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Household Chaos and Sleep-Disturbing Behavior of Family Members: Results of a Pilot Study of African-American Early Adolescents

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Abstract

Background—Although disorganized, chaotic households have been linked to poorer sleep outcomes, how household chaos actually manifests itself in the behaviors of others around the bedtime of a child or adolescent is not well understood.

Objective—To determine whether household chaos was associated with specific, nightly sleep-disturbing activities of adolescents' family members.

Design—Longitudinal study

Participants—Twenty-six African-American or multi-ethnic early adolescent (ages 11–12 years) and parent dyads, recruited from local schools and social-service agencies in greater Cleveland, OH.

Measurements—Over 14 days, each night at bedtime, adolescents identified family-member activities keeping them awake or making it difficult to sleep by using a smart-phone-administered survey. Household organization was assessed via parent-completed, validated instruments. A generalized linear mixed model examined associations between each activity and household-organization measures.

Results—Adjusted for the effect of school being in session the next day, an increasingly chaotic household was associated with increased odds of household members disturbing adolescents'

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efforts to fall asleep by watching TV/listening to music (odds ratio [OR]=1.8, 95% confidence interval [CI]=1.2–3.2), phoning/texting (OR=1.7, 95%CI =1.2–2.9), or having friends/relatives over visiting at the home (OR=1.6, 95%CI =1.0–3.0). Conversely, a more chaotic household was associated with decreased odds of adolescents reporting that “nothing” was keeping them awake or making it more difficult to sleep (OR=0.6, 95%CI =0.4–0.8). Enforced sleep rules were inconsistently associated with sleep-disturbing behaviors.

Conclusion—Improving early-adolescent sleep may benefit from considering the nighttime behavior of all household members and encouraging families to see that improving early-adolescent sleep requires the household’s participation.

INTRODUCTION

Sleep occurs in socio-cultural context,¹ and a number of interrelated social and environmental characteristics influence child and adolescent sleep duration and timing, including parenting practices and styles,^{2,3} work/school schedules and demands,^{4–7} bedroom electronics,^{8–11} and noise from neighbors and air/vehicular traffic.^{12–17} One important contextual characteristic shaping sleep is household organization. Households may differ substantially in their level of organization, as expressed by the presence (or absence) of observed routines, enforced rules, and parental monitoring of adolescents’ activities. The increased presence of routines and rules around sleep are generally associated with greater sleep duration, quality, or both, for young children and adolescents.^{7,18–22}

One construct of household organization important to sleep behavior is household chaos, which is characterized as disorganization, confusion, and lack of structure or predictability in the home setting.²³ Research has linked chaotic settings with a range of health and behavioral issues in children and adolescents.^{24–26} A small number of studies have examined the relationship between household chaos and sleep, and most, though not all,²⁷ have reported increased levels of chaos associated with increased sleep problems in preschool^{28–30} and school-age children.³¹ Household chaos has also been found to mediate the relationships between SES and poor sleep in women³² as well as between young children’s emotional/behavioral problems and bedtime resistance.²⁸

Existing research provides a picture of what a chaotic household may look like in terms of the child or adolescent’s own behavior: e.g., lack of a regular routine around bedtime. Investigators have also speculated that chaos might be exhibited by inappropriate levels of household noise, light, and temperature.³⁰ Yet, how chaos concretely manifests itself via the specific behaviors of others around a child or adolescent’s bedtime is less clear. As part of a pilot study investigating the use of ecological momentary assessment approaches³³ to study household organization and sleep among early-adolescent African-Americans (forthcoming), we investigated how household chaos is concretely expressed at an adolescent’s bedtime. Specifically, we sought to determine whether household chaos was associated with potentially sleep-disturbing nightly activities of adolescents’ family members. Our primary hypothesis was that greater household chaos would be associated with the adolescents reporting more frequent sleep-disturbing activities of others in the home setting. Our secondary hypothesis was that other potential contributors to household organization, such

as parental monitoring of child's behavior, and the presence of routines and enforcement of sleep-related rules, would be inversely associated with adolescent-reported, sleep-disturbing activities of other household members.

