

# Equally Protected?

## A review of the evidence on the physical punishment of children

Supplement: Summary tables of individual studies

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## Summary tables of individual studies

Table S.1 Longitudinal studies on outcomes of physical punishment

Year / author(s)	Study design	Study population	Outcomes	Measure(s) of physical punishment	Covariates adjusted for	Key findings <sup>a</sup>	Main strengths and limitations	Pos. / neg. <sup>b</sup>
Affi et al. 2006 <sup>1</sup>	Retrospective, regression models	5,877 participants aged 15-54 from National Comorbidity Survey, USA	Psychiatric disorders via Composite International Diagnostic Interview: major depression, any anxiety disorder, alcohol abuse/dependence, externalising problems	Childhood adversity to varying degrees (no physical punishment or abuse, physical punishment only, and child abuse)	Age; gender; ethnicity; education; income; marital status; maternal/paternal warmth, protectiveness, and authoritarianism	Prevalence of physical punishment / abuse: 35.5% reported no physical punishment or child abuse, 48% reported physical punishment only, and 16.5% reported child abuse.  Prevalence of psychiatric disorders increased as severity of childhood adversity increased; physical punishment was associated with increased odds of major depression, alcohol abuse or dependence, and externalizing problems in adulthood (adjusted OR's ranged from 1.22 to 1.32).	Strengths: use of 3 categories to take severity of physical punishment into account, large sample size from representative survey  Limitations: cross-sectional design with retrospective information – possible recall bias	+
Affi et al. 2012 <sup>2</sup>	Retrospective, regression models and population-attributable fractions	20,607 adults aged ≥ 20 years from National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), USA	Mental disorders (Axis I and Axis II disorders via Alcohol Use Disorder and Associated Disabilities Interview Schedule IV)	Childhood harsh physical punishment before 18 years of age, via Conflict Tactics Scales (“As a child how often were you ever pushed, grabbed, shoved, slapped or hit by your parents or any adult living in your house?”; answer = “sometimes” or greater)	Gender, age, marital status, ethnicity, education, household income, family history of dysfunction  Note: Respondents reporting severe child maltreatment (physical, sexual or emotional abuse) were excluded.	Prevalence of harsh physical punishment in the absence of any abuse in the sample: 5.9%.  Harsh physical punishment associated with increased likelihood of most lifetime mental disorders (adjusted OR: 1.36–2.46).  “...approximate reduction of 2% to 5% for Axis I disorders and 4% to 7% for Axis II disorders may be noted in the general population if harsh physical punishment in the absence of child maltreatment did not occur.”	Strengths: exclusion of respondents reporting maltreatment/ abuse, large sample size from representative survey  Limitations: cross-sectional study with retrospective information – possible recall bias; milder forms of physical punishment included in reference category	+
Affi et al. 2013 <sup>3</sup>	Retrospective, regression models and population-attributable fractions	34,226 adults aged ≥ 20 years from National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), USA	Adult physical health: arteriosclerosis or hypertension; hepatic disease; diabetes; cardiovascular disease; gastrointestinal disease; arthritis; obesity; or any of these.	Childhood harsh physical punishment before 18 years of age, via Conflict Tactics Scales (“As a child how often were you ever pushed, grabbed, shoved, slapped or hit by your parents or any adult living in your house?”); physical abuse (“having been hit so hard it left marks or bruises or caused an injury”)	Gender, age, marital status, ethnicity, education, household income, family history of dysfunction, and Axis I and II mental disorders	Prevalence of harsh physical punishment: 3.6%; prevalence of child maltreatment (including physical, emotional and sexual abuse): 38.1%.  Harsh physical punishment associated with adult cardiovascular disease (borderline significance), arthritis, and obesity (adjusted OR's ranged from 1.20 to 1.30).	Strengths: large sample size from representative survey  Limitations: cross-sectional study with retrospective information – possible recall bias; milder forms of physical punishment (less frequent than “sometimes”) included in reference category	+

<sup>a</sup> Odds ratios included if reported in the paper.

<sup>b</sup> Positive association between physical punishment and at least one adverse outcome: (+)

No association between physical punishment and adverse outcome, or evidence of beneficial effects: (-)

Mixed findings or inconclusive: (+/-)

Year / author(s)	Study design	Study population	Outcomes	Measure(s) of physical punishment	Covariates adjusted for	Key findings <sup>a</sup>	Main strengths and limitations	Pos. / neg. <sup>b</sup>
Alati et al. 2010 <sup>4</sup>	Retrospective, regression models	4,158 mothers and children followed from birth to age 14, from Mater University Study of Pregnancy, Australia	Problematic patterns of adolescent (age 14) alcohol consumption	Mothers' reported use of smacking at age 5, for 5 different scenarios (sometimes, always or never).	Child age and sex; family income, maternal level of education, relationship satisfaction, number of adverse life events, changes in marital circumstances, maternal depression and anxiety, maternal smoking and alcohol consumption	No association between physical punishment at age 5 and intake of alcohol at age 14.	Strengths: Long follow-up Limitations: no information on physical punishment by fathers; high loss to follow up (40%); alcohol drinking assessed via child self-report	-
Bakoula et al. 2009 <sup>5</sup>	Prospective, regression models	2,065 children followed from age 7 to 18, from Greek Birth Cohort, Greece	Internalising and externalising problems at age 18 via Achenbach Youth Self-Report	Mothers' reported use of physical punishment in pre-school years (often, occasionally or never), via postal questionnaire	Child sex and parental education; child mental health at age 7; parental interest in child activities and mother/father's perceived stress status at age 18	For boys, physical punishment at age 7 was associated with higher externalising problems at age 18.  For girls, association reversed after adjustment for child mental health at age 7: occasional physical punishment at age 7 was associated with lower internalising problems at age 18, and being 'often' physically punished at age 7 was associated with lower externalising behaviour at age 18.	Strengths: Large, representative sample; long follow-up; outcomes measured via youth's self report – avoids same-source bias; adjustment for child mental health at age 7 Limitations: physical punishment not defined and severity not measured	+/-
Barnes et al. 2013 <sup>6</sup>	Prospective, cross-lagged path analysis; behavioural genetic (BG) methods	Approximately 750 twins followed from age 4 up to age 5/6; from Early Childhood Longitudinal Study, Birth Cohort; USA	Externalising behavioural problems (EBP) via Preschool and Kindergarten Behaviour Scales, reported by mothers and child care providers/teachers	Spanking ('Sometimes kids mind pretty well and sometimes they don't. About how many times, if any, have you spanked (child) in the past week for not minding?')	Child sex and ethnicity; child self-regulation at age 3	Mother reported outcome: in cross-lagged path analyses spanking at age 4 was not related to EBP at age 5/6; EBP at age 4 did not predict spanking at age 5/6.  Teacher-reported outcome: higher levels of EBP at age 4 predicted more spankings at age 5/6; children spanked more frequently at age 4 displayed increase in EBP from age 4 to age 5/6.  Genetic models: link between spanking and EBP may be driven in part by shared genetic factors.	Strengths: modelling of reciprocal effects, teacher-reported outcome available – avoids same-source bias Limitations: only 1-2 years between 2 time points	+
Baumrind et al. 2010 <sup>7</sup>	Prospective, multivariate analyses of covariance (MANCOVA), regression models	87 families with children followed from preschool (mean age 5) to early adolescence (mean age 15), from Baumrind's Family Socialization Project	Adolescent competence and emotional health via Preschool Behaviour Q-Sort (Baumrind 1968) and Adolescent Q-Sort (Baumrind 1978), and Child Problem Behaviour Scale	Total physical punishment, severe physical punishment ('yes' if 'using an object for paddling or striking the head or torso' or 'lifting and throwing' or 'shaking the child' were >1 SD above mean), and spanking ('normative physical punishment')	Child sex, socioeconomic status, child IQ, child age, and parents' education at baseline; variables analogous to the adolescent outcomes collected at baseline	Normative physical punishment (spanking) did not predict adverse (or beneficial) outcomes after controlling for child competences and emotional health at baseline and exclusion of children who experienced severe physical punishment.  Severe physical punishment was related to reduced communal competence and increased internalising problems (borderline statistical significance).	Strengths: long follow-up, comprehensive measures Limitations: very small sample of middle-class families – low statistical power, limited generalisability	-

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Beauchaine et al. 2005 <sup>8</sup>	Experimental, Latent Growth Curve Models (LGMs)	514 families with children who met criteria for oppositional defiant disorder (ODD) and conduct disorder (CD) and took part in interventional studies; child age at baseline 3-8 years; USA	Early-onset externalising and conduct problems (mother-reported and observed)	Harsh parenting (e.g. slap, spank, hit, restrain) Intervention: parent training (Incredible Years Parent Training Program) including aim to reduce the use of harsh parenting, reduce verbal criticism and increase supportive parenting	Child age and sex; maternal age, education, relationship status, social class; family size; maternal depression, parental substance abuse; child comorbid psychopathology; parenting stress; baseline parenting; baseline externalising problems	Study tested effectiveness of different combinations of parent training, child treatment and teacher training. Children and mothers assessed at 3 time points via maternal reports and observations: pre-intervention, post-intervention and 1 year follow-up.  Interventions that included parent training conferred the most consistent positive effects.  For mother-reported outcomes, lower harsh parenting at baseline and reduction in harsh parenting post intervention were associated with better treatment responses i.e. larger reductions in conduct problems and externalising behaviour.	Strengths: interventional research including randomised assignment to treatment groups – providing evidence for causal relationship between reduced physical punishment and improvements in conduct problems; wide range of confounders  Limitations: sample of children diagnosed with conduct disorder – possibly limited generalisability	+
Berlin et al. 2009 <sup>9</sup>	Prospective, cross-lagged path analysis	2,573 low-income White, African American, and Mexican American toddlers aged 1-3, and primary caregivers from Early Head Start (EHS) National Research and Evaluation Project, USA	Child aggressive behaviour problems via Achenbach Child Behaviour Checklist; Child cognitive development via Bayley Scales of Infant Development. Measured at ages 2 and 3.	Spanking (whether mother or anyone else in the household had spanked the child during the week preceding the interview, and how often). Measured at ages 1, 2 and 3.	Child sex; maternal age and ethnicity; maternal education; family income; family structure; maternal depression at age 1; child fussiness at age 1; EHS program participation.  Note: Maternal emotional responsiveness included as potential moderator.	Prevalence of spanking in the sample: at age 1 – 34%; at ages 2 and 3 – 49%.  Child fussiness at age 1 predicted spanking at age 2. Spanking at age 1 predicted child aggressive behaviour at age 2 and lower Bayley scores at age 3. Spanking at age 1 or 2 did not predict child aggressive behaviour at age 3 or Bayley scores at age 2. Results similar when families reporting high-frequency spanking were excluded.  Effects of spanking not moderated by maternal emotional responsiveness.	Strengths: modelling of reciprocal effects; large sample size; adjusted for maternal depression and child fussiness at age 1.  Limitations: no specific definition of spanking; exclusively low-income sample.	+
Bodovski & Youn 2010 <sup>10</sup>	Prospective, structural equation models	9,648 students followed from kindergarten (mean age 5) to 5 <sup>th</sup> grade, from Early Childhood Longitudinal Study-Kindergarten Cohort, USA	Maths and reading scores in 5th grade; classroom behaviour (approaches to learning, externalising and internalising problem behaviours – all teacher reported)	Physical discipline (binary variable, 'yes' if positive response to either of 2 questions: (a) whether the parent hits back or spansks if the child hits a parent; and (b) frequency of spanking in last week)	Child sex, age at kindergarten assessment, ethnicity, no. of siblings, family SES (parental education, occupational prestige and income), family structure, parental depression, parental warmth	Use of physical discipline in kindergarten was associated with lower 5th grade math achievement, but not with classroom behaviour.  Parental warmth did not buffer the negative effects of physical discipline on math achievement.  Association between physical discipline and math achievement did not differ by race/ethnicity.	Strengths: Large, representative sample, five-year time lag between exposure and outcome  Limitations: physical punishment frequency and severity not assessed, no adjustment for baseline test scores	+

