The relationship between frequency of family dinner and adolescent problem behaviors after adjusting for other family characteristics

Sen, Bisakha

University of Alabama at Birmingham

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The relationship between frequency of family dinner and adolescent problem behaviors after adjusting for other family characteristics

Bisakha Sen*

Department of Healthcare Organization & Policy, University of Alabama, RPHB 330, 1665 University Blvd, Birmingham, AL 35294, United States

Abstract

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Objective: To examine the association between frequency of family dinners (FFD) and selected problem behaviors for adolescents after adjusting for family connectedness, parental awareness, other family activities, and other potentially confounding factors.
Methods: Data are drawn from the National Longitudinal Survey of Youth, 1997. The primary variable of interest is self-reported FFD in a typical week. Problem behaviors studied are substance-use, physical violence, property-destruction, stealing, running away from home, andgang membership. Multivariate logistic models are estimated for each behaviors. Linear regression models are estimated for behavior-frequency for the sub-samples engaging in them. Analysis is done separately by gender.
Results: FFD is negatively associated with substance-use and running away for females; drinking, physical violence, property-destruction, stealing and running away for males. Conclusion: Family meals are negatively associated to certain problem behaviors for adolescents even after controlling rigorously for potentially confounding factors. Thus, programs that promote family meals are beneficial.

Introduction

Adolescence can be a time of turbulence. In their seminal work on protecting adolescents from harm, Resnick, Bearman, and Blum, (1997) report that the main threat to adolescents' health in the U.S. are the health-risk behaviors they engage in and choices they make; that the majority of deaths in the second decade of life are causes by social morbidities – namely, suicide, juvenile homicide and unintentional injuries; and that the use of substances like cigarettes and marijuana has trended upwards in recent decades. They also find that family connectedness serves as a powerful protective factor against a wide array of health-risk behaviors, including substance-use, emotional distress, perpetration of violence and early sexual activity.

One aspect of family life consistently seen to be correlated with more positive and fewer negative outcomes for young people is eating meals together as a family, and there have been concerns about whether family meals are becoming less frequent in modern times (Mackenzie, 1993). Extant research finds that 25–30 percent of adolescent respondents report dining with their families 7 days a week, but similar or higher percentages report dining with their families 2 or fewer days aweek (Eisenberg, Olson, Neumark-Sztainer, Story, & Bearinger, 2004; Neumark-Sztainer, Hannan, Story, Croll, & Perry, 2003; Neumark-Sztainer, Story, Ackard, Moe, & Perry, 2003). Frequent family meals are associated with better nutritional intake (Gillman, Rifas-Shiman, & Frazier, 2000) and better school performances (Wildavsky, 1994). For adolescents, moreover, frequent family meals are positively correlated with being ''well-adjusted'' (Bowden & Zeisz, 1997), and negatively with eating disorders (Neumark-Sztainer, Wall, Story, & Fulkerson, 2004), substance-use, early sexual intercourse, depression, and suicide ideation (CASA, 2003; CASA, 2005; Council of Economic Advisors, 2005; Neumark-Sztainer, Hannan, et al., 2003;

Eisenberg, Olson et al., 2004). Such findings have inspired community, state and national-level programs that promote the concept of regular family meals – for example, the 'Family Day' program initiated by The National Center on Addiction and Substance Abuse (CASA) (http://www.casafamilyday.org/) and the 'Eat Better Eat Together' program initiated by Washington State University (http://nutrition.wsu.edu/ebet/brochures.html).

This empirical study revisits the relationship between family meals and various adolescent 'problem behaviors'. Following Richard Jessop, a ''problem behavior'' is defined as behavior that is socially viewed as a ''source of concern, or as undesirable by the social and/or legal norms of conventional society and its institutions of authority; it is behavior that usually elicits some form of social control response, whether minimal, such as a statement of disapproval, or extreme, such as incarceration.''(Problem behavior theory – a brief overview) The specific new contributions that this study makes to the literature will be described later in this section.

The underlying conceptual theory here is that more frequent family meals may reduce problem behaviors by providing structure, stability, and improving family communications – which serve as protective influences against feelings of depression, anger and other psycho-social problems. Frequent family meals may also reduce the propensity for problem behavior simply by reducing the time that adolescents spend away from parental supervision. Thus, there is likely to be a negative association between the frequency of family meals and the probability that an adolescent will engage in problem behaviors. It is possible, however, that frequent family meals merely serve as a proxy for other family characteristics, like the quality of interpersonal relationships within the family or parental vigilance. In other words, families with good interpersonal relationships and those where parents monitor children more closely may be more likely to eat together. Thus, the apparent association between family meals and beneficial outcomes for adolescents may arise purely from omitting the underlying factors such as parent-child connectedness and parental vigilance, and may cease to exist once these factors are explicitly controlled for. This study will explicitly investigate that issue. Moreover, adolescents are likely to have more autonomy than younger children in deciding whether to participate in family meals. Hence, it may be that adolescents who are well-adjusted and less prone to problem behaviors to begin with are more willing to eat with their families, while adolescents who are less well-adjusted and more prone to problem behaviors try to avoid family meals. In other words, there might be bi-directional causality between an adolescent's propensity for problem behaviors and participation in family meals. This study will use an innovative method to try to minimize the bias arising from unobserved adolescent characteristics that may correlate both with participating in family meals and engaging in problem behaviors.