METHODS

Study Procedure

African-American children 11–12 years of age and a caregiver were recruited from elementary schools and community agencies in greater Cleveland, OH. Study eligibility criteria consisted of: child age 11–12 years, African-American ethnicity, and ability to read English. One adult caregiver (usually mother) and one child from each family participated. If multiple eligible children were present in the home and interested in participating, the child whose birthdate (day and month) was closest to the initial study-visit date was selected to be included in the analytic sample. All parents provided informed consent and children provided assent. The protocol was approved by the University Hospitals Case Medical Center Institutional Review Board.

A smart phone was provided to each adolescent and used to administer a survey each evening before bedtime and a follow-up survey the next morning over the two-week study period. With the exception of school being in session (assessed by morning survey), this report focuses on the information obtained by the bedtime survey. The bedtime survey was programmed so that the survey was available on the phone for completion starting at 4 PM through 4 AM the next morning. This way, participants could quickly complete the survey with minimal disruption. Participants were instructed to click on the icon for the survey application on the phone screen before they went to bed. There was also an icon to 'opt out' of the survey if they decided they just wanted to go to bed. Based on information obtained from previous research in Cleveland on bedtimes in this age group,³⁴ the smart phone was programmed to provide an audio soft chime/vibration prompt for the bedtime survey beginning at 9:00 PM and continuing every 30 minutes until 11:00 PM, when it automatically stopped. We also took steps to minimize unnecessary prompting, such as stopping the prompts once the child completed survey or if child opted not to complete the survey.

The survey contained questions about a range of sleep-related topics: e.g., daytime naps, participant activities before and at bedtime, and whether the participant was sick or went to school that day. The survey also included a question about other household members' activities occurring around the participant's bedtime that the participant felt were making it difficult to sleep. Data were transmitted via the smart phone to a secure study server for storage and analysis. To minimize the possibility of the cell phone use affecting adolescents' nighttime behavior, "data-only" plans for the smartphones were obtained to preclude telephone calls, and the parental control application "Kids Place" (Kiddoware, Tempe, AZ) was installed on the smartphone to restrict phone use to study purposes only. Participants were compensated for their time.

Measures

Potential Study Covariates: Demographic and School-Related—Caregivers provided: child age, sex; caregiver's sex and education (dichotomized as high-school graduate or less, versus greater than high-school graduate); total family income (categorized as USD\$22,500 or >USD\$22,500, the sample median); caregiver's current living arrangement (alone or with spouse/partner); household density (number of residents per bedroom); presence of night- or swing-shift worker in household (yes/no). Neighborhood poverty rate was obtained for the U.S. census tract in which the domicile was located (www.census.gov). Concerning the study's one potential time-varying covariate, the adolescent indicated via the survey whether or not school was in session each day.

Main Study Predictors: Household organization variables—*Household chaos* was measured with the caregiver-completed 15-item Confusion, Hubbub, and Order Scale (CHAOS),²³ assessing the level of disorganization/commotion in home environments. The CHAOS has displayed sound internal consistency and validity in samples of African-American families.^{23,35} Here, internal consistency was acceptable: Cronbach's alpha = 0.76. Frequency of *child routines* was measured by the caregiver-completed 36-item Child Routines Inventory (CRI),³⁶ which has shown good validity and internal consistency among ethnically mixed samples of children and adolescents. In this study, internal consistency was good: Cronbach's alpha = 0.84. *Parental monitoring* was measured by the child-completed 7-item Parental Monitoring Scale,³⁷ assessing the degree to which parents were aware of their children's daily activities and friends. Cronbach's alpha for the scale was acceptable: 0.74. Consistent enforcement of *sleep rules* was assessed by caregivers' enforcement of 4 rules identified by previous pilot work with similar Cleveland families: child having a set bedtime on school nights; family members required to lower TV volume and noise from other activities at the child's bedtime; child turning off bedroom electronics at bedtime on school nights; and child not allowed to snack after bedtime.³⁸ Caregivers used a 4-pt. scale (0=almost never, 4 = nearly always) to indicate rule-enforcement frequency, and a variable was created for each rule.

Study Outcomes: Potentially Sleep-Disturbing Family Activities—Each night before bedtime, children identified family-member activities that are “keeping you awake or making it difficult to sleep” using the smart phone-administered survey and a list of likely activities initially determined from the literature and previous sleep-related research conducted with Cleveland-area children,^{38,39} and refined during pre-testing of the smart-phone survey system over 7–14 nights with each of 5 Cleveland-area children 11–12 years of age: Visiting with friends or relatives at the home; Watching TV or listening to music; Doing homework or chores; Playing video games; On the phone or texting; Eating; Other; and Nothing (disturbing sleep).

