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The risk for persistent adult alcohol and nicotine dependence: the role of childhood maltreatment

Jennifer C. Elliott, Ph.D.¹, Malka Stohl, M.S.¹, Melanie M. Wall, Ph.D.^{2,3,4}, Katherine M. Keyes, Ph.D.¹, Renee D. Goodwin, Ph.D.^{1,5}, Andrew E. Skodol, M.D.^{2,6}, Robert F. Krueger, Ph.D.⁷, Bridget F. Grant, Ph.D., Ph.D.⁸, and Deborah Hasin, Ph.D.^{1,2,3}

¹Department of Epidemiology, Mailman School of Public Health, Columbia University, New York, New York, USA

²Department of Psychiatry, College of Physicians and Surgeons, Columbia University, New York, New York, USA

³New York State Psychiatric Institute, New York, New York, USA

⁴Department of Biostatistics, Mailman School of Public Health, Columbia University, New York, New York, USA

⁵Department of Psychology, Queens College and The Graduate Center, City University of New York (CUNY), Queens, New York, USA

⁶Department of Psychiatry, University of Arizona College of Medicine, Tucson, Arizona, USA

⁷Department of Psychology, University of Minnesota, Minneapolis, Minnesota, USA

⁸Laboratory of Epidemiology and Biometry, National Institute of Alcohol Abuse and Alcoholism, Rockville, Maryland, USA

Abstract

Background and aims—Alcohol and nicotine dependence are associated with considerable morbidity and mortality, especially when cases are persistent. The risk for alcohol and nicotine dependence is increased by childhood maltreatment. However, the influence of childhood maltreatment on dependence course is unknown, and is evaluated in the current study.

Design—Physical, sexual, and emotional abuse, and physical and emotional neglect, were evaluated as predictors of persistent alcohol and nicotine dependence over three years of follow-up, with and without control for other childhood adversities.

Setting—National Epidemiologic Survey on Alcohol and Related Conditions (NESARC).

Participants—NESARC participants completing baseline and follow-up who met criteria at baseline for past-year alcohol dependence ($n=1,172$) and nicotine dependence ($n=4,017$).

Measurements—Alcohol Use Disorder and Associated Disabilities Interview Schedule (AUDADIS) measures of alcohol/nicotine dependence, childhood maltreatment, and other adverse childhood experiences (e.g., parental divorce).

Findings—Controlling for demographics only, physical, sexual, and emotional abuse, and physical neglect, predicted three-year persistence of alcohol dependence (adjusted odds ratios

Correspondence Deborah S. Hasin, Ph.D., Columbia University College of Physicians and Surgeons, Department of Psychiatry, 1051 Riverside Drive #123, New York, NY 10032., Phone: (212) 543-5035, Fax: (212) 543-5913, dsh2@columbia.edu.

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[AORs]: 1.50–2.99, 95% CIs 1.04–4.68) and nicotine dependence (AORs: 1.37–1.74, 95% CIs 1.13–2.11). With other childhood adversities also controlled, maltreatment types remained predictive for alcohol persistence (AORs: 1.53–3.02, 95% CIs 1.07–4.71) and nicotine persistence (AORs: 1.35–1.72, 95% CIs 1.11–2.09). Further, a greater number of maltreatment types incrementally influenced persistence risk (AORs: 1.19–1.36, 95% CIs 1.11–1.56).

Conclusions—A history of childhood maltreatment predicts persistent adult alcohol and nicotine dependence. This association, robust to control for other childhood adversities, suggests that maltreatment (rather than a generally difficult childhood) affects the course of dependence.

Alcohol and nicotine are legal, readily available, and commonly used substances that contribute substantially to preventable morbidity and mortality worldwide (1–4). Alcohol and nicotine dependence are common disorders (5, 6) associated with elevated health risks (7, 8). While individuals who use alcohol or nicotine heavily for short periods face some increased risk, individuals with prolonged, heavy use face substantial risk (9, 10). Thus, identifying individuals at risk for persistent alcohol and nicotine dependence among those who experience these disorders has considerable public health importance. Many studies have addressed the course of substance use disorders among patients in treatment (11–17). However, patient studies may be biased by numerous confounds and selection factors (18, 19). To better understand the course of alcohol and nicotine dependence and its predictors, prospective epidemiological studies are useful (18). Researchers studying predictors of persistent substance disorders in large national samples have focused on demographic characteristics (20), psychiatric comorbidity (21, 22), and symptom severity and treatment (23). These all provide important information, but leave many other possible predictors unexplored.

Childhood maltreatment is an important factor that may predict the persistence of alcohol and nicotine dependence. Childhood maltreatment refers to harm, neglect, or exploitation of children that may be physical, sexual, or emotional in nature (24). Nationally representative research suggests that nearly one third (30.1%) of the U.S. population is affected by physical, sexual, or emotional abuse, or physical or emotional neglect (25). Researchers have already found that childhood maltreatment predicts increased alcohol and nicotine use (26–29) and dependence symptoms (30, 31), as well as substance use problem severity (32–34). However, whether childhood maltreatment increases the risk for *persistence* of alcohol and nicotine dependence has not been studied, and chronologically distal risk factors for lifetime occurrence are not necessarily the same factors that predict disorder course once it has begun.

