Why is lower family socio-economic status associated with conduct problems in children and adolescents? A systematic review of longitudinal studies

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Abstract

Socio-economic status (SES) has been extensively linked to child and adolescent conduct problems (CP). Understanding the origins of this link is important for informing policy to reduce social inequalities. Potential competing explanations have been investigated and a comprehensive review of the strength of this evidence is required to inform progress towards an integrated model of the underlying mechanisms. We systematically searched ten databases for studies published in English between 1960 and 2026. The eligibility criteria included a quantitative design, a community sample of children or adolescents, measures of SES and CP, longitudinal analyses of the association between SES and CP, and results informing on the potential mechanisms. We identified 45 papers that met the eligibility criteria, comprising 48 individual studies included in the review. Family stress pathways were the most frequently studied mechanisms; however, the results were mixed. There was some support for pathways involving warm and supportive parenting and somewhat weaker support for supervision and discipline pathways. Investment pathways involving cultural/educational resources, neighbourhood characteristics, and models incorporating family stress and investment pathways were found to have received considerable support. There was also evidence that factors such as child's diet and associations with antisocial peers may contribute. These findings support an integrated model of the mechanisms linking SES and CP. This model can provide targets for interventions aiming to reduce CP inequalities and sets the agenda for research to elucidate the mechanisms further.

Family socio-economic status (SES) is a well-documented correlate of conduct problems (CP) during childhood and adolescence (e.g., Garratt et al., 2017), and adulthood (Murray et al., 2024). As with many health-related measures, the relationship with SES is graded; the greatest risk of CP exists for children and adolescents in families occupying the lowest social positions, with diminishing risk as SES increases. This pattern holds across various measures of social position and resources (e.g., parent education, poverty, income), and for a range of different forms of CP including conduct disorder, aggression, and oppositionality (e.g., Piotrowska, Stride, Maughan, et al., 2015). A meta-analysis of studies testing this relationship in young people identified a mean weighted effect size (r) of -.10 (95% confidence intervals -.08 to -.12) on the basis of data from 339,868 individuals reported across 133 studies published 1960-2012 (Piotrowska, Stride, Croft, et al., 2015). As with any cross-sectional association, a number of explanations might underlie the correlation: (1) variation in SES may cause variation in CP, (2) variation in CP may cause variation in SES, or (3) confounding factors may cause variation in both SES and CP. It is also possible that combinations of these explanations contribute to the relationship, and that their importance varies across developmental stages. Testing these possibilities presents considerable challenges.

Randomised controlled trials offer the gold standard in assessing causal relationships but their application to the study of associations between SES and CP is limited by ethical and practical constraints (Rutter, 2007). However, a growing body of work using quasi-experimental designs indicates that SES provides a causal component to the association as identified in reviews (Jaffee et al., 2012; Maughan et al., 2017) covering 12 empirical studies. This is further supported by the recent prospective register-based study utilising linked data from national registries in Norway which showed that parental income remained significantly

associated with child mental health difficulties including CP after taking into account other sociodemographic factors (Kinge et al., 2021). The associations were also present in the adoptee sample sub-analyses (i.e., children were genetically unrelated to their parents), thus controlling for potentially confounding effects of genetic factors. However, using a Finnish nationwide cohort in a sibling-comparison study design, Sariaslan and colleagues (2021) showed that despite earlier population-level associations there was no causal relationship between childhood family income and violent crime arrests. This focus on arrests for violence (including individuals who were convicted and acquitted) provides a valuable contribution by highlighting potential influences on severe offending. However, it differs somewhat from other studies in the field which typically consider a range of CP behaviours including those more covert or which do not lead to arrests. Importantly, within-family designs might conflate the role of exposure factors (e.g., low SES) and potential mechanisms (e.g., family interactions, parenting), and the lack of direct causal effect of income on arrests does not negate the potential total effect of income (Ledberg, Rajaleid, & Modin, 2022). Further work is needed to explore nuances in the forms of CP to which causal effects of SES extend and how long such effects may last. Notably, using a natural experiment design, Copeland and colleagues (2022) found that the positive effects (i.e., fewer risky and illegal behaviours) of cash transfer in childhood were maintained 20 years later.

Assuming that some part of the SES-CP association is causal, identifying the mechanisms that underlie this causal link between SES and CP is an important societal goal. This information can inform policies and interventions that aim to reduce both the overall levels of, and income inequalities in, CP in the community. Many researchers over the last 50 years have posited that SES functions as a distal risk factor for CP, with more proximal risk factors mediating the effect. The Family Stress Model (FSM; Conger et al., 1990), for example,

provides an influential theoretical account of the effects of SES on CP, as described in a number of reviews (Conger & Donnellan, 2007; Shaw & Shelleby, 2014). As summarised by Masarik and Conger (2017), the FSM specifies that financial difficulties put economic pressures on parents that cause distress. The distress is modelled to cause problems in interpersonal relationships between parents which in turn contribute to disrupted parenting behaviours. Distress is also proposed to lead directly to disrupted parenting. Disrupted parenting is thought to lead to adjustment problems in child and adolescent offspring in the family, such as CP. Initial evidence for the paths in the model was largely based on cross-sectional data (e.g., Conger et al., 2010). These studies provide weak evidence regarding the causal relationships posited by the FSM for the reasons discussed above regarding cross-sectional associations between SES and CP.

Causally informative data relevant to some aspects of the FSM is available, however. Jaffee and colleagues' (2012) review of quasi-experimental evidence noted that while familial confounding contributes to the cross-sectional relationships of CP with harsh parenting and parental psychopathology, these factors have an environmentally mediated effect on CP. Quasi-experimental studies have rarely addressed the mediation of SES effects on CP via intermediate factors such as those specified in the FSM. One exception is Akee et al.'s (2018) finding that quasi-experimentally increased parental income (through unconditional income transfer) led to improved relationships between partners and between parents and children as well as to improvements in child behaviour. This finding is consistent with the FSM's hypothesised mediation pathway. Other studies have also demonstrated the effect of increased income on parental wellbeing (Milligan & Stabile, 2011). However, these studies do not test all the steps in the proposed causal pathway. For example, Akee et al. (2018) cannot rule out the possibility that increased income improved child behaviour through an

unspecified mechanism and it was the improved child behaviour that led to better parent-child relationships rather than vice versa.

Alongside the FSM, it has also been suggested that the SES-CP relationship could be explained by the broadly conceptualised *investment* that parents or caregivers make in their child's environment. This model originates from the economics literature (e.g., Mayer, 1997) but has also been adapted to family contexts (e.g., Yeung et al., 2002) and termed the Family Investment Model (FIM; Conger & Donnellan, 2007). This defines investment as time and financial contributions such as providing a cognitively stimulating environment, extracurricular activities, or cultural experiences. The FIM has often been applied in the context of child cognitive outcomes (e.g., Sohr-Preston et al., 2013) but has also been extended to child mental health and CP outcomes. Interactionist perspectives that integrate FSM and FIM have also been tested (e.g., Martin et al., 2010). This provides a promising approach to further our understanding of the mechanisms underlying SES-CP relationships. However, it is also possible that other mechanisms that are not included in the FSM or the FIM play a role.

While experimental and quasi-experimental studies are valuable in testing the FSM and similar models, their scope and frequency is severely limited by ethical and practical constraints. Appropriately designed and analysed longitudinal studies, where potentially causal factors are measured prior to putative outcomes, can provide some of the most helpful data available to assess models of this kind. Longitudinal studies do not have the power to control unmeasured confounders in the way that quasi-experimental studies can, but by recognising the importance of elapsed time in testing relationships between hypothesised causal factors and outcomes offer substantial advantages over cross-sectional data.

A range of analytic approaches can test hypotheses regarding the mediation of SES effects on CP (Preacher, 2015). Panel models, in which predictors (e.g., family SES), distal mediators (e.g., parental discord), more proximal mediators (e.g., parenting), and outcomes (i.e., child CP) are each measured across temporal intervals, are well suited to capitalise on the multi-wave data provided by the many cohort studies that have been fruitful for developmental psychopathology research. For example, in a hypothetical cross-lagged panel model (CLPM) utilising data collected at three time points, the indirect effect (i.e., mediated effect) from SES to CP would be a product of paths from the predictor at time 1 to mediator at time 2, and from the mediator at time 2 to the outcome at time 3. These models typically include autoregressive paths which account for the stability of individual differences in modelled variables so that predictors at contact t-1 only account for unstable variance in the outcome at time t. It is also possible to include additional (cross-lagged) paths that model potential reciprocal effects, where the hypothesised mediator (e.g., parental discord) might influence the hypothesised causal variable (e.g., SES), and the hypothesised outcome (i.e., CP) might influence the hypothesised mediator (e.g., parental discord). This type of model offers one potential analytic approach that could usefully inform theory development with respect to the direction of causality.

An increasingly recognised extension to such models is the random-intercept cross-lagged panel model (RI-CLPM) where within- and between-person differences can be separated by the inclusion of a random intercept, i.e. a between-person intercept variance term (see Hamaker et al., 2015). This approach allows estimation of within-person autoregressive effects where each person can vary around their mean at different time points, and the cross-lagged effects (Mund & Nestler, 2019). However, it is important to note that this approach

has been critiqued in recent years for its limited control of unobserved stable confounders (Lüdtke & Robitzsch, 2021). These authors also note that focussing on within-person changes only quantifies the associations of fluctuations (around the individual's mean) rather than longer-term relationships between relatively stable risks and behavioural tendencies. Furthermore, Hübner and colleagues (2023) showed that, despite the popularity of the RI-CLPM in studying reciprocal effects, the resulting estimates are less consistent than those of standard CLPMs.

The present review critically examines the existing literature to integrate current evidence on the mechanisms linking family SES and child CP. This includes work explicitly addressing the FSM, work addressing the components of the FSM without explicitly invoking the FSM framework, and work that addresses other factors that might explain the link between SES and CP. We focus especially on the extent to which the published data and analyses can inform causal modelling of the processes underlying the link between SES and CP, such as the use of longitudinal data and quasi-experimental designs. We aim to extend current knowledge on the processes linking SES and CP by synthesising available evidence into a combined model of the key mechanisms, and by identifying the directions that future research can most fruitfully take.

Method

Search strategy and study selection

The review follows the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Page et al., 2021). The literature search protocol is described elsewhere (Piotrowska et al., 2012) and was previously registered in PROSPERO (CRD42012002193). This protocol was used to construct the database used in the meta-analysis of studies published between 1960 and 2012 which addressed the first two research questions in the preregistration (Piotrowska, Stride, Croft, et al., 2015). The present review addresses the third research question in the PROSPERO preregistration and is based on an updated version of this dataset with the coverage extended to February 2026. The update process involved literature searches conducted on June 15th 2020, July 15th 2022, May 20th 2025, and February 3rd 2026. Only the search procedures used in the extension are reported here. The search was carried out on the following databases: PsycInfo, Web of Science, Scopus, CINAHL, ASSIA, Sociological Abstracts, Worldwide Political Science, National Criminal Justice Reference Service Abstracts Database, EconLit, and ERIC. Additionally, grey literature sources were searched, including the Office of National Statistics and the System for Information on Grey Literature in Europe. Furthermore, forward and backward searches were conducted on key articles (i.e., those directly investigating the potential underlying mechanisms) in our growing database, while experts in the field recommended studies to be included in the screening process. Our search strategy was applied to the fields of titles and abstracts, and the search terms themselves related to three themes (Piotrowska et al., 2012): children (e.g., child*, adolescen*, teen*, "young pe*", youth* etc.), conduct problems (e.g., "antisocial behav*", "conduct disorder*", delinquen*), social class (e.g., "social inequality*", "socioeconomic status", "soci* posit*". All search terms are available in the Online Supplement.

