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ORIGINAL PAPER

Sexually Coercive Behavior Following Childhood Maltreatment

Mats Forsman · Ada Johansson · Pekka Santtila · Kenneth Sandnabba · Niklas Långström

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Abstract Child maltreatment is associated with adult sexually coercive behavior. The association may be causal or confounders that increase the risk of both childhood victimization and sexually coercive behavior might explain the observed links. We examined if childhood maltreatment was related to sexual coercion independently of familial (genetic or common family environment) risk factors, thereby addressing potential causality. Participants were 6,255 18 to 33-year-old twins from the Finnish population-based study "Genetics of Sex and Aggression" who responded to self-report questionnaires of child maltreatment and sexually coercive behavior. We used generalized estimating equations to elucidate risk of sexual coercion in maltreated compared to unrelated, non-maltreated individuals. To adjust for unmeasured familial factors, we used the co-twin control method and compared sexual coercion risk within maltreatment-discordant twin pairs. Further, we examined possible differential effects of maltreatment subtypes and compared mean differences in maltreatment summary scores between sexually coercive individuals and controls. Sexual coercion was moderately more common among individuals maltreated as children versus unrelated controls (38.3 vs. 22.8 %; age- and gender-adjusted odds ratio, aOR = 2.31, 95 % CI 1.75–3.05) and the risk increase remained similar within maltreatment-discordant twins (OR = 2.82, 95 % CI 1.42–5.61). Moreover, different maltreatment subtypes predicted sexual coercion equally well and effect sizes remained similar within discordant twin pairs. We conclude that associations between child maltreatment and sexual coercion are largely independent of shared familial confounds, consistent with a causal inference. Importantly, detection and targeted interventions for maltreated children should remain a priority to reduce societal sexually coercive behavior.

Keywords Childhood maltreatment · Child abuse · Sexual coercion · Violent behavior · Twins

M. Forsman (✉) · N. Långström
Swedish Prison and Probation Service, R&D Unit, POB 12055, 102 22 Stockholm, Sweden
e-mail: mats.forsman@ki.se

A. Johansson · P. Santtila · K. Sandnabba
Department of Psychology and Logopedics, Åbo Akademi University, Turku, Finland

M. Forsman · N. Långström
Department of Medical Epidemiology and Biostatistics, Karolinska Institutet, Stockholm, Sweden

Introduction

Maltreated children are at increased risk for many adverse consequences, including somatic illness and pain (Paras et al., 2009; Wegman & Stetler, 2009), psychopathology, and self-harming behavior (Afifi et al., 2011; Arsenault et al., 2011; Cutajar et al., 2010; Jonas et al., 2011; Kessler et al., 2010; McLaughlin et al., 2010; Nanni, Uher, & Danese, 2012; Nelson et al., 2002; Teicher, Samson, Sheu, Polcari, & McGreenery, 2010; Widom, DuMont, & Czaja, 2007; for reviews, see Chen et al., 2010; Gilbert et al., 2009; Hillberg, Hamilton-Giachritsis, & Dixon, 2011; Klonsky & Moyer, 2008; Maniglio, 2009, 2010). However, attempts to minimize possible negative impact of child maltreatment through prevention efforts with maltreated children, or with individuals likely to maltreat children, more or less explicitly posits a causal role of childhood maltreatment on that outcome.

There is empirical evidence for an association between childhood maltreatment and sexually coercive behavior (e.g., Jespersen, Lalumière, & Seto 2009; Salter et al., 2003; Seto et al., 2010; Seto & Lalumière, 2010; Ward, Polaschek, & Beech, 2006) and with non-sexually violent behavior (Loeber et al., 2005; Maxfield & Widom, 1996; Nikulina, Widom, & Czaja, 2010; Stouthamer-Loeber, Loeber, Homish, & Wei, 2001; Wilson, Stover, & Berkowitz, 2009). These findings offer little insight into possible mechanisms underlying observed associations. In particular, causal conclusions have been difficult to infer because only few studies (e.g., Forsman & Långström, 2012; Jaffee, Caspi, Moffitt, & Taylor, 2004; Jonson-Reid et al., 2010; Nelson et al., 2002) controlled for potential genetic and common family environmental confounding of the associations (for discussion, see Freyd et al., 2005; Kendler & Gardner, 2010; McMillan, Hastings, Salter, & Skuse, 2008).

