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Co-occurrence of antisocial behavior and substance use: Testing for sex differences in the impact of older male friends, low parental knowledge and friends' delinquency

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A B S T R A C T

Delinquency and substance use (SU) are commonly comorbid during adolescence. In the present study we investigate this co-morbidity with 3 main objectives: 1. Evaluate reciprocal relationships between delinquency/SU across early adolescence. 2. Assess the impact of older male friends, low parental knowledge and friends' delinquency on subsequent development and inter-relationships of delinquency and SU. 3. Evaluate sex differences in these relationships.

We applied cross-lagged structural equation models to the analysis of a longitudinal sample ($n = 3699$). Findings demonstrated: (1) At ages 13–14 delinquency predicted SU more so than vice versa but effects became equal between ages 14 and 15. (2) Low parental knowledge and friends' delinquency predicted delinquency and SU. Older male friends predicted ASB. (3) Sex differences were present. For example, in the absence of antisocial friends low parent knowledge at age 12 indirectly predicted increased age 15 SU for girls more than boys.

Antisocial behavior (ASB)[2] and substance use (SU) exact large health and financial burdens on individuals and society (Hicks, Krueger, Iacono, McGue, & Patrick, 2004). Among the models that describe the co-occurrence of ASB and SU is the notion of the externalizing syndrome. The grouping of these behaviors into a syndrome follows from observations that ASB and SU co-occur at a rate greater than chance (Kendler, Davis, & Kessler, 1997); comprise the most common pattern of psychiatric co-morbidity in adolescence (Armstrong & Costello, 2002); fall under a broad unitary latent factor (Achenbach &

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[2] ASB can be defined as behavior that violates legal or social norms, typically in such a way as to disregard the welfare or personal rights of others. ASB may or may not involve open hostility toward others.

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Edelbrock, 1978; Krueger, Markon, Patrick, & Iacono, 2005); and share common genetic and environmental vulnerabilities (Krueger et al., 2002; McAdams, Rowe, Rijsdijk, Maughan, & Eley, 2012; Slutske et al., 1998). However, importantly, twin studies have shown that variance not shared between ASB and SU can be attributed to environmental factors, suggesting unique etiological factors for these two broad dimensions (Hicks et al., 2004). As will be revisited below, several environmental risk factors for the development of ASB and SU have been identified, and sex differences exist in terms of the degree of exposure to, and impact of, many of these risk factors. In the present article we have 3 primary goals: 1. To examine the development and inter-relationships of ASB and SU from early to mid adolescence (ages 12, 13, 14, and 15). 2. To assess the impact of several established environmental risk factors on this inter-relationship. 3. To examine sex differences in these relationships.

The externalizing syndrome

Following the lead of research showing that groups of psychiatric disorders, or behavioral and emotional problems, are often correlated and united by a common coherent "spectrum" (Achenbach & Edelbrock, 1978), Krueger et al. (2002, 2005) and Krueger, Markon, Patrick, Benning, and Kramer (2007) examined the extent to which such a phenomenon may explain the high association of ASB with SU. Research results indicated that a highly heritable generalized externalizing factor linked more specific syndromes (e.g., adult antisocial personality, conduct disorder, alcohol dependence, etc). These researchers also highlighted the importance of specific environmental factors in distinguishing between the different facets of the syndrome (Krueger et al., 2002). This would indicate that from a developmental standpoint, there might be different evolving pathways that eventually lead to developmental inter-relationships between ASB and SU behaviors.

Developmental pathways

Whereas the majority of the data Krueger et al. (2002, 2005, 2007) used was based on cross-sectional samples spanning late adolescence and early adulthood, two general types of longitudinal studies have examined ASB and SU: psychiatric and developmental. With regard to psychiatric studies, Krueger, Caspi, Moffitt, and Silva (1998) reported high stability (i.e., a coefficient of .86) of an externalizing factor consisting of diagnoses of conduct disorder, marijuana dependence and alcohol dependence from age 18 to 21, in males. Likewise, Vollebergh et al. (2001) reported substantial 1-year stability (i.e., a coefficient of .96) for an externalizing factor consisting of alcohol and drug dependence, in men and women between the ages of 18 and 24.

Developmental studies, in addition to examining the temporal stability of an externalizing factor (e.g. Haberstick, Schmitz, Young, & Hewitt, 2005; van der Valk, van den Oord, Verhulst, & Boomsma, 2003), have assessed reciprocal influences between ASB and SU. Evidence suggests that early initiation of alcohol and/or drug use is predictive not only of further SU in adulthood (Odgers et al., 2008), but also ASB (Huizinga, Loeber, & Thornberry, 1995). Similarly, the consequence of early ASB includes not only adult ASB (Loeber & Farrington, 2000), but also SU in adolescence (Odgers et al., 2007) and adulthood (Mason et al., 2010).

Few studies have directly tested the reciprocal relationship between ASB and SU, and existing studies are mixed in their conclusions. A study of boys and girls indicated that age 10 ASB was a better predictor of age 14 alcohol use than age 10 alcohol use was of age 14 ASB (Mason et al., 2010). Another study, based on males between the ages 3 and 32, reported little evidence of reciprocal influence, particularly going from SU to ASB (Odgers et al., 2008). A study of post-incarcerated male offenders (mean age 18 at time 1), reported that the relationship was mainly reciprocal (symmetrical) over a 7-year span (Sullivan & Hamilton, 2007). Hence, existing evidence indicates that ASB may be a greater risk for subsequent SU than the converse (Mason et al., 2010; Odgers et al., 2008); but also that the two behaviors may co vary in a reciprocal manner (Sullivan & Hamilton, 2007). We suggest that the results of these studies may be further informed by examining three key risk factors – gender, the characteristics of children's friends, and low parental knowledge.

The child's gender

Gender differences exist in the prevalence of ASB and SU, with boys tending to engage in more of each than girls (e.g. Maughan, Rowe, Messer, Goodman, & Meltzer, 2004; Zilberman, Tavares, & el-Guebaly, 2003). This may indicate that boys are exposed to higher levels of the risk factors that predispose toward ASB and SU than are girls and/or that boys and girls ASB and SU are the result of different risk factors. In the present study we examine possible gender differences in response to established risk factors:

The peer context and the gender of the child

During adolescence, youth spend increasingly more time with peers (Larson & Richards, 1991) and are more susceptible to their influence (Steinberg & Monahan, 2007). Peer relationships are considered to be a major risk factor for initiation of SU (Engels, Bot, Scholte, & Granic, 2007) and engaging in ASB (van Lier, Wanner, & Vitaro, 2007). A child's gender, and that of their friends, also plays an important role in the development of ASB and SU: Research indicates that girls transition to other-sex friendships earlier than boys (Poulin & Pedersen, 2007), and when young girls are friends with boys they are at increased risk