Stage one record screening took place after duplicate removal. For each record, the title, abstract and keywords were screened according to the inclusion criteria for a link between SES and child CP. Records included in stage two screening required full-text articles. To pass stage two screening and therefore enter our database, a study was required to satisfy nine criteria: (1) English language was used in the full-text, (2) an empirical and quantitative approach was taken, (3) general population rather than targeted sample (e.g., children screened for psychopathology) was recruited, (4) participants aged from zero to 18 years, (5) an objective socio-economic status measure was used (i.e., SES indicators such as income, education, or occupation were used rather than individuals' perceptions of their financial strain or relative social position which are considered subjective SES), (6) a measure of CP was used, (7) an association was reported between SES and CP, and (8) all the necessary information was reported in the article to allow for inclusion assessment. To ensure potential mechanisms were being investigated, studies also needed to (9) present longitudinal analyses (i.e., SES was measured before CP) identifying mediators or moderators of the relationship between SES and CP, or in some other way explaining the relationship between these two variables. Studies from our 1960-2012 database were assessed against the new inclusion criterion (i.e., 9 - longitudinal study of mechanisms). First stage screening of titles and abstracts was completed by PJP and by GH for the 2025 and 2026 update, and the second stage screening and assessment against the inclusion criteria was completed independently by at least two reviewers (PJP, RR, GH). Any disagreements were discussed and final decision and reason for exclusion recorded. Figure 1 presents the study selection process.

<insert Figure 1>

Data extraction and quality appraisal

Data extraction was first piloted by two reviewers (PJP, RR) to ensure that all relevant data were extracted. Data extraction was then conducted by PJP, MF, and GH with 20% of the articles checked and verified by the second reviewer (RR). Each study was coded in terms of the mechanisms analysed. Each study could explore more than one mechanism and could therefore be coded more than once, with each mechanism entered as a separate record.

A number of tools such as the STROBE checklist (Von Elm et al., 2007) were initially considered for assessing study quality. However, these criteria were not specific enough to differentiate between design and analysis aspects that were relevant to the current review such as temporal order of studied constructs or consideration of reciprocal pathways. Following McCambridge and colleagues (2011) we assessed study quality using seven criteria regarding the included studies' capacity to inform our understanding of the SES-CP relationship. Six quality criteria were binary; studies were judged as to whether: (i) the participant sample size at T1 (time point 1) was 1,000 or more; (ii) there was evidence that the final (analysis) sample was =>80% of the original sample. In addition, studies scored one point (i.e., criteria met) when (iii) they analysed data with three or more separate time points (i.e., SES at T1, the mechanism variable at T2, and CP at T3, thus maintaining the temporal order; NA was recorded if this criterion was deemed not relevant such as for the moderator studies); (iv) controlled for the previous CP level to ensure that SES or mediator relates to the change in CP; (v) included tests of potential reciprocal pathways; (vi) controlled for sociodemographic variables appropriate for the sample (e.g., sex, age, ethnic background). The final criterion scored the analysis type between 1 to 3 points; 1 - regression models (e.g., hierarchical) including moderation analyses where variables could be assessed as to how they affected the SES-CP relationship (e.g., where the change in a regression coefficient could be attributed to a specific variable); 2 - separate 'mediation' pathways assessed between SES and mediator(s), and between mediator(s) and CP (i.e., regression models assuming

mediation mechanism and testing separate pathways); 3 - path analysis or structural equation models explicitly testing and reporting indirect effects.

Transparency and openness

We adhered to the PRISMA 2020 guidelines (Page et al., 2021); the summary of the included data is included in Tables 1a-d and detailed quality scoring is available in the Online Supplement. This systematic review was preregistered with PROSPERO (CRD42012002193).

Results

Study sample characteristics and quality

As presented in Figure 1, the 2013-2026 database search initially returned 15,159 records from which 8,453 were unique following duplicate removal. Three papers were identified by experts as relevant to the review and an additional 235 records were added from the 1960-2012 database as they also met our inclusion criteria. All the identified records were initially screened, and 737 were independently assessed by at least two reviewers against the inclusion criteria. This selection process identified 45 papers that met the eligibility criteria which resulted in 48 included studies; three papers reported two datasets that each individually met the inclusion criteria (Huisman et al., 2010; Parsons et al., 2021; Perez-McCluskey, 2002).

Figure 2 displays the distribution of included studies by publication year. Over half of the studies (n=28; 58.3%) were published in the last ten years of the review period (2016-2026). A detailed summary of the study characteristics is presented in Tables 1a-d; when papers were deemed to study two (or more) mechanisms, these are presented separately in the

relevant sections. The majority of studies (n=36; 75%) included an even gender balance (between 45-55% boys), and six studies included boys only (Bellair et al., 2019; Defoe et al., 2013; Le Blanc et al., 1998; Lipton & Smith, 1983; Perez-McCluskey, 2002). Sample sizes ranged from 37 (Spann et al., 2020) to 519,920 (Kent, Hogarth, Williams, Cornish, & Leckie, 2025) participants [Mean (SD) = 14,469 (74668); without Kent et al. (2025), Mean (SD) = 3,715 (4940)]. The majority of studies (n=28; 58.3%) came from the USA, some studies from the United Kingdom (n=7; 14.6%), Canada (n=6; 12.5%), the Netherlands (n=3; 6.25%), and single studies from Sweden, Taiwan, Norway, and France. Overall study quality was moderate (mean = 4.71; median = 5.0; mode = 5.0); the overall quality score for each study is included in the Tables 1a-d, and the detailed quality scoring is presented in the Online Supplement. The most commonly met quality criterion was including models that controlled for sociodemographic variables (77.1%); almost two thirds of the studies used a large sample (62.5%), about half had a high (=>80% of the original sample) follow-up rate (50.0%) or controlled for the previous level of CP (47.9%). Excluding moderator studies, only 15 (39.5%; out of 38 eligible studies) included three or more time points allowing for temporal ordering of the predictor-mediator-outcome path across the studied constructs, and only five studies (10.4%) probed potential reciprocal pathways.

<insert Figure 2>

We begin the review with studies that tested the whole FSM (including parental mental health, family functioning, and parenting), the FIM, and studies combining the two models in an *interactionist* perspective; next we consider papers that tested components of the FSM (e.g., parenting) in isolation. Then we review studies that addressed factors not considered in the FSM which include neighbourhood and school factors, language/cognitive abilities, peers,

life stressors, childcare, beliefs and values, and health and diet. Throughout the results section, the term *association* refers to cross-sectional relationships, and *prediction* refers to paths between variables with temporal separation (e.g., predictor variables at time point t and outcomes at time points t+1). A summary of the results by mechanism type is presented in Table 2. We also present an integrated model of the most supported mechanisms in Figure 3 including the number of studies examining each path to provide clearer context regarding the strength of support across pathways.

Family Stress and Investment perspectives

Overall, support for the FSM and investment pathways was mixed. Components of the FSM received some support across the studies in our database but attention in recent years has shifted to studying investment perspectives as alternate mechanisms (e.g., Simons et al., 2016) or testing models where investment affects FSM constructs such as parenting (Coley et al., 2021). Despite the small number of studies considering investment mechanisms and the wide range of constructs included (e.g., cognitive stimulation, cultural resources, crime rate), the investment perspective received considerable support as a mechanism underlying the SES-CP relationship. Parental mental health was not supported as an individual mechanism explaining the relationship between SES and CP, and there have been mixed findings regarding the role of parenting. Positive parenting, including supportive and sensitive approaches, received some support from two high-quality studies.

Of the included studies, three explicitly tested the FSM (see Table 1a). Barajas (2011) incorporated all the key FSM constructs: parental mental health, family functioning, and parenting. Support was found for the FSM in that lower SES was associated with family conflict and maternal reports of depression, which were in turn positively associated with

aggressive parenting and lack of warmth toward the child (only associated with family conflict), which in turn predicted CP. This study recruited a large sample and included additional controls in their analyses. However, SES was measured concurrently with the proposed mechanisms thus limiting the temporal ordering of key constructs. Stronger support for the FSM was found by Simons and colleagues (2016). They reported that low income (SES) was associated with higher economic stress that was then associated with increased parental depression. This, in turn, was associated with increased family conflict which predicted lower levels of nurturing parenting which negatively predicted later CP. Despite the relatively small sample size (N=422), this study captured the temporal order of the proposed model by measuring the key constructs at three different time points and controlling for prior levels of CP. Maintaining the temporal ordering of the key constructs and using a larger sample (N=1157), Backer-Grøndahl, Idsoe, Shaw, and Nærde (2025) found that the relationship between maternal education and child aggression was mediated by paternal harsh parenting. This effect, however, was very small ($\beta = -0.001$). No other longitudinal paths from parental mental distress to parenting stress, harsh parenting, or child aggression were significant and potential indirect effects including mental distress were not investigated.

Five more studies considered *multiple* potential mechanisms that are relevant to the FSM (see Table 1a). Family functioning (i.e., conflict) and parenting were considered as potential mechanisms in two studies (Lavigne et al., 2016; Le Blanc et al., 1998). In a high-quality study, Lavigne and colleagues (2016) found that lower SES predicted higher levels of CP via increased family conflict and increased scaffolding. However, these effects were no longer significant when prior CP was controlled. In addition, lower SES predicted higher levels of supportive parenting, but this did not predict later CP. Lavigne et al. (2016) considered parenting and family functioning (i.e., conflict) as two independent mechanisms which

contrasts with Le Blanc, McDuff, and Kaspy (1998) who proposed a sequential family control model. Le Blanc and colleagues (1998) showed that socio-economic disadvantage significantly predicted greater use of regulations, supervision, and punishments (parenting) and in turn, supervision and punishment (but not regulations) significantly predicted self-reported delinquency. However, family functioning did not mediate the relationship between SES and delinquency. Notably, in contrast to Le Blanc et al. (1998), Lavigne et al. (2016) included reciprocal pathways in their modelling and controlled for previous CP.

Using a similar sequential approach, Stern, Smith, and Jang (1999) found that parental distress and discipline mediated the effect of poverty on CP. However, there was no evidence that supportive parenting contributed to this pathway. In line with the parenting processes and the economic pressure construct central to the FSM, Lee (2022) found poverty was associated with higher economic pressure, which in turn predicted greater parental stress. In turn this predicted harsh parenting, which then predicted child CP. However, indirect effects were not tested. Finally, Piotrowska and colleagues (2022) found no evidence that the effect of SES on CP was mediated by parental mental health and family functioning conceptualised as involvement in decision making, feelings of acceptance, and discussions of emotions within the family. Instead, the results showed a significant indirect effect with the direction of causality reversed: lower SES predicted higher child CP and higher child CP predicted more parental mental health problems. This emphasises the importance of the longitudinal study designs which enable the probing of reciprocal effects, and the potential role of CP in predicting parent wellbeing. This study was based in data recorded at two time points but adopted a cross-lagged panel model using a half-longitudinal design (Preacher, 2015) to model the temporal ordering between both predictor and mediator and between mediator and outcome.

Among the studies testing aspects of the FSM, some authors also incorporated elements of the *investment model* as potential mechanisms. Simons and colleagues (2016) found that investment constructs including parental investment (i.e., helping with homework, involvement with teachers, supporting extracurricular activities) and neighbourhood disadvantage (i.e., crime, dilapidation) were not significant mediators, showing limited support for the investment model. This contrasts with Coley and colleagues (2021) who found indirect effects of SES on CP through educational resources, cultural resources, and concentrated disadvantage (investment constructs) which were associated with CP through cognitive stimulation. Similar significant indirect paths were also identified through paths from lower concentrated disadvantage and neighbourhood violent crime to lower harsh discipline, which was in turn associated with lower child CP. These pathways combined investment and FSM (i.e., parenting) constructs in explaining the relationship between SES and CP. Notably, the indirect effects operating through increased cognitive stimulation and lower harsh discipline remained significant when community contexts were omitted. This indicates the potentially more important role of parenting and supporting children's engagement in reading (cognitive stimulation) than community resources. Finally, although SES was significantly associated with emotional support, no significant indirect path to CP via emotional support was reported. This study supports the investment model (via community and neighbourhood context and cognitive stimulation) and is also consistent with the FSM pathway involving harsh parenting. However, despite testing alternative models and controlling for many potential covariates, the study did not maintain full temporal order between the key constructs as the SES and key mediator variables were averaged across multiple waves which lowered the quality of the study.