Some evidence from twin studies suggests that childhood maltreatment may play a causal role in the development of antisocial behavior. Jaffee et al. (2004) found a large effect (Cohen's $d = .80$) of physical maltreatment at age 5 years on antisocial behavior at age 7. The association decreased by half but remained significant when genetic factors were controlled for, partly supporting a causal role of childhood maltreatment. Data presented by Nelson et al. (2002), using self-reported childhood sexual victimization and lifetime DSM-IV conduct disorder among young adult twins, also suggested a causal effect of sexual abuse on conduct disorder when familial factors were taken into account. Jonson-Reid et al. (2010) found that officially reported childhood maltreatment increased the risk of parent-reported antisocial behavior in victimized children (Odds Ratio [OR] = 4.64, $p < .001$) and that the risk decreased but remained significant after controlling for inherited liability of antisocial behavior (OR = 3.31, $p < .001$). In contrast, Forsman and Långström, (2012) recently reported that childhood maltreatment (before age 18 years) was associated with an increased risk of a violent criminal conviction in adulthood (from age 18 years) (OR = 1.98), but that the risk decreased substantially (OR = 1.18) when maltreated twins were compared to their non-maltreated co-twins, suggesting that possible causal effects of childhood maltreatment on non-sexual violent behavior may not extend into adulthood.

To our knowledge, no prior study has examined the risk of sexually coercive behavior in maltreated individuals while controlling for potentially confounding of familial factors. By using a large population-based twin cohort, we aimed to examine if childhood maltreatment predicted sexual coercion independently of shared familial confounds, consistent with a causal inference. Further, we examined possible differential effects of maltreatment subtypes and also compared mean differences in maltreatment summary scores between sexually coercive individuals and controls.

Method

Participants

Participants were part of the second data collection of the genetics of sex and aggression sample (for a detailed description, see Santtila et al., 2007) carried out in 2006 and targeting 18 to 33-year-old twins ($M = 25.0$ years; SD = 4.0) and their 18-year-old or older siblings (age range: 18–49 years) obtained from the Finnish population registry. A total of 23,577 individuals were contacted by regular mail and asked to complete a questionnaire. Those who agreed completed the questionnaire either online through a secure webpage or as a paper-and-pencil version returned in pre-stamped envelopes by regular mail to the research group.

Following the invitation to participate in March 2006, a reminder letter was sent late July 2006. A total of 9,534 male and female individuals with valid responses on questions about child maltreatment and sexually coercive behavior (of which 6,255 were twins) participated, yielding an overall response rate of 40 %.

Twin zygosity was established using standard physical similarity questions previously validated through genotyping (95 % correct classification; Eisen, Neuman, Goldberg, Rice, & Treu, 1989). The sample consisted of monozygotic men ($n = 711$), same-sex dizygotic men ($n = 732$), monozygotic women ($n = 1{,}532$), same-sex dizygotic women ($n = 1{,}197$), opposite-sex dizygotic men ($n = 790$), and opposite-sex dizygotic women ($n = 1{,}293$). The research plan was approved by the Ethics Committee of the Abo Akademi University.

Measures

Childhood Maltreatment

To assess childhood maltreatment, we used a Finnish translation of the childhood trauma questionnaire short form (CTQ-SF) (Bernstein et al., 2003). The CTQ-SF consists of five subscales: physical, sexual, and emotional abuse, emotional neglect, and physical neglect. Each subscale comprised five items rated on a 5-point Likert-type scale (*1* never true to *5* very often true). Participants were asked if they had been maltreated "during childhood" without any further specification of age. The CTQ-SF provides cutoff scores for none-low, low-moderate, moderate-severe, and severe-extreme exposure for each subscale (Bernstein & Fink, 1997). In addition to good reliability and validity (Bernstein et al., 2003), CTQ-SF cutoffs yield good specificity and sensitivity for the classification of maltreated subjects. In line with previous studies (Bradley et al., 2008; Heim et al., 2009; Majer, Water, Lin, Capuron, & Reeves, 2010), we used the moderate-severe cutoff scores for each subscale. Thus, childhood maltreatment was defined as

scores equal to or larger than the moderate-severe cutoff on physical abuse (≥10), sexual abuse (≥8), emotional abuse (≥13), emotional neglect (≥15), or physical neglect (≥13). In sensitivity analyses, we also examined possible effects of maltreatment subtypes separately and summed these up to examine mean differences in maltreatment between sexually coercive individuals and controls.

