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Physical Maltreatment of Children

A Bibliography

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Scope

This bibliography provides research literature discussing the physical maltreatment of children. Bruising, fractures, corporal punishment, and burns are among the topics covered.

Organization

Publications are listed in date descending order, organized by the categories listed below, and include articles, book chapters, reports, research briefs, and international publications. Links are provided to full text publications when possible. However, this collection may not be complete. More information can be obtained in the Child Abuse Library Online.

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Physical Maltreatment of Children

A Bibliography

Bruising

Downing, N. R., Scafide, K. N., Ali, Z., & Hayat, M. J. (2024). Visibility of inflicted bruises by alternate light: Results of a randomized controlled trial. *Journal of Forensic Sciences*, *69*(3), 880-887. DOI:10.1111/1556-4029.15481

Difficulty visualizing bruises resulting from interpersonal violence, especially in individuals with dark skin, contributes to disparities in access to justice. The purpose of this analysis was to compare bruise visibility of detected injuries using white light versus alternate light sources (ALS). Visibility was assessed using the 5-point Bruise Visibility Scale (BVS) for white light and the ALS Visibility Scale (AVS) for ALS. Bruises were induced using controlled application of a paintball to the upper arm on 157 healthy adults across six skin color categories. Using a crossover design, the light source used first to assess the bruise (white light or ALS) was randomized. Each bruise was examined up to 21 times over 4 weeks using white light and 10 combinations of wavelengths (350 nanometer [nm] – 535 nm) and colored filters (yellow, orange, and red). Multilevel modeling was used to analyze the repeated measures data with a total 20,103 bruise assessments. Results revealed 415 nm with yellow filter resulted in an almost 0.5-point increase in BVS/AVS score across all skin colors (Estimate = 0.46; 95% CI: 0.43, 0.49; $p < 0.001$), a clinically significant improvement in ability to visualize bruises. Conversely, 515 nm (Estimate = -0.80; 95% CI: -0.84, -0.76; $p < 0.001$) and 535 nm (Estimate = -0.64, 95% CI: -0.67, -0.60; $p < 0.001$) with red filter resulted in more than 0.5-point decrease in BVS/AVS score. The use of ALS is supported by the data and results in improved bruise visibility during medical forensic examinations.

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Pierce, M. C., Kaczor, K., Lorenz, D. J., Bertocci, G., Fingarson, A. K., Makoroff, K., Berger, R. P., Bennett, B., Magana, J., Staley, S., Ramaiah, V., Fortin, K., Currie, M., Herman, B. F., Herr, S., Hymel, K. P., Jenny, C., Sheehan, K., Zuckerbraun, N., Hickey, S., Meyers, G., & Leventhal, J. M. (2021). Validation of a clinical decision rule to predict abuse in young children based on bruising characteristics. *JAMA Network Open*, *4*(4), e215832-e215832. DOI:10.1001/jamanetworkopen.2021.5832

Bruising caused by physical abuse is the most common antecedent injury to be overlooked or misdiagnosed as nonabusive before an abuse-related fatality or near-fatality in a young child. Bruising occurs from both nonabuse and abuse, but differences identified by a clinical decision rule may allow improved and earlier recognition of the abused child. The objective to refine and validate a previously derived bruising clinical decision rule (BCDR), the TEN-4 (bruising to torso, ear, or neck or any bruising on an infant <4.99 months of age), for identifying children at risk of having been physically abused. This prospective cross-sectional study was conducted from December 1, 2011, to March 31, 2016, at emergency departments of 5 urban children's hospitals. Children younger than 4 years with bruising were identified through deliberate examination. Statistical analysis was completed in June 2020. EXPOSURES Bruising characteristics in 34discrete body regions, patterned bruising, cumulative bruise counts, and patient's age. The BCDR was refined and validated based on these variables using binary recursive partitioning analysis. Injury from abusive vs nonabusive trauma was determined by the consensus judgment of a multidisciplinary expert panel. A total of 21123 children were consecutively screened for bruising, and 2161 patients (mean[SD]age,2.1[1.1] years; 1296 [60%] male; 1785[83%] White;1484[69%] non-Hispanic/Latino) were enrolled. The expert panel achieved consensus on 2123 patients (98%), classifying 410 (19%) as abuse and 1713 (79%) as nonabuse. A classification tree was fit to refine the rule and validated via bootstrap resampling. The resulting BCDR was95.6%(95%CI,93.0%-97.3%) sensitive and 87.1% (95% CI, 85.4%-88.6%) specific for distinguishing abuse from nonabusive trauma based on body region bruised(torso, ear, neck, frenulum, angle of jaw, cheeks[fleshy], eyelids, and subconjunctivae), bruising anywhere on an infant 4.99 months and younger, or patterned bruising (TEN-4-FACESp). In this study, an affirmative finding for any of the 3BCDRTEN-

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4FACESp components in children younger than 4 years indicated a potential risk for abuse; these results warrant further evaluation. Clinical application of this tool has the potential to improve recognition of abuse in young children with bruising.

Black, H. I., Coupaud, S., Daéid, N. N., & Riches, P. E. (2019). On the relationships between applied force, photography technique, and the quantification of bruise appearance. *Forensic Science International*, *305*, 109998. DOI:10.1016/j.forsciint.2019.109998

Bruising is an injury commonly observed within suspect cases of assault or abuse, yet how a blunt impact initiates bruising and influences its severity is not fully understood. Furthermore, the standard method of documenting a bruise with colour photography is known to have limitations which influence the already subjective analysis of a bruise. This research investigated bruising using a standardised blunt impact, delivered to 18 volunteers. The resulting bruise was imaged using colour, cross polarised (CP) and infrared photography. Timelines of the L*a*b* colour space were determined from both colour and CP images for up to 3 weeks. Overall, no single photographic technique out-performed the others, however CP did provide greater contrast than colour photography. L*a*b* colour space timelines were not attributable any physiological characteristics. Whilst impact force negatively correlated with BMI ($R^2 = 0.321$), neither were associated with any measure of bruise appearance. Due to the inter-subject variability in the bruise response to a controlled infliction, none of the methods in the current study could be used to reliably predict the age of a bruise or the severity of force used in creating a bruise. A more comprehensive approach combining impact characteristics, tissue mechanics, enhanced localised physiological measures and improvements in quantifying bruise appearance is likely to be essential in removing subjectivity from their interpretation.

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Matthews, L., Kemp, A., & Maguire, S. (2017). Bruising in children: Exploring the attitudes, knowledge and training of child protection social workers and the interface with paediatricians regarding childhood bruising. *Child Abuse Review*, *26*(6), 425-438. DOI:10.1002/car.2474

While child protection social workers (CPSWs) make decisions about which children with an injury need a medical examination, we do not know how they make these decisions. We aimed to ascertain the knowledge, attitudes and training of CPSWs in regards to assessing childhood bruising. Paediatricians' views on the bruising knowledge and training of CPSWs were also explored, as well as the relationship and communication between the two professions. Semi-structured, face-to-face interviews were conducted with 39 CPSWs and 16 paediatricians across South Wales and South West England. Interviews were recorded and transcribed until data saturation was reached. Using NVivo, two independent assessors conducted a thematic analysis, identifying themes emerging from the data with group comparisons where appropriate. CPSWs lack confidence in assessing bruising with knowledge gaps regarding bruise patterns and the lack of evidence for ageing bruises. This appears to be linked to an almost complete lack of training. An important theme was that CPSWs regard the clinician's view as paramount, yet paediatricians feel that there is an over-expectation of what a child protection medical can conclude; this exemplified some of the communication issues between the professions. Evidence-based training of CPSWs is needed jointly by health and social care professionals, including an understanding of the respective roles.

Byard, R. W., & Langlois, N. E. (2015). Bruises: Is it a case of “the more we know, the less we understand?”. *Forensic Science, Medicine, and Pathology*, *11*, 479-481. DOI:10.1007/s12024-015-9661-0

In this issue of the journal the possibility that heme oxygenase activity is responsible for the delay in the appearance of the yellow color in bruises has been investigated [1]. Although bruises may have been a “very much neglected branch of injuries” [2] for many years, recent investigations, including the current paper [1] have revealed some

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unexpected and highly relevant findings. Bruises in the skin and subcutaneous tissues occur when there has been extravasation of blood following the application of blunt force. Generally the requirements for their formation are injury, compromise of the integrity of vessel walls, and blood pressure [3]. The most useful bruises in a forensic context are those that have a patterned appearance reflecting the nature of the impacting object. Questions that are commonly asked in court regarding bruises involve their age, the amount of force required for their production, and whether they occurred before or after death. Although it was once considered possible to provide answers to all of these queries, recent studies have shown that forensic assessments, particularly of the age of these injuries, may be less reliable than was previously considered.

Kemp, A. M., Maguire, S. A., Nuttall, D., Collins, P., & Dunstan, F. (2014). Bruising in children who are assessed for suspected physical abuse. *Archives of Disease in Childhood*, *99*(2), 108-113. DOI:10.1136/archdischild-2013-304339

A cross-sectional study was used to describe the characteristics of bruising and mode of presentation of 519 children, <6 years referred to the paediatric child protection team with suspected physical abuse (PA), and the extent to which these differ between the children where abuse was confirmed and those where it was excluded. The mode of presentation, number, anatomical distribution, size and appearance of bruises according to whether PA was confirmed or excluded. ORs with 95% CI were calculated where relevant. PA was confirmed in 69% of children; the rate varied from 84% when abuse was witnessed, admitted, alleged or where explanation for injury was absent or implausible, to 50% where there was a concerning history. Significantly more children with PA had bruises (89.4%) than PA-excluded (69.9%) and had significantly more sites affected ($p<0.001$). The odds of a PA child having bruising to: buttocks/genitalia (OR 10.9 (CI 2.6 to 46), left ear (OR 7.10 (CI 2.2 to 23.4), cheeks (Left (OR 5.20 (CI 2.5 to 10.7), Right OR 2.83 (CI 1.5 to 5.4)), neck (OR 3.77 (CI 1.3 to 10.9), trunk (back (OR 2.85 (CI 1.6 to 5.0) front (OR 4.74 (CI 2.2 to 10.2), front of thighs (OR2.48 (CI 1.4 to 4.5) or upper arms (OR 1.90 (CI 1.1 to 3.2) were significantly greater

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than in children with PA-excluded. Petechiae, linear or bruises with distinct pattern, bruises in clusters, additional injuries or a child known to social services for previous child abuse concerns were significantly more likely in PA. Features in the presenting history, the extent and pattern of bruising differed between children with confirmed PA and those where abuse was excluded. These findings can provide a deeper understanding of bruising sustained from PA.

Maguire, S., & Mann, M. (2013). Systematic reviews of bruising in relation to child abuse-What have we learnt: An overview of review updates. *Evidence-based Child Health: A Cochrane Review Journal*, *8*(2), 255-263. DOI:10.1002/ebch.1909

Dogma has long prevailed regarding the ageing of bruises, and whether certain patterns of bruising are suggestive or diagnostic of child abuse. We conducted the first Systematic Reviews addressing these two issues, to determine the scientific basis for current clinical practice. There have been seven updates since 2004. An all language literature search was performed across 13 databases, 1951–2004, using >60 key words, supplemented by 'snowballing' techniques. Quality standards included a novel confirmation of abuse scale. Updates used expanded key words, and a higher standard for confirmation of abuse. Of 1495 potential studies, only three met the inclusion criteria for ageing of bruises in 2004, confirming that it is inaccurate to do so with the naked eye. This was roundly rejected when first reported, generating a wave of new studies attempting to determine a scientifically valid method to age bruises, none of which are applicable in children yet. Regarding patterns of bruising that may be suggestive or diagnostic of abuse, we included 23 of 167 studies reviewed in 2004, although only 2 were comparative studies. Included studies noted that unintentional bruises occur predominantly on the front of the body, over bony prominences and their presence is directly correlated to the child's level of independent mobility. Bruising patterns in abused children, differed in location (most common site being face, neck, ear, head, trunk, buttocks, arms), and tended to be larger. Updates have included a further 14 studies, including bruising in disabled children,

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defining distinguishing patterns in severely injured abused and non-abused children, and importance of petechiae. Systematic Reviews of bruising challenged accepted wisdom regarding ageing of bruises, which had no scientific basis; stimulated higher quality research on patterns of bruises distinguishing abusive and non-abusive bruising patterns, and highlighted the benefits of regular updates of these reviews.

Sheets, L. K., Leach, M. E., Koszewski, I. J., Lessmeier, A. M., Nugent, M., & Simpson, P. (2013). Sentinel injuries in infants evaluated for child physical abuse. *Pediatrics*, *131*(4), 701-707. DOI:10.1542/peds.2012-2780

Relatively minor abusive injuries can precede severe physical abuse in infants. Our objective was to determine how often abused infants have a previous history of "sentinel" injuries, compared with infants who were not abused. Case-control, retrospective study of 401, <12-month-old infants were evaluated for abuse in a hospital-based setting and found to have definite, intermediate concern for, or no abuse after evaluation by the hospital-based Child Protection Team. A sentinel injury was defined as a previous injury reported in the medical history that was suspicious for abuse because the infant could not cruise, or the explanation was implausible. Of the 200 definitely abused infants, 27.5% had a previous sentinel injury compared with 8% of the 100 infants with intermediate concern for abuse (odds ratio: 4.4, 95% confidence interval: 2.0–9.6; $P < .001$). None of the 101 nonabused infants (controls) had a previous sentinel injury ($P < .001$). The type of sentinel injury in the definitely abused cohort was bruising (80%), intraoral injury (11%), and other injury (7%). Sentinel injuries occurred in early infancy: 66% at <3 months of age and 95% at or before the age of 7 months. Medical providers were reportedly aware of the sentinel injury in 41.9% of cases. Previous sentinel injuries are common in infants with severe physical abuse and rare in infants evaluated for abuse and found to not be abused. Detection of sentinel injuries with appropriate interventions could prevent many cases of abuse.

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Pierce, M. C., Kaczor, K., Aldridge, S., O'Flynn, J., & Lorenz, D. J. (2010). Bruising characteristics discriminating physical child abuse from accidental trauma. *Pediatrics*, *125*(1), 67–74. DOI:10.1542/peds.2008-3632

Our objective was to conduct a pilot study to identify discriminating bruising characteristics and to model those findings into a decision tool for screening children at high risk for abuse. A case-control study of children 0 to 48 months of age who were admitted to a PICU because of trauma was performed. Case subjects (N = 42) were victims of physical abuse, and control subjects (N = 53) were children admitted because of accidental trauma during the same time period. Bruising characteristics (total number and body region) and patient age were compared for children with abusive versus accidental trauma. The development of a decision rule for predicting abusive trauma was accomplished with the fitting of a classification and regression tree through binary recursive partitioning. Ninety-five patients were studied. Seventy-one (33 of 42 patients in the abuse group and 38 of 53 in the accident group) were found to have bruising, and the characteristics were modeled. Characteristics predictive of abuse were bruising on the torso, ear, or neck for a child <or=4 years of age and bruising in any region for an infant <4 months of age. A bruising clinical decision rule was derived, with a sensitivity of 97% and a specificity of 84% for predicting abuse. Discriminating differences exist in bruising characteristics for abusive versus accidental trauma. The body region- and age-based bruising clinical decision rule model functions as a clinically sensible screening tool to identify young children who require further evaluation for abuse.

Maguire, S., Mann, M. K., Sibert, J., & Kemp, A. (2005). Are there patterns of bruising in childhood which are diagnostic or suggestive of abuse? A systematic review. *Archives of Disease in Childhood*, *90*(2), 182–186. DOI:10.1136/adc.2003.044065

An all-language literature search from 1951–2004 was examined to investigate what patterns of bruising are diagnostic or suggestive of child abuse by means of a systematic review. Studies included defined patterns of bruising in non-abused or abused children

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<18 years. Excluded: personal practice, review articles, single case reports, inadequate confirmation of abuse. Two independent full text reviews using standardised data extraction and critical appraisal forms. Studies ranked by study design and definition of abuse used. Twenty three studies included: seven non-abusive bruising, 14 abusive bruising, and two both. *Non-abusive*: The prevalence, number, and location of bruises is related to increased motor development. Bruising in non-independently mobile babies is very uncommon (<1%). Seventeen per cent of infants who are starting to mobilise, 53% of walkers, and the majority of schoolchildren have bruises. These are small, sustained over bony prominences, and found on the front of the body. *Abuse*: Bruising is common in children who are abused. Any part of the body is vulnerable. Bruises are away from bony prominences; the commonest site is head and neck (particularly face) followed by the buttocks, trunk, and arms. Bruises are large, commonly multiple, and occur in clusters. They are often associated with other injury types that may be older. Some bruises carry the imprint of the implement used. When abuse is suspected, bruising must be assessed in the context of medical, social, and developmental history, the explanation given, and the patterns of non-abusive bruising. Bruises in non-mobile infants, over soft tissue areas, that carry the imprint of an implement and multiple bruises of uniform shape are suggestive of abuse. Quality research across the whole spectrum of children is urgently needed.

Maguire, S., Mann, M. K., Sibert, J., & Kemp, A. (2005). Can you age bruises accurately in children? A systematic review. *Archives of Disease in Childhood*, *90*(2), 187–189. DOI:10.1136/adc.2003.044073

An all language literature search was conducted to investigate whether it is possible to determine the age of a bruise in a child in clinical practice by means of a systematic review. Included studies assessed the age of bruises in live children less than 18 years old published up until 2004. Excluded: review articles, expert opinion, and single case reports. Standardised data extraction and critical appraisal forms were used. Two reviewers

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independently reviewed studies. Of 167 studies reviewed, three were included: two studies described colour assessment in vivo and one from photographs. Although the Bariciak *et al* study showed a significant association between red/blue/purple colour and recent bruising and yellow/brown and green with older bruising, both this study and Stephenson and Bialas reported that any colour could be present in fresh, intermediate, and old bruises. Results on yellow colouration were conflicting. Stephenson and Bialas showed yellow colour in 10 bruises only after 24 hours, Carpenter after 48 hours, and Bariciak *et al* noted yellow/green/brown within 48 hours. Stephenson and Bialas reported that red was only seen in those of one week or less. The accuracy with which clinicians correctly aged a bruise to within 24 hours of its occurrence was less than 40%. The accuracy with which they could identify fresh, intermediate, or old bruises was 55–63%. Intra- and inter-observer reliability was poor. A bruise cannot accurately be aged from clinical assessment in vivo or on a photograph. At this point in time the practice of estimating the age of a bruise from its colour has no scientific basis and should be avoided in child protection proceedings.

Bariciak, E. D., Plint, A. C., Gaboury, I., & Bennett, S. (2003). Dating of bruises in children: An assessment of physician accuracy. *Pediatrics*, *112*(4), 804-807. DOI:10.1542/peds.112.4.804

This article serve to help determine whether physicians can estimate accurately the age of an accidental bruise on direct physical examination. Children who presented to the emergency department of a children's hospital with accidental bruises of known age and origin had demographic data and information about their injury recorded. History-blinded emergency pediatricians, other physicians, and trainees (fellows, residents, and medical students) independently examined the bruised area and recorded injury characteristics and age estimation and ranked characteristics that influenced their estimation. Fifty children with accidental bruises were enrolled. Emergency pediatricians' accuracy of age estimation within 24 hours of actual age was 47.6%. Individual

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emergency pediatrician's accuracy ranged from 0% to 100%, and the interobserver reliability was poor (κ = -0.03). Accuracy within 24 hours of actual age was 29.4% for other physicians and 36.8% for trainees, which was similar to the emergency pediatricians. Observers reported using color primarily to estimate age, followed by tenderness and then swelling; however, none of these factors was significantly correlated with accuracy. Physician estimates of bruise age are highly inaccurate within 24 hours of the actual age of the injury. Large individual variability and poor interrater reliability also suggest that caution must be used when interpreting these estimates. This study supports earlier studies, urging extreme caution in estimating bruise age, even when such estimates are based on direct examination of the injured area.

Sugar, N. F., Taylor, J. A., & Feldman, K. W. (1999). Bruises in infants and toddlers: Those who don't cruise rarely bruise. *Archives of Pediatrics & Adolescent Medicine, 153*(4), 399-403. DOI:10.1001/archpedi.153.4.399

A cross-sectional survey of community primary care pediatric offices was examined to determine the frequency and location of bruises in normal infants and toddlers, and to determine the relationship of age and developmental stage to bruising. Looking at children younger than 36 months attending well-child care visits, prospective data collection of demographics, developmental stage, and presence and location of bruises. Any medical condition that causes bruises as well as known or suspected abuse was also recorded. A χ^2 test or Fisher exact test was used to determine the significance of differences. Bruises were found in 203 (20.9%) of 973 children who had no known medical cause for bruising and in whom abuse was not suspected. Only 2 (0.6%) of 366 children who were younger than 6 months and 8 (1.7%) of 473 children younger than 9 months had any bruises. Bruises were noted in only 11 (2.2%) of 511 children who were not yet walking with support (cruising). However, 17.8% of cruisers and 51.9% of walkers had bruises (P<.001). Mean bruise frequency ranged from 1.3 bruises per injured child among precruisers (range, 1-2 bruises) to 2.4 per injured child among walkers (range, 1-11). The

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most frequent site of bruises was over the anterior tibia and knee. Bruises on the forehead and upper leg were common among walkers, but bruises on the face and trunk were rare, and bruises on the hands and buttocks were not observed at any age. There were no differences in bruise frequency by sex. African American children were observed to have bruises much less frequently than white children ($P<.007$). Bruises are rare in normal infants and precruisers and become common among cruisers and walkers. Bruises in infants younger than 9 months and who are not yet beginning to ambulate should lead to consideration of abuse or illness as causative. Bruises in toddlers that are located in atypical areas, such as the trunk, hands, or buttocks, should prompt similar concerns.

Langlois, N. E. I., & Gresham, G. A. (1991). The ageing of bruises: A review and study of the colour changes with time. *Forensic Science International*, *50*(2), 227-238. DOI:10.1016/0379-0738(91)90154-B

This work was inspired by a recent case of child abuse where the question of the age of the bruises on the body was raised. The first part of this paper reviews published work on bruises. It illustrates the paucity of work in this field and the absence of studies of the colour changes in bruises of human skin with time. The second part of this paper consists of our own study of the appearance of bruises. The aim was to identify the colour changes which occur in bruises and over what time-scale, in order to determine whether bruises can be aged by appearance. A total of 369 photographs were obtained of bruises aged <6 h and up to 21 days old, in 89 subjects aged 10–100 years. It was found that the development of a yellow colour was the most significant change (subjects aged <65, $P < 0.001$; subjects aged ≥65 years, $P < 0.001$). The development of a yellow colour occurred significantly faster in subjects aged < 65 years. ($P < 0.001$). The appearance of a blue and purple/black colour was of lesser significance. The appearance of a red colour did not alter significantly with time. From this study it was only possible to conclude that a bruise with a yellow colour was more than 18 h old.

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Dental/Orofacial

Justesen, D., Wingren, C. J., Teilum, A., Jensen, N. D., Slot, L., Ylijoki-Sørensen, S., J. Banner, & Hermann, N. V. (2025). Caries experience in suspected physical child abuse: A comparative analysis with register-based controls. *Child Abuse & Neglect*, *161*, 107240. DOI:10.1016/j.chiabu.2024.107240

Child Abuse and Neglect (CAN) is a severe threat to children's health and well-being worldwide. Since oral and dental health are indicators of general health, dentists and dental hygienists are in a favorable position to identify potential cases of CAN. This study aims to investigate the caries experience in primary and permanent dentition in children where physical abuse was suspected compared to controls. All cases were police-reported cases of suspected physical abuse, examined from 2020 to 2023 at the Child Advocacy Centre (CAC) in Copenhagen. Control groups were established using annual reports from the Danish Health Authority of children examined in pediatric dental clinics from 2020 to 2023. The children underwent a comprehensive and systematic forensic medical and dental examination. The control group was matched by age and geography. The main outcome was caries experience, defined as decayed, extracted, or filled primary teeth (def-t) and decayed, missing, or filled permanent teeth (DMF-T). Logistics regression analyses were used to predict the caries experience in cases compared to controls. Overall, significantly higher caries experience was found in primary dentition among cases (Chi-square, $p < 0.05$). Stratified by age, higher caries experience was found in the primary dentition in the 5-year-old (OR: 2.5-3.0; 95% CI 1.1-7.2) and in the permanent dentition of the 11-year-old (OR: 2.9-3.9; 95% CI 1.4-13.9) across all study years. Certain age groups of suspected physically abused children exhibit significantly higher caries experience than matched controls.