Finally, using the data from the Family Transitions Project, Martin and colleagues (2010) found that an interactionist model that incorporates FSM and investment pathways fit their data best. Specifically, they found that lower SES was associated with lower emotional (e.g., childrearing enjoyment, parental monitoring, consistent discipline) and material investments (e.g., adequate material resources, books in the home, residence and neighbourhood quality). Higher emotional investment (i.e., parenting) significantly predicted lower CP and was the strongest mediator of the effect of SES on children's CP. This was followed by the indirect effect via material investment, which predicted lower CP (only when reported by fathers).

Parenting

Ten studies focused on different aspects of parenting as a mechanism linking SES and CP. Overall study quality and results were mixed. Parenting constructs included supervision and discipline, supportive/positive parenting including warmth, or parental involvement and attachment (see Table 1a). Some studies focussed on specific parenting dimensions and are discussed in the first parenting subsection below. Studies including combined parenting dimensions are discussed in the second subsection. Although a mediating role of supervision and punishment (Le Blanc et al., 1998) and discipline (Stern et al., 1999) has been found as reported above, parenting does not seem to explain the relationship between SES and CP particularly well when it is operationalised as supervision, or using mixed constructs of supervision, punishment, and warm/supportive parenting. Somewhat stronger evidence was found for a role of positive/supportive parenting. This, however, was not the case in the previously discussed studies (Lavigne et al., 2016; Stern et al., 1999) that tested multiple FSM mechanisms.

<u>Individual parenting dimensions</u>

Bornstein and colleagues (2018) reported that higher SES was associated with more supportive parenting which in turn predicted lower teacher reported CP, and Mills-Koonce and colleagues (2016) used formal tests of indirect effects to show that the association between income and CP was mediated by sensitive parenting behaviour with significant indirect effects from SES to CP via sensitive parenting. An indirect effect via harsh/intrusive parenting was not found. Consistent with this last point, Bellair and colleagues (2019) found that the addition of parental supervision did not affect the relationship between persistent economic hardship and CP. It should be noted that in this study persistent economic hardship did not significantly predict CP. This could reflect the moderate quality of the study or the persistence of economic hardship modelled as a trajectory. Furthermore, Bornstein and colleagues (2018) found that parental cognitions (i.e., knowledge, satisfaction, internal attributions of parenting success) were not associated with SES. One study (Awada & Shelleby, 2021) tested bidirectional predictions between parenting and CP and found that higher SES significantly predicted lower positive parenting, but none of the parenting subtypes (i.e., lax, overreactive, positive) predicted later CP. Instead, CP predicted more overreactive, lax, and less positive parenting. This study, however, was not designed to examine indirect effects as it focussed on the bidirectional paths between parenting and CP. Finally, Brislin, Choi, and Hicks (2025) reported that SES significantly interacted with parental involvement such that low SES and low parental involvement resulted in higher levels of delinquency.

Combined parenting dimensions

Five studies examined different parenting dimensions simultaneously as combined constructs including attachment, warmth, approval, control/discipline, or punishment. Three of these studies were of moderate quality and did not find evidence in support of parenting

mechanisms contributing to the SES-CP association (Eamon, 2001; Stern & Smith, 1995; Tyler & Bersani, 2008). Conversely, Odgers and colleagues (2012) showed that the effect of SES on CP was no longer significant when parental monitoring and warmth were modelled as simultaneous predictors. In this study, the authors considered maternal warmth and parental monitoring as measures of *supportive parenting*. Similarly, the high-quality study by Haggerty and colleagues (2013) that included parental monitoring, discipline, consequences/punishment, and attachment in their parenting measure, showed that higher income was associated with more optimal parenting, and the impact of parenting on CP was further mediated by reduced relationships with deviant peers. This finding highlights the potential role of parenting and also emphasises that parenting may not act in isolation but might instead involve interplay with other mechanisms.

Parental mental health

We identified three studies across two papers that examined *parental distress/mental health* as a potential mechanism linking SES and CP (Amone-P'Olak et al., 2011; Huisman et al., 2010). As shown in Table 1a, all the studies used well-established large cohort datasets - the Avon Longitudinal Study of Parents and Children (ALSPAC; UK), and the Tracking Adolescents' Individual Lives Survey (TRAILS, the Netherlands). However, the overall study quality was low: despite large sample sizes, these studies focussed on two time points only. Furthermore, none controlled for prior CP or tested reciprocal effects.

Amone-P'Olak and colleagues' (2011) analysis of the TRAILS dataset examined lifetime parental psychopathology including dimensions of depression, anxiety, substance dependence, persistent CP, and psychosis (Amone-P'Olak et al., 2011). The other two studies focussed on depression (Huisman et al., 2010). Overall, these three studies did not support parental mental health as a potential individual mechanism linking SES and CP. All three

studies showed that SES predicted later CP (in linear or logistic regression models) and that this relationship remained when a measure of parental mental health was included (Amone-P'Olak et al., 2011; Huisman et al., 2010). Results were consistent across different measures of SES (maternal education; income, education, occupation composite) and mental health (lifetime psychopathology; depression).

Cognitive ability

Seven studies examined the role of child cognitive ability, focussing on reading and language skills (Parsons et al., 2021; Piotrowska et al., 2022), academic performance (Defoe et al., 2013), measuring cognitive ability using established intelligence assessments (Huisman et al., 2010) or functional development which included socio-emotional, language, problem solving, physical, and creative development domains (Kent, Hogarth, Williams, Cornish, & Leckie, 2025); full details are presented in Table 1b. Most of the studies scored high on the quality criteria. Overall, the interest in cognitive ability as a potential mechanism did not translate into evidence supporting its role. Only one study found that academic achievement measured through parent and teacher reports of performance in reading, math, writing, and spelling mediated the effect of SES on delinquency (Defoe et al., 2013). This high-quality study used a sophisticated design including multiple time points, controlling for prior CP, and modelling potential reciprocal pathways. Kent et al. (2025) found a significant interaction between early childhood free school meal eligibility and functional development on the presence of a police national computer record (i.e., caution or conviction of a recordable offence) by adolescence. In their analysis of 519,920 electronic records from the Department for Education, Kent and colleagues (2025) also found that those in poverty and with low functional development had the greatest risk of the police record, and that was slightly amplified by the presence of both risks. However, the remaining six studies in this section found no effect of broadly

conceptualised child cognition in explaining the SES-CP relationship. These included studies that explicitly modelled the hypothesised indirect effect (Piotrowska et al., 2022) and studies showing that the addition of cognitive variables did not affect the SES-CP relationship (Huisman et al., 2010; Parsons et al., 2021).

Neighbourhood and School

As shown in Table 1c, six studies addressed the role of neighbourhood in the SES-CP relationship focussing largely on neighbourhood disadvantage with two studies considering greenspace availability. Overall, the quality of the studies in this section was mixed and there was little evidence supporting a role of neighbourhood characteristics in the effect of SES on CP. The highest quality study (Simons et al., 2016) found neighbourhood disadvantage was not a significant mediator. Similarly, Vogel and South (2016) reported that neighbourhood disadvantage did not contribute to the SES-CP relationship. However, the statistical model used was not well suited to study SES-CP mechanisms as reflected in its lower overall quality score. Conversely, Coley and colleagues (2021) found concentrated disadvantage and violent crime rate mediated the effect of SES on CP through associations with harsh parenting and cognitive stimulation (concentrated disadvantage only). This suggests that SES might influence the effects of neighbourhood on CP via proximal variables such as parenting. The two studies investigating the moderating effects of greenspace exposure found no evidence that residential greenness influenced the relationship between SES and CP (Bolanis, 2024; Chazelas, Parker, Barreto-Zarza, Charles, & Melchior, 2025).

Finally, Burrington (2018) examined the role of neighbourhood disadvantage in combination with immigration status as potential moderators of the relationship between SES and CP. They found that youth with first generation immigrant status from low SES families had the

highest odds of CP in the most advantaged neighbourhoods. In contrast, high SES first generation adolescents had the highest probability of CP in the least advantaged neighbourhoods but the lowest in the most advantaged neighbourhoods. This suggests a role for relative deprivation, the gap between family or individual SES and that of the neighbourhood, in predicting child CP.

Only two studies examined the role of school characteristics in the SES-CP relationship, and both received low quality scores. As Table 1c shows, Higgins and colleagues (2020) used data from the Belfast Youth Development Study and focussed on school attachment and commitment as well as school safety (i.e., frequency of fights in the school grounds). They found that the relationship between SES and offending (i.e., a CP construct) was no longer significant when school variables were added to the model indicating that school attachment, commitment, and safety may contribute to the SES-CP relationship. In addition, there was an interaction between school fighting and SES (measured by eligibility for free school meals). Adolescents from higher SES backgrounds (i.e., not receiving free school meals) were involved in a lower proportion of school fights, a variable that was in turn associated with lower rates of offending behaviour. It is important to note that only a two time point analysis predicting the intercept of offending met our review inclusion criteria. This weakens the conclusions that can be drawn about the school behavioural variables explaining the SES-CP relationship. The second study (Lipton & Smith, 1983) focussed on attachment to school operationalised by academic performance, perceived teachers' interest in the respondent, perception of the value/importance of education, commitment to finishing school, and time spent doing homework. This study reported a positive suppressor effect of school variables. When school attachment was controlled, the effect of SES on delinquency (i.e., CP construct) became significant. This suggests that the SES-CP relationship might be related to SES

differences in attachment to school so that when the school attachment was controlled, the effect of SES on CP emerged.

Peers

Only two studies considered the effect of peers (see Table 1d). As noted above, the higher quality study by Haggerty and colleagues (2013) found that the impact of parenting on CP was mediated by deviant peer association. This suggests that peer associations might be a more proximal factor affecting child behaviour, which is influenced by distal family environment factors such as parenting. Further supporting the peer effect, Dishion, Ha, and Veronneau (2012) found that lower SES was associated with 'deviant peer clustering' which in turn predicted adolescent CP. Although only two studies explicitly addressed potential peer mechanisms, it is likely that school or neighbourhood constructs indirectly include peer associations and friendships.

Life Stressors

As described in Table 1d, three studies examined the roles of life stressors in the SES-CP relationship with two studies reporting evidence of mediation (Amone-P'Olak et al., 2009; Guerra et al., 1995). Specifically, Amone-P'Olak and colleagues (2009) found that environment-related stressors such as chronic illness, death of a family member, or parental divorce rather than person-related stressors (e.g., chronic illness, bullying, fewer friends than desired, romantic breakup) contributed to the SES-CP relationship. However, this effect has not been consistently found in the literature; a study considered higher quality (Piotrowska et al., 2022) found no significant SES-CP indirect effects through stressful life events including similar indicators such as separation and marital difficulties, serious illness/stay at hospital, or major accident. Instead, the authors reported an indirect effect from SES to stressful life

events via increased level of CP. Despite all three studies including relatively comparable sample sizes and modelling data from two time points, they varied in their control of potentially confounding factors. Only Piotrowska and colleagues (2022) controlled for previous CP as well as child age and sex while only previous CP (Guerra et al., 1995) or sociodemographic (Amone-P'Olak et al., 2009) variables were controlled in the other two studies.