Sexual Coercion

We used information from two different measures to assess sexually coercive behavior. First, participants responded to the item "I have had or tried to have sex with someone against their will" from the Hare Self-Report Psychopathy Scale (Hare SRP) (Paulhus, Neumann, & Hare, in press) on a 5-point Likert type scale (*1* disagree completely to *5* agree completely). Sexually coercive behavior was assessed also with the Sexual Coercion Scale (SCS), a questionnaire based on the Sexual Experiences Survey (originally introduced by Koss & Oros, 1982, revised by Forbes & Adams-Curtis, 2001). Participants answered yes or no to six questions: Have you ever engaged in sexual interaction (oral, vaginal or anal) with somebody even if that person did not want to, because (1) You said things that you did not really mean?; (2) You pressurized him/her by making continuous demands?; (3) You threatened to end your relationship otherwise?; (4) You exploited the fact that the person was unable to resist (e.g., after drinking too much alcohol)?; (5) You threatened to use physical force?; (6) you used physical force?

Participants were defined as sexually coercive if they answered "agree" or "agree completely" to the Hare SRP item or endorsed any of the six SCS items. We present prevalence estimates for actual/threats of sexual coercion ("I have had or tried to have sex with someone against their will"; you threatened to use physical force; you used physical force), deceiving/pressurizing/exploiting someone ("I have had or tried to have sex with someone against their will"; you said things that you did not really mean; you pressurized him/her by making continuous demands; you threatened to end your relationship otherwise; you exploited the fact that the person was unable to resist), or any of these two.

Statistical Analyses

We examined associations between childhood maltreatment and sexual coercion in two steps. First, we used the full twin dataset ($n = 6{,}255$) and compared the risk of sexual coercion in individuals who self-reported childhood maltreatment to that among unrelated, non-maltreated individuals. This was done using generalized estimating equations (GEE; PROC GENMOD in SAS, version 9), to control for the clustering of (lack of independence between) twins within a pair.

Second, we used the co-twin control method (McGue, Osler, & Christensen, 2010); that is, compared the risk of sexual coercion in twin pairs (both mono and dizygotic) discordant for childhood maltreatment ($n = 932$ twins in 466 complete twin pairs). This was done to control for unmeasured genetic and common family environment factors associated with both the exposure and the outcome. If childhood maltreatment truly were a causal risk factor for sexual coercion, we would expect childhood maltreatment to be associated with the outcome both among unrelated individuals and within twin pairs discordant for childhood maltreatment. In contrast, if the association between exposure and outcome decreased from comparisons with unrelated controls to co-twin controls, this suggests confounding by familial (genetic and/or common family environmental) factors. Further, if the association between exposure and outcome were partly causal and partly confounded by familial factors, the risk would be greater than 1 among maltreatment-discordant twins but still lower than that observed among unrelated individuals (for a review, see McGue et al., 2010). The risks of sexual coercion in maltreated twins compared to their non-maltreated co-twins were modeled with conditional logistic regression. ORs with 95 % confidence intervals (CIs) were calculated for all associations.

