Lunchtime Practices and Problem Behaviors Among Multiethnic Urban Youth

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Abstract:

Research has begun to show associations between adolescents' mealtime practices and their engagement in problem behaviors. Few studies have addressed this longitudinally and/or examined lunchtime practices during the school day. This study tests for associations between urban multiethnic middle school students' (N = 1498) lunchtime practices in the sixth grade and their engagement in problem behaviors by eighth grade. Positive associations were found between not eating lunch at school in the sixth grade and increased drug use and delinquency by eighth grade. Eating lunch outside of school was found to be significantly associated with smoking and marijuana use only. Gender differences in associations between lunchtime practices and problem behaviors were suggested. Implications for school policy and prevention efforts are discussed.

Keywords: adolescents | substance use | school lunch

Article:

Adolescence is a unique transitional period marked by changes in biological, cognitive, emotional, psychosocial, and environmental domains. The myriad changes make adolescence a particularly vulnerable time for developing problem behaviors, including experimentation with both licit and illicit substances, involvement in aggressive and violent acts, and engaging in delinquent acts such as vandalism and shoplifting (Johnston, O'Malley, Bachman, & Schulenberg, 2005; Schulenberg, Maggs, & Hurrelmann, 1997). At the same time, early adolescents begin making less healthy food choices than during childhood, such as decreasing intake of fruits, vegetables, and milk and increasing the frequency of skipping meals (Lytle, Seifert, Greenstein, & McGovern, 2000). The field of adolescent health promotion requires a more holistic approach to understanding causal relationships across health domains (Williams, Holmbeck, & Greenly, 2002). This study examines associations between adolescents' reported practices during the school lunch period and their engagement in problem behaviors.

Adolescent Problem Behaviors

Substance use is typically initiated during early adolescence and the most recent national data show that by the end of eighth grade, 22% of all adolescents have tried an illicit drug, increasing to 51% by the end of high school (Johnston et al., 2005). Violence and aggression is another concern during adolescence, with 36% of the nation's high school youth reporting having been in a physical fight in the past year, 19% reporting that they carried a weapon in the past month, and 4% reporting treatment by a health professional for injuries sustained in a physical fight at least once in the past year (Centers for Disease Control and Prevention [CDC], 2006). Other problem behaviors that are associated with this developmental period include precocious sexual activity (particularly unprotected/risky sex), truancy and school dropout, vandalism, and shoplifting (CDC, 2006). Engagement in problem behaviors generally increases across the middle school years (Johnston et al., 2005; Schulenberg et al., 1997).

Gender-based analyses have previously shown men to exhibit greater engagement in problem behaviors. More recently, these differences have been diminishing. Drug use rates have been increasing among adolescent girls in the past two decades, and although some gender differences still exist, the gender gap is closing (Johnston et al., 2005). In addition, rates of delinquent behaviors and violence for women also have shown an increase in recent years and are coming closer to male rates (Snyder, 2003), particularly among urban adolescents of color (Nichols, Graber, Brooks-Gunn, & Botvin, 2006).

Problem Behaviors and Mealtime Practices. Several studies have begun to examine associations between engagement in problem behaviors and mealtime practices (i.e., meal skipping and engaging in family meals) or food choices among adolescents (Baer Wilson & Nietert, 2002; Benedict, Evans, & Calder, 1999; Crocker et al., 2001; Stice & Shaw, 2003). The majority of these studies focus on smoking among adolescent girls, which has been positively associated with unhealthy dieting behaviors and food choices (Baer Wilson & Nietert, 2002; Crocker et al., 2001; Stice & Shaw, 2003) and negatively associated with family meals (Benedict et al., 1999; Eisenberg, Olson, Neumark-Sztainer, Story, & Bearinger, 2004). Benedict and colleagues (1999), examining associations between meal patterns and drug use among 7th- through 12th-grade students in Nevada, found students who engaged in the highest levels of drug use were less likely to eat meals with family and more likely to eat meals with friends than the students reporting little or no drug use behavior. Drug-using students also were less likely to eat at school and more likely to eat at convenience stores and fast food restaurants. Most pertinent to the current study, students who reported the highest levels of drug use were no more likely to skip breakfast or dinner but were more likely to skip lunch.

Adolescent Lunchtime Practices

Striving for independence from parents and other authority figures is an important developmental task for adolescents. Making their own decisions about how to spend discretionary time, such as

the school lunch period, is one way in which adolescents may assert their independence. With the transition to middle school, many early adolescents face an expanded array of options for the lunch period, including eating in the school cafeteria (school lunch, items from the snack bar, à la carte line, or bagged lunch), eating snacks from other sources, eating lunch outside of school (e.g., in local restaurants or take-out shops), going home for lunch, or skipping lunch altogether.