Childcare

We identified three studies that examined the effect of childcare arrangement on the relationship between SES and CP, all conducted in Canada (Table 1d). One found that childcare arrangements were not associated with CP, conceptualised as disruptive behaviour, and there were no significant interactions with SES (Garon-Carrier & Bégin, 2021). Importantly, propensity score matching was used to control for selection bias between children exclusively in parental care and those in other childcare arrangements (e.g., daycare centre, family daycare, care by relatives or nonrelatives). However, also using propensity score weights to control for the likelihood of following different childcare intensity trajectories (based on the amount of time spent in childcare), Orri and colleagues (2019) found a significant interaction between childcare intensity and family SES in predicting aggressive behaviour; the effect of experiencing moderate intensity childcare on lower reported aggression was specific to children from lower SES backgrounds. However, no such effect was observed on oppositional behaviour. In contrast, Kingsbury and Findlay (2025) found a significant interaction between SES and childcare participation, where those with higher SES and higher level of non-parental childcare (i.e., 35 or more hours per week) had greater oppositional symptoms. The two higher quality studies (Garon-Carrier & Bégin, 2021; Orri et al., 2019) applied comparable analyses on Canadian samples and were judged to

be the same quality. It is possible that the discrepancy in the results reflects different conceptualisations of CP where childcare arrangements are not related to generic disruptive behaviour, defiance, or oppositionality (Garon-Carrier & Bégin, 2021; Orri et al., 2019) but play a role in physical aggression (Orri et al., 2019).

Beliefs/Values

Three studies of moderate quality examined potential mechanisms involving beliefs and values (see Table 1d). This potential mechanism suggests that SES may influence beliefs about aggression such as whether it can be considered appropriate or normative which in turn may contribute to later CP. Guerra and colleagues (1995) found the prediction from SES to CP was mediated by children's normative beliefs about (approval of) aggression. Further support for delinquent values as a mechanism was found in two studies reported by Perez-McCluskey (2002). SES was negatively associated with strain and predicted challenge of legitimate and conventional norms of goal attainment (i.e., challenging/rejecting socially acceptable behaviour), which was in turn associated with delinquent values. Delinquent values in turn predicted CP in the Rochester Youth Development Study, but not in the Denver Youth Survey (see Table 1d).

Health and Health Behaviours

Two high quality studies specifically addressed child health problems and found that they did not contribute to the SES-CP relationship (Table 1d). This result was found both when physical health was assessed as a single item question (Piotrowska et al., 2022) and when multiple indicators of common health problems such as headaches and joint pain were used (Stogner et al., 2014). Stogner and colleagues (2014) found that lower SES was significantly

associated with greater drug/substance use (i.e., marijuana, cocaine, alcohol, smoking) which in turn predicted later violence. Note, however, that although drug use can be considered a health mechanism, it might also overlap with some CP operationalisations. When testing reverse causality, Piotrowska and colleagues (2022) found a significant indirect effect from SES to child physical health that was mediated by child CP. Similarly, Stogner and colleagues (2014) reported that lower SES was associated with higher level of violence, which in turn predicted more health problems. The evidence from these two studies indicates children's CP can contribute to subsequent health problems rather than health problems predicting future CP.

Two other studies, however, found associations between SES and brain morphology and birth complications. DiLalla and colleagues (2021) reported significant interactions between SES and birth complications and negative emotionality in predicting child CP. As income decreased, children with greater negative emotionality were at increased risk of higher CP. For birth complications, children from families with moderate to fairly high incomes and those with more birth complications were at risk of higher level of CP, but children from lower income families were more at risk of having higher CP regardless of birth complications. Spann and colleagues (2020) focused on brain morphology and found that SES was positively correlated with CP, but antisocial outcome was not significantly correlated with the brain regions (distance values) that they found were associated with low SES. This study outlines an interesting avenue that could potentially provide an additional level of understanding of the SES-CP relationship. However, it is limited by the small sample size (N=37) and correlational analyses.

Among the studies exploring the role of health behaviours, Alawie, Olivier, and Dupéré (2025) did not find evidence that child physical activity affected the relationship between

family income and physical aggression. Some evidence, however, was found for the role of child's diet (Wu et al., 2020) in the only study in the review that addressed this question. Using a large sample from the Taiwan Birth Cohort Study, Wu and colleagues (2020) showed that higher SES, as measured by maternal education, predicted a diet lower in fats, sugar and salt, which in turn was associated with lower level of aggressive behaviour (CP). Despite only two time points being available, the study was judged high quality as there was control for previous CP and for other likely covariates including child's sex, marital status, and internalising difficulties.

Other mechanisms

This section discusses the remaining included studies, which each considered the role of other potential mechanisms that have not been covered above. Overall conclusions on the role of the mechanisms studied here cannot be drawn at this stage, as only one study has addressed each of the mechanisms considered, and the quality of the studies was low to moderate. However, these studies may highlight some potential new leads.

Plenty (2018) studied the role of youth economic resources (i.e., not being able to afford activities, cash margin/disposable cash) and found no evidence that this explained the effect of household income on CP. Two studies explored the potential moderating role of gender and immigration status. The latter was considered in combination with neighbourhood disadvantage (Burrington, 2018) and is discussed above in the neighbourhood section. Wojciechowski (2025) tested the interactive effects of income and gender as predictors of violent offending in childhood. The author reported a *marginally* significant interaction where no gender differences in violent offending were present at the lower income levels, however, the protective effect of higher income was significantly stronger for girls compared

to boys. Finally, Le Blanc and colleagues (1998) in their study of family functioning/parenting as a potential mediator, showed that despite mother's childbearing age not having a direct effect on delinquency, it impacted family constructs including increased socio-economic disadvantage, family adversity, or parenting practices. This highlights the possibility that other factors (e.g., mother's age) may affect the key constructs explored in this review - i.e., SES, potential mechanisms, and CP outcomes.

Summary

This results section provided a detailed overview of the research into the mechanisms underlying the SES-CP relationship while carefully considering the quality of studies. The summary of the results by mechanism type including the number of studies addressing each of the potential mechanisms is presented in Table 2. We also presented an integrated model of the most supported mechanisms in Figure 3 where the solid lines indicate stronger evidence base.

Discussion

This systematic review critically synthesised the current state of evidence on the potential mechanisms underlying the relationship between family SES and child/adolescent CP. As expected, the approaches used in the included studies were heterogenous and lent themselves to qualitative review rather than quantitative synthesis. A large number of databases were searched resulting in 48 included studies spanning over 40 years (1983-2026) and eight countries. Of the included studies, over half were published in the last ten years highlighting that this topic is of current research interest. The overall quality of the studies (assessed in the context of their suitability to inform our understanding of the SES-CP relationship) was

moderate. Despite the inclusion criteria requiring longitudinal designs allowing the identification of the temporal order between SES and CP, many studies did not control for prior levels of CP nor consider potential reciprocal effects in which CP may function as a predictor rather than as an outcome of adversity. Even among the studies aiming to further explain the SES-CP relationship, formal tests of indirect effects were often missing.

Among the studied mechanisms, the FSM and its composite pathways have received most attention, highlighting its continuing influence on the literature and our understanding of the family systems and the impact of socio-economic disadvantage on families and child outcomes. It should be noted, however, that this review only included three studies formally testing the FSM. A number of highly cited FSM studies relied on cross-sectional data (e.g., Conger et al., 2010) or used a subjective assessment of economic stress/pressure (e.g., Simons & Brown, 2022) which did not meet our inclusion criteria. Our rationale for excluding studies that only contained subjective assessments of SES was that they may partly reflect a psychological disposition to view circumstances negatively rather than reflecting actual economic hardship. Such a disposition might also be correlated with other FSM components, including parental mental health, and therefore might inflate correlations between modelled constructs.

The most comprehensive FSM tests included in our review came from the two studies that were explicitly designed and analysed to test pathways linking SES to CP (Barajas, 2011; Simons et al., 2016; Backer-Grøndahl, Idsoe, Shaw, & Nærde, 2025). However, only one of these studies included three time points *and* controlled for prior CP (Simons et al., 2016). None of these studies considered potential reciprocal effects. This is especially important given that other studies in this review reported ‘reverse causality’ effects involving the FSM

constructs such as parental mental health (Piotrowska et al., 2022) or parenting (Lavigne et al., 2016). Furthermore, three studies incorporated elements of the investment or interactionist perspectives highlighting other potential mechanisms external to the FSM pathways (Coley et al., 2021; Martin et al., 2010; Simons et al., 2016). Although Simons and colleagues (2016) supported the full FSM with investment pathways being non-significant, Coley et al. (2021) found stronger support for investment factors such as education or cultural resources and cognitive stimulation with some support for harsh parenting as a potential mechanism. On the other hand, Martin and colleagues (2010) reported stronger support for parenting than material investment.

A number of studies have tested paths between SES and CP via individual components of the FSM. Poor parental mental health was not supported as a mechanism in these studies. It is still possible that, as suggested in the original FSM (Conger et al., 1990), parental mental health contributes to other more proximal factors and affects child outcomes, for example, through parenting (Simons et al., 2016; Stern et al., 1999). A recent systematic review and meta-analysis by Goodman and colleagues (2020) supported parenting quality as a mediator of the relationship between maternal depression and child outcomes including externalising difficulties. This review, however, focused only on maternal depression rather than a broader parental mental health construct and included attention and hyperactivity difficulties in their conceptualisation of externalising symptoms, thus differing from the current review. Assuming that parental mental health affects other more proximal factors such as parenting, we would still expect the path via poor parental mental health to be highlighted in the studies reviewed here, which was not the case.

The most common individual FSM mechanisms to be studied focused on parenting producing mixed results. A number of studies of varying quality did not support parenting as a mechanism underlying the SES-CP relationship. However, two studies found evidence for positive, warm, and supportive parenting as a mediator (Bornstein et al., 2018; Mills-Koonce et al., 2016). Despite both of these studies being classified as high quality, a larger evidence base would be desirable to support firm conclusions. Importantly, we also found some support for supervision and discipline as a potential parenting mechanism, but the evidence came from the studies that also incorporated parental warmth and attachment into their parenting measures (Haggerty et al., 2013; Odgers et al., 2012).

This highlights important issues in consistently conceptualising and operationalising parenting constructs and the need for more specificity when exploring the relationships between parenting and child outcomes (Smetana, 2017). The original FSM work focused on nurturant and involved parenting which is thought to incorporate warm and supportive parenting practices, monitoring, and discipline (Conger et al., 1992). Some of the approaches used in the reviewed studies included simultaneous tests of different practices such as punishment, warmth, and support (Tyler & Bersani, 2008) while others focused on specific parenting practices such as supervision (Bellair et al., 2019), or used overarching categories of negative, positive, lax, or supportive parenting (e.g., Awada & Shelleby, 2021; Bornstein et al., 2018; Odgers et al., 2012). The initial support for positive parenting practices such as warmth and support highlights the need for more consistent categorisations of parenting dimensions but also indicates that it is possible for only some dimensions to play a role linking SES and CP. As such, it is essential that different parenting practices such as discipline or punishment are tested independently from parent-child attachment or warmth in future studies.

The FSM has been much studied and reviewed with often positive conclusions (e.g., Masarik & Conger, 2017). However, many studies included limited temporal ordering, did not test reciprocal pathways, did not control for previous CP levels, and focussed on subjective SES assessments. We did find some studies of sufficient quality to meet our inclusion criteria and they do not provide compelling support for the FSM. There was partial support for the FSM from studies explicitly testing the full model (e.g., Gard et al., 2020) although these studies also found evidence that was at least as persuasive for the alternative investment pathway. Similarly, many of the studies that tested components of the FSM did not fully support their involvement. The evidence base supporting FSM components seems no stronger than that supporting some of other constructs reviewed here that are not part of the FSM. We suggest that more data and further analyses that control for previous CP levels and consider reciprocal effects and bidirectional relationships between child and family factors will be needed to fully understand the processes underlying the association between SES and CP. It is also possible that, while the FSM 'stress' pathway is an important component of the effect of SES on CP, additional pathways may also perform a role.

