Effects of Family-Related Activities on Adolescent Smoking in the United States: Evidence from a Longitudinal Study

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Abstract

Background: Worldwide, Smoking is one of the most critical public health issues. On the other hand, different levels of family activity may explain adolescent smoking behaviors. Therefore, this longitudinal study examines the effect of family activities on adolescent Smoking in the United States.

Methods: 4966 American adolescents aged 12-18 years are used for analysis between 1980 and 2015. Family process criteria (peer influence, control variables, and Smoking) are used to collect data. Kaplan- Meier survival analysis and logistic regression are used to analyze the data.

Results: The results showed that women are less likely to smoke than men. The same is true for blacks as compared to whites. Children separated from the family are 20 percent more likely to smoke, and adolescents with high physical activity levels are less likely to smoke before age 16. Moreover, moderate sport levels reduce the risk of smoking by 15%, so people who are more physically active are less likely to smoke during adolescence, but parental education was not related to smoking.

Conclusion: Developing standard programs with adequate education and social reinforcement and the efforts of families and communities to engage in sports activities reduced adolescent smoking.

Key Words: Adolescents, Family activities, Smoking.

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1- INTRODUCTION

Worldwide, smoking is one of the most critical public health issues. However, smoking causes the death of 50% of smokers, affecting approximately 7 million people worldwide each year and is a significant public health concern not only for the elderly but also for adults (1). The current smoking patterns have shown that the annual number of smoking-related Mortality is expected to reach 10 million by 2030. In the 21st century, there is probably 1 billion smoking-related mortality that mostly occurs in low-income and underdeveloped countries (2). Despite significant efforts in recent decades to combat smoking, this factor is still a major cause of various preventable diseases (3). So that smoking is one of the direct causes of cancer, as well as cardiovascular, and respiratory diseases (4). Dwivedi et al. (2013) noted that smoking alone is responsible for most cancer and coronary artery disease cases (5).

Many adolescents are aware of smoking adverse effects on health, but smoking is dealt with as a recreation, promoting it to a regular matter. Studies have shown that early onset of smoking, even occasionally, can lead to a rapid increase in smoking and regular smoking (6, 7). Smoking is more likely to begin in adolescence, and the prevalence of smoking among adolescents in the United States in 2015 was higher than in previous surveys between 2002 and 2008. Smoking onset occurs during adolescence for various reasons, including low grades, low academic motivation (8), low life satisfaction (8), and Nicotine dependence as early as 24 months after onset. However, the elapsed time is considered from the onset (9). It is estimated that more than 2,000 adolescents engage in regular smoking each day (9). About 29 percent of adolescents now smoke, while the rate has gradually increased from 24 percent in ninth grade to 35 percent among 12th graders (10). Thus, the development of smoking in adolescence is a significant concern, and identifying the factors that affect progress is very important for smoking prevention and interventions.

On the other hand, smoking is not related to an individualistic phenomenon, and efforts to control addiction should be focused on the whole family (4); because the family has the most direct and lasting impact not only on education and psycho-intellectual development but also on the formation of values, attitudes, behaviors, and habits of children (3). Sharma et al. (4) stated that the family atmosphere might play a role in nicotine dependence and the rate of smoking in the smokers' family was significantly higher than that in the control group (5). Wells et al. (11) also found that some family-related factors, family functioning, and parenting are exogenous variables that mediate the risk and protective factors leading to smoking and drinking behavior.

Social learning theory focuses on the important effect of the family members and peers on young people in modeling substance use behaviors (12). Positive social impact during adolescence is an essential factor in preventing or delaying the onset of smoking. The social effect of stress on the family process and peer behavior is modeled as the main factors influencing the growth of substance use in adolescents (12). Family processes are built by subsystems such as parental supervision, family routines, and parent-adolescent relationships. These subsystems are independent of each other and work interdependently. The family process has a multidimensional structure and plays a decisive role in determining the complexity of daily family life (13). Positive family process and Parenting are less likely to lead to substance use. Effective monitoring is associated with a reduced likelihood of relationships with peers who use drugs. Adolescents with

higher interactions and family routines tend to exhibit less risky behaviors (4). Adolescence is a period during which people want more independence, and parental restrictions and restricting adolescents' activities or relationships can prevent substance use. Less parental regulation is associated with a higher risk of substance use for women and girls (5).