The majority of studies on adolescents' school lunch practices have focused on nutritional issues, such as participation in and perceptions of the school lunch program; availability and purchase of competitive foods (i.e., foods other than those offered in the school meal program); or selection and consumption of specific foods, beverages, or nutrients (e.g., Cullen & Zakeri, 2004; Kubik, Lytle, Hannan, Perry, & Story, 2003; Probart, McDonnell, Hartman, Weirich, & Bailey-Davis, 2006). Findings from such studies suggest that many adolescents prefer alternatives to the school lunch program and choose other options, including skipping lunch altogether, when possible (Marples & Spillman, 1995; Moag-Stahlberg, Miles, & Marcello, 2003).

Although much has been written regarding the school food environment and adolescents' food choices, little research has examined how adolescents choose to spend their time during lunch periods and how these lunchtime practices may relate to other behaviors. The current study examines associations between what urban middle school students report doing during the lunch period and their subsequent engagement in drug use and delinquency.

Schools vary in their policies on allowing adolescents to leave the premises during the lunch period, but adolescents may choose to ignore or find ways to override school policy. In a Cincinnati school district in which students were not allowed to leave school during the lunch period, for example, one study found that the policy notwithstanding, 41% of high school students ate lunch off campus at least once a week and 9% reported going home for lunch two or more times per week (Marples & Spillman, 1995). Neumark-Sztainer, French, Hannan, Story, and Fulkerson (2005) found that approximately two thirds of the Minnesota high schools in their study had a closed lunch policy, and whereas students in those schools reported less use of fast food restaurants and convenience stores for lunch options, the amount was not zero, leading the authors to concur that students found their way off campus. Stone and Runyon (2005) found significant increases in adolescent risky driving during lunchtime in areas surrounding high schools with open campus policies. In large urban areas, such as New York City, where public transportation is readily available and alternative food choices (i.e., fast food restaurants) are within walking distance, many middle and junior high schools also have open campus lunch policies. As students transition through middle school they become less likely to eat school lunch or bring their lunch from home and more likely to buy lunch outside of school or otherwise skip school lunch (Birnbaum, Nichols, Allen, Griffin, & Botvin, 2005).

Goals of the Current Study

This article examines associations between the lunchtime practices of urban middle school students in the first year of transitioning to middle school and their development of problem behaviors over time. Given previous findings that erratic meal patterns, such as skipping meals, and diet practices have been associated with increased drug use (Baer Wilson & Nietert, 2002; Benedict et al., 1999; Crocker et al., 2001; Stice & Shaw, 2003), we hypothesized that students who reported not eating lunch in school would have greater engagement in drug use and delinquency over time than students who ate their lunch in school. We also hypothesized that students who reported eating their lunch outside of school, which represents a decrease in adult supervision, would be more likely to engage in more drug use and delinquency over time than students who ate their lunch in school. Previous studies have shown associations between unsupervised time after school and engagement in a variety of problem behaviors (Astor, Meyer, & Behre, 1999; Cohen, Farley, Taylor, Martin, & Schuster, 2002). However, few studies have examined unsupervised time during the school day.

The current study also examines gender as a potential modifier of the relationship between lunchtime practices and problem behaviors over time. In light of previous findings on the association between unhealthy diet practices and smoking among girls (Baer Wilson & Nietert, 2002; Crocker et al., 2001, Stice & Shaw, 2003), we hypothesized that the strength of the association between not eating lunch in school and drug use, specifically smoking, would be stronger for girls than boys.

METHOD

Research Design

The current study is part of a larger group-randomized clinical trial designed to expand and test the effectiveness of an already-proven drug prevention strategy as a means of preventing violent and aggressive behavior (Botvin, Griffin, & Nichols, 2006). A total of 42 public and parochial middle schools in New York City participated in the intervention study from 1998 to 2000. All schools participated in annual surveys with the cohort of students who entered sixth grade in 1998 through their completion of eighth grade in 2000; half of the schools received prevention programming for 3 years.

Participants

The current study uses data collected at baseline (sixth grade) and 2-year follow-up (eighth grade). Only participants from schools randomly assigned to the control condition at baseline (N = 2,961 students, N = 21 schools) were used to avoid possible confounding by intervention effects. Parochial school students (N = 308 students or 10% of the control sample, N = 11 schools) were excluded from analyses due to differences in access to free or reduced-price lunch options as compared with public school students.

