Addictive Behaviors 58 (2016) 161–166

Contents lists available at ScienceDirect

Addictive Behaviors

journal homepage: www.elsevier.com/locate/addictbeh

Cumulative contextual risk at birth in relation to adolescent substance use, conduct problems, and risky sex: General and specific predictive associations in a Finnish birth cohort

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HIGHLIGHTS

- Cumulative Contextual Risk (CCR) at birth had long-term consequences for teens.
- CCR predicted substance misuse, conduct problems, and risky sex over the long term.
- CCR also had a long-term predictive association with general problem behavior.
- CCR had a specific predictive association with risky sex for girls but not boys.
- The study, conducted in Finland, extends prior research conducted in the US and UK.

ARTICLE INFO

Article history:
Received 8 August 2015
Received in revised form 1 December 2015
Accepted 14 February 2016
Available online 17 February 2016

Keywords:
Cumulative contextual risk
Substance use
Conduct problems
Risky sex
Adolescence

ABSTRACT

Background: Research indicates that risk factors cluster in the most vulnerable youth, increasing their susceptibility for adverse developmental outcomes. However, most studies of cumulative risk are cross-sectional or short-term longitudinal, and have been based on data from the United States or the United Kingdom. Using data from the Northern Finland Birth Cohort 1986 Study (NFBC1986), we examined cumulative contextual risk (CCR) at birth as a predictor of adolescent substance use and co-occurring conduct problems and risky sex to determine the degree to which CCR predicts specific outcomes over-and-above its effect on general problem behavior, while testing for moderation of associations by gender.
Methods: Analyses of survey data from 6963 participants of the NFBC1986 followed from the prenatal/birth period into adolescence were conducted using structural equation modeling.
Results: CCR had long-term positive associations with first-order substance use, conduct problems, and risky sex factors, and, in a separate analysis, with a second-order general problem behavior factor. Further analyses showed that there was a positive specific effect of CCR on risky sex, over-and-above general problem behavior, for girls only.

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http://dx.doi.org/10.1016/j.addbeh.2016.02.031

Conclusions: This study, conducted within the Finnish context, showed that CCR at birth had long-term general and specific predictive associations with substance use and co-occurring problem behaviors in adolescence; effects on risky sex were stronger for girls. Results are consistent with the hypothesis that early exposure to CCR can have lasting adverse consequences, suggesting the need for early identification and intervention efforts for vulnerable children.

1. Introduction

The most vulnerable youth are those who experience multiple contextual risks, such as poverty and prenatal alcohol exposure, during early development. Research conducted within the cumulative risk (Rutter, 1979; Sameroff, Seifer, Zax, & Barocas, 1987) and adverse childhood experiences (Felitti et al., 1998) traditions indicates that the accumulation of risk factors increases the likelihood of problem outcomes (Evans, Li, & Whipple, 2013), including substance use (Ostaszewski & Zimmerman, 2006) and co-occurring problem behaviors (Mitchell, Whitesell, Spicer, Beals, & Kaufman, 2007; Stoddard et al., 2013). Although basic relationships between cumulative contextual risk (CCR) and problem outcomes have been documented, there are gaps in knowledge. Most studies have been conducted in the United States (US) or the United Kingdom (UK), and have been cross-sectional or short-term longitudinal. The degree to which CCR confers vulnerability for youth within different macro-societal contexts is relatively unknown, and the long-term consequences of such risk are poorly understood. Moreover, multivariate analyses that account for associations of substance use with other problem behaviors are rare, as are tests of gender differences. The degree to which CCR in early development has general and/or specific associations with correlated problem behaviors in adolescence, and whether gender moderates these associations, has yet to be determined. The current study addresses these gaps, examining CCR at birth in relation to adolescent substance use, conduct problems, and risky sexual behavior via analyses of data from the Northern Finland Birth Cohort 1986.

