Childhood Punishment and Risk for Alcohol use Disorders: Data from South Africa

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Childhood Punishment and Risk for Alcohol use Disorders: Data from South Africa

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Abstract Previous research predominantly from the developed world investigating the association between early childhood physical punishment (CPP) and later alcohol use has resulted in mixed findings. The purpose of the present study is to use the South African Stress and Health (SASH) study dataset to investigate whether there is an association between CPP and later alcohol problems among participants with and without caregivers who had alcohol and other drug problems (CAODP). A national survey of 4,351 South African adults was conducted as part of the World Mental Health Survey (WMHS). Participants were asked about early life experiences (including CPP), caregiver alcohol or other drug problems (CAODP), and alcohol outcomes. A modest association between CPP and later alcohol use was found in participants who reported an absence of CAODP (4 out of 10 alcohol outcomes remained significantly associated with CPP). For participants with a history of CAODP, the association between CPP and later alcohol use was weaker (only 1 alcohol outcome was significantly associated with CPP). Longitudinal research is necessary to clarify the causal mechanisms which underlie the association between CPP and Alcohol Use Disorders (AUDs). In the interim, these findings point to the potential value of addressing CPP in order to reduce the prevalence of alcohol use disorders in South Africa.

Keywords Childhood physical punishment · Alcohol use · Caregiver alcohol or drug problems · South Africa

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Background

Alcohol use disorders (AUD) represent a major public health problem, both globally and in South Africa. Data from a nationally representative community sample, the South African Stress & Health Study (SASH) indicate a high lifetime prevalence and early onset of substance use disorders, with the major substance of abuse being alcohol (Stein et al. 2008). It is estimated that 6.3 % of the disability-adjusted life-years lost in South Africa in 2004 were attributable to alcohol, a significant proportion of the country's overall burden of disease and injury (Rehm, Kehoe, Rehm, and Patra 2009). Research that identifies risk and protective factors for alcohol problems, as well as the relationships among these factors, may be useful in developing interventions that prevent alcohol-related problems.

Research indicates that a combination of genetic and environmental influences contribute to the development of AUD. Studies show that the heritability of all addictive disorders ranges from 40 to 60 %, with the estimate for the heritability of alcohol dependence being 50 % (Goldman, Oroszi, and Ducci 2005; Van der Vorst et al. 2006). Environmental influences, such as family characteristics and caregiver practices, are also associated with the development of AUD in later life (Chassin, Pitts, and Prost 2002; Richter and Richter 2001). One caregiver practice that is a strong predictor of alcohol problems during adolescence is caregiver alcohol and other drug problems (CAODP) (Richter and Richter 2001; Fergusson, Boden, and Horwood 2008; Afifi, Brownridge, Cox, and Sareen 2006).

Another caregiver practice that is associated with the development of alcohol problems in later life is childhood maltreatment (which includes physical, sexual and psychological abuse as well as neglect) (Gilbert et al. 2009). For alcohol-related outcomes specifically, prospective and retrospective studies provide evidence that maltreatment during childhood increases the risk of alcohol problems in adolescence and adulthood. However these effects are at best moderate (Gilbert et al. 2009). In addition, when childhood physical punishment (CPP) is separated out from other forms of child maltreatment such as childhood sexual abuse, the relationship between this form of maltreatment and later alcohol problems is less clear (Fergusson et al. 2008). While several retrospective studies found weak to moderate associations between CPP and alcohol problems in adulthood (Anda et al. 2002; Trent, Stander, Thomsen, and Merrill 2007; Horwitz, Widom, McLaughlin, and White 2001), prospective studies found mixed results; with a few studies reporting a positive association for women only (Widom, White, Czaja, and Marmorstein 2007; Galaif, Stein, Newcomb, and Bernstein 2001) and at least one study reporting no association between CPP and alcohol problems in adulthood (Dube et al. 2001).