Of the 2,362 students who completed the questionnaire during the sixth grade, 1,498 (63%) also participated during the eighth grade. Attrition analyses were performed to compare the baseline characteristics of students who responded to the questionnaire at both times with those who responded only at baseline. Chi-square tests and *t* tests were used where appropriate to determine differences between participants and those lost to attrition. Boys were more likely to drop out than were girls (38% vs. 32%, $p < .001$), as were those who did not eat lunch at school (eat lunch in school: 34%, do not eat lunch at school: 40%, and eat lunch outside of school: 42%; $p < .05$), those who did not live with two natural parents (intact: 31%, single: 39%, blended: 39%, and other: 47%; $p < .0001$), those who smoked yearly or more versus less than yearly (68% vs. 36%; $p < .0001$), and those who had ever used marijuana versus never used marijuana (60% vs. 36%; $p < .01$). Those who dropped out also were more likely to engage in delinquent behavior (average of 1.4461 vs. 1.3761 on the delinquency scale, which ranges from 1 to 5; $p < .01$).

The mean baseline age for the current sample was 11.7 years, with a range of 10.2 to 14 years. Approximately 49% of the sample was male, 25% Hispanic, 49% Black, 7% Asian, 7% White, and 12% Other. Approximately half (48%) of the students lived with both natural parents; 32% lived with a single parent; 11% lived with one natural parent and one stepparent; and 9% lived with other relatives, guardians, friends, or alone.

Procedure

A passive consent procedure approved by Weill Cornell Medical College's Internal Review Board (IRB) was used to inform parents about the nature of the study and to provide them with an opportunity to disallow their child's participation. A consent form describing the focus of the larger study and the self-report survey was both distributed in the schools and mailed directly to students' homes.

The survey was divided into two separate booklets and data collection was conducted on two separate days during regular 40-min class periods. A multiethnic team of three to five trained data collectors administered the questionnaire following a standardized protocol similar to those used in previous research (e.g., Botvin, Schinke, Epstein, & Diaz, 1994). Steps taken to ensure the quality of self-report data included using identification codes rather than names and assuring students about the confidentiality of their responses. Carbon monoxide (CO) breath samples also were collected at both surveys as a bogus pipeline procedure, which has been shown to increase the validity of self-report data (Evans, Hansen, & Mittlemark, 1977). This procedure involved informing students that they would be individually tested for smoking by assessing the level of CO in their expired air. The protocol specified that students should be informed prior to administration of the self-report survey and that the procedure should be demonstrated to the entire group. Students were then individually summoned to a semiprivate location as the self-report survey was being administered. Although this measure was used to increase the validity of questions pertaining to cigarette smoking, studies have shown bogus pipeline procedures also

can increase the validity of reporting other problem behaviors (Tourangeau, Smith, & Rasinski, 1997).

Measures

Demographic Data. Data on participant characteristics were collected using standard survey items assessing gender (dichotomous variable), household structure (four group variable: two-parent families, single-parent families, blended families, and other families), and race/ethnicity (five group variable: Black/African American, Latino, Caucasian, Asian, and Other).

Delinquency. Students were asked how many times in the past year they had engaged in each of 10 delinquent behaviors ($\alpha = .84$; Elliot, Huizinga, & Menard, 1989). Example behaviors included, "Thrown objects such as rocks or bottles at cars or people," "Taken part in a fight where a group of your friends were against another group," "Purposefully damaged or destroyed property or things that did not belong to you," and "Taken something worth less than $50." Response categories were on the following 5-point scale: 1 (*never*), 2 (*once*), 3 (*2-3 times*), 4 (*4-5 times*), and 5 (*more than 5 times*). Items were averaged, with higher scores indicating greater aggressive or nonaggressive delinquency.

Substance Use. The frequency of cigarette, alcohol, and marijuana use was assessed with separate items that asked, "How often (if ever) do you smoke cigarettes/drink alcohol/smoke marijuana?" Response categories ranged from *never* (1) to *more than once a day* (9). As expected given the age of the respondents, drug use rates were low; therefore, all drug use variables were dichotomized. Cigarette smoking and alcohol drinking were recoded as *past-year use* versus *less than yearly use*. Marijuana use was recoded as *ever* versus *never used*.

Lunch Practices. Students were asked about their lunch practices with the following question: "What do you do for lunch on school days?" Seven response options were provided and were collapsed into three distinct lunch practices. "I bring my lunch from home," "I receive free lunch from school," "I buy my lunch at school at a reduced price," and "I buy my lunch at school for the full price" were recoded as *In-School Lunch* to capture students who report eating their lunch inside the school building. "I go home for lunch" and "I buy my lunch outside of school" were recoded as *Outside Lunch* to capture students who report eating their lunch outside of the school building. "I don't eat lunch at school" was recoded as *No School Lunch*. This last category captures students who do not eat their lunch inside the school building but also do not report eating outside of school. Students in this category may skip lunch altogether but the response item is not specific enough to verify this possibility.