Two existing studies that do adjust for the family connectedness aspect when assessing the correlation between family meals and adolescent outcomes are by Neumark-Sztainer et al (2003) (in context of disordered eating behavior) (Neumark-Sztainer, Hannan et al., 2003) and by (Eisenberg, Olson et al, 2004) (in context of substance-use, school performance, depression and suicide ideation) (Neumark-Sztainer, Hannan, et al., 2003). Both studies use a sample of middle-school and high-school students from Minneapolis/St. Paul (MN) metropolitan area, and measures family connectedness using answers to 4 questions – how much respondents felt their mother and father respectively cared about them, and how much they felt they could talk to mother and father respectively about problems. In their results, family meals continued to correlate with beneficial outcomes for adolescents after including the family connectedness control variable. A follow-up study by Eisenberg, Neumark-Sztainer, Jayne, and Fulkerson (2008) found that 5 or more family meals per week at the baseline period were correlated with lower rates of substance-use five years later in models that also controlled for family connectedness at the baseline period. However, the localized nature of the samples leads to questions about whether the results are generalizable.

This study explores the association between the frequency of family dinners and a number of problem behaviors for adolescent males and females in a multivariate regression framework after controlling extensively for numerous potential confounders. It contributes to the literature in several ways. Firstly, this study utilizes a national-level representative sample of adolescents from a large, secondary panel data set. Secondly, it adjusts for family connectedness using broader and more robust measures than extant

studies like Eisenberg et al (2004) or by Neumark-Sztainer et al (2003), Neumark-Sztainer, Hannan, et al (2003) and additionally adjusts for parental awareness and the frequency of other family activities. Thirdly, it utilizes the panel nature of the data to use an innovative approach towards adjusting for the adolescent's own characteristics that correlate both with participation in family dinners and with problem behaviors. Finally, it considers certain problem behaviors that have not previously been well-studied in context of family meals, like engaging in physical violence, property-destruction, theft, running away from home, and gang membership.

Methods

Data

The data is drawn from the National Longitudinal Survey of Youth, 1997 (hereafter NLSY97). This is one of the series of the National Longitudinal Surveys that are sponsored by the Bureau of Labor Statistics, Department of Labor. This annual survey that was initiated in 1997, and consisted of 6748 youth respondents who are a nationally representative sample of the U.S. population who were 12–16 years of age on December 31, 1996, coupled with a supplemental over-sample of 2236 black and Hispanic adolescents representative of the U.S. population of blacks and Hispanics of that same age-range. Respondents have been interviewed in each subsequent year since 1997, with a low attrition rate. Complete technical details regarding the
sample design and sampling strategies is available in the NLSY97 User's Guide, which may be viewed online at http://www. bls.gov/nls/97guide/rd5/nls97ug2.pdf , or obtained from the Center for Human Resource Research, Ohio State University, Columbus Ohio. The NLSY97 provides extensive information on demographic and familial characteristics, SES, employment, education, health, substance-use, and delinquent activities of the respondents.

Frequency of family dinners

In each annual survey from 1997 to 2000, youth respondents aged 14 or less as of December 31, 1996 who were living with at least one parent/parent-figure/legal guardian as of the survey date were asked about their household environment in a typical week. The respondents reported the number of days in a typical week their family ate dinner together – this is hereafter referred to as 'frequency of family dinners' or FFD.

Problem behaviors

In all survey years, the NLSY97 used Audio-Computer Assisted Self-Interview (ACASI) methods to elicit what was deemed sensitive information from the youth respondents, like substance-use, and delinquent activities. The specific 'problem behaviors' utilized in this study includes smoking, alcohol consumption, binge-drinking (defined in NLSY97 as consuming 5 or more drinks at one time), marijuana use, engaging in physical violence (defined as physically attacking someone with the intention to injure), deliberately destroying others' property, stealing, running away from home, and belonging to a gang. Respondents are asked about substance-use behaviors pertaining to the 30 days preceding the survey, and the other behaviors pertaining to the year preceding the survey. Respondents who replied in the affirmative to using the substances are then asked how frequently they did so within those 30 days, and those who reply in the affirmative to attacking someone or destroying property are asked how often they did so in the last year.

Other variables

The ACASI methods are also used to elicit details of the respondents' relationships with their parents, which are used to construct indexes of the respondent's relationship with each parent, as well as parental awareness (details are provided later). In addition, the NLSY97 also has respondents report the number of days in a typical week they participated in religious activities with their family, and did 'something fun' with their family in the past year. Finally, the NLSY97 provides extensive information on the demographic and socio-economic characteristics of each respondent, including age, race-ethnicity, family income and parental education, which are used as controls in the empirical analysis.

The empirical analysis uses pooled data for survey years 1997–1999 for all respondents with non-missing values for FFD and the relevant behavioral outcomes. Recall that, in 1997, only respondents aged 14 or less as of December 31st, 1996, were asked about family meals. Including the data for 1998 and

1999 allows for including 15–17 years olds in the empirical model. In 1997, there were 2658 male respondents and 2457 female respondents who qualified for inclusion. Of these males, 2365 remained in 1998 and 2002 remained in 1999. Of the females, 2190 remained in 1998 and 1876 remained in 1999. Thus, pooling the three years yields 6533 respondent-year observations for females and 7025 respondent-year observations for males.