If an association between CPP and AUD in adulthood exists, it is more than likely confounded by several other variables including CAODP (Fergusson et al. 2008; Gilbert et al. 2009). CAODP increases the risk of CPP, but also increases children's risk of developing alcohol problems, due to the role of genetic influences and exposure to a social learning environment where heavy drinking is normalised (Fergusson et al. 2008; MacMillan et al. 2001; Gilbert et al. 2009). Despite this, relatively few studies investigating CPP (as a specific form of childhood maltreatment) and its association with later alcohol use have examined the influence of CAODP on participants' alcohol use. The studies that have controlled for caregiver drinking have reported equivocal findings: some found that the association between CPP and later alcohol use (Widom, Ireland, and Glynn 1995; Dube et al. 2006; Jasinski, Williams, and Siegel 2000) persists after controlling for the influence of caregiver drinking, while others found no significant association after controlling for the influence of confounding variables (Fergusson et al. 2008; Hughes, Johnson,

Wilsnack, and Szalacha 2007). Further research is needed to clarify the relationship between CPP and later alcohol outcomes.

To date, there has been little research from developing countries on the association between CPP and alcohol outcomes in adulthood. An exception to this has been a study conducted in China which found robust associations linking CPP with drinking outcomes when stratifying for CAODP (Cheng et al. 2011). In this study, the most robust estimated associations were found between CPP and early socially maladaptive problems (OR=7.3, CI 1.1–48.9) and any early alcohol problem (less than 23 years old) (OR=4.8, CI 1.1–49.5).

This paper hopes to use similar methodology to the study from China to shed some light on the association between CPP and alcohol use in another developing country context. It is important to examine this association within sub-Saharan Africa countries, because CPP may be more commonplace than in developed country contexts. For example, in comparison to a nationally representative study conducted in the United States the overall prevalence of physical child punishment was 5.9 %. On the other hand, the nationally representative SASH study (Williams et al. 2004), found that childhood physical abuse was reported by 12 % of South Africans, with men and women reporting similar rates of exposure (Kaminer, Grimsrud, Myer, Stein, and Williams 2008). Whether or not this high prevalence of physical abuse during childhood contributes to the high rate of alcohol use in the country is yet to be determined.

The present study aims to use the SASH dataset to investigate whether CPP is associated with later alcohol problems in a South African sample. Similar to the study conducted in China, a strength of the SASH dataset is that it not only measured CPP and CAODP, but also a number of drinking-related outcomes, such as early initiation of alcohol use, binge-drinking, and alcohol problems. While the SASH data are cross-sectional, the current study involves a research approach similar to that used by Cheng et al. (Cheng et al. 2011) that attempts to tease out the temporal sequencing of CPP and alcohol problems through the use of explicit developmental time frames in the assessment of CPP and alcohol problems. It is hypothesized that data from South Africa will reveal similar associations between CPP and later alcohol problems as reported in China (Cheng et al. 2011). We hope that findings from this paper will lay the groundwork for further prospective and longitudinal studies in the South African context.

Methods

The SASH study was undertaken as part of the World Mental Health Surveys (Demyttenaere et al. 2004) to investigate the prevalence of mental disorders in the South African context. Data for the SASH study were collected between January 2002 and June 2004.

Study Sample

A national probability sample of 4,351 adult South Africans was selected using a three-stage stratified and clustered area design. See (Williams et al. 2004) for a detailed account of the SASH study design. First, a stratified sample of recruitment areas were selected from the 2001 South African census enumeration areas (EAs). Second, a probability sample of housing units was selected from each EA. Third, one respondent (who was at least 18 years old) was randomly selected from the eligible persons in each of the selected housing units. Field interviews were conducted with 3,651 adult South Africans (85.5 % response rate) representing all racial groups.

Survey Instrument

During the field interviews, the World Health Organisation's Composite International Diagnostic Interview, Version 3.0 (CIDI 3.0) was administered. The CIDI is a structured, lay-administered interview that generates psychiatric diagnoses according to the International Classification of Diseases (ICD)-10 and DSM-IV (*Diagnostic and Statistical Manual*, 4th edition) diagnostic systems. For this study, the English version of the CIDI was translated into six other South African languages by panels of bilingual and multilingual experts using iterative back-translation procedures. These field interviews lasted approximately three and a half hours. All recruitment, consent and field procedures were approved by the Human Subjects Committees of the University of Michigan, Harvard Medical School, and by a single project assurance of compliance from the Medical University of South Africa (MEDUNSA) that was approved by the National Institute of Mental Health.