One prior study assessed the influence of childhood maltreatment on the course of substance use; this case-control study found that childhood neglect (but not abuse) predicted course of illicit drug use over young and middle adulthood (35). However, no studies have assessed the effect of childhood maltreatment on course of dependence on the most widely used, licit substances: alcohol and nicotine. Given the impairment and consequences associated with longstanding dependence on these substances (6, 36), investigating whether childhood maltreatment predicts the persistence of alcohol and nicotine dependence in a large nationally representative sample of the general population would provide findings with important public health significance. Assessing a range of maltreatment experiences could help determine which specific experiences increase risk; controlling for exposure to other aspects of a difficult childhood (e.g., parental death or divorce) could clarify whether any significant maltreatment effects are simply due to a generally adverse childhood environment.

The present study utilizes data from a large, nationally representative US prospective study, in which participants were assessed at two waves, three years apart. First, we provide

descriptive information on childhood physical, sexual, and emotional abuse, and physical and emotional neglect, among individuals with baseline alcohol and nicotine dependence, and among those with persistent disorders. Second, we assess the relationship between these five types of childhood maltreatment and the persistence of alcohol and nicotine dependence among those with baseline diagnoses. We conduct these analyses with and without control for other adverse childhood events, to determine whether significant associations are simply the result of a generally difficult childhood. Third, we assess which maltreatment types remain significant when all maltreatment types are considered together, to determine unique effects. Finally, we assess whether experiencing a greater number of types of childhood maltreatment incrementally influences the risk for persistent alcohol and nicotine dependence.

Methods

Participants and procedures

The current sample consists of participants from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), an in-person survey of a US population sample. The NESARC has been described elsewhere (37, 38). The NESARC's multistage cluster sampling procedure involved choosing 655 primary sampling units (PSUs; representing geographical regions), and selecting eligible housing units within the PSUs (39). Within each household, one individual was randomly selected. Non-Hispanic Black and Hispanic housing units were oversampled in order to ensure accurate estimates and sufficient sample sizes for analyses of these groups, and young adults aged 18–24 were oversampled in order to better understand heavy drinking in this age group. Participants were from all 50 states, and from households and group quarters (e.g., colleges, shelters). Wave 1 of the NESARC included 43,093 participants interviewed in 2001–2002 (response rate: 81.0%); Wave 2 was a re-interview of 34,653 of these individuals conducted in 2004–2005 (37, 38). The Wave 2 response rate was 86.7%, providing a cumulative response rate for the Wave 2 sample of 70.2% (38).

Sub-samples used in the current study included individuals with current (past-year) alcohol dependence ($n=1,172$) and nicotine dependence ($n=4,017$) at Wave 1 who were reassessed at Wave 2; these subsamples have been described previously (22). In brief, alcohol dependent participants were mostly male (68.0%), White (69.9%), young (75.2% under age 40), and high school graduates (83.4%). Of the nicotine dependent subsample, the majority were also male (52.9%), White (79.6%), young (51.4% under age 40), and high school graduates (82.0%). For demographic information by childhood maltreatment status, please see Supplemental Tables 1 and 2.

Measures

Alcohol dependence and persistence—Alcohol dependence was assessed using the Alcohol Use Disorder and Associated Disabilities Interview Schedule, DSM-IV Version (AUDADIS-IV), which evaluates diagnostic criteria according to the fourth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (40). Alcohol dependence using the AUDADIS-IV has demonstrated good-to-excellent test-retest reliability across a variety of studies (past-year: $\kappa=0.66$ – 0.79) (41). At Wave 1, alcohol dependence was assessed for the last 12 months. At Wave 2, alcohol dependence was assessed for (a) the last 12 months, and (b) prior to the last 12 months but since Wave 1. Persistence of alcohol dependence was operationalized as meeting alcohol dependence criteria throughout all assessed time periods, as described previously (22).

Nicotine dependence and persistence—Nicotine dependence was also assessed using the AUDADIS-IV. Nicotine dependence diagnoses using the AUDADIS-IV have also demonstrated good reliability in past research (Past-year: $\kappa=0.63$) (42). Similar to assessment of alcohol dependence, nicotine dependence was assessed for the last 12 months at Wave 1; at Wave 2, nicotine dependence was assessed for (a) the last 12 months, and (b) prior to the last 12 months but since Wave 1. Persistence of nicotine dependence was operationalized as meeting nicotine dependence criteria throughout all assessed time periods.

Childhood maltreatment—Physical, sexual, and emotional abuse, and physical and emotional neglect, were assessed using the AUDADIS-IV. The AUDADIS-IV items were adapted from widely-used, well-validated scales, as described elsewhere (43). Participants reported whether they had a range of experiences with a parent or caregiver before age 18, using a five-point response scale. Most items involved rating the frequency of certain experiences using the response options: never, almost never, sometimes, fairly often, and very often. Emotional neglect items involved rating styles of interpersonal relations on the scale: never true, rarely true, sometimes true, often true, and very often true. The AUDADIS-IV childhood maltreatment items have demonstrated excellent test–retest reliability (ICCs=0.79–0.88) and internal consistency (Cronbach α s=0.78–0.90) (43). We defined abuse and neglect consistently with prior research (31), requiring lower thresholds for indicators of more severe abuse (e.g., sexual abuse, injury from physical abuse).