As young people gain more control over their social relationships, socializing with peers who engage in antisocial and illegal behaviors is one of the most critical factors in substance use at an early age (13). Adolescents who exaggerate about smoking and drinking may be at a greater risk for smoking. Smoking is more likely to occur in social situations (4). Higher frequencies of use are correlated with lower rates, and people who are not friends of smokers are more likely to avoid smoking.

Contrary to empirical evidence and theoretical frameworks for family bonding and peer influence, and the onset of smoking, there are many gaps in the literature. First, the family process criteria, including the relationship between parental supervision and substance use, have been examined in various studies (4, 13). Other criteria of the family process are not sufficiently evaluated. Second, most studies have used general measures of peer influence. However, peer influence has a multidimensional nature that may affect the participants in different ways. The purpose of this study is to examine the socialization processes. This study examines the variability between peer influence criteria (e.g., peers who smoked, used illicit drugs, belonged to gangs, and drank at least once a month). Third, although some previous research has shown a gender difference in smoking (4), some other research studies have shown no gender difference in the onset of smoking (5). Some studies like the one by Heidari (4) have shown the significant relationship

of the other demographic characteristics such as age and level of education with smoking. Little research has been done on the extent of age-gender interaction from early adolescence to age 35 with smoking. In addition, a delayed relationship is established between the family process and peer influence metrics to measure one-way influences, providing more assertive statements about the long-term impact of socialization on smoking. Also, Mahabee-Gittens et al. (13) examined the effects of family on smoking in different racial groups and showed high levels of family influence on protecting the individuals against smoking in all racial/ethnic groups.

Previous research has identified several factors associated with adolescent Smoking. One of the behavioral factors that may slow down the process of smoking is physical activity. Studies have shown a negative and coherent relationship between physical activity and Smoking, and show that adolescents who participate in higher levels of physical activity smoke less (14, 15). For example, one study found that increased student participation in sport during high school was associated with a reduced likelihood of regular or intense smoking (16). Efendi et al. (9) showed that smoking increases the incidence of respiratory symptoms and decreases physical activity in healthy women. Maziar et al. (17) explained the role of sport and physical activity in creating a healthy society emphasizing on the reduction of crime and smoking. The results indicate that sport and physical activity, directly and indirectly, affect crime, drug use, and smoking reduction. Peretti-Watel et al. (18) showed a negative relationship between performing sports as an elite student-athlete and smoking and alcohol use. Audrain-McGovern et al. (9) showed that higher levels of physical activity reduce the chances for high levels of Smoking by about 1.5. Inthachai et al. (19) pointed out that healthy people who smoked and did not perform sport

activities faced imbalances in body composition, decreased respiratory muscle strength, sport performance, and increased arterial stiffness. These studies suggest that physical activity may have a protective function against smoking. However, available data on physical activity and smoking in adolescence are incomplete and primarily cross-sectional (20). Ahmadabadi (21) showed no significant relationship between being an athlete and smoking, alcohol, and drug use. This article is a longitudinal study reporting how family process and peers affect the smoking onset from adolescence to adulthood for both men and women. Given these factors, this study has two primary purposes. First, what are the relationships between family process criteria (e.g., parental supervision, family routine, and independence once puberty) and the onset of smoking? Second, what are the relationships between the peer influence factors (e.g., smoking, illicit drugs, drinking, and gang membership) and the onset of Smoking? It is predicted that people with positive family backgrounds, fewer peers involved in smoking, alcohol use, and misbehavior are less likely to smoke early.