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Callender et al. 2012 <sup>11</sup>	Prospective, structural equation models	245 children at risk for school-age conduct problems, followed from age 3 to age 5/6, USA	Externalising behaviours at age 5/6 years, via Achenbach Child Behaviour Checklist (parent and teacher reports)	Physical punishment (defined as spanking, grabbing, or shaking), via Harshness of Discipline Scale, measuring frequency of physical punishment during past 3 months	Parental depressive symptoms, mother- and father-rated externalising behaviour at age 3	More frequent maternal and paternal physical punishment at age 3 predicted higher levels of child externalising problems at age 5/6, adjusted for parent-ratings of child behaviour at age 3.  Parents' negative perceptions of their child's behaviour mediated associations between their depressive symptoms and physical punishment.	Strengths: multiple informants (mothers, fathers, teachers)  Limitations: Severity of physical punishment not measured, small convenience sample of mainly middle class, white, two parent families – limited generalisability	+
Cast et al. 2006 <sup>12</sup>	Retrospective, structural equation models	188 married couples (mean age 26), followed over the first 2 years of marriage, USA	Verbal and physical aggression towards spouse via Conflict Tactics Scales; controlling behaviour; ability to understand the perspective of others	2 items from Conflict Tactics Scales: 'While you were growing up (before age 18), how often would you say your mother (or the woman who raised you) used physical punishment?', same question about fathers	Income; education	Individuals who were physically punished during childhood were more likely to engage in physical and verbal aggression with their spouses, were more controlling and were less able to take their spouse's perspective.  No significant differences by gender.	Limitations: small sample size – limited generalisability; limited choice of potential confounders; severity of physical punishment not measured; retrospective information – possible recall bias	+
Chang et al. 2011 <sup>13</sup>	Prospective, structural equation models	241 children at risk for school-age conduct problems, followed from age 3 to age 6, USA	Externalising behaviour at age 6, via Achenbach Child Behaviour Checklist (parent and teacher reports)	Corporal punishment via Harshness of Discipline Scale, measuring frequency of physical punishment during past 3 months	Child sex, maternal education and family income; parent warm responsiveness and inductive discipline at age 3; child effortful control at age 3	For boys, low levels of warm responsiveness and frequent corporal punishment at age 3 predicted higher levels of externalising behaviours at age 6.  For girls, low levels of warm responsiveness and frequent corporal punishment at age 3 were associated with low levels of child effortful control at age 3 but not with externalising behaviour at age 6.	Strengths: multiple informants (mothers, fathers, teachers)  Limitations: small convenience sample of mainly middle class, white, two parent families – limited generalisability  Parenting behaviours reported by mothers only	+
Childs et al. 2014 <sup>14</sup>	Prospective, generalised estimating equations (GEE) models	120 aggressive children (mean age at baseline = 11, followed annually over 4 years), control group from Coping Power Program, USA	Callous-unemotional (CU) traits, via CU Scale of the Antisocial Processes Screening Device (average of parent and teacher reports)	Corporal punishment via Alabama Parenting Questionnaire (3 items: slapping; spanking with hand; hitting with an object)	Child sex, age and ethnicity; outcome at previous time point; antisocial behaviour  Parental depression included as potential moderator (interaction)	Relationship between parenting and outcome variables modelled as autoregressive process over 4 time points.  Corporal punishment predicted increases in CU traits, but reciprocal associations not supported  Interaction with parental depression: corporal punishment associated with increases to CU traits at high levels of parental depression but unrelated to CU traits at low levels of parental depression.	Strengths: modelling of reciprocal effects; for 2/3 of sample outcome reported by both parents and teachers  Limitations: small sample of children identified as aggressive – limited generalisability	+

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Choe et al. 2013 <sup>15</sup>	Prospective, cross-lagged path analysis	241 children at risk for school-age conduct problems, followed from age 3 through age 5 to age 10, USA	Children's externalising problems via Achenbach Child Behaviour Checklist, reported by teachers	Physical punishment at ages 3 and 5 defined as spanking, grabbing, or shaking, via Harshness of Discipline Scale (frequency of physical punishment during past 3 months)  Physical punishment at age 10: defined as spanking with hand or object (frequency of physical punishment over past year)	Inductive discipline, other covariates excluded due to their negligible effects and reduction in statistical power  Note: autoregressive cross-lagged model estimated, i.e. externalising problems and physical punishment at all three time points included	Child externalising problems at age 3 predicted high levels of physical discipline (but not inductive discipline) at age 5.  Physical punishment at age 3 predicted high levels of externalising problems at age 10.  Inductive discipline at age 3 predicted less physical discipline and fewer externalising problems at age 5.  Conclusion: 'Physical discipline increased children's externalising problems and inductive discipline reduced child behaviour problems.'	Strengths: modelling of reciprocal effects; inclusion of inductive discipline; outcome reported by teachers  Limitations: small convenience sample of mainly middle class, white, two parent families – limited generalisability	+
Christie-Mizell 2008 <sup>16</sup>	Prospective, regression models	713 African American and 1,139 European American children aged 6-14 years, assessed at 2 waves (1992 and 1994) of National Longitudinal Survey of Youth (NLSY), USA	Depressive symptoms via Behaviour Problems Index (mother report)	Spanking (how many times the mother spanked her child in the last week)	Childs age and sex; no. of children in household; family structure; city residence, region; household income, maternal education and employment, maternal depressive symptoms, maternal emotional support, child depressive symptoms 2 years earlier	Separate models for African Americans and European Americans. Regardless of race, frequency of spanking was related to child and adolescent depressive symptoms cross-sectionally, but not after adjusting for depressive symptoms measured 2 years earlier.  Association between spanking and depressive symptoms was not moderated by emotional support given by mothers.	Limitations: 2 time points only 2 years apart – possible over-adjustment if depressive symptoms at time 1 already influenced by earlier physical punishment; mother reports of both exposure and outcome – possible same-source bias; spanking not further defined	+ / -
Coley et al. 2014 <sup>17</sup>	Prospective, cross-lagged path analysis	592 children aged 3, 4 and 9 and their mothers from low-income urban African American and Hispanic families from Three City Study, USA	Children's internalising and externalising problems via Achenbach Child Behaviour Checklist	Mothers' endorsement of spanking ('sometimes the child needs a good spanking to help him/her understand' and 'I spank the child when he/she has done something really wrong')	Child sex and age (months); maternal ethnicity, marital status and education.  (family income and employment were unrelated to exposure and outcomes)	Spanking endorsement at age 3 predicted small declines in internalising problems by age 4 (in Hispanics only); but spanking endorsement at age 4 predicted larger increased internalising and externalising problems by age 9.  No evidence that child internalising or externalising problems predict spanking endorsement.	Strengths: modelling of reciprocal effects  Limitations: exclusively low-income sample – limited generalisability; frequency/severity of spanking not assessed; fathers' spanking not measured.	+
Davidov & Khoury-Kassabri 2013 <sup>18</sup>	Retrospective, Analyses of Covariance	365 Jewish and Arab university students (mean age 24 years), Israel	Depressive symptoms via Major Depression Inventory and WHO-5 Well-being scale (average of both scales combined)	Physical punishment at age 10, via Dimensions of Discipline Inventory, Adult Recall form ('How often did your mother/father shake or grab you to get your attention?'; 'How often did your mother/father spank, slap, smack, or swat you?')	Composite SES measure from family income and maternal and paternal education; age	Prevalence of physical punishment: about 50% of Jewish and 75% of Arab students reported any physical punishment around age 10.  Interaction effects: For Jewish participants and Arab females, higher levels of corporal punishment were associated with higher levels of current depressive symptoms; for Arab males, higher levels of corporal punishment in childhood related to lower levels of depressive symptoms.	Limitations: cross-sectional study with retrospective information – possible recall bias; severity of physical punishment not measured; limited choice of covariates; small sample of very specific population – limited generalisability	+ / -