Physical abuse was considered positive if the participant had (a) “fairly often” or “very often” experienced pushing, grabbing, shoving, slapping, or hitting, or (b) reported that they were ever hit hard enough to cause injury or bruises (two items). Sexual abuse was considered positive if the participant reported that he/she had ever been (a) touched/fondled in a sexual way, (b) been forced to touch/fondle others, or been the recipient of (c) attempted or (d) completed intercourse (four items). Emotional abuse was considered positive if the participant had fairly or very often (a) had a parent or caregiver swear at him/her, insult him/her, say hurtful things, or (b) threaten to hit or throw something at him/her; emotional abuse was also positive if the participant had (c) at least “sometimes” felt that the adult acted in a way that made him/her afraid of physical injury (three items).

Physical neglect was considered positive when a participant reported that any of the following experiences happened “sometimes” or more: (a) was forced to do difficult/dangerous chores, (b) was left alone or unsupervised at a young age, (c) went without needed items, (d) did not have regular meals, or (e) did not receive needed medical treatment (five items). Emotional neglect represented the lack of positive emotional experiences. Emotional neglect was considered positive if individuals rated more than one of the following items as rarely or never true: (a) their family was close-knit; (b) someone in their family believed in them, (c) wanted them to be successful, (d) made them feel important/special, or (e) was a source of strength/support (five items).

In addition to dichotomous maltreatment variables, a count variable was created to represent the number of maltreatment types experienced (range: 0–5). A secondary count variable was also made using the three types of abuse and physical neglect, after finding that these four maltreatment types predicted persistence of both alcohol and nicotine dependence (range: 0–4).

Other Adverse Childhood Experiences—Consistent with prior research (31), a binary variable was created to capture other adverse childhood experiences that did not constitute abuse or neglect. These included living in an institution or foster home, parental divorce, or

having observed serious fights at home. Also included were: having a parent attempt or commit suicide, having a parent die, and having a parent in jail.

Analysis Plan

First, rates of the five types of childhood maltreatment are described for participants with baseline alcohol and nicotine dependence; and by persistence status within these groups. Second, logistic regressions assessed the effects of these maltreatment variables on (a) the persistence of alcohol dependence among those with baseline alcohol dependence and (b) the persistence of nicotine dependence for those with baseline nicotine dependence. For each outcome (alcohol and nicotine persistence), separate regressions were performed for each of the five childhood maltreatment variables controlling for demographics (age, gender, ethnicity, education) (Model 1) and controlling for demographics plus other adverse childhood experiences (Model 2). The purpose of Model 2 was to determine whether significant associations remained after controlling for other childhood adversities. Third, logistic regression models including all maltreatment types as predictors were run for both alcohol persistence (among those with baseline alcohol dependence) and nicotine persistence (among those with baseline nicotine dependence). These models controlled for demographics specified above, and were run to determine the unique effects of the varied maltreatment types. Fourth, logistic regressions were run to determine whether having more types of childhood maltreatment affected persistence risk incrementally. For these analyses, separate logistic regressions were run for alcohol and for nicotine; each included the count of childhood maltreatment types as a predictor, and demographics (and other childhood adversities) as covariates. The childhood maltreatment count variable was specified as continuous to determine the overall effect of an increasing number of maltreatment types, and then re-run as categorical to determine the effects of each level of maltreatment exposure. All analyses were performed in SUDAAN software (RTI International, Research Triangle Park, North Carolina) to adjust for the complex survey design. SUDAAN software properly adjusts standard errors for the clustered sampling designs through the use of Taylor series linearization. Logistic regression results are presented using adjusted odds ratios (AORs) and 95% confidence intervals (95% CIs).

Results

The alcohol and nicotine dependent subsamples evidenced high rates of childhood maltreatment (Table 1; for rates among non-dependent participants see Supplemental Table 3). Among participants with alcohol dependence at Wave 1, 58.17% reported no maltreatment. The percent reporting one, two, three, four and all five types of childhood maltreatment was 19.27%, 9.90%, 6.51%, 4.36%, and 1.80%, respectively (mean = 0.85 types [95% CI: 0.76–0.94]). Among those with nicotine dependence at Wave 1, 54.97% reported no maltreatment. The percent reporting one, two, three, four and five types of childhood maltreatment was 20.06%, 9.72%, 7.15%, 5.70%, and 2.40%, respectively (mean = 0.96 types [95% CI: 0.90–1.01]). Among those with Wave 1 alcohol dependence, 30.1% had persistent dependence, and among those with Wave 1 nicotine dependence, 56.6% had persistent dependence (22).