Data Analysis

Multivariate generalized estimating equations (GEE) models for dichotomous outcomes (cigarette smoking, alcohol, and marijuana use) were used to determine the effect of lunch practices on the outcomes, controlling for covariates (baseline drug use, race/ethnicity, gender,

and household structure). For the one continuous measure (delinquency), a mixed effects model was used, also controlling for the same covariates. Interactions between gender and lunch practices were examined and determined not to be statistically significant.

Because the surveys were administered at the school level, it was necessary to control for intracluster correlations (ICCs) among students within schools. In the present context, ICCs quantify the degree of similarity of students' questionnaire responses within schools and how lunch practices and drug use rates vary at the school level. Furthermore, we have found in our previous work that prevalence rates of drug and alcohol use are often lower among African American youth compared to other racial-ethnic groups, and therefore these behaviors may cluster among small intact groups of high-risk youth within some schools, underscoring the need to control for the ICCs (Scheier, Griffin, Doyle, & Botvin, 2002). Therefore, each analysis was run using the GEE approach in SAS PROC GENMOD or PROC MIXED to adjust the estimated standard error to account for the within-cluster correlation. This approach generally provides for a more conservative test of the hypothesis when a positive ICC is present (Norton, Bieler, Ennett, & Zarkin, 1996).

RESULTS

Table 1 shows the mean rates of drug use and delinquency among students by gender and lunchtime practices. As expected, rates of problem behaviors were low in the sixth grade and increased by eighth grade. Although some gender differences in problem behaviors are evident, more striking are the differences by lunchtime practices. In almost all cases in both the sixth and eighth grade, students who ate their lunch outside of school had higher mean levels of problem behaviors. Likewise, in all cases, students who ate lunch in school had the lowest rates.

Table 1. Self-Reported Drug Use and Delinquency in Sixth and Eighth Grade by Lunchtime Practice and Gender

	Total		Girls		Boys	
	M	*SD*	*M*	*SD*	*M*	*SD*
Sixth grade						
Smoking						
School lunch	1.04	0.26	1.04	0.25	1.05	0.27
Outside lunch	1.36	1.24	1.18	0.61	1.47	1.42
No lunch	1.12	0.51	1.10	0.51	1.13	0.46
Drinking						
School lunch	1.20	0.63	1.17	0.63	1.23	0.63
Outside lunch	1.46	1.22	1.25	0.56	1.63	1.41
No lunch	1.36	0.86	1.30	0.68	1.39	0.84

Marijuana use						
School lunch	1.01	0.18	1.00	0.06	1.02	0.24
Outside lunch	1.08	0.46	1.09	0.52	1.06	0.33
No lunch	1.02	0.13	1.01	0.10	1.02	0.15
Delinquency						
School lunch	1.33	0.52	1.23	0.37	1.44	0.63
Outside lunch	1.54	0.69	1.52	0.71	1.56	0.68
No lunch	1.46	0.57	1.39	0.50	1.54	0.61
Eighth grade						
Smoking						
School lunch	1.34	1.16	1.32	1.05	1.36	1.27
Outside lunch	1.91	2.03	1.85	1.91	2.06	2.27
No lunch	1.50	1.44	1.48	1.26	1.53	1.65
Drinking						
School lunch	1.55	1.20	1.53	1.16	1.56	1.25
Outside lunch	2.12	2.00	2.00	1.82	2.29	2.31
No lunch	1.81	1.40	1.86	1.36	1.76	1.46
Marijuana use						
School lunch	1.22	1.00	1.16	0.80	1.28	1.16
Outside lunch	1.74	1.97	1.78	2.15	1.69	1.64
No lunch	1.48	1.45	1.34	1.12	1.63	1.73
Delinquency						
School lunch	1.63	0.81	1.54	0.71	1.73	0.88
Outside lunch	1.90	1.03	1.93	1.05	1.88	1.01
No lunch	1.83	0.93	1.74	0.82	1.95	1.05

NOTE: Range for drug use variables = 1 (*no use*) to 9 (*more than daily use*). Range for delinquency score = 1 (*never in past year*) to 5 (*5 or more times in past year*).