Analysis Plan

Means (and standard deviations) and frequencies (and proportions) were used to summarize sample characteristics for continuous and categorical data, respectively. To avoid undue influence from a single participant, we used a generalized linear mixed model (i.e. logistic regression with random effects). A random effect was used for each individual, which allows

individuals to differ in the proportion of times they report a sleep-disturbing behavior and accounts for the correlation between measurements of the same individual made on different days. We initially examined for associations between household-member activity and (1) whether school was in session the next day (as a time-varying co-variate); and (2) each demographic variable one at a time adjusted for school in session the next day. Final analyses used a generalized linear mixed model to examine the association between each household-member activity (as the outcome) with each predictor one at a time, adjusted for whether school was in session the next day (see below). Also, we did not find an association between the number of observations collected for each child and the child's reporting that no one was disturbing their sleep ($p = 0.69$), supporting that the missing-at-random assumption was met. We therefore used the maximum likelihood generalized linear mixed-model approach, which is known to be robust under the missing-at-random assumption.^{40,41} We examined the 4 sleep rules independently because of evidence that different rules may differentially influence sleep behavior.^{20,22} Results are expressed as odds ratios with the corresponding 95th percentile confidence intervals.

RESULTS

Study Sample

The analytic sample consisted of 26 children (Table 1). Most children were 11 years of age (53.8%), girls (61.5%) and identified by their caregiver as African-American (80.8%). Five of the children were identified by their caregiver as "bi-racial": four African-American and White, and one African-American and Native American. Most participating caregivers were the child's biological parent (88.5%) and female (92.3%).

Approximately one-third of caregivers were married or living with a partner (30.8%) and had a high-school degree or less (34.6%). Median annual income was \$22,500, and 8 (30.8%) children lived in public housing. Families lived in predominately poor neighborhoods: the threshold used by the US Bureau of the Census for a geographic area to be considered as an area of concentrated poverty is a poverty rate of 40% or greater. In this study, the mean poverty rate for the children's neighborhoods (US census tract) of residence was 40.6%, and one-half of the sample lived in a neighborhood with concentrated poverty. The average household density was 1.4 (SD 0.6) persons per bedroom. Fifteen of the children (57.7%) lived in single family homes, 8 children lived in multiple-unit apartment buildings (30.7%), and three children (11.5%) lived in duplexes. Ten of the children shared a bedroom with one sibling (in two cases, they shared a single bed), and two of the children shared a bedroom with two siblings. In 30.8% of homes, at least one household member was working a night or swing shift; the remaining homes had day worker(s) only.

Completion of Smartphone Survey

Over the 2-week study period, pre-bedtime surveys were completed on 226 of the 272 evenings for which the survey was available (unavailability of survey in 92 nights due to connectivity and application issues and adolescent spending the night in another home), resulting in a completion rate of 83%. Study participants' completion of the pre-bedtime

survey was not associated with any child, household, or neighborhood demographic characteristic (not shown).

Distribution of Potentially Sleep-Disturbing Activities

The frequency of sleep disturbance activities varied across children (Figure 1). Three children indicated that “nothing” disturbed their efforts to sleep every night of the study, and another five children similarly reported that no household members’ activities were interfering with sleep efforts at least 80% of the study nights. In contrast, some children reported high levels of sleep-disturbing activity. For example, four children reported that TV noise or music was disturbing their efforts to sleep at 80% of the study nights or more. Three children reported that household members’ phones calling/texting was similarly disrupting at least 80% of the study nights. Also, three children reported that nighttime visitors to the home were making it more difficult to sleep.

