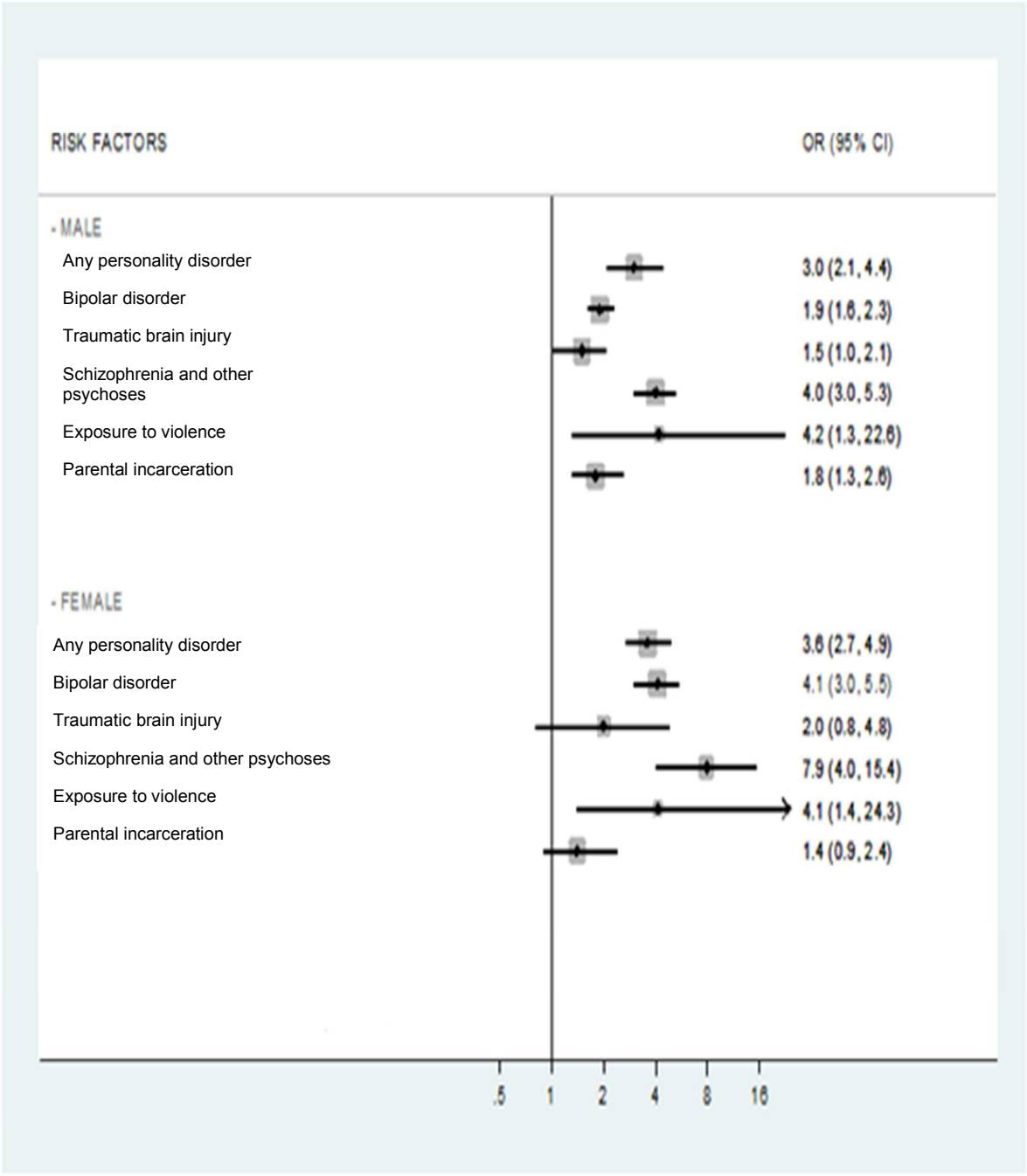


Figure – Meta-review of risk factors for violence stratified by gender

Note: OR=odds ratio, CI=confidence interval. Adjusted ORs were used when possible.