Participants with persistent alcohol and nicotine dependence endorsed particularly high rates of maltreatment (Table 1). Among those with persistent alcohol dependence, 47.77% met no maltreatment criteria. The percent reporting one, two, three, four, and five maltreatment types were 20.94%, 12.92%, 9.42%, 5.98%, and 2.97%, respectively (mean = 1.14 types [95% CI: 0.96, 1.32]). Among those with nicotine persistence, 49.98% met no maltreatment criteria. The percent reporting one, two, three, four, and five types were 20.50%, 11.56%, 8.10%, 7.23%, and 2.62% (mean = 1.10 types [95% CI: 1.03, 1.17]).

Among those with Wave 1 alcohol dependence, physical, sexual, and emotional abuse, as well as physical (but not emotional) neglect, increased the risk for persistence, controlling for demographics only (AORs: 1.50–2.99) and demographics and other childhood adversities (AORs: 1.53–3.02) (Table 2). Among those with Wave 1 nicotine dependence, the same maltreatment types predicted persistence, controlling for demographics only (AORs: 1.37–1.74) and controlling for demographics and other childhood adversities (AORs: 1.35–1.72).

When all maltreatment types were included in one model to predict alcohol persistence, only sexual abuse remained predictive (AOR: 2.62; 95% CI: 1.62–4.23). All other maltreatment types lost significance (physical abuse: AOR=0.90, 95% CI: 0.57–1.42; emotional abuse: AOR=1.49, 95% CI: 0.92–2.42; physical neglect: AOR=1.30, 95% CI: 0.83–2.05; emotional neglect AOR=0.82, 95% CI: 0.48–1.38). For nicotine persistence, sexual abuse (AOR: 1.38; 95% CI: 1.07–1.78), physical abuse (AOR=1.34, 95% CI: 1.09–1.66) and emotional abuse (AOR=1.43, 1.12–1.81) remained predictive; physical neglect (AOR=1.08, 95% CI: 0.86–1.34) did not, and emotional neglect (AOR=0.68, 95% CI: 0.51–0.90) actually predicted *less* persistence.

Childhood maltreatment also had an incremental effect on alcohol persistence risk among those with baseline alcohol dependence; individuals with more types of maltreatment were more likely to have persistent disorders, controlling for demographics only (AOR=1.29, 95% CI: 1.13–1.46) or demographics and other childhood adversities (AOR=1.31, 95% CI: 1.15–1.48). Although more maltreatment types were generally associated with greater risk, there was some variability in the risk between levels (Table 3). Similarly, more types of childhood maltreatment incrementally predicted nicotine persistence among those with baseline nicotine dependence, controlling for demographics only (AOR=1.19, 95% CI: 1.12–1.27), or demographics and other childhood adversities (AOR=1.19, 95% CI: 1.11–1.26). Again, despite a general positive trend, nicotine also evidenced some variability between levels (Table 3). Results were slightly stronger when the predictor did not include emotional neglect (controlling for demographics [alcohol: AOR=1.34, 95% CI: 1.16–1.54; nicotine: AOR: 1.25, 95% CI: 1.16–1.34] or demographics and other childhood adversities [alcohol: AOR=1.36, 95% CI: 1.18–1.56; nicotine: AOR: 1.24, 95% CI: 1.16–1.33]).

Discussion

Among individuals with alcohol dependence at Wave 1, persistence was predicted by all types of abuse and physical neglect, even after other adverse childhood experiences were controlled. The same was true for nicotine persistence. Participants who had experienced more types of childhood maltreatment experienced more risk. Models including all predictors indicated the strongest unique influence of sexual abuse.

In general, childhood maltreatment was predictive of alcohol and nicotine persistence, and results remained robust despite control for other childhood adversities. However, models that included all maltreatment predictors *together* demonstrated reduced predictive value for maltreatment variables that had been significant when examined individually. This was likely due to multicollinearity, or co-occurrence of childhood maltreatment types, as phi coefficients for the maltreatment types ranged from 0.18–0.55. Thus, although these findings indicate that sexual abuse (and for nicotine, physical and emotional abuse) exerted unique effects beyond the general effect of childhood maltreatment, the findings also highlight the importance of the general effect of maltreatment.

These results build upon previous research. The present study shows that not only does child maltreatment affect risk for alcohol and nicotine use (26–29) and dependence symptoms (30,

31), it also affects disorder course. This is consistent with research suggesting that childhood maltreatment is associated with more severe substance use problems (32–34). Our finding that physical neglect affects course is consistent with the one previous study of the effect of childhood neglect on course of drug use (35). However, our findings that all types of abuse also predicted course conflict with findings by Wilson and Widom (2010), which may be due to various differences between the studies including (a) the specific substances studied or (b) their legality, (c) the current study's focus on dependence (not use), or (d) the current study's use of a nationally representative (not case-control) sample. The robust findings despite control for other adversities is consistent with research that finds that maladaptive family functioning (characterized by parental psychological disorder/criminality or childhood maltreatment) influences substance use involvement more than other childhood adversities (e.g., parental death, divorce) (44).