One such potential pathway is the family investment perspective including factors associated with educational and cultural resources, which received considerable support from studies included in our review (Coley et al., 2021; Martin et al., 2010; Simons et al., 2016). However, its conceptualisations and operationalisations vary substantially; from reading with children, providing a stimulating home environment, extracurricular activities, additional cultural and educational resources, to neighbourhood quality (e.g., neighbourhood disadvantage, crime). This highlights the difficulty in assessing these potential mechanisms as independent from each other, and from other potential mechanisms. For example, Coley and colleagues (2021)

found indirect effects from neighbourhood concentrated disadvantage and violent crime rate through harsh parenting and cognitive stimulation. This suggests that investment constructs cannot be easily separated from neighbourhood effects or broadly operationalised cognitive ability as educational resources and cultural resources (*investment*) can be associated with CP through cognitive stimulation (Coley et al., 2021).

Despite the inclusion of several high-quality studies, the current review found little support for neighbourhood characteristics such as disadvantage or greenspace availability. Neither study testing the role of residential greenspace found support for it functioning as a mechanism, and only one study (out of four) supported pathways from neighbourhood concentrated disadvantage and violent crime to CP (Coley et al., 2021); however, this pathway went through parenting. This suggests that potential neighbourhood effects may work through more proximal variables such as parenting to contribute to CP risk. The same might be true for school effects but not for peer deviance. Despite some indication that school attachment, commitment, and safety may play some role in the SES-CP relationship (Higgins et al., 2020), support for mechanisms operating through school characteristics was limited. However, two studies that considered the effects of peers found that associating with deviant peers contributed to the effect of SES on CP (Dishion et al., 2012; Haggerty et al., 2013). It is possible that the peer effects found in this review relate to broader school and neighbourhood effects and that the impact of friendships may be indirectly included in the school or neighbourhood measures. It will be crucial for future studies to further explore the associations between school, neighbourhood, and peers in explaining the SES-CP relationship, and to incorporate multilevel modelling approaches that can separate personal, family, and neighbourhood effects. This also highlights the difficulty in synthesising the existing literature and any attempt to meaningfully compare and evaluate the strength of

evidence for separate mechanisms as they are likely to indirectly include aspects of other mechanisms.

Finally, this review found some initial support for the role of individual delinquent values and normative beliefs about aggression as a potential mechanism (Guerra et al., 1995; Perez-McCluskey, 2002) as well as diet where higher SES predicted diets lower in fats, sugar and salt, which in turn predicted less aggressive behaviour (Wu et al., 2020). There was also some indication of potential SES and gender interaction in predicting violent offending (Wojciechowski, 2025). There was no evidence supporting more general health as contributing to the SES-CP relationship; instead, the evidence from two studies indicated that CP can contribute to children's health problems (Piotrowska et al., 2022; Stogner et al., 2014). The effect of CP on general health in adulthood has been well-documented (e.g., Bevilacqua et al., 2017), but an emerging body of work identified in this review indicates that this effect may be important over shorter developmental periods as well with potential intervention implications. Furthermore, the role of stressful life events and childcare arrangements in the mediation of the effect of SES on CP has received limited attention. The studies that have addressed these mechanisms have produced mixed findings. Similarly, despite some initial associations with brain morphology (Spann et al., 2020) or birth complications and negative emotionality (DiLalla et al., 2021), there has not yet been strong tests of their roles in the SES-CP relationship.

We note there are other variables that have not received much attention in the studies included in the review that could contribute to explaining the association between SES and CP. These should receive more research attention in the future. For example, Hosokawa and Katsura (2017) found that social competence was influenced by negative parenting practices

and marital conflict, and negatively associated with CP. This suggests that child social competence could be an important protective factor in the context of socio-economic disadvantage. Furthermore, Choy and Raine (2022) showed that vitamin D deficiency could affect the relationships between early social adversity and child CP, and that the positive relationship between social adversity and CP existed only among the vitamin D-insufficient sample. Similarly, Bertoldi, Evans, Oskarsson and colleagues (2022) showed that childhood low resting heart rate predicted later criminal behaviour, and this relationship was particularly evident among young people who were persistently classified as having low SES. It is also possible that other variables such as maternal age at first childbirth (Van Vugt et al., 2016) or paternal incarceration (Dwyer Emory, 2018) could act as 'third variables' that are associated with both socio-economic disadvantage and CP. Finally, gene and environment interactions have been explored in the context of CP. For example, Cheung, Paige Harden, and Tucker-Drob (2014) found significant SES moderation of nonshared environmental effects such that these factors were more strongly related to CP at lower levels of SES. This suggests that child CP could be more attributable to unique experiences among children from lower SES backgrounds. More recently, potential epigenetic mechanisms such as DNA methylation patterns of inflammation and biological aging have been shown to associate with aggression problems and contribute to the relationship between socioeconomic inequality and child mental health (Raffington, Tanksley, Vinnik et al. 2024). As noted by Burt (2022), numerous multilevel and interconnected factors are likely influencing CP. These may include broadly genetic, environmental, cultural, temporal, and spatial factors which emphasises the importance of context for the development of CP.

The current review is the first to critically synthesise the evidence base for mechanisms that may explain the relationship between family SES and child CP. Despite the preregistered and

piloted search strategy, some limitations and difficulties should be considered. Studies not in English were excluded and over half of the studies in the review came from the USA with smaller representation from the UK, Netherlands, Canada and single studies from Sweden and Taiwan. This limits the generalisability of the review findings across different family policy, socio-economic, and cultural settings. However, we note that more relevant work on social inequality and child mental health as well as potential mechanisms is being conducted in countries such as China (Jia et al., 2021), Malaysia (Kassim & Hutagalung, 2020), Croatia (Pandžić et al., 2022), or Turkey (Williams et al., 2022). All these studies were identified in our literature search but did not meet our inclusion criteria because of reliance on cross-sectional data. This illustrates the need to develop methodological sophistication in all settings. Although our review strategy was not explicitly designed to search for quasi-experimental studies, we found two studies applying propensity score matching techniques (Garon-Carrier & Bégin, 2021; Orri et al., 2019) and believe that more quasi-experimental studies would have been found had they existed. Bringing these techniques as well as random intercept models to the field may lead to further progress.

This review also highlights variability in the designs and analysis types applied to studying SES-CP links as well as the key constructs studied. As can be observed in the study summary characteristics, a wide range of measures of SES, CP, and potential mechanisms have been used. This literature commonly wrestles with operationalisations of SES using single indicators such as parental income or education (e.g., Parsons et al., 2021; Wu et al., 2020), composite scores incorporating multiple SES indicators (e.g., Amone-P'Olak et al., 2011), or modelling SES as a latent construct (Martin et al., 2010). Each of these methods has strengths and limitations, and it is possible that variations in the conceptualisation and operationalisation of SES contributed to the variety of findings identified in this review.

Although more work is needed in this area, one recent study showed that latent operationalisations of family sociodemographic status did not account for a greater proportion of externalising problems variance than single-item or composite scores commonly used in the studies included in this review (King & Waldman, 2024). Furthermore, the heterogeneity of CP measures and conceptualisations of the key mechanisms (e.g., parenting dimensions) affected the classification and grouping of mechanisms, and complicated synthesis efforts. Some constructs spanned disciplinary and developmental domains, introducing an unavoidable degree of subjectivity into their categorisation. In addition, some potentially relevant mechanisms could not be included when they were analysed jointly with other constructs and estimates were not presented for each construct separately.

Although most of the reviewed studies focused on separate mechanisms, it is likely that a number of mechanisms including numerous interactions and bidirectional relationships underlie the observed SES-CP correlation. Therefore, more complex and comprehensive models will be needed to provide a complete model of the SES-CP relationship. This has been partially addressed by papers identified in this review (e.g., Le Blanc et al., 1998; Simons et al., 2016). However, further paths and their bidirectionality should be considered. Overall, the design of the reviewed studies and whether single mechanisms or sequential models were considered likely contributed to the inconsistencies in findings. This review highlights the need for more careful research and use of designs that are best suited to studying processes and mechanisms such as path analysis/structural equation modelling including random-intercept cross-lagged panel models and using designs that incorporate multiple time points, control for the previous level of studied constructs to ensure that the selected variables predict changes in outcomes, and that explicitly test reciprocal pathways.

There is urgent need for future research to increase efforts to model family systems in a more dynamic way and to fully capitalise on the rich longitudinal data available and build such longitudinal infrastructure in countries less well represented in the current literature.

This review is the first comprehensive synthesis of the available evidence on the mechanisms underlying the relationship between SES and CP. It provides a new perspective on the quality and strength of evidence base for traditional pathways such as the FSM and new emerging potential mechanisms such as investment, peer associations, and diet. Overall, there is some mixed support for the family stress pathways particularly involving aspects of supportive and warm parenting and somewhat weaker support for supervision and discipline. There is encouraging support for the investment pathways involving cultural and educational resources, neighbourhood characteristics, and for models that incorporate family stress experiences and investment pathways. The review also highlighted that a number of other factors such as diet or associations with antisocial peers may contribute to the SES-CP relationship and should be considered more thoroughly in future research.

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Fig. 1. PRISMA flow diagram.

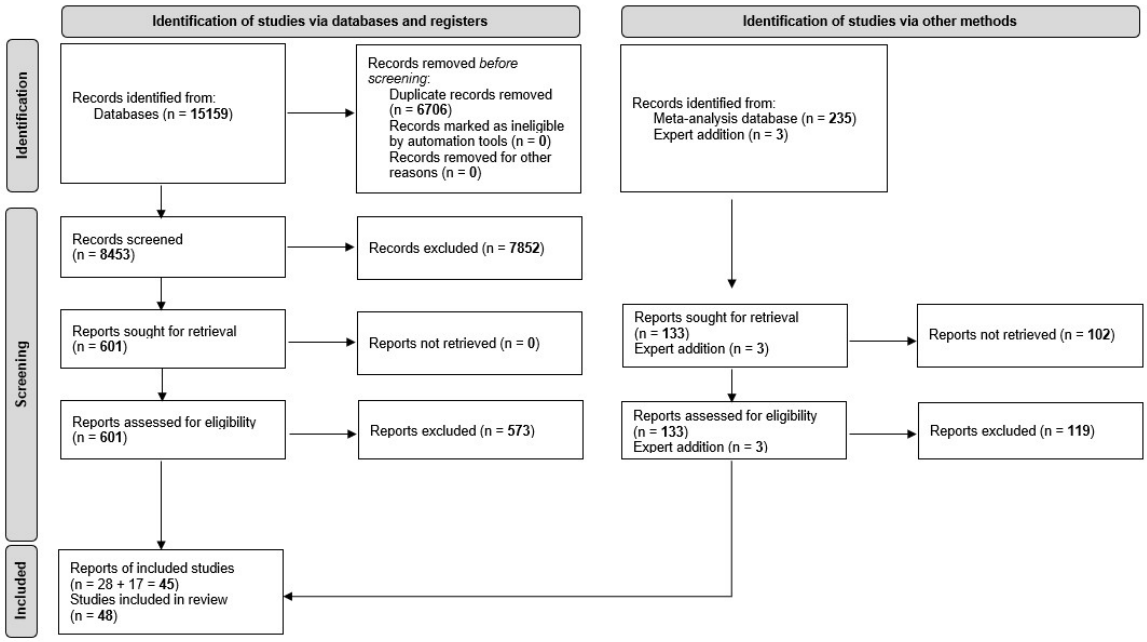


Fig. 2. Included studies by publication year.