Table 2 presents adjusted odds ratios for the three dichotomous dependent variables (smoking, drinking, and marijuana use) and the betas for the one continuous variable (delinquency) according to lunchtime practice using *In-School Lunch* as the comparison. The adjusted odds ratios indicate that adolescents who reported eating lunch outside of school (*Outside Lunch*) in the sixth grade were 3.5 times more likely to smoke and 2.23 times more likely to use marijuana

by the eighth grade than were adolescents who ate lunch at school (*In-School Lunch*). Adolescents who reported not eating lunch in school (*No School Lunch*) in the sixth grade were 1.84 times more likely to smoke, 1.45 times more likely to drink alcohol, and 1.78 times more likely to use marijuana by the eighth grade than were adolescents who reported eating lunch inside the school. The beta estimates indicate that not eating lunch in school (*No School Lunch*) in the sixth grade also was associated with more delinquent behaviors (i.e., shoplifting, vandalism, group fights) by eighth grade, with delinquency scores increasing by .11 (95% CI = 0.01–0.21) for students who did not eat lunch in school. No significant results were found for eating lunch outside of school.

Table 2. Estimates for the Effect of Lunch Practices on the Drug Use and Delinquency Variables

	Outcomes							
	Smoking		Drinking		Marijuana Use		Delinquency	
Lunch Practices	OR	CI (95%)	OR	CI (95%)	OR	CI (95%)	*B*	CI (95%)
Outside[a]	3.5	1.68–7.31	1.55	0.92–2.6	2.23	1.6–3.12	0.12	–0.05–0.28
No lunch[a]	1.84	1.33–2.55	1.45	1.13–1.86	1.78	1.24–2.55	0.11	0.01–0.21

NOTE: All analyses are adjusted for gender, race/ethnicity, household structure, and baseline (sixth grade) values of outcome variables. OR = odds ratio; CI = confidence interval. a. Versus school lunch.

Table 3. Estimates for the Effect of Lunch Practices on the Drug Use and Delinquency Variables Stratified by Gender

	Outcomes							
	Smoking		Drinking		Marijuana Use		Delinquency	
	OR	CI (95%)	OR	CI (95%)	OR	CI (95%)	*B*	CI (95%)
Girls								
Outside lunch[a]	3.12	1.36–7.16	1.74	0.77–3.92	1.8	0.7–4.63	0.09	–0.11–0.28
No school lunch[a]	2.07	1.19–3.61	1.76	1.21–2.56	1.49	0.72–3.09	0.03	–0.09–0.15
Boys								
Outside lunch[a]	3.84	1.18–12.54	1.36	0.6–3.09	2.88	1.64–5.05	0.08	–0.22–0.38
No school lunch[a]	1.71	0.81–3.62	1.12	0.71–1.78	2.02	1.21–3.37	0.16	–0.00–0.33

NOTE: All analyses are adjusted for gender, race/ethnicity, household structure, and sixth-grade outcome variables. OR = odds ratio; CI = confidence interval. a. Versus school lunch.

Despite the lack of statistical significance of the Gender × Lunch Practice interaction terms, evaluation of gender-specific parameter estimates indicated that gender differences exist for some dependent variables. Table 3 therefore presents results from the multivariate analyses stratified by gender. Girls who reported *Outside Lunch* or *No School Lunch* in sixth grade were 3.12 and 2.07 times more likely, respectively, to smoke by eighth grade than were girls who reported *In-School Lunch*. Girls who reported eating *No School Lunch* in sixth grade were also 1.76 times more likely to use alcohol by eighth grade than were girls who reported *Inside Lunch*, although similar associations were not seen for girls reporting *Outside Lunch* in the sixth grade.

No associations between lunchtime practices and marijuana use or delinquency were observed in girls.

In contrast, boys who reported eating *Outside Lunch* or *No School Lunch* in the sixth grade were 2.88 and 2.02 times more likely, respectively, to use marijuana by eighth grade than were boys who reported *In-School Lunch*. Boys who reported eating lunch outside of school in sixth grade were also 3.84 times more likely to smoke by eighth grade than were boys who ate lunch inside the school, although similar associations were not seen for boys who reported *No School Lunch*. No associations between lunchtime practices and alcohol use were observed in boys. There was, however, a marginal effect for delinquency ($p = .05$), with boys who reported eating *No School Lunch* in sixth grade having slightly higher delinquency in eighth grade than boys who reported *In-School Lunch*.

DISCUSSION

This study shows an association between the lunchtime practices of middle school students at sixth grade and their engagement in problem behaviors by eighth grade. Findings indicate a strong association among students who do not eat school lunch (either eat lunch outside of school or report not eating lunch at school) and smoking. Some gender differences were found with the association between smoking and eating lunch outside of school, demonstrating significance for both boys and girls, whereas the association between not eating lunch and smoking was significant for girls only. Overall, students who reported not eating lunch at school in the sixth grade were more likely to engage in smoking, drinking, marijuana use, and delinquency by eighth grade. Students who ate lunch outside of school in the sixth grade were more likely to smoke and use marijuana by eighth grade. Although eating lunch outside of school was associated with fewer problem behaviors, the magnitude of the odds ratios is almost uniformly higher than those for not eating lunch.