The use of the co-twin control method is meaningful only if genetic and common family factors influence both child maltreatment and sexual coercion. Thus, we first estimated additive genetic (A), common family environment (C), and non-shared environmental (E) effects on childhood maltreatment and sexual coercion, using a Cholesky decomposition model in OpenMx 1.3 (Boker et al., 2011). To retain statistical power, a continuous summary score of childhood maltreatment was used in the analysis. Since the distribution of the maltreatment variable was positively skewed, it was log-transformed prior to analysis. For sexually coercive behavior, we used a dichotomization of the continuous variable since a summary measure of the number of endorsed sexual coercion items was too skewed for log-transformation. We found genetic effects for child maltreatment (A = 48 %; 95 % CI 37–48 %) and sexually coercive behavior (A = 18 %; 0–49 %), although not statistically significantly for the latter; most likely due to low statistical power. Further, common family environment factors significantly influenced child maltreatment (C = 16 %; 95 % CI 3–25 %), but not sexually coercive behavior (C = 0 %; 95 % CI 0–22 %). Finally, non-shared environmental factors (and random error) significantly influenced both child maltreatment (E = 36 %; 95 % CI 32–40 %) and sexually coercive behavior (E = 82 %; 95 % CI 50–100 %).

Results

The overall prevalence of any childhood maltreatment was 23.4 % in the full sample (21.1 % among men and 24.7 % among women). The frequencies of victimization subtypes were: physical abuse 9.8 % (men 11.1 %; women 9.1 %), sexual abuse

5.1 % (men 2.3 %; women 6.6 %), emotional abuse 8.1 % (men 4.9 %; women 9.9 %), emotional neglect 8.1 % (men 7.0 %; women 8.8 %), and physical neglect 9.2 % (men 9.2 %; women 9.2 %). Regarding sexual coercion against others, 3.8 % reported any sexual coercion (men 8.1 %; women 1.5 %); 0.6 % actual/threats of sexual coercion (men 0.6 %; women 0.6 %), and 2.8 % reported deceiving/pressurizing/exploiting someone sexually (men 7.0 %; women 0.6 %), and 0.4 % reported both types (men 1.0 %; women 0.2 %). In subsequent analyses, we only used the any sexual coercion measure due to statistical power limitations.

Table 1 shows the associations between childhood maltreatment and sexual coercion analyzed with GEEs (Step 1) and with logistic regression within maltreatment-discordant twin pairs (Step 2; rightmost column). First, any childhood maltreatment was moderately strongly associated with sexual coercion when maltreated individuals were compared to unrelated, non-maltreated individuals and controlling for age and gender (aOR = 2.31). Second, consistent with a causal inference, the risk of sexual coercion among twins maltreated in childhood remained similarly strong when compared to that among their corresponding, non-maltreated co-twins (aOR = 2.82). To test the robustness of this finding, we analyzed the predictive effects of five child maltreatment subtypes separately. Possibly except for emotional neglect, each subtype predicted sexual coercion similarly well when assessed separately. Effect sizes remained quite similar when controlling for age and gender and genetic and common family environmental factors, respectively (Table 1).

Next, we used *t*-tests to examine if sexually coercive individuals differed significantly from controls in summary levels of child maltreatment and individual maltreatment subscale scores, respectively. The same was done within outcome-discordant twin pairs. Table 2 suggests that, among unrelated twins, sexually coercive individuals had significantly more often been exposed to child maltreatment overall and to all five maltreatment subtypes compared to controls. Similar effect sizes regarding differences in child maltreatment were found when discordant twins were compared, although only the child maltreatment summary score and emotional abuse reached statistical significance ($p < .05$), probably due to limited statistical power.

In sum, the results suggested that associations between child maltreatment and sexual coercion is largely independent of shared familial confounds, consistent with a causal hypothesis. Further, we also found that subtypes of maltreatment had roughly equivalent statistical associations with sexual coercion and that effect sizes remained at the same level when discordant twin pairs were used.

Discussion

Using a contemporary, population-based cohort of more than 6,000 adult twins, we examined the mechanisms behind previously reported associations between childhood maltreatment and sexually coercive behavior. The results confirmed that childhood maltreatment in general might be moderately strongly causal in the development of sexual coercion. Further, subtypes of child maltreatment (except for emotional neglect) predicted sexual coercion similarly when assessed separately and associations stayed the same when mean-exposures to child maltreatment were compared between sexually coercive individuals and controls.