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Douglas & Straus 2006 <sup>19</sup>	Ecological (unit of analysis = university), retrospective, partial correlations	9,549 university students from 19 nations, from International Dating Violence Study	Physical assault / injury of a dating partner via revised Conflict Tactics Scales; approval of partner violence	Physical punishment during childhood via Personal and Relationships Profile ('I was spanked or hit a lot by my parents before age 12'; outcome = percentage of students who did not 'Strongly Disagree')	At university level: mean age; % females; mean relationship length; social desirability bias	Mean prevalence (university level) of reported physical punishment in childhood between 13% in Belgium and 73% in the USA.  At university level, higher prevalence of reported physical punishment associated with higher prevalence of assault and injury against a dating partner; but not with approval of partner violence.	Strengths: between-country comparisons; adjusted for social desirability bias  Limitations: limited choice of covariates; cross-sectional with retrospective information – possible recall bias; sample of university students – limited generalisability	+
Edwards et al. 2010 <sup>20</sup>	Gene-environment interaction study, prospective, regression models	250 male, European American participants from Child Development Project, assessed annually from age 6 to age 22, USA	Composite measure of externalising behaviour (aggression and delinquency) across childhood and adolescence, via Achenbach's Child Behaviour Checklist (self-reports, mother and teacher reports)	Frequency of physical discipline between ages 1-5 via Conflict Tactics Scales (threw, smashed, hit, or kicked something; threatened child; threw something at child; pushed, grabbed, or shoved child; hit or tried to hit child; hit or tried to hit child with something); for both parents	Tested interaction effects between childhood physical discipline and MAOA (monoamine oxidizing gene monoamine oxidase A) uVNTR genotype (from DNA samples)	Linear relationship between physical discipline and externalising behaviour i.e. not only at higher end of physical discipline.  Physical discipline significantly and positively associated with overall externalising behaviour, as well as subdomains aggressive behaviour and delinquency.  For delinquency: significant gene-environment interaction: effect of physical discipline on delinquency nearly twice as high in males carrying the low-activity (high risk) allele of MAOA uVNTR .	Strengths: test of genetic risk and gene-environment interaction, long follow up, multiple informants  Limitations: small sample size – limited power, male Caucasians only	+
Ellison et al. 2011 <sup>21</sup>	Prospective, regression models	456 children aged 2-4, follow-up 5 years later, National Survey of Families and Households, USA	Antisocial behaviour and emotional problems at follow up (ages 7-10), mother report	Corporal punishment, number of times mothers spanked or slapped child during the week prior to the interview, mother report	Child age and sex; race/ethnicity; maternal age, education, marital status; maternal depression; positive maternal behaviours, baseline child behaviour and mood  Moderator: Conservative Protestantism	Children spanked at both baseline and follow-up (but not at baseline only) had greater emotional problems and antisocial behaviour at follow-up than those not spanked at either time point.  Less adverse effects of corporal punishment for children from Conservative Protestantism groups; among conservative Protestant children, those spanked only at baseline had fewer antisocial behaviours at follow up than those not spanked at either time point.	Limitations: Small sample – limited generalisability, outcome measures not based on validated instruments, severity of physical punishment not measured, fathers' spanking not measured, exposure and outcome mother-reported – possible same-source bias	+/-
Evans et al. 2012 <sup>22</sup>	Prospective, structural equation models	704 African American children assessed at 2 time points (ages 10-12 and 13-14), from Family and Community Health Study, USA	Delinquency at ages 13-14 via Diagnostic Interview Schedule for Children (child self-report)	Corporal punishment: frequency primary caregiver disciplines child by slapping or striking with an object (child self-report), averaged across 2 time points	Analyses stratified by child sex; verbal abuse; parental warmth, parental monitoring; delinquency at age 10-12  Mediators: low self-control; hostile view of relationships; anger/frustration	Prevalence of corporal punishment in the sample: 70% across both time points  Boys: Corporal punishment associated with higher delinquency at age 13/14 (adjusted for delinquency at age 10-12). Association between corporal punishment and delinquency mediated through low self-control and hostile view of relationships.  Girls: Verbal abuse, but not corporal punishment, predicted delinquency at ages 13/14.	Limitations: short follow-up; limited choice of covariates; sample of African Americans only – limited generalisability	+

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Gámez-Guadix et al. 2010 <sup>23</sup>	Retrospective, regression models	1,071 Spanish university students (mean age 21) from International Parenting Study, Spain	Antisocial and criminal behaviour derived from the DSM-IV via items from Antisocial Personality Traits Scale and Criminal History Scale; depressive symptoms via Major Depression Inventory	Physical punishment during childhood (age 10) via Dimensions of Discipline Inventory, Adult Recall form ('How often did your mother/father spank, slap, smack, or swat you?' and '...shake or grab you to get your attention?')	Sex, age, level of education; limited disclosure (tendency to minimise disclosure of socially undesirable behaviour); parental psychological aggression; positive parenting  Note: students reporting any example of physical abuse were excluded.	Prevalence of reported physical punishment in the absence of abuse (at age 10): 63% for males and 64% for females.  Physical punishment associated with antisocial and criminal behaviour independent of parental psychological aggression and positive parenting; no independent association between physical punishment and depressive symptoms.  Association between physical punishment and anti-social / criminal behaviour not moderated by parental psychological aggression or positive parenting.	Strengths: exclusion of respondents reporting abuse; adjusted for parental psychological aggression and positive parenting; adjusted for social desirability bias  Limitations: cross-sectional study with retrospective information – possible recall bias; sample of university students – limited generalisability	+
Gámez-Guadix et al. 2011 <sup>24</sup>	Retrospective, path analysis via regression models	13,877 university students from 32 nations (about 1/3 from USA), International Dating Violence Study	Sexual coercion of a dating partner via Revised Conflict Tactics Scales (3 categories: no sexual coercion, verbal sexual coercion without physically force, physically forced sex)	Physical punishment during childhood via Personal and Relationships Profile ('I was spanked or hit a lot by my parents before age 12'; 4 answer categories from 'Strongly Disagree' to 'Strongly Agree')	Sex and age; maternal and paternal education; family income; relationship length; limited disclosure (tendency to minimise disclosure of socially undesirable behaviour); sexual abuse; history of neglect; USA university  Mediating variable: Anti-social Traits and Behaviour (ATB)	Frequent physical punishment associated with increased odds for ATB (adjusted OR men = 3.07; adjusted OR women = 2.25). ATB increased the odds of verbal sexual coercion and physically forced sex for both males and females (verbal sexual coercion: adjusted OR men = 1.33; adjusted OR women = 1.44; physically forced sex: adjusted OR men = 1.69; adjusted OR women = 2.08).	Strengths: large international sample; adjusted for social desirability bias; testing of mediating factor ATB  Limitations: cross-sectional study with retrospective information – possible recall bias; convenience sample of university students – limited generalisability; severity of physical punishment not measured	+
Gershoff et al. 2012 <sup>25</sup>	Prospective, cross-lagged path models	10,044 children followed from age 5 to 8, from Early Childhood Longitudinal Study's Kindergarten Cohort, USA	Child externalising behaviour via Social Skills Rating Scale (teacher rated)	Spanking (whether mothers had ever spanked the child; how many times they had spanked the child in the past week)	Child sex and age, family income-to-needs ratio, parents' education, parents' marital status, mother's and father's employment status, and race / ethnicity	Prevalence of physical punishment in the sample at age 5 (in 1999): 80%.  Cross-lagged path model (controlled for initial levels of both externalising and spanking): early spanking predicted increases in children's externalising behaviour, while early child externalising predicted more spanking over time, associations did not vary by ethnic group.	Strength: large, nationally representative sample; modelling of reciprocal effects, behaviour teacher reported  Limitations: short follow-up, spanking not further defined	+

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Grogan-Kaylor 2005a <sup>26</sup>	Prospective, fixed-effects models	1,943 mother-child pairs (children aged 4 to 14 years), assessed at 4 time points between 1994 and 2000, from the National Longitudinal Survey of Youth, USA	Externalising and internalising behaviour problems via Behaviour Problems Index (mother report)	Corporal punishment (number of times mother had spanked her child in the past week)	Child sex, age and ethnicity; cognitive stimulation; emotional support; family poverty status; perceived neighbourhood quality	Greater use of corporal punishment by parents was associated with increases in children's externalising, but not internalising, behaviour problems (each spanking associated with a 5% of a standard-deviation increase in externalising behaviour problems).  Association did not vary by neighbourhood.	Strengths: fixed effects models – modelling association between change in exposure and change in outcome while adjusting for all unobserved time-invariant confounders  Limitations: spanking not further defined	+
Grogan-Kaylor 2005b <sup>27</sup>	Prospective, hierarchical linear models	6,912 children aged 4 to 14 years, assessed biannually between 1988 and 1998 in the National Longitudinal Survey of Youth, USA	Trajectories of antisocial behaviour, via Behaviour Problems Index (mother report)	Corporal punishment (number of times mother had spanked her child in the past week)	Child sex, age and ethnicity; cognitive stimulation; emotional support; family poverty status	Linear growth of antisocial behaviour as children get older.  Children who experienced higher levels of corporal punishment displayed more antisocial behaviour.  Interaction effects: association between corporal punishment and antisocial behaviour stronger for older children; and stronger for boys than for girls. Strength of association independent of ethnicity and initial levels of antisocial behaviour.	Strengths: large, nationally representative sample; modelling of growth trajectories  Limitations: spanking not further defined	+
Gromoske & Maguire-Jack 2012 <sup>28</sup>	Prospective, cross-lagged path models	3,870 children followed from age 1 to age 5, from Fragile Families and Child Wellbeing study, USA	Internalising and externalising symptoms at ages 3 and 5, via Achenbach Child Behaviour Checklist (mother report)	Spanking (how often mother had spanked the child: never in the past month, once or twice, a few times this past month, a few times a week, or every day or nearly every day)	Child sex; maternal ethnicity, age at birth, single parent status and employment; household income; no. children and adults in household; maternal cognitive ability; maternal depression; Head Start participation; child emotionality at age 1	Prevalence of physical punishment in the sample: 30% at age 1, 56% at age 3, and 51% at age 5 (children born 1998-2000).  Transactional process: spanking associated with greater externalizing behaviour and externalizing behaviour associated with greater spanking over time.  No association between spanking and internalising behaviour at age 3 or age 5, but cascade effects from age 1 spanking to age 3 externalising to age 5 internalising.	Strengths: large sample, modelling of reciprocal effects  Limitations: spanking not further defined, mother reports of both exposure and outcome – possible same-source bias	+

Year / author(s)	Study design	Study population	Outcomes	Measure(s) of physical punishment	Covariates adjusted for	Key findings <sup>a</sup>	Main strengths and limitations	Pos. / neg. <sup>b</sup>
Gunnoe 2013 <sup>29</sup>	Retrospective, Multivariate Analysis of Covariance (MANCOVA) / regression models	158 adolescents aged 13-18, from Portraits of American Life Study, USA	2 aspects of youth maladjustment: externalising behaviour, depressive symptoms; 3 aspects of youth competence: academic rank (self-report), volunteer work, optimism	Physical punishment reported by youth and grouped into 3 categories: 'physical discipline absent', 'physical discipline age-delimited' (=not beyond age 12) and 'physical discipline into adolescence' (= beyond age 12), reported for mothers and fathers	Sex; age; parental education; youth ethnicity, and youth Evangelical Protestant affiliation; parenting style (authoritative, permissive, authoritarian, disengaged)	In MANCOVA (not adjusted for parenting style), age-delimited spanking associated with better youth competence compared to no spanking; no difference between absent spanking and age-delimited spanking for maladjustment.  In fully adjusted regression models, physical discipline into adolescence associated with worse outcomes compared to age-delimited: more externalising behaviour, more depressive symptoms, lower academic rank, lower volunteer work and lower optimism; no difference between age-delimited and absent discipline, except for absent spanking by fathers only – this was associated with lower academic rank compared to age-delimited.	Limitations: cross-sectional study with retrospective information – possible recall bias; academic achievement self-reported – possible misclassification; severity of physical punishment not measured; small sample – limited generalisability	+ / -
Hao & Matsueda 2006 <sup>30</sup>	Prospective, random effects models and fixed-effects sibling models	4,354 children aged 6-14, born to 1,805 mothers from National Longitudinal Survey of Youth, USA	Internalising and externalising behaviour problems, via Achenbach Behaviour Problems Checklist (mother report)	Physical punishment via number of times the mother spanked the child in the past week, measured 2 years prior to outcome measure (mother report)	Child sex, birth order, age, current health status, sibling situation; ethnicity; mother's cognitive ability, education, teen-mother status, positive parenting practices, smoking and drinking during pregnancy; child exposure to changes in family structure	Using a 2-year lagged variable of physical punishment, physical punishment was positively associated with both internalising and externalising symptoms in both random effects models and fixed-effects sibling models.	Strengths: fixed effects models – adjusting for all unobserved time-invariant confounders  Limitations: mother reports of both exposure and outcome – possible same-source bias, severity of spanking not measured	+
Huang et al. 2010 <sup>31</sup>	Prospective, structural equation models	905 mother and child pairs, followed from child's birth to age 5, from The Fragile Families and Child Wellbeing Study, USA	Internalising and externalising behaviour problems at age 5, via Achenbach Child Behaviour Checklist (mother report)	Spanking (how often mother had spanked the child: never in the past month, once or twice, a few times this past month, a few times a week, or every day or nearly every day)	Child sex, maternal depression, parenting behaviour, domestic violence	Study assessed whether physical punishment was on pathway between domestic violence and child behaviour problems (spill over hypothesis).  Domestic violence at age 1 predicted spanking at age 3. Spanking at age 3 predicted behaviour problems at age 5, association stronger for externalising than internalising problems.	Limitations: no adjustment for initial levels of behaviour problems, high attrition (only 20% of original sample included in analysis) – limited generalisability, mother reports of both exposure and outcome – possible same-source bias	+
Jackson et al. 2010 <sup>32</sup>	Prospective, regression models	89 low-income, single, Black mothers, and their children (age at baseline = 3), USA	Child behaviour problems at age 5 (kindergarten teacher report)	Spanking frequency at age 3 ('About how many times, if any, have you had to spank your child in the past week?'), mother report	Child sex, maternal education, income-to-needs ratio, financial child support, parenting stress, satisfaction with father's presence in child's life, father contact	More frequent spanking at age 3 was related to increased child behaviour problems at age 5  Contact with a father moderated the association: low contact – elevated behaviour problems at age 5, high contact – no association.	Limitations: very small sample of specific population – limited generalisability, fathers' spanking not measured, not adjusted for baseline problem behaviour	+