Contextual risks do not occur in isolation, but tend to cluster in vulnerable families. Research has shown that CCR, traditionally operationalized as a count of the number of dichotomized contextual risk factors present at a particular time point, increases children's likelihood of experiencing multiple problem outcomes (Appleyard, Egeland, van Dulmen, & Sroufe, 2005; Sameroff, Bartko, Baldwin, & Seifer, 1998; Sameroff et al., 1987). Much of this research has focused on the academic and psychosocial functioning of younger children (Evans et al., 2013). During adolescence, however, substance use begins to emerge (Johnston, O'Malley, Bachman, & Schulenberg, 2014), and co-occurring problem behaviors, including conduct problems and risky sex, increase (Mason et al., 2010; Windle, 2000). Selected studies have documented links between CCR and adolescent substance use (Newcomb & Felix-Ortiz, 1992; Ostaszewski & Zimmerman, 2006), as well as conduct problems (Mitchell et al., 2007; Stoddard et al., 2013; van der Laan, Veenstra, Bogaerts, Verhulst, & Ormel, 2010) and risky sex (Price & Hyde, 2009; Small & Luster, 1994). However, it remains to be determined if CCR in early development has long-term consequences for adolescent substance use and co-occurring problem behaviors. For example, long-term effects might result from direct genetic influences or epigenetic processes, such as the modification of gene expression related to individuals' stress response resulting from early exposure to prenatal and postnatal stressors (National Scientific Council on the Developing Child, 2010).

A prominent explanation for the co-occurrence of adolescent substance use with other problem behaviors is that such co-occurrence is due to a common latent factor, typically conceptualized as a general problem behavior syndrome (Jessor & Jessor, 1977) or common liability (Vanyukov et al., 2012). Research has shown that the correlations among adolescent problem behaviors are captured to a large extent, but not wholly, by a general problem behavior factor (Donovan & Jessor, 1985; Donovan, Jessor, & Costa, 1988). However, analyses of CCR have not accounted for the correlations among multiple behaviors. Thus, it is unknown if CCR primarily has effects on general problem behavior or if it might also have specific effects on particular outcomes. For example, early adversity in the form of CCR might lead to accelerated pubertal development (Belsky, Houts, & Fearon, 2010), which is associated with earlier initiation of sexual activity and sex-risk behavior (Savolainen et al., 2015). These processes could result in a specific effect from early CCR to adolescent risky sex, over-and-above heightened risk for general problem behavior.

Few studies have evaluated whether gender moderates the association between CCR and adolescent problem behaviors. There is some evidence that cumulative risk increases the likelihood of aggression more in boys than girls (Ribeaud & Eisner, 2010). However, other studies have indicated a relative lack of support for gender differences in the associations between cumulative risk and substance use (Griffin, Scheier, Botvin, & Diaz, 2000) and externalizing problems (Gerard & Buehler, 2004). Additional tests of gender differences are needed.

Little is known about the effects of CCR in national contexts outside of the US and the UK. The consequences of CCR might vary across countries. The current study examines the general and specific effects of CCR at birth in relation to substance use and co-occurring problem behaviors in adolescence using data on a birth cohort from Northern Finland. As a Nordic welfare state, Finland represents a unique context, due to generous and comprehensive systems of collective social support and protection available. Such policy arrangements might attenuate well-established CCR effects reported in the literature from US and UK studies. Alternatively, if these effects are similar in Finland, the results would suggest that CCR effects represent general developmental processes.

2. Method

2.1. Participants and procedures

Participants were from the Northern Finland Birth Cohort 1986 (NFBC1986), a population-based study of individuals born during a one-year period in the two northernmost provinces of Finland. The original NFBC1986 cohort included 9432 children born alive, whose expected date of birth fell between July 1, 1985 and June 30, 1986 (98.5% of all deliveries taking place in the target location). Details about data collection are available elsewhere (Hurtig et al., 2007; Järvelin, Hartikainen-Sorri, & Rantakallio, 1993).

The current analyses use data collected during the prenatal/birth period and middle adolescence. A prenatal background questionnaire of mothers was distributed at their first antenatal visit to the local prenatal clinic (on average at the 12th gestational week) and returned by their 24th gestational week. A second pregnancy questionnaire was completed by midwives at mother's last antenatal visit to the clinic, or during the first home visit by the midwife after delivery. Additional information on pregnancy and delivery was completed by midwives and/or medical staff at the prenatal clinics. In 2001–2002, when the participants were age 15–16, they were asked to complete a postal questionnaire on health, living habits, and social background (80% participation rate). By this time, 217 were deceased, emigrated, or had an unknown address. They also were invited to a clinical examination, during which youth filled in an additional questionnaire (76% participation rate)