



# Chaos, Hubbub, and Order Scale and Health Risk Behaviors in Adolescents in Los Angeles

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**Objective** To determine the relationship between household chaos and substance use, sexual activity, and violence-related risk behaviors in adolescents.

**Study design** We analyzed cross-sectional data among 929 high-school students in Los Angeles who completed a 90-minute interview that assessed health behaviors and household chaos with the 14-question Chaos, Hubbub, and Order Scale (CHAOS). Using the generalized estimating equation and adjusting for personal, parental, and family covariates, we examined associations of CHAOS score with substance use, sexual activity, and violent behavior outcome variables. We also examined the role of depression and school engagement as mediators.

**Results** Mean (SD) age of the 929 students was 16.4 (1.3) years, 516 (55%) were female, and 780 (84%) were Latino. After adjustment, compared with students with CHAOS score 0, those students with the greatest scores (5-14) had ORs of 3.1 (95% CI 1.1-8.7) for smoking, 2.6 (95% CI 1.6-4.4) for drinking, 6.1 (95% CI 1.8-21) for substance use at school, and 1.9 (95% CI 1.1-3.3) for fighting in the past 12 months. Associations between CHAOS score and sexual risk and other violent behaviors were not significant. Depression and school engagement attenuated the associations.

**Conclusions** In this group of adolescents, greatest CHAOS score was associated with increased odds of risky health behaviors, with depression and school engagement as potential mediators. In the future, CHAOS score could be measured to assess risk for such behaviors or be a target for intervention to reduce chances of engaging in these behaviors. (*J Pediatr* 2015;167:1415-21).

Chaos has been defined as the overall physical, social, and environmental disorder in a person's life<sup>1</sup> and may be an important but understudied determinant of health. The Chaos, Hubbub, and Order Scale (CHAOS) assesses the amount of disorder in the home environment<sup>1</sup> and has been linked longitudinally in children and adolescents to increased psychological distress,<sup>2</sup> learned helplessness,<sup>3</sup> and poor self-regulatory ability.<sup>4</sup> A chaotic home environment also has been shown to be longitudinally associated with more conduct problems and hyperactivity-inattention in childhood and early adolescence.<sup>5</sup> Despite the evidence that household chaos is associated with the aforementioned poor psychosocial outcomes in children, we are unaware of studies in which authors have examined the relationship between household chaos and health behaviors in adolescents.

Risky health behaviors—such as substance use, sexual risk behaviors, and violent behaviors—often are acquired during adolescence<sup>6</sup> and contribute significantly to morbidity and mortality.<sup>7,8</sup> According to Youth Risk Behavior Surveillance System (YRBSS) data from 2013, 16% of teens have smoked cigarettes in the past 30 days, 34% report having been sexually active, and 18% have carried weapons in the past 30 days.<sup>6</sup> Household chaos, through effects on self-regulatory ability, disruptive behaviors, or other mechanisms, could be a predisposing factor for risky health behaviors in adolescents, or could be an important downstream effect of risky behaviors, but has not been studied in this context. Understanding the association of chaos and adolescent health risk behaviors is an important first step in exploring the relationship.

The objective of our study was to determine whether household chaos is associated with self-reported engagement in health risk behaviors in a sample of low-income, minority high school students. We hypothesized that a greater CHAOS score, because it is associated with increased psychological distress and decreased self-regulatory ability in adolescents, ultimately would be associated with a greater risk of substance use, risky sexual behaviors, and violent behaviors.

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A-CASI	Audio-enhanced computer-assisted self-interview
CES-D	Center for Epidemiologic Studies Depression Scale
CHAOS	Chaos, Hubbub, and Order Scale
RISE	Reducing Health Inequalities through Social and Educational Change
YRBSS	Youth Risk Behavior Surveillance System

## Methods

The Reducing Health Inequalities through Social and Educational Change (RISE) study was a cross-sectional natural experimental study originally designed to examine the impact of exposure to high-performing school environments on risky behaviors among low-income adolescents.<sup>9</sup> In 2010 and 2011, the study sampled students who had applied to enter 1 of 3 high-performing charter high schools in Los Angeles between 2007 and 2010. Admission into these schools was determined by lottery. The RISE study compared those who were and were not accepted into these charter schools and thus included some students who attended traditional public schools. We examined data from all participants who completed the face-to-face survey. The RISE study received approval from the Medical Institutional Review Board of the University of California, Los Angeles, and this study was granted exemption from review by the Institutional Review Board of the Harvard Pilgrim Health Care Institute.