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Azadani, E. N., McTigue, D. J., Peng, J., & Casamassimo, P. S. (2024). Associations between child abuse and neglect, and dento-alveolar injuries in a children's hospital population. *Dental Traumatology*, *40*(52), 53-60. DOI:10.1111/edt.12902

The purpose of this study was to identify social variables common to children with dento-alveolar trauma (DAT) and child abuse and neglect (CAN) in a large children's hospital population. Emergency department data from an urban trauma Level 1 children's hospital were queried between December 02, 2017 and September 30, 2022 to identify children with both DAT and CAN. Patients with DAT and CAN were compared to DAT-only children in a case–control study design. Descriptive statistics were used to report characteristics of children in case and control groups. Chi-Squared and Fisher's exact tests were used to compare cases and controls. The level of significance was set at $p \leq .05$. In total, 14 children who had DAT and CAN reported simultaneously comprised the case group. A total of 42 children with DAT-only, age/sex matched with cases, comprised the control group. Mean (SD) age of cases was 10.4 (±4) and controls was 10.1 (±3.9) years-old. Eight cases (57.1%) and 24 controls (57.1%) were female. No statistical differences ($p = .05$) were present for language, race, insurance coverage, parental custody, legal guardianship, and type of residence for cases versus controls. Five (35.7%) cases had a special need versus 4 (9.5%) controls and was statistically different ($p = .03$). Nine (64.3%) cases had behavioral problems versus 13 (31%) controls ($p = .05$). Cases were more likely to have facial injuries than controls (74.3 vs. 31%), however no significant differences were present for total number of injured teeth, head injury or neck injury between cases and controls. In half of cases, the perpetrator reported was the sibling. Demographics did not predict CAN in children with dental injuries. Sibling violence should be considered in suspected CAN children.

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Han, H., Koziol-McLain, J., Morse, Z., Lees, A. B., & Carrington, S. D. (2024). Enhancing child protection responses in oral health practice: A scoping review of evidence-based approaches. *Child Abuse Review*, *33*(6), e2904. DOI:10.1002/car.2904

Child abuse and neglect represent significant global health challenges with long-lasting adverse impacts. Oral health practitioners, who often interact with children, play a key role in detecting and responding to suspected cases. Despite this, there is a notable gap in the systematic child protection measures in dental practices globally. This scoping review, utilising the Joanna Briggs Institute methodology, aims to outline current approaches for oral health practitioners and identify gaps in the approaches designed to enhance their responsiveness. Covering studies from January 2000 to May 2023, the review explored educational programmes, guidelines and interdisciplinary training modules. A comprehensive search across multiple databases, including MEDLINE, CINAHL and Scopus, along with grey literature sources, identified 1230 sources, resulting in the inclusion of 20 relevant sources. Findings highlight three main approaches: dental-specific education programmes, practical guidelines for child protection responses and analysis of legal and professional obligations. These approaches demonstrate a mix of direct educational interventions and policy-driven strategies aimed at enhancing oral health practitioners' knowledge, attitudes and practices towards child abuse and neglect. Given the identified variability and gaps in training and resources, future research should assess the effectiveness of these approaches and develop comprehensive, culturally safe training for oral health practitioners globally.

Tate, A. R., Fisher-Owens, S. A., Spiller, L., Muhlbauer, J., Lukefahr, J. L., Section on Oral Health, & Council on Child Abuse and Neglect. (2024). Oral and dental aspects of child abuse and neglect: Clinical report. *Pediatrics*, *154*(3), e2024068024. DOI:10.1542/peds.2024-068024

In all 50 states, the District of Columbia, and the Commonwealth of Puerto Rico, pediatricians, dental professionals, and other physicians are mandated to report suspected cases of abuse and neglect to social service or law enforcement agencies.

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The purpose of this clinical report is to review the oral aspects of abuse and dental neglect in children and the role of pediatricians, dental professionals, and other physicians in evaluating such conditions. This clinical report addresses recommendations on the evaluation of bite marks, as well as perioral and intraoral injuries, infections, and diseases that may raise suspicion for child abuse or neglect. Some physicians may have received less education pertaining to oral health, dental injury, and oral disease. These physicians may not detect the mouth and gum findings possibly related to abuse or neglect as readily as abuse injuries involving other areas of the body. Therefore, pediatricians, dental professionals, and other physicians are encouraged to collaborate to increase the prevention, detection, and treatment of these conditions in children.

Spiller, L. R. (2024). Orofacial manifestations of child maltreatment: A review. *Dental Traumatology*, *40*(52), 10-17. DOI:10.1111/edt.12852

The recognition and reporting of child abuse and neglect continues to be a challenge in the healthcare setting. All healthcare providers, including dentists, should be aware of the high prevalence of orofacial injuries and conditions that are concerning for abuse and neglect. Sentinel injuries may appear trivial and do not require medical attention, but are unlikely caused by accidental mechanisms and, if not properly identified, often precede more severe abusive injuries. Concerning orofacial findings can manifest as bruising, eye injuries, intraoral injuries, pharyngeal perforations, facial bone fractures, and sexually transmitted infections. Abusive caregivers are likely to give inadequate explanations or no history at all to explain concerning findings. Medical providers' failure to make mandated reports about their concerns to the appropriate agencies can have significant long-term impacts on the physical and psychological well-being of children.

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Mele, F., Introna, F., & Santoro, V. (2023). Child abuse and neglect: Oral and dental signs and the role of the dentist. *The Journal of Forensic Odontostomatology*, *41*(2), 21–29.

Historically, the law, dental and forensic literature has included numerous articles concerning abused children. The orofacial structures are injured frequently in the maltreated child. Injuries of the neck, head, face, and oral cavity represent the most affected areas of the victim's body that routinely sustain physical trauma in child maltreatment cases. This literature review aimed to report the state of art of child abuse from the point of view of the dentist with focus on studies in dental aspects of child abuse and neglect of the last ten years. Considering the time slot, 20 papers were included with the following inclusion criteria: papers published in English, all keywords included in the title, articles available on PubMed. Many of the injuries are within the scope of dentistry or easily observed by the dental professional during routine dental treatment, and it is essential that the dentist recognizes them. Concerning neglect, it is appropriate to make a distinction between deliberate parental behavior that has the consequence of unavoidable and voluntary neglect towards their children and those conditions of involuntary carelessness determined by socio-economic and cultural factors such as family isolation, lack of finances, parental ignorance, or lack of perceived value of oral health. Therefore, it is relevant that the dentist pays attention to the cases to report and those that only need help.

Passmore, S., Grant, S., Isaac, R., & Hendrix-Dicken, A. D. (2023). Pharyngeal trauma: When to suspect physical abuse. *Child Abuse Review*, *32*(5), e2819. DOI:10.1002/car.2819

Paediatric pharyngeal trauma is common and frequently occurs after falls or other accidents. Children with these injuries typically present to emergency departments with drooling, respiratory distress, stridor and hematemesis. Although most cases of pharyngeal trauma are minor, some can have rare, life-threatening complications.

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Bradbury-Jones, C., Isham, L., Morris, A. J., & Taylor, J. (2021). The "neglected" relationship between child maltreatment and oral health? An international scoping review of research. *Trauma, Violence, & Abuse*, *22*(2), 265-276. DOI:10.1177/1524838019841598

Globally, the oral health needs of children who have, or are suspected of having, experienced abuse or neglect has become a focus of concern. It is thus valuable and timely to map the contemporary nature of the research landscape in this expanding field. This review reports the findings of a scoping review of the international empirical literature. The aim was to explore the relationship between child maltreatment and oral health and how this complex issue is addressed in contemporary dental, health, and social work practice. The review identified 68 papers, analysis of which identified three themes: (1) There is a relationship between poor oral health and child maltreatment that is well evidenced but conceptually underdeveloped. (2) There are discrepancies between the knowledge of members of the dental team about child maltreatment and their confidence and aptitude to identify and report child protection concerns. (3) There are areas of local-level policy and practice development that seek to improve working relationships between dentists and health and social work practitioners; however, there is widespread evidence that the oral health needs of this group of vulnerable children are not consistently met. To orientate critical discussion and planning for future research and practice, we present the Patterns, Advances, Gaps, Evidence for practice and Research recommendations (PAGER) framework. The review's findings are likely to be of interest to researchers, practitioners, and policy makers working across dentistry, health and social work.

Sarkar, R., Ozanne-Smith, J., & Bassed, R. (2021). Systematic review of the patterns of orofacial injuries in physically abused children and adolescents. *Trauma, Violence, & Abuse*, *22*(1), 136-146. DOI:10.1177/1524838019827617

The objective of this study is to examine the evidence base for patterns of oro-facial injuries in physical abuse cases of children and adolescents aged 0-17 years. Systematic

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searches of Ovid Medline, Ovid Embase, Cochrane Central and grey literature, dating from the oldest entry to August 2017. Search criteria included English language peer reviewed articles and theses on physical abuse cases affecting the age group of 0-17 years. Exclusion criteria were: Case reports and <10 case series; studies involving bite mark injuries elsewhere on the body, sexual, ritualistic or emotional abuse and neglect, exposure to domestic violence; reviews; book chapters and conference proceedings. The following data was extracted: quality and design of study, oro-facial manifestations, new/old injuries, fatalities, coexistent injuries, co-morbidities and radiologic investigations. Each study was subjected to two independent reviews and a third, if reviewers disagreed. The authors identified 51 articles, 26 of which satisfied the inclusion criteria. The oro-facial signs were superficial injuries of face, ears, neck, lips and oral mucosa, burns, torn fraenii and fractured teeth and jaws. A minority of studies stood out due to their well-developed design; expert opinion inclusion; new/old/occult injury investigations and facial bruising/ intraoral injuries as sentinel markers. Overall, the review demonstrated weak study quality and representativeness as well as lacunae in uniform reporting. The available literature does not endorse any pathognomonic signature patterns of child physical abuse to the exposed oro-facial region.

Singh, V., & Lehl, G. (2020). Child abuse and the role of a dentist in its identification, prevention and protection: A literature review. *Dental Research Journal*, *17*(3), 167–173.

Child abuse, a reprehensible act, pervades all strata of society. Dentists are more likely to encounter such cases in their daily practice. However, such cases usually go unreported due to lack of adequate knowledge. Practitioners flinch from reporting these due to various reasons, and this sets up a vicious cycle which traps the victim leading to grave long-term consequences. This review aims to collect all literature available on PubMed, PubMed Central, MEDLINE, Google Scholar, and Google search engines on the role of dentists in child abuse identification and information and summarize these details. The

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review will shed light on the identification of abuse in dental settings, the various legal recourses and organizations related to it, and how dentists can better equip themselves to tackle such cases if they come across one. The review also makes certain recommendations by which dentists and healthcare providers in general can better prepare themselves for such contingencies.

Crouch, E., Radcliff, E., Nelson, J., Strompolis, M., & Martin, A. (2018). The experience of adverse childhood experiences and dental care in childhood. *Community Dentistry and Oral Epidemiology*, *46*(5), 442-448. DOI:10.1111/cdoe.12389

Routine preventive dental care is important to overall child health and well-being. However, the experience of adversity in childhood may prevent children from getting adequate preventive care. This study seeks to explore how the prevalence of adverse childhood experiences (ACEs) and the role of a protective adult may be associated with dental care utilization in childhood. Data from the 2016 South Carolina Behavioral Risk Factor Surveillance System (SC BRFSS), which interviews adults eighteen year of age and older, were used in this study. Dental care utilization in childhood was measured as the adult retrospectively reported frequency of dental care in childhood: at least once every 2 years (adequate dental care) or less often than every 2 years (inadequate dental care). ACEs were determined by asking about each of respondent's childhood exposure to eleven childhood experiences, including divorce, parental incarceration, domestic violence, drug and alcohol abuse, mental illness and emotional, physical or sexual abuse. The presence of a protective adult in childhood included respondents who had an adult who made them feel safe and protected during childhood. Descriptive and bivariate statistics explored differences in the adequacy of child dental care by ACE exposure, the presence of a protective adult and selected demographic characteristics. Multivariate regression models were used to examine the impact of counts and types of ACEs and the presence of a protective adult with inadequate childhood dental care. The unweighted study sample included 7079 respondents ageing from 18 to 79 years of age Sampling

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weights were used for all analyses. Among all respondents, 71.7% reported receiving adequate dental care during childhood; 28.3% responded that they received inadequate dental care. Adjusting for sociodemographic characteristics, respondents who experienced four or more ACEs had a higher likelihood of inadequate dental care than respondents who reported no ACEs (aOR 2.79; 95% CI 2.77-2.82). The odds of reporting inadequate dental care were lower among those grew up with an adult who made them feel safe and protected (aOR 0.38; 95% CI 0.37-0.39). The presence of protective factors may mitigate the effects of ACEs on paediatric dental care. This research contributes to the literature through the further identification of the role of dentists in identifying signs of abuse and neglect.

Nagarajan, S. K. (2018). Craniofacial and oral manifestation of child abuse: A dental surgeon's guide. *Journal of Forensic Dental Sciences*, *10*(1), 5-7. DOI:10.4103/jfo.jfds_84_16

Children should be given the privilege to mature in a loving, supportive family environment that promotes the development of an individual to his/her full potential. The abuse and neglect of children is a problem that pervades all segments of society. Dentists/forensic odontologists are in a strategic position to recognize mistreated children. While the detection of dental care neglect is an obvious responsibility for dentists, other types of child abuse and neglect also may present themselves in the dental office. Once this information is known to the dentist, he/she can join physicians in protecting children from injury.

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Kaur, H., Vinod, K. S., Singh, H., Arya, L., Verma, P., & Singh, B. (2017). Child maltreatment: Cross-sectional survey of general dentists. *Journal of Forensic Dental Sciences*, *9*(1), 24-30. DOI:10.4103/jfo.jfds_6_15

Child abuse continues to be a social menace causing both physical and emotional trauma to benevolent children. Census has shown that nearly 50–75% of child abuse include trauma to mouth, face, and head. Thus, dental professionals are in a strategic position to identify physical and emotional manifestations of abuse. A cross-sectional survey was conducted to assess knowledge and attitude of dental professionals on the exigent issue of child abuse. With prior consent, a 20-question survey including both multiple choice and dichotomous (yes/no) questions was mailed to 120 state-registered general dentists and the data collected were subjected to statistical analysis. The overall response rate to the questionnaires was 97%. Lack of knowledge about dentist role in reporting child abuse accounted to 55% in the reasons for hesitancy to report. Pearson's Chi-square test did not show any significant difference between male and female regarding the reason for hesitancy to report and legal obligation of dentists. Although respondent dentists were aware of the diagnosis of child abuse, they were hesitant and unaware of the appropriate authority to report. Increased instruction in the areas of recognition and reporting of child abuse and neglect should be emphasized.

Costacurta, M., Benavoli, D., Arcudi, G., & Docimo, R. (2016). Oral and dental signs of child abuse and neglect. *ORAL & Implantology*, *8*(2-3), 68–73. DOI:10.11138/orl/2015.8.2.068

The aim of this report is to identify the main oral and dental aspects of physical and sexual abuse and dental neglect in childhood, contributing to the precocious identification and diagnosis in a dental practice. The oral and dental manifestations were divided and classified according to the type of child abuse: physical abuse, sexual abuse, neglect. Several studies in the literature have shown that oral or facial trauma occurs in about 50% of physically abused children; the oral cavity may be a central focus for physical abuse.

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Oro-facial manifestations of physical abuse include bruising, abrasions or lacerations of tongue, lips, oral mucosa, hard and soft palate, gingiva, alveolar mucosa, frenum; dental fractures, dental dislocations, dental avulsions; maxilla and mandible fractures. Although the oral cavity is a frequent site of sexual abuse in children, visible oral injuries or infections are rare. Some oral signs may represent significant indications of sexual abuse, as erythema, ulcer, vescicle with purulent drainage or pseudomembranus and condylomatous lesions of lips, tongue, palate and nose-pharynx. Furthermore, if present erythema and petechiae, of unknown etiology, found on soft and hard palates junction or on the floor of the mouth, can be certainly evident proofs of forced oral sex. Oral signs of neglect are easily identifiable and are: poor oral hygiene, halitosis, Early Childhood Caries (ECC), odontogenous infections (recurrent and previous abscesses), periodontal disease, aptha lesions as a consequence of a nutritional deficiency status. Moreover, it is analyzed the assessment of bite marks because often associated with child abuse, the identification and collection of clinical evidence of this type of injury. A precocious diagnosis of child abuse, in a dental practice, could considerably contribute in the identification of violence cases and in an early intervention.

Nuzzolese, E., Lepore, M. M., Montagna, F., Marcario, V., De Rosa, S., Solarino, B., & Di Vella, G. (2009). Child abuse and dental neglect: The dental team's role in identification and prevention. *International Journal of Dental Hygiene*, *7*(2), 96-101. DOI:10.1111/j.1601-5037.2008.00324.x

Health, education and social services are placing increasing emphasis on preventing abuse and neglect by early intervention to support families where children and young people may be at risk. Dental hygienist and dental assistants, like all other health professionals, can have a part in recognizing and preventing children from those who would cause them harm. They should be aware of the warning signs, recognizing what to consider as abuse or dental neglect and know how to deal with these young patients, and to fulfil their legal and ethical obligation to report suspected cases. The purpose of this

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report is to review the oral and dental aspects of child abuse and dental neglect thus helping the dental team in detecting such conditions. In particular, this report addresses the evaluation of bite marks as well as perioral and intraoral injuries, infections, early childhood caries and diseases that may be indicative of child abuse or neglect. Emphasis is placed on an appropriate protocol to follow in the dental practice to best treat and protect children who may have suffered abuse, helping the team in the diagnosis and documentation.

Maguire, S., Hunter, B., Hunter, L., Sibert, J. R., Mann, M., Kemp, A. M., & Welsh Child Protection Systematic Review Group. (2007). Diagnosing abuse: A systematic review of torn frenum and other intra-oral injuries. *Archives of Disease in Childhood*, *92*(12), 1113–1117. DOI:10.1136/adc.2006.113001

A torn labial frenum is widely regarded as pathognomonic of abuse. We systematically reviewed the evidence for this, and to define other intra-oral injuries found in physical abuse. Nine studies documented abusive torn labial frena in 30 children and 27 were fatally abused: 22 were less than 5 years old. Only a direct blow to the face was substantiated as a mechanism of injury. Two studies noted accidentally torn labial frena, both from intubation. Abusive intra-oral injuries were widely distributed to the lips, gums, tongue and palate and included fractures, intrusion and extraction of the dentition, bites and contusions. Current literature does not support the diagnosis of abuse based on a torn labial frenum in isolation. The intra-oral hard and soft tissue should be examined in all suspected abuse cases, and a dental opinion sought where abnormalities are found.

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Welbury, R. R., MacAskill, S. G., Murphy, J. M., Evans, D. J., Weightman, K. E., Jackson, M. C., & Crawford, M. A. (2003). General dental practitioners' perception of their role within child protection: A qualitative study. *European Journal of Paediatric Dentistry, 4*(2), 89–95.

This study was constructed to assess general dental practitioners' knowledge, attitudes and practice regarding their role within child protection in relation to child abuse. Structured interviews with seven key informants from general dental practice (2), local dental committees (1), social services (2), paediatric dentistry (1) and community child health (1), together with five focus groups comprising 23 general dental practitioners (GDPs) on Health Authority Lists in Tyne and Wear and Northumberland (UK). GDPs reported feelings of isolation with little communication with other health professionals or local authority services. The majority had scarcely considered child protection issues in their clinical practice although those qualified for less than 15 years were more aware. GDPs acknowledged a lack of awareness of signs and symptoms of physical abuse and even less confidence in dealing with emotional or sexual abuse. Dentists expressed concern, even fear, about the outcomes of reporting suspicions, and had little knowledge of the local Child Protection mechanisms. GDPs in Tyne and Wear and Northumberland feel unprepared to undertake a role in the child protection process with confidence. National and local initiatives may be required to address existing barriers.

Naidoo, S. (2000). A profile of the oro-facial injuries in child physical abuse at a children's hospital. *Child Abuse & Neglect*, *24*(4), 521-534. DOI:10.1016/S0145-2134(00)00114-9

The aim of the present study was to determine the head, face and neck injuries associated with child abuse cases in the Cape Peninsula, Cape Town, South Africa. A retrospective, record-based analysis (n = 300) of non-accidental injuries at a Children's Hospital over a 5-year period (1992–1996) was carried out. The mean age of the sample was 4.75 years—54.3% were boys and 45.7% were girls. Most of the crimes were committed in the child's own home (88.7%). Crimes were reported by mothers (48.7%),

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grandmothers (11.7%) and day hospitals (13%). Ninety percent of the perpetrators were known to the victim. The majority of the perpetrators were male (79%)—20% the perpetrators were the mother's boyfriend; 36% the father or step father, and in 12% the mother was responsible. Thirty-five percent of perpetrators were under the influence of alcohol or drugs when they committed the offence; 64.7% of cases suffered serious injuries, 48.7% had to be hospitalized, four children were critically injured and died. The head, face, neck, and mouth were the sites of physical injury in 67% of the 300 cases reviewed. The face was the most frequently injured (41%) part of the body, with the cheek being the most common site for the injury. The range and diversity of the oro-facial injuries included skull fractures, subdural hematomas, retinal hemorrhages, bruises, burns, and lacerations. Injuries to the mouth included fractured teeth, avulsed teeth, lacerations to the lips, frenum, tongue, and jaw fractures. The main conclusions of this study were (i) under 2-year-old children were most at risk from abuse (36%); (ii) the number of the reported injuries to the oral cavity was extremely low (11%); and (iii) no dentists participated in the examination of any of the patients. Intra-oral injuries may be overlooked because of the medical examiner's unfamiliarity with the oral cavity. Oral health professionals should be consulted for diagnosis, advice and treatment.

Needleman, H. L. (1986). Orofacial trauma in child abuse: Types, prevalence, management, and the dental profession's involvement. *Pediatric Dentistry*, *8*(1), 71-80.

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Burns

Amadasi, A., & Etzold, S. (2024). Iron contact burns and the path to the diagnosis of child abuse. *Legal Medicine*, *70*, 102474. DOI:10.1016/j.legalmed.2024.102474

Burns are a common injury in both abused and non-abused children, and the accurate diagnosis of abusive burns is important to ensure protection. In the particular case of a three year old child with a second degree burn on her face and neck caused by an alleged contact with a hot iron, the correct analysis of the injury and the dynamics of what was reported as a domestic accident allowed the recognition of a different scenario and a diagnosis of child abuse due to the pressure of the flat part of the iron on the skin, thus uniformly involving the cheek and the upper part of the neck. The involvement of parts of the body placed on different anatomical planes (thus indicating pressure and not mere contact) should be considered as a further element of differential diagnosis. This demonstrates and underlines the importance of a thorough multidisciplinary assessment for this type of injury which is described as an accidental event but rarely as an outcome of child abuse.

Cowley, L. E., Bennett, C. V., Quinn-Scoggins, H. D., Nuttall, D., Wilkins, D., & Kemp, A. M. (2024). Factors influencing clinicians', health visitors' and social workers' professional judgements, decision-making and multidisciplinary collaboration when safeguarding children with burn injuries: A qualitative study. *Child Abuse Review*, *33*(1), e2862. DOI:10.1002/car.2862

Burns are a common injury to young children, sometimes related to neglect or physical abuse. Emergency department (ED) clinicians, health visitors and social workers must work collaboratively when safeguarding children with burns; however, little is known about the factors influencing their professional judgements, decision-making and multidisciplinary collaboration. Objective was to explore factors affecting ED clinicians', health visitors' and social workers' professional judgements and decision-making when children present to the ED with burns, and experiences of multidisciplinary collaboration,

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to identify areas for improvement. This was a qualitative semi-structured interview study using purposive and snowball sampling to recruit participants. Data were analysed using 'codebook' thematic analysis. Four themes were identified: 'perceived roles and responsibilities when safeguarding children with burn injuries', 'factors influencing judgment of risk and decision-making', 'information sharing' and 'barriers and facilitators to successful multidisciplinary collaboration'. There is limited understanding between the groups about each other's roles. Each agency is dependent on one another to understand the full picture; however, information sharing is lacking in detail and context and hindered by organisational and resource constraints. Formal opportunities for multiagency team working such as strategy meetings can be facilitators of more successful collaborations. Professionals may benefit from multiagency training to improve understanding of one another's roles. Greater detail and context are needed when notifying health visitors of burn injuries in children or making a referral to children's services.