Certain issues should be considered when interpreting these results. First, retrospective self-reports of childhood maltreatment may be underestimates; yet, such measures are generally viewed as valid, provided that questions are clear (45). Retrospective self-report measures are less susceptible to underestimation than court records (which only detect individuals who have gone through the legal system due to maltreatment), and are more feasible than prospective studies. Second, data were only available to assess three-year course of substance dependence, prohibiting consideration of longer-term outcomes over participants' lifetimes. However, this dataset was chosen because it is from a large, methodologically strong, nationally representative study, which has made it a valuable resource for persistence research (21, 22). Third, despite the large overall sample size, relatively few alcohol dependent participants (7.83%) reported emotional neglect; analyses of the effect of emotional neglect on alcohol persistence may have thus had lower power, making it more difficult to detect true small effects. However, null findings for nicotine persistence do not appear to be due to low power, given the larger sample size and low adjusted odds ratio magnitude. Fourth, incremental analyses assume that the varied maltreatment types affected persistence risk equally, implying equal "harm magnitude". Future research could investigate this assumption. Finally, this study does not explore more complex issues such as (a) the possibility that these associations may differ for different demographic groups, or (b) the possible existence of mediators that could explain these associations. Exploration of interactions with demographic variables could provide insight on groups most at risk; such analyses are beyond the scope of the current paper and should be assessed through deliberate a-priori testing after hypothesis development in future research. Similarly, future research is also needed to determine *why* history of childhood maltreatment impedes recovery from alcohol and nicotine dependence.

Several potential mediators may form part of the causal pathway. For example, childhood maltreatment increases risk for post-traumatic stress disorder (46, 47), major depression (48), and personality disorders (25); these disorders may limit ability to remit from dependence. Individuals with a history of childhood maltreatment may also be less resilient in overcoming substance dependence due to a reduced sense of autonomy (which could affect their confidence in taking the steps needed to recover) (49), reliance on avoidance-based coping strategies (50, 51), and strained interpersonal relations (and resulting reduced social support) (52). The effects of childhood maltreatment may also be biologically mediated, as inhibitory brain processes have been shown to differ by childhood maltreatment status (53). Individuals with and without childhood maltreatment may also differ in treatment-seeking, which could affect persistence. Although no nicotine treatment information was available in the present study, we ran exploratory post-hoc analyses on the effect of childhood maltreatment on alcohol persistence, controlling for demographics, other childhood adversities, and *professional treatment for alcohol problems* (i.e., use of medical, psychiatric, or social services for alcohol problems). The pattern of results did not change,

with significant effects for all types of abuse and physical neglect (AORs: 1.53–3.12) but not emotional neglect (AOR=1.32). Treatment-seeking should be considered further in future research, especially in studies that assess nicotine treatment-seeking.

Several strengths of the study also warrant mention. Analyses were conducted on a large, nationally representative sample. Five different types of child maltreatment were studied in order to determine specifically which types of maltreatment affect dependence course. Also, analyses were conducted with and without control for other childhood adversity, which enhances understanding of the role of a generally difficult childhood. Although reported analyses use one dichotomous variable representing presence/absence of any such adversities, results are consistent using a count of adverse childhood experiences. Further, incremental analyses shed light on those with multiple risk factors.

Overall, the current study suggests that alcohol or nicotine dependent individuals who have suffered abuse or physical neglect during childhood are more likely to have persistent disorders. Associations remained strong despite control for other childhood adversities, suggesting specific effects of a history of direct maltreatment rather than a generally difficult childhood. Future research should address the mechanisms of this effect, including psychiatric, psychological, social, and/or neurological mediators. The findings suggest the need for assessment of childhood maltreatment history during intake for alcohol or nicotine dependence treatment, as maltreatment experiences suggest a more difficult path to recovery, and may indicate the need for more intensive treatment. This study adds important and novel findings to the literature on factors predicting course of dependence, and suggests directions for future research on *how* childhood maltreatment impacts persistence.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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References

1. Ezzati M, Lopez AD. Estimates of global mortality attributable to smoking in 2000. *Lancet*. 2003; 362:847–52. [PubMed: 13678970]
2. McGinnis JM, Foege WH. Actual causes of death in the United States. *JAMA*. 1993; 270:2207–12. [PubMed: 8411605]
3. Mokdad AH, Marks JS, Stroup DF, Gerberding JL. Actual causes of death in the United States, 2000. *JAMA*. 2004; 291:1238–45. [PubMed: 15010446]
4. Rehm J, Gmel G, Sempos CT, Trevisan M. Alcohol-related morbidity and mortality. *Alcohol Res Health*. 2003; 27:39–51. [PubMed: 15301399]
5. Grant BF, Hasin DS, Chou SP, Stinson FS, Dawson DA. Nicotine dependence and psychiatric disorders in the United States: results from the national epidemiologic survey on alcohol and related conditions. *Arch Gen Psychiatry*. 2004; 61:1107–15. [PubMed: 15520358]
6. Hasin DS, Stinson FS, Ogburn E, Grant BF. Prevalence, correlates, disability, and comorbidity of DSM-IV alcohol abuse and dependence in the United States: results from the National