By using co-twin controls, we aimed to account for familial (genetic and environmental) risks that are shared by siblings and may confound any observed link between exposure and outcome. Hence, to our knowledge, this is the first study providing empirical evidence that associations between child maltreatment and sexual coercion are largely independent of shared familial confounds, consistent with a causal hypothesis. Further studies are needed to elucidate if the causal link is direct through social learning or imitation (Burton, 2003) or indirect through biased social information-processing (e.g., encoding

Table 1 Associations between child maltreatment and sexually coercive behavior among 6,255 18 to 33-year-old Finnish twins

Child maltreatment type	Any sexually coercive behavior		Odds ratio (95 % CI)		
	Yes ($n = 228$–235)	No ($n = 5{,}822$–$5{,}927$)	Unadjusted	Adjusted[a]	Adjusted co-twin-control[b]
Any child maltreatment	90 (38.3 %)	1,351 (22.8 %)	2.10 (1.60–2.76)	2.31 (1.75–3.06)	2.82 (1.42–5.61)
Sexual abuse	19 (8.3 %)	288 (4.9 %)	1.76 (1.08–2.84)	2.85 (1.71–4.86)	1.60 (0.50–4.90)
Physical abuse	45 (19.4 %)	552 (9.4 %)	2.31 (1.64–3.26)	2.11 (1.48–3.00)	2.40 (0.85–6.81)
Emotional abuse	31 (13.5 %)	458 (7.9 %)	1.83 (1.23–2.74)	2.53 (1.66–3.86)	2.67 (1.04–6.82)
Emotional neglect	27 (11.8 %)	466 (8.0 %)	1.54 (1.01–2.35)	1.66 (1.07–2.58)	1.44 (0.62–3.38)
Physical neglect	38 (16.4 %)	522 (8.9 %)	2.01 (1.39–2.89)	1.98 (1.36–2.90)	2.83 (1.12–7.19)

Odds ratios express the strength of the relationship between child maltreatment and sexually coercive behavior. 95 % CIs that do not include 1.00 indicate a statistically significant odds ratio at $p < .05$

95 % CI 95 % confidence interval

[a] Odds ratios adjusted for age and gender

[b] Odds ratios within discordant MZ and DZ twin pairs

Table 2 Mean differences (SD) in childhood maltreatment exposure among sexually coercive individuals and controls; presented for unrelated twins and within outcome-discordant twins

	Sexually coercive behavior				
	Yes ($n = 228$–235)	No ($n = 5{,}822$–$5{,}927$)	Cohen's *d*	*t*	*df*
Any child maltreatment					
Unrelated twins	37.6 (11.3)	33.9 (10.1)	0.14	5.4**	6,160
Discordant twins	37.4 (9.9)	34.7 (10.9)	0.25	2.1*	272
Sexual abuse					
Unrelated twins	5.7 (1.9)	5.4 (2.1)	0.06	2.4*	6,086
Discordant twins	5.8 (2.2)	5.4 (1.7)	0.16	1.3	252
Physical abuse					
Unrelated twins	7.6 (3.2)	6.5 (2.5)	0.16	6.4**	6,086
Discordant twins	7.2 (3.0)	6.6 (2.1)	0.24	1.9	264
Emotional abuse					
Unrelated twins	8.3 (4.0)	7.4 (3.3)	0.10	3.8**	6,049
Discordant twins	8.4 (4.1)	7.5 (3.1)	0.35	2.0*	258
Emotional neglect					
Unrelated twins	9.7 (3.7)	8.6 (3.6)	0.11	4.4**	6,055
Discordant twins	9.9 (3.7)	9.0 (3.8)	0.24	1.9	252
Physical neglect					
Unrelated twins	7.1 (2.4)	6.4 (2.8)	0.10	4.0**	6,093
Discordant twins	7.1 (2.6)	6.6 (2.4)	0.17	1.4	268

We used independent *t*-tests for significance tests of mean differences between sexually coercive individuals and controls in the full sample (i.e., unrelated twins), and paired *t*-tests for differences between the outcome-discordant twin pairs

* $p < .05$

** $p < .001$

errors, hostile attribution biases, positive attitudes against sexual aggression) (Shahinfar, Kupersmidt, & Matza, 2001 and Weiss, Dodge, Bates, & Pettit, 1992; for reviews, see Crick & Dodge, 1994 and Dodge, 1993), influences on psychosexual development (Brown, Cohen, Chen, Smailes, & Johnsen 2004; Cortoni & Marshall, 2001; Smallbone & McCabe, 2003) or deficient responses to stressful stimuli (Oullet-Morin et al., 2012). The causal chains from childhood maltreatment to sexually coercive behavior could be addressed in future twin or family studies examining if maltreatment-discordant twins/siblings differ also on these and other possible mediating factors that contribute to individuals' risk of sexually coercive behavior.