2- METHOD

2-1. Sample

The National Longitudinal Study of Youth 1997 (NLSY97), a prospective national representative survey from the 1980-1984 cohort, was used for this study. The first wave began in 1997 when the participants were between 12 and 18 years old, and since then, respondents have been interviewed annually. Nlsy97 has collected data on substance use and crime, including detailed information on smoking more than seventeen waves by 2015. In the first wave, a parent or guardian was asked about academic achievement and family structure. From among the 4966 eligible adolescents, 46.33% were males. In the

last wave, nearly 20% of men and 16% of women had smoked at least once.

2-2. Criteria

Smoking onset. All adolescents were surveyed about their smoking experience, referred to as "grass" or "pot" in the questionnaires. In the first wave, the respondents were first asked if they had ever smoked. In round 2, the respondents who had previously provided valid answers to the question about Smoking were asked if they had smoked since the last interview. The participants having smoked at least once was a risk indicator, and those who reported smoking were eliminated at each wave.

2-2.1. Family process criteria

The following family process criteria were examined: family routine, parental supervision, and parent-adolescent relationship. They are designed as time-varying variables at maturity, measured by four likert scale questions, with score ranges of 0 = no day in the week to 7 = all 7 days of the week. The four questions included: How many days in a typical week does the respondent eat dinner with the family, help his / her parents with household chores, have fun with them, and do a religious activity as a family? Thus, the potential score range was 0 to 28, and higher scores indicated more days of routine family activities. This study coded family routines from 0 to 16 as low family routines and 15 to 28 as moderate to high family routines. The Parental supervision scale was based on four questions: Do parents have information about the adolescents' educational status, and teachers, friends, and the parents of the friends? The parental supervision scale was the sum of these four scores, from 0 to 16. The degree of parental supervision is coded 0 to 8 as low supervision and 9 to 16 as high supervision. The control/autonomy scale has two sets of questions, including limit setting and breaking. Limit setting is

measured by questions about setting limits for staying awake at night, socializing with friends, and watching TV series or movies. This variable is coded at three levels: (1) Adolescents set all the limits. (2) Parents set all the limits, and (3) the limits are jointly imposed by parents and adolescents. The latest family process in this study is the limit-breaking sub-scale, which asks the adolescents that how many times they have broken each of these limits in the past 30 days. The variable is coded in two sentences: (1) The adolescent broke the limits, and (2) the child broke the limits.

2-2.2. Peer influence

The participants answered questions about the percentage of peers involved in different activities in the first wave. They assessed four peer behaviors, including the percentage of peers involved in Smoking, drinking at least once a month, gang membership, Smoking, and illegal drugs. In each question, the participants were asked about what percentage of peers were involved in negative behaviors. The answers ranged from 1 (almost none) to 5 (almost all) for all questions. These four items are coded in two sentences: (1) high (more than 50% of peers) and (2) low (less than 50% of peers).

2-2.3. Control variables

Information about family structure in adolescence was used to control the analysis. Several variables cause parental divorce. First, one parent was asked about all previous marriages and divorces; in the second set of variables, the people whose parents divorced after the first round were identified. In rounds 6, 11, and 13, young people were asked if their parents had been divorced in the last 5 years. This set of variables was used to create a binomial variable to identify an intact family or a divorced family. In addition to gender and race/ethnicity to control the analysis, several other individuals' experiences were used to test family formation factors in this study.

This study was controlled in terms of the mother's education level, employment and enrollment status as life events, and the mother's age at birth to control the socio-demographic status of mothers. Academic achievement status was classified into four groups: lower than high school, high school, associate, and bachelor or higher. A binomial time-varying variable is designed for employment status, identifying those who work part-time and full-time and those who do not. The last time-varying control variable was the enrollment status, which included people enrolled in schools, universities and those who did not.

2-3. Statistical analysis

In the initial analysis, Kaplan-Meier survival analysis was used to estimate the probability of first smoking and family process criteria. The participants who had not smoked till the age of 15 were set in periodic personal files, and any adolescents who reported Smoking before the study were excluded from the risk set. Next, logistic regression models were used to determine whether smokers differed from non-smokers. Discrete event history analysis was performed on the initiation of smoking with time-varying predictor variables. The question is whether predictors of socialization (e.g., family process and peer influence) can account for the transition from non-use to first use. In addition, a Piecewise linear strip was added to the analysis to estimate the age correlations. The next year's data were deleted when the teen reported first smoking. The analysis was performed with three models. Model 1 included family process criteria, model 2 was analyzed using peer influence criteria, and the control variables were added to the family process and peer influence criteria.