Johnson, K., Crumm, C., & Brown, E. (2024). Abusive pediatric burns module in the Child Abuse Pediatrics Curriculum for Physicians (CAP-CuP). *MedEdPORTAL*, *20*, 11429. DOI:10.15766/mep_2374-8265.11429

Child abuse pediatrics is an underrepresented area of medical education. To date, the available teaching materials about child abuse in *MedEdPORTAL* do not address burn injury, and the available materials about burn injury do not address child abuse. We created an interactive, case-based module on abusive pediatric burns to fill this educational gap. The abusive pediatric burns module was presented to a hybrid audience at a 45-minute emergency medicine grand rounds at Mayo Clinic. Participants completed a pre- and postmodule assessment to measure their confidence and knowledge pertaining to abusive pediatric burns. Fifty-six attendees, from an audience primarily composed of emergency medicine physicians but also including some multidisciplinary individuals, participated in the module. The median confidence level in assessing pediatric burns for abuse showed a modest increase from 4 (interquartile

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range [IQR]: 2–6) to 6 (IQR: 5–8), and the proportion of participants answering knowledge questions correctly increased for every question: 18% versus 45%, 41% versus 100%, 59% versus 84%, and 72% versus 100%. Qualitative feedback from the audience was favorable. This interactive, case-based module about abusive pediatric burns was successfully administered to an audience at emergency medicine grand rounds. Increases in confidence and knowledge were observed, and positive qualitative feedback was received.

The Royal College of Paediatrics and Child Health (RCPCH). (2022). *Child protection evidence-Systematic review on burns*.

Scald burns remain the most common burn type in children who have been abused with the most common mechanism involving water. Scalds secondary to abuse are classically described as being distributed on the buttocks, perineum, and lower extremities, with clear upper limits and scald symmetry especially when present on the lower extremities. Contact burns are the most common non-scald causes of abusive burns. These burns tend to be distributed on the back, shoulders, and buttocks, with clearly demarcated edges and can present in the pattern of the object used. The following systematic review evaluates the scientific literature on abusive and accidental burns in children published up until October 2021. This update includes four new studies with evidence added to all current clinical questions. One study reported that apart from abusive head trauma, intentional burns are the most likely injury to cause death or long-term morbidity. The prevalence of abusive burns is estimated to be 5.3% – 14% of children admitted to burns units, highest for those aged 0 – 1 years and scalds are the most common intentional burn injury. These injuries may occur as a consequence of running water, resulting in burns to the lower limbs with a symmetrical distribution.

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Loos, M. L. H., Almekinders, C. A., Heymans, M. W., de Vries, A., & Bakx, R. (2020). Incidence and characteristics of non-accidental burns in children: A systematic review. *Burns*, *46*(6), 1243-1253. DOI:10.1016/j.burns.2020.01.008

The estimated incidence of non-accidental burns varies between 1–25% in children. Distinguishing non-accidental burns from accidental burns can be very complicated but is of utmost importance for prevention of future injuries. Several studies concerning non-accidental burns have been published, however a clear overview is lacking. The purpose of this article was to conduct a systematic review of the existing literature to identify the incidence and characteristics of burns due to intentional causes and neglect. The protocol of this systematic review was prospectively registered in an international database (PROSPERO, National Institute for Health Research, York, United Kingdom). We searched literature in electronic databases published from 1948 until July 2018 written in English, Dutch, German and French. Two researchers screened, selected and graded the included articles, using standard methodology. We included primary studies of confirmed non-accidental burns in children. We excluded literature reviews, case-reports and unpublished data. We extracted data regarding demographics, burn characteristics, Child Protective Services (CPS) referral information and parent/household characteristics. 825 studies were screened, 17 were included. The incidence of non-accidental burns was pooled out of 10 studies and is 9.7%. Indicators raising a very high suspicion of intentional burns are deep partial thickness and full thickness burns, burns to the posterior trunk and burns caused by hot tap water. Indicators raising a high to moderate suspicion of an intentional cause are burns to buttocks, genital and legs, a younger age of the child, additional injuries such as cutaneous injuries/bruises and fractures. More commonly caused by accidents are burns to head, neck, anterior trunk, upper extremities and feet. Little data are available regarding burns as a result of neglect. Quality of studies was often low to moderate mostly due to a high heterogeneity. This review is mainly based on retrospective studies. From this review of the literature, the incidence of non-accidental burns in children was 9.7%. Indicators raising a very high

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suspicion of intentional burns are: location at the posterior trunk, deep partial thickness and full thickness burns and burns caused by hot tap water.

Mullen, S., Begley, R., Roberts, Z., & Kemp, A. M. (2019). Fifteen-minute consultation: Childhood burns: Inflicted, neglect or accidental. *Archives of Disease in Childhood-Education and Practice*, *104*(2), 74-78. DOI:10.1136/archdischild-2018-315167

Burns are a relatively common injury in children accounting for over 50 000 emergency department attendances each year. An estimated 1 in 10 of these are due to maltreatment. These may present in the form of physical abuse or neglect with a reported ratio of 1:9. A burn associated with maltreatment may be a marker for future abuse or neglect and it is paramount that concerns are identified and addressed at the initial visit. Paediatricians need to be confident to identify safeguarding concerns specific to childhood burns and investigate accordingly. In this review, key variables that may aid in differentiating maltreatment from accidental burns are discussed in a case-based format, utilising up-to-date evidence to support the recommendations. Despite a proportion of burns resulting from physical abuse, the rate of child protection investigations in these patients are significantly lower than for children who present with other forms of physical injuries despite a similar proportion of positive findings. Our objective is to review the available evidence to support the safe assessment and management of children presenting with scalds or contact burns.

Kemp, A. M., Hollén, L., Emond, A. M., Nuttall, D., Rea, D., & Maguire, S. (2018). Raising suspicion of maltreatment from burns: Derivation and validation of the BuRN Tool. *Burns*, *44*(2), 335-343. DOI:10.1016/j.burns.2017.08.018

10–25% of childhood burns arise from maltreatment. The purpose of this study is to derive and validate a clinical prediction tool to assist the recognition of suspected maltreatment. Prospectively collected data from 1327 children with burns were analyzed

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using logistic regression. Regression coefficients for variables associated with 'referral for child maltreatment investigation' (112 cases) in multivariable analyses were converted to integers to derive the BuRN-Tool, scoring each child on a continuous scale. A cut-off score for referral was established from receiver operating curve analysis and optimal sensitivity and specificity values. We validated the BuRN-Tool on 787 prospectively collected novel cases. Variables associated with referral were: age <5 years, known to social care, concerning explanation, full thickness burn, uncommon body location, bilateral pattern and supervision concern. We established 3 as cut-off score, resulting in a sensitivity and specificity for scalds of 87.5% (95% CI:61.7–98.4) and 81.5% (95% CI:77.1–85.4) respectively and for non-scalds sensitivity was 82.4% (95%CI:65.5–93.2) and specificity 78.7% (95% CI:73.9–82.9) when applied to validation data. Area under the curve was 0.87 (95% CI:0.83–0.90) for scalds and 0.85 (95% CI:0.81–0.88) for non-scalds. The BuRN-Tool is a potential adjunct to clinical decision-making, predicting which children warrant investigation for child maltreatment. The score is simple and easy to complete in an emergency department setting.

Pawlik, M. C., Kemp, A., Maguire, S., Nuttall, D., Feldman, K. W., Lindberg, D. M., & ExSTRA Investigators. (2016). Children with burns referred for child abuse evaluation: Burn characteristics and co-existent injuries. *Child Abuse & Neglect*, *55*, 52-61. DOI:10.1016/j.chiabu.2016.03.006

Intentional burns represent a serious form of physical abuse that must be identified to protect children from further harm. This study is a retrospectively planned secondary analysis of the Examining Siblings To Recognize Abuse (ExSTRA) network data. Our objective was to describe the characteristics of burns injuries in children referred to Child Abuse Pediatricians (CAPs) in relation to the perceived likelihood of abuse. We furthermore compare the extent of diagnostic investigations undertaken in children referred to CAPs for burn injuries with those referred for other reasons. Within this dataset, 7% (215/2890) of children had burns. Children with burns were older than children with

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other injuries (median age 20 months vs. 10 months). Physical abuse was perceived as likely in 40.9% (88) and unlikely in 59.1% (127). Scalds accounted for 52.6% (113) and contact burns for 27.6% (60). Several characteristics of the history and burn injury were associated with a significantly higher perceived likelihood of abuse, including children with reported inflicted injury, absent or inadequate explanation, hot water as agent, immersion scald, a bilateral/symmetric burn pattern, total body surface area ≥10%, full thickness burns, and co-existent injuries. The rates of diagnostic testing were significantly lower in children with burns than other injuries, yet the yield of skeletal survey and hepatic transaminases testing were comparable between the two groups. This would imply that children referred to CAPs for burns warrant the same level of comprehensive investigations as those referred for other reasons.

Kemp, A. M., Maguire, S. A., Lumb, R. C., Harris, S. M., & Mann, M. K. (2014). Contact, cigarette and flame burns in physical abuse: A systematic review. *Child Abuse Review, 23*(1), 35-47. DOI:10.1002/car.2278

This systematic review identifies features of intentional non-scald burns in physical abuse. Fifteen bibliographic databases of international literature (1950–2011) were searched to identify potential studies that were critically appraised using standardised methods. Primary studies with confirmed intentional non-scald burns in children aged < 18 years were included to provide a descriptive analysis of the causation, appearance and distribution of burns. Twenty studies were included: one cross-sectional, one case control and 18 case studies/small case series representing 73 children with intentional non-scald burns. The majority were contact burns from household items: the agents included cigarettes (18), irons (9), electric fires/heaters/radiators (10), cigarette lighters (2), hairdryers (7), curling tongs (3), chemicals (3), microwaves (2) flame burns (7), miscellaneous (7) and burns of unknown cause (5). The burns occurred throughout childhood. The majority of children were older than three years. The characteristic features were of clearly demarcated contact burns or scars in shapes that mirrored the

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agent. They were predominantly recorded on the limbs, trunks and the backs of hands; they were frequently multiple and co-existed with additional signs of abuse. These features should raise concerns of suspected physical abuse.

Maguire, S., Okolie, C., & Kemp, A. M. (2014). Burns as a consequence of child maltreatment. *Paediatrics and Child Health*, *24*(12), 557-561. DOI:10.1016/j.paed.2014.07.014

Over 25,000 children a year attend emergency departments in the UK with burns. Scalds predominate, with infants aged one year being 10 times more likely to sustain a burn than any other age group. Identifying which burns result from abuse or neglect is challenging, but inflicted injuries are more likely to have certain characteristics and differences in the causative agent, mechanism and pattern of burns have been observed in children with non-accidental burn injuries. Children have been subjected to every type of burn as a consequence of abuse including scalds, contact, caustic, flame and radiation burns, thus careful scrutiny of all burns cases for possible maltreatment is warranted. Whilst neglectful burns outnumber inflicted burns by 9:1, these are most challenging to discern. A detailed history is vital to determine whether the burn pattern is consistent with the child's developmental stage, and the agent and mechanism offered, in addition to evaluating supervision, and previous or co-existent injuries. Social features such as domestic violence in the home or being previously known to social services are also key indicators. If abuse is suspected, full investigations including skeletal survey in those aged less than 2 years is required, consideration of cranial neuro-imaging in younger infants and possible scene assessment.

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Toon, M. H., Maybauer, D. M., Arceneaux, L. L., Fraser, J. F., Meyer, W., Runge, A., & Maybauer, M. O. (2011). Children with burn injuries-Assessment of trauma, neglect, violence and abuse. *Journal of Injury &Violence Research*, *3*(2), 98–110. DOI:10.5249/jivr.v3i2.91

Burns are an important cause of injury to young children, being the third most frequent cause of injury resulting in death behind motor vehicle accidents and drowning. Burn injuries account for the greatest length of stay of all hospital admissions for injuries and costs associated with care are substantial. The majority of burn injuries in children are scald injuries resulting from hot liquids, occurring most commonly in children aged 0-4 years. Other types of burns include electrical, chemical and intentional injury. Mechanisms of injury are often unique to children and involve exploratory behavior without the requisite comprehension of the dangers in their environment. Assessment of the burnt child includes airway, breathing and circulation stabilization, followed by assessment of the extent of the burn and head to toe examination. The standard rule of 9s for estimating total body surface area (TBSA) of the burn is inaccurate for the pediatric population and modifications include utilizing the Lund and Browder chart, or the child's palm to represent 1% TBSA. Further monitoring may include cardiac assessment, indwelling catheter insertion and evaluation of inhalation injury with or without intubation depending on the context of the injury. Risk factors and features of intentional injury should be known and sought and vital clues can be found in the history, physical examination and common patterns of presentation. Contemporary burn management is underscored by several decades of advancing medical and surgical care however, common to all injuries, it is in the area of prevention that the greatest potential to reduce the burden of these devastating occurrences exists.

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Maguire, S., Moynihan, S., Mann, M., Potokar, T., & Kemp, A. M. (2008). A systematic review of the features that indicate intentional scalds in children. *Burns*, *34*(8), 1072-1081. DOI:10.1016/j.burns.2008.02.011

Most intentional burns are scalds, and distinguishing these from unintentional causes is challenging. A systematic review was conducted to identify distinguishing features of intentional and unintentional scalds. We performed an all language literature search of 12 databases1950–2006. Studies were reviewed by two paediatric/burns specialists, using standardised methodology. Included: Primary studies of validated intentional or accidental scalds in children 0–18 years and ranked by confirmation of intentional or unintentional origin. Excluded: neglectful scalds; management or complications; studies of mixed burn type or mixed adult and child data. 258 studies were reviewed, and 26 included. Five comparative studies ranked highly for confirmation of intentional/unintentional cause of injury. The distinguishing characteristics were defined based on best evidence. Intentional scalds were commonly immersion injuries, caused by hot tap water, affecting the extremities, buttocks or perineum or both. The scalds were symmetrical with clear upper margins, and associated with old fractures and unrelated injuries. Unintentional scalds were more commonly due to spill injuries of other hot liquids, affecting the upper body with irregular margins and depth. We propose an evidence based triage tool to aid in distinguishing intentional from unintentional scalds, requiring prospective validation.

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Fractures

Haney, S., Scherl, S., DiMeglio, L., Perez-Rossello, J., Servaes, S., Merchant, N., The Council on Child Abuse and Neglect, Section on Orthopaedics, Section on Radiology, and Section on Endocrinology, & The Society for Pediatric Radiology. (2025). Evaluating young children with fractures for child abuse: Clinical report. *Pediatrics*, *155*(2), e2024070074. DOI:10.1542/peds.2024-070074

Fractures are common injuries in childhood and can be caused by unintentional injury, medical conditions, and child abuse. Although the consequences of failing to diagnose an abusive injury in a child can be grave, the consequences of incorrectly diagnosing child abuse in a child whose fractures have another etiology are also significant. This report aims to review recent advances in the understanding of fracture specificity, fracture mechanisms, and other medical conditions that predispose infants and children to fracture. This clinical report will aid pediatricians and pediatric care providers in developing an evidence-based differential diagnosis and performing appropriate evaluations when assessing a child with fractures.

Lee, A., Phillips, L., & Tran, V. (2025). Incidence and 12-month outcomes of fracture types associated with abuse in children under three years old presenting to an emergency department. *Future*, *3*(1), 3. DOI:10.3390/future3010003

Child physical abuse is a significant contributor to overall pediatric mortality and morbidity and is associated with both short- and long-term effects on the physical, social and mental wellbeing of the child involved. Fractures are the second most common physical injury in children suffering from physical abuse and are present in up to 55% of cases of physically abused children. Specific fracture patterns may prompt suspicion for abuse, although none are specific. We aim to identify the incidence of fracture types associated with abuse in children under three years old presenting to the ED. This study was a retrospective descriptive study. The inclusion criteria consisted of (a) children less than three years of age, (b) presenting to the ED, (c) between 1 January 2020, and 31 December 2022, inclusive and (d) with a diagnosis consistent with a fracture type

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associated with abuse. There were 214 patients diagnosed with fractures who were under 3 years of age. Of these, twenty-one patients fit the criteria for fracture suspcious for non-accidental injury (a rate of one per month if following a normal distribution). The diagnosis of NAI was considered in eight (38%) patients. NAI was not considered in 13 (62%) patients. A medical record review of these patients up to 12 months after initial ED presentation showed that five did not re-present to the ED, one was referred to CSS from outpatients and two re-presented within this period with minor head injuries. Presentations of fractures concerning NAI are rare but important not to miss. Automated systems and targeted education and action are critical to ensure that concerns for NAI are managed appropriately.

Rosendahl, K., de Horatio, L. T., Habre, C., Shelmerdine, S. C., Patsch, J., Kvist, O., Lein, R. K., Plut, D., Eknoksen, E. J., Avenarius, R., Laborie, L. B., Augdal, T. A., Simoni, P., van Rijn, R. R., Offiah, A. C., & European Society of Paediatric Radiology (ESPR) Musculoskeletal and Child Abuse Task Forces. (2024). The incidence of fractures in children under two years of age: A systematic review. *BMC Musculoskeletal Disorders*, *25*(1), 528. DOI:10.1186/s12891-024-07633-5

Epidemiological research on fractures in children under the age of two is of great importance to help understand differences between accidental and abusive trauma. This systematic review aimed to evaluate studies reporting on the incidence of fractures in children under two years of age, excluding birth injuries. Secondary outcome measures included fracture location, mechanisms of injury and fracture characteristics. A systematic literature review (1946 to February 7th 2024), including prospective and retrospective cohort studies and cross-sectional cohort studies, was performed. Studies including children from other age groups were included if the actual measures for those aged 0–2 years could be extracted. We also included studies restricted to infants. Annual incidence rates of fractures were extracted and reported as the main result. Critical appraisal of was performed using the Appraisal tool for Cross-Sectional Studies. Twelve moderate to good quality studies met eligibility criteria, of which seven were based on

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data from medical records and five were registry studies. Studies investigated different aspects of fractures, making comprehensive synthesis challenging. There was an overall annual fracture incidence rate of 5.3 to 9.5 per 1,000 children from 0–2 years of age; with commonest sites being the radius/ulna (25.2–40.0%), followed by tibia/fibula (17.3–27.6%) and the clavicle (14.6–14.8%) (location based on 3 studies with a total of 407 patients). In infants, the reported incidence ranged between 0.7 to 4.6 per 1,000 (based on 3 studies), with involvement of the clavicle in 22.2% and the distal humerus in 22.2% of cases (based on 1 study). Only a single metaphyseal lesion was reported (proximal humerus of an 11-month-old infant). Fracture mechanisms were detailed in four studies, with fall from chair, bed, table, own height or fall following indoor activities causing 50–60% of fractures. There is a paucity of good quality data on fracture incidence in children under the age of two. Larger, prospective and unbiased studies would be helpful in determining normal pattern of injuries, so that differences from abusive trauma may be better understood.

Muhammad, U., Di Bella, C., Thompson, S., & Istfan, S. (2023). Skeletal surveys in suspected non-accidental trauma: Examining the yield and current clinical practices at a regional referral center in West Virginia. *Cureus*, *15*(9), e46020. DOI:10.7759/cureus.46020

Non-accidental trauma (NAT) is a leading cause of pediatric injury and death. When NAT is suspected in children under the age of 24 months, the American Academy of Pediatrics (AAP) recommends using skeletal surveys (SS) to identify acute, healing, or old fractures and to repeat the SS approximately two weeks after initial imaging as acute fractures can sometimes not be seen on initial imaging. In this study, we determined the yield of initial and follow-up SS obtained for suspected NAT in children under the age of 24 months at a regional referral hospital. We reviewed charts of children younger than 24 months who received SS imaging, due to physical abuse suspicion, at our hospital system between 2017 and 2022. We used convenient sampling to examine all SS occurring at the Charleston Area Medical Center Healthcare System. A total of 61 of the 126 initial SS

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showed fractures. Only 9% of children received follow-up SS. Repeat SS performed approximately two weeks after positive initial SS showed signs of healing, including new fractures not reported on the initial scan. Follow-up SS performed within eight weeks after initial negative scans continued to be negative. Lastly, consults from child abuse pediatricians were found to be underutilized as only 48% of patients received consultations. Follow-up SS and child abuse pediatrician consults were found to be underutilized. Follow-up SS and consulting child abuse specialists should not be overlooked, irrespective of positive or negative initial SS, to provide optimal management of NAT.

Tadepalli, V., Schultz, J. D., Rees, A. B., Wollenman, L. C., Louer, C. R., Lempert, N. L., Moore Lotridge, S. N., & Schoenecker, J. G. (2022). Nonaccidental trauma in pediatric elbow fractures: When you should be worried. *Journal of Pediatric Orthopaedics*, *42*(6), e601-e606. DOI:10.1097/BPO.0000000000002145

Nonaccidental trauma (NAT) is a rising source of morbidity and mortality in the pediatric population. Fractures are often the first cause for presentation to health care providers in the case of NAT but can be misidentified as accidental. Given that elbow fractures are the most common accidental injuries among pediatric patients, they are not traditionally associated with NAT. This study aims to determine the prevalence of NAT among elbow fractures and identify common features in nonaccidental elbow fractures. Current Procedural Terminology (CPT) codes were used to retrospectively identify all pediatric (0 to 17) elbow fractures at a single, tertiary children's hospital between 2007 and 2017. Among these, all fractures for which an institutional child abuse evaluation team was consulted were identified. The medical record was then used to determine which of these fractures were due to NAT. Standard injury radiographs of all victims of NAT as well as all patients under 1 year of age were blinded and radiographically evaluated for fracture type by a pediatric orthopaedic surgeon. The prevalence of nonaccidental elbow fractures across the 10-year study period was 0.4% (N=18). However, the prevalence of

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nonaccidental elbow fractures in those patients below 1 year of age was markedly higher at 30.3% (10/33). Among all elbow fractures in patients below 1 year of age, supracondylar humerus fractures were the most common fracture type (19/33, 57.6%), yet transphyseal fractures (6/33, 18.1%) were most commonly the result of NAT (5/6, 83.3%). In children over 1 year of age, fracture type was not an indicator of NAT. The vast majority of pediatric elbow fractures (99.6%) are accidental. However, certain factors, namely age below 1 year and transphyseal fractures increase the likelihood that these fractures may be a result of NAT.

Hermans, K., Fransz, D., Walbeehm-Hol, L., Hustinx, P., & Staal, H. (2021). Is a Parry fracture—An isolated fracture of the ulnar shaft—Associated with the probability of abuse in children between 2 and 16 years old?. *Children*, *8*(8), 650. DOI:10.3390/children8080650

A parry fracture is an isolated fracture of the ulnar shaft. It occurs when the ulna receives the full force of an impact when the forearm is raised to protect the face. The aim of this study is to assess a possible association between a parry fracture and the probability of abuse in children. In this retrospective, observational, multicenter study, we identified patients between 2 and 16 years old who had been treated for an isolated ulnar shaft fracture. Patient characteristics were registered, anonymized radiographs were rated, and charts were screened for referral to a child protective team. A total of 36 patients were analyzed. As no referrals were registered during follow-up, the primary outcome was changed to a perpendicular force as trauma mechanism. Univariable regression analysis and independent *t*-test both showed no significant association between patient factors or radiographic classification, and the reported trauma mechanism. We were unable to determine an association between a parry fracture and the probability of abuse. Since trauma mechanism does have a biomechanical effect on the fracture type, we would advise that a very clear reconstruction (and documentation) of the trauma mechanism should be established when a parry fracture is identified on radiographs.

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Mitchell, I. C., Norat, B. J., Auerbach, M., Bressler, C. J., Como, J. J., Escobar Jr., M. A., Flynn-O'Brien, K. T., Lindberg, D. M., Nickoles, T., Rosado, N., Weeks, K., & Maguire, S. (2021). Identifying maltreatment in infants and young children presenting with fractures: Does age matter?. *Academic Emergency Medicine*, *28*(1), 5-18. DOI:10.1111/acem.14122

Child abuse is a significant cause of morbidity and mortality in preverbal children who cannot explain their injuries. Fractures are among the most common injuries associated with abuse but of themselves fractures may not be recognized as abusive until a comprehensive child abuse evaluation is completed, often prompted by other signs or subjective features. We sought to determine which children presenting with rib or long-bone fractures should undergo a routine abuse evaluation based on age. A systematic review searching Ovid, PubMed/Medline, Scopus, and CINAHL from 1980 to 2020 was performed. An evidence-based framework was generated by a consensus panel and applied to the results of the systematic review to form recommendations. Fifteen articles were suitable for final analysis. Studies with comparable age ranges of subjects and sufficient evidence to meet the determination of abuse standard for pediatric patients with rib, humeral, and femoral fractures were identified. Seventy-seven percent of children presenting with rib fractures aged less than 3 years were abused; when those involved in motor vehicle collisions were excluded, 96% were abused. Abuse was identified in 48% of children less than 18 months with humeral fractures. Among those with femoral fractures, abuse was diagnosed in 34% and 25% of children aged less than 12 and 18 months, respectively. Among children who were not in an independently verified incident, the authors strongly recommend *routine* evaluation for child abuse, including specialty child abuse consultation, for: 1) children aged less than 3 years old presenting with rib fractures and 2) children aged less than 18 months presenting with humeral or femoral fractures (Level of Evidence: III Review).