- Epidemiologic Survey on Alcohol and Related Conditions. *Arch Gen Psychiatry*. 2007; 64:830–42. [PubMed: 17606817]
7. Gandini S, Botteri E, Iodice S, et al. Tobacco smoking and cancer: a meta-analysis. *Int J Cancer*. 2008; 122:155–64. [PubMed: 17893872]
 8. Rehm J, Shield KD, Gmel G, Rehm MX, Frick U. Modeling the impact of alcohol dependence on mortality burden and the effect of available treatment interventions in the European Union. *Eur Neuropsychopharmacol*. 2013; 23:89–97. [PubMed: 22920734]
 9. Agusti AG, Noguera A, Sauleda J, et al. Systemic effects of chronic obstructive pulmonary disease. *Eur Respir J*. 2003; 21:347–60. [PubMed: 12608452]
 10. Gramenzi A, Caputo F, Biselli M, et al. Review article: alcoholic liver disease--pathophysiological aspects and risk factors. *Aliment Pharmacol Ther*. 2006; 24:1151–61. [PubMed: 17014574]
 11. Hasin D, Liu X, Nunes E, et al. Effects of major depression on remission and relapse of substance dependence. *Arch Gen Psychiatry*. 2002; 59:375–80. [PubMed: 11926938]
 12. Skodol AE, Oldham JM, Gallaher PE. Axis II comorbidity of substance use disorders among patients referred for treatment of personality disorders. *Am J Psychiatry*. 1999; 156:733–8. [PubMed: 10327906]
 13. Kushner MG, Abrams K, Thuras P, et al. Follow-up study of anxiety disorder and alcohol dependence in comorbid alcoholism treatment patients. *Alcohol Clin Exp Res*. 2005; 29:1432–43. [PubMed: 16131851]
 14. Brown SA, Vik PW, Patterson TL, Grant I, Schuckit MA. Stress, vulnerability and adult alcohol relapse. *J Stud Alcohol*. 1995; 56:538–45. [PubMed: 7475034]
 15. Driessen M, Meier S, Hill A, et al. The course of anxiety, depression and drinking behaviours after completed detoxification in alcoholics with and without comorbid anxiety and depressive disorders. *Alcohol Alcohol*. 2001; 36:249–55. [PubMed: 11373263]
 16. LaBounty LP, Hatsukami D, Morgan SF, Nelson L. Relapse among alcoholics with phobic and panic symptoms. *Addict Behav*. 1992; 17:9–15. [PubMed: 1317660]
 17. Mossberg D, Liljeberg P, Borg S. Clinical conditions in alcoholics during long-term abstinence: a descriptive, longitudinal treatment study. *Alcohol*. 1985; 2:551–3. [PubMed: 4026978]
 18. Skodol AE, Grilo CM, Keyes KM, et al. Relationship of personality disorders to the course of major depressive disorder in a nationally representative sample. *Am J Psychiatry*. 2011; 168:257–64. [PubMed: 21245088]
 19. Cohen P, Cohen J. The clinician's illusion. *Arch Gen Psychiatry*. 1984; 41:1178–82. [PubMed: 6334503]
 20. Grant JD, Verges A, Jackson KM, et al. Age and ethnic differences in the onset, persistence and recurrence of alcohol use disorder. *Addiction*. 2012; 107:756–65. [PubMed: 22085024]
 21. Fenton MC, Keyes K, Geier T, et al. Psychiatric comorbidity and the persistence of drug use disorders in the United States. *Addiction*. 2012; 107:599–609. [PubMed: 21883607]
 22. Hasin D, Fenton MC, Skodol A, et al. Personality disorders and the 3-year course of alcohol, drug, and nicotine use disorders. *Arch Gen Psychiatry*. 2011; 68:1158–67. [PubMed: 22065531]
 23. Dawson DA, Grant BF, Stinson FS, et al. Recovery from DSM-IV alcohol dependence: United States, 2001–2002. *Addiction*. 2005; 100:281–292. [PubMed: 15733237]
 24. World Health Organization. Prevention, W. H. O. S. C. a. M. H. V. a. I. Report of the consultation on child abuse prevention. 1999.
 25. Afifi TO, Mather A, Boman J, et al. Childhood adversity and personality disorders: results from a nationally representative population-based study. *J Psychiatr Res*. 2011; 45:814–22. [PubMed: 21146190]
 26. Goldstein AL, Flett GL, Wekerle C. Child maltreatment, alcohol use and drinking consequences among male and female college students: An examination of drinking motives as mediators. *Addict Behav*. 2010; 35:636–9. [PubMed: 20199849]
 27. Topitzes J, Mersky JP, Reynolds AJ. Child maltreatment and adult cigarette smoking: a long-term developmental model. *J Pediatr Psychol*. 2010; 35:484–98. [PubMed: 19995869]
 28. Spratt EG, Back SE, Yeatts SD, et al. Relationship between child abuse and adult smoking. *Int J Psychiatry Med*. 2009; 39:417–26. [PubMed: 20391862]