Measures

Alcohol Related Outcomes

In this study, alcohol-related problems were the variables of interest. More specifically, we examined:

Early Use of Alcohol This was indicated by two variables, namely 'Precocious involvement with alcohol', defined as any use of alcohol before the age of 13, and 'More than the minimum drinking', defined as drinking at least 12 drinks in a year before the age of 20. The rationale for including these variables is that both precocious alcohol use and more than minimum drinking are known risk factors for the development of future alcohol-related problems (Dawson et al. 2008; Reddy et al. 2010).

Binge-Drinking This was assessed by the question "On the days when you drank the most, how many drinks would you usually have per day?" Binge drinking was operationalized as ≥5 drinks in a single drinking session for males, ≥ 4 for females. In South Africa, binge drinking has been associated with increased risk of morbidity and mortality (Peltzer and Ramlagan 2009).

Socially Maladaptive Patterns of Drinking We studied socially maladaptive or hazard-laden drinking that corresponds with the DSM-IV's diagnostic criteria for 'alcohol abuse disorder'. This composite variable is comprised of several items that refer to "responsibility interference," "social problems associated with alcohol use," "drinking despite social problems," "hazardous drinking," and "legal problems." As a separate variable we also examined the early onset of these socially maladaptive patterns of drinking (defined as onset before 24 years of age). The 24 years of age cut-off was chosen as individuals who develop alcohol dependence before age 25 are less likely to seek treatment than those after 30 years of age (Parry et al. 2002).

Alcohol Dependence This composite variable was based on the DSM-IV's diagnostic criteria for alcohol dependence, and is comprised of items that refer to socially maladaptive patterns of drinking as well as the eight clinical features of alcohol dependence (namely, "tolerance", "withdrawal", "drink more than intended", "difficulty cutting down", "giving up activities because of drinking", "a great deal of time spent on drinking-related activities", "drinking despite physical/emotional problems", and "compulsive desire to drink"). Early onset of alcohol dependence was also examined (defined as onset before 24 years old).

Any Clinical Feature of Alcohol Dependence We also examined whether participants reported any of the aforementioned eight clinical features of alcohol dependence. This was viewed as an early indicator of alcohol-related problems as participants may have reported some features of alcohol dependence without meeting the criteria for a diagnosis of alcohol dependence.

Onset of Problems After 16 Years of Age We examined the onset of alcohol problems after 16 years of age. The focus on problems after age 16 (and exclusion of anyone who had alcohol problem onset before age 17) creates greater confidence in the temporal sequencing from earlier CPP to later alcohol problems, particularly as the items used to collect data on CPP may detect CPP during early adolescence.

Covariates

Childhood Physical Punishment (CPP) The childhood physical punishment (CPP) construct is the primary covariate of interest, as measured via the single question item: 'When you were growing up, how often did someone in your household push/threw something/hit you?" Response categories ranged from 'never' to 'often'. As responses on this variable were not normally distributed but were skewed in favour of the "never" response category, we decided to treat this variable as a dichotomous rather than as an ordinal variable: respondents who answered "often" and "sometimes" were coded as "yes" (1); "rarely" and "never" as "no" (0). It is possible that individuals with drinking problems may search their memories more thoroughly for experiences of CPP. Coding the variable in this manner, therefore allows the CPP variable to represent a chronic stressor during childhood.

Caregiver Alcohol or Other Drug Problems (CAODP) A second covariate of interest was caregiver alcohol and other drug problems (CAODP). Due to the low rate of female caregivers who reported AOD problems, the two items examining respondents' knowledge of AOD problems among their male and female caregivers were combined into a single variable. These items were: "Did the women who raised you ever have a problem with alcohol or drugs?" and "Did the man who raised you ever have a problem with alcohol or drugs?".