Empirical methods

There is evidence in previous studies that the correlation of family characteristics and substance-use or violence differ across gender (Bowden & Zeisz, 1997; Neumark-Sztainer, Hannan, et al., 2003; Saner & Ellickson, 1996). Hence, the analyses are done separately for female and male respondents. Multivariate logistic regression (logit) models for the probability of engaging in each of the above behaviors are estimated. The results are presented in the form of actual changes in probability based on the formula by Roncek (1991), where

$$\partial P/\partial x_i = \beta_i * \exp(x\beta)/(1+\exp(x\beta))^2 \quad (1)$$

Where 'P' represents the probability of obtaining the outcome defined by '1' (sometimes referred to as 'success') in a binary logit model, x represents the vector of independent variables, and b represents the coefficient estimates corresponding to the x variables. Presenting results in this form is preferred to the conventional 'odds ratios', since odds ratios cannot directly be interpreted as changes in probability (though they are sometimes misinterpreted as doing so), and odds ratios are particularly difficult to translate when the independent variable of interest, such as FFD in this case, is not binary.

For the sub-samples who reported engaging in each behavior, linear regression models are estimated, using the natural log of the number of times the behavior occurred. This 'two part' approach, where a binary logistic (logit) or probabilistic (probit) model is estimated to determine the probability of initial usage and a log-linear model is estimated for the sub-sample reporting any usage is described by Manning, Duan, and Rogers (1987), and is now widely used in empirical studies that estimate behaviors that tends to highly skewed – such as substance-use and delinquent behaviors (Manning, Blumberg, & Moulton, 1995; Markowitz & Taurus, 2006a; Pacula, 1997). These linear regression models are not estimated for stealing, running away and gang membership, because information on frequencies for those behaviors is not provided. The statistical software STATA is used for all empirical analysis.

The models use pooled data for 1997–1999, with up to three observations per respondent. Such pooling is conventional when using the NLSY97 (examples include Markowitz & Tauras, 2006b; Mennemeyer & Sen, 2006; Saffer & Dave, 2006)as well as the other National Longitudinal Surveys datasets (examples include Anderson, Butcher, & Levine, 2002; Chatterji & Markowitz, 2001; Cawley, 2004). When multiple observations for the same individual are included in a dataset, the assumption of independent identically distributed error terms is no longer valid given the very high probability of serial correlations in the error term (Wooldridge, 2002), but the problem is easily adjusted and the correct standard errors and t-statistics are obtained by 'clustering' the standard errors at the individual level using a modified version of the Hubert-White estimator as described by Williams (2000). This method that can be easily implemented in STATA using the 'robust cluster' command.

The first empirical specification, model 1, includes in the vector of x variables FFD, and an array of demographic and socioeconomic controls that are fairly standard in the literature. Previous research has found that self-reported FFD is correlated with age, race and socio-economic status (Bradley, Corwyn, McAdoo, & Garcia Coll, 2001; Neumark-Sztainer, Story, et al., 2003) – characteristics that are also likely influence the behavioral outcomes under study. Therefore, model 1 adjusts for the respondent's age, binary indicators for whether the respondent is black, Hispanic, family income is below poverty level, family income is at least five times greater than poverty level, the respondent resides with both biological parents, at least one parent in the household has completed college, and neither parent in the household has completed high school.

The next specification, model 2, addresses the issue that the apparent association between family meals and problem behaviors may in part arise from common underlying factors such as parental awareness, the quality of the respondent's relationship with the parents, and with other family activities. Hence, in addition to the controls already in d to the controls in model 1, model 2 is also adjusted for other family

activities, family connectedness, and parental awareness. Other family activities include the respondent reported number of days in a typical week the family does something fun together, and the family participates in religious activities together. Family connectedness is adjusted for with indexes measuring the quality of relationship of the adolescent respondent to each parent in the household (these are available as 'created variables' in the original NLSY97 dataset), and binary indicators for whether the respondent considers his/her father and mother to be a role model. The relationship index with each parent is constructed based on the respondent's answers to how often that parent praises the respondent for doing well, criticizes the respondent or the respondent's ideas, helps the respondent to do things important to the respondent, blames the respondent for his or her (the parent's) problems, makes plans with the respondent and cancels for no good reason, whether the respondent thinks highly of the parent, wants to be like the parent, and enjoys spending time with the parent. The youth answers each question on a 5-point scale of 'never', 'rarely', 'sometimes', 'usually' and 'always' for the first 5 items, and 'strongly disagree', 'disagree', 'neutral', 'agree', and 'strongly agree' for the latter 3 items. The responses are re-ordered in a consistent direction, with 0 denoting the worst case and 4 denoting the best case for each item, and the responses are then added to form an index where higher values signify better relationship with that parent. The internal consistency of these indexes as measured by Cronbach's alpha ranges from 0.75 to 0.82 (NLSY97 Codebook Supplement Main File Round 1). Whether the respondent considers each parent to be a role model is denoted using a binary variable that is 1 if the respondent agrees or strongly agrees with the statement that the parent is ''person I want to be like''. Parental awareness is controlled for by including a 'monitoring' or 'awareness' index for each parent in the household (also available as 'created variables' in the original NLSY97 dataset). The index is based on the respondent's stated opinion of how well the parent knows the respondent's close friends, the parents of the respondent's close friends, the people the respondent is with when not at home, and the respondent's teachers/school activities. Higher scores indicate greater parental awareness. The internal consistency of these indexes as measured by Cronbach's alpha ranges from 0.71 to 0.81(Roncek, 1991). If the respondent resides with only one biological parent, then the relationship and awareness indexes for the missing parent are set to 0.