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Pfeifer, C. M., Henry, M. K., Caré, M. M., Christian, C. W., Servaes, S., Milla, S. S., & Strouse, P. J. (2021). Debunking fringe beliefs in child abuse imaging: AJR expert panel narrative review. *American Journal of Roentgenology*, *217*(3), 529-540. DOI:10.2214/AJR.21.25655

Child abuse is a global public health concern**.** Injuries from physical abuse may be clinically occult and not appreciable on physical examination. Imaging is therefore critical in identifying and documenting such injuries. The radiologic approach for a child who has potentially been abused has received considerable attention and recommendations according to decades of experience and rigorous scientific study. Nonetheless, fringe beliefs describing alternative explanations for child abuse–related injuries have emerged and received mainstream attention. Subsequently, imaging findings identified in abused children have been attributed to poorly supported underlying medical conditions, clouding the evidence basis for radiologic findings indicative of nonaccidental trauma. Fringe beliefs that attribute findings seen in child abuse to alternate pathologies such as genetic disorders, birth trauma, metabolic imbalances, vitamin D deficiency, and short-distance falls typically have limited evidence basis and lack professional society support. Careful review of the scientific evidence and professional society consensus statements is important in differentiating findings attributable to child abuse from fringe beliefs used to discount the possibility that a child's constellation of injuries is consistent with abuse. This review refutes fringe beliefs used to provide alternative explanations in cases of suspected child abuse and reinforces the key literature and scientific consensus regarding child abuse imaging.

Kriss, S., Thompson, A., Bertocci, G., Currie, M., & Martich, V. (2020). Characteristics of rib fractures in young abused children. *Pediatric Radiology*, *50*, 726-733. DOI:10.1007/s00247-019-04599-8

The objective of this study was to characterize rib fractures in abused children, particularly sidedness; additionally, we evaluated the sidedness of other abusive skeletal fractures. The presumed mechanism of rib fractures in abuse is violent grasping of the

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torso causing anterior–posterior chest compression. We hypothesized an asymmetrical distribution of rib fractures in abused infants given the greater incidence of right-hand dominance within the general population. We reviewed medical records from abused children (0–18 months old) with rib fractures. We also retrospectively reviewed their radiographs to determine characteristics of rib fractures (number, side, rib region, level, acuity) and other skeletal fractures (number, side, location), as well as differences in the distribution of rib and other skeletal fractures. A total of 360 rib fractures were identified on 273 individual ribs involving 78 abused children. Sixty-three children (81%) had multiple rib fractures. There was a significantly greater number of left-side rib fractures (67%) than right-side fractures ($P<0.001$). Fractures were most often identified in the posterior and lateral regions and mid level of the ribcage (Ribs 5 through 8). Fifty-four percent of subjects had other skeletal fractures; these non-rib fractures were also predominantly on the left side ($P=0.006$). In our study of abused children, there was a higher incidence of rib fractures in the posterior, lateral and mid-level locations. Additionally, we found a predominance of left-side rib and other skeletal fractures. Further research is needed to understand whether factors such as perpetrator handedness are associated with these unequal distributions of fractures in abused children.

Adamsbaum, C., De Boissieu, P., Teglas, J. P., & Rey-Salmon, C. (2019). Classic metaphyseal lesions among victims of abuse. *The Journal of Pediatrics*, *209*, 154-159. DOI:10.1016/j.jpeds.2019.02.013

The CML, so called “corner fracture,” is considered a highly specific marker for abuse in infants. However, the precise correlation between CMLs and abusive head trauma is still unknown. In this retrospective observational study, we selected 67 cases with at least 1 CML from a 15-year cohort of legally prosecuted child abuse cases. Their clinical, radiologic, and forensic records were analyzed. In 27 cases, the perpetrator confessed to abusing the child and described the events. Potential associations with subdural hematoma and with confession were evaluated using 2 separate binary logistic

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regression models. All 67 infants showed other signs of abuse. Median age was 3.4 months. Over 65% had multiple CMLs. Knees and ankles were predominantly involved (64%). Only CMLs of the shoulder were significantly associated with subdural hematoma (P = .03). Different-age fractures were more common in the nonsubdural hematoma group (P = .01). In the group with confessions, perpetrators admitted inflicting violent indirect skeletal forces (torsion, traction, compression, and forced movements). The most common circumstance was diapering (44%), reported by male perpetrators only (P = .03) followed by dressing/undressing (30%). The violence was habitual in 67% of cases. This unique forensic case series shows that CMLs are caused by violent acts inflicted most during physical care of infants. The frequency of habitual violence responsible for CMLs deserves greater attention.

Paine, C. W., Fakeye, O., Christian, C. W., & Wood, J. N. (2019). Prevalence of abuse among young children with rib fractures: A systematic review. *Pediatric Emergency Care*, *35*(2), 96–103. DOI:10.1097/PEC.0000000000000911

We aimed to estimate the prevalence of abuse in young children presenting with rib fractures and to identify demographic, injury, and presentation-related characteristics that affect the probability that rib fractures are secondary to abuse. We searched PubMed/MEDLINE and CINAHL databases for articles published in English between January 1, 1990 and June 30, 2014 on rib fracture etiology in children ≤ 5 years old. Two reviewers independently extracted predefined data elements and assigned quality ratings to included studies. Study-specific abuse prevalences and the sensitivities, specificities, and positive and negative likelihood ratios of patients' demographic and clinical characteristics for abuse were calculated with 95% confidence intervals. Data for 1,396 children ≤ 48 months old with rib fractures were abstracted from 10 articles. Among infants < 12 months old, abuse prevalence ranged from 67% to 84%, whereas children 12-23 months old and 24-35 months old had study-specific abuse prevalences of 29% and 28% respectively. Age < 12 months was the only characteristic significantly associated

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with increased likelihood of abuse across multiple studies. Rib fracture location was not associated with likelihood of abuse. The retrospective design of the included studies and variations in ascertainment of cases, inclusion/exclusion criteria, and child abuse assessments prevented further meta-analysis. Abuse is the most common cause of rib fractures in infants < 12 months old. Prospective studies with standardized methods are needed to improve accuracy in determining abuse prevalence among children with rib fractures and characteristics associated with abusive rib fractures.

Berthold, O., Frericks, B., John, T., Clemens, V., Fegert, J. M., & Moers, A. V. (2018). Abuse as a cause of childhood fractures. *Deutsches Arzteblatt international*, *115*(46), 769-775. DOI:10.3238/arztebl.2018.0769

It is well known that physical abuse of children all too often escapes detection. Fractures are among the potential consequences of physical abuse but are also common in childhood because of accidents. A question frequently addressed to the Medical Child Protection Hotline (*Medizinische Kinderschutzhotline*) is how fractures due to abuse can be distinguished from accidental fractures. This review is based on pertinent publications retrieved by a search in PubMed and in the Cochrane Database, as well as on the authors' experience in a pediatric emergency department with ca. 29 000 consultations per year and in a child protection outpatient clinic with ca. 100 consultations per year. Fractures due to abuse are especially common among infants; their incidence is estimated at 56.8/100 000 among infants less than six months old and 39.8/100 000 among infants aged 6 to 11 months. In consideration of the age of the child, the type of fracture, the history, and other factors, a high probability of abuse can be suspected in many cases, so that further measures can be initiated. All physicians involved in the care of children (even if only occasionally) should be aware of the major indicators of likely physical abuse and of the available opportunities for counseling and intervention. Failures to diagnose child abuse are associated with high rates of recurrence and mortality.

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Chauvin-Kimoff, L., Allard-Dansereau, C., & Colbourne, M. (2018). The medical assessment of fractures in suspected child maltreatment: Infants and young children with skeletal injury. *Paediatrics & Child Health*, *23*(2), 156–160. DOI:10.1093/pch/pxx131

Fractures are common injuries in childhood. While most fractures are caused by accidental trauma, inflicted trauma (maltreatment) is a serious and potentially unrecognized cause of fractures, particularly in infants and young children. This practice point identifies the clinical features that prompt concern for inflicted skeletal injury and outlines a management approach based on current literature and published guidelines, including the clinician's duty to report suspicion of child abuse to child welfare authorities. This document does not address isolated skull fractures.

Paine, C. W., & Wood, J. N. (2018). Skeletal surveys in young, injured children: A systematic review. *Child Abuse & Neglect*, *76*, 237–249. DOI:10.1016/j.chiabu.2017.11.004

Skeletal surveys (SSs) have been identified as a key component of the evaluation for suspected abuse in young children, but variability in SS utilization has been reported. Thus, we aimed to describe the utilization patterns, yield, and risks of obtaining SS in young children through a systematic literature review. We searched PubMed/MEDLINE and CINAHL databases for articles published between 1990 and 2016 on SS. We calculated study-specific percentages of SS utilization and detection of occult fractures and examined the likelihoods that patient characteristics predict SS utilization and detection of occult fractures. Data from 32 articles represents 64,983 children < 60 months old. SS utilization was high (85%–100%) in studies of infants evaluated by a child protection team for suspected abuse and/or diagnosed with abuse except in one study of primarily non-pediatric hospitals. Greater variability in SS utilization was observed across studies that included all infants with specific injuries, such as femur fractures (0%-77%), significant head injury (51%-82%), and skull fractures (41%-86%). Minority children and children without private insurance were evaluated with SS more often than white children and

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children with private insurance despite lack of evidence to support this practice. Among children undergoing SS, occult fractures were frequently detected among infants with significant head injury (23%-34%) and long bone fractures (30%) but were less common in infants with skull fractures (1%-6%). These findings underscore the need for interventions to decrease disparities in SS utilization and standardize SS utilization in infants at high risk of having occult fractures.

Servaes, S., Brown, S. D., Choudhary, A. K., Christian, C. W., Done, S. L., Hayes, L. L., Levine, M. A., Moreno, J. A., Palusci, V. J., Shore, R. M., & Slovis, T. L. (2016). The etiology and significance of fractures in infants and young children: A critical multidisciplinary review. *Pediatric Radiology*, *46*, 591-600. DOI:10.1007/s00247-016-3546-6

This paper addresses significant misconceptions regarding the etiology of fractures in infants and young children in cases of suspected child abuse. This consensus statement, supported by the Child Abuse Committee and endorsed by the Board of Directors of the Society for Pediatric Radiology, synthesizes the relevant scientific data distinguishing clinical, radiologic and laboratory findings of metabolic disease from findings in abusive injury. This paper discusses medically established epidemiology and etiologies of childhood fractures in infants and young children. The authors also review the body of evidence on the role of vitamin D in bone health and the relationship between vitamin D and fractures. Finally, the authors discuss how courts should properly assess, use, and limit medical evidence and medical opinion testimony in criminal and civil child abuse cases to accomplish optimal care and protection of the children in these cases.

Ryznar, E., Rosado, N., & Flaherty, E. G. (2015). Understanding forearm fractures in young children: Abuse or not abuse?. *Child Abuse & Neglect*, *47*, 132-139. DOI:10.1016/j.chiabu.2015.02.008

This retrospective study describes the characteristics and mechanisms of forearm fractures in children <18 months adding to the evidence-base about forearm fractures. It

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also examines which features of forearm fractures in young children may help discriminate between abusive and noninflicted injuries. Electronic medical records were reviewed for eligible patients evaluated between September 1, 2007 and January 1, 2012 at two children's hospitals in Chicago, IL. The main outcome measures were the type of fracture and the etiology of the fracture (abuse versus not abuse). The 135 included patients sustained 216 forearm fractures. Most were buckle (57%) or transverse (26%). Child protection teams evaluated 47 (35%) of the patients and diagnosed 11 (23%) as having fractures caused by abuse. Children with abusive versus non-inflicted injuries had significant differences in age (median age 7 versus 12 months), race, and presence of additional injuries. Children with abusive forearm fractures often presented without an explanation or a changing history for the injury. Children with non-inflicted forearm fractures often presented after a fall. No particular type of forearm fracture was specific for child abuse. Any forearm fracture in a young child should be evaluated with special attention to the details of the history and the presence of other injuries. Young age, additional injuries, and an absent or inconsistent explanation should increase concern that the fracture was caused by child abuse.

Flaherty, E. G., Perez-Rossello, J. M., Levine, M. A., Hennrikus, W. L., American Academy of Pediatrics Committee on Child Abuse and Neglect, Section on Radiology, American Academy of Pediatrics, Section on Endocrinology, American Academy of Pediatrics, Section on Orthopaedics, American Academy of Pediatrics, & Society for Pediatric Radiology. (2014). Evaluating children with fractures for child physical abuse. *Pediatrics*, *133*(2), e477–e489. DOI:10.1542/peds.2013-3793

Fractures are common injuries caused by child abuse. Although the consequences of failing to diagnose an abusive injury in a child can be grave, incorrectly diagnosing child abuse in a child whose fractures have another etiology can be distressing for a family. The aim of this report is to review recent advances in the understanding of fracture specificity, the mechanism of fractures, and other medical diseases that predispose to fractures in infants and children. This clinical report will aid physicians in developing an

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evidence-based differential diagnosis and performing the appropriate evaluation when assessing a child with fractures.

Karmazyn, B., Lewis, M. E., Jennings, S. G., Hibbard, R. A., & Hicks, R. A. (2011). The prevalence of uncommon fractures on skeletal surveys performed to evaluate for suspected abuse in 930 children: Should practice guidelines change?. *American Journal of Roentgenology*, *197*(1), W159-W163. DOI:10.2214/AJR.10.5733

The objective of our study was to evaluate the prevalence and site of fractures detected on skeletal surveys performed for suspected child abuse at a tertiary children's hospital and to determine whether any survey images may be eliminated without affecting clinical care or the ability to make a diagnosis. We identified all skeletal surveys performed for suspected abuse from 2003 to 2009 of children younger than 2 years. Repeated studies were excluded, as were studies not performed to evaluate for suspected abuse. From the reports, we documented the sites of all the fractures. Nine hundred thirty children (515 boys and 415 girls) with a median age of 6 months met the entry criteria for the study. Fractures were detected in 317 children (34%), of whom 166 (18%) had multiple fractures. The most common sites for fractures were the long bones (21%), ribs (10%), skull (7%), and clavicle (2%). Ten children (1%) had fractures in the spine (n = 3), pelvis (n = 1), hands (n = 6), and feet (n = 2). All 10 children had other signs of physical abuse. In skeletal surveys performed for suspected child abuse, fractures limited to sites other than the long bones, ribs, skull, and clavicles are rare. The additional radiation exposure and cost of obtaining radiographs of the spine, pelvis, hands, and feet may outweigh their potential benefit. Given the rarity of fractures of the spine, pelvis, hands, and feet, consideration may be given to eliminating those views from routine skeletal surveys performed to evaluate for suspected child abuse.

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Pandya, N. K., Baldwin, K., Wolfgruber, H., Christian, C. W., Drummond, D. S., & Hosalkar, H. S. (2009). Child abuse and orthopaedic injury patterns: Analysis at a level I pediatric trauma center. *Journal of Pediatric Orthopaedics*, *29*(6), 618-625. DOI:10.1097/BPO.0b013e3181b2b3ee

Child abuse is a serious threat to the physical and psychosocial well-being of the pediatric population. Musculoskeletal injuries are common manifestations of child abuse. There have been multiple studies that have attempted to identify the factors associated with, and the specific injury patterns seen with musculoskeletal trauma from child abuse, yet there have been no large studies that have used prospectively collected data and controlled comparisons. The purpose of our study was to describe the patterns of orthopaedic injury for child abuse cases detected in the large urban area that our institution serves, and to compare the injury profiles of these victims of child abuse to that of general (accidental) trauma patients seen in the emergency room and/or hospitalized during the same time period. This study is a retrospective review of prospectively collected information from an urban level I pediatric trauma center. Five hundred cases of child abuse (age birth to 48 mo) were identified by membership in our institution's Suspected Child Abuse and Neglect database collected between 1998 and 2007. These cases were compared against 985 general trauma (accidental) control patients of the same age group from 2000 to 2003. Age, sex, and injury type were compared. Victims of child abuse were on average younger than accidental trauma patients in the cohort of patients under 48 months of age. There was no difference in sex distribution between child abuse and accidental trauma patients. When the entire cohort of patients under 48 months were examined after adjusting for age and sex, the odds of rib (14.4 times), tibia/fibula (6.3 times), radius/ulna (5.8 times), and clavicle fractures (4.4 times) were significantly higher in child abuse versus accidental trauma patients. When regrouping the data based on age, in patients younger than 18 months of age, the odds of rib (23.7 times), tibia/fibula (12.8 times), humerus (2.3 times), and femur fractures (1.8 times) were found to be significantly higher in the child abuse group. Yet, in the more than 18 months age group, the risk of humerus (3.4 times) and femur fractures (3.3 times) was actually

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higher in the accidental trauma group than in the child abuse group. Patients who present to an urban level I pediatric trauma center and are victims of abuse are generally younger, and have an equal propensity to be male or female. It is important for the clinician to recognize that the age of the patient (younger or older than 18 mo and/or walking age) is an important determinant in identifying injury patterns suspicious for abuse. Patients below the age of 18 months who present with rib, tibia/fibula, humerus, or femur fractures are more likely to be victims of abuse than accidental trauma patients. Yet, when patients advance in age beyond 18 months, their presentation with long bone fractures (ie, femur and humerus) is more likely to be related to accidental trauma than child abuse.

Kemp, A. M., Dunstan, F., Harrison, S., Morris, S., Mann, M., Rolfe, K., Datta, S., Thomas, D. P., Sibert, J. R., & Maguire, S. (2008). Patterns of skeletal fractures in child abuse: Systematic review. *British Medical Journal (Clinical research ed.)*, *337*, a1518. DOI:10.1136/bmj.a1518

Published studies were systematically reviewed to identify the characteristics that distinguish fractures in children resulting from abuse and those not resulting from abuse, and to calculate a probability of abuse for individual fracture types. An all language literature search of Medline, Medline in Process, Embase, Assia, Caredata, Child Data, CINAHL, ISI Proceedings, Sciences Citation, Social Science Citation Index, SIGLE, Scopus, TRIP, and Social Care Online were examined for original study articles, references, textbooks, and conference abstracts until May 2007. Comparative studies of fracture at different bony sites, sustained in physical abuse and from other causes in children <18 years old were included. Review articles, expert opinion, postmortem studies, and studies in adults were excluded. Each study had two independent reviews (three if disputed) by specialist reviewers including paediatricians, paediatric radiologists, orthopaedic surgeons, and named nurses in child protection. Each study was critically appraised by using data extraction sheets, critical appraisal forms, and evidence sheets based on NHS

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Centre for Reviews and Dissemination guidance. Meta-analysis was done where possible. A random effects model was fitted to account for the heterogeneity between studies. In total, 32 studies were included. Fractures resulting from abuse were recorded throughout the skeletal system, most commonly in infants (<1 year) and toddlers (between 1 and 3 years old). Multiple fractures were more common in cases of abuse. Once major trauma was excluded, rib fractures had the highest probability for abuse (0.71, 95% confidence interval 0.42 to 0.91). The probability of abuse given a humeral fracture lay between 0.48 (0.06 to 0.94) and 0.54 (0.20 to 0.88), depending on the definition of abuse used. Analysis of fracture type showed that supracondylar humeral fractures were less likely to be inflicted. For femoral fractures, the probability was between 0.28 (0.15 to 0.44) and 0.43 (0.32 to 0.54), depending on the definition of abuse used, and the developmental stage of the child was an important discriminator. The probability for skull fractures was 0.30 (0.19 to 0.46); the most common fractures in abuse and non-abuse were linear fractures. Insufficient comparative studies were available to allow calculation of a probability of abuse for other fracture types. When infants and toddlers present with a fracture in the absence of a confirmed cause, physical abuse should be considered as a potential cause. No fracture, on its own, can distinguish an abusive from a non-abusive cause. During the assessment of individual fractures, the site, fracture type, and developmental stage of the child can help to determine the likelihood of abuse. The number of high quality comparative research studies in this field is limited, and further prospective epidemiology is indicated.

Leventhal, J. M., Martin, K. D., & Asnes, A. G. (2008). Incidence of fractures attributable to abuse in young hospitalized children: Results from analysis of a United States database. *Pediatrics*, *122*(3), 599-604. DOI:10.1542/peds.2007-1959

The goal was to assess the proportion of children with fractures attributable to abuse and the incidence of fractures caused by abuse among children <36 months of age who were hospitalized in the United States. We used the Kids' Inpatient Database, which has

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discharge data on 80% of acute pediatric hospitalizations in the United States, for 3 time periods (1997, 2000, and 2003). Fractures attributable to abuse in children <36 months of age were identified by both an International Classification of Diseases, Ninth Revision, Clinical Modification code for fracture and a diagnosis external-cause-of-injury code for abuse. Weighted estimates of the incidence were calculated. Among children <36 months of age who were hospitalized with fractures, the proportions of cases attributable to abuse were 11.9% in 1997, 11.9% in 2000, and 12.1% in 2003. The proportions of cases attributable to abuse decreased with increasing age; for example, in 2003, the proportions attributable to abuse were 24.9% for children <12 months of age, 7.2% for children 12 to 23 months of age, and 2.9% for children 24 to 35 months of age. In 2003, the incidence of fractures caused by abuse was 15.3 cases per 100000 children <36 months of age. The incidence was 36.1 cases per 100000 among children <12 months of age; this decreased to 4.8 cases per 100000 among 12- to 23-month-old children and 4.8 cases per 100000 among 24- to 35-month-old children. The Kids' Inpatient Database can be used to provide reasonable estimates of the incidence of hospitalization with fractures attributable to child abuse. For children <12 months of age, the incidence was 36.1 cases per 100000, a rate similar to that of inflicted traumatic brain injury (25–32 cases per 100000).

Prosser, I., Maguire, S., Harrison, S. K., Mann, M., Sibert, J. R., & Kemp, A. M. (2005). How old is this fracture? Radiologic dating of fractures in children: A systematic review. *American Journal of Roentgenology*, *184*(4), 1282-1286. DOI:10.2214/ajr.184.4.01841282

We conducted a systematic review of the literature to define the evidence for radiologic dating of fractures in children in the context of child protection. Radiologic dating of fractures is an inexact science. Most radiologists date fractures on the basis of their personal clinical experience, and the literature provides little consistent data to act as a

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resource. There is an urgent need for research to validate the criteria used in the radiologic dating of fractures in children younger than 5 years.

Oral, R., Blum, K. L., & Johnson, C. (2003). Fractures in young children: Are physicians in the emergency department and orthopedic clinics adequately screening for possible abuse?. *Pediatric Emergency Care*, *19*(3), 148-153. DOI:10.1097/01.pec.0000081234.20228.33

A descriptive, retrospective chart review was conducted in the pediatric emergency department and orthopedic clinic of an urban teaching hospital to determine whether physicians are sufficiently investigating the cause of fractures in children younger than 3 years and 2) to find out what influences physicians' quality of history taking and documentation necessary to rule out inflicted trauma. Children younger than 3 years treated between January 1, 1995, and December 31, 1998, presenting with a fracture were analyzed. A total of 653 charts met entry criteria. Information that was significantly lacking in the recorded history included witness presence, history of previous injury, review of past medical record, other injury description, and whether the injury was consistent with the development of the child. It was not possible to rule out inflicted injury in 42% of the patients. Four groups emerged from the entire cohort: group 1, accidental trauma, which made up 63% of the entire group (*n*= 413); group 2, inflicted trauma, which made up 13% (*n*= 85); group 3, missed inflicted trauma, which made up 23% (*n*= 151); and group 4, missed accidental trauma, which made up 0.6% (*n*= 4). Younger age of the child, multiple fractures, need for hospital admission, and the examining physician being a pediatrician positively influenced physicians' propensity to accurately report inflicted trauma. A large percentage of the charts reviewed contained inadequate documentation to explain the cause of fractures and thereby rule out inflicted trauma. Information in 23% of the charts reviewed aroused suspicion of inflicted trauma. There is a need to ensure that adequate information is obtained and documented in hospital records to rule out inflicted injury.