3- RESULTS

Women were more likely to be healthy, and half of the samples were white. Sixty percent of the sample reported low levels of sport activities, and the majority were in families with no sport. Model 1 shows that the adolescents with high levels of sport performance were less likely to smoke before the age of 16, and moderate sport performance was associated with a 15% reduction in the risk of Smoking. Women smoke less than men; and the same was true for blacks compared to whites. Children separated from the family are 20% more likely to smoke, and parental education has nothing to do with smoking. After controlling the intervening variables, no significant relationship was observed between sport and smoking. The figure shows that people who are more involved in sports are less likely to smoke during adolescence.
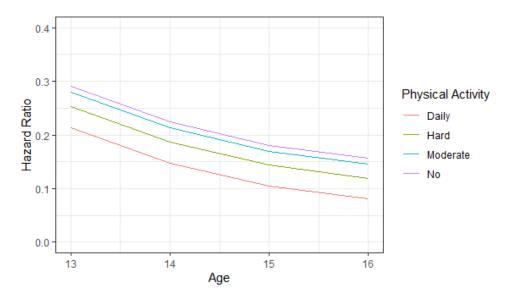

Fig. 1: Onset of Smoking by physical Activity within the Family

4- DISCUSSION & CONCLUSION

Today, family activities are considered an essential factor for children and adolescents. The present study hypothesized that regular family activities were associated with positive health practices and reduced smoking. Consistent with the present study, previous research also supports the hypothesis that family activities are associated with lower substance use and smoking (5, 7, 11, 22, 23). Mahabee-Gittens et al. (13) showed that family effects are significantly associated with smoking prevention. Family activities are a tool that parents try to use to socialize their children with their attitudes and are ways for the parents to connect with their children to prepare them for future stressors. Family activities or the family's regular engagement in activities for the children can positively affect their children, including improving health and quality of life as well as reducing depression and drugs and nicotine dependence. Thus, the existence of more vital family factors such as supervision, closeness and intimacy of parents and adolescents and constant discipline protects children, even if there is a high level of risk for them to start smoking (13).

Table-1: Logistic Regression Models (NLSY97).

Predictors	Odds Ratios	CI	p	Odds Ratios	CI	p	Odds Ratios	CI	p	Odds Ratios	CI	p
(Intercept)	0.23	0.21 - 0.25	<0.001	0.28	0.24 - 0.31	<0.001	0.23	0.20 - 0.27	<0.001	0.26	0.21 - 0.32	<0.001
Family Sport (No)	Reference			Reference			Reference			Reference		
High	0.61	0.47-0.78	<0.001	0.57	0.41 - 0.76	<0.001	0.83	0.56 1.20	0.338	0.76	0.47 1.17	0.225
Low	0.95	0.87 - 1.04	0.292	0.93	0.84-1.03	0.156	0.96	0.82 1.13	0.602	0.88	0.74 1.06	0.189
Moderate	0.85	0.75 - 0.97	0.016	0.91	0.78 - 1.06	0.222	0.85	0.69 - 1.06	0.149	0.80	0.62 - 1.03	0.080
Gender (Male)	Reference			Reference			Reference			Reference		
Female				0.83	0.76-0.90	<0.001				0.88	0.75 - 1.04	0.124
Race (White)	Reference			Reference			Reference			Reference		
Black				0.72	0.65 - 0.81	<0.001				0.85	0.69 1.04	0.119
Hispanic				0.89	0.79 1.01	0.077				0.88	0.69 1.11	0.279
Mixed				1.54	0.89 2.57	0.107				1.21	0.64 - 2.15	0.533
Family Structure (Intact)	reference			Reference			Reference			Reference		
Parental Divorce				1.20	1.07 - 1.35	0.002				0.91	0.75 - 1.10	0.339
Mother Education	(Academic)			Reference			Reference			Reference		
High School				0.99	0.89-1.11	0.917				1.18	0.98 1.43	0.073
Less than High School				1.09	0.94 - 1.26	0.234				1.48	1.11 1.96	0.007
Father Education (Academic)				Reference			Reference			Reference		
High School				1.00	0.90 1.12	0.954				0.91	0.75 1.10	0.324
Less than High School				0.92	0.79 - 1.07	0.270				0.85	0.64 1.13	0.269