Model 3 addresses the problem of one more potential confounder – the adolescent's own personal attributes that are difficult to observe or measure, but that might correlate both to his (her) propensity for engaging in problem behaviors and his (her) willingness to participate in family meals. The way this is done is to include one more variable in addition to all the variables already in model 2 – the next year's FFD. The rationale is as follows: there is obviously no way that FFD in year $t+1$ could directly affect behavioral outcomes in year t; hence any correlation between the two could arise only from two potential sources. First, reverse causality, whereby adolescents who engage in problem behaviors would thereafter become less willing to dine with their families. Second, the presence of certain unobserved respondent characteristics – for example, introversion, sociability, self-esteem issues – that do not change substantially from year to year. Such unobserved respondent characteristics would therefore be correlated with the adolescent's willingness to dine with their families both in year t and in year $t+1$, and would also – by virtue of being fairly time-invariant – be correlated to their propensity to engage in problem behaviors in year t. Thus, FFD in year $t+1$ essentially serves as a proxy-variable that helps control for the unobserved and potentially confounding respondent characteristics. Readers should note that this does not require that FFD in year $t+1$be equal to FFD in year t, since adolescents are likely to change their family dining patterns as they grow older and start having other commitments. Nor does this posit that there are no unobserved personality changes between years t and $t+1$, since this is an age where some personality changes are likely as adolescents go through inevitable hormonal changes and other 'adolescent phases'. However, the underlying premise is that there is at least some degree of consistency in their character – and hence in their choice to interact with their families – that persists over a one-year period. Indeed, the data confirms that there is a consistent pattern of FFD between the years t and $t+1$ (this will be discussed

further in the next section) which supports the rationale for this model. Thus, it can be posited that the inclusion of FFD from period t 1 reduces the estimation bias that can arise either from reverse causality or from time-invariant unobservable characteristics, and thus provides added assurance that any association found between the problem behaviors and FFD within the same period is, in fact, real. A similar approach has been utilized by Ruhm (2004). In conclusion, Model 3 takes the most rigorous approach to control for confounding factors that appears possible with this dataset, and is the least likely to lead to type I errors when testing the null hypothesis that FFD has no effect on behavioral outcomes.

Results

Table 1 presents the frequency distribution for FFD. In the pooled sample, about 30 percent of the female adolescents and 35 percent of male adolescents report eating with families 7 days a week on a typical week. When the data are disaggregated by survey year, then not surprisingly, we see that over time (i.e. as the respondents grow older), the percent of respondents eating with their family for 7 days a week or 6 days a week decline, whereas the percent who report eating only 1, 2 or 3 days a week increase (though there is a small decrease over time in the percentage who report never eating with their families in a typical week). The general result that adolescents dine less frequently with their families as they grow older is not surprising, since adolescents are likely to have more commitments and also greater autonomy as they grow older, and the decline in FFD as they age does not in itself imply that FFD will have any associations with problem behaviors.

Table 2 shows the proportions of the pooled sample who engage in problem behaviors. The proportions shown here are somewhat lower than in studies that use samples weighted more strongly towards high-school students [5] (whereas our sample is mostly younger than 16 years), but are comparable to what has been found in other national level datasets for 9th and 10th graders [1]. Table 3 gives summary statistics for the control variables. Note that the statistics presented in tables 2 and 3 describe the sample used in this study. They have not been adjusted for the oversampling of blacks and Hispanics in the NLSY97 and are thus not necessarily representative of the general U.S. population in this age-group.

Pairwise correlation coefficients calculated between FFD and the parental awareness indexes, parental relationship indexes, whether respondent considers each parent to be a role model, and the other family activities, found that FFD is positively correlated with all of the above at 5 percent or better significance level. Those results are available upon request.

Pairwise correlation coefficients between FFD in period t and period t+1 was found to be 0.502, and significant at better than 1 percent level. More detailed analyses (full results available upon request) found that, while the majority of the adolescent respondents did dine fewer times with their families in period t+1 than they had in period t , on average those who reported higher FFD than their peers in year t also did so in year t+1. For example, those with FFD of 4 in year t reported an average FFD of 3.8 in year t+1, whereas those with FFD of 6 in year t reported an average FFD of 4.9 in year t+1, and those with FFD of 7 in year t reported an average FFD of 5.5 in year t+1. This supports the conjecture of the existence of certain factors that remain reasonably consistent over time, and in any given year make some adolescents more (or less) likely to dine with their families than other adolescents.

Table 4 presents estimated changes in the probabilities of participating in each problem behavior associated with a unit increase in FFD for models 1, 2 and 3. Each of the results can be interpreted as the average percentage point change in the likelihood of engaging in that behavior associated with a once- a-week increase in the frequency of FFD. For example, a one day a week increase in the frequency of dining with the family is associated with a 1.8 percentage point reduction in the probability of smoking among females, and a 1.5 percentage point reduction in the probability of smoking among males. For brevity, the estimated results pertaining to the control variables are not presented here. The results show that, with the 'conventional' set of controls (as in model 1), FFD appears to be significantly and negatively associated with the probabilities of engaging in all the problem behaviors. When adjustments are made for parental awareness, quality if relationship with parents and other activities (model 2), the associations between FFD and some of the problem behaviors cease to be significant. When the FFD for period t+1 is added (model 3), the associations between FFD and even more problem behaviors cease to

be significant, particularly for males. However, some problem behaviors continue to be associated with FFD even after all attempts are made to control for underlying confounders. There are also notable gender differences in the patterns of the associations.