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This will require changes in the knowledge, skills, and attitudes of physicians. The use of forms, protocols, and periodic chart review will help to ensure compliance.

Lane, W. G., Rubin, D. M., Monteith, R., & Christian, C. W. (2002). Racial differences in the evaluation of pediatric fractures for physical abuse. *JAMA*, *288*(13), 1603-1609. DOI:10.1001/jama.288.13.1603

Child maltreatment is a significant problem within US society, and minority children have higher rates of substantiated maltreatment than do white children. However, it is unclear whether minority children are abused more frequently than whites or whether their cases are more likely to be reported. Retrospective chart review was conducted at an urban US academic children's hospital among 388 children younger than 3 years hospitalized for treatment of an acute primary skull or long-bone fracture between 1994 and 2000. Children with perpetrator-admitted child abuse, metabolic bone disease, birth trauma, or injury caused by vehicular crash were excluded. Reports of suspected abuse were filed for 22.5% of white and 52.9% of minority children (P<.001). Abusive injuries, as determined by expert review, were more common among minority children than among white children (27.6% vs 12.5%; P<.001). Minority children aged at least 12 months to 3 years (toddlers) were significantly more likely to have a skeletal survey performed compared with their white counterparts, even after controlling for insurance status, independent expert determination of likelihood of abuse, and appropriateness of performing a skeletal survey (adjusted odds ratio [OR], 8.75; 95% confidence interval [CI], 3.48-22.03; P<.001). This group of children was also more likely to be reported to CPS compared with white toddlers, even after controlling for insurance status and likelihood of abuse (adjusted OR, 4.32; 95% CI, 1.63-11.43; P =.003). By likelihood of abuse, differential ordering of skeletal surveys and reporting of suspected abuse were most pronounced for children at least 12 months old with accidental injuries; however, differences were also noted among toddlers with indeterminate injuries but not among infants or toddlers with abusive injuries. Minority children at least 12 months old with accidental injuries were more than 3 times

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more likely than their white counterparts to be reported for suspected abuse (for children with Medicaid or no insurance, relative risk [RR], 3.08; 95% CI, 1.37-4.80; for children with private insurance, RR, 3.74; 95% CI, 1.46-6.01). While minority children had higher rates of abusive fractures in our sample, they were also more likely to be evaluated and reported for suspected abuse, even after controlling for the likelihood of abusive injury. This suggests that racial differences do exist in the evaluation and reporting of pediatric fractures for child abuse, particularly in toddlers with accidental injuries.

Thomas, S. A., Rosenfield, N. S., Leventhal, J. M., & Markowitz, R. I. (1991). Long-bone fractures in young children: Distinguishing accidental injuries from child abuse. *Pediatrics*, *88*(3), 471-476. DOI:10.1542/peds.88.3.471

While testifying in child abuse cases, physicians have been frustrated by the lawyer who asks, "Doctor, how did this injury happen?" The medical records and radiographs of 215 children younger than the age of 3 with fractures evaluated by a pediatric service during a 5-year period were retrospectively reviewed in an attempt to elucidate the mechanism of childhood fractures. Based on these reviews, two clinicians and two pediatric radiologists rated the likelihood that the fracture was either accidental or due to child abuse. Long-bone fractures were strongly associated with abuse. This report focuses on the 39 children with either humeral or femoral fractures. Fourteen children had humerus fractures. Eleven were considered to be the result of child abuse, and 3 the result of accidents. The latter 3 were supracondylar elbow fractures in children who fell from a tricycle, a rocking horse, or downstairs. Humerus fractures other than supracondylar fractures were all found to be due to abuse. There were 25 femur fractures. Nine were found to be from abuse, 14 were found to be from accidents, and 2 could not be rated. Sixty percent of femur fractions in infants younger than 1 year of age were due to abuse. Although it is taught that femur fractures in young children are inflicted unless proven otherwise, in this study it was found that femur fractures often are accidental and that the femur can be fractured when the running child trips and falls.

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Worlock, P., Stower, M., & Barbor, P. (1986). Patterns of fractures in accidental and non-accidental injury in children: A comparative study. *British Medical Journal (Clinical Research Edition.)*, *293*(6539), 100–102. DOI:10.1136/bmj.293.6539.100

The incidence and pattern of fractures in children who had been abused were compared with those of fractures sustained by children of similar ages in whom abuse had been excluded. From 1976 to 1982 there were 35 children with fractures resulting from child abuse, and all were aged under 5. Of the 826 children in the control group, seen from January to June 1981, 85% were aged over 5. Abused children were much more likely to have multiple fractures (p less than 0.001) and bruising of the head and neck (p less than 0.001). Fractures of the ribs were common in children who had been abused, and their presence, in the absence of major chest trauma, strongly suggested that abuse was occurring. Injuries to the long bones were invariably spiral or oblique fractures or subperiosteal new bone formation--both "gripping or twisting" injuries. Spiral fracture of the humeral shaft was significantly more common (p less than 0.001) in the group of abused children. Classic metaphyseal chip fractures were uncommon. One child in eight aged under 18 months who sustains a fracture may be a victim of child abuse.

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Spanking/Corporal Punishment

Gershoff, E. T., Lee, S. J., Lee, J. Y., Chang, O. D., & Taylor, C. A. (2025). Spare the dog, hit the child: Preliminary findings regarding parents' beliefs about spanking and hitting children. *Psychology of Violence, 15*(1), 76–84. DOI:10.1037/vio0000535

The goal of this study was to determine if parents view spanking as a form of hitting and view hitting children as more acceptable than hitting other family members, including dogs. Parents of children 0–8 years of age from across the United States (N = 286; 85% White; 56% women) were recruited through Prolific to participate in an online survey. Although 90% of parents agreed with a definition of spanking that included the word "hitting" and 33% used the term "hitting" in their definitions of spanking, parents also rated spanking as less severe than hitting. The percentage of participants who agreed that it is acceptable for parents to hit children (30%) was significantly higher than the percentage that reported it was acceptable to hit other family members (dog, 17%; wife, 1%; parent with Alzheimer's, 0%; Tukey tests, $p < .001$). Nearly a third of parents reported that completing the survey had changed their beliefs about spanking. This study demonstrated that American parents hold inconsistent beliefs about hitting children, including a judgment that it is more acceptable to hit a child than to hit a dog. These results exemplify the need for systemic parent education and policy interventions to bring children's human rights to live free from family violence in line with the recognized rights of adults.

Xu, Y., Wang, X., & Silverstein, M. (2025). Intergenerational transmission of corporal punishment: A scoping review. *Trauma, Violence, & Abuse*, *0*(0). DOI:10.1177/15248380251336170

Numerous studies have investigated the impacts of corporal punishment (CP) within families. However, there has been limited research on how these practices are transmitted across generations. This scoping review synthesized 18 peer-reviewed articles published between 2000 and 2023 from four databases, including PsycINFO,

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PubMed, PsycNet, and ProQuest. The findings revealed that 16 out of 18 studies showed a significant positive correlation in the intergenerational transmission of CP. Among them, nine studies indicated the intergenerational transmission of perpetrating CP, while seven found individuals with childhood CP experience would approve CP. Conversely, only one study suggested a negative association, indicating adults experienced childhood CP were less likely to use it on their own children. Additionally, one study found no significant impact of harsh mothering on later harsh parenting behaviors. These mixed findings highlight the intricate relationship between childhood CP experiences and adult disciplinary attitudes and behaviors. Future studies should prioritize longitudinal research and culturally sensitive approaches to better understand the mechanisms underlying CP transmission and develop effective strategies to break this cycle across generations.

Duong, H. T., Sirohi, A., & Baggett, K. M. (2024). Predicting black parents' attitudes toward corporal punishment: A moderated-mediation model of frequency and valence of childhood experiences. *Journal of Interpersonal Violence*, *39*(9-10), 2103-2126. DOI:10.1177/08862605231214591

Child corporal punishment (CP) may lead to child physical abuse, which is a public health concern in the United States. The present study examined major risk factors predicting attitudes toward CP among a sample of Black parents (N = 394), including frequency and valence of experiences of CP during childhood, outcome expectancies of CP, and perceptions of self-efficacy and response efficacy of non-physical discipline strategies. Structural equation modeling results revealed that the indirect associations between CP frequency and attitudes through self-efficacy and response efficacy were moderated by CP valence. Results extend the literature and point to the need for incorporating information about efficacy of evidence-based non-physical discipline strategies into intervention messages targeting prevention of child physical abuse.

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Garces-Davila, I., Stewart-Tufescu, A., Linton, J., McCarthy, J.-A., Gill, S., Ciochon Newton, A., Salmon, S., Taillieu, T., & Afifi, T. O. (2024). Parenting interventions to prevent and reduce physical punishment: A scoping review. *International Journal of Environmental Research and Public Health*, *21*(11), 1539. DOI:10.3390/ijerph21111539

Physical punishment is the most common form of violence against children worldwide and is associated with an increased risk of long-term adverse outcomes. Interventions targeting parents/caregivers are frequently implemented to prevent and reduce the use of physical punishment. This scoping review aimed to map the existing literature on evidence-informed parenting interventions targeting physical punishment. A scoping review following the World Health Organization (WHO) Review Guide, the Joanna Briggs Institute (JBI) 2020 Guide for scoping reviews, was conducted to address the objective of this review. An academic health sciences librarian systematically searched electronic databases (EBSCO, MEDLINE, EMBASE, SCOPUS) for peer-reviewed journal articles. Two reviewers independently screened titles and abstracts, followed by a full-text review according to inclusion and exclusion criteria following the Participants, Concept, and Context framework. Eighty-one studies were included for full-text eligibility. The results suggest that most interventions examined were conducted in North America, targeted mothers and fathers, and were delivered in person. The results from this scoping review describe the state of evidence-informed parenting interventions to prevent and reduce physical punishment. This review found opportunities for future research to implement effective parenting interventions on a larger societal scale and use mixed methods approaches to evaluate parenting interventions.

Barbaro, N., Connolly, E. J., Sogge, M., Shackelford, T. K., & Boutwell, B. B. (2023). The effects of spanking on psychosocial outcomes: Revisiting genetic and environmental covariation. *Journal of Experimental Criminology*, *19*(3), 713-742. DOI:10.1007/s11292-021-09496-5

There is a vast literature on the negative associations between spanking in childhood and various psychosocial developmental outcomes; yet, control for potential genetic

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confounds is rare. The current research aimed to provide probable ranges of estimates of the degree to which genetic and nonshared environmental covariation could explain the reported phenotypic effects in the Gershoff and Grogan-Kaylor (Gershoff and Grogan-Kaylor, Family Relations 65:490–501, 2016a, Gershoff and Grogan-Kaylor, Journal of Family Psychology 30:453, 2016b) meta-analysis of spanking. The analytic sample for Study 1 was secured from the Children of the National Longitudinal Survey of Youth (CNLSY) and consisted of 2868 respondents (siblings and half-siblings). The data for Study 2 were secured from the published literature. Study 1 analyzed the data from the CNLSY using univariate ACE models and bivariate Cholesky decomposition models. Study 2 used simulation modeling to provide a summative evaluation of the psychosocial effects of spanking with regard to genetic and nonshared environmental covariation. Study 1 replicated previous work showing that associations between spanking and outcomes of delinquency, depression, and alcohol use were explained by moderate-to-large degrees of genetic covariation and small-to-moderate degrees of nonshared environmental covariation. Simulation estimates from Study 2 suggest that genetic covariation accounts for a substantial amount of the phenotypic effect between spanking and psychosocial outcomes (≈60–80%), with the remainder attributable to nonshared environmental covariation (≈0–40%). Results of the current research indicate that continued work on the effects of spanking is best served by behavior genetic research on a broader range of outcomes than what is currently available.

Wilson, R. F., Afifi, T. O., Yuan, K., Lyons, B. H., Fortson, B. L., Oliver, C., Watson, A., & Self-Brown, S. (2023). Child abuse-related homicides precipitated by caregiver use of harsh physical punishment. *Child Abuse & Neglect*, *135*, 105953. DOI:10.1016/j.chiabu.2022.105953

Physical punishment (PP), which may involve the use of physical force, has been linked to negative effects in children and can escalate to abusive or harsh PP, resulting in injury or death. Characteristics associated with fatal abuse involving caregiver use of harsh PP

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were examined. Data were from the National Violent Death Reporting System in 40 states, the District of Columbia, and Puerto Rico for years 2012–2018. Qualitative analysis was used to code textual material into categorial data, and logistic regression was used to examine associations between various characteristics and harsh PP. Approximately 4 % (*n* = 87) of the 2414 abuse-related homicides were known to have been precipitated by caregiver use of harsh PP. In adjusted models, homicides had greater odds of being harsh PP-related when incidents involved mothers' male companions (versus fathers), victims had a previous nonfatal injury (versus no previous nonfatal injury), and another adult participated in the fatal incident or had awareness of prior abuse/neglect (versus those without this characteristic). Two common precipitators of caregivers' use of harsh PP were: 1) child had a bathroom-related accident/soiled clothes (23.0 %; *n* = 20), and 2) child disobeyed a directive given by the perpetrator (17.2 %; *n* = 15). This study highlights characteristics associated with fatal abuse precipitated by caregiver use of harsh PP. Children were physically punished for developmentally normative behaviors. Ensuring caregivers are aware of and use effective parenting practices that focus on use of nonphysical discipline and promote healthy child development, may help decrease harsh PP and physical abuse-related homicides among children.

Fortier, J., Stewart-Tufescu, A., Salmon, S., MacMillan, H. L., Gonzalez, A., Kimber, M., Duncan, L., Taillieu, T., Garces-Davila, I., Struck, S., & Afifi, T. O. (2022). Associations between lifetime spanking/slapping and adolescent physical and mental health and behavioral outcomes. *The Canadian Journal of Psychiatry*, *67*(4), 281-289. DOI:10.1177/07067437211000632

Many parents use physical forms of punishment, including spanking to correct perceived misbehavior. While some authors suggest spanking/slapping is a distinct and “milder” form of physical punishment, parents’ use of spanking is consistently associated with poor outcomes for their children. However, less is known about the relationship between spanking/slapping and health and behavioral outcomes in adolescence independent of other childhood adversities. The objectives of this study were to examine the associations

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between lifetime experiences of spanking on the bottom and/or slapping on the hand and 3 adolescent outcomes: (a) mental health disorders, (b) physical health conditions, and (c) defiant behaviors, after adjusting for other types of childhood adversities and child maltreatment. Cross-sectional data from the provincially representative 2014 Ontario Child Health Study (*N* = 6,537 dwellings, response rate = 50.8%) were used. The current study focused on one selected child aged 14 to 17 years within a household (*n* = 1,883) with data collected from the adolescent and the parent/caregiver. Logistic regression models were used to identify associations with lifetime experiences of spanking/slapping 3 or more times (vs. 0 to 2 times). Lifetime spanking/slapping was independently associated with increased odds of mental health disorders, physical health conditions, and defiant behaviors in adolescence after adjusting for childhood adversities and child maltreatment (unadjusted and adjusted odds ratios ranging from 1.29 to 2.19). These findings suggest that lifetime spanking/slapping is uniquely associated with harmful mental, physical, and behavioral outcomes in adolescence, and efforts should focus on its prevention.

McGuier, E. A., Kolko, D. J., & Dubowitz, H. (2022). Public policy and parent-child aggression: Considerations for reducing and preventing physical punishment and abuse. *Aggression and Violent Behavior*, *65*, 101635. DOI:10.1016/j.avb.2021.101635

Parent-child physical aggression, including both physical punishment and abuse, remains a prevalent problem in the United States. In this paper, we briefly review the prevalence and harms of parent-child aggression and discuss changes in social norms and policies over the past several decades. Then, we discuss broad social policies influencing risk for parent-child physical aggression, policies relevant to reducing and preventing physical abuse, and policies relevant to reducing and preventing physical punishment. We close by considering future directions to strengthen research and evaluation and accelerate progress toward ending parent-child physical aggression.

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Holden, G. W. (2020). Why do parents hit their children? From cultural to unconscious determinants. *The Psychoanalytic Study of the Child*, *73*(1), 10-29. DOI:10.1080/00797308.2020.1690858

Parental use of corporal punishment (CP) as a way of disciplining children is a widespread global problem. A number of child and family problems are linked to the behavior. Despite being commonly used to discipline children in many countries, its use is far from universal. Why do some parents use it while others do not? This paper examines the principal determinants, or predictors, that influence parental use of this form of punishment. I begin with a brief historical overview of the efforts to study the determinants of parental behavior. I then provide a brief summary of the four major categories of variables that predict CP use: *socio-cultural influences; the family and social environment; child variables*; and *parental variables*. Two types of *parental variables* – conscious thoughts as well as unconscious motives–will be examined in some detail. It is noteworthy that unconscious forces have received little research attention and typically go ignored. This raises an important methodological point: how CP is assessed affects the determinants studied. The article ends with a discussion of some future directions for the study of the predictors of CP and other disciplinary responses.

Lokot, M., Bhatia, A., Kenny, L., & Cislaghi, B. (2020). Corporal punishment, discipline and social norms: A systematic review in low-and middle-income countries. *Aggression and Violent Behavior*, *55*, 101507. DOI:10.1016/j.avb.2020.101507

There is increased recognition that incorporating a social norms approach provides insights for understanding corporal punishment and/or discipline (CPD). This review seeks to explore how the literature analyses social norms and CPD in low- and middle-income countries (LMICs). We searched eight electronic databases, Google Scholar, Google and institutional websites, including articles in LMICs which examined social norms and CPD perpetrated by family members or teachers. Data was extracted, assessed for quality and analyzed according to key themes. Of 21,708 articles from

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academic databases and 92 from other sources, 37 studies were included. We observed heterogeneity in study design, and in the definition and measurement of social norms. In the majority of studies, social norms supporting CPD were either harmful or, at times, protective. The review also finds that gender, age, power hierarchies and changes such as conflict, migration and modernization may influence norms on CPD. CPD interventions should be evaluated over longer periods and with consideration to the continuum of violence between homes and schools. Future research on CPD should (1) theorize and define social norms more clearly; (2) examine both harmful and protective norms linked to CPD; (3) explicitly examine perpetration of violence across the home-school continuum.

Finkelhor, D., Turner, H., Wormuth, B. K., Vanderminden, J., & Hamby, S. (2019). Corporal punishment: Current rates from a national survey. *Journal of Child and Family Studies*, *28*, 1991-1997. DOI:10.1007/s10826-019-01426-4

This study was based on a 2014 cross-sectional, telephone survey of a nationally representative sample of US households with children. Reports about spanking of 0–9 year olds were obtained from parents, while reports about 10–17 year olds were obtained from the youth themselves. The survey suggested that a majority of children in the US were not subject to corporal punishment in 2014. The rate was 49% in the past year for children ages 0–9, 23% for youth 10–17 and 37% overall. Rates of spanking were lower for girls compared to boys, Northeasterners compared to Southerners, and whites compared to blacks. They were also lower among those with a graduate education, and families with fewer than 3 children. The proportion of children subject to corporal punishment had declined by 2014 compared to other national surveys conducted in 1975 and 1985. This is in line with other studies showing declines of 26–40% in the spanking of kindergarden age children from 1988 to 2011. The trends suggest a continuing reduction of spanking in the population. Because of growing research and advocacy about this practice both

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nationally and internationally, it may be that awareness is having some impact and it will continue to decline.

Brown, A. S., Holden, G. W., & Ashraf, R. (2018). Spank, slap, or hit? How labels alter perceptions of child discipline. *Psychology of Violence*, *8*(1), 1–9. DOI:10.1037/vio0000080

Words shape our perceptions of behavior, and we applied this maxim to evaluating how different verbs can alter the perception of corporal acts used to discipline children. Specifically, we compared spank, swat, slap, hit, and beat. We hypothesized that (a) parents and nonparents would rate these terms differently, (b) corporal terms would be differentiated in a consistent manner across 3 behavior rating scales (common, acceptable, effective), and (c) acceptable and effective ratings would align more closely to each other than either would to common ratings. Method: In an online survey, participants read 8 vignettes with words used to label parental reactions to child misbehaviors and rated each vignette on how common, acceptable, and effective the response was. Results: Parents rated corporal actions as more common than did nonparents, but the samples were comparable on acceptable and effective ratings. Rank order of corporal term ratings was consistent across rating scales, with spank rated as the most common, acceptable, and effective response, followed (in order) by swat, hit, slap, and beat. Finally, evaluations of corporal terms on the acceptability and effectiveness of parental responses were more closely aligned with each other than either was to evaluations of how common the responses are. Conclusion: The specific verbs used to describe acts of physical discipline can alter interpretations of the associated behavior, and potentially serve to normalize, conceal, or justify violent actions.

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Gershoff, E. T., Goodman, G. S., Miller-Perrin, C. L., Holden, G. W., Jackson, Y., & Kazdin, A. E. (2018). The strength of the causal evidence against physical punishment of children and its implications for parents, psychologists, and policymakers. *American Psychologist, 73*(5), 626–638. DOI:10.1037/amp0000327

The question of whether physical punishment is helpful or harmful to the development of children has been subject to hundreds of research studies over the past several decades. Yet whether causal conclusions can be drawn from this largely nonexperimental research and whether the conclusions generalize across contexts are issues that remain unresolved. In this article, the authors summarize the extent to which the empirical research on physical punishment meets accepted criteria for causal inference. They then review research demonstrating that physical punishment is linked with the same harms to children as is physical abuse and summarize the extant research that finds links between physical punishment and detrimental outcomes for children are consistent across cultural, family, and neighborhood contexts. The strength and consistency of the links between physical punishment and detrimental child outcomes lead the authors to recommend that parents should avoid physical punishment, psychologists should advise and advocate against it, and policymakers should develop means of educating the public about the harms of and alternatives to physical punishment.

King, A. R., Ratzak, A., Ballantyne, S., Knutson, S., Russell, T. D., Pogalz, C. R., & Breen, C. M. (2018). Differentiating corporal punishment from physical abuse in the prediction of lifetime aggression. *Aggressive Behavior*, *44*(3), 306-315. DOI:10.1002/ab.21753

Corporal punishment and parental physical abuse often co-occur during upbringing, making it difficult to differentiate their selective impacts on psychological functioning. Associations between corporal punishment and a number of lifetime aggression indicators were examined in this study after efforts to control the potential influence of various forms of co-occurring maltreatment (parental physical abuse, childhood sexual abuse, sibling abuse, peer bullying, and observed parental violence). College students (N = 1,136) provided retrospective self-reports regarding their history of aggression and

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levels of exposure to childhood corporal punishment and maltreatment experiences. Analyses focused on three hypotheses: 1) The odds of experiencing childhood physical abuse would be higher among respondents reporting frequent corporal punishment during upbringing; 2) Corporal punishment scores would predict the criterion aggression indices after control of variance associated with childhood maltreatment; 3) Aggression scores would be higher among respondents classified in the moderate and elevated corporal punishment risk groups. Strong support was found for the first hypothesis since the odds of childhood physical abuse recollections were higher (*OR* = 65.3) among respondents who experienced frequent (>60 total disciplinary acts) corporal punishment during upbringing. Partial support was found for the second and third hypotheses. Dimensional and categorical corporal punishment scores were associated significantly with half of the criterion measures. These findings support efforts to dissuade reliance on corporal punishment to manage child behavior.

Fréchette, S., & Romano, E. (2017). How do parents label their physical disciplinary practices? A focus on the definition of corporal punishment. *Child Abuse & Neglect*, *71*, 92-103. DOI:10.1016/j.chiabu.2017.02.003

The lack of consensus about the definition of corporal punishment (CP) contributes to the varying research findings and fuels the debate surrounding its use. Related to the problem of definitional variability is also the possibility that some parents may not be aware that their physical disciplinary strategies (PDS) are forms of CP. As a first step to move beyond the debate and to tailor educational efforts to change cultural norms and parents' behaviors, the objective of the current study was to clarify what parents self-label as CP. Using a sample of 338 Canadian parents, the study assessed the relationship between endorsement of CP and self-reports of specific PDS ranging in level of severity. Predictors (i.e., cultural norms, attitudes toward and childhood experiences of CP) of this relationship were investigated. Results revealed that general questions on CP may best reflect parental use of milder forms of PDS, such as spanking (Φ = 0.62; *r* = -0.65) and

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slapping on the hand, arm, or leg (r = -0.47). Results also suggested that some parents (19.8%) do not endorse CP but use mild PDS. To move beyond the debate and to reach parents at risk of underreporting their use of CP, educational messages need to be tailored to specific and mild forms of PDS rather than to broad concepts such as CP. Moreover, factors such as attitudes toward corporal punishment ($p < 0.001$) can help identify those parents who use PDS but who do not endorse CP.