Identification of Covariates to include in Final Analytic Models

Analyses of the time-varying variable “school in session the next day” showed that “school in session tomorrow” resulted in over twice the odds of an adolescent indicating that “nothing” was keeping him/her awake or disturbing the attempt to sleep: Odds Ratio (OR) = 2.35, 95% Confidence Interval (95%CI) 1.05, 5.6. Analyses of demographic characteristics revealed that a higher neighborhood poverty rate (10% increase) was associated with (a) greater odds of an adolescent reporting that a household member doing housework or chores was keeping the adolescent awake or making it more difficult to sleep (OR = 1.79, 95%CI 1.10, 3.39); and (b) lower odds of an adolescent reporting that “nothing” was keeping the adolescent awake or making it more difficult to sleep (OR = 0.74, 95%CI 0.48, 0.90). No other significant relationships involving the demographic variables (e.g., child sex and age, caregiver living arrangement and education, presence of at least one household night-shift or rotating-shift worker, household income, household density, public housing domicile) were observed. Based on these results, “school in session the next day” was included in all subsequent models. Because the small sample size raised concerns about overfitting the analytic models by adding another baseline (time-constant) covariate, we conducted sensitivity analyses to determine whether addition of neighborhood poverty to the analytic models substantially changed results. Results did not change appreciably, so here we report results with only the addition of “school in session the next day” in the analytic models. Results adjusted for both “school in session the next day” and neighborhood poverty are presented in Supplemental Table 1.

Relationship Between Household Members’ Nighttime Sleep-Disturbing Activities and Household Organization

Adjusting for the effects of school being in session the next day, an increasingly chaotic household was associated with increased odds of several sleep-disturbing family activities (Table 2): watching TV/listening to music (OR = 1.8, 95%CI = 1.2–3.2), talking on the phone/texting (OR = 1.7, 95%CI = 1.2–2.9), having friends/relatives over visiting the home (OR = 1.6, 95%CI = 1.0–3.0). On the reverse side, a more chaotic household environment was associated with decreased odds of “nothing” keeping the adolescent awake or making it more difficult to sleep (OR = 0.6, 95%CI = 0.4–0.8). In contrast, frequency of child routines

and parental monitoring were not associated with the occurrence of any adolescent-reported sleep-disturbing behaviors.

Regarding sleep rules, a consistently enforced bedtime for the adolescent was associated with increased odds of “nothing” keeping the adolescent awake (OR = 3.5, 95%CI = 1.5–9.1), and a consistently enforced rule forbidding electronics use after bedtime was associated with lower odds of visitors at the household (OR = 0.1, 95%CI = 0.01, 0.9). On the other hand, some sleep rules were associated with more sleep-disturbing behavior: a consistently enforced “no cell phone after bedtime” rule was associated with a 50% decrease in the odds of “nothing” disturbing sleep (i.e., greater likelihood that something made sleeping more difficult) and the consistently enforced “no snacks after bedtime” rule was associated with 4 times the odds of the adolescent reporting that other family members were disturbing the adolescent’s sleep via talking on the phone or texting (Table 2). Of note, the rules “no cell phone use after bedtime” and “no snacking after bedtime” were associated with elevated odds ratios of other household members disturbing efforts to sleep by talking on the phone/texting and eating, but with broad confidence intervals that included 1: e.g., children with a no snacking after bedtime rule had 3.8 times the odds (95%CI = 0.8, 42.4) of reporting that other family members’ eating was disturbing their efforts to sleep; children with a rule forbidding cell phone use at bedtime was associated with 3.5 times the odds (95%CI = 1.0, 20.4) of reporting other household members’ cell phone use/texting at bedtime as disturbing efforts to sleep.

Finally, additional analyses revealed no significant effect of the interaction of “school in session tomorrow” and each measure of household organization (e.g., CHAOS, CRI) in the analytic models, thereby indicating that observed effects of the measures of household organization were similar regardless of whether or not school was in session the next day (not shown).

DISCUSSION

This pilot study investigated the relationship between household organization and household members’ nighttime activities that young African-American adolescents reported were “keeping them awake or making it difficult to sleep.” Our hypothesis that household chaos would be associated with greater frequency of sleep-disturbing activities was confirmed: As household “chaos” increased, adolescents were more likely to report sleep-disturbing activities such as family members watching TV, listening to music or talking on the phone, or family members entertaining visitors at the home, and they were less likely to report that “nothing” (i.e., no other family member activity) was keeping them awake or making it more difficult to sleep. These findings point to the potential importance of other family-members’ nighttime activity when an adolescent is trying to sleep. With the exception of household disturbances presumably made by shift or nighttime workers returning home from work,⁵ the literature on nighttime behaviors has seemingly focused largely on those of the adolescents themselves and less on behaviors of other family members. Research involving household members’ behavior when younger children are trying to sleep has seemingly gravitated towards behavior of parents at their child’s bedtime, and indicate the positive effect on sleep of parents promoting and assisting with bedtime routines,^{42–44} as well as the

tendency for active intervention, particularly physical comforting strategies, to be associated with increased sleep problems.^{45,46} Here, study findings underscore how the *entire* household may contribute (or not) to the “sleep-friendliness” of the early adolescent’s sleep environment.