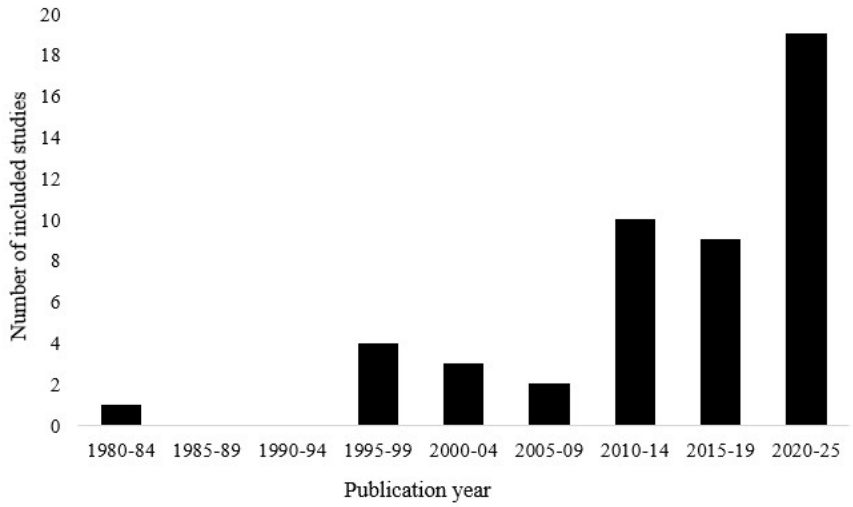


Fig. 3. An integrated model of the mechanisms underlying the relationship between SES and CP.

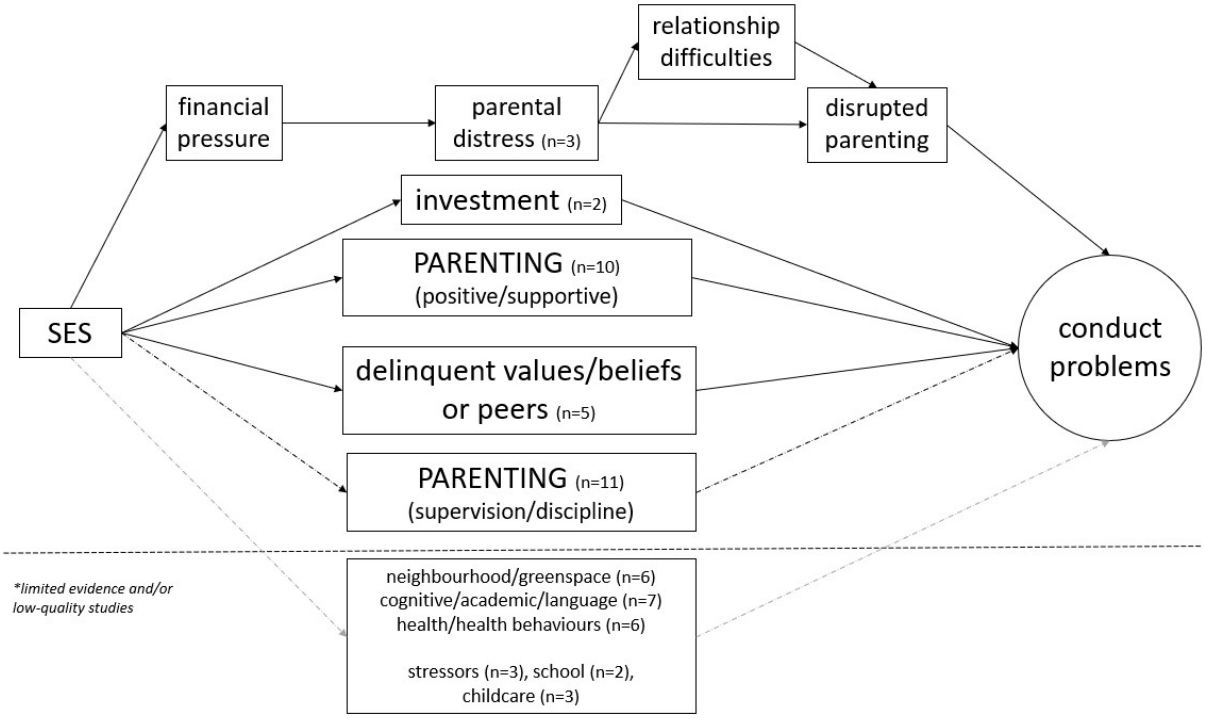


Table 1a. Summary characteristics of the included studies - Family Stress Model and investment mechanisms.

Author(s)	Sample (N; age at T1; % male)	Study, Country	Quality score	Key measures
FSM and investment perspectives				
Backer-Grøndahl, Idsoe, Shaw, & Nærde (2025)	N=1,157; Age = 6 months; 52% male	Behaviour Outlook Norwegian Development Study (BONDS), Norway	7	SES: Education (6 months) CP: Physical aggression (4 years) Mechanisms: a. mental distress - depression, anxiety (1 year, 3 years), b. parenting stress (1 year, 3 years), c. harsh parenting (1 year, 3 years).
Barajas (2011)	N=2,025; M*age*=10.2 years; 49.2% male	Project on Human Development in Chicago Neighborhoods (PHDCN), USA	5	SES: Income-to-needs-ratio (T1: four cohorts of children aged 6, 9, 12, and 15 years) CP: CBCL (T2: 2.5 years later) Mechanisms (T1): a. family conflict (Family Environment Scale), b. parenting (maternal aggression - Conflict Tactics Scale; warmth - Home and Life Interview), c. maternal depressive symptoms (Family Mental Health & Legal History interview).
Simons, Wickrama, Lee et al. (2016)	N=422; M*age*=10.5 years; 48% male	The Family and Community Health Study (FACHS), USA	7	SES: Family per capita income (10.5 years) CP: DISC-IV (10.5 years, 15.5 years) Mechanisms: a. primary and secondary caregiver depression (the Mini Mood and Anxiety Symptom Questionnaire; 10.5 years), b. caregiver relationship conflict (warmth and hostility; scales developed by Matthews, Wickrama, and Conger, 1996; 10.5 years), c. nurturant-involved parenting (hostility and warmth; 12.5 years), d. parental investment (12.5 years).
Coley, Spielvogel, Kruzik, Miller, Betancur, & Votruba-Drzal (2021)	N=10,650; Age = 10 months; 51% male	the Early Childhood Longitudinal Study - Birth Cohort (ECLS), USA	5	SES: Family income (10 months - 4 years) CP: Antisocial and impulsive behaviour (5 years) Mechanisms: a. cognitive stimulation/investment (HOME-SF; NHES; additional items; 2 years - 5 years), b. parenting (the Two Bags Task; discipline questions; 2 years - 5 years).
Martin, Conger, Schofield et al. (2010)	N=271; M*age*= 2.31 years; 55% male	the Family Transitions Project, USA	5	SES: Education and income (2 years) CP: CBCL (3 years - 4 years)

				Mechanisms: a. material investments (index of adequate material resources, books in the home, newspapers in the home, items to promote learning in the home, quality of residence, health insurance, and neighbourhood quality; 2 years), b. emotional investments (index of childrearing enjoyment, parental monitoring, consistent discipline, punitive parenting, observed harsh parenting, observed warm parenting, time spent with child, parenting learned, coparenting, and parental happiness; 2 years).
Multiple relevant pathways				
Lavigne, Gouze, Hopkins et al. (2016)	N=796; M*age*=4.4 years; 49.1% male	USA	6	SES: Hollingshead Four Factor Index of Social Status (4 years) CP: ODD symptoms (CSI; ECBI; DISC Parent Scale -Young Child; 4 years, 5 years, 6 years) Mechanisms: a. family conflict (developed from the McCubbin Family Distress Index, the Family Problem Solving/Communication Scale, the Family Environment Scale conflict scale; 4 years, 5 years), b. parent support and hostility (PBI); scaffolding (the NICHD Three Boxes Paradigm; 4 years, 5 years).
Le Blanc, McDuff & Kaspy (1998)	N=894; Age=10 years; 100% male	Canada	5	SES: Occupational prestige and welfare receipt (10 years) CP: Self-reported delinquency (12 years) Mechanisms: a. parental deviance (parental alcohol use and deviant attitudes; 10 years), b. marital relations (frequency of arguments; 10 years), c. attachment and involvement (in family life; 11 years), d. discipline, regulations and supervision (11 years).
Lee (2022)	N=13,611; M*age*=73.52 months; 52% male	Early Childhood Longitudinal Study, Kindergarten Class of 2010–11, USA	7	SES: Household poverty status (spring of kindergarten) CP: Externalising problem behaviours (adapted from the SSRS; spring of 4th grade) Mechanisms: a. parental stress (spring of 1st grade), b. parenting practices (hostility, emotional support, punishment; spring of 3rd grade).
Piotrowska, Stride, Maughan, Ford, McIntyre, & Rowe (2022)	N=2,399; M*age*=9.93 years; 52% male	Mental Health of Children and Young People, UK	7	SES: Household income (T1: 5-15 years, T2: 3 years later) CP: DAWBA; SDQ (T1, T2) Mechanisms: a. parental mental health (General Health Questionnaire; T1, T2), b. family functioning (General Functioning Scale - FAD; T1, T2).

Stern, Smith, & Jang (1999)	N=800; Age=13-14 years; 73% male	Rochester Youth Development Study, USA	6	SES: Family income and welfare receipt (T1: 13-14 years; further interviews at 6-month intervals) CP: CBCL (T3) Mechanisms: a. parent distress (derived from CES-D; T2), b. family processes (discipline and supportive parenting; T2).
Parental mental health/distress				
Amone-P'Olak, Burger, Huisman et al. (2011)	N=2,149; M*age*=11.1 years; 49% male	Tracking Adolescents' Individual Lives Survey (TRAILS), Netherlands	3	SES: Income, education, occupation (10-12 years) CP: CBCL; YSR; TCP (10-12 years, 12-15 years) Mechanisms: lifetime parental psychopathology (the TRAILS Family History Interview; 10-12 years).
Huisman, Araya, Lawlor et al. (2010)	N=4,041, Age=32 weeks gestation; 50% male	Avon Longitudinal Study of Parents and Children (ALSPAC), UK	3	SES: Education (32 weeks gestation) CP: SDQ (13 years) Mechanisms: maternal depression (the Edinburgh Post-natal Depression Score; during pregnancy).
Huisman, Araya, Lawlor et al. (2010)	N=2,149; M*age*=11.09 years; 48.8% male;	Tracking Adolescents' Individual Lives Survey (TRAILS), Netherlands	3	SES: Education (10-11 years) CP: CBCL (13 years) Mechanisms: maternal depression (10-11 years).
Parenting				
Awada & Shelleby (2021)	N=293; M*age*=4.4 years; 43.7% male	recruited through Amazon's Mechanical Turk (MTurk), USA	7	SES: Income-to-needs ratio (T1: 3-6 years) CP: SDQ (T1, T3: 8 weeks after T1, T5: 8 weeks after T3) Mechanisms: negative parenting behaviours (the O'Leary Parenting Scale); positive parenting behaviours (the Parenting Practices Interview; T1, T3, T5).
Bellair, McNulty, Roscigno, & Lei (2019)	N=1,135; Age=1 year; 100% male	Fragile Families and Child Well-Being Study, USA	4	SES: Poverty (1 year, 3 years, 5 years) CP: adapted from the Things That You Have Done Scale (9 years) Mechanisms: primary caregiver supervision (9 years).
Bornstein, Putnick, & Suwalsky (2018)	N=317; M*age*=20.09 months; 53.9% male	USA	6	SES: Hollingshead Four-Factor Index of Socioeconomic Status (20 months) CP: PBQ; CRQ; TRF; the Teacher Prediction of Peer-Nomination Inventory (4 years, 10 years) Mechanisms: a. parenting cognitions (KIDI; SPPR; PAQ; 20 months), b. supportive parenting (free play; 20 months, 4 years).
Brislin, Choi, & Hicks (2025)	N=2,426; M*age*=9.9 years; 52% male	Adolescent Brain Cognitive Development - Social Development (ABCD-SD), USA	3	SES: Household income (9.9 years) CP: Delinquency (11.7 years) Mechanisms: parental involvement (11.7 years).