29. Keyes KM, McLaughlin KA, Koenen KC, et al. Child maltreatment increases sensitivity to adverse social contexts: neighborhood physical disorder and incident binge drinking in Detroit. *Drug Alcohol Depend.* 2012; 122:77–85. [PubMed: 21981990]
30. Al Mamun A, Alati R, O'Callaghan M, et al. Does childhood sexual abuse have an effect on young adults' nicotine disorder (dependence or withdrawal)? Evidence from a birth cohort study. *Addiction.* 2007; 102:647–54. [PubMed: 17286640]
31. Fenton MC, Geier T, Keyes K, et al. Combined role of childhood maltreatment, family history, and gender in the risk for alcohol dependence. *Psychol Med.* 2013; 43:1045–57. [PubMed: 22883538]
32. Danielson CK, Amstadter AB, Dangelmaier RE, et al. Does Typography of Substance Abuse and Dependence Differ as a Function of Exposure to Child Maltreatment? *Journal of Child & Adolescent Substance Abuse.* 2009; 18:323–342. [PubMed: 20151043]
33. Kirisci L, Dunn MG, Mezzich AC, Tarter RE. Impact of parental substance use disorder and child neglect severity on substance use involvement in male offspring. *Prev Sci.* 2001; 2:241–55. [PubMed: 11833927]
34. Grossman, GA. *Psychology.* Ann Arbor, MI: Wright Institute; 1997. Effects of childhood trauma and dissociation with substance abusing adolescents.
35. Wilson HW, Widom CS. Predictors of drug-use patterns in maltreated children and matched controls followed up into middle adulthood. *J Stud Alcohol Drugs.* 2010; 71:801–9. [PubMed: 20946736]
36. Grief SN. Nicotine dependence: health consequences, smoking cessation therapies, and pharmacotherapy. *Prim Care.* 2011; 38:23–39. v. [PubMed: 21356419]
37. Grant BF, Stinson FS, Dawson DA, et al. Prevalence and co-occurrence of substance use disorders and independent mood and anxiety disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Arch Gen Psychiatry.* 2004; 61:807–16. [PubMed: 15289279]
38. Grant BF, Goldstein RB, Chou SP, et al. Sociodemographic and psychopathologic predictors of first incidence of DSM-IV substance use, mood and anxiety disorders: results from the Wave 2 National Epidemiologic Survey on Alcohol and Related Conditions. *Mol Psychiatry.* 2009; 14:1051–66. [PubMed: 18427559]
39. Grant, BF.; Kaplan, K.; Shepard, J.; Moore, T. Source and Accuracy Statement for Wave 1 of the 2001–2002 National Epidemiologic Survey on Alcohol and Related Conditions. Bethesda MD: National Institute on Alcohol Abuse and Alcoholism; 2003.
40. American Psychiatric Association. *Diagnostic and statistical manual of mental disorders.* Washington, DC: Author; 1994.
41. Hasin D, Hatzenbuehler ML, Keyes K, Ogburn E. Substance use disorders: Diagnostic and Statistical Manual of Mental Disorders, fourth edition (DSM-IV) and International Classification of Diseases, tenth edition (ICD-10). *Addiction.* 2006; 101(Suppl 1):59–75. [PubMed: 16930162]
42. Grant BF, Dawson DA, Stinson FS, et al. The Alcohol Use Disorder and Associated Disabilities Interview Schedule-IV (AUDADIS-IV): reliability of alcohol consumption, tobacco use, family history of depression and psychiatric diagnostic modules in a general population sample. *Drug Alcohol Depend.* 2003; 71:7–16. [PubMed: 12821201]
43. Ruan WJ, Goldstein RB, Chou SP, et al. The alcohol use disorder and associated disabilities interview schedule-IV (AUDADIS-IV): reliability of new psychiatric diagnostic modules and risk factors in a general population sample. *Drug Alcohol Depend.* 2008; 92:27–36. [PubMed: 17706375]
44. Kessler RC, McLaughlin KA, Green JG, et al. Childhood adversities and adult psychopathology in the WHO World Mental Health Surveys. *Br J Psychiatry.* 2010; 197:378–85. [PubMed: 21037215]
45. Hardt J, Rutter M. Validity of adult retrospective reports of adverse childhood experiences: review of the evidence. *J Child Psychol Psychiatry.* 2004; 45:260–73. [PubMed: 14982240]
46. Epstein JN, Saunders BE, Kilpatrick DG, Resnick HS. PTSD as a mediator between childhood rape and alcohol use in adult women. *Child Abuse Negl.* 1998; 22:223–34. [PubMed: 9589176]
47. White HR, Widom CS. Three potential mediators of the effects of child abuse and neglect on adulthood substance use among women. *J Stud Alcohol Drugs.* 2008; 69:337–47. [PubMed: 18432375]