Gershoff, E. T., Lee, S. J., & Durrant, J. E. (2017). Promising intervention strategies to reduce parents' use of physical punishment. *Child Abuse & Neglect*, *71*, 9–23. DOI:10.1016/j.chiabu.2017.01.017

The strong and ever-growing evidence base demonstrating that physical punishment places children at risk for a range of negative outcomes, coupled with global recognition of children's inherent rights to protection and dignity, has led to the emergence of programs specifically designed to prevent physical punishment by parents. This paper describes promising programs and strategies designed for each of three levels of intervention - indicated, selective, and universal – and summarizes the existing evidence base of each. Areas for further program development and evaluation are identified.

Miller-Perrin, C., & Perrin, R. (2017). Changing attitudes about spanking among conservative Christians using interventions that focus on empirical research evidence and progressive biblical interpretations. *Child Abuse & Neglect*, *71*, 69-79. DOI:10.1016/j.chiabu.2017.03.015

This study examined how interventions that include either empirical research evidence about spanking, progressive biblical interpretations, or both, affect attitudes and intentions about spanking. A sample of 129 college students (70% female; 30% male; M_{age} = 19) attending a private, Christian university was randomly assigned to one of three intervention conditions: (1) Research Only, (2) Religion Only, or (3) Research and Religion. Four weeks prior to the intervention sessions, students completed a

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Demographic Form, the Religious Fundamentalism Scale, and the Attitudes Toward Spanking (ATS) scale. Following the intervention, students completed the ATS scale a second time. A two-way ANOVA indicated a significant main effect for the intervention condition and an interaction effect between intervention condition and religious fundamentalism, indicating that positive spanking attitudes declined most significantly in the Research and Religion intervention condition ($F(2, 123) = 4.05$, $p = .02$, $hp^2 = .06$) with the greatest change in attitudes among the Religious Fundamentalism Group in that condition ($F(2, 123) = 4.50$, $p = .01$, $hp^2 = .07$). A second two-way ANOVA indicated a significant main effect for Conservative Protestant Affiliation ($F(2, 123) = 4.39$, $p = .04$, $hp^2 = .03$) indicating that positive spanking attitudes declined most significantly for participants identifying with a conservative religious affiliation. Overall, the findings suggest that, especially among Conservative Protestants, interventions that focus on both empirical research and progressive biblical interpretations of scripture can reduce positive attitudes toward, and intentions to use, spanking. This study has implications for decreasing spanking use among Conservative Christians and for the development of training programs to reduce parents' use of spanking.

Altschul, I., Lee, S. J., & Gershoff, E. T. (2016). Hugs, not hits: Warmth and spanking as predictors of child social competence. *Journal of Marriage and the Family*, *78*(3), 695–714. DOI:10.1111/jomf.12306

Many parents believe that spanking is an effective way to promote children's positive behavior, yet few studies have examined spanking and the development of social competence. Using information from 3,279 families with young children who participated in a longitudinal study of urban families, this study tested competing hypotheses regarding whether maternal spanking or maternal warmth predicted increased social competence and decreased child aggression over time and which parent behavior was a stronger predictor of these changes. The frequency of maternal spanking was unrelated to maternal warmth. Findings from cross-lagged path models indicated that spanking

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was not associated with children's social competence, but spanking predicted increases in child aggression. Conversely, maternal warmth predicted children's greater social competence but was not associated with aggression. Warmth was a significantly stronger predictor of children's social competence than spanking, suggesting that warmth may be a more effective way to promote children's social competence than spanking.

Gershoff, E. T., & Grogan-Kaylor, A. (2016). Spanking and child outcomes: Old controversies and new meta-analyses. *Journal of Family Psychology*, *30*(4), 453–469. DOI:10.1037/fam0000191

Whether spanking is helpful or harmful to children continues to be the source of considerable debate among both researchers and the public. This article addresses 2 persistent issues, namely whether effect sizes for spanking are distinct from those for physical abuse, and whether effect sizes for spanking are robust to study design differences. Meta-analyses focused specifically on spanking were conducted on a total of 111 unique effect sizes representing 160,927 children. Thirteen of 17 mean effect sizes were significantly different from zero and all indicated a link between spanking and increased risk for detrimental child outcomes. Effect sizes did not substantially differ between spanking and physical abuse or by study design characteristics.

Fréchette, S., Zoratti, M., & Romano, E. (2015). What is the link between corporal punishment and child physical abuse? *Journal of Family Violence, 30*(2), 135-148. DOI:10.1007/s10896-014-9663-9

This study aimed to contribute to the literature on corporal punishment by examining the link between spanking and child physical abuse. First, we examined the extent to which individuals who experienced spanking in childhood were at greater risk of also experiencing physical abuse by their parents. Second, we examined various parenting

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and family factors that could distinguish between spanking that occurred within and without a physically abusive context. A sample of 370 university students completed a questionnaire on disciplinary experiences at age 10. Results suggested that individuals who indicated having experienced spanking during childhood were at greater risk of also having experienced physical abuse. Among individuals who indicated having experienced spanking, greater spanking frequency, perceptions of impulsiveness in parental discipline, and reports of physical violence between parents significantly increased the risk of physical abuse. This research contributes to the growing evidence on the risks associated with child corporal punishment.

Holden, G. W., Brown, A. S., Baldwin, A. S., & Caderao, K. C. (2014). Research findings can change attitudes about corporal punishment. *Child Abuse & Neglect*, *38*(5), 902-908. DOI:10.1016/j.chiabu.2013.10.013

Positive attitudes toward the use of corporal punishment (CP) predict subsequent spanking behavior. Given that CP has frequently been associated with behavior problems in children and child maltreatment, this prevention work was designed to test whether adults' attitudes could be changed by informing participants about the research findings on problematic behaviors associated with CP. Two random assignment studies are reported. In Study 1, we tested whether an active reading condition would result in more attitude change than a passive condition. With a sample of 118 non-parent adults, we found that after reading very brief research summaries on the problems associated with CP, there was a significant decrease in favorable attitudes toward CP. Contrary to expectations, the magnitude of the change was comparable for active and passive processing conditions. In Study 2, we extended our approach to a sample of 520 parents and included a control group. A significant decrease in positive attitudes toward spanking was observed in the intervention group, but no change for the control group. Parents who were unaware of the research showed more change after reading the summaries. Thus, these studies demonstrate that a brief and cost-effective approach to raise awareness

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of research findings can reduce positive attitudes toward CP. Implications for prevention and intervention are discussed.

Romano, E., Bell, T., & Norian, R. (2013). Corporal punishment: Examining attitudes toward the law and factors influencing attitude change. *Journal of Family Violence*, *28*, 265-275. DOI:10.1007/s10896-013-9494-0

There remains considerable societal support for child corporal punishment, despite much research about its ineffectiveness and potential harm to children. We examined attitudes toward Section 43 of the Canadian Criminal Code which gives parents the right to use reasonable physical force for discipline purposes. We also examined attitude change and predictors of this change. Participants (N = 212) completed an on-line study, which found that 39.2 % disagreed with ending Section 43. Upon presentation of corporal punishment-related information, the majority (63.8–70.5 %) now indicated being in favor of ending Section 43. Attitude change was highest for information on the potential for child abuse. Socio-demographics (ethnicity, religion), childhood disciplinary experiences (non-punitive discipline), and discipline perceptions (parental warmth/involvement) predicted attitude change. Results indicate that providing information about corporal punishment is key to changing attitudes toward parents' legal right to its use. Also, parental background and childhood discipline characteristics may differentially influence the amount of attitude change.

Mackenzie, M. J., Nicklas, E., Brooks-Gunn, J., & Waldfogel, J. (2011). Who spanks infants and toddlers? Evidence from the fragile families and child well-being study. *Children and Youth Services Review*, *33*(8), 1364–1373. DOI:10.1016/j.childyouth.2011.04.007

We use data from the Fragile Families and Child Well-Being Study (FFCW), a birth cohort study of children in 18 medium to large U.S. cities, to examine the prevalence and determinants of spanking among infants and toddlers (at mean age 14 months). Taking

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advantage of the large and diverse sample in FFCW, we conduct separate analyses for children of African American (N=1,710), Hispanic (N=853), and white non-Hispanic (N=812) mothers. Overall, about 15% of children are spanked at 12 months, with this share rising to 40% by 18 months and nearly 50% for children age 20 months or older. We find that there are marked differences in the use of spanking across the three racial/ethnic groups, with children of African American mothers more likely to be spanked and at a younger age. Moreover, while some predictors of spanking are seen across all three groups, others vary. Mothers who are young, who report more parental stress, or report their child has a more difficult temperament are more likely to spank across all three groups. However, being a boy increases the risk of spanking only within African American families. First-born children are at elevated risk of spanking to at least some extent in all groups, but much more so within Hispanic families. In addition, maternal employment is associated with a greater likelihood of spanking in Hispanic families. Although spanking at these young ages is not necessarily indicative of maltreatment, it may be a marker for families who are at elevated risk of maltreatment. As such, our findings, by highlighting some risk factors that are common across groups as well as some that are more important for particular groups, may have implications for child abuse prevention.

Coleman, D. L., Dodge, K. A., & Campbell, S. K. (2010). Where and how to draw the line between reasonable corporal punishment and abuse. *Law and Contemporary Problems*, *73*(2), 107–166.

Zolotor, A. J., & Puzia, M. E. (2010). Bans against corporal punishment: A systematic review of the laws, changes in attitudes and behaviours. *Child Abuse Review*, *19*(4), 229-247. DOI:10.1002/car.1131

Twenty-four countries have passed legislative bans on corporal punishment since the passage of the Convention on the Rights of the Child. This systematic review briefly reviews the arguments for corporal punishment bans and the contents and context of

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the current legal bans. All such bans have occurred in representative governments. Following this background, the paper will examine the impacts of the laws with regard to attitudes regarding corporal punishment and parental discipline behaviours. It is clear from the findings of this systematic review that legal bans on corporal punishment are closely associated with decreases in support of and use of corporal punishment as a child discipline technique. However, it is less clear if such legislative bans always generally precede a decline in popular support for corporal punishment or result from such a decline in popular support. The known impact of such bans on child physical abuse will then be reviewed. The paper concludes with a policy analysis framework for considering new legislation to ban corporal punishment.

Straus, M. A., & Paschall, M. J. (2009). Corporal punishment by mothers and development of children's cognitive ability: A longitudinal study of two nationally representative age cohorts. *Journal of Aggression, Maltreatment & Trauma, 18*(5), 459-483. DOI:10.1080/10926770903035168

This study tested the hypothesis that the use of corporal punishment (CP), such as slapping a child's hand or "spanking," is associated with restricted development of cognitive ability. Cognitive ability was measured at the start of the study and 4 years later for 806 children age 2–4 and 704 children age 5–9 in the National Longitudinal Study of Youth. The analyses controlled for 10 parenting and demographic variables. Children of mothers in both cohorts who used little or no CP at Time 1 gained cognitive ability faster than children who were not spanked. The more CP experienced, the more they fell behind children who were not spanked.

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Gershoff, E. T., & Bitensky, S. H. (2007). The case against corporal punishment of children: Converging evidence from social science research and international human rights law and implications for US public policy. *Psychology, Public Policy, and Law*, *13*(4), 231-272. DOI:10.1037/1076-8971.13.4.231

Although support for corporal punishment of children remains widespread in the United States, there is a substantial body of research from psychology and its allied disciplines indicating corporal punishment is ineffective as a disciplinary practice and can have unintended negative effects on children. At the same time, there is a growing momentum among other countries to enact legal bans on all forms of corporal punishment, bolstered by the fact that the practice has come to be regarded as a violation of international human rights law. The authors summarize these developments in research and law as well as the current legal status of corporal punishment of children in the United States. The authors conclude with 4 proposed program and policy strategies to reduce the use of corporal punishment in the United States by both parents and school personnel.

Robinson, D. H., Funk, D. C., Beth, A., & Bush, A. M. (2005). Changing beliefs about corporal punishment: Increasing knowledge about ineffectiveness to build more consistent moral and informational beliefs. *Journal of Behavioral Education*, *14*, 117-139. DOI:10.1007/s10864-005-2706-9

Although the effectiveness of corporal punishment (CP) has received little empirical support, public support for this disciplinary method continues despite calls for its abandonment by researchers. Even among educators, favorable attitudes toward the use of CP are prevalent. We measured education majors' beliefs about CP before and after they read about CP research on its effectiveness and side effects. Students who changed their behavioral intent regarding whether they would use CP as a parent increased their knowledge about its ineffectiveness, resulting in greater consistency between their moral and informational beliefs (Wainryb, 1998). Persons who are likely to change from defending to opposing CP regard it as being similar to bad-tasting

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medicine—not very pleasant but nonetheless necessary. Recommendations concerning implementation and changing other beliefs are discussed.

Elliman, D., & Lynch, M. A. (2000). The physical punishment of children. *Archives of Disease in Childhood*, *83*(3), 196–198. DOI:10.1136/adc.83.3.196

Whipple, E. E., & Richey, C. A. (1997). Crossing the line from physical discipline to child abuse: How much is too much?. *Child Abuse & Neglect*, *21*(5), 431-444. DOI:10.1016/S0145-2134(97)00004-5

The aim of this paper was to better differentiate physical discipline, corporal punishment, and physical child abuse based on samples drawn from the United States. The American literature was examined to differentiate these three constructs, first on such dimensions as severity, intention, and child effects; and second on key contextual or environmental factors empirically associated with higher rates of violent behavior in families. Third, normative data on parental spanking frequencies were summarized to better operationalize patterns of physical discipline among abusive and nonabusive parents. Five articles that met selection criteria revealed that abusive parents spanked their children more often than did nonabusive parents. Aggregated data from nonabusive parents were used to compute a continuum or "normal range" of daily spanking frequencies from 0 to 5.73 (M = 2.5) times in 24 hours. While further research is needed to address spanking intensity, severity, and context, results of the research suggest that "relative exposure" to spanking may be an additional risk marker for abuse when considered with other known indicators or risk factors.

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Muller, R. T., Hunter, J. E., & Stollak, G. (1995). The intergenerational transmission of corporal punishment: A comparison of social learning and temperament models. *Child Abuse & Neglect*, *19*(11), 1323–1335. DOI:10.1016/0145-2134(95)00103-f

This family study examined two models regarding the intergenerational transmission of corporal punishment. The model based on social learning assumptions asserted that corporal punishment influences aggressive child behavior. The model based on temperament theory suggested that aggressive child behavior impacts upon parental use of corporal punishment. Participants were 1,536 parents of 983 college students. Corporal punishment was assessed from father, mother, and child perspectives. Path analyses revealed that the social learning model was most consistent with the data.

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Torture

Deutsch, S. A., & O'Brien, E. (2024). Child torture victimization: Review of criminal statutes and medico-legal issues. *Child Abuse & Neglect*, *151*, 106750. DOI:10.1016/j.chiabu.2024.106750

A renowned group of pediatricians and an attorney with expertise in child abuse matters proposed a medical definition of intrafamilial child torture perpetrated by a caretaker in a landmark 2014 publication in the health sciences literature. Representing one of the most widely cited publications on non-politically motivated child torture to date, this medical definition encompassing physical abuse, psychological abuse, deprivation, and neglect characterizing child torture has been broadly recognized and accepted by multidisciplinary professionals across medical, child welfare, and criminal justice sectors. While the medical community's efforts aimed to compel legislative changes, including adoption of explicit torture-specific statutes that would enable criminal justice system responses reflective of abuse severity, subsequent legal analyses have revealed tremendous variability in criminal investigations, prosecution, sentencing, and case outcomes. In this discussion piece, medico-legal issues relevant to intrafamilial child torture case prosecution are reviewed. The impact of the established medical definition on jurisdictional legal approaches and unique case challenges related to longitudinal nature of abuse, frequent psychological injury, and victim-perpetrator dynamics are explored in depth. Utilizing available legal research platforms, investigative information, health sciences literature, and prosecutor self-report, existing child torture statutes and case outcomes were compared with focus on perpetrator, victim, socio-environmental, and community influence on legal outcome. Prosecutorial challenges facing jurisdictions lacking child torture statutes are discussed with emphasis placed on the critical role played by the medical community to support diagnosis of physical and emotional impacts to the child. Finally, the process by which states can establish a jurisdictional torture statute are suggested.

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Nahlén Bose, C., & Tamdjidi, R. (2024). Children who survive torture: A systematic review of screening, documentation and treatment of torture injuries in children. *Torture, 34*(3), 15–40. DOI:10.7146/torture.v34i3.143968

Children all over the world are subjected to torture, but few are identified as victims of these actions. Knowledge that facilitates identification, documentation, and treatment of torture injuries in children can allow redress and rehabilitation for more children in need. To synthesise research regarding screening, documentation, and treatment of child survivors of torture. A systematic literature review was conducted. A total of 4795 titles and/or abstracts were screened, of which 80 articles were included. Grey literature was also included. Screening for torture exposure usually consisted of questions that were included in trauma questionnaires. Questions about perpetrators in the traumatic events were missing from more than half of the studies. Although children were screened mainly for psychological injuries, it was primarily physical injuries that were documented. The evidence on treatment effects was limited. However, there was a tendency that Trauma-Focused Cognitive Behavioral Therapy (TF-CBT) and Narrative Exposure Therapy (NET) significantly reduced PTSD up to three months to one year after the end of treatment. Treatments with individual and group-based formats, as well as those with normal and more intensified approaches, were found to have an effect on PTSD.

Schlatter, A., Wiester, R. T., Thompson, A. D., Gilbert, J., Forshag, T., & Feldman, K. W. (2024). Child torture: A Washington state case series. *Child Abuse Review*, *33*(1), e2848. DOI:10.1002/car.2848

Child torture is a worldwide problem, but there is very little research on torture as a form of child abuse. In 2014 Knox et al. reported the first case series on child torture and developed criteria to diagnose child abuse torture. Our objective was to describe additional child abuse torture victims and to determine whether they shared similar patterns, including types of abuse, duration and possible opportunities for early identification. This multi-site case series reviewed 47 children identified as torture victims

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at three Washington State child abuse programs spanning 15 years. Data was collected through retrospective chart review. Simple descriptive statistics were utilised. Our study found that abuse occurred over months to years. All children experienced psychological maltreatment, 89 per cent had findings of physical abuse. Malnutrition and medical, emotional and educational neglect were common. Majority of torture victims had previously been involved with CPS or had seen a medical provider prior to diagnosis, at which time they had findings of torture, but received no protective intervention. It's important to develop criteria for recognition and early intervention since tortured children experienced sustained, systematic and escalating abuse.

Sebastian, A., & Fay-Hillier, T. (2024). Through the shadows: Exploring domestic child torture. *Journal of the Academy of Forensic Nursing*, *2*(1), 12–22. DOI:10.29173/jafn719

Child torture is a severe form of child maltreatment. Children who are tortured are at high risk of death and/or re-traumatization. It is imperative both legally and ethically that health care providers recognize children who are being tortured in order to develop a safety plan to help prevent further abuse and trauma to the child. This article will define and address the following: child torture, intrafamilial child torture (ICT), common presentations of victims of ICT, risk factors of victims of ICT, and guidelines for healthcare practitioners working in the United States when they assess victims. Additionally, there will be a discussion on the importance of collaborating both on an interdisciplinary (e.g. medical, social workers, child protective case workers, psychology) and multidisciplinary (clinical and legal) level. and the utilization of self-care activities for clinicians, after treating a child who has been tortured.

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Shelton, J. L. E., Knox, B. L., Hardie, J. E., Burd, T. E., Hoffer, T. A., & Slater, K. E. (2024). Child torture as a form of child abuse: An exploratory study of investigative aspects among 42 offenders. *Child Abuse & Neglect*, *158*, 107092. DOI:10.1016/j.chiabu.2024.107092

Torture has traditionally been described in the context of politically motivated abuse. Torture of children in the familial context is a less studied phenomenon, with scholarly articles focused on legal or medical viewpoints. Analysis from a frontline professional's perspective is virtually nonexistent in the literature. The present study seeks to identify the common features of child torture and assist law enforcement, medical, and child protection agencies in earlier identification and inform more effective investigative and intervention strategies. A convenience sampling method was used to identify and collect cases involving severe child maltreatment consistent with torture. The sample included 42 offenders and 35 victims, representing 20 households. Researchers reviewed and extracted data from law enforcement case files, to include investigative, medical, and child protective services (CPS) reports, as well as recorded law enforcement interviews of offenders/witnesses and child forensic interviews. Descriptive and frequency statistics were generated. Offenders were often female (57 %), most commonly biological mothers (38 %), with a history of violence (57 %). Prior CPS reports were noted in 85 % of cases, less than half of which were substantiated. In over half of the cases (55 %), law enforcement discovered digital documentation of the torture. Over half (54 %) of the victims died as a result of the torture. This study demonstrated how CT is a distinct form of child maltreatment that is especially severe and pervasive. Recognition, assessment and documentation of the unique constellation of physical and psychological abuse are key to an efficient intervention.

Miller, P. J., Rycus, J. S., & Vieth, V. (2022). *Intrafamilial child torture: Victim impact and professional interventions*. Institute for Human Services.

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Hoffman, S. J., Vukovich, M. M., Gewirtz, A. H., Fulkerson, J. A., Robertson, C. L., & Gaugler, J. E. (2020). Mechanisms explaining the relationship between maternal torture exposure and youth adjustment In resettled refugees: A pilot examination of generational trauma through moderated mediation. *Journal of Immigrant and Minority Health*, *22*(6), 1232–1239. DOI:10.1007/s10903-020-01052-z

The intergenerational effects of trauma resulting from torture and war are complex and multi-faceted and have important implications for the family system. The current study aimed to identify key relationships between refugee maternal caregiver exposure to torture, mental health, and physical health with maternal-reported youth adjustment. Ninety-six Karen maternal caregivers originating from Burma and resettled in the United States participated in a cross-sectional, explanatory mixed methods study. Maternal mental health distress was found to mediate the relationship betweenmaternal torture experiences and youth adjustment, R^2 = .357. Physical health problems was found to moderate the degree to which mental health distress mediated the relationship between torture and war trauma experiences and youth adjustment, R^2 = .409. The current study is significant in that it enhances our mechanistic understanding of factors relevant to the intergenerational effects of trauma within families where maternal caregivers experienced trauma from torture and/or war.

Miller, P. J. (2020). Intrafamilial child torture: Training mandated reporters. *APSAC Advisor*, *32*(1), 3-8.

Macy, A. R. (2020). *Protecting domestic child torture victims: Addressing the gap in U. S. state criminal codes*. National Center for Child Abuse Statistics & Policy.

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Macy, A. R. (2019). A precarious gap in US criminal codes for cases of child torture and suggested model statute. *Children and Youth Services Review*, *96*, 500-508. DOI:10.1016/j.childyouth.2018.10.046

Child torture includes a combination of two or more cruel inhuman degrading treatments for long periods of time, such as: intentionally starving the child, forcing the child to sit in urine or feces, binding or restraining the child, repeatedly physically injuring the child, exposing the child to extreme temperatures without adequate clothing, locking the child in closets or other small spaces, and forcing the child into stress positions or exercise which results in prolonged suffering permanent disfigurement/dysfunction, or death. This study is a comprehensive analysis of the 50 U.S. state criminal codes and the D.C. criminal code, and identifies a gap in at least fourteen state codes for cases of child torture.[2] Every state code prohibits causing physical harm to a child, but not every state code criminalizes the mental trauma that occurs or a child when the torture does not result in a serious physical injury. Thirty-six-state criminal codes and the DC criminal code contain a form of felony child torture statute. For fourteen states without a felony child torture statute, a gap in the criminal code exists that often allows people who have tortured children to serve light sentences usually reserved for slight misconduct. Legislation is suggested in these states. This study further highlights a model statute based on the survey of various U.S. child torture statutes.