Table-2: Logistic Regression Models (NLSY97)

Variables		Healthy (N=14270)	Not Healthy (N=4442)	Overall (N=18712)
Gender	Male	6228 (43.6%)	2146 (48.3%)	8374 (44.8%)
	Female	8042 (56.4%)	2296 (51.7%)	10338 (55.2%)
Race	White	7156 (50.1%)	2574 (57.9%)	9730 (52.0%)
	Black	3698 (25.9%)	1097 (24.7%)	4795 (25.6%)
	Hispanic	3343 (23.4%)	707 (15.9%)	4050 (21.6%)
	Mixed	73 (0.5%)	64 (1.4%)	137 (0.7%)
Sport	High	450 (3.2%)	165 (3.7%)	615 (3.3%)
	Low	8604 (60.3%)	2509 (56.5%)	11113 (59.4%)
	Moderate	1748 (12.2%)	684 (15.4%)	2432 (13.0%)
	No	3468 (24.3%)	1084 (24.4%)	4552 (24.3%)
Family Structure	Intact Family	11910 (83.5%)	3420 (77.0%)	15330 (81.9%)
	Parental Divorce	2360 (16.5%)	1022 (23.0%)	3382 (18.1%)
Mother Education	Some college and more	6661 (46.7%)	2274 (51.2%)	8935 (47.8%)
	High School	4648 (32.6%)	1483 (33.4%)	6131 (32.8%)
	Less than High School	2961 (20.7%)	685 (15.4%)	3646 (19.5%)
Father Education	Some college and more	5691 (39.9%)	2057 (46.3%)	7748 (41.4%)
	High School	5422 (38.0%)	1725 (38.8%)	7147 (38.2%)
	Less than High School	3157 (22.1%)	660 (14.9%)	3817 (20.4%)

Sharma et al. (3) stated that the family structure has become more complex, and we are witnessing a change from the traditional family to single-parent families, stepmother families, adopted child families, and multi-generational households. Therefore, when a family member starts an activity, such as Smoking in any way, the whole family, including children, are affected. It can be explained that nicotine dependence seems to occur "in the family" and that children who grow up in families with nicotine dependence may repeat it in their adult behavior based on what they have seen and learned from their family experience; thus, nature and upbringing both affect a person's vulnerability or resistance to such a drug addiction. Finally, in explaining the effects of family activities on smoking, it can be stated that these cases are supported by the ecological theory, which shows that children are initially affected by their immediate and close actors, which are the family members. Family and parenting processes are defined as intimacy factors,

directly and indirectly, related to children's competencies that can predict adolescent smoking and drinking behavior (24).

Women also smoke less than men, and blacks smoke less than whites. Consistent with the present study, Heydari et al. (25) showed that the prevalence of smoking in women is lower than in men. Mahabee-Gittens et al. (13) showed no statistically significant difference between the genders in the youth's smoking status. However, Yousefi Il Zoleh (26) showed that male and female students have different perceptions of smoking and are encouraged to smoke for various reasons. The findings of the World Health Organization in 151 countries show that 7% of adult girls smoke, while this figure is about 12% in adult boys. Differences in the lived experience of Smoking between men and women indicate that different smoking patterns prevail, especially in terms of motivation, conditioning, and facilitating conditions. At the same time, the family atmosphere and environment, to some extent, pave the way for smoking

among girls and boys. In this regard, Audrain-McGovern et al. (9) showed no difference in smoking between different races. Mahabee-Gittens et al. (13) showed that more parental supervision, more intention to control and communicating more against smoking played a protective role among Hispanics, while more parental punishment and a favorable attitude towards supervision were protective agents against smoking among blacks. In general, they showed a high level of family influence on protecting the youth and adolescents against smoking among all racial/ethnic groups. Ellickson et al. (8) also showed that the highest smoking rates were among whites, followed by Hispanics and black youth. Lack of parent-adolescent closeness, inadequate discipline, and ineffective supervision may have led to more smoking among whites.