48. Danese A, Moffitt TE, Harrington H, et al. Adverse childhood experiences and adult risk factors for age-related disease: depression, inflammation, and clustering of metabolic risk markers. *Arch Pediatr Adolesc Med.* 2009; 163:1135–43. [PubMed: 19996051]
49. Herrenkohl TI, Klika JB, Herrenkohl RC, Russo MJ, Dee T. A prospective investigation of the relationship between child maltreatment and indicators of adult psychological well-being. *Violence Vict.* 2012; 27:764–76. [PubMed: 23155725]
50. Asberg K, Renk K. Substance use coping as a mediator of the relationship between trauma symptoms and substance use consequences among incarcerated females with childhood sexual abuse histories. *Subst Use Misuse.* 2012; 47:799–808. [PubMed: 22468563]
51. Hyman SM, Paliwal P, Sinha R. Childhood maltreatment, perceived stress, and stress-related coping in recently abstinent cocaine dependent adults. *Psychol Addict Behav.* 2007; 21:233–8. [PubMed: 17563143]
52. Kim J, Talbot NL, Cicchetti D. Childhood abuse and current interpersonal conflict: the role of shame. *Child Abuse Negl.* 2009; 33:362–71. [PubMed: 19457556]
53. Elton A, Tripathi SP, Mletzko T, et al. Childhood maltreatment is associated with a sex-dependent functional reorganization of a brain inhibitory control network. *Hum Brain Mapp.* 2013

Weighted prevalence (%) of physical, sexual, and emotional abuse, as well as physical and emotional neglect, by dependence type and persistence status.

Table 1

	Alcohol dependent at Wave 1						Nicotine dependent at Wave 1					
	Persistent			Not persistent			Persistent			Not persistent		
	%	SE	n=347	%	SE	n=825	%	SE	n=1172	%	SE	n=1748
Physical abuse	31.19	2.99		22.46	1.79		25.09	1.48		29.54	1.14	19.53
Sexual abuse	20.79	2.85		9.80	1.26		13.11	1.31		19.20	1.03	12.35
Emotional abuse	27.16	2.78		16.65	1.58		19.81	1.37		25.21	1.07	15.90
Physical neglect	25.47	2.79		16.47	1.55		19.18	1.32		24.98	1.08	19.11
Emotional neglect	9.22	1.58		7.22	0.99		7.83	0.85		11.05	0.73	10.28
												0.89
												10.71
												0.88
												0.71
												0.81
												0.80
												0.58

Note. SE=Standard error. Alcohol and nicotine dependence diagnoses are not mutually exclusive.

Associations between childhood maltreatment types and persistence of alcohol and nicotine dependence.

Table 2

	Model 1		Model 2	
	Controlling for demographics		Controlling for demographics and other adverse childhood events	
	AOR	95% CI	AOR	95% CI
Persistence of alcohol dependence ^a				
Physical abuse	1.50	1.04, 2.16	1.53	1.07, 2.21
Sexual abuse	2.99	1.91, 4.68	3.02	1.93, 4.71
Emotional abuse	1.90	1.30, 2.79	1.97	1.33, 2.90
Physical neglect	1.69	1.14, 2.49	1.73	1.17, 2.56
Emotional neglect	1.30	0.80, 2.10	1.31	0.81, 2.12
Persistence of nicotine dependence ^b				
Physical abuse	1.68	1.42, 1.98	1.66	1.40, 1.96
Sexual abuse	1.64	1.29, 2.10	1.64	1.28, 2.09
Emotional abuse	1.74	1.44, 2.11	1.72	1.42, 2.09
Physical neglect	1.37	1.13, 1.67	1.35	1.11, 1.65
Emotional neglect	1.00	0.79, 1.27	0.99	0.78, 1.25

Note. AOR = Adjusted odds ratio. 95% CI = 95% confidence intervals.

^a Analyses restricted to those with Wave 1 alcohol dependence (n=1,172).

^b Analyses restricted to those with Wave 1 nicotine dependence (n=4,017).

Table 3
Incremental effects of childhood maltreatment types on alcohol and nicotine persistence.

	Alcohol ^a (AOR[95% CI])		Nicotine ^b (AOR[95% CI])	
	Controlling for demographics	Controlling for demographics and other adverse childhood events	Controlling for demographics	Controlling for demographics and other adverse childhood events
One maltreatment type	1.45 (0.98, 2.16)	1.48 (0.99, 2.20)	1.28 (1.04, 1.57)	1.28 (1.05, 1.57)
Two maltreatment types	1.95 (1.18, 3.23)	1.97 (1.19, 3.25)	1.93 (1.49, 2.51)	1.92 (1.48, 2.49)
Three maltreatment types	2.42 (1.29, 4.55)	2.55 (1.35, 4.79)	1.64 (1.17, 2.30)	1.60 (1.14, 2.26)
Four maltreatment types	2.13 (1.02, 4.44)	2.28 (1.11, 4.70)	2.23 (1.55, 3.19)	2.19 (1.53, 3.15)
Five maltreatment types	3.55 (1.61, 7.82)	3.76 (1.69, 8.36)	1.43 (0.87, 2.35)	1.41 (0.86, 2.30)

Note. The comparison group for each substance is those without any maltreatment history (for alcohol: n=635; for nicotine: n=2142).

^a For alcohol, sample sizes are n=241 for one maltreatment type, n=123 for two, n=87 for three, n=52 for four, and n=34 for five.

^b For nicotine, sample sizes are n=829 for one maltreatment type, n=402 for two, n=302 for three, n=227 for four, and n=115 for five.