Pérez-Sales P. (2019). Documentation of torture in children and young adults: Time to reflect. *Torture: Quarterly Journal on Rehabilitation of Torture Victims and Prevention of Torture*, *29*(1), 1–15. DOI:10.7146/torture.v29i1.114028

Documenting torture in children and young adults (ChYA) is a challenge. Less than 3% of academic papers on documentation and rehabilitation of torture victims are focused on children and youth. In the Delphi study on research priorities in the sector (Pérez-Sales, Witcombe, & Otero Oyague, 2017), five lines were proposed regarding torture in children, which covered: developmental disruptions related to the torture of relatives;

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developmental deficits related to infant torture; the effect on caregivers of torture/kidnapping of their children; the impact of torture on identity and worldviews among adolescents; and transgenerational trauma. The latter was considered among the 40 top research priorities. In this editorial, we briefly review: aspects related to the notion of torture as applied to ChYA; specific ethical problems in forensic documentation; and challenges in consistency statements. By doing so, we aim to outline key challenges that researchers and practitioners ought to pursue.

Knox, B. L., Starling, S. P., Feldman, K. W., Kellogg, N. D., Frasier, L. D., & Tiapula, S. L. (2014). Child torture as a form of child abuse. *Journal of Child & Adolescent Trauma*, *7*, 37-49. DOI:10.1007/s40653-014-0009-9

This paper describes clinical findings and case characteristics of children who are victims of severe and multiple forms of abuse; and proposes clinical criteria that indicate child abuse by torture. Medical records, investigation records, and transcripts of testimony regarding a non-consecutive case series of 28 children with evidence of physical abuse, neglect, and psychological maltreatment, such as terrorizing and isolation, were reviewed for types of injuries, duration of maltreatment, medical and physical neglect, social and family history, and history of prior Child Protective Services (CPS) involvement. The median age was 7.5 years (9 months to 14.3 years). Thirty-six percent died. Duration of abuse ranged from 3.5 months to 8 years (median 3 years). Ninety-three percent of children were beaten and exhibited cutaneous injury; 21 % had fractures. There were 25 victims of isolation (89 %), as well as 61 % who were physically restrained and 89 % who were restricted from food or water. All of the children were victims of psychological maltreatment; 75 % were terrorized through threats of harm or death to themselves or loved ones and 54 % were degraded and/or rejected by caregivers. Nearly all children were medically neglected. Half had a history of prior referrals to CPS. The children in this case series were physically abused, isolated, deprived of basic necessities, terrorized, and neglected. We define child torture as a longitudinal experience characterized by at least

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two physical assaults or one extended assault, two or more forms of psychological maltreatment, and neglect resulting in prolonged suffering, permanent disfigurement or dysfunction, or death.

den Otter, J. J., Smit, Y., dela Cruz, L. B., Özkalipci, Ö., & Oral, R. (2013). Documentation of torture and cruel, inhuman or degrading treatment of children: A review of existing guidelines and tools. *Forensic Science International*, *224*(1-3), 27-32. DOI:10.1016/j.forsciint.2012.11.003

The documentation of individual cases of child torture is of paramount importance to bring justice to, and help heal, individuals and sensitize societies. Our objective is to systematically review medical guidelines for the recording of individual cases of child torture or cruel, inhuman or degrading treatment (CIDT). We searched CINAHL, Embase, the Guidelines International Network, Lilacs, Medline, the National Guideline Clearinghouse, PsychInfo and all websites of the organizations participating in the updating of the Istanbul Protocol for guidelines or studies on how to document torture, CIDT or abuse in persons under 18 years. We did not find a comprehensive guideline that encompassed all aspects of the documentation of child torture, as does the Istanbul Protocol for adults. An expert opinion guideline on how to document sexual torture in children was found, and in addition we identified 13 consensus-based guidelines for the evaluation of abuse in children or specific aspects thereof. We strongly recommend a child specific, comprehensive guideline on the documentation of torture and CIDT in children.

Alayarian, A. (2009). Children, torture and psychological consequences. *Torture: Quarterly Journal on Rehabilitation of Torture Victims and Prevention of Torture*, *19*(2), 145-156.

Torture is a strategic means of limiting, controlling, and repressing basic human rights of individuals and communities that is often covert and denied by authorities. Deliberate

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infliction of pain and suffering or intimidation or coercion on children to obtain a confession or information, for punishment of real or perceived offences on the basis of discrimination about race, ethnic or political affiliation, is practiced in many places around the world. Impact of torture on children may vary depending on the child's coping strategies, cultural and social circumstances. We at Refugee Therapy Centre provide psychotherapy and associated treatments to people who have been tortured, giving priority to children. While our main objective is provision of clinical services, our focus is also to influence policy and practice by searching for evidence and demonstrating solutions to improve the lives, homes and communities of children disadvantaged by torture and the services that support them. We seek to provide some remedies to children of refugees who are suffering the consequence of trauma that they experienced and demonstrate good practice. In this paper I will give a brief introduction of our work at the RTC. I then discuss and reflect on children and torture. I will present a vignette and some examples of clinical intervention.

Quiroga, J. (2009). Torture in children. *Torture: Quarterly Journal on Rehabilitation of Torture Victims and Prevention of Torture*, *19*(2), 66-87.

This is a review article that studies the problem of torture in children. Torture in children is a significant worldwide problem, but there are no official or reliable independent statistics to measure the magnitude of the problem. The definition of torture in the Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment applies to adults and children. The Convention on the Rights of the Child defines children as "every human being below the age of eighteen years". Torture in children happens during peace times and during political violence and war conflicts. The majority of torture victims happen during peace times. The high-risk groups are impoverished children living in the street, children deprived of parental care, children in conflict with the law, and children in detention. During political violence and war the high risk children are the children detained during political violence, child soldiers, children internally displaced in refugee

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camps, detained children during the war against terrorism and children tortured by peacekeeping forces. The perpetrators of torture in children are the members of the same forces that torture adults, generally the police, civil police, security guards trained by police, prison guards, and military forces. The paper identifies some preventive measure and develops recommendations for action at the local, national and international level.

Daud, A., Skoglund, E., & Rydelius, P. A. (2005). Children in families of torture victims: Transgenerational transmission of parents' traumatic experiences to their children. *International Journal of Social Welfare*, *14*(1), 23-32. DOI:10.1111/j.1468-2397.2005.00336.x

This article details a study to test the hypothesis that immigrant children whose parents have been tortured before coming to Sweden suffer from depressive symptoms, posttraumatic stress symptoms, somatisation and behavioural disorders. Fifteen families where at least one of the parents had experienced torture were compared with fifteen families from a similar ethnic and cultural background where their parents might have experienced violence but not torture. The parents were investigated using interviews, the Karolinska Scales of Personality (KSP) and Harvard/Uppsala Trauma Questionnaire (H/UTQ). The children were assessed using the DICA-interview according to DSM-IV On the H/UTQ test, traumatised parents scored higher with respect to post-traumatic stress disorder, depression, somatisation, anxiety and psychosocial stress symptoms. On the KSP, they scored higher on nine of the fifteen sub-scales. The fathers in the tortured group scored higher than their wives only on the sub-scale for guilt. According to the DICA-interviews, the children of tortured parents had more symptoms of anxiety, depression, posttraumatic stress, attention deficits and behavioural disorders compared with the comparison group. Social workers, psychiatrists, psychologists and teachers need to be aware of a possible transmission of parents' traumatic experiences to their children and to develop treatment methods for children of torture victims.

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Petersen, H. D., & Wandall, J. H. (1995). Evidence of physical torture in a series of children. *Forensic Science International*, *75*(1), 45-55. DOI:10.1016/0379-0738(95)01766-C

In a refugee camp for Kashmiris it was stated that children had been exposed to torture and ill-treatment; consequently, we decided to appraise the validity of such statements. Ten boys allegedly exposed to torture and 10 children who were said to have been ill-treated were interviewed and examined. The veracity of the individual statements about exposure was appraised through an assessment of the consistency between the history and the clinical findings. In all cases of alleged torture, the history was in agreement with clinical findings ascribed to torture. Torture methods included cuts with bayonets and burns with items easily available in any setting. In five of the 10 cases of torture, the scars were highly indicative of intentionally inflicted injuries, by their shapes, their presence in clusters and their localization in regions not normally exposed to traumatization. Nine of the 10 children allegedly exposed to ill-treatment had scars in accordance with their histories. In all cases, Indian security forces were said to have been responsible for the inflicted violence. The histories and the clinical findings were in accordance with results of examinations of adult victims of organized violence from the same region. On the basis of the physical evidence, in each case in agreement with the history, it is concluded that torture of children has occurred in Kashmir. Series of children with physical evidence of torture have not previously been described in the medical literature.

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General

Flaherty, A., Ghandour, S., Mirochnik, K., Lucaciu, A., Nassour, N., Kwon, J. Y., Harris, M. B., & Ashkani-Esfahani, S. (2025). Identifying risk factors of children who suffered physical abuse: A systematic review. *JAAOS Global Research & Reviews*, *9*(1), e24. DOI:10.5435/JAAOSGlobal-D-24-00163

Approximately 25% of children in the United States experience child abuse or neglect, 18% of whom are physically abused. Physicians are often in a position to differentiate accidental trauma from physical child abuse. Therefore, the aim of this study was to review recent literature for risk factors associated with physical child abuse. In this systematic review, three electronic databases were searched for articles published in the past 10 years, using the terms "abuse," "risk factors," and "children," with associated variations. A total of 1,568 articles were identified. A sequential screening process was conducted by two independent reviewers in each phase, and 63 articles were included in the final analysis. Data extraction was conducted, and a narrative synthesis was conducted. Sociodemographic risk factors of physical child abuse were younger age, male sex, African American or Hispanic race, nonprivate insurance, lower income, and lower maternal education. Other risk factors reported were previous reports of child abuse, birth defects, and developmental, musculoskeletal, intellectual, or mood disorders. Clinical and radiographic signs possibly indicative of child abuse included subdural hematoma, traumatic brain injury, retinal injury, bruising, superficial skin injury, lung injury, and fracture in skull, femur, clavicle, humerus, and foot. The results of this systematic review provide insights into the potential risk factors that should be considered when assessing a child for physical abuse in the health care setting.

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Hanafusa, M., Nawa, N., Owusu, F. M., Kondo, T., Khin, Y. P., Yamoka, Y., Abe, A., & Fujiwara, T. (2025). Do the norms of tolerance for child physical abuse modify the intergenerational transmission of physical abuse?. *Child Abuse & Neglect*, *159*, 107156. DOI:10.1016/j.chiabu.2024.107156

Intergenerational transmission of physical abuse is well-known; however, the potential for contextual effect modification remains unknown. We investigated whether the norms of tolerance for child physical abuse modify the intergenerational transmission of physical abuse. Data from the Child Living Standard Survey (grades five and eight) conducted between 2016 and 2018 in three prefectures in Japan was analyzed. The norms of tolerance for child physical abuse were calculated based on the proportion of caregivers who physically abuse their offspring in each of the 33 districts (n = 43,534). The caregivers' childhood physical abuse victimization and perpetration of child physical abuse were assessed via questionnaire. A multilevel analysis was performed to evaluate the cross-level interaction of the norms of tolerance for child physical abuse at the neighborhood level on the association between the caregiver's childhood physical abuse victimization and perpetration of child physical abuse, stratified by fathers (n = 4334) and mothers (n = 38,290). By district, the average percentage of caregivers who physically abuse their offspring was 14.4 %. Intergenerational transmission was confirmed for both fathers and mothers. Fathers who are living with highly tolerant norms for child physical abuse showed higher odds of intergenerational transmission of physical abuse, while mothers showed no effect modification. The norms of tolerance for child physical abuse showed a more prominent intergenerational transmission of physical abuse for fathers but not for mothers. To modify the cycle of physical abuse, interventions to reduce norms of tolerance for child physical abuse may be useful.

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Karni-Visel Y. (2025). The effectiveness of the Revised Protocol's supportive techniques in eliciting information from children disclosing physical abuse. *Child Abuse & Neglect*, *165*, 107491. DOI:10.1016/j.chiabu.2025.107491

Allegedly maltreated children are often reluctant to disclose information about abusive events during forensic interviews. The Revised NICHD Protocol (RP), which emphasizes interviewer support, has been shown to enhance children's testimonies. This study aimed to examine the types of supportive techniques used during forensic interviews and assess their effectiveness in eliciting from children emotional content and forensic details about their alleged physical abuse. Interviews were conducted throughout Israel with 165 children (44.8 % girls) aged 4 to 14 (M = 9.3, SD = 2.33) who disclosed multiple incidents of physical abuse by their parents. Multilevel regressions assessed the effects of support types on the children's emotional expression and the forensic details they provided. Analyses showed that reinforcement (22.3 %) was the most widely used technique. Unconditional support predicted overall emotional expression (B = 0.576), maintaining a relationship predicted negative emotional expression (B = 0.568), and encouragement predicted reporting of forensic details (B = 0.98). Emotional support for negative emotions related to the interview negatively predicted reporting of forensic details (B = -0.601). Tailored support that addresses children's emotional and cognitive needs is essential for optimizing interview outcomes, highlighting the importance of interviewers using a nuanced approach to elicit comprehensive testimonies.

Cho, N., & Koti, A. S. (2024). Identifying inflicted injuries in infants and young children. *Seminars in Pediatric Neurology*, *50*, 101138. DOI:10.1016/j.spen.2024.101138

Child physical abuse is a common cause of pediatric morbidity and mortality. Up to half of all children presenting with abusive injuries have a history of a prior suspicious injury, suggesting a pattern of repeated physical abuse. Medical providers are responsible for identifying children with suspicious injuries, completing mandated reporting to child protective services for investigation, and screening for occult injuries and underlying

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medical conditions that can predispose to injuries. Early identification of inflicted injuries appropriate evaluations may serve as an opportunity for life-saving intervention and prevent further escalation of abuse. However, identification of abuse can be challenging. This article will review both physical exam findings and injuries that suggest abuse as well as the evaluation and management of physical abuse.

Schermerhorn, S. M. V., Muensterer, O. J., & Ignacio Jr., R. C. (2024). Identification and evaluation of non-accidental trauma in the pediatric population: A clinical review. *Children*, *11*(4), 413. DOI:10.3390/children11040413

Non-accidental trauma (NAT) is a major cause of morbidity and mortality for children around the world and most significantly impacts children under one year of age. Prompt and comprehensive treatment of these children relies on a high index of suspicion from any medical provider that treats pediatric patients. This review discusses those most at risk for experiencing NAT, and common initial presentations, to assist providers in the identification of potential victims. In addition, this review provides guidance on the recommended workup for these patients so that the full extent of associated injuries may be identified and the appropriate healthcare team may be assembled.

Aksoy, D., Favre, C. A., Janousch, C., & Ertanir, B. (2022). Internalizing and externalizing symptoms in adolescents with and without experiences of physical parental violence, a latent profile analysis on violence resilience. *Frontiers in Psychology, 13*, 824543. DOI:10.3389/fpsyg.2022.824543

Questionnaire data from a cross-sectional study on social resilience in adolescence, with a sample of N = 1,974 Swiss seventh grade high school students ages 12–14 (M = 11.76; SD = 0.65) was used to identify and compare violence resilience profiles. Person-centered latent profile analysis (LPA) was applied and allowed for the grouping of adolescents into profiles of internalizing (depression/anxiety, dissociation) and externalizing symptoms (peer aggression, peer victimization, classroom disruption) and differentiation of

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adolescents with (*n* = 403) and without (*n* = 1,571) physical parental violence experiences. Subsequently, a multinomial logistic regression analysis was conducted to further investigate the sociodemographic predictors of violence resilience profiles. With LPA, we identified four distinct profiles for both adolescent groups (with and without parental physical violence experiences). The results showed three particularly burdened profiles of adolescents, one with *higher externalizing* and one with *higher internalizing* symptoms, which did not occur simultaneously to the same extent. Furthermore, the third profile contained adolescents with both elevated internalizing and externalizing symptoms, the *comorbid* profile. The fourth profile consisted of the majority of adolescents, who exhibited little or no internalizing and externalizing symptoms, the so-called *no/low symptomatic* profile. A differentiated view of the symptoms can create added value regarding the understanding of violence resilience. Moreover, in the multinomial logistic regression, significant associations were found between the profiles and adolescents' gender in the group of adolescents with parental physical violence experiences, but none were found in relation to sociocultural status and migration background.

Delaplain, P. T., Guner, Y. S., Rood, C. J., & Nahmias, J. (2022). Non-accidental trauma in infants: A review of evidence-based strategies for diagnosis, management, and prevention. *Current Trauma Reports*, *8*, 1-11. DOI:10.1007/s40719-021-00221-1

Infants are more likely to both suffer from physical abuse and die from their subsequent injuries. There are missed opportunities among providers for recognizing sentinel injuries. This article serves to provide a resource for providers that may be involved in the diagnosis and management of infant non-accidental trauma (NAT).Minority children are overrepresented in the reporting of child maltreatment, and there is systemic bias in the evaluation and treatment of minority victims of child abuse. Unfortunately, no single, primary preventative intervention has been conclusively shown to reduce the incidence of child maltreatment. Standardized algorithms for NAT screening have been shown to increase the bias-free utilization of NAT evaluations. Every healthcare provider that

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interacts with children has a responsibility to recognize warning signs of NAT, be able to initiate the evaluation for suspected NAT, and understand their role as a mandatory reporter.

Manan, M. R., Rahman, S., Komer, L., Manan, H., & Iftikhar, S. (2022). A multispecialty approach to the identification and diagnosis of nonaccidental trauma in children. *Cureus*, *14*(7), e27276. DOI:10.7759/cureus.27276

Child abuse is a preventable phenomenon of considerable concern resulting in significant child mortality and morbidity. We analyze various abuse lesions such as radiological (visceral and skeletal lesions and those associated with head trauma) and cutaneous (burns, bruises, bites, etc.) to enhance streamlined identification of injuries in cases of physical child abuse. For effective results, it is essential to remain mindful of all background factors, such as the caregiver setting and the prevalence of child maltreatment in the concerned community while acknowledging the possibility of natural causes (genetic diseases such as osteogenesis imperfecta and hemophilia, or acquired abnormalities) that can mimic NAT and cause confusion in diagnosis and treatment. The margin of error in cases of abuse is negligible, therefore, making its diagnosis a momentous as well as challenging clinical task. An ineffective diagnosis can have detrimental emotional consequences for the family and may even expose the child to future potentially fatal episodes of abuse. Hence, there is a need to direct special focus on the importance of accurate history taking and immediate, responsible reporting to authorities, as well as to child protective services. Therefore, considering the multifactorial approach this subject requires, this review aims to delve into prevalence statistics, various risk factors, and their effect on psychological health to offer a near-complete regulation to ensure an effective understanding of NAT on part of doctors, social workers, and other relevant authorities.

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Bruer, K. C., Furlong, M. A. R., Williams, S., & Evans, A. D. (2021). Adults' sensitivity to the age-appropriateness of lawyer's questioning of children in a physical abuse case. *Canadian Journal of Behavioural Science, 53*(4), 469–479. DOI:10.1037/cbs0000266

This study explored if adults (laypersons) are sensitive to the appropriateness of questions posed by lawyers to child witnesses in court. We examined whether this sensitivity, if present, was influenced by (a) the child's age (6 or 12-year old) and (b) the presence of judicial instructions. We also explored whether sensitivity to question appropriateness was related to adults' perceived credibility of a child witness. All participants (N = 217) were provided with an adapted trial transcript depicting a prosecution lawyer questioning a child in a physical abuse case in Canada. Results suggest adults are sensitive to different types of questions asked to children but that this sensitivity involves a significant bias toward labeling all questions as appropriate for use with a child. The presence of judicial instructions, designed to highlight developmental considerations of a child witness was found to influence this sensitivity. Specifically, the presence of the judicial instructions was found to encourage adults to better consider whether a question posed to a child was appropriate. We also found that increased perceptions of witness intelligence were related to a reduction in sensitivity but that this effect was reversed with older children. These findings have important implications for how legal decision makers (i.e., jurors) may assess testimony provided by a child in court.

Lansford, J. E., Godwin, J., McMahon, R. J., Crowley, M., Pettit, G. S., Bates, J. E., Coie, J. D., & Dodge, K. A. (2021). Early physical abuse and adult outcomes. *Pediatrics*, *147*(1), e20200873. DOI:10.1542/peds.2020-0873

Because most physical abuse goes unreported and researchers largely rely on retrospective reports of childhood abuse or prospective samples with substantiated maltreatment, long-term outcomes of physical abuse in US community samples are unknown. We hypothesized that early childhood physical abuse would prospectively predict adult outcomes in education and economic stability, physical health, mental

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health, substance use, and criminal behavior. Researchers in two multisite studies recruited children at kindergarten entry and followed them into adulthood. Parents completed interviews about responses to the child's problem behaviors during the kindergarten interview. Interviewers rated the probability that the child was physically abused in the first 5 years of life. Adult outcomes were measured by using 23 indicators of education and economic stability, physical health, mental health, substance use, and criminal convictions reported by participants and their peers and in school and court records. Controlling for potential confounds, relative to participants who were not physically abused, adults who had been abused were more likely to have received special education services, repeated a grade, be receiving government assistance, score in the clinical range on externalizing or internalizing disorders, and have been convicted of a crime in the past year (3.20, 2.14, 2.00, 2.42, 2.10, and 2.61 times more likely, respectively) and reported levels of physical health that were 0.10 SDs lower. No differences were found in substance use. Unreported physical abuse in community samples has long-term detrimental effects into adulthood. Pediatricians should talk with parents about using only nonviolent discipline and support early interventions to prevent child abuse.

Pfeifer, C. M., Henry, M. K., Caré, M. M., Christian, C. W., Servaes, S., Milla, S. S., & Strouse, P. J. (2021). Debunking fringe beliefs in child abuse imaging: AJR expert panel narrative review. *American Journal of Roentgenology*, *217*(3), 529-540. DOI:10.2214/AJR.21.25655

Child abuse is a global public health concern**.** Injuries from physical abuse may be clinically occult and not appreciable on physical examination. Imaging is therefore critical in identifying and documenting such injuries. The radiologic approach for a child who has potentially been abused has received considerable attention and recommendations according to decades of experience and rigorous scientific study. Nonetheless, fringe beliefs describing alternative explanations for child abuse-related

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injuries have emerged and received mainstream attention. Subsequently, imaging findings identified in abused children have been attributed to poorly supported underlying medical conditions, clouding the evidence basis for radiologic findings indicative of nonaccidental trauma. Fringe beliefs that attribute findings seen in child abuse to alternate pathologies such as genetic disorders, birth trauma, metabolic imbalances, vitamin D deficiency, and short-distance falls typically have limited evidence basis and lack professional society support. Careful review of the scientific evidence and professional society consensus statements is important in differentiating findings attributable to child abuse from fringe beliefs used to discount the possibility that a child's constellation of injuries is consistent with abuse. This review refutes fringe beliefs used to provide alternative explanations in cases of suspected child abuse and reinforces the key literature and scientific consensus regarding child abuse imaging.

Tiyyagura, G., Emerson, B., Gaither, J. R., Bechtel, K., Leventhal, J. M., Becker, H., Della Guistina, K., Balga, T., Mackenzie, B., Shum, M., Shapiro, E. D., Auerbach, M. A., McVaney, C., Morrell, P., & Asnes, A. G. (2021). Child protection team consultation for injuries potentially due to child abuse in community emergency departments. *Academic Emergency Medicine, 28*(1), 70–81. DOI:10.1111/acem.14132

Emergency care for children is provided predominantly in community emergency departments (CEDs), where abusive injuries frequently go unrecognized. Increasing access to regional child abuse experts may improve detection of abuse in CEDs. In three CEDs, we intervened to increase involvement of a regional hospital child protection team (CPT) for injuries associated with abuse in children < 12 months old. We aimed to increase CPT consultations about these infants from the 3% baseline to an average of 50% over 12 months. We interviewed CED providers to identify barriers and facilitators to recognizing and reporting abuse. Providers described difficulties differentiating abusive from nonabusive injuries and felt that a second opinion would help. Using a plan-do-study-act approach, beginning in April 2018, we tested, refined, and implemented interventions to increase the frequency of CPT consultation, including leadership and champion

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engagement, provider training, clinical pathway implementation, and an audit and feedback process. Data were collected for 15 months before and 17 months after initiation of interventions. We used a statistical process control chart to track CPT consultations about children < 1 year old with high-risk injuries, use of skeletal surveys (SSs), and reports to child protective services (CPS). Evidence of special cause was identified beginning in June 2018, with a shift of 8 points to one side of the center line. For the subsequent 8-month period, the CPT was consulted for a mean of 47.5% of children with high-risk injuries; this was sustained for an additional 7 months. The average percentage of infants with high-risk injuries who received a SS increased from 6.7% to 18.9% and who were reported to CPS increased from 10.7% to 32.6%. Targeted interventions in CEDs increased the frequency of CPT consultation, SS use, and reports to CPS for infants with high-risk injuries. Such interventions may improve recognition of physical abuse.