Analysis Procedures

Data were analysed using Stata Version 9.0 (College Station, Texas, USA). All analyses were weighted to adjust for sample selection, non-response, and for residual discrepancies between the sample and the population on a profile of demographic and geographic variables. We then examined the associations between CPP and later (adult-onset) alcohol-related outcomes using multiple logistic regression. We conducted four regression models, in which CPP was the independent variable and the ten drinking outcomes were entered as dependent variables. The first model was an unadjusted model of the association between CPP and drinking outcomes. We then conducted a second regression that adjusted for the potential confounding effects of gender and age. Following this, because temporal sequencing of CAODP and CPP remains uncertain and as CAODP and CPP may be jointly determined by other unmeasured background factors, we stratified the sample by caregiver drinking to limit the potentially confounding influence of this variable. The size of the CPP-drinking outcomes associations were therefore re-estimated via separate regression analyses for the sub-samples of individuals with (model 3; CAODP) and without caregiver alcohol and other drug problems (model 4;

NCAOD). The results of these four regression models were reported as odds ratios (ORs) with 95 % confidence intervals (CIs).

Results

Overall, 11.8 % (N=522) reported experiencing child physical punishment. The results indicate that those with a history of CPP had a higher prevalence of all adverse drinking outcomes except one (Table 1). The only outcome that was not associated with CPP was drinking more than the minimum before the age of 19 (Table 1).

Estimated odds ratios (OR) were modest for the link between CPP and the later onset of drinking problems (Table 1). For individuals who reported CPP, the odds of precocious drinking were three-fold greater than those individuals who did not report CPP (CI 1.39–6.72). Similarly, the odds of having a lifetime alcohol dependence diagnosis were almost three times greater for individuals who reported CPP compared to those who did not report it (OR= 2.79; CI:1.72–4.52). Individuals with CPP experiences also had double the odds of heavy alcohol use (OR=2.09; CI: 1.67–2.62) and socially maladaptive patterns of drinking (OR= 2.00, CI:1.24–2.78) than their peers who had not experienced CPP. In addition, for individuals with CPP histories, the odds of socially maladaptive patterns of drinking and alcohol dependence emerging by the age of 23 were roughly double that of their counterparts without CPP experiences (Table 1). The direction and size of these associations did not change appreciably after adjusting for the potential confounding effects of sex and age; with all of the associations remaining statistically significant (Table 1).

In total, 3.4 % (n=150) and 10.5 % (n=466) reported CAODP for the "women who raised them" and the "man who raised them. When we stratified the sample by history of CAODP

Table 1 Unadjusted and adjusted associations between alcohol outcomes and CPP in a Nationally Representative Sample of South African adults: results of multiple logistic regression

	CPP No (%)	CPP Yes (%)	Model 1: Unadjusted OR (95 % CI)	Model 2: OR Adjusted for sex and age (95 % CI)
Precocious drinking (drinking onset ≤12 years)	2	4	**3.05 (1.39–6.72)**	**2.96 (1.35–6.48)**
Early more than minimal (MTM) (12+ drinks in 1 year at ≤19 years)	6	7	1.21 (0.76–1.93)	1.18 (0.71–1.98)
Early socially maladaptive problem (onset ≤23 years)	5	8	**1.87 (1.22–2.86)**	**1.81 (1.13–2.89)**
Early alcohol dependence (≤23 years)	2	5	**2.34 (1.52–3.60)**	**2.25 (1.44–3.52)**
Early any problem (≤23 years)	5	9	**1.86 (1.24–2.78)**	**1.82 (1.17–2.83)**
Ever binge drinking	15	27	**2.09 (1.67–2.62)**	**2.21 (1.73–2.82)**
Ever socially maladaptive problems	10	19	**2.00 (1.53–2.62)**	**2.13 (1.60–2.83)**
Ever alcohol dependence	2	6	**2.79 (1.72–4.52)**	**2.88 (1.77–4.69)**
Any clinical feature of dependence	6	11	**1.83 (1.26–2.66)**	**1.87 (1.27–2.75)**
Onset of problem drinking after 16	9.7	17	**1.92 (1.36–2.71)**	**2.03 (1.40–2.93)***