Eamon (2001)	N=963; Age=10-12 years; 48.6% male	National Longitudinal Survey of Youth, USA	3	SES: Poverty (year before entered the sample) CP: BPI (12-14 years) Mechanisms: parenting practices (HOME-SF; the Child Self-Administered Supplement; 10-12 years).
Haggerty, Skinner et al. (2013)	N=331; Age=13-14 years; 51.4% male	USA	7	SES: Family income (13-14 years) CP: Frequency of violent behaviour (13-14 years, 15-16 years) Mechanisms: parenting (parental guidelines, parental monitoring, consequences, parent-teen attachment; 13-14 years).
Mills-Koonce, Willoughby, Garrett-Peters et al. (2016)	N=1,230; Age=2 months; 50% male	The Family Life Project, USA	6	SES: Income-to-needs ratio (6-36 months) CP: the Disruptive Behaviors Rating Scale; the Inventory of Callous Unemotional Traits (6-7 years) Mechanisms: parenting (sensitive parenting, harsh/intrusive parenting - observations; 6-36 months).
Odgers, Caspi, Russell et al. (2012)	N=2,232; Age=5 months; 49% male	E-Risk Longitudinal Twin Study, UK	5	SES: Education, employment, income (5 years) CP: CBCL; TRF (5 years, 7 years, 10 years, 12 years) Mechanisms: maternal warmth (speech sample), parental monitoring questionnaire (10 years).
Stern & Smith (1995)	N=864; Age=13-14 years; 73% male	Rochester Youth Development Study, USA	5	SES: Economic hardship (income below poverty line, welfare dependence, household income, education, unemployment; 13-14 years) CP: Self-reported delinquency (14-15 years) Mechanisms: family process measures (attachment, involvement, parental control; 13-14 years).
Tyler & Bersani (2008)	N=1,579; Age=12-13 years; 51% male	National Longitudinal Survey of Youth 1997, USA	5	SES: Income-to-poverty ratio (12-13 years) CP: Running away (14-15 years, 15-16 years, 16-17 years) Mechanisms: parenting (harsh punishment, monitoring, warmth and support; 12-13 years).

Table 1b. Summary characteristics of the included studies - cognitive/language

Author(s)	**Sample (N; age; % male)**	**Study, Country**	**Quality score**	**Key measures**
Defoe, Farrington, & Loeber (2013)	N=503; Age=11 years; 100% male	Pittsburgh Youth Study, USA	7	SES: Hollingshead Four Factor Index of Social Status (11 years, 12 years, 13 years, 14 years, 15 years) CP: Self-reported delinquency (11 years, 12 years, 13 years, 14 years, 15 years) Mechanisms: academic achievement (performance in reading, math, writing, spelling; 11 years, 12 years, 13 years, 14 years, 15 years).

Huisman, Araya, Lawlor et al. (2010)	N=4,041, Age=32 weeks gestation; 50% male	Avon Longitudinal Study of Parents and Children (ALSPAC), UK	3	SES: Education (32 weeks gestation) CP: SDQ (13 years) Mechanisms: cognitive ability (WISC-III; 8 years).
Huisman, Araya, Lawlor et al. (2010)	N=2,149; M*age*=11.09 years; 48.8% male;	Tracking Adolescents' Individual Lives Survey (TRAILS), Netherlands	3	SES: Education (10-11 years) CP: CBCL (13 years) Mechanisms: cognitive ability (WISC-R; 10-11 years).
Kent, Hogarth, Williams, Cornish, & Leckie (2025)	N = 519,920; Age=4-5 years; 51.3% male	UK	4	SES: Free school meals (4-5 years) CP: Caution or conviction of a recordable offence (Police National Computer record; 15-16 years) Mechanisms: functional development (Early Years Foundation Stage Profile; 4-5 years).
Parsons, Sullivan, Fitzsimons, & Ploubidis (2021)	N=15,856, Age=birth survey; 52% male	1970 British Cohort Study, UK	6	SES: Family income (birth) CP: the Rutter Behaviour scales (5 years, 10 years) Mechanisms: vocabulary skills (the English Picture Vocabulary Test; 5 years).
Parsons, Sullivan, Fitzsimons, & Ploubidis (2021)	N=16,628, Age=~9 months; 51% male	Millennium Cohort Study, UK	6	SES: Family income (9 months) CP: SDQ (5 years, 11 years) Mechanisms: vocabulary skills (BAS Naming Vocabulary test; 5 years).
Piotrowska, Stride, Maughan, Ford, McIntyre, & Rowe (2022)	N=2,399; M*age*=9.93; 52% male	Mental Health of Children and Young People, UK	7	SES: Household income (T1: 5-15 years, T2: 3 years later) CP: DAWBA; SDQ (T1, T2) Mechanisms: reading as compared with peers (T1, T2).

Table 1c. Summary characteristics of the included studies - neighbourhood and school.

Author(s)	**Sample (N; age; % male)**	**Study, Country**	**Quality score**	**Key measures**
Neighbourhood				
Bolanis (2024)	N = 742; Age=10 years; 55.7% male	Québec Longitudinal Study of Children Development, Canada	3	SES: Education, occupational prestige, and income (8 and 10 years) CP: Mental Health and Social Inadaptation questionnaire (15 and 17 years) Mechanisms: Greenspace availability (Normalized Difference Vegetation Index (10 years).
Burrington (2018)	N=1,908; M*age*=12.20 years; 53% males	Project on Human Development in Chicago Neighborhoods (PHDCN), USA	5	SES: Household income, educational attainment and occupational prestige (T1: cohorts of children aged 9, 12, and 15 years) CP: Self-reported violence (T2: 3 years later) Mechanisms: Neighbourhood and immigration status (Census; before T1).

Chazelas, Parker, Barreto-Zarza, Charles, & Melchior (2025)	N=10,092; Age=birth; 51.2% male	Etude Longitudinale Francaise depuis l'Enfance (ELFE), France	3	SES: Family income (birth) CP: SDQ (5.5 years) Mechanisms: Greenspace availability (Normalized Difference Vegetation Index (2 months, 3.5 years, 5.5 years).
Coley, Spielvogel, Kruzik, Miller, Betancur, & Votruba-Drzal (2021)	N=10,650; Age=10 months; 51% male	the Early Childhood Longitudinal Study - Birth Cohort (ECLS), USA	5	SES: Family income (10 months - 4 years) CP: Antisocial and impulsive behaviour (5 years) Mechanisms: a. neighbourhood/community cultural resources - number of museums, zoos, sport centres etc. (Economic Census; 2 years - 5 years), b. neighbourhood/community educational resources - number of schools, day care services etc. (Economic Census; 2 years - 5 years), c. concentrated socioeconomic disadvantage (2000 Decennial Census; 2 years - 5 years), d. crime (Crime Reporting Database; 2 years - 5 years).
Simons, Wickrama, Lee et al. (2016)	N=422; M*age*=10.5 years; 48% male	The Family and Community Health Study (FACHS), USA	7	SES: Family per capita income (10.5 years) CP: DISC-IV (10.5 years, 15.5 years) Mechanisms: neighbourhood disadvantage (neighbourhood dilapidation, crime, and concentrated disadvantage; 12.5 years).
Vogel & South (2016)	N=6,491; M*age*=14.3 years; 51% male	National Longitudinal Survey of Youth 1997, USA	3	SES: Welfare receipt (12 months prior to T1) CP: Self-reported delinquency (T2: 1 year later) Mechanisms: neighbourhood disadvantage (Census; T1).
School				
Higgins, Perra, Jordan et al. (2020)	N=4,049; Age=12 years; mixed (males and females)	Belfast Youth Development Study, UK	3	SES: Free school meals (13 years) CP: Self-reported offending (14-16 years) Mechanisms: school attachment, commitment and safety (13 years).
Lipton & Smith (1983)	N=1,592; Age=16 years; 100% male	Youth in Transition, USA	2	SES: Occupation, education, home environment (16 years) CP: Self-reported delinquency (18 years) Mechanisms: attachment to school (academic performance, time spent on homework, perception of the value of education; 16 years).

Table 1d. Summary characteristics of the included studies - other.

Author(s)	Sample (N; age; % male)	Study, Country	Quality score	Key measures
Peers				
Dishion, Ha & Veronneau (2012)	N=998; Age=11; 52.8% male	USA	4	SES: Employment status, education, income, housing, financial aid (13-14 years) CP: Problem behaviour (self-report, parent and teacher; 16-17 years) Mechanisms: deviant peer clustering (13-14 years).
Haggerty, Skinner et al. (2013)	N=331; Age=13-14 years; 51.4% male	USA	7	SES: Family income (13-14 years) CP: Frequency of violent behaviour (13-14 years, 15-16 years) Mechanisms: delinquent behaviour and substance use of peers (14-15 years).
Stressors				
Amone-P'Olak, Ormel, Huisman et al. (2009)	N=2,149; M*age*=11.1 years; 49% male	Tracking Adolescents' Individual Lives Survey (TRAILS), Netherlands	5	SES: Income, education, occupation (10-12 years) CP: CBCL (10-12 years, 12-15 years) Mechanisms: environment-related and person-related life stressors (12-15 years).
Guerra, Huesmann, Tolan et al. (1995)	N=1,243 (subsample N=943); Age= 6-10 years; 49% male	USA	4	SES: Free school meals (school archival data) CP: CBCL; the Peer-Nominated Index of Aggression (T1: children in the 1st, 2nd, 4th grades; T2: 2 years later) Mechanisms: stressful life events (the Stress Index; T1, T2).
Piotrowska, Stride, Maughan, Ford, McIntyre, & Rowe (2022)	N=2,399; M*age*=9.93; 52% male	Mental Health of Children and Young People, UK	7	SES: Household income (T1: 5-15 years, T2: 3 years later) CP: DAWBA; SDQ (T1, T2) Mechanisms: stressful life events (separation and marital difficulties, serious illness/stay at hospital etc.; T1, T2).
Childcare				
Garon-Carrier & Bégin (2021)	N=6,852; Age=2-5 years; 50.2% male	The National Longitudinal Survey of Children and Youth (NLSCY), Canada	4	SES: Household income (3-5 years) CP: CBQ (6-11 years, 12-15 years) Mechanisms: childcare arrangements (3-5 years).
Kingsbury & Findlay (2025)	N=8,929; Age=1-5 years; 51.4% male	Canadian Health Survey on Children and Youth (2019 and 2023), Canada	3	SES: Family income (1-5 years) CP: ODD (the Emotional-Behavioural Scale, 5-9 years) Mechanisms: childcare participation/non-parental childcare (1-5 years).
Orri, Tremblay, Japel et al. (2019)	N=1,588; Age=5 months; 48.4% male	Quebec Longitudinal Study of Child Development, Canada	4	SES: Education, income, and occupation (5 months) CP: the Social Behaviour Questionnaire; the Mental Health and Social Inadaptation Assessment for Adolescents (12 years, 13 years, 15 years, 17 years) Mechanisms: childcare intensity (hours per week; 5 months - 5 years).
Beliefs/values				