Our findings robustly support that effective prevention programs directly addressing maltreated children, their families, and individuals likely to maltreat children may indeed reduce societal sexually coercive behavior. Detection of maltreated children and targeted interventions and efficient interventions for child molesters should therefore remain a priority within health care and criminal justice systems.

We found no evidence that genetic confounding explained most or even part of the association between childhood maltreatment and sexually coercive behavior. This could have occurred if parents who pass on genes involved in sexually coercive behavior to their offspring also maltreated their children (passive gene-environment correlation) or if children with a genetic liability to sexually coercive behavior evoke maltreatment experiences from the environment (evocative gene-environment correlation) (Plomin, DeFries, & Loehlin, 1977; Scarr & McCartney, 1983). Examination of gene-environment correlations requires separate analyses with maltreatment-discordant MZ and DZ twin-pairs. Unfortunately, this was not possible in the present study due to too few observations. Previous research suggests that both passive (Jaffee et al., 2004) and evocative (Schulz-Heik et al., 2010; Wade & Kendler, 2000) gene-environment correlations are relevant for childhood maltreatment and its link to antisocial behavior.

In contrast to earlier reports (Borowsky et al., 1997; Jespersen et al., 2009), we found no evidence that the so-called sexually abused-sexual abuser association would be specific for childhood sexual victimization. Subtypes of victimization in childhood were associated with similar risks for sexually coercive behavior, in line with a seminal prospective study of physically abused, sexually abused, and neglected children in the U.S. (Widom & Ames, 1994). As suggested earlier (Borowsky et al., 1997; Jespersen et al., 2009), it may be that the sexually abused-sexual abuser association is specific to sexual offending against younger children.

Limitations

There were some limitations to our findings. First, despite the large sample, we failed to obtain statistical significance for effects obtained for maltreatment subtypes, except for emotional abuse and physical neglect. Thus, the overall measure of any childhood maltreatment may be preferred to gain power in co-twin control analyses or the present study would need replication with even larger twin cohorts.

Second, the validity of adult retrospective reports of maltreatment experiences has been questioned. Studies suggest that such reports involve a substantial rate of false negatives, but that false positive reports probably are rare (for a review, see Hardt & Rutter, 2004). Possible associations may therefore be biased downwards if sexually coercive individuals retrospectively underreported childhood maltreatment more often compared to controls. At least for non-sexual violent behavior, previous studies suggest that this is not the case since increased risks for later violence are mostly similar for prospective and retrospective reporting of childhood maltreatment (Smith, Ireland, Thornberry, & Elwyn, 2008; Tajima, Herrenkohl, Huang, & Whitney, 2004). We have no strong reason to believe that this would be substantially different for sexually coercive behavior.

Third, participants were asked about maltreatment occurring "during childhood," but there were no age specifications for when acts of sexually coercive behavior occurred. This made it difficult to clearly determine if maltreatment occurred before or after the development of sexually coercive behavior. However, recent studies strongly suggest that the direction of causation is from maltreatment to antisocial behavior rather than the other way around (Jonson-Reid et al., 2010; Schulz-Heik et al., 2010).

Fourth, by the use of the co-twin control method, we were able to control for a highly plausible explanation of the association between maltreatment and sexual coercion–confounding of genetic and family environment factors. However, the method does not control for potential non-shared environmental confounding. It is possible, for example, that non-shared environmental factors cause early differences in childhood temperament, and that these differences both lead to increased risk of maltreatment and later sexual coercion. Unfortunately, we did not have any measures of childhood temperament or other potential childhood confounders, but this is something future studies could examine in more detail.

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