Bold numbers indicate that the estimate was statistically significant P<0.05

several of the associations between CPP and later alcohol use were no longer significant (Table 2). Out of 10 problematic alcohol outcomes examined in this study, four were significant for participants without CAODP and one was significant for participants with CAODP" For individuals without a history of parental AOD problems, the only associations that remained statistically significant were between CPP and lifetime patterns of binge drinking (OR=1.86,CI:1.20–2.87), socially maladaptive patterns of drinking (OR=1.81, CI:1.23–2.66), alcohol dependence diagnosis (OR=1.89, CI: 1.08–3.30), and the onset of alcohol problems after 16 years of age (OR-1.70, CI:1.12–2.59; Table 2). While these associations were statistically significant, individuals with CPP only had modestly greater odds of reporting these alcohol outcomes compared to individuals without CPP histories. For individuals with a history of parental AOD problems, the only association that was significant was that of CPP and "ever drinking heavily" (binge-drinking) (OR=1.91, CI 1.03–3.52).

All associations between AOD outcomes and CPP were not as strong in South Africa in comparison to the data from China. In China, estimated ORs were moderately strong for the link from early CPP to early onset of AOD and to the occurrence of the more general early socially maladaptive construct (OR=4.2–8.2) among participant with Parental AOD problems. However, in South Africa only binge drinking was found to be associated with CPP.

Discussion

The findings of this study revealed a modestly strong association between alcohol and a history of CPP among participants who did not have caregivers with alcohol and other drug problems. This finding is consistent with a large body of literature delineating experiences of trauma/disruption in childhood as a potential risk factor for AUD (Widom et al. 1995, 2007; Simpson and Miller 2002). Additionally, the findings are consistent with evidence derived from animal models revealing that exposure to early adversity alters reward processes and increases susceptibility to subsequent drug consumption (Matthews, Robbins, Everitt, and Caine 1999).

Our findings also suggest that a history of CPP may play a role in the onset of AUD. Specifically, the odds of socially maladaptive patterns of drinking (alcohol abuse) and alcohol dependence emerging by the age of 25 were roughly double that for individuals with CPP histories compared to participants without CPP histories. This finding is of concern considering the implications of early onset for prognosis over the lifespan. For example, utilizing data from 4,778 US adults in a nationally representative sample, individuals who developed alcohol dependence before age 25 were less likely to seek treatment than those who developed alcohol dependence after 30 years of age. Additionally, after controlling a number of demographic and behavioural characteristics associated with early onset of alcohol dependence, individuals who were first dependent before the age of 25 had significantly greater odds of experiencing multiple dependence episodes, episodes exceeding 1 year, and more dependence symptoms (Hingson et al., 2006). These findings support the importance of intervening early in individuals who have histories of CPP to prevent and/or delay the problematic use of alcohol.

It is interesting to note that stratifying by gender and age made very little difference to the strength of the associations between alcohol outcomes and a history of CPP. This is in contrast to other studies which found that gender was a significant confounder of the relationship between maltreatment and alcohol outcomes (Simpson and Miller 2002; Hussey, Chang, and Kotch 2006). The reason for this difference is unclear and future studies should consider disaggregating the relationship between CPP and alcohol outcomes by gender to further explore whether there are gender differences.

Table 2 Associations between CPP and alcohol outcomes in Nationally Representative Samples of South African and Chinese adults, stratified by history of caregiver alcohol and other drug problems