Specifically, in model 1, all of the problem behaviors studied are associated with FFD at the 5 percent level or better, with the exception of gang membership among females, where the association is only significant at the 10 percent level. When we move from model 1 to model 2, no statistical associations remain between FFD and fighting, property-destruction, stealing, gang membership, or running away from home for adolescent females; and no statistical association remains between FFD and gang membership for adolescent males. For the problem behaviors which continue to be negatively and significantly associated to FFD in model 2, the changes in probability associated with an increase in FFD are uniformly smaller in magnitude compared to those from model 1. When we move from model 2 to model 3, no statistical associations remain between FFD and smoking or marijuana use for males. Thus, in the final and most rigorous model specification, an increase of one day a week in FFD is associated at the 5 percent level of significance or better with reduced probabilities of smoking (by 0.6 percentage points), any drinking (by 0.8 percentage points) and binge-drinking (by 0.4 percentage points) among females, binge drinking (by 0.5 percentage points), property destruction (by 0.5 percentage points), stealing (by 0.4 percentage points) and running away from home (by 0.3 percentage points) among males. It is associated at the 10 percent but not 5 percent level of significance with reduced probabilities of marijuana use (by 0.3 percentage points) and running away from home (by 0.2 percentage points) among females, and any drinking (by 0.5 percentage points) and fighting (by 0.4 percentage points) among males. Hence, for example, based on the 'marginal effect' of 0.6 percentage points reduction in the probability of smoking for a one-day increase in FFD among females, it can be surmised the female teen who dines all seven days a week with her family will have a 4.2 percentage point lower probability of smoking than her counterpart with identical demographic and familial characteristics but who does not dine at all with her family. Parallel calculations can be made for each of the other behaviors.

Table 5 presents the estimated change in the frequency of the problem behavior associated with a unit increase in FFD from the log-linear regressions models for the sub-samples who reported engaging in substance-use, fighting and property destruction. Here too, we observe that FFD appears to be significantly associated with lower frequencies of the above behaviors in model 1, but once the additional controls are added in models 2 and 3, many of these associations cease to be statistically significant. In fact, in models 2 and 3, higher FFD is significantly associated only with lower frequencies of smoking and marijuana use for adolescent males, and with lower frequencies of marijuana use for adolescent females.

Table 6 summarizes the results for the of the control variables from model 3. While FFD is the main variable of interest, the associations between problem behaviors and the other control variables, especially those of parental relationships, parental awareness, and frequency of other family activities, may be of interest to readers since they have rarely been explored in the current literature. Briefly, results indicate that

- Higher parental awareness indexes are significantly and strongly associated with lower probabilities of most of the problem behaviors.
- Better relationship indexes with parents as well as considering parents to be role models are associated with lower probabilities of some of the problem behaviors. Notably, however, the relationship index with the father is significant for adolescent males, but not for adolescent females.
- An increase in the number of days the family does something fun together and participates in religious activities together in a typical week are associated with lower probabilities of many of the problem behaviors.

The complete results for all control variables are available upon request.

Discussion

Extant literature provides many reasons as to why family meals might be beneficial to adolescents.

These include providing family identity, order and consistency, and enhancing familial communications and interactions (Lyman & Tenn, 1989; Neumark-Sztainer, Story, Hannan, Perry, & Irving, 2002; Reisch, 1997; Wolin & Bennett, 1984), greater parental supervision and reduced exposure to negative peer influences and detrimental aspects of the 'youth culture' (Neumark-Sztainer, Hannan, et al., 2003).

This study explores how the self-reported frequency of family dinners correlates to a series of adolescent problem behaviors, including substance-use and delinquency. The primary contribution of this study is that it controls for family connectedness, parental awareness, other family activities, and also uses a proxy-variable to control for confounding individual characteristics and potential reverse causality between the behaviors and family meals. The findings here suggest that the associations found in extant literature between family meals per se and adolescent behavioral outcomes are, to some extent, driven by the omission of the above factors. Specifically, when only standard socio-demographic factors are adjusted for (as in model 1) FFD appears to be correlated with lower probabilities of all the undesired behavioral outcomes under consideration, but the above factors are also adjusted for, there ceases to be any significant relationship between FFD and many of the behaviors.

Nonetheless, it is worth noting that even after controlling rigorously for all these factors, FFD is associated with lower probabilities of all substance-use and running away for females; binge-drinking, physical fights, property-destruction, stealing and running away for males; among the sub-samples engaging in the respective problem behaviors, FFD is associated with lower frequencies of smoking for males, and lower frequencies of marijuana use for both genders. These findings indicate that participating in family meals may have additional benefits to adolescents even if there is good family connectedness and parental awareness, and when the families do other activities together. It may be that eating meals together provides a certain kind of emotional sustenance that other family activities or other forms of parent-child bonding cannot perfectly substitute for. Family meals may also increase parental supervision time and hence reduce the time that could potentially either be spent in solitary experimentation with addictive substances, or with peers who are a 'bad influence' on the adolescent.