Our second hypothesis was partially confirmed. Although presence of child routines, parental monitoring, and consistently enforced sleep rules were conceptualized as contributing to overall household organization and, therefore, to a more sleep friendly environment in general, observed associations when present were few and were inconsistently related to other household members’ “sleep disturbing” behaviors. On one hand, consistent enforcement of the bedtime and no electronics use rules were associated with a less sleep-disturbing environment, findings congruent with other reports linking consistent enforcement of a bedtime rule and decreased use of electronics in the bedroom or at bedtime (or both) with better sleep.^{22,47,48} On the other hand, rules forbidding snacking and cell phone use were associated with more sleep-disturbing activities of household members. Perhaps these findings may be explained by the fact that the child routines and three of the four sleep rules target the adolescent, not the other family members: organization or structure around one individual in a household may not extend to other household members.

Of note, school nights had over twice the odds of our adolescent study participants reporting that “nothing” was keeping them awake or disturbing their sleep compared to reports on non-school nights. This finding may speak to the efforts of parents to try to improve the night-time “sleep friendliness” of the home environment when they know their children must go to school the next morning, and perhaps may serve as a foundation for additional sleep-improvement activities.

Although not statistically significant, we thought it intriguing that some of the largest observed odds ratios linked consistent enforcement of rules forbidding post-bedtime snacking or cell phone use with adolescent reports of their sleep being disturbed by other household members engaged in these very activities. For example, adolescents trying to sleep and who are not allowed to snack after bedtime had nearly four times the odds of reporting that their efforts to fall asleep were disturbed by other family members eating. We suspect that the association between rules and sleep-disturbing behaviors were observed because parents enforced the rules in response to adolescents joining in or wanting to join in the activities. However, we cannot rule out the possibility that adolescents from families with high rates of poverty were going to bed hungry, which could make those adolescents more sensitive to other family members’ activities, particularly eating. The small sample size coupled with the cross-sectional nature of the data and lack of additional information about the circumstances under which the rules were established render further analyses to understand the influence of poverty on the observed associations and interpretation of the results challenging.

The study had notable limitations; as indicated above, it utilized a small convenience sample, and each participant’s data were collected over a single two-week period. Moreover, pre-bedtime survey data were missing some nights, due largely to connectivity issues with

the smart phone. Also, sleep-disturbing behaviors were examined independently in this study. However, they may co-occur, and future research with larger sample sizes would permit analysis of the effects of clusters of sleep-disturbing behaviors. Finally, the possibility of reporter bias cannot be ruled out: participants may have identified behaviors salient to them not because the behaviors disturbed sleep but because participants observed others engaged in the very behaviors forbidden to them.

In light of these limitations, we are cautious in drawing conclusions or clinical implications from the findings. Perhaps the safest implication to be made is that efforts to improve early adolescent sleep may benefit from considering the nighttime behavior of all household members and encouraging families to see that improving adolescent sleep requires all family members' participation. Such a "systems approach" has been used with families to address a range of health behaviors.⁴⁹ Studies such as this one point to possible areas to target for future intervention: e.g., working with families to reduce use of, or at least the volume of, TVs, music, or phone calls; and being cognizant of the potential for night-time visits to generate sleep-disturbing noise for those household members already in bed. Future studies should investigate how entire households may contribute to adolescent sleep behaviors. In this view, Fuligni and colleagues' work to investigate sleep behavior of multiple household members simultaneously is exemplary.⁵⁰ Also, future investigations should involve a substantially greater number of children, with a more ethnically diverse sample and broader age range, to better understand how differences in household organization may influence sleep across the developmental spectrum and across different levels of economic advantage/disadvantage.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.