	South Africa: With parental AOD problems	China: With parental AOD problems	South Africa: Without parental AOD problems	China: Without parental AOD problems
Precocious drinking	1.62 (0.46–5.75)	3.2 (0.6–16.7)	2.62 (0.82–8.32)	1.7 (0.8–3.4)
Early MTM drinking	0.82 (0.40–1.69)	3.7 (0.9–15.8)	0.68 (0.34–1.35)	**2.1 (1.3–3.6)**
Early socially maladaptive problem	0.94 (0.41–2.16)	**7.3 (1.1–48.9)**	1.51 (0.94–2.41)	**4.9 (1.6–14.9)**
Early alcohol dependence	1.93 (0.66–5.58)	–	1.72 (0.93–3.17)	**3.6 (1.0–12.5)**
Early any problem	1.11 (0.50–2.46)	**7.5 (1.1–49.5)**	1.44 (0.91–2.26)	**4.8 (1.6–14.3)**
Ever binge drinking	**1.91 (1.03–3.52)**	3.4 0(0.8–15.0)	**1.86 (1.20–2.87)**	**2.3 (1.3–4.1)**
Ever socially maladaptive problems	1.31 (0.80–2.13)	5.1 (0.9–27.1)	**1.81 (1.23–2.66)**	**2.9 (1.5–5.7)**
Ever alcohol dependence	1.67 (0.80–3.49)	–	**1.89 (1.08–3.30)**	**2.8 (1.2–6.4)**
Any clinical feature of dependence	1.39 (0.76–2.55)	–	1.39 (0.79–2.47)	**3.3 (1.3–8.2)**
Onset of problem after 16	1.09 (0.59–1.99)	3.9 (0.5–25.5)	**1.70 (1.12–2.59)**	**3.0 (1.5–5.9)**

Bold numbers indicate that the estimate was statistically significant $P<0.05$

All models held sex and age constant

AOD parental alcohol or other drug use

While some associations between later alcohol outcomes and CPP histories and were found in the unadjusted model, this study also found that CAODP confounded many of these associations. Specifically, where caregiver drinking was not reported, CPP remained strongly associated with most alcohol outcomes apart from early more than the minimum (MTM) drinking. For this non-significant finding, it is possible that the cut-off age of 19 that was used to indicate early drinking was too high and not appropriate for a South African population where the legal age for drinking is 18 and youthful drinking is relatively common with 35 % of South African adolescents under 18 years of age reporting lifetime alcohol use (Reddy et al. 2010).

However, where caregiver alcohol problems were reported, most of the associations between later alcohol outcomes and CPP were found to be non-significant. This suggests that where caregiver alcohol problems are present, these confound the relationship between later alcohol use outcomes and a history of CPP. This is in keeping with findings from several other studies which also reported the confounding effect that caregiver alcohol use has on the relationship between CPP and alcohol outcomes (Simpson and Miller 2002). More specifically, caregiver alcohol problems may both directly and indirectly determine later alcohol outcomes. Direct determinants may include the social learning environment where heavy alcohol use is normalised, alcohol is viewed as a coping tool, and alcohol is readily available and also genetic influences. Although not investigated in the present study, caregiver AUD may also increase the risk of CPP in the home, thereby indirectly determining later alcohol outcomes (Hussey et al. 2006; Fergusson et al. 2008; Simpson and Miller 2002). Future studies that directly examine the role that caregiver alcohol use plays in CPP and the unique contribution it makes to later alcohol problems relative to CPP are needed to support this explanation.

Interestingly, results of the present study did not coincide with findings from China. According to nationally representative data, In China the overall prevalence of current drinking is approximately 35.7 %, (55.6 % of men and 15.0 % of women). Of these current drinkers 57 % meet criteria for binge drinking. In South Africa, of the 27.3 % of people who drink (42 % of men, 17 of women), only 9.6 % met criteria for binge drinking.