The gender differences in the results warrant a special comment. Earlier studies that considered a different sub-set of behaviors found fewer associations between FFD and substance-use as well as disordered eating behaviors for males than for females (Neumark-Sztainer, Hannan, et al., 2003; Neumark-Sztainer et al., 2004), leading to the speculation that girls may be more sensitive to nuances of family interactions, hence FFD might play a greater role in their emotional and behavioral health. However, this study finds that there is an array of problem behaviors (like physical fights and property-destruction) where FFD plays a more significant role for adolescent males than for females. Therefore, it is possible that the protective effects of family meals operate differently across domains of behaviors for adolescent males and females, but this study gives evidence that family meals are not overall less relevant for males than for females.

This study confirms the findings of earlier studies (Farrington, Ohlin, & Wilson, 1986; Kingon & O'Sullivan, 2001; Resnick et al., 1997) regarding the protective aspects of family connectedness. Additionally, it suggests that there are protective aspects of parental awareness, with higher parental awareness scores being inversely related with a number of problem behaviors for both genders. Finally, it suggests that frequent family religious activities may have at least as much of a protective influence as frequent family meals. Indeed, for adolescent males, frequent family religious activities are negatively associated with more problem behaviors than are frequent family meals. This supports earlier findings of an inverse relationship between religiosity and delinquency (Baier & Wright, 2001), and evidence that the protective influence of religiosity is more effective when it is shared by parents and children (Pearce, 2004).

While this study makes numerous contributions to the literature, some limitations must be acknowledged. Firstly, as with all survey data, and there are the usual concerns about honesty, accuracy and recall bias in respondent replies – particularly about potentially sensitive topics like substance-use, delinquent behavior, and relationship with parents. Secondly, information is provided about FFD on a typical week, but no information is provided about the frequency of other family meals such as breakfast, and nothing is known about the atmosphere at any of the family meals. Thirdly, not all the problem

behaviors are measured in the ideal way – for example, many scientists argue that, for females, 4 drinks should constitute 'binge-drinking', but this dataset defines 'binge-drinking' as 5 drinks for adolescents of either gender. Fourthly, this dataset provides very scant information about adolescent depression, emotional distress or suicide ideation; therefore, it is not possible to explore the relationship between FFD and those outcomes after including the controls that are unique to this study. Finally, while this study controls very extensively for underlying factors that may confound the relationship between family meals and problem behaviors, there may still remain some unaccounted for confounding factors – and thus causality between FFD on adolescent problem behaviors cannot be definitively established.

What of the policy implications? A recent CASA (2007) report offers some reassuring evidence of an increase in the frequency of family dinners among adolescents since 1999. Between 1999 and 2003, the percent of teens in CASA surveys who reported dining with their families at least 5 times a week increased from 51to 61 percent. However, the trend seems to have stalled and even reversed itself somewhat since then – in 2006 the figure was down to 58 percent. The results from this study support emphasize the need for continuing and furthering public education on the benefits of family meals, so that positive trend of more teens dining with their families can be resumed and strengthened. It is important that health professionals and social workers interacting with adolescents and their families are cognizant of the benefits of family meals and impart those to their clients, and that the society work towards fostering a cultural climate where after-school activities (for adolescents) and overtime work (for adults) do not unduly hamper the ability of families to meet for meals. At the same time, these results caution against assuming that more frequent family meals are a panacea that will help reduce all adolescent substance-use and delinquent behavior problems for both genders, and also suggests that, at the margin (that is, a once-a-week increase in the frequency of family dining), the size of the protective effect is quite small. Finally, these results indicate that family characteristics other than family meals can also have important protective influences for adolescents. It reinforces the importance of parent-child connectedness and parental awareness of a child's friends, school and teachers; it also supports continuing and furthering public education about the benefits of other activities – religious and recreational – undertaken as a family. This implies that healthcare professionals and social workers should be made cognizant of the benefits of these other family activities so that they may encourage clients to participate in them insofar as feasible, whether or not frequent family meals are a possibility.

Table 1. Percentage Distribution of FFD, By Gender.

	Pooled Years			**1997**		**1998**		**1999**	
	Percentage of Sample			**Percentage of Sample**		**Percentage of Sample**		**Percentage of Sample**	
FFD in a typical week	**Females N= 6533**	**Males N=7025**		**Females N=2467**	**Males N=2658**	**Females N=2190**	**Males N= 2365**	**Females N=1876**	**Males N=2002**
0	9.50	8.06		10.05	7.29	10.52	9.33	7.90	7.65
1	5.27	3.53		3.74	2.43	5.20	2.84	7.04	5.44
2	7.93	6.20		4.75	4.17	7.77	6.17	11.59	8.50
3	9.96	8.62		6.86	5.84	9.91	8.44	12.43	11.96
4	10.28	9.58		7.84	6.96	10.87	9.53	11.62	12.53
5	16.74	16.86		15.97	15.59	17.16	16.71	17.17	18.41
6	10.30	11.85		11.49	13.45	10.92	11.68	8.37	9.63
7	30.01	35.48		39.50	44.27	27.64	35.29	23.89	25.90

Notes: FFD is the 'frequency of family meals' – the number of days the respondent reported having dinner with family on a typical week.

Table 2. Substance-use & Delinquent Behavior, By Gender.