Year / author(s)	Study design	Study population	Outcomes	Measure(s) of physical punishment	Covariates adjusted for	Key findings <sup>a</sup>	Main strengths and limitations	Pos. / neg. <sup>b</sup>
Lahey et al. 2008 <sup>33</sup>	Prospective, generalised estimating equations (GEE models)	1,863 children aged 4-13 years, from The National Longitudinal Survey of Youth, USA	Child conduct problems during ages 4-13 years, via Behaviour Problem Index (mother report)	Spanking during infancy: yes if mother reported spanking infant during the last week or interviewer observed spanking during the assessment	Child age and sex, maternal age at first birth, ethnicity, total family income; parenting during infancy (maternal responsiveness, cognitive stimulation); infant temperament (activity level, predictability of cycles and moods, positive affect, fearfulness, fussiness)	Prevalence of spanking (as defined) in the sample: 8%.  Spanking during infancy was related to childhood conduct problems after adjusting for demographic covariates and parenting during infancy, but no longer statistically significant after adjustment for infant temperament.	Limitations: outcome based on mother report and parenting measures mainly based on mother reports – possible same-source bias	-
Lansford et al. 2009 <sup>34</sup>	Prospective, modelling of trajectory groups, ANCOVA	Study 1: 499 children aged 5-16 years, from Child Development Project, USA  Study 2: 258 boys aged 10-15 years from low-income families, from Pitt Mother-Child Project, USA	Age 16 (study 1) and age 15 (study 2) externalising behaviour via Achenbach Child Behaviour Checklist (mother and self-report); and parent-adolescent relationship quality (mother and observer report)	Study 1: Frequency of physical discipline between ages 6-9 (mild: 'spank with hand'; harsh: 'spank with object'), mother report  Study 2: Frequency of physical discipline between ages 10-15 (mild: 'spank'; harsh: 'slap or hit with hand, fist or object'), mother report	Study 1: ecological disadvantage (family SES, single parent status and family stress), child externalising behaviour at age 5  Study 2: ecological disadvantage (family SES, single parent status, neighbourhood danger), child externalising behaviour at age 5 and 8	Age 5 externalising problems predicted subsequent trajectories of mild and harsh physical discipline in study 1, and trajectories of harsh physical discipline in study 2.  Minimal/ceasing trajectory groups were associated with the lowest levels of subsequent adolescent antisocial behaviour in both studies and with better parent-adolescent relationship quality in study 2.  Associations did not vary by child sex or ethnicity in either study.	Strengths: data from multiple informants, modelling of trajectories of physical punishment  Limitations: mothers' only report of discipline – possible bias, no data on fathers' use of physical punishment; limited choice of covariates; study 2 small sample limited to boys	+
Lansford et al. 2011 <sup>35</sup>	Prospective, cross-lagged path models	Study 1: 562 children aged 5-9 years, from Child Development Project, USA  Study 2: 290 boys aged 10-15 years from low-income families, from Pitt Mother-Child Project, USA	Study 1: externalising Behaviour via Achenbach Child behaviour Checklist – Teacher Report Form  Study 2: antisocial behaviour via Self-Reported Delinquency (SRD)	Study 1: Frequency of physical discipline ('spank with hand', 'spank with object'), mother report  Study 2: Frequency of physical discipline ('spank' and 'slap or hit with hand, fist or object'), mother report	Study 1: gender; ethnicity; SES  Study 2: ethnicity; SES	Study 1: Reciprocal effects: higher levels of child externalising behaviours in a given year predicted more frequent parental physical discipline in the next year. More frequent physical discipline (both mild and harsh) in a given year predicted more frequent child externalising behaviours in the next year.  Study 2: More frequent physical discipline (both mild and harsh) predicted higher levels of antisocial behaviour in the following year, antisocial behaviour did not predict subsequent physical discipline.  Both studies: severity of punishment did not moderate associations.	Strengths: data from multiple informants, teacher reported behaviour; modelling of reciprocal effects  Limitations: mothers' only report of discipline – possible bias, no data on fathers' use of physical punishment; limited choice of covariates; study 2 small sample limited to boys	+

Year / author(s)	Study design	Study population	Outcomes	Measure(s) of physical punishment	Covariates adjusted for	Key findings <sup>a</sup>	Main strengths and limitations	Pos. / neg. <sup>b</sup>
Lansford et al. 2012a <sup>36</sup>	Prospective, regression models and structural equation models	585 children aged 5-9 years, from Child Development Project, USA	Externalising behaviours via Achenbach Teacher Report Form	Frequency of 'spanking with hand' (never, less than once a month, about once a month, about once a week, about every day), mother report	Sex; SES; maternal stress; single caregiver; ethnicity; externalising behaviours at age 5  Analysis stratified by ethnicity (African American and European American)	Only for European American children, higher levels of teacher-reported child externalising in kindergarten predicted mothers' more frequent spanking in grades 1-3. Of 3 parenting practices, only spanking (but not denying privileges or yelling) was associated with more child externalising behaviours in grade 4.  For African American children, spanking was not related to externalising behaviours.	Strengths: adjusted for externalising behaviours at age 5; teacher reported outcome  Limitations: fathers or other caregivers use of physical punishment not assessed; limited choice of covariates	+
Lansford et al. 2012b <sup>37</sup>	Prospective, ANCOVA and cross-lagged path analysis	585 children assessed at ages 6, 7 and 8, from Child Development Project, USA	Externalising behaviour, via Achenbach Child Behaviour Checklist (mothers) and Teacher Report Form (teachers)	3 forms of spanking: never spanked in the last year; mild spanking: spanked with a hand only and less than once a week (=Baumrind's definition of 'ordinary' physical punishment); harsh spanking: spanked with a hand once a week or more frequently, or with an object	ANCOVA adjusted for externalising reported the previous year; child sex, ethnicity; mother's and father's education and occupation; family stress; mothers' marital status, mothers' age.	ANCOVA results: teacher-reported externalising – no differences between the 3 spanking groups; mother-reported externalising – higher in harsh spanking group compared to no/mild spanking but no differences between no spanking and mild spanking.  SEM models including no spanking and mild spanking groups only (n=258): spanking related to concurrent and prior, but not subsequent, externalising.  Compared to no spanking, mild spanking associated with a 50% increase in risk of subsequent harsh spanking. 55% of mothers used harsher forms of spanking than 'mild spanking' defined by Baumrind.	Strengths: assessed both mild and harsh spanking and association between the two, modelling of reciprocal effects  Limitations: SEM models on small subsample – limited generalisability, fathers' spanking not assessed	+ / -
Lansford et al. 2014 <sup>38</sup>	Cross-country, prospective, country-specific latent growth models, random effects meta-analysis	1,196 children assessed annually at ages 7-10 years, from eight countries (China, Colombia, Italy, Jordan, Kenya, the Philippines, Thailand, and USA)	Aggression and anxiety via Achenbach Child Behaviour Checklist (mother report) and Youth Self-Report; composite score of mother and child items	Corporal punishment via adapted Parent Conflict Tactics Scale (4 items): whether mother or anyone in household had ...spanked, hit, or slapped with a bare hand; hit or slapped on the hand, arm, or leg; hit or slapped on the face; or shook the child in the last month	Child gender; maternal education; single parent household; maternal warmth;  Moderator: child reported maternal warmth	Higher levels of corporal punishment generally predicted more subsequent child adjustment problems (both for aggression and anxiety), taking prior adjustment into account.  Maternal warmth moderated associations, but with significant between-country variability.  Greater adverse effects of physical punishment in less authoritarian groups.	Strengths: diverse, international sample; mother and child reports; adjusted for baseline measure of each outcome;  Limitations: samples not nationally representative – limited generalisability; possible reporting bias; limited covariates	+