Entry into middle school brings with it a number of new and challenging social situations along with opportunities for increased independence. Many of these social situations can occur during unsupervised time and in unsupervised space both in school and during after school hours. Previous research has found increases in unsupervised time and space to be associated with greater drug use, delinquency, and sex among adolescents (Astor et al., 1999; Cohen et al., 2002). It is important to note that the present study did not ascertain whether the problem behaviors under investigation were actually enacted during the lunch period. Nonetheless, the data are suggestive of possible links between unsupervised time during the lunch period and engaging in problem behaviors. For example, this unsupervised time might provide direct opportunities for engaging in behaviors such as substance use or delinquency, or it may have a more indirect contribution through unsupervised social interactions with peers. In addition, adolescents have identified lunchrooms, hallways, and gymnasiums as unsupervised spaces within schools and as the primary locations for violent acts (Astor et al., 1999). Students who report not eating lunch in school but do not report going outside of school for lunch may be

spending their lunchtimes in unsupervised spaces within schools. This is of particular interest from the perspective of school safety and healthy school environments. Data from the current study are insufficient to fully examine these issues but future studies should include methods to assess students' lunchtime experiences within the school and potential links to increases in problem behaviors.

Problem Behavior Theory (Jessor & Jessor, 1977) posits that negative behaviors cluster within individuals so that an adolescent engaging in deviant behavior, such as drug use, is also likely to engage in other problematic behaviors, such as truancy, or in minor criminal offenses such as vandalism and shoplifting. Negative health behaviors also are thought to cluster with antisocial behaviors but little empirical evidence exists between eating practices and deviant behaviors. Previous research found associations between adolescent drug use and unhealthy eating patterns, specifically skipping meals and eating at convenience stores and fast food restaurants (Benedict et al., 1999). Findings from this study suggest additional linkages between engagement in problem behaviors and eating practices, specifically how adolescents choose to spend their lunchtime during a school day. This study found that sixth graders who ate their lunch within the school building were less likely to engage in problem behaviors by eighth grade.

Although this study adds to the literature by examining associations between lunchtime practices and problem behaviors over time, it does not answer questions of causation. The associations found may be explained by constructs not measured in this study, such as peer selection. It is also possible that the students who are already at greater risk for engaging in drug use and delinquency are disregarding school (and potentially parental) policies at lunchtime. Previous studies have found iatrogenic effects of drug prevention programs that aggregate at-risk children together to receive program activities (Poulin, Dishion, & Burraston, 2001). Similar effects may be occurring at lunchtime, with more at-risk students spending greater amounts of time together, and this time may be largely unsupervised.

Gender Effects

Although no significant interactions were found by gender, it is likely that the study lacked adequate power to detect such effects. However, trends for differences by gender were found across several of the variables. Boys (but not girls) who reported a practice other than eating lunch inside school in sixth grade had significantly increased odds of marijuana use in eighth grade. Marijuana is currently the only gateway drug that still shows consistently higher prevalence rates for boys relative to girls (Johnston et al., 2005). Therefore, the lack of any association between lunchtime practices and marijuana use for girls may be due to less use of the drug by girls overall. There was also a trend for boys who reported not eating lunch in school (*No School Lunch*) in the sixth grade to report higher levels of delinquency by eighth grade, but no such trend was found for girls. Again, delinquency has consistently shown higher prevalence among boys relative to girls (CDC, 2006). Although more recent studies indicate a decrease in the gender gap for aggressive and delinquent behaviors, especially among urban youth (Nichols

et al., 2006), the current sample showed greater rates of delinquency for boys than girls, which may account for the difference in trends.

Not eating lunch in school (*No School Lunch*) in the sixth grade was significantly associated with both smoking and drinking for girls in the eighth grade but not for boys. Although we cannot be sure that adolescents who reported not eating lunch in school were, in fact, skipping lunch altogether, to the extent that this did occur it would support previous findings between girls' dieting practices/weight loss concerns and their drug use, especially smoking (Baer Wilson & Nietert, 2002; Crocker et al., 2001; Stice & Shaw, 2003).

Limitations

The current study has several significant strengths that add to the literature. The majority of studies on problem behaviors and eating practices have been conducted with primarily White, suburban populations and multiethnic, urban youth are underrepresented in the literature. In addition, few studies have used longitudinal designs to examine associations between school lunch practices and problem behaviors among youth. Although this study has numerous strengths, it also has several limitations that should be noted. An important limitation concerns the wording of the lunch practices variable. The variable was not originally intended to examine lunch behaviors among middle school students but rather as a proxy for socioeconomic status. Therefore, the response options were not as explicit and exhaustive as would be desired for the current investigation. In particular, the *No School Lunch* category (defined by endorsing the response option "I don't eat lunch at school") is vague. It is likely that the actual lunch practices of those students are varied and include skipping lunch as well as other unspecified practices. Future studies should include exhaustive and mutually exclusive response categories such as, "I do not eat any lunch/I skip lunch," "I eat food and/or drinks from vending machines," and "I eat food and/or drinks from the a la carte/snack line."