Proportion of Pooled sample engaging in Substance-use, Delinquent Behavior		
Substance Abuse and Delinquent Behaviors	**Female (N=6533)**	**Male (N=7025)**
Any smoking [a]	0.19	0.20
Any drinking alcohol [a]	0.24	0.24
Any binge-drinking [a]	0.10	0.12
Any marijuana [a]	0.08	0.10
Any fighting [b]	0.08	0.14
Any property-destruction [b]	0.09	0.17
Any stealing [b]	0.16	0.22
Any Running Away [b]	0.07	0.06
Gang membership [b]	0.01	0.03
Descriptive Statistics for Sub-samples engaging in substance-use, delinquent behavior [c]		
	Female Mean (s.d.)	**Male Mean (s.d.)**
Days smoked [a]	14.85 (12.54)	14.92 (12.35)
Days drank alcohol [a]	3.73 (4.60)	4.36 (5.00)
Days binged [a]	3.10 (3.52)	3.70 (3.83)
Days used marijuana [a]	6.65 (8.32)	9.59 (10.57)
Times in physical fight [b]	3.11 (7.03)	4.93 (11.02)
Times destroyed property [b]	3.08 (7.11)	6.18 (13.70)

Notes: Based on pooled respondent-year data over 1997-1999. In 1997, there were 2658 male respondents and 2457 female respondents who qualified for inclusion. Of these males, 2365 remained in 1998 and 2002 remained in 1999. Of the females, 2190 remained in 1998 and 1876 remained in 1999.
[a]: In 30 days prior to survey. [b]: In 12 months prior to survey. [c]: The N for the sub-samples engaging in each delinquent behavior can be derived from the proportion of the full sample engaging in that particular behavior.
The data is not adjusted for the oversampling of blacks and Hispanics in NLSY97. Thus, these describe the sample for this study but are no representative of the U.S. population.

Table 3. Summary Statistics for Control Variables, by Gender.

	Female (N=6533)	**Male (N=7025)**		**Female (N=6533)**	**Male (N=7025)**
Variable	**Mean (s.d.)**	**Mean (s.d.)**	**Variable**	**Mean (s.d.)**	**Mean (s.d.)**
Age of respondent	14.70 (1.42)	14.71 (1.42)	Relationship Index, Mother [a]	24.02 (6.57)	23.78 (6.51)
Black	0.25 (0.43)	0.24 (0.43)	Relationship Index, Father [a]	17.00 (11.80)	18.40 (11.56)
Hispanic	0.21 (0.41)	0.20 (0.40)	Awareness Index, Mother [b]	10.09 (3.65)	9.29 (3.66)
HH Income < Poverty	0.17 (0.38)	0.17 (0.37)	Awareness Index, Father [b]	5.54 (4.86)	5.88 (4.79)
HH Income> 5 times Poverty	0.10 (0.30)	0.10 (0.30)	Days in typical week do something fun with family	2.18 (1.92)	2.30 (1.96)
Live with both own parents	0.53 (0.50)	0.55 (0.50)	Days in typical week do religious activity with family	1.48 (1.92)	1.38 (1.84)
At least 1 parent has college degree	0.56 (0.50)	0.55 (0.50)	Want to be like mother	0.57 (0.49)	0.53 (0.50)
Neither parent completed High school	0.07 (0.26)	0.08 (0.28)	Want to be like father	0.36 (0.48)	0.45 (0.50)

Notes: [a]: Ranges from 0 (worst) to 32 (best). Set to 0 for missing parents in single-parent household.
[b]: Ranges from 0 (least aware) to 16 (most aware). Set to 0 for missing parents in single-parent household.
The data is not adjusted for the oversampling of blacks and Hispanics in NLSY97. Thus, these describe the sample for this study but are no representative of the U.S. population.

Table 4. Logistic Regression (Logit) Models for the Relationship between Problem Behaviors and FFD.

	Model 1 Change in P (t-statistic)		**Model 2 Change in P (t-statistic)**		**Model 3 Change in P (t-statistic)**	
	Female	**Male**	**Female**	**Male**	**Female**	**Male**
Any smoking	-0.018*** (-7.52)	-0.015*** (-6.48)	-0.007*** (-2.94)	-0.007*** (-2.62)	-0.006** (-2.50)	-0.004 (-1.54)
Any drinking	-0.024*** (-9.37)	-0.016*** (-6.10)	-0.011*** (-4.33)	-0.003** (-2.46)	-0.008*** (-2.70)	-0.005* (-1.65)
Any binge-drinking	-0.011*** (-6.88)	-0.010*** (-6.01)	-0.005*** (-3.09)	-0.007*** (-3.04)	-0.004** (-1.99)	-0.005*** (-2.60)
Any marijuana	-0.012*** (-7.51)	-0.011*** (-6.16)	-0.004*** (-3.05)	-0.005*** (-2.76)	-0.003* (-1.85)	-0.002 (-0.85)
Any fighting	-0.005*** (-3.49)	-0.009*** (-4.51)	-0.001 (-0.84)	-0.005** (-2.04)	-0.001 (-0.99)	-0.004* (-1.74)
Any property-destruction	-0.009*** (-6.13)	-0.014*** (-6.36)	-0.002 (-1.57)	-0.006*** (-2.65)	-.001 (-0.81)	-.005** (-2.22)
Any stealing	-0.012*** (-5.76)	-0.016*** (-6.98)	-0.001 (-0.16)	-0.008*** (-3.28)	0.002 (0.08)	-0.004** (-2.09)
Run away from home	-0.007*** (-5.01)	-0.007*** (-5.73)	-0.002 (-1.61)	-0.003*** (-2.69)	-0.002* (-1.65)	-0.003** (-2.07)
Gang membership	-0.001* (-1.90)	-0.002** (-2.29)	-0.001 (-1.02)	-0.001 (-1.22)	-.000 (-0.68)	-.001 (-1.10)