Appendix 8 – Comparison of meta-analyses' effect sizes

Note: ES=effect size

Study	***Meta-analysis ES (O)****	***Largest Study ES (E)*** **	***Observed/expected Ratio***
Yu, 2012	3.0	2.9	1.0
Fazel, 2010	4.1	2.5	1.6
Fazel, 2009	1.7	1.3	1.3
Fazel, 2009	0.7	0.7	1.0
Fazel, 2009	7.4	4.0	1.9
Fazel, 2009	5.5	3.4	1.6
Fazel, 2009	4.9	2.6	1.9
Ttofi, 2012	1.4	1.3	1.2
Wilson, 2009	2.7	1.2	2.3
Murray, 2012	1.6	1.6	1.0
Stamms, 2006	4.0	6.7	0.6
Morgan, 2000	2.8	3.6	0.8
G-Gonzalez, 2006	4.6	2.9	1.6

Table – A comparison of meta-analyses' overall effect size ('O' or 'observed') versus effect size of meta-analyses' largest included study effect size ('E' or 'expected').

Appendix 9 – Effect sizes for risk factors with prediction intervals

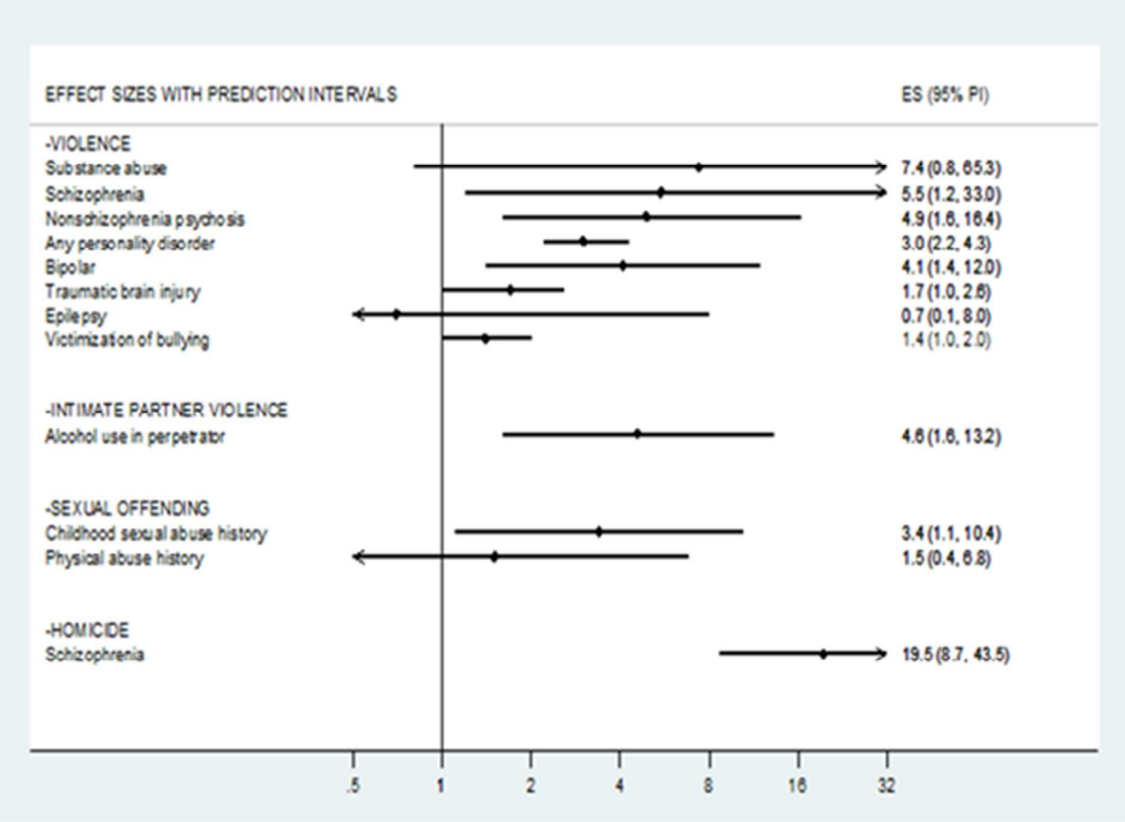


Figure – Effect sizes for risk factors with prediction intervals

Note: prediction intervals that exclude the null value are deemed to be of higher quality