Although unsupervised time and space is a credible explanation for the associations found between lunchtime practices and increases in problem behavior over time, the current study does not directly test the lack of supervision during lunchtime. Future studies should include measures of adult supervision both within and outside of school, during lunch, and during other free periods. In addition, schools vary greatly in the development and enforcement of student-related policies. The current study is limited by the lack of information on lunchtime policies within each of the schools. Future studies should include measures of school climate as well as policy and discipline practices.

The current study also suffers from a large attrition rate and analyses reveal that students lost to follow-up were at higher risk for problem behaviors, thereby limiting the generalizability of results. However, even with the loss of many high-risk students, the current study was able to show significant associations between lunch practices in the sixth grade and engagement in problem behaviors in the eighth grade.

Implications for Practitioners

In spite of these limitations, this study is one of the first to examine associations between how students spend their lunchtime and their engagement in problem behaviors. The findings from this study, that sixth-grade lunchtime practices (both eating lunch outside the school and not eating lunch at school) are associated with increased drug use and delinquency by eighth grade, as well as the potential differences that exist by gender, warrant additional attention from the field. As previously mentioned, lunchtime practices within middle school settings should be researched more thoroughly.

The original study was not designed to address school climate or school policies. The policies that schools set, the degree to which these policies are enforced, and the degree to which students feel safe and welcome within their school all may have strong associations with both students' lunchtime practices and their engagement in problem behaviors. These issues should be included in future studies and examined by health educators and other school practitioners as they plan drug and delinquency prevention strategies within middle schools. The study also indicates that eating lunch in school can serve as a protective factor for middle schools students' engagement in problem behaviors. Efforts to decrease problem behaviors as well as increase healthy eating may be enhanced by examining and enforcing school policies around lunchtime polices and practices.

References

Astor, R. A., Meyer, H. A., & Behre, W. J. (1999). Unowned places and times: Maps and interviews about violence in high schools. *American Educational Research Journal*, *36*(1), 3-42.

Baer Wilson, D., & Nietert, P. J. (2002). Patterns of fruit, vegetable, and milk consumption among smoking and nonsmoking female teens. *American Journal of Preventive Medicine, 22*(4), 240-246.

Benedict, J., Evans, W., & Calder, J. C. (1999). An exploratory study of recreational drug use and nutrition-related behaviors and attitudes among adolescents. *Journal of Drug Education*, *29*(2), 139-155.

Birnbaum, A. S., Nichols, T. R., Allen, B. B., Griffin, K. W., & Botvin, G. J. (2005). *Adolescents' lunchtime practices throughout the middle school years*. Philadelphia: American Public Health Association.

Botvin, G. J., Griffin, K. W., & Nichols, T. R. (2006). Preventing youth violence and delinquency through a universal school-based prevention approach. *Prevention Science, 7*, 403-408.

Botvin, G. J., Schinke, S. P., Epstein, J. E., & Diaz, T. (1994). The effectiveness of culturally focused and generic skills training approaches to alcohol and drug abuse prevention among minority youth. *Psychology of Addictive Behaviors, 8*, 116-127.

Centers for Disease Control and Prevention. (CDC). (2006). Youth risk surveillance: United States, 2005. *MMWR, 55*(No. SS-5), 1-33.

Cohen, D. A., Farley, T. A., Taylor, S. N., Martin, D. H., & Schuster, M. A. (2002). When and where do youths have sex? The potential role of adult supervision. *Pediatrics, 110*(66), 1-6.

Crocker, P., Kowalski, N., Kowalski, K., Chad, K., Humbert, L., & Forrester, S. (2001). Smoking behaviour and dietary restraint in young adolescent women: The role of physical self-perceptions. *Canadian Journal of Public Health, 92*(6), 428-432.

Cullen, K. W., & Zakeri, I. (2004). Fruits, vegetables, milk, and sweetened beverages consumption and access to a la carte/snack bar meals at school. *American Journal of Public Health, 94*(3), 463-467.

Eisenberg, M. E., Olson, R. E., Neumark-Sztainer, D., Story, M., & Bearinger, L. H. (2004). Correlations between family meals and psychosocial well-being among adolescents. *Archives of Pediatrics and Adolescent Medicine, 158*(8), 792-796.