Year / author(s)	Study design	Study population	Outcomes	Measure(s) of physical punishment	Covariates adjusted for	Key findings <sup>a</sup>	Main strengths and limitations	Pos. / neg. <sup>b</sup>
Larzelere et al. 2010 <sup>39</sup>	Prospective, regression and structural equation models; re-analysis of data used in Straus et al. 1997 <sup>40</sup>	785 children aged 6-9 in 1988 followed for 2 years, from National Longitudinal Survey of Youth, USA	Antisocial behaviour via 1990 NLSY Antisocial subscale from Behaviour Problems Index (mother report)	Maternal spanking 1988 ('About how many times, if any, have you had to spank your child in the past week?')	Child sex; ethnic minority status; maternal occupation, education and income; cognitive stimulation and emotional support; baseline antisocial subscale plus externalising subscale of Behaviour Problems Index	Effect size for association between spanking and antisocial behaviour 2 years later similar to effect sizes for grounding, sending to room, and privilege removal but smaller than for psychotherapy, none of these statistically significant when baseline antisocial behaviour measured as continuous variable.  When all discipline tactics included in the same model, only spanking, grounding and psychotherapy (but not privilege removal and sending to room) related to subsequent antisocial behaviour when adjusted for baseline antisocial (continuous), all effects non-significant after adjusting for baseline externalising.	Strengths: compares effect sizes between spanking and other discipline tactics  Limitations: short follow-up (2 years) – possible over-adjustment if antisocial behaviour and externalising at age 6-9 already influenced by earlier physical punishment – authors' conclusion that detrimental effects of spanking are entirely due to residual confounding not justified	+/-
Lau et al. 2006 <sup>41</sup>	Prospective, ANCOVA	442 children aged 4-8 years and at risk of maltreatment, from Longitudinal Studies of Child Abuse and Neglect (LONGSCAN), USA	Externalising behaviour at age 8, via Child Behaviour Checklist	Corporal punishment at age 6 via Conflict Tactics Scale, parent report	Child sex and race; family income; parental education; single parenthood; physical abuse; externalising behaviours at age 4	Interaction effects: physical punishment only associated with later externalising behaviour in children with high levels of externalising behaviour at age 4 (punishment exacerbation effect or reverse causality).  Above associations not moderated by ethnicity.	Strengths: adjusted for externalising behaviour at age 4, wide range of potential confounders including abuse  Limitations: parent reports of punishment and behaviours – possible reporting bias; small sample of specific population – limited generalisability	+/-
Lee, Altschul & Gershoff 2013 <sup>42</sup>	Prospective, cross-lagged path analysis	3,279 mother-child dyads, aged 1-5, from Fragile Families and Child Wellbeing Study, USA	Child aggressive behaviour via Achenbach Child Behaviour Checklist (mother report) at ages 3 and 5 years	Maternal spanking in the last month, assessed at age 1, 3 and 5 ('In the past month, have you spanked [child] because he/she was misbehaving or acting up?'); frequency of spanking	Child sex; maternal age, relationship status, race/ethnicity, education, income; parenting stress, major depression, heavy alcohol use; intimate partner violence; child emotionality at baseline  Mediation tested by maternal warmth at ages 3 and 5	Reciprocal effects: greater maternal spanking at age 1 predictive of higher child aggression at age 3 and greater maternal spanking at age 3 predictive of higher aggression at age 5; child aggression at age 3 associated with increased maternal spanking at age 5.  No evidence of moderation by maternal warmth.	Strengths: modelling of reciprocal effects, wide range of covariates  Limitations: low-income sample – limited generalisability; missing data on maternal warmth; both outcome and exposure based on maternal report – possible same-source bias; paternal spanking not assessed	+

Year / author(s)	Study design	Study population	Outcomes	Measure(s) of physical punishment	Covariates adjusted for	Key findings <sup>a</sup>	Main strengths and limitations	Pos. / neg. <sup>b</sup>
Lee, Taylor, Altschul & Rice 2013 <sup>43</sup>	Prospective, regression models	923 children aged 3-5, from Fragile Families and Child Wellbeing Study birth cohort, USA	Child aggressive behaviour via Achenbach Child Behaviour Checklist (mother report) at age 5 years	Maternal and paternal spanking in the last month, assessed at age 3 ('In the past month, have you spanked (child) because he/she was misbehaving or acting up?'); frequency of spanking	Child sex; TV viewing; parental ages, income and education; race/ethnicity; parents foreign born; parenting stress; father involvement; depression; alcohol use; drug use; intimate partner violence; child maltreatment; child aggression at age 3	Prevalence: at age 3, no spanking in past month (by either parent) reported for 68% of the sample.  Dose-response relationship between spanking and child aggressive behaviour for both maternal and paternal spanking (compared to no spanking, both parents spanking 1-2 times or one parent >2 times= adjusted OR 1.40; both parents spanking >2 times a month= adjusted OR 2.01).	Strengths: wide range of covariates including initial level of aggressive behaviour, adjusted for child maltreatment, fathers' spanking included  Limitations: low-income sample – limited generalisability	+
Lee et al. 2015 <sup>44</sup>	Prospective, cross-lagged path analysis	1,298 children aged 1-5, from Fragile Families and Child Wellbeing Study birth cohort, USA	Externalising behaviour via Achenbach Child Behaviour Checklist (mother report) at age 5 years	Maternal and paternal spanking in the last month, assessed at age 3 and 5 ('In the past month, have you spanked (child) because he/she was misbehaving or acting up?'); frequency of spanking	Child sex; maternal age at birth, income, education, race/ethnicity; parenting stress at each age; caregiver involvement; maternal depression; heavy drinking; intimate partner violence; child temperament at age 1	Prevalence of spanking (in last month): age 1 – mothers 21.3%, fathers 19.4%; age 3 – mothers 52.8%, fathers 43.9%; age 5 – mothers 45.7%, fathers 35.2%.  Reciprocal effects: maternal spanking (but not paternal spanking) at age 3 predicted increased child aggression at age 5. Child aggression at age 3 predicted increased maternal spanking at age 5.	Strengths: analysis of fathers' and mothers' spanking separately and together; modelling of reciprocal effects, wide range of covariates  Limitations: low-income sample – limited generalisability	+
Lengua 2008 <sup>45</sup>	Prospective, regression models	188 children aged 8-12 years followed for 1 year, community sample, USA	Internalising and externalising via Child Behaviour Checklist – mother and child reports; depression and anxiety via child self report	Physical punishment via Alabama Parenting Questionnaire (spanking, slapping, hitting with object), child self report	Child age and sex; maternal education and family income; child effortful control, frustration and anxiousness; maternal rejection/acceptance and inconsistent discipline	Interaction effects: physical punishment related to lower externalising problems in children with high effort-control, no association for children with low effort-control.  Physical punishment associated with higher externalising behaviours in boys high in anxiousness / low frustration, and with lower externalising behaviours for boys low in anxiousness / high frustration.	Strengths: maternal and child reports of behaviour  Limitations: small sample – limited generalisability; short follow-up; testing of multiple interactions for significance – increased possibility of chance findings	+/-

Year / author(s)	Study design	Study population	Outcomes	Measure(s) of physical punishment	Covariates adjusted for	Key findings <sup>a</sup>	Main strengths and limitations	Pos. / neg. <sup>b</sup>
MacKenzie et al. 2012 <sup>46</sup>	Prospective, regression models	1,110 (for externalising behaviour) and 779 (for vocabulary) children aged 3-5, from Fragile Families and Child Wellbeing Study birth cohort, USA	Externalising behaviour via Achenbach Child Behaviour Checklist (mother report); receptive vocabulary (Peabody Picture Vocabulary test); both at age 5	Maternal and paternal spanking in the last month, assessed at age 3 ('In the past month, have you spanked (child) because he/she was misbehaving or acting up?'); frequency of spanking	Child sex, age, if first born; age 1 temperament; age 3 externalising/vocabulary; maternal age at birth, ethnicity, foreign born, education, employment, marital status, income; mother lived with both parents at age 15; family size; maternal drugs, alcohol/smoking; prenatal care; supportive birth father; partner violence; maternal parenting stress, depression, impulsivity, and cognitive level; cognitive stimulation at age 1	Both low and high frequency maternal and paternal spanking at age 3 years independently associated with higher levels of externalising behaviours at age 5. Association was stronger for high-frequency spanking (dose-response relationship).  High frequency maternal spanking at age 3 was associated with significantly lower vocabulary scores at age 5.	Strengths: wide range of covariates including initial levels of outcome variables, fathers' spanking included  Limitations: low-income sample – limited generalisability	+
MacKenzie et al. 2013 <sup>47</sup>	Prospective, regression models	1,933 children aged 3-9, from Fragile Families and Child Wellbeing Study birth cohort, USA	Externalising behaviour via Achenbach Child Behaviour Checklist (mother report) at age 9; receptive vocabulary via Peabody Picture Vocabulary Test at age 9	Maternal and paternal spanking in the last month, assessed at age 3 and 5 ('In the past month, have you spanked (child) because he/she was misbehaving or acting up?'); frequency of spanking	Child sex, age, if first born; temperament at age 1; maternal age at birth, ethnicity, foreign born, education, employment, marital status, income; mother lived with both parents at age 15; family size; maternal drugs, alcohol/smoking; prenatal care; supportive birth father; partner violence; maternal depression, impulsivity, cognitive level	Prevalence of spanking: age 3 – mothers 57%, fathers 40%, age 5 – mothers 52%, fathers 33%.  Both high- and low-frequency maternal spanking (but not paternal spanking) at age 5 predicted greater externalising problems at age 9. Association was stronger for high-frequency spanking (dose-response relationship).  No independent relationship between spanking and receptive vocabulary score.  Associations did not vary by child sex or ethnicity.	Strengths: wide range of covariates including initial level of aggressive behaviour, fathers' spanking included  Limitations: low-income sample – limited generalisability	+
MacKenzie et al. 2014 <sup>48</sup>	Prospective, ANOVA	2,768 children aged 1-9 years, from Fragile Families and Child Wellbeing Study, USA	Externalising behaviour at age 9 via the Child Behaviour Checklist, mother report	Exposure to high frequency spanking from age 1 through to age 9 (number of waves mother reported spanking 2 or more times per week)	Child sex and race/ethnicity; maternal nativity; and city of residence; early cumulative risk at age 1 (16 items)	Dose-response relationship between spanking and externalising behaviour: repeated high-frequency spanking increased the risk at each age of externalising behaviour.  Association moderated by early cumulative risk: association stronger for children exposed to higher levels of cumulative risk at age 1.	Limitations: low-income sample – limited generalisability; possible same-source bias; paternal spanking not assessed	+