Notes: Estimated results are presented in terms of change in 'P', the probability that the outcome will take the value '1'. All models use pooled respondent-year observations for 1997-1999. The i.i.d. assumption for error terms is relaxed and standard errors (and t-statistics) are adjusted for clustering upon individual respondents.
Model 1 controls for age, race-ethnicity, household income variables, living with both own parents, and parental education variables. Model 2 includes Model 1 controls and relationship indexes with both parents, awareness index for both parents, whether respondent wants to be like parents, and frequency of family religious activities and family fun activities, and Model 3 includes all Model 2 controls as well as FFD in following year. The null hypothesis that all right-hand side variables jointly have zero effect on the dependent variable is rejected at 99 percent confidence in all models. Pseudo R^2 values range between 0.05 and 0.12.
***: significant at 1%. **: significant at 5%. *: significant at 10%.

Table 5. Log Linear Regression Models for the Relationship between Frequency of Problem Behaviors and FFD for Sub-Samples Engaging In Each Behavior

	Model 1 Coefficient (t-statistic)		**Model 2 Coefficient (t-statistic)**		**Model 3 Coefficient (t-statistic)**	
	Female	**Male**	**Female**	**Male**	**Female**	**Male**
Days smoked	-0.037** (-2.11)	-0.092*** (-5.78)	-0.020 (-1.07)	-0.053*** (-3.38)	-0.030 (-1.49)	-0.043** (-2.27)
Days drank alcohol	-0.024** (-2.33)	-0.023** (-2.11)	-0.009 (-0.85)	-0.010 (-0.83)	-0.008 (-0.66)	-0.011 (-0.91)
Days binged	-0.026* (-1.78)	-0.027** (-2.02)	-0.012 (-0.68)	-0.003 (-0.20)	-0.014 (-0.71)	-0.007 (0.45)
Days used marijuana	-0.071*** (-3.15)	-0.071*** (-3.45)	-0.050** (-1.99)	-0.048** (-2.10)	-0.054** (-1.95)	-0.052** (-2.03)
Days in violent fight	-0.015 (-0.88)	-0.013 (-0.88)	-0.025 (-1.43)	-0.004 (-0.26)	-0.025 (-1.30)	-0.020 (-1.11)
Days destroyed property	-0.012 (-0.76)	-0.040** (-2.53)	0.007 (0.47)	-0.021 (-1.31)	0.010 (0.56)	-0.023 (-1.17)

Notes: All models use pooled respondent-year observations for 1997-1999. The i.i.d. assumption for error terms is relaxed, and standard errors (and thereby t-statistics) are adjusted for clustering upon individual respondents. For details about controls, please refer to notes for Table 4.

Table 6. Correlation of Other Control Variables to Behavioral Outcomes for Model 3.

	Female	Female	Male	Male
Variable	Positively correlated at 95% confidence with	Negatively correlated at 95% confidence with	Positively correlated at 95% confidence with	Negatively correlated at 95% confidence with
Age of respondent	smoke, binge, drink, marijuana, Days smoked,	destroy property, Times fight,	binge, drink, marijuana, smoke, Days smoked, days drank,	destroy property
Black		Days smoked, days drank, times fight, times destroy property, smoke, runaway, steal , binge, drink, marijuana	Times fight, gang	drink, binge, marijuana, steal , smoke, Days smoked,
Hispanic		drink, destroy property, smoke, Days smoked, days used marijuana, times fight, days binged,	gang	Smoke, Days smoked, days binged,
HH Income < Poverty	Days drank, days used marijuana, fight	steal		Days used marijuana,
HH Income> 5 times Poverty	steal	Days binged, days used marijuana	binge, destroy property	
Live with both own parents			destroy property	Smoke, Days smoked,
At least 1 parent has college degree		fight, smoke, Days smoked,		smoke, binge, Days smoked, days drank,
Neither parent completed High school		Days drank, days used marijuana,	Runaway, fight, gang	
Relationship Index, Mother [a]		Runaway, Days used marijuana,		Runaway, destroy property, Days drank, times fight,
Relationship Index, Father [a]				runaway, marijuana, Days drank, days used
Awareness Index, Mother [b]		drink, smoke, binge, fight, runaway, gang, steal , destroy property, days drank, days used marijuana,		Smoke, destroy property, marijuana, steal , gang
Awareness Index, Father [b]		Smoke, drink, binge, marijuana, fight, steal , destroy property, steal , runaway, days drank,		Smoke, drink, binge, fight, steal , destroy property
Days in typical week do something fun with family		steal , drink,	times fight	drink, steal , days smoked,

Days in typical week do religious activity with family		binge, smoke, drink, marijuana, steal ,		smoke, marijuana, drink, steal , steal , destroy property, Days smoked, times fight,
Want to be like mother	times fight	Drink, fight, destroy property, steal		days smoked
Want to be like father		smoke, steal , Days used marijuana,	Days drank	Destroy property, steal
FFD in t+1		steal , drink.	times fight	Smoke, drink, marijuana, destroy property, steal.

[1] CDC, 2004. Youth Risk Behavior Surveillance – United States 2003. *MMWR* 53(SS02);1-96. Available at http://www.cdc.gov/mmwr/preview/mmwrhtml/ss5302a1.htm. (Last accessed July 2008).