Appendix 10 – Full Details of Quality Analysis Tables

Scores: Prediction interval excluding null value = 1; p-value less than 0.05 for random effects model = 1; low heterogeneity (I^2 <50%) = 1; case number > 1000 = 1; no evidence to suggest small study effects = 1; confounders adjusted for = 1.

Risk Factor	**Outcome Category**	**Prediction Interval Excludes Null Value**	**p-Value**	**Heterogeneity**	**Number of Cases > 1000**	**Small Study Effects**	**Confounder Adjusted**	**Total Score (maximum score = 6)**
Substance abuse	Violence	No	0.001	High	Yes	Yes	Yes	3
Schizophrenia	Violence	Yes	< 0.001	High	Yes	Yes	Yes	4
Nonschizophrenia psychoses	Violence	Yes	< 0.001	High	Yes	Yes	Yes	4
Any personality disorder	Violence	Yes	0.309	Low	Yes	No	Yes	5
Bipolar disorder	Violence	Yes	< 0.001	High	Yes	Yes	Yes	4
Traumatic brain injury	Violence	No	0.585	Low	Yes	Yes	Yes	3
Hyperkinetic disorder	Violence	No	< 0.01		Yes		Yes	3
Epilepsy	Violence	No	0.779	Low	No	No	Yes	3
Youth antisocial behaviour	Violence				Yes		Yes	2

Victimization of bullying	Violence	No	0.042	Low			Yes	4
Exposure to violence	Violence			High	Yes		Yes	2
Poor attachment to parents	Violence			High	Yes		Yes	2
Parental incarceration	Violence		< 0.01	High	Yes		Yes	3
Antisocial attitudes in parents and peers	Violence		< 0.01	High	Yes		Yes	3
Family problems	Violence			High	Yes		Yes	2
Poor executive function	Violence			High	Yes	No	Yes	4
Poor moral judgement	Violence		< 0.001	High	Yes	No	Yes	4
Low empathy	Violence			High	Yes		Yes	2

Risk Factor	Outcome Category	Prediction Interval Excludes Null Value?	p-Value	Low or High Heterogeneity	Number of Cases > 1000	Evidence to Suggest Small Study Effects?	Confounder Adjusted for?	Total Score (maximum score = 6)
Alcohol abuse	IPV	Yes	< 0.001	High			Yes	3
History of emotional/verbal abuse of partner	IPV						Yes	1
History of sexual abuse towards partner	IPV						Yes	1
Attitude condoning violence in perpetrator	IPV						Yes	1
Traditional sex-role ideology in perpetrator	IPV						Yes	1
Marital discord	IPV						Yes	1
Anger/hostility in perpetrator	IPV						Yes	1
Career/life stress in perpetrator	IPV						Yes	1
History of unspecified partner abuse by perpetrator	IPV						Yes	1
Depression in perpetrator	IPV						Yes	1
High levels of	IPV						Yes	1

jealousy in perpetrator							
Exposure to violence in perpetrator	IPV					Yes	1
Substance abuse in perpetrator	IPV					Yes	1
Childhood sexual abuse	Sexual offending	Yes		High		Yes	2
Social problems	Sexual offending			High		Yes	1
Tolerant attitudes to sexual offending	Sexual offending					Yes	1
Externalizing behavioural problems	Sexual offending					Yes	1
Sexual problems	Sexual offending					Yes	1
Internalizing behavioural problems	Sexual offending					Yes	1
Family problems	Sexual offending					Yes	1
Physical abuse in childhood	Sexual offending	No		High		Yes	1
Schizophrenia	Homicide	Yes	0.042	High	No	Yes	2
Substance abuse	Homicide		0.001	High	No	Yes	1