Year / author(s)	Study design	Study population	Outcomes	Measure(s) of physical punishment	Covariates adjusted for	Key findings <sup>a</sup>	Main strengths and limitations	Pos. / neg. <sup>b</sup>
MacKenzie et al. 2015 <sup>49</sup>	Prospective, cross-lagged path analyses	1,874 children aged 1-9 years, from Fragile Families and Child Wellbeing Study, USA	Externalising behaviour at ages 3, 5 and 9 via Child Behaviour Checklist	Frequency of maternal spanking at ages 1, 3, 5 and 9 ('In the past month, have you spanked (child) because he/she was misbehaving or acting up?')	Child sex and race/ethnicity; maternal nativity; and city of residence; early cumulative risk at age 1 (16 items); modelling of reciprocal effects	Prevalence of maternal spanking: age 1 –28%; age 3 –57%; age 5 – 53%; age 9 – 49%.  Amplifying transactional processes: spanking predicted increased externalising behaviour at each subsequent age, and behaviour predicted spanking at each subsequent age. Spanking at age 1 associated with increased externalising behaviour at age 9.  Associations did not vary by child sex or ethnicity.	Strengths: wide range of covariates including child temperament at age 1, modelling of reciprocal effects  Limitations: low-income sample – limited generalisability; possible same-source bias; paternal spanking not assessed	+
MacKinnon-Lewis et al. 2014 <sup>50</sup>	Prospective, structural equation models	268 children aged 12-14 years, assessed at 2 time points 1 year apart, community sample of two-parent families, USA	Mother-child conflict, via observational ratings of hostility and coercion (adapted version of Iowa Family Interaction Rating Scales)	Corporal punishment via mother report (whether used or threatened to use physical punishment the last time they disciplined their child); youth self report ('how often did your mother spank you?'; 'how often did your mother push, shove, grab, or yell at you?')	Child age and sex; maternal age, family income, maternal education; time 1 adolescent aggression; time 1 mother-child conflict  Mediator: adolescent hostile attributions of mothers' intent (HAI); moderator: ethnicity	For European American families, corporal punishment at time 1 was associated with time 2 hostile conflict in the mother-child relationship, mediated through children's HAI.  For African American families, no association between corporal punishment and mother-child hostile conflict.	Strength: inclusion of adolescents' perceptions of physical punishment  Limitations: small convenience sample – limited generalisability; short follow-up – time 1 mother-child conflict may have been influenced by earlier physical punishment	+
Maguire-Jack et al. 2012 <sup>51</sup>	Prospective, cross-lagged path analyses	3,870 children aged 1-5 years, from Fragile Families and Child Wellbeing Study birth cohort, USA	Internalising and externalising behaviours via Child Behaviour Checklist; cognitive skills via Peabody Picture Vocabulary Test; all at ages 3 and 5	Maternal and paternal spanking in the last month (combined), assessed at ages 1, 3 and 5 ('In the past month, have you spanked (child) because he/she was misbehaving or acting up?'); frequency of spanking	Child sex, maternal age at birth, race/ethnicity, employment, household income, single mother, no. of adults and children in household; maternal vocabulary score; maternal depression; Head Start participation; child emotionality at age 1	Prevalence of spanking: age 1 – 30%; age 3 – 56%; age 5 – 51%.  Reciprocal effects: Spanking at ages 1 and 3 associated with greater externalising behaviour at ages 3 and 5, child emotionality at age 1 and child behaviour problems at age 3 associated with later spanking.  Spanking at age 1 indirectly associated with externalising and internalising behaviour at age 5 via spanking and externalising/internalising behaviour at age 3.  No association between spanking and cognitive skills.	Strengths: modelling of reciprocal effects, wide range of covariates including child emotionality at age 1  Limitations: low-income sample – limited generalisability	+

Year / author(s)	Study design	Study population	Outcomes	Measure(s) of physical punishment	Covariates adjusted for	Key findings <sup>a</sup>	Main strengths and limitations	Pos. / neg. <sup>b</sup>
McDonald et al. 2013 <sup>52</sup>	Prospective, regression models	116 aggressive children (mean age at baseline 10 years), control group from Coping Power Program, USA	Social goals (dominance, revenge, affiliation) via Social Goals Measure, 1 year after baseline assessment	Corporal punishment via Alabama Parenting Questionnaire (average score across 3 items: slapping; spanking with hand; hitting with an object), parent report	Child sex and age; SES (Hollingshead index); race/ethnicity; social goals at baseline; positive parenting (parent and child report)	Corporal punishment was associated with dominance goals 1 year later, for boys only.  No associations between corporal punishment and later revenge or affiliation goals for either sex.  Positive parenting predicted a decrease in revenge and dominance goals, and increase in affiliation goals.	Strengths: adjusted for baseline measure of social goals  Limitations: small sample of aggressive children – limited generalisability; short follow-up	+
McLoyd et al. 2007 <sup>53</sup>	Prospective, structural equation models	890 African American children aged 0-12 and followed over 4 years, from Panel Study of Income Dynamics, USA	Childhood depressive symptoms at time 2 (mean age 12.5 years), child report	Time 1: maternal endorsement of spanking ('When a child misbehaves, it is best to spank him/her.') Time 2: Frequency of maternal spanking ('How many times in the past week have you spanked [child]?')	Child sex and age; maternal age; single parenthood; maternal education; number of children in household; income/need ratio; maternal psychological distress	Interaction effect: child depressive symptoms at time 2 were associated with earlier spanking only for children of non-endorsing mothers.	Limitations: wide variation of child age; specific population – limited generalisability	+/-
Miller-Perrin et al. 2009 <sup>54</sup>	Retrospective, regression models	292 college students aged 18-27 years, USA	Self-reported adult psychological adjustment via 9 subscales of Brief Symptom Inventory (BSI)	Parent-Child Conflict Tactics Scales, divided into 3 categories (corporal punishment, child physical abuse, psychological aggression)	Sex, parental income, child abuse, psychological aggression	Psychological aggression predicted 8 of the 9 BSI subscales.  Corporal punishment in the absence of physical abuse was not related to detrimental effects on any of the subscales.	Limitations: cross-sectional study with retrospective information – possible recall bias; small sample of university students – limited generalisability	-
Morris & Gibson 2011 <sup>55</sup>	Prospective, propensity score matching	1,346 children aged 6-15 and followed over 2.5 years, Project on Human Development in Chicago Neighbourhoods, USA	Aggression and delinquency at time 2 via subscales of Achenbach Child Behaviour Checklist (caregiver report)	Corporal punishment at time 1 via Conflict Tactics Scales ('threw something at him/her,' 'pushed, grabbed, or shoved him/ her,' and 'slapped or spanked him/her' in the past year), binary, caregiver report	Propensity scores derived using wide range of child and family characteristics including demographics, family SES, parent-child and spousal relations, social support, parenting practices, child personality and aggression/delinquency at time 1	Prevalence of physical punishment in the sample (data collected 1997-1999): 68%  In sample of 870 matched children, no significant difference in aggression scores at time 2 between punished / unpunished children.	Strengths: propensity score matching – matched across wide range of observable factors  Limitations: frequency and severity of punishment not assessed, intraindividual change not assessed, early life punishment not measured	-
Mulvaney & Mebert 2007 <sup>56</sup>	Prospective, regression models	1,028 mothers and their children followed from infancy to first grade (age 6-7), from Study of Early Child Care and Youth Development, USA	Child behaviour problems at age 3 and in first grade, via Achenbach Child Behaviour Checklist (mother report)	Corporal punishment via mother report (child spanked more than once in the previous week), and interviewer observation, in infancy and early childhood (3-4 years)	Child sex and ethnicity; infant temperament at 6 months; maternal depression; income-to-needs ratio; maternal sensitive parenting	Corporal punishment at 15 months associated with externalising and internalising behaviour problems at 36 months, association stronger for children with difficult temperament.  Corporal punishment at ages 36 / 54 months was associated with increased externalising (but not internalising) behaviour at first grade, adjusted for externalising (internalising) at 36 months.  Ethnicity did not moderate the associations.	Strengths: adjusted for early problem behaviour  Limitations: both outcome and exposure based on maternal report – possible same-source bias; paternal spanking not assessed, severity of physical punishment not measured	+

Year / author(s)	Study design	Study population	Outcomes	Measure(s) of physical punishment	Covariates adjusted for	Key findings <sup>a</sup>	Main strengths and limitations	Pos. / neg. <sup>b</sup>
<b>Mulvaney &amp; Mebert 2010</b> <sup>57</sup>	Retrospective, regression models	174 university students aged 18-21, from a Christian university, USA	Attachment to Parents via Inventory of Parent and Peer Attachment; depressive symptoms via Centers for Epidemiological Studies Depression Scale; self-esteem via Rosenberg Self-Esteem Scale	Corporal punishment and physical abuse experienced during childhood (during a typical week, or ever), via adult-recall form of the revised Conflict Tactics Scales	Sex; parenting styles; neglect; physical abuse  Note: perceived threat from corporal punishment included as mediator / moderator variable	Perceived threat from corporal punishment associated with more depressive symptoms and lower self-esteem, association with corporal punishment itself not statistically significant.  Maternal corporal punishment associated with lower maternal (but not paternal) attachment, participants who viewed corporal punishment unfavourably more adversely affected.	Limitations: cross-sectional study with retrospective information – possible recall bias; small convenience sample of university students – limited generalisability; limited choice of covariates	+
<b>Olson et al. 2011</b> <sup>58</sup>	Prospective, regression models	199 children aged 3-6 years, at risk of school-age conduct problems, USA	Peer aggression at age 6, via Achenbach Child Behaviour Checklist Teacher Report Form, and naturalistic observations	Physical punishment by mothers and fathers at age 3 (spank, grab, shake) during the last 3 months	Child sex, age 3 effortful control, negative emotional reactivity, theory of mind abilities, peer aggression, parental warmth	Corporal punishment at age 3 associated with both concurrent and later peer aggression. Corporal punishment at age 3 predicted peer aggression at age 6 after adjustment for peer aggression at age 3. Association not moderated by child sex or parental warmth.	Strengths: Use of multiple informants and direct observations of peer aggression  Limitations: small sample of at risk-children – limited generalisability	+
<b>Palili et al. 2010</b> <sup>59</sup>	Prospective, regression models	2,695 participants in Greek cohort study, recruited at birth and re-interviewed at ages 7 and 18, Greece	ADHD-like symptoms (inattention, hyperactivity and impulsivity) at ages 7 and 18 (age 7 – parent and teacher reports, age 18 – self report)	Physical punishment at age 7 (never, occasionally, often)	Sex, parental education, place of residence; age 7: specialist evaluation of learning difficulties, school performance, sleeping difficulties, peer conflicts, nocturnal enuresis, conduct and emotional problems; complications around birth; age 18: chronic illness, parental perceived stress	Parents reporting to often physically punish their children were more likely to have a child who was hyperactive (OR=2.00) or inattentive at age 7 (OR=2.92).  No longitudinal association between physical punishment at age 7 and ADHD-like symptoms at age 18	Strengths: wide range of covariates  Limitations: physical punishment not further defined, cross-sectional association could be due to reverse causality	+ / -
<b>Pardini et al. 2007</b> <sup>60</sup>	Prospective, regression models	120 aggressive children aged 9-12 years at time 1, followed for 1 year, USA	Callous and unemotional traits (CU) via Antisocial Processes Screening Device; antisocial behaviour via Behaviour Assessment System for Children; both parent and teacher reports	Corporal punishment via Alabama Parenting Questionnaire (3 items: slapping; spanking with hand; hitting with an object)	Child sex, age and ethnicity, living arrangements, academic history; history of treatment for social emotional difficulties; family income; parental warmth; child anxiety and affective dysregulation at time 1; child CU and antisocial at time 1	Higher levels of corporal punishment at time 1 predicted both higher levels of CU traits and antisocial behaviour at time 2.  Children exposed to lower levels of corporal punishment had lower levels of CU and antisocial behaviour at time 2.	Strengths: wide range of covariates including CU and antisocial at baseline; large number of covariates; multiple informants  Limitations: small sample of at risk-children – limited generalisability	+

