



Effects of parent-child affective quality during high school years on subsequent substance use.

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The literature indicates that the quality of affective relationships between youth and parents is associated with lower levels of a range of problem behaviors during childhood, early and late adolescence. While the protective effect of parental monitoring on substance use in the high school and post high school years has been demonstrated, there is a knowledge gap concerning effects of parent-child affective quality (PCAQ) during the same periods. We tested a conceptual theoretical model to examine the effects of PCAQ on substance use following high school. The sample was from a RCT that assessed adolescents in rural Iowa from the seventh grade through two years after high school (N=456). We specified direct effects of PCAQ in 12th grade on drunkenness, smoking and illicit drug use during the two years immediately following high school graduation. We also specified the effects of early substance use initiation (alcohol, tobacco and marijuana use reported at baseline) on later use. The direct effect of PCAQ in 12th grade on substance use was significant for all substances during at least one of the two years past graduation (ypg). Results were: drunkenness 1 ypg, $\beta=-.126$, $p<.05$; smoking 1 ypg, $\beta=-.119$, $p<.05$; 2 ypg, $\beta=-.146$, $p<.05$; illicit drug use 2 ypg, $\beta=-.165$, $p<.05$. Some significant indirect effects of PCAQ at baseline, via PCAQ at 12th grade, were found. Results also indicated significant direct effects of early initiation on two of the three substances, albeit with a different pattern of effects over time for each substance by years post high school. Importantly, while early initiation remains the strongest predictor of long-term tobacco and illicit drug use, results show how PCAQ might reduce its harmful effects.

Keywords: parent-child affective quality, substance use, adolescence

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Introduction

Relationships between parents and youth, as well as delinquent behaviors, such as alcohol and substance misuse, rarely follow a straightforward, clearly defined path. Many of these behaviors vary by developmental phases, milestones and life events. Late adolescence is often viewed by researchers as developmentally pivotal. This stage of life typically is associated with transitions and milestones related to gaining independence and acquiring multiple new roles – for example, graduating from high school, starting advanced education, moving out of the parents' home, changing peer networks, and finding new jobs (Arnett, 2004). These changes bring novelty and stress, with both positive and negative effects, and warrant the development of new coping mechanisms to adjust to the transitions and new roles (Bachman et al., 1997; Newcomb and Bentler, 1987; Schulenberg and Maggs, 2001).

Importance of substance use among youth

The literature highlights how substance use is a developmental phenomenon that changes over the life course. Late adolescence is considered to be a period during which experimentation with multiple substances is frequently observed and one during which substance use reaches its highest level. Schulenberg and Maggs (2001) argue that changes during late adolescence in consumption of alcohol, tobacco and illicit drugs are closely related to the developmental changes experienced by youth, especially the increase in unrestrained opportunities and decrease in typical constraints for substance use (e.g., parental monitoring, broadened peer network, not living in the parents' home).

Each substance-related behavior is marked by a specific trajectory. For example, the past year rates of marijuana use tend to peak at the age of 20 and then drop nearly 50% by the age of 30, while the rates of binge drinking peak by age 22 and decrease significantly among 30-year-olds (Johnston et al., 2004). Relative instability in acquisition of and adjustment to new roles and responsibilities, coupled with continuous exploration of identity, contribute to the increase in substance use and poly-substance experimentation following high school graduation (Arnett, 2000; Schulenberg and Maggs, 2001).

Another key factor in adolescence is the timing of substance initiation, from early initiation in young adolescence to onset later on in high school when use becomes more developmentally normative. Kandel and Yamaguchi (2002) argue that the high school years are characterized by greater initiation rates, frequency of use, and variability of substances used than later stages of development. Additionally, the literature suggests that early substance initiation may play a significant role in both substance use and misuse later in life (Chassin et al., 1990; Kandel and Yamaguchi, 1993; Rachal et al., 1982). For example, Kandel (2002) argues that early onset of alcohol or tobacco use is strongly linked to subsequent initiation of marijuana or other illicit drug use, and research affirms that early onset of any substance use leads to the greater involvement with drugs and greater use frequency (Fleming et al., 1982; Kandel, 1982; Robins and Przybeck, 1985).

Research has shown that youth with early alcohol or tobacco experience are at increased risk to continue using other drugs later in life (Morral et al., 2002; Wagner and Anthony, 2002). Lynskey and colleagues (2003) demonstrated that early onset of marijuana use is causally linked to later use of other “hard” drugs. In this vein, Agrawal and colleagues (2006) found that early initiation of marijuana is positively associated with subsequent initiation of other illicit drugs. Similar findings are noted in an earlier study by Kandel and Yamaguchi (1993) who linked early initiation of tobacco to later involvement in other illicit substances. Finally, Auld (2005) finds that youth who initiated smoking by the age of 14 are 5.5 times likely to smoke in late adolescence. Overall, the consensus in the existing body of research is that, in general, early initiation is a consistently strong predictor of substance use in adolescence and later in life.