Lawson, M., Piel, M. H., & Simon, M. (2020). Child maltreatment during the COVID-19 pandemic: Consequences of parental job loss on psychological and physical abuse towards children. *Child Abuse & Neglect*, *110*(Pt 2), 104709. DOI:10.1016/j.chiabu.2020.104709

Job loss resulting from the COVID-19 pandemic presents significant risk for child abuse. Protective factors, such as reframing coping, may mitigate the risk of job loss on child maltreatment. The current study investigated factors associated with child maltreatment during the COVID-19 pandemic, including parental job loss, and whether cognitive reframing moderated associations between job loss and child maltreatment. A community sample of 342 parents (62% mothers) of 4- to 10-year-olds (M = 7.38, SD = 2.01; 57.3% male) living in the United States completed online questionnaires regarding experiences with COVID-19, the Parent-Child Conflict Tactics Scale, and the Family Crisis Oriented Personal Evaluation Scales. Two logistic regression analyses evaluated predictors of whether parents psychologically maltreated or physically abused their children during the pandemic controlling for maltreating history, parental depressive

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symptoms, financial stability, parent age, parent gender, child age, and child gender. Parents who lost their jobs (*OR* = 4.86, 95% CI [1.19, 19.91], *p* = .03), were more depressed (*OR* = 1.05, 95% CI [1.02, 1.08], *p* < .01), and previously psychologically maltreated their children (*OR* = 111.94, 95% CI [28.54, 439.01], *p* < .001) were more likely to psychologically maltreat during the pandemic. Regarding physical abuse, a significant interaction between job loss and reframing coping emerged (*OR* = 0.76, 95% CI [0.59, 0.99], *p* = .04). Among parents who lost their jobs, the probability of physical abuse decreased as reframing coping increased. Job loss during the COVID-19 pandemic is a significant risk factor for child maltreatment. Reframing coping may be an important buffer of this association on physical abuse and presents implications for maltreatment prevention.

Soto Martinez, M. E., Love, J. C., Pinto, D. C., Wiersema, J. M., Derrick, S. M., Bachim, A., Greeley, C., Donaruma-Kwoh, M.., Truong, V. T. T., Gao, S., & Crowder, C. M. (2019). The infant injury database: A tool for the study of injury patterns in medicolegal investigations of child abuse. *Journal of Forensic Sciences*, *64*(6), 1622-1632. DOI:10.1111/1556-4029.14120

In 2012, the Harris County Institute of Forensic Sciences began prospectively collecting injury data from pediatric autopsies. These data and associated case information from 635 pediatric cases are archived in the Infant Injury Database (IID). This paper introduces the IID to the forensic community and demonstrates its potential utility for child abuse and infant fatality investigations. The database is intended to be a source of evidence-based research for coroners/medical examiners and clinicians in the recognition and diagnosis of child abuse. RR estimates were employed to quantify the relationship between individual autopsy findings to trauma-related and nontrauma-related causes of death. For example, unsurprisingly, the RR of trauma cases with multiple injury types is significantly greater than other causes of death, but the RR results provide a quantitative representation of the relationship. ROC curve modeling of the presence/absence of various injury types performed well at discriminating trauma from other causes of death (AUC = 0.96).

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Busso, D. S., McLaughlin, K. A., Brueck, S., Peverill, M., Gold, A. L., & Sheridan, M. A. (2017). Child abuse, neural structure, and adolescent psychopathology: A longitudinal study. *Journal of the American Academy of Child and Adolescent Psychiatry*, *56*(4), 321–328.e1. DOI:10.1016/j.jaac.2017.01.013

Child abuse exerts a deleterious impact on a broad array of mental health outcomes. However, the neurobiological mechanisms that mediate this association remain poorly characterized. Here, we use a longitudinal design to prospectively identify neural mediators of the association between child abuse and psychiatric disorders in a community sample of adolescents. Structural magnetic resonance imaging (MRI) data and assessments of mental health were acquired for 51 adolescents (aged 13–20; M=16.96; SD=1.51), 19 of whom were exposed to physical or sexual abuse. Participants were assessed for abuse exposure (Time 1), participated in MRI scanning and a diagnostic structured interview (Time 2), and two years later were followed-up to assess psychopathology (Time 3). We examined associations between child abuse and neural structure, and identified whether abuse-related differences in neural structure prospectively predicted psychiatric symptoms. Abuse was associated with reduced cortical thickness in medial and lateral prefrontal and temporal lobe regions. Thickness of the left and right parahippocampal gyrus predicted antisocial behavior symptoms, and thickness of the middle temporal gyrus predicted symptoms of generalized anxiety disorder. Thickness of the left parahippocampal gyrus mediated the longitudinal association of abuse with antisocial behavior. Child abuse is associated with widespread disruptions in cortical structure, and these disruptions are selectively associated with increased vulnerability to internalizing and externalizing psychopathology. Identifying predictive biomarkers of vulnerability following childhood maltreatment may uncover neurodevelopmental mechanisms linking environmental experience with the onset of psychopathology.

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Vlahovicova, K., Melendez-Torres, G. J., Leijten, P., Knerr, W., & Gardner, F. (2017). Parenting programs for the prevention of child physical abuse recurrence: A systematic review and meta-analysis. *Clinical Child and Family Psychology Review*, *20*, 351-365. DOI:10.1007/s10567-017-0232-7

Child physical abuse is an issue of global concern. Conservative estimates set global prevalence of this type of maltreatment at 25%, its consequences and cost to society escalating with increasing frequency and severity of episodes. Syntheses of the evidence on parenting programs for reducing rates of physical abuse recidivism have, to date, not been able to establish effectiveness. Paucity of data and inconsistent inclusion criteria in past reviews made meta-analysis often impossible or uninformative. The current systematic review updates prior reviews and overcomes some of the methodological issues they encountered by pooling trial-level data from a well-defined scope of trials of parenting interventions aimed at preventing the re-abuse of children by parents with substantiated or suspected physical abuse history. Randomized controlled trials and rigorous non-randomized designs were sought via nine online databases, two trial registries, several clearinghouses and contact with experts. A total of fourteen studies of variable quality were included in this review, four of which had outcomes that enabled meta-analysis. Overall, this review presents evidence supporting the effectiveness of parenting behavioral programs based on social learning theory for reducing hard markers of child physical abuse recidivism. Meta-analysis found that the absolute risk reduction in risk of recidivism was 11 percentage points less for maltreating parents who undergo parenting programs (RD = -0.11, 95% CI [-0.22, -0.004], $p = 0.043$, $I^2 = 28.9\%$). However, the pooled effect size was not statistically significant when calculated as a risk ratio (0.76, 95% CI [0.54, 1.07], $I^2 = 38.4\%$). Policy makers and practitioners should be made aware that this intervention method is backed by promising evidence featuring modest yet significant reductions in hard markers of child physical abuse, even though the methodological robustness of these findings should be further explored in future research.

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Glick, J. C., Lorand, M. A., & Bilka, K. R. (2016). Physical abuse of children. *Pediatrics in Review*, *37*(4), 146-158. DOI:10.1542/pir.2015-0012

This article stresses the importance of the "sentinel injury," a physical injury that is unusual for the age of the child and may herald more serious injuries, thereby necessitating further evaluation.

Christian, C. W., & Committee on Child Abuse and Neglect. (2015). The evaluation of suspected child physical abuse. *Pediatrics*, *135*(5), e20150356. DOI:10.1542/peds.2015-0356

Child physical abuse is an important cause of pediatric morbidity and mortality and is associated with major physical and mental health problems that can extend into adulthood. Pediatricians are in a unique position to identify and prevent child abuse, and this clinical report provides guidance to the practitioner regarding indicators and evaluation of suspected physical abuse of children. The role of the physician may include identifying abused children with suspicious injuries who present for care, reporting suspected abuse to the child protection agency for investigation, supporting families who are affected by child abuse, coordinating with other professionals and community agencies to provide immediate and long-term treatment to victimized children, providing court testimony when necessary, providing preventive care and anticipatory guidance in the office, and advocating for policies and programs that support families and protect vulnerable children.

Ehrensaft, M. K., Knous-Westfall, H. M., Cohen, P., & Chen, H. (2015). How does child abuse history influence parenting of the next generation? *Psychology of Violence, 5*(1), 16–25. DOI:10.1037/a0036080

This study examines the prospective association of childhood abuse (physical and/or sexual abuse) with subsequent parenting practices in adulthood. The sample is drawn

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from the Children in the Community Study, a prospective longitudinal study of children's mental health development in a community sample of children followed for approximately 30 years. The study uses a multimethod, multiinformant design (self-report, parent report, and official records) incorporating data from 3 generations to examine the influence of childhood maltreatment on parenting practices at M age 33, and the mediating effects of adolescent conduct disorder at M age 15 and adult psychopathology at M age 22. Sexual abuse predicted lower availability, time spent with the child, satisfaction with the child, and higher perceived ineffectiveness; physical abuse predicted higher perceived ineffectiveness; and dual abuse predicted lower availability and harsh discipline. Conduct disorder mediated the association of sexual abuse with satisfaction and dual abuse with availability, whereas generalized anxiety disorder mediated the association of sexual abuse with time spent with the child. These results suggest that some mothers and fathers with a history of child abuse may benefit from parenting interventions that address difficulties with emotional disengagement. Specific attention could be paid to assist these parents with emotional regulation strategies to maximize their emotional and physical engagement with their child, so as to increase their capacity for availability, time spent with the child, and parental self-efficacy.

Lindberg, D. M., Beaty, B., Juarez-Colunga, E., Wood, J. N., & Runyan, D. K. (2015). Testing for abuse in children with sentinel injuries. *Pediatrics*, *136*(5), 831-838. DOI:10.1542/peds.2015-1487

Child physical abuse is commonly missed, putting abused children at risk for repeated injury and death. Several so-called sentinel injuries have been suggested to be associated with high rates of abuse, and to imply the need for routine testing for other, occult traumatic injuries. Our objective was to determine rates of abuse evaluation and diagnosis among children evaluated at leading children's hospitals with these putative sentinel injuries. This is a retrospective secondary analysis of the Pediatric Health Information System database. We identified 30 355 children with putative sentinel injuries.

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We measured rates of abuse diagnosis and rates of testing commonly used to identify occult injuries. Among all visits for children <24 months old to Pediatric Health Information System hospitals, the rate of abuse diagnosis was 0.17%. Rates of abuse diagnosis for children with at least 1 putative sentinel injury ranged from 3.5% for children <12 months old with burns to 56.1% for children <24 months with rib fractures. Rates of skeletal survey and other testing that can identify occult traumatic injury were highly variable between centers and for different injuries. Several putative sentinel injuries are associated with high rates of physical abuse. Among eligible children with rib fracture(s), abdominal trauma, or intracranial hemorrhage, rates of abuse were more than 20%. Future work is warranted to test whether routine testing for abuse in these children can improve early recognition of abuse.

Paul, A. R., & Adamo, M. A. (2014). Non-accidental trauma in pediatric patients: A review of epidemiology, pathophysiology, diagnosis and treatment. *Translational Pediatrics*, *3*(3), 195–207. DOI:10.3978/j.issn.2224-4336.2014.06.01

Non-accidental trauma (NAT) is a leading cause of childhood traumatic injury and death in the United States. It is estimated that 1,400 children died from maltreatment in the United States in 2002 and abusive head trauma (AHT) accounted for 80% of these deaths. This review examines the epidemiology and risk factors for NAT as well as the general presentation and required medical work up of abused children. In addition, potential algorithms for recognizing cases of abuse are reviewed as well as outcomes in children with NAT and potential neurosurgical interventions which may be required. Finally, the evidence for seizure prophylaxis in this population is addressed.

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Klika, J. B., Herrenkohl, T. I., & Lee, J. O. (2013). School factors as moderators of the relationship between physical child abuse and pathways of antisocial behavior. *Journal of Interpersonal Violence*, *28*(4), 852-867. DOI:10.1177/0886260512455865

Physical child abuse is a predictor of antisocial behavior in adolescence and adulthood. Few studies have investigated factors that moderate the risk of physical child abuse for later occurring outcomes, including antisocial behavior. This analysis uses data from the Lehigh Longitudinal Study to investigate the prediction of antisocial behavior from physical child abuse and the buffering role of 3 school-related factors (i.e., school commitment, school dropout, and IQ), which are hypothesized to change the course of antisocial behavior from childhood into the adult years. Results show an association between physical child abuse and early antisocial behavior. Early antisocial behavior predicts antisocial behavior in adolescence, and that, in turn, predicts antisocial behavior in adulthood. Child IQ moderated the relationship between child physical abuse and antisocial behavior in childhood. However, no other moderation effects were observed. Limitations and implications for future research and prevention are discussed.

Leventhal, J. M., Martin, K. D., & Gaither, J. R. (2012). Using US data to estimate the incidence of serious physical abuse in children. *Pediatrics*, *129*(3), 458-464. DOI:10.1542/peds.2011-1277

There are limited data on the epidemiology of serious injuries due to physical abuse of children. We used the 2006 Kids' Inpatient Database to estimate the incidence of hospitalizations due to serious physical abuse among children <18 years of age. Abuse was defined by using International Classification of Diseases, Ninth Revision, Clinical Modification codes for injuries (800–959) and for physical abuse (995.50, 995.54, 995.55, or 995.59), selected assault codes (E960-966, 968), or child battering (E967). We examined demographic characteristics, mean costs, and length of stay in 3 groups of hospitalized children: abusive injuries, nonabusive injuries, and all other reasons for hospitalization. Incidence was calculated using the weighted number of cases of physical

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abuse and the number of children at risk based on 2006 intercensal data. The weighted number of cases due to abuse was 4569; the incidence was 6.2 (95% confidence interval [CI]: 5.5–6.9) per 100 000 children <18 years of age. The incidence was highest in children <1 year of age (58.2 per 100 000; 95% CI: 51.0–65.3) and even higher in infants covered by Medicaid (133.1 per 100 000; 95% CI: 115.2–151.0 [or 1 in 752 infants]). Overall, there were 300 children who died in the hospital due to physical abuse. This is the first study to provide national US data on the occurrence of serious injuries due to physical abuse in hospitalized children. Data from the 2006 Kids' Inpatient Database on hospitalizations due to serious physical abuse can be used to track trends over time and the effects of prevention programs on serious physical abuse.

Norman, R. E., Byambaa, M., De, R., Butchart, A., Scott, J., & Vos, T. (2012). The long-term health consequences of child physical abuse, emotional abuse, and neglect: A systematic review and meta-analysis. *PLoS Medicine*, *9*(11), e1001349. DOI:10.1371/journal.pmed.1001349

Child sexual abuse is considered a modifiable risk factor for mental disorders across the life course. However the long-term consequences of other forms of child maltreatment have not yet been systematically examined. The aim of this study was to summarise the evidence relating to the possible relationship between child physical abuse, emotional abuse, and neglect, and subsequent mental and physical health outcomes. A systematic review was conducted using the Medline, EMBASE, and PsycINFO electronic databases up to 26 June 2012. Published cohort, cross-sectional, and case-control studies that examined non-sexual child maltreatment as a risk factor for loss of health were included. All meta-analyses were based on quality-effects models. Out of 285 articles assessed for eligibility, 124 studies satisfied the pre-determined inclusion criteria for meta-analysis. Statistically significant associations were observed between physical abuse, emotional abuse, and neglect and depressive disorders (physical abuse [odds ratio (OR) = 1.54; 95% CI 1.16–2.04], emotional abuse [OR = 3.06; 95% CI 2.43–3.85], and neglect [OR = 2.11; 95% CI

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1.61–2.77]); drug use (physical abuse [OR = 1.92; 95% CI 1.67–2.20], emotional abuse [OR = 1.41; 95% CI 1.11–1.79], and neglect [OR = 1.36; 95% CI 1.21–1.54]); suicide attempts (physical abuse [OR = 3.40; 95% CI 2.17–5.32], emotional abuse [OR = 3.37; 95% CI 2.44–4.67], and neglect [OR = 1.95; 95% CI 1.13–3.37]); and sexually transmitted infections and risky sexual behaviour (physical abuse [OR = 1.78; 95% CI 1.50–2.10], emotional abuse [OR = 1.75; 95% CI 1.49–2.04], and neglect [OR = 1.57; 95% CI 1.39–1.78]). Evidence for causality was assessed using Bradford Hill criteria. While suggestive evidence exists for a relationship between maltreatment and chronic diseases and lifestyle risk factors, more research is required to confirm these relationships. This overview of the evidence suggests a causal relationship between non-sexual child maltreatment and a range of mental disorders, drug use, suicide attempts, sexually transmitted infections, and risky sexual behaviour. All forms of child maltreatment should be considered important risks to health with a sizeable impact on major contributors to the burden of disease in all parts of the world. The awareness of the serious long-term consequences of child maltreatment should encourage better identification of those at risk and the development of effective interventions to protect children from violence.

Sugaya, L., Hasin, D. S., Olfson, M., Lin, K. H., Grant, B. F., & Blanco, C. (2012). Child physical abuse and adult mental health: A national study. *Journal of Traumatic Stress, 25*(4), 384–392. DOI:10.1002/jts.21719

This study characterizes adults who report being physically abused during childhood, and examines associations of reported type and frequency of abuse with adult mental health. Data were derived from the 2000-2001 and 2004-2005 National Epidemiologic Survey on Alcohol and Related Conditions, a large cross-sectional survey of a representative sample (N = 43,093) of the U.S. population. Weighted means, frequencies, and odds ratios of sociodemographic correlates and prevalence of psychiatric disorders were computed. Logistic regression models were used to examine the strength of associations between child physical abuse and adult psychiatric disorders adjusted for sociodemographic

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characteristics, other childhood adversities, and comorbid psychiatric disorders. Child physical abuse was reported by 8% of the sample and was frequently accompanied by other childhood adversities. Child physical abuse was associated with significantly increased adjusted odds ratios (AORs) of a broad range of DSM-IV psychiatric disorders (AOR = 1.16-2.28), especially attention-deficit hyperactivity disorder, posttraumatic stress disorder, and bipolar disorder. A dose-response relationship was observed between frequency of abuse and several adult psychiatric disorder groups; higher frequencies of assault were significantly associated with increasing adjusted odds. The long-lasting deleterious effects of child physical abuse underscore the urgency of developing public health policies aimed at early recognition and prevention.

Maguire, S. (2010). Which injuries may indicate child abuse?. *Archives of Disease in Childhood-Education and Practice*, *95*(6), 170-177. DOI:10.1136/adc.2009.170431

Making the decision as to whether an injury is a result of child abuse or not is stressful for both the family involved and the clinical team. It is not a decision that is taken lightly, and with an increasing expectation by the investigating agencies, lawyers and the public in general, to ensure that it is based on explicit 'evidence', clinicians need to be up to date with the latest scientific publications in the field. This article aims to summarise the current evidence in relation to all physical injuries except those pertaining to the central nervous system, which will form a separate article. It will examine the pattern of accidental and abusive bruises, fractures, burns, abdominal injuries and oral injuries focusing on discriminating features and necessary investigations.

Jenny, C., & Reese, R. (2009). Cutaneous manifestations of child abuse. In R. M. Reece & C. Christian (Eds.), *Child abuse medical diagnosis and management* (3rd ed., pp. 19-51). American Academy of Pediatrics.

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Kos, L., & Shwayder, T. (2006). Cutaneous manifestations of child abuse. *Pediatric Dermatology*, *23*(4), 311-320. DOI:10.1111/j.1525-1470.2006.00266.x

Dermatologists and child abuse are not frequently associated in the minds of most physicians. Yet the most common manifestations of child abuse are cutaneous. This article reviews cutaneous manifestations of physical abuse, including bruises, lacerations, abrasions, human bites, and burns. It also discusses ways that dermatologists can differentiate abusive injuries from accidental ones as well as from the many dermatologic conditions that can mimic child abuse. Finally, we review what actions the dermatologist should take when suspecting abuse in a patient.

Kolko, D. J. (2002). Child physical abuse. In J. E. B. Myers, L. Berliner, J. Briere, C. T. Hendrix, C. Jenny, & T. A. Reid (Eds.), *The APSAC handbook on child maltreatment* (2nd ed., pp. 21–54). Sage Publications, Inc.

This chapter provides an analysis of physical abuse, and updates D. J. Kolko's chapter from the 1st edition. The author begins with definitions, moves to prevalence and incidence, and then reviews the literature on etiology. Next, he turns his attention to the medical and psychological consequences of physical abuse. He concludes the chapter with discussion of intervention and treatment.

Black, D. A., Heyman, R. E., & Slep, A. M. S. (2001). Risk factors for child physical abuse. *Aggression and Violent Behavior, 6*(2-3), 121–188. DOI:10.1016/S1359-1789(00)00021-5

Reviews the risk and protective factors for child physical abuse. An etiological model based on moderate to strongly supported risk factors would begin with distal perpetrator variables of being abused as a child/teen and receiving less family social support as a child. Next might come current family variables such as parents' youth, father's drinking, and family's living in a community that is impoverished and/or has a lower percentage

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of two parent families. More proximal variables that increase the probability of parents, especially mothers, employing severe or abusive physical tactics could include mothers' dysphoria, stress and coping (most likely a protective factor). Finally, risk factors that are proximal to abuse could include mothers' high reactivity, high-risk parenting, and negative attributions, and children's behavior problems.

Kaplan, S. J., Pelcovitz, D., & Labruna, V. (1999). Child and adolescent abuse and neglect research: A review of the past 10 years. Part I: Physical and emotional abuse and neglect. *Journal of the American Academy of Child & Adolescent Psychiatry*, *38*(10), 1214-1222. DOI:10.1097/00004583-199910000-00009

Articles published during the past 10 years were reviewed following a systematic search of *Medline, Psychinfo*, and the National Clearinghouse on Child Abuse and Neglect. Clinically relevant literature on the physical and emotional abuse and neglect of children and adolescents published between 1988-1998 was examined. During the last decade there has been substantial progress in understanding the symptomatology associated with maltreatment. However, prevention and intervention research studies are relatively rare and frequently have important methodological limitations. Child maltreatment research in the next decade needs to focus on understanding factors leading to resilient outcomes and on assessing the effectiveness of psychotherapeutic and psychopharmacological treatment strategies. Increased resources are needed to support child maltreatment research studies and investigators.

Kaplan, S. J., Pelcovitz, D., Salzinger, S., Weiner, M., Mandel, F. S., Lesser, M. L., & Labruna, V. E. (1998). Adolescent physical abuse: Risk for adolescent psychiatric disorders. *American Journal of Psychiatry*, *155*(7), 954-959. DOI:10.1176/ajp.155.7.954

The present study examined whether physical abuse functions as an additional risk factor for adolescent psychopathology after other important known risk factors are controlled for. The authors recruited 99 adolescents aged 12 to 18 years directly from the New York

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State Department of Social Services after official documentation of physical abuse. The abused adolescents were compared to 99 nonabused adolescents matched for age, gender, race, and community income. Diagnostic interviews and measures of selected risk factors for psychopathology were administered to the adolescents and their parents and then entered into a multiple logistic regression model testing the added risk contributed by physical abuse to adolescent psychopathology. Physical abuse added significantly to other risk factors in accounting for lifetime diagnoses of major depression, dysthymia, conduct disorder, drug abuse, and cigarette smoking. Physical abuse also contributed significantly to prediction of current adolescent unipolar depressive disorders, disruptive disorders, and cigarette smoking. Since physically abused adolescents are at greater risk for the development of psychiatric disorders, recognition of adolescent abuse and the provision of psychiatric and substance abuse services may reduce morbidity.

Salzinger, S., Feldman, R. S., Hammer, M., & Rosario, M. (1993). The effects of physical abuse on children's social relationships. *Child Development*, *64*(1), 169–187. DOI:10.1111/j.1467-8624.1993.tb02902.x

Social behavior and peer status of 87 physically abused 8-12-year-old urban children were compared with those of 87 case-matched nonmaltreated classmates. Peer nominations and peer ratings were collected in classrooms, social networks were assessed by child interview, family variables were assessed by interviewing mothers, and behavior problems were rated by parents and teachers. Significant findings were that abused children had lower peer status and less positive reciprocity with peers chosen as friends; they were rated by peers as more aggressive and less cooperative and by parents and teachers as more disturbed; and their social networks showed more insularity, atypicality, and negativity. Social behavior as perceived by peers accounted for a significant portion of the variance in social status; global disturbance measures did

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not add to this association. Results are discussed in terms of a context of family violence in the development of social maladjustment.

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