Year / author(s)	Study design	Study population	Outcomes	Measure(s) of physical punishment	Covariates adjusted for	Key findings <sup>a</sup>	Main strengths and limitations	Pos. / neg. <sup>b</sup>
Pardini et al. 2008 <sup>61</sup>	Prospective, population-averaged GEE models	1,517 boys aged 6-16 (3 cohorts combined, mean age at baseline 6.9, 10.2, 13.4); followed in 6 month intervals for up to 4 years; from Pittsburgh Youth Study, USA	Conduct problems via Child Behaviour Checklist, parent and teacher reports	Physical punishment via one item from Discipline Scale ('If your son does something that he is not allowed to do or that you don't like, do you slap or spank him, or hit him with something?'; 'almost never' vs. 'sometimes/ often')	Child age and ethnicity; parental age, education, occupation, employment status; living with partner; number of children; parent mental health; parent-child communication; positive parenting; parental monitoring; timid parenting; parental involvement	Reciprocal effects: bidirectional relationship between conduct problems and physical punishment from childhood to adolescence, for both parent- and teacher-reported conduct problems. Effect sizes similar in both directions.  Interactions: Overall association stronger for African Americans compared to Caucasians. Association between physical punishment and teacher reported conduct problems dissipated with age.	Strengths: modelling of reciprocal effects; wide range of covariates  Limitations: boys only sample, paternal spanking not assessed	+
Petts & Kysar -Moon 2012 <sup>62</sup>	Prospective, regression models	1,214 children followed from age 3 to age 5, from Fragile Families and Child Wellbeing Study, USA	Externalising and internalising behaviour at age 5, via Child Behaviour Checklist and Adaptive Social Behaviour Inventory	Spanking at age 3 by mothers and fathers (both parents spanked, mother only, father only, neither parent spanked); frequency of spanking (never, infrequently, frequently)	Child sex, maternal age; parental race; no. of additional children; parental income and education; parenting stress; marital status; maternal depressive symptoms; behaviour problems at age 3; parent protestant affiliation	Corporal punishment at age 3 associated with increased externalising problem behaviour at age 5. Interaction: children of conservative Protestant parents were less likely to display problem behaviour if only father spanked / father spanked infrequently.  Age 3 spanking associated with increased internalising behaviours at age 5 in all family types.	Strengths: fathers' spanking included, wide range of covariates  Limitations: low-income sample – limited generalisability; conservative protestants may have heterogeneous parenting behaviour	+
Rotenberg et al. 2012 <sup>63</sup>	Prospective, structural equation models	1,329 children assessed twice across 1 year (mean age time 1 = 7.5 years), from Zurich Project on Social Development, Switzerland	Children's trustworthiness (teacher and peer reported), via Non-aggressive Conduct Disorder scale of the Social Behaviour Questionnaire	Corporal punishment via Alabama Parenting Questionnaire (3 items: slapping; spanking with hand; hitting with an object)	Child sex; time 1 trustworthiness; neighbourhood trustworthiness	Corporal punishment at time 1 predicted lower child trustworthiness at time 2.  Association did not vary by child sex.	Strengths: adjusted for baseline trustworthiness; multiple informants  Limitations: very short follow-up, limited choice of covariates	+
Scott et al. 2014 <sup>64</sup>	Prospective, regression models	1,600 children followed from age 2 to age 4, from Growing Up in Scotland Prospective Study, UK	Emotional and behavioural problems at age 4, via Strengths and Difficulties Questionnaire (parent report)	Smacking by main caregiver at age 2 (ever having smacked the child)	Child age and sex; parental age and sex; parental education, ethnicity, mental health; no. of siblings at baseline; area of residence; change in family structure	Only included children whose parents reported no behaviour problems at baseline – among them, prevalence of smacking at age 2 = 20%.  Smacked children were twice as likely to have emotional and behavioural problems at age 4 (adjusted OR = 2.29).	Strengths: only included children whose parents reported no behaviour problems at baseline  Limitations: limited to main caregiver; limited measure of material deprivation	+

Year / author(s)	Study design	Study population	Outcomes	Measure(s) of physical punishment	Covariates adjusted for	Key findings <sup>a</sup>	Main strengths and limitations	Pos. / neg. <sup>b</sup>
Sheu et al. 2010 <sup>65</sup>	Retrospective, neuroimaging study, ANCOVA and GLM	19 young adults (mean age 22), who experienced harsh physical punishment and 23 similar controls, USA	Changes in brain function i.e. alterations in the ascending dopamine system (T2 relaxation), via neuroimaging	Harsh corporal punishment (HCP), defined as hitting on buttocks or extremities by a primary caregiver prior to age 12, about 12 times or more per year, including occasional use of an implement such as paddle, belt or hair brush (self-report)	Age, gender, parental education and perceived financial sufficiency during childhood	In subjects reporting HCP, increased T2-relaxation time in dopaminergic brain regions was observed. Increased T2-relaxation time was associated with use of drugs and alcohol, and poorer memory performance.	Strengths: first study to explore whether HCP is related to alterations in brain function  Limitations: small sample, causal effect cannot be established, residual confounding cannot be ruled out	+
Simons et al. 2013 <sup>66</sup>	Longitudinal, negative binomial regression models	683 African American youth followed from age 10 to age 15, from family and community health study, USA	Change in delinquency, depressive symptoms, and school engagement between ages 10 and 15 (all child self-report)	8 parenting styles that included all combinations of responsiveness, demandingness, and corporal punishment; corporal punishment via Conflict Tactics Scales (spanking, slapping, hitting, pushing, shoving, hitting with an object); scores averaged over ages 12 and 15, via child self-report	Child sex; parental education; family structure; community violence; respective outcome variable measured at age 10	8 parenting styles derived by separating each of the classic styles (Maccoby and Martin typology: authoritative, authoritarian, permissive and neglectful) into 2 subgroups based on whether use of physical punishment was low or high.  Authoritative parenting with low physical punishment was related to most favourable outcomes, while authoritative parenting with high physical punishment was second best. None of the styles with high physical punishment was associated with better outcomes when compared to its counterpart.	Strengths: adjusted for baseline measure of each outcome  Limitations: small sample resulting in low cell counts; exclusively African-American sample – limited generalisability; physical punishment measured via average of ages 12 and 15 – reverse causality cannot be ruled out, no distinction between use / non-use of physical punishment	+ / -
Stacks et al. 2009 <sup>67</sup>	Prospective, regression models	3,001 children living below the federal poverty line, followed from age 1 to age 3, from Early Head Start Research and Evaluation Study, USA	Child aggressive behaviour at age 3, via Achenbach Child Behaviour Checklist (mother report)	Spanking at ages 1, 2 and 3 (whether or not child was spanked in the past week), parent report	Child sex and ethnicity; maternal age, marital status, education, employment; maternal warmth; child temperament at age 1 and aggressive behaviour at age 2	Spanking at age 1 associated with aggressive behaviour at age 3 after adjusting for child temperament at age 1. In model including spanking at every age, only spanking at age 3 was associated with aggressive behaviour at age 3.  Association varied by ethnicity: spanking at age 3 predicted aggressive behaviour at age 3 only for Caucasian children. Association did not vary by maternal warmth.	Strengths: adjusted for child temperament at age 1  Limitations: low-income sample – limited generalisability; inclusion of 3 spanking variables for each age in same model – possible multicollinearity	+

Year / author(s)	Study design	Study population	Outcomes	Measure(s) of physical punishment	Covariates adjusted for	Key findings <sup>a</sup>	Main strengths and limitations	Pos. / neg. <sup>b</sup>
<b>Straus &amp; Paschall 2009</b> <sup>68</sup>	Prospective, ANCOVA, regression models	806 children aged 2-4 and 704 children aged 5-9, followed over 4 years, from the National Longitudinal Study of Youth, USA	Cognitive ability at time 2 via Peabody Individual Achievement Tests (PIAT) for Math and Reading	Spanking at time 1 via mother interview ('Did you find it necessary to spank your child in the past week?'; 'About how many times, if any, have you had to spank your child in the past week?'), and interviewer observations	Child age, sex and ethnicity, birth weight; maternal education; no. of children in the home, mother's age at child's birth, father living with mother at time 1; maternal cognitive stimulation and emotional support; child cognitive ability at time 1.	Prevalence of spanking (1986): age 2-4 – 92%; age 5-9 – 58%.  Corporal punishment at time 1 was associated with lower cognitive ability at time 2 in both cohorts., adjusted for cognitive ability at time 1. Dose-response relationship.  Associations not moderated by any of the family and child's characteristics.	Strengths: wide range of covariates including baseline cognitive ability  Limitations: fathers' spanking not assessed	+
<b>Taillieu &amp; Brownridge 2013</b> <sup>69</sup>	Retrospective, regression models	1,133 university students (mean age 24; predominantly female), Canada	Internalising problems (depression via Major Depression Inventory, anxiety, and low self-esteem via Rosenberg's Self-Esteem Scale) in early adulthood	Legally permissible forms of physical punishment experienced during childhood (at age 10), via adult recall version of the Dimensions of Discipline Inventory	Sex; ethnic minority status; sociodemographic risk factor index (parental marital status, no. of children in family, parental education, family income, family home-ownership); misbehaviour in childhood; physical abuse; interparental violence; positive parenting	Reported prevalence of physical punishment at age 10: 63% among males, 51% among females.  Participants experiencing physical punishment were more likely to report physical abuse and interparental violence in childhood; level of physical punishment highly correlated with level of psychological aggression.  In fully adjusted regression models, childhood psychological aggression but not physical punishment was associated with anxiety and lower self-esteem in adulthood.	Strengths: adjustment for wide range of potential confounders  Limitations: child reports only on both exposure and outcomes; cross-sectional study with retrospective information – possible recall bias; convenience sample of university students – limited generalisability	-
<b>Taylor et al. 2010</b> <sup>70</sup>	Prospective, regression models	2,461 children followed from age 3 to age 5, from Fragile Families and Child Wellbeing Study, USA	Aggressive behaviour at age 5, via Achenbach Child Behaviour Checklist (mother report)	Frequency of spanking at age 3 for 'misbehaving or acting up' in the month before the interview (never; once or twice; more than twice)	Child sex; maternal age, ethnicity, education, income, religion, marital status, child maltreatment or neglect; intimate partner aggression; maternal parenting stress, depression, substance use; child unwanted; child aggression at age 3	Frequent maternal spanking (more than twice in previous month) at age 3 associated higher levels of child aggression at age 5 (adjusted odds ratio: 1.49), after adjusting for child aggression at age 3.	Strengths: wide range of covariates including baseline level of aggression and physical maltreatment  Limitations: fathers' spanking not assessed, possible reporting bias	+
<b>Trepal et al. 2014</b> <sup>71</sup>	Prospective, structural equation models	622 children aged 3-5 years, at risk of psychopathological problems; Spain	Oppositional defiant disorder (ODD) at age 5 via Diagnostic Interview for Children and Adolescents for Parents of Preschool Children	Corporal punishment at age 3 via Alabama Parenting Questionnaire	Child sex, age and race; family SES; parental age, education and occupation, parental psychopathology via Adult Self-Report, child ODD at age 3	Mothers' corporal punishment at age 3 directly associated with ODD at age 5, and indirectly via ODD at age 3.  Fathers' corporal punishment at age 3 only indirectly associated with ODD at age 5 via ODD at age 3.	Strengths: both mothers' and fathers' corporal punishment assessed  Limitations: smaller sample of fathers (mothers n=570 & fathers n=306); possible reporting bias	+

