



Temperament disturbances measured in infancy progress to substance use disorder 20 years later



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ABSTRACT

Objective: This prospective study determined whether temperament before two years of age predicts transmissible risk for substance use disorder (SUD) up to a decade later and SUD outcome in adulthood. **Method:** Boys between 10 and 12 years of age ($N = 482$) were tracked to age 22. The previously validated *transmissible liability index* (TLI) was administered at baseline, and temperament prior to two years of age was retrospectively rated. The Structured Clinical Interview for DSM-III-R (SCID) was administered to document presence/absence of SUD for parents at baseline and sons at age 22.

Results: Path analysis revealed that number of parents with SUD predicted severity of temperament disturbance in their sons which in turn predicted TLI score at age 10–12, presaging SUD. Temperament before age two did not predict SUD at age 22. The association between number of SUD parents and transmissible risk was mediated by severity of temperament disturbance.

Conclusion: Temperament disturbance in early childhood, reflecting quality of behavioral and emotion regulation, comprise psychological antecedents of transmissible risk for SUD.

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1. Introduction

Substance use disorder (SUD) frequently persists across generations consequent to genetic vulnerability and parental rearing environment (Agrawal & Lynskey, 2008; Hopfer, Crowley, & Hewitt, 2003). Biological children of SUD parents have up to seven-fold heightened risk to develop SUD (Johnson & Leff, 1999; Tarter, Horner, & Ridenour, 2012). Compared to children whose parents do not have SUD, offspring of SUD parents initiate substance use at a younger age (Hill, Shen, Lowers, & Locke, 2000) and more rapidly progress to SUD (Trim, Schuckit, & Smith, 2010; Warner, White, & Johnson, 2007). Notably, the transmissible component of risk encompassing both genetic and parental environment influences accounts for over 40% of variance underlying cannabis dependence (Hopfer et al., 2003).

Research has shown that the psychological characteristics comprising transmissible risk for SUD are indicators of a unidimensional interval construct (Vanyukov, Tarter et al., 2003; Vanyukov et al., 2009). This trait, termed the *transmissible liability index* (TLI), predicts SUD in adulthood, and, consistent with the common liability model of SUD etiology (Vanyukov, Tarter et al., 2003), predicts all SUD categories in the DSM-IV (Ridenour, Kirisci, Tarter, & Vanyukov, 2011). Twin studies demonstrate that 75% (Hicks, Iacono, & McGue, 2012) to 85% (Vanyukov et al., 2009) of TLI variance is genetic, and the genetic component accounts for approximately 50% of variance underlying development of SUD (Vanyukov et al., 2015). Furthermore, TLI score in childhood covaries negatively with age of first substance use and interval between initial substance exposure and SUD diagnosis (Kirisci et al., 2013). Conforming to the theory that SUD is a developmental outcome (Tarter, 2002; Tarter & Horner, in press; Tarter et al., 2012), five age-specific versions of the TLI have been validated to quantify transmissible risk between childhood and adulthood using a Web-based computer-adaptive test format (Kirisci et al., 2012).

Inspection of the TLI in Table 1 indicates that the items mainly denote various aspects of behavior and emotion dysregulation.

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Table 1
Items comprising the transmissible liability index (TLI).

Parent as respondent

Characteristics of child prior to age 13

1. Lying
2. Stealing
3. Impulsive
8. Did he often do things to annoy people like grabbing another child's hat?
9. Did he often annoy people on purpose to get even?
10. Did he have difficulty staying in line in the supermarket or waiting for his turn while he was playing with other children?
11. Did he blurt out answers to questions before they had been completed or did he get into trouble because he would rush into things without thinking?
12. Did he get into trouble a lot for talking out of turn in school or talking without the teacher calling on him or for bothering people?
13. Did he get into trouble because he would do things without thinking about them first, for example running into the street without looking?
15. He/she interrupts on people when they are speaking

Describes your child now or within the past 6 months...

21. Impulsive or acts without thinking
22. Destroys things belonging to his/her family or others
23. Disobedient at school
24. Steals at home
25. Bites fingernails
26. Picks nose, skin or other parts or body
38. My child moves a great deal in his/her sleep.
39. In the morning, my child is still in the same place as he/she was when he/she fell asleep (reverse-coded)
40. My child doesn't move around much at all in his/her sleep (reverse-coded)
41. It takes my child a long time to get used to a new thing in the home (reverse-coded)
42. It takes my child a long time to adjust to new schedules (reverse-coded)
43. Changes in plans make my child restless (reverse-coded)
44. My child resists changes in routine (reverse-coded)

Child as respondent

4. Did you often annoy people on purpose to get even?
5. Did you often do things to annoy people like grabbing another child's hat?
6. Did you blurt out answers to questions before they had been completed or did you get into trouble because you would rush into things without thinking?
7. Were things so bad that you were thinking a lot about death or that you would be better off dead?
14. I interrupt on people when they are speaking
32. I move a great deal in my sleep
33. I don't move around much at all in my sleep (reverse-coded)
34. I get hungry about the same time each day (reverse-coded)
35. I usually eat the same amount each day (reverse-coded)
36. I eat about the same amount at supper from day to day (reverse-coded)
37. My appetite seems to stay the same day after day (reverse-coded)
45. Did you skip classes or school without an excuse?

Teacher as respondent

16. Excitable, Impulsive best describes the child

The behavior of the child is best described as ...

17. ...often engages in physically dangerous activities without considering possible consequences (not for the purpose of thrill-seeking), e.g. runs into street without looking
18. ...has difficulty awaiting turn in games or group situations
19. ...often blurts out answers to questions before they have been completed
20. ...often interrupts or intrudes on others, e.g., butts into other children's games

Describes the pupil now or within the past 2 months...

27. Impulsive or acts without thinking
28. Talks out of turn
29. Aches or pains (not stomach or headaches) (without known medical causes)
30. Headaches (without known medical causes)
31. Deliberately harms self or attempts suicide

Considering that several items in the TLI correspond to traits posited by Thomas and Chess (1977), and that low inhibitory control in early childhood, conceptualized within a temperament framework, predicts SUD in adulthood (Caspi, Moffitt, Newman, & Silva, 1996), it was hypothesized that higher parental loading for SUD predicts temperament disturbances in infancy and higher TLI score in childhood, which in turn predicts SUD in adulthood. Furthermore, TLI score is hypothesized to mediate the relationship between number of SUD affected parents and SUD manifested in the offspring at 22 years of age. To determine whether temperament disturbance constitutes the psychological phenotype of transmissible risk in young children, it is hypothesized that temperament mediates the association between number of SUD parents and severity of transmissible risk. Confirming these hypotheses would provide important evidence that temperament disturbance in early childhood contributes to the transmissible risk for SUD that is conferred from parent to child.

2. Methods

2.1. Participants

Participants were 482 10–12 year-old boys having biological fathers who either qualified for DSM-III-R diagnosis of SUD consequent to use of an illicit drug (SUD+, $N = 245$) or had no adult psychiatric disorder (SUD–, $N = 237$). The sample was confined to boys because the TLI is still undergoing development and validation in females. Multiple recruitment procedures were required due to the low prevalence of men diagnosed with lifetime SUD consequent to use of illegal drugs who have a healthy son in the designated age range and current or past spouse willing to participate in this long-term project. The families were recruited using random digit telephone calls, advertisement and public service announcements. Approximately 20% of the SUD+ fathers were recruited from substance abuse treatment programs. Exclusion criteria for the fathers

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