Investigators accessed lists of applicants to the 9th-grade lottery for the 3 charter schools in 2007-2010. Investigators randomly selected 2384 students from the list of applicants, 952 of whom had been accepted to attend charter schools by lottery, and 1432 of whom had not. Of the potential participants, 410 could not be contacted, and 736 were ineligible because they attended a private school, a charter school outside of the lottery, or received preference in the charter school lottery because they had a sibling at the charter school. Of the remaining students, 308 refused to participate (24.9% refusal rate). We excluded 1 subject who only answered the demographic questions, leaving 929 students who completed the interviews and whose data we analyzed.<sup>9</sup>

After receiving written consent, research assistants administered a 90-minute interview with students to assess their demographics, school information, depression (the 20-item Center for Epidemiologic Studies Depression Scale, CES-D),<sup>10</sup> school engagement,<sup>11</sup> and parenting style.<sup>12</sup> Investigators measured household chaos using the CHAOS questionnaire, 14 yes-no items such as—"we almost always seem to be rushed," and "it's a real zoo in our home" (Table I).<sup>1</sup> The CHAOS questionnaire was derived from

observations and parent interviews from hundreds of home visits during the Louisville Twin Study in the 1980s<sup>1,13</sup> and subsequently validated and used widely in children and adolescents.<sup>1,5,14</sup> In a sample of 123 families in the Louisville study, the CHAOS questions had a Cronbach alpha of 0.79, and when validated against direct observation in a sample of 52 families, had a high correlation with observer-reported measures of household chaos.<sup>1</sup> The CHAOS questionnaire also has been shown to be reliable and valid in Latino families. In a study of the CHAOS questionnaire in the families of 68 Latino children, the instrument was found to have similar reliability (Cronbach alpha of 0.79) and high convergent validity against other measures of parental stress and child behavior.<sup>15</sup>

Research assistants conducted interviews in as private a setting as possible, at the student's home, school, or in a public place without parents present. All participants were able to complete the interview in English. Subjects completed sensitive portions of the interview, including report of the health risk behaviors via audio-enhanced computer-assisted self-interview (A-CASI). A-CASI has been shown to be more sensitive than in-person interview for sensitive topics.<sup>16</sup> RISE Investigators drew questions about health risk behaviors from the Youth Risk Behavior Survey.<sup>17</sup> Using an iPad (Apple Inc, Cupertino, California), students could themselves read and then respond to the questions, or click a button to have the computer read the question to them, and then respond.

Primary outcomes included questions about substance use (tobacco use, alcohol use, or marijuana use in the past 30 days, or any substance use at school in the past 30 days), sexual activity (whether students had had sexual activity in the past 90 days, whether they had used contraception at their last sexual encounter, or whether they had used substances during sex in the past 90 days), and violent behaviors (whether students had carried a weapon in the past 30 days, whether the student had been involved in a gang in the past 12 months, or whether the student had been in a fight in the past 12 months).

### Data Analyses

We summed the 14 individual CHAOS items to create a composite score on a 0-14 scale. In preliminary bivariate analysis, we found the relationship between CHAOS and risk behavior outcomes to be nondichotomous and nonlinear, and given the sample size and prevalence of primary outcomes, we divided the subjects into 4 roughly equal groups by CHAOS score—score 0, 1-2, 3-4, and 5-14. We dichotomized responses to questions about risky health behaviors.

We used the generalized estimating equation to examine the relationship between chaos and risky health behaviors, accounting for clustering at the school level by adding terms for fixed effects of each school. We sequentially added sets of covariates to control for pre-specified individual, family history, parental socioeconomic factors, and school type (traditional public vs charter). We prespecified covariates on the basis of previous evidence of association with CHAOS score, health risk behavior or both—it is known, for example, that

**Table I. The CHAOS Questionnaire**<sup>14</sup>

For each of the following statements, please tell me whether you think it is true or false for you.

1. There are very few disturbances in our home.
2. We can usually find things when we need them.
3. We almost always seem to be rushed.
4. We are usually able to stay on top of things.
5. No matter how hard we try, we always seem to be running late.
6. It's a real zoo in our home.
7. At home we can talk to each other without being interrupted.
8. There is a lot of needless worrying going on in our home.
9. No matter what our family plans, it usually doesn't seem to work out.
10. It's so noisy, you can't hear yourself think in our home.
11. I often get drawn into other people's arguments at home.
12. Our home is a good place to relax.
13. The telephone takes up a lot of our time at home.
14. The atmosphere in our home is calm.

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