Children separated from the family are 20% more likely to smoke, and parental education has nothing to do with smoking. The issues mentioned in this study showed that the family has a positive effect on the children's behaviors. Therefore, separation from family will naturally harm the child. The parents' activities against their children's smoking are essential because they are the primary role models for the adolescents. The parents' attitudes toward smoking, their understanding of smoking, and the love between the parents and their children are important factors influencing adolescent smoking. However, frequent disagreements with parents, parental divorce, abuse by family members, underage parents, and poor family relationships all play a role in adolescents' risk of smoking. Park (27) stated that reducing adolescent smoking rates is not possible only through social constraints such as stereotyped education which is consistent with the present study. Therefore, instead of forcing children not to smoke, it is better to fully explain the harmful effects of smoking on their physical growth and mental health, and to

convince them that smoking causes social problems, is a facilitating factor for other drugs,. Such explanations can reduce the tendency to smoke and drug use among young people. The results are, however, inconsistent with those of Heidari et al. (4) and Kandel et al. (28), who manifested that education has a significant relationship with Smoking. The research by Heidari et al. (4) showed that the level of the parents' education does not have a significant effect on the students' occasional and daily smoking. Inconsistent findings can be related to methodological (such as statistical population and measurement), cultural and social differences, etc.

The results indicate that adolescents with high levels of physical activity were less likely to smoke before the age of 16, and moderate sport was associated with a 15% reduction in the risk of smoking. Therefore, people who have high levels of physical activity are less likely to smoke during adolescence. The results are consistent with Maziar et al., (17); Audrain-McGovern et al., (9); Efendi et al., (2); Inthachai et al., (19) and inconsistent with Ahmadabadi et al. (21). Audrain-McGovern et al. (9) revealed that higher levels of physical activity reduce the chance of smoking or high levels of smoking by about 1.5 and may reduce the risk of smoking during adolescence. However, some studies have reported inconsistent results (29). In general, consistent research has suggested that sport helps prevent smoking through mechanisms such as reducing stress and anxiety, increasing self-esteem, decision-making, resisting other people's insistence, improving self-image, and becoming more aware of the harmful effects of drugs.

In contrast, some studies have identified specifically competitive sport activities as risk factors for smoking, drug and alcohol use and found that a competitive culture and the pressure to succeed could lead to such risky behaviors (29, 30). Sport and

physical activity increase serotonin, which by itself increases the feeling of happiness and vitality in addicted people, reducing substance use and smoking. For example, according to the social capital theory, membership in sports teams and clubs is a form of social participation that can help promote healthy behaviors. These methods include increasing awareness and information, filling leisure time, reducing opportunities to participate in high-risk activities, and continuous social control (21). However, social participation does not always have an entirely positive effect on the individuals. Sometimes, group norms and values (delinquent groups) may be at odds with individual and social health, where adherence to such norms and values endangers the participants' health. In this regard, a group of studies has examined the negative role of sports team membership on behavioral health (31, 32).

The literature has focused more on cross-sectional data. This study adds to the previous literature by considering the long-term consequences of family activities on smoking during adolescence. Future efforts are essential to replicate the results of the present study in large samples involving different groups of young people and determine how these findings can inform future parental smoking prevention interventions. They should develop standard programs and make relevant efforts to significantly reduce the smoking rate of adolescents in society. Because the home or school environment strongly influences adolescent smoking, it is necessary to work on practical education and social empowerment at school, establishing relevant norms, and implementing preventive education using peer groups. Such efforts, if expanded with the cooperation of parents and communities, will also be beneficial for maintaining the health of adolescents and improving their quality of life.

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