Guerra, Huesmann, Tolan et al. (1995)	N=1,243 (subsample N=943); Age= 6-10 years; 49% male	USA	4	SES: Free school meals (school archival data) CP: CBCL; the Peer-Nominated Index of Aggression (T1: children in the 1st, 2nd, 4th grades; T2: 2 years later) Mechanisms: beliefs (the Normative Beliefs about Aggression Scale; T1, T2).
Perez-McCluskey (2002)	N=345; M*age*=14.92 years; 100% male	The Denver Youth Survey (DYS), USA	4	SES: Welfare/public assistance receipt (14-15 years) CP: General delinquency (16-17 years) Mechanisms: strain (economic success goal orientation and academic performance; 14-15 years); externalisation of blame (reasons for failure to advance academically or make money; 15-16 years); challenge of legitimacy of norms (conventional beliefs; comprehensive conventional beliefs index; 15-16 years); delinquent values (15-16 years).
Perez-McCluskey (2002)	N=578; M*age*=15.17 years; 100% male	Rochester Youth Development Study (RYDS), USA	5	SES: Welfare/public assistance receipt (15 years) CP: General delinquency (17 years) Mechanisms: strain (constructed from economic success goal orientation and academic performance; 15 years); externalisation of blame (reasons for failure to advance academically or make money; 16 years); challenge of legitimacy of norms (conventional beliefs; 16 years); delinquent values (16 years).
Health and Health Behaviours				
Alawie, Olivier, & Dupéré (2025)	N=1,312; Age=12 years; 47% male	Quebec Longitudinal Study of Child Development (QLSCD), Canada	4	SES: Family income (12 years) CP: SBQ (13 years) Mechanisms: physical activity (13 years).
DiLalla, Jamnik, Marshall, Weisbecker, & Vazquez (2021)	N=355; Age=4 years; 45% male	Southern Illinois Twins/Triplets and Siblings Study, USA	4	SES: Family income (4 years) CP: CBCL (5 years, 6-11 years) Mechanisms: birth complications (4 years); child negative emotionality (BSQ; 5 years).
Piotrowska, Stride, Maughan, Ford, McIntyre, & Rowe (2022)	N=2,399; M*age*=9.93; 52% male	Mental Health of Children and Young People, UK	7	SES: Household income (T1: 5-15 years, T2: 3 years later) CP: DAWBA; SDQ (T1, T2) Mechanisms: child general physical health (T1, T2).
Spann, Bansal, Hao et al. (2020)	N=37; M*age*=6 weeks; 64.9% male	USA	1	SES: Hollingshead Four Factor Index of Social Status (prenatal) CP: CBCL (24 months) Mechanisms: brain morphology - MRI brain scans (within the first 6 weeks).
Stogner, Gibson, & Miller (2014)	N=14,738; M*age*=15.65 years; 49.48% male	National Longitudinal Study of Adolescent Health (Add Health), USA	7	SES: Education (T1) CP: Frequency of youth violence (T1: 7th - 11th grades, T2: 1 year later) Mechanisms: self-reported health (T1, T2); substance use (marijuana, cocaine, drinks, cigarettes; T1, T2).

Wu, Lin, Li et al. (2020)	N=18,513; Age=6 months; 52.49% male	Taiwan Birth Cohort Study; Taiwan	6	SES: Education (6 months) CP: Physical aggression (5.5 years) Mechanisms: dietary patterns (5.5 years).
Other				
Burrington (2018)	N=1,908; M*age*=12.20 years; 53% males	Project on Human Development in Chicago Neighborhoods (PHDCN), USA	5	SES: Household income, educational attainment and occupational prestige (T1: cohorts of children aged 9, 12, and 15 years) CP: Self-reported violence (T2: 3 years later) Mechanisms: Immigration status (Census; before T1).
Plenty (2018)	N=3,939; Age=14-15 years; 49.5% male	Children of Immigrants Longitudinal Survey, Sweden	4	SES: Household income (14-15 years) CP: Self-reported disruptive or deviant behaviours (14-15 years, 15-16 years) Mechanisms: own economic resources (missing social activities, cash margin; 14-15 years).
Wojciechowski (2025)	N=2,422; Age=9-10 years; 52.3% male	Adolescent Brain Cognitive Development - Social Development (ABCD-SD), USA	5	SES: Family income (9-10 years) CP: Violent offending (9-10 years, 10-11 years) Mechanisms: gender (9-10 years).

BDI: the Beck Depression Inventory; **BPI**: Behaviour Problems Index; **BSQ:** the Behavioral Style Questionnaire; **CBCL**: the Child Behavior Checklist; **CBQ**: Children's Behavior Questionnaire; **CES-D**: Center for Epidemiologic Studies Depression Scale; **CRQ**: Child Rating Questionnaire; **CSI**: the Child Symptom Inventory; **DAWBA**: Development and Well-Being Assessment; **DISC-IV**: the Diagnostic Interview Schedule for Children version 4; **ECBI**: Eyberg Child Behavior Inventory; **FAD**: the McMaster Family Assessment Device; **GHQ**: General Health Questionnaire; **HOME-SF**: the Short Form of the Home Observation for Measurement of the Environment Inventory; **KIDI**: Knowledge of Infant Development Inventory; **NHES**: the National Household Education Survey; **PAQ**: the Parent Attributions Questionnaire; **PBI**: the Parent Behavior Inventory; **PBQ**: the Preschool Behaviour Questionnaire; **SBQ**: Social Behavior Questionnaire; **SDQ**: the Strengths and Difficulties Questionnaire; **SSP**: the Short Sensory Profile, **SPPR**: the Self-Perceptions of the Parental Role; **SSRS**: Social Skills Rating System; **TCP**: the Teacher Checklist of Psychopathology; **TRF**: Teacher Report Form; **WISC-III**: Wechsler Intelligence Scale for Children; **WISC-R**: Wechsler Intelligence Scale for Children; **YSR**: the Youth Self-Report

Table 2. Results summary by mechanism.

Mechanism	Number of studies	Results summary
FSM and investment perspectives	10	Mixed support for the FSM: supported by FSM studies but mixed support from the studies modelling multiple component pathways. Considerable support for the investment pathways.
Parental mental health/distress	3	Mechanism not supported.
Parenting	10	Some support for parenting dimensions of supervision/discipline with somewhat stronger support for positive/supportive parenting, however, based on two only two high-quality studies.
Cognitive/language	7	Mechanism largely not supported; only one study found the mediating effect of academic achievement.
Neighbourhood	6	Limited support for concentrated disadvantage which might affect more proximal factors such as parenting. No support for greenspace availability.
School	2	Some support for the school attachment, however, based on studies with low quality scores.
Peers	2	Considerable support for associations with deviant peers as a mechanism. One study indicated that it mediated the effect of parenting on CP.
Stressors	3	Some support for life stressors such as chronic illness or death of a family member. The stud with the highest level of control variables did not support the mechanism.
Childcare	3	Only SES and childcare moderation was considered; discrepant results with one study reporting significant interaction.
Beliefs/values	3	Considerable support for delinquent values and belief about aggression.
Health and Health Behaviours	6	Health was largely not supported as a mechanism. Some evidence for the role of diet and interactions between SES and birth complications and negative emotionality.
Other	3	Youth economic resources were not supported as a mechanism. Some evidence of SES interactions with gender and immigration status.

Online Supplement A: Search terms used in the Web of Science.

child* OR adolescen* OR teen* OR "young pe*" OR youth* OR juven* OR “young ad*”

"antisocial behav*" OR "conduct disorder*" OR "conduct problem*" OR delinquen* OR callous* OR "oppositional-defiant disorder*" OR aggressi* OR irritab* OR "disrupt* behav*" OR "rule break*" OR crim* OR offen* OR “oppositional defiant”

"social inequalit*" OR "unequal* soci*" OR "soci* gradient*" OR "economi* gradient*" OR "socioeconomic status" OR "soci* class" OR income OR "soci* posit*" OR depriv* OR disadvantage* OR *pover*

Online Supplement B: Detailed quality scoring for each included study

Study	Sample size (N => 1000)	Follow-up rates => 80%	3 time points or more	CP control	Reciprocal paths	Additional controls*	Analysis**	Quality score
Alawie, Olivier, & Dupéré (2025)	1	0	0	1	0	1	1	**4**
Amone-P'Olak, Burger, Huisman et al. (2011)	1	1	0	0	0	0	1	**3**
Amone-P'Olak, Ormel, Huisman et al. (2009)	1	1	0	0	0	1	2	**5**
Awada & Shelleby (2021)	0	0	1	1	1	1	3	**7**
Backer-Grøndahl, Idsoe, Shaw, & Ane Nærde (2025)	1	1	1	0	0	1	3	**7**
Barajas (2011)	1	0	0	0	0	1	3	**5**
Bellair, McNulty, Roscigno, & Lei (2019)	1	0	0	1	0	1	1	**4**
Bolanis (2024)	0	0	NA	1	0	1	1	**3**
Bornstein, Putnick, & Suwalsky (2018)	0	0	1	1	0	1	3	**6**
Brislin, Choi, & Hicks (2025)	1	0	NA	0	0	1	1	**3**
Burrington (2018)	1	1	NA	1	0	1	1	**5**

Chazelas, Parker, Barreto-Zarza, Charles, & Melchior (2025)	1	0	NA	0	0	1	1	**3**
Coley, Spielvogel, Kruzik, Miller, Betancur, & Votruba-Drzal (2021)	1	0	0	0	0	1	3	**5**
Defoe, Farrington, & Loeber (2013)	0	1	1	1	1	0	3	**7**
DiLalla, Jamnik, Marshall, Weisbecker, & Vazquez (2021)	0	1	NA	1	0	1	1	**4**
Dishion, Ha & Veronneau (2012)	0	1	0	0	0	0	3	**4**
Eamon (2001)	0	1	0	0	0	1	1	**3**
Garon-Carrier & Bégin (2021)	1	1	NA	0	0	1	1	**4**
Guerra, Huesmann, Tolan et al. (1995)	0	0	0	1	0	0	3	**4**
Haggerty, Skinner et al. (2013)	0	1	1	1	0	1	3	**7**
Higgins, Perra, Jordan et al. (2020)	1	0	0	0	0	1	1	**3**
Huisman, Araya, Lawlor et al. (2010) - ALSPAC	1	0	0	0	0	1	1	**3**
Huisman, Araya, Lawlor et al. (2010) - TRAILS	1	0	0	0	0	1	1	**3**
Kent, Hogarth, Williams, Cornish, & Leckie (2025)	1	1	NA	0	0	1	1	**4**
Kingsbury & Findlay (2025)	1	0	NA	0	0	1	1	**3**
Lavigne, Gouze, Hopkins et al. (2016)	0	0	1	1	1	0	3	**6**
Le Blanc, McDuff & Kaspy (1998)	0	1	1	0	0	0	3	**5**

Lee (2022)	1	0	1	1	0	1	3	**7**
Lipton & Smith (1983)	1	0	0	0	0	0	1	**2**
Martin, Conger, Schofield et al. (2010)	0	1	0	1	0	0	3	**5**
Mills-Koonce, Willoughby, Garrett-Peters et al. (2016)	1	1	0	0	0	1	3	**6**
Odgers, Caspi, Russell et al. (2012)	1	1	1	0	0	1	1	**5**
Orri, Tremblay, Japel et al. (2019)	1	0	NA	1	0	1	1	**4**
Parsons, Sullivan, Fitzsimons, & Ploubidis (2021) - BCS70	1	1	1	1	0	1	1	**6**
Parsons, Sullivan, Fitzsimons, & Ploubidis (2021) - MCS	1	1	1	1	0	1	1	**6**
Perez-McCluskey (2002) - DYS	0	0	1	0	0	0	3	**4**
Perez-McCluskey (2002) - RYDS	0	1	1	0	0	0	3	**5**
Piotrowska, Stride, Maughan, Ford, McIntyre, & Rowe (2022)	1	0	0	1	1	1	3	**7**
Plenty (2018)	1	0	0	1	0	1	1	**4**
Simons, Wickrama, Lee et al. (2016)	0	1	1	1	0	1	3	**7**
Spann, Bansal, Hao et al. (2020)	0	0	0	0	0	0	1	**1**
Stern & Smith (1995)	0	1	0	0	0	1	3	**5**
Stern, Smith, & Jang (1999)	0	1	1	0	0	1	3	**6**
Stogner, Gibson, & Miller (2014)	1	0	0	1	1	1	3	**7**
Tyler & Bersani (2008)	1	1	0	1	0	1	1	**5**

Vogel & South (2016)	1	0	0	0	0	1	1	**3**
Wojciechowski (2025)	1	1	NA	1	0	1	1	**5**
Wu, Lin, Li et al. (2020)	1	1	0	1	0	1	2	**6**

*Additional controls: sociodemographic variables (appropriate for the sample, e.g., sex, age, ethnic background); **Analysis: 1- hierarchical regression models or moderation analyses, 2 – separate 'mediation' paths, 3 - SEM/path analysis *(further details are presented in the Methods section).*