Apart from this, several important limitations should be emphasized when interpreting these results. First, the data are based on retrospective self-reports of the occurrence of CPP and the timing and frequency of alcohol use—so that a systematic recall bias may be present. Nevertheless systematic reviews have suggested that people can recall past experiences with sufficient accuracy to provide valuable information (Hardt and Ritter 2004). Additionally, the assessment of caregiver alcohol and other drug problems are based on self-reports of drinking or drug problems from participants rather than caregivers themselves. It is quite likely that this may have contributed to inaccurate (and possibly under-) reporting as many participants may have been unaware that their caregivers had alcohol-related problems. Third, our crude measure of CPP was a significant limitation of the study. As we used a dichotomous measure of CPP, we were unable to assess whether the frequency, type and number of years over which CPP occurred impacted on the strength of the associations between CPP and alcohol problems. This may have negatively impacted on findings, especially as previous research has shown that CPP that occurs regularly and extends from childhood into adolescence is more strongly related to alcohol problems than CPP that occurs relatively infrequently (Hussey et al. 2006). Future research in this area should strongly consider using more sensitive measures of CPP that allow for the examination of potential dose–response relationships between the degree of physical punishment and alcohol problems. Additionally, the study did not include South Africans who were homeless. This population might represent the more severe end of the spectrum in terms of alcohol problems and/or childhood physical punishment.

A further limitation is that this study looked at CPP in isolation from other forms of child maltreatment, despite the fact that CPP co-occurs alongside other forms of abuse (Fergusson et al. 2008; Gilbert et al. 2009; Hussey et al. 2006; Widom et al. 1995, 2007). Given earlier research which identified the confounding effect that childhood sexual abuse has on the association between CPP and mental health outcomes (including alcohol problems) (Fergusson et al. 2008), it is quite possible that controlling for other forms of maltreatment may have weakened the association between CPP and later alcohol problems. Future studies on this subject should consider examining the relative (and unique) contribution that each type of maltreatment makes to risk for AUD. Related to this, there were several other factors that may have confounded the relationship between CPP and alcohol problems which this study failed to take into account. Previous studies have found that child conduct problems (Hussey et al. 2006; Simpson and Miller 2002) experiences of partner abuse, and caregivers' mental health (Gilbert et al. 2009; Hussey et al. 2006; Simpson and Miller 2002) mediate the associations between CPP and AUD in adulthood. Furthermore, we did not control for the influence of family characteristics (such as socio-economic status and family structure) on the association between CPP and alcohol problems. As family characteristics are powerful confounders of the relationship between CPP and alcohol problems (Fergusson et al. 2008), it is possible that the one remaining significant relationship between CPP and alcohol outcomes among participants with CAODP may have disappeared after taking the influence of these other variables into account. If this is the case, the earlier association between CPP and alcohol problems may have reflected the social and family context within which abuse and punishment occurs.

Despite these limitations, our findings have a number of potential implications for preventing AUD in South Africa. To begin with, health care professionals may have a key role to play in identifying at risk children for physical punishment. If at risk children and their families are detected early, the broad range of negative health, mental health and behavioural outcomes for the child (Hussey et al. 2006) could be minimized should the necessary intervention services be provided. Focusing on changing caregiver styles for at risk families have been shown to be a preventative measure to reduce alcohol misuse (Barth 2009). Additionally, it could be beneficial if programs and interventions go beyond the approaches that educate youth about the detriments of substance use and include approaches designed to help youth identify and manage the stressors of childhood physical punishment, domestic violence, and related adverse experiences in childhood. What is also clear is that there is a need to move beyond universal prevention programmes for children from troubled homes (be it due to punitive caregiving or caregiver AOD problems). Children at risk for alcohol problems, whether this is due to their caregivers' AOD problems or due to their traumatic childhood experiences should be identified and should receive targeted interventions aimed at preventing the early onset of alcohol use and negative alcohol outcomes. Related to this, child maltreatment is not only a risk factor for alcohol and drug problems but also other behavioural difficulties and mental health problems (Hussey et al. 2006) . Consequently, any intervention that focuses on the impact of physical punishment on alcohol outcomes should also focus on reducing the impact of this punishment on other potential outcomes. Interventions that target multiple outcomes are likely to hold powerful benefits for the physical and psychological well-being of survivors of child maltreatment.

In summary, our findings provide further insight into the relationship between CPP and the later onset of drinking problems in the South African context. However, longitudinal research is necessary to clarify the causal mechanisms which underlie the association between CPP and AUDs.

In the interim, these findings point to the potential value of addressing CPP in order to reduce the prevalence of alcohol use disorders in South Africa.

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