Proportion of Nights Other Household Members Engaged in Sleep-Disturbing Activities (n=26 participants)

Note: Figure 1 shows the proportion of nights that children reported household activities that were keeping the child awake or making it difficult for her/him to sleep. For example, the two circles in the column “TV/Music” at the proportion equal to 1 (or 100%) indicates that two participants (each circle represents an individual child) reported other household members disturbing their efforts to sleep by watching TV or listening to music every night they completed the survey. An activity with a large cluster of children at proportions at 0.2 or less indicates that relatively few children reported the activity as disturbing their sleep across the study nights.

Table 1

Sample Characteristics (n=26 participants)

Characteristic	Number (%) or Mean (SD)
Child	
Age 11 years	14 (53.8%)
Age 12 years	12 (46.2%)
Female sex	16 (61.5%)
African-American	21 (80.8%)
Mixed ethnicity	5 ^a (19.2%)
Caregiver	
Biological Parent	23 (88.5%)
Female sex	24 (92.3%)
High school diploma or less	9 (34.6%)
Married/Living with Partner	8 (30.8%)
Household/Neighborhood	
Family Income \$22,500 (median) (n=25)	15 (60.0%)
Single family home	15 (57.7%)
Public Housing Domicile	8 (30.8%)
Household density (persons/bedrooms)	1.4 (0.6)
Shared a bedroom with at least one sibling	12 (46.2%)
At least one household member on night/rotating shifts	8 (30.8%)
Neighborhood poverty rate (per 100 residents)	40.6 (25.9)

Associations between Household Members' Sleep-Disturbing Activities^a and Household Organization, adjusted for "school in session tomorrow" (n=226 nights)

Household Measure ^a	Household Members' Sleep Disturbing Activities							
	Nothing (disturbing sleep) OR 95% CI	Visiting with friends, relatives OR 95% CI	Watching TV / Listening to Music OR 95% CI	Doing Homework / Chores OR 95% CI	Playing Video Games OR 95% CI	On Phone / Texting OR 95% CI	Eating OR 95% CI	Other OR 95% CI
CHAOS	0.6** 0.4, 0.8	1.6* 1.0, 3.0	1.8** 1.2, 3.2	1.3 0.8, 2.6	1.2 0.8, 1.9	1.7** 1.2, 2.9	1.4 0.7, 3.4	0.8 0.4, 1.5
Child Routines	1.1 1.0, 1.2	0.91 0.8, 1.0	1.0 0.8, 1.1	1.0 0.9, 1.1	1.0 0.9, 1.1	1.0 0.8, 1.1	1.1 0.9, 1.5	NC
Parental Monitoring	1.0 0.7, 1.3	1.2 0.7, 2.4	1.1 0.7, 1.8	1.5 0.9, 2.6	1.1 0.8, 1.6	0.8 0.5, 1.3	NC	1.4 1.0, 2.21
Rule: Bedtime	3.5** 1.5, 9.1	0.3 0.04, 2.2	0.3 0.1, 1.3	0.7 0.1, 5.0	0.3 0.04, 1.0	0.4 0.1, 1.9	1.1 0.1, 29.3	0.9 0.1, 4.7
Rule: Reduce Activities	1.1 0.5, 3.0	0.7 0.1, 7.8	0.8 0.1, 4.0	1.2 0.2, 10.4	2.0 0.5, 19.0	2.5 0.5, 24.2	3.1 0.4, 574.3	2.0 0.4, 10.0
Rule: No Electronics	1.3 0.5, 3.4	0.1* 0.01, 0.9	1.3 0.3, 8.3	1.1 0.3, 8.3	2.0 0.5, 24.1	0.6 0.1, 2.5	0.6 0.02, 15.5	2.4 0.5, 29.0
Rule: No Cell Phone	0.5* 0.2, 0.9	1.7 0.2, 47.8	3.1 0.9, 14.6	1.8 0.6, 7.9	1.9 0.6, 7.4	3.5 1.0, 20.4	2.6 0.9, 9.7	2.3 1.0, 7.2
Rule: No Snacks	0.7 0.4, 1.6	1.2 0.2, 7.7	2.0 0.6, 6.5	NC	1.1 0.3, 3.3	4.4* 1.3, 25.2	3.8 0.8, 42.2	1.8 0.5, 7.2

* = p < .05,

** = p < .01

^a Each household measure modeled separately, with results adjusted for "school in session tomorrow."

Note: CHAOS = household chaos, CI = Confidence Interval, NC = Non-calculable due to too few events, OR = Odds Ratio