Year / author(s)	Study design	Study population	Outcomes	Measure(s) of physical punishment	Covariates adjusted for	Key findings <sup>a</sup>	Main strengths and limitations	Pos. / neg. <sup>b</sup>
Van Aken et al. 2008 <sup>72</sup>	Prospective, latent growth models	108 boys followed from 17 months to 35 months, Netherlands	Externalising behaviour via Child Behaviour Checklist (mother report)	Maternal and paternal physical punishment via discipline-scale of the Parental Behaviour Checklist and Alabama Parenting Questionnaire	n/a	Over time there was a linear decrease in attention problems and a linear increase in aggressive behaviours.  Initial levels of maternal physical punishment positively related to initial levels of externalising but did not predict change in externalising. Greater decrease in maternal physical punishment associated with greater decrease in attention problems.	Strengths: examined maternal and paternal physical punishment  Limitations: no adjustment for possible confounders, small sample of boys only – limited generalisability	+/-
Verhoeven et al. 2010 <sup>73</sup>	Prospective, structural equation models	104 boys aged 17 months, followed until aged 35 months, Netherlands	Externalising behaviour via Child Behaviour Checklist (parent report)	Maternal and paternal physical punishment via discipline-scale of the Parental Behaviour Checklist and Alabama Parenting Questionnaire	Baseline level of externalising behaviour	Physical punishment at time 1 did not predict subsequent externalising behaviour.	Strengths: examined maternal and paternal physical punishment  Limitations: no adjustment for possible confounders, small sample of boys only – limited generalisability	-
Wang & Kenny 2014 <sup>74</sup>	Prospective, cross-lagged path analyses	862 adolescents assessed at ages 12, 14 and 16, longitudinal study of youth development, USA	Misconduct and depressive symptoms at ages 14 and 16	Mothers' and fathers' physical punishment at ages 12 and 14 ('In the past 6 months, if your child did something that he/she is not allowed to do or something that you did not like, how often did you: slap, push, grab, or shove him/her?')	Adolescent sex and ethnicity; parental education and income; parental warmth, parenting stress; parental depression; previous levels of misconduct and depressive symptoms	Physical punishment at ages 12 and 14 predicted increased misconduct and depressive symptoms at ages 14 and 16.  Reciprocal effects: misconduct (but not depressive symptoms) at ages 12 and 14 predicted greater use of physical punishment at ages 14 and 16.  Associations not moderated by parental warmth or ethnicity.	Strengths: modelling of reciprocal effects  Limitations: earlier (before age 12) transactional effects not examined	+
Wilson et al. 2013 <sup>75</sup>	Prospective, regression models	2,070 children followed annually from age 3 to age 5, from Growing Up in Scotland Prospective Study, UK	Conduct problems between ages 3–5 via Strengths and Difficulties Questionnaire (parent report): abnormal SDQ conduct scores at: none, some or all three measurement occasions	Parental endorsement of smacking at age 3: whether parents agree/disagree that smacking is sometimes necessary	Child sex, ethnicity, birth weight, general health, developmental milestones, difficulty being understood, maternal age at birth; no. of siblings; family structure and income; maternal smoking during pregnancy; frequency child taken to visit others; frequency child is read to	Children of parents who endorsed smacking were more likely to have inconsistent conduct problems (adjusted OR = 1.28)	Strengths: large representative sample  Limitations: possible same-source bias, not adjusted for baseline levels of conduct problems, study design combines cross-sectional and longitudinal associations	+

Table S.2 Studies on associations between physical punishment and risk of child maltreatment / abuse

Year / author(s)	Study design	Study population	Outcomes	Measure(s) of physical punishment	Covariates adjusted for	Key findings <sup>a</sup>	Main strengths and limitations	Pos. / neg. <sup>b</sup>
<b>Crandall et al.</b> 2006 <sup>76</sup>	Cross-sectional, regression models	3,808 socio-economically disadvantaged and unmarried mothers and their one-year-old children from Fragile Families and Child Wellbeing Study, USA	Injury requiring medical attention, sustained during the first year of life	Mother / father spanking child during previous month	Maternal age, ethnicity, alcohol use; infant reacts strongly when upset; infant fusses and cries; mother feeling overwhelmed by childcare; father unemployed or in jail because of drug use; relationship between mother and father ended because of violence (maternal depression, child sex and other variables dropped as not significant)	Prevalence of spanking in the sample: mothers 26%, fathers 13%.  Maternal spanking independently associated with higher odds of injury requiring medical attention during the first year of life (adjusted OR = 2.32)	Strengths: large sample; wide range of potential confounders included  Limitations: low-income sample – limited generalisability; exposures and outcome self-reported by mother – possible reporting bias	+
<b>Frechette et al.</b> 2015 <sup>77</sup>	Retrospective, online survey, regression models	370 university students enrolled in a psychology course, Canada	Physical abuse at age 10 via Conflict Tactics Scales (hit you with fist or kicked you hard, grabbed around the neck and choked you, beat you up i.e. hit you over and over as hard as they could, hit you on some other part of the body besides the bottom with hard object, threw or knocked you down)	Experience of spanking ('When you misbehaved at around age 10, how often did your parents spank, smack, or swat you?')	Sex, ethnicity; spanking frequency; psychological aggression; positive discipline; consistency of discipline; perceived parental warmth /support, perceived impulsiveness of discipline, and perceived parental anger; interparental violence	Prevalence of spanking at age 10: 45%; physical abuse: 11%.  Presence of spanking associated with markedly higher odds of physical abuse (unadjusted OR = 59.3).  Regression model only included participants who reported spanking. Among them, spanking frequency, parental impulsiveness and interparental physical violence predicted childhood physical abuse.	Strengths: adjusted for a range of family contextual variables  Limitations: cross-sectional /retrospective information – possible recall bias; small convenience sample of university students – limited generalisability; limited choice of covariates; adjusted OR for presence of spanking not reported	+
<b>Lee et al.</b> 2014 <sup>78</sup>	Prospective, regression models	2,788 mothers and their children followed from age 1 to 5, from Fragile Families and Child Wellbeing Study, USA	Child Protective Services (CPS) involvement between age 1 and age 5	Spanking at age 1, by mother, father, or mother's current partner ("In the past month, have you spanked (child) because (he/she) was misbehaving or acting up?")	Child sex; maternal age at child's birth, race/ethnicity, education; household income; parents married at the child's birth; maternal depression at child age 1	Prevalence of spanking: 30% of 1-year-olds were spanked at least once in the past month.  Compared to non-spanked children, there was a 33% greater probability of subsequent CPS involvement for families of children who were spanked at age 1.	Strengths: longitudinal, fathers' spanking included  Limitations: "spanking" not further defined; low-income sample – limited generalisability; exposures and outcome self-reported by mother – possible reporting bias	+

<sup>a</sup> Odds ratios included if reported in the paper.

<sup>b</sup> Positive association between physical punishment and at least one adverse outcome: (+)  
No association between physical punishment and adverse outcome, or evidence of beneficial effects: (-)  
Mixed findings or inconclusive: (+/-)

Year / author(s)	Study design	Study population	Outcomes	Measure(s) of physical punishment	Covariates adjusted for	Key findings <sup>a</sup>	Main strengths and limitations	Pos. / neg. <sup>b</sup>
<b>Peltonen et al. 2014</b> <sup>79</sup>	Cross-sectional, regression models	2,716 mothers with 0–12-year-old children, representative sample, Finland	Severe physical violence committed by mothers (slapping or hitting, punching with a fist, kicking, biting, hitting with an object or trying to hit with an object, or shaking a child under 2 years of age), based on Conflict Tactics Scales	Acceptance of corporal punishment; use of mild corporal punishment (throw with an object, push or grab a child, pull a child's hair, give a child a flick i.e. flick of the fingers)	Child age, sex, special needs, chronic disease; maternal age, education, employment status, mothers' experience of corporal punishment, needed help with parenting, stress, tiredness, inter-partner violence, number of children, marital status, financial worries	Prevalence of severe physical violence: 5.5%, mostly slapping or hitting (prevalence of slapping/hitting = 4.2%, survey conducted in 2011); prevalence of mild corporal punishment = 43% (own calculation)  Mothers who used corporal punishment were 11 times more likely to use severe physical violence (adjusted OR = 10.9).  Note: slapping and hitting classified as severe violence – Finland is a country with a longstanding ban of physical punishment (introduced in 1983).	Strengths: large, nationally representative study  Limitations: mothers' self report – possible reporting bias; cross-sectional data	+
<b>Taillieu &amp; Brownridge 2013</b> <sup>69</sup>	Retrospective, descriptive	1,133 university students (mean age 24; predominantly female), Canada	Physical abuse experienced in childhood (hit with fist or kicked hard, choked, beat up, hit with an object on a part of the body other than their bottom, thrown or knocked down), via severe physical violence scale of Parent–Child Conflict Tactics Scales	Legally permissible forms of physical punishment experienced during childhood (at age 10), via adult recall version of the Dimensions of Discipline Inventory	Result refers to unadjusted associations	Participants experiencing legally permissible forms of physical punishment were more likely to report physical abuse and interparental violence in childhood; level of physical punishment highly correlated with level of psychological aggression.	Limitations: association between physical punishment and abuse not main focus – only unadjusted associations reported; cross-sectional study with retrospective information – possible recall bias; convenience sample of university students – limited generalisability	+
<b>Zolotor et al. 2008</b> <sup>80</sup>	Cross-sectional, regression models	1,435 mothers with children aged < 18 years (mean age 9), telephone survey in North and South Carolina, USA	Index of harsh physical punishment consistent with physical abuse during the past year (beating, burning, kicking, hitting with an object somewhere other than the buttocks, or shaking a child aged below 2 years), via Parent–Child Conflict Tactics Scales	Occurrence and frequency of spanking (without object / with object) for both mothers and partners during the past year, via Parent–Child Conflict Tactics Scales	Child age; maternal education; receipt of public assistance as a proxy for poverty; and race	Prevalence (in 2002): 45% of children in the sample spanked by mother or their partner; spanking with an object reported by 25% of parents. Prevalence of physical abuse: 4%.  Mothers who reported spanking were 2.7 (adjusted OR) times more likely to report abuse. Mothers reporting spanking with an object were at markedly increased odds of reporting abuse (adjusted OR = 8.9).  Dose-response relationship: higher frequency of spanking associated with higher odds of physical abuse.	Strengths: sample weighted and representative  Limitations: cross-sectional data – cannot establish causality; data from 2 US states – limited generalisability; exposures and outcome self-reported by mother – possible reporting bias	+

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