Elliot, D., Huizinga, D., & Menard, S. (1989). *Multiple problem youth: Delinquency, substance use, and mental health problems*. New York: Springer-Verlag.

Evans, R. I., Hansen, W. B., & Mittlemark, M. B. (1977). Increasing the validity of self-reports of smoking behavior in children. *Journal of Applied Psychology, 62*, 521-523.

Jessor, R., & Jessor, S. L. (1977). *Problem behavior and psychosocial development: A longitudinal study of youth*. New York: Academic Press.

Johnston, L. D., O'Malley, P. M., Bachman, J. G., & Schulenberg, J. E. (2005). *Monitoring the future national survey results on drug use, 1975-2004. Volume I: Secondary school students* (NIH Publication No. 05-5727). Bethesda, MD: National Institute on Drug Abuse.

Kubik, M. Y., Lytle, L. A., Hannan, P. J., Perry, C. L., & Story, M. (2003). The association of the school food environment with dietary behaviors of young adolescents. *American Journal of Public Health, 93*(7), 1168-1173.

Lytle, L. A., Seifert, S., Greenstein, J., & McGovern, P. (2000). How do children's eating patterns and food choices change over time? Results from a cohort study. *American Journal of Health Promotion, 14*(4), 222-228.

Marples, C. A., & Spillman, D. M. (1995). Factors affecting students' participation in the Cincinnati public schools lunch program. *Adolescence, 30*(119), 745-754.

Moag-Stahlberg, A., Miles, A., & Marcello, M. (2003). What kids say they do and what parents think kids are doing: The ADAF/Knowledge Networks 2003 family nutrition and physical activity study. *Journal of the American Dietetic Association, 103*(11), 1541-1545.

Neumark-Sztainer, D., French, S. A., Hannan, P. J., Story, M., & Fulkerson, J. A. (2005). School lunch and snacking patterns among high school students: Associations with school food environment and policies. *International Journal of Behavior, Nutrition and Physical Activity, 2*(1), 14.

Nichols, T. R., Graber, J. A., Brooks-Gunn, J., & Botvin, G. J. (2006). Sex differences in overt aggression and delinquency among urban minority middle school students. *Journal of Applied Developmental Psychology, 27*, 78-91.

Norton, E. C., Bieler, G. S., Ennett, S. T., & Zarkin, G. A. (1996). Analysis of prevention program effectiveness with clustered data using generalized estimating equations. *Journal of Consulting and Clinical Psychology, 64*, 919-926.

Poulin, F., Dishion, T. J., & Burraston, B. (2001). 3-year iatrogenic effects associated with aggregating high-risk adolescents in cognitive-behavioral preventive interventions. *Applied Developmental Science, 5*(4), 214-224.

Probart, C., McDonnell, E., Hartman, T., Weirich, J. E., & Bailey-Davis, L. (2006). Factors associated with the offering and sale of competitive foods and school lunch participation. *Journal of American Dietetic Association, 106*(2), 242-247.

Scheier, L. M., Griffin, K. W., Doyle, M. M., & Botvin, G. J. (2002). Estimates of intragroup dependence for drug use and skill measures in school-based drug abuse prevention trials: An empirical study of three independent samples. *Health Education and Behavior, 29*(1), 85-103.

Schulenberg, J., Maggs, J. L., & Hurrelmann, K. (1997). Negotiating developmental transitions during adolescence and young adulthood: Health risks and opportunities. In J. Schulenberg,

J. L. Maggs, & K. Hurrelmann (Eds.), *Health risks and developmental transitions during adolescence*. New York: Cambridge University Press.

Snyder, H. N. (2003). *Juvenile arrests 2001*. Washington, DC: Juvenile Justice Bulletin, Office of Juvenile Justice and Delinquency Programs, U.S. Department of Justice.

Stice, E., & Shaw, H. (2003). Prospective relations of body image, eating, and affective disturbances to smoking onset in adolescent girls: How Virginia slims. *Journal of Consulting and Clinical Psychology, 71*(1), 129-135.

Stone, L. M., & Runyan, C. W. (2005). High school off-campus lunch policies and adolescent motor vehicle crash risks. *Journal of Adolescent Health, 36*(1), 5-8.

Tourangeau, R., Smith, T. W., & Rasinski, K. A. (1997). Motivation to report sensitive behaviors on surveys: Evidence from a bogus pipeline experiment. *Journal of Applied Social Psychology*, *27*(3), 209-222.

Williams, P. G., Holmbeck, G. N., & Greenly, R. N. (2002). Adolescent health psychology. *Journal of Consulting and Clinical Psychology*, *70*(3), 828-842.