Parent-child affective quality effects on substance use

Parental influence has been identified in the developmental literature as one of the most prominent factors that can slow down and to some extent prevent early initiation and future misuse of substances. Studies on parenting have recognized two major parenting dimensions – labeled *control* and *support* (Hoeve et al., 2009; Lac et al., 2009); both have been shown to affect patterns of substance use in adolescence. Control is a dimension that typically includes parental monitoring or knowledge of child’s location and peers, disciplinary efforts, and standard setting, and has been widely studied. A variety of studies demonstrated the protective effects of parental monitoring on heavy drinking and marijuana use not only in childhood and adolescence, but also following graduation from high school (Bates and Labouvie, 1995; Kosterman et al., 2000; Schulenberg and Maggs, 2001; White and Jackson, 2004–2005; Wood et al., 2004). Lac et al. (2009) suggested that parental control is reflected in knowledge of the youth’s whereabouts and contacts, and comes largely from volunteer disclosure by children. The authors demonstrated that such disclosure is closely linked to the dimension of support, which may indicate that young people are comfortable sharing details of their personal lives with parents, despite a growing desire for independence.

Compared to the investigation of parental monitoring and other controlling behaviors, the dimension of support – encompassing warmth, quality of affect, and attachment in the parent-child relationship – has been relatively understudied. The existing body of research conducted on parental support has examined the quality of parent-child relationships, especially such traits as mutual attachment, warmth and mutual supportive communication. A variety of studies have focused on the absence of support, such as withholding love and affection or rejection. Meta-analysis conducted by Hoeve and colleagues (2009) revealed a strong link between parental support and child delinquency. Riggs and colleagues (2009) reported that parental warmth is negatively related to child impulsivity — a construct, linked by previous studies, to a variety of negative behavioral outcomes (including substance use) in young adulthood (Achenbach and Edelbrock, 1983; Connors et al., 1998). These findings are consistent with earlier study by Scaramella and colleagues

(1999) and Spoth and colleagues (1999) that demonstrated a strong association between high levels of parental affective quality and fewer externalizing problems during adolescence.

Effects of positive support on such problem behaviors as substance misuse, however, are less known. The literature indicates that the quality of the parent–child relationship has an effect on substance use in adolescence (Catalano and Hawkins, 1996; Mrazek and Haggerty, 1994; Spoth and Redmond, 1995). Specifically, a lack of warmth or presence of hostility in the relationship between parents and children are associated with an increase in alcohol and tobacco use as well as their earlier initiation during adolescence (Brody and Forehand, 1993; Melby et al., 1993; Simons-Morton et al., 2001; Shelton et al., 2008; Shelton and Van den Bree, 2010), while a positive parent-child relationship has been found to be inversely related to drug use (Piercy et al., 1991).

A few studies looked at the perception of parental practices and substance use in college students, retrospectively. Montgomery and colleagues (2008) found that young adults who perceived their parents as having been neglectful were more likely to engage in polydrug use than peers who perceived their parents as having exhibited warmth and control. This finding is consistent with earlier studies of college students perceived their parents as neglectful reporting higher levels of drug and alcohol use (Emmelkamp and Heeres, 1988; Weiss and Schwarz, 1996). We were not able, however, to locate current research that focused specifically on the transition youth experience upon graduating high school, using self-reports about parental practices (including warmth and support dimensions) from children and their parents at various stages of youth's life, including early and late adolescence. This notion is supported by Hoeve and colleagues (2009) who specifically mention the need for more longitudinal studies that test the links between parent-child affective quality and delinquent behaviors across various life course stages, including childhood, early and late adolescence.

This study focused on the effects of positive parent-child affective quality, in other words, relationships characterized by warmth, support and absence of harsh behaviors and critiques of the child (Spoth and Redmond, 1995; Spoth et al., 1999), established in childhood and re-measured during late adolescence, on youth's subsequent substance use practices. Although research has explored the link between parent-child affective quality and substance use in childhood and adolescence, establishing the importance of these relationships as a natural means of protecting youth from substance-related problems, there is very limited research examining this relationship during the time of transition into increased independence after high school. Gaining a better understanding of positive parent-child affective quality that could potentially slow down youths' involvement with alcohol and other substances during this transitional period can help inform parents and prevention practitioners. Lac and colleagues (2009) explored the effects of parent-child affective quality in youth between 12 and 18 years of age and suggested that, developmentally, parental influences are more strongly associated with beliefs (and subsequent behaviors) of younger children than adolescents, due to young adolescents spending more time with parents. These researchers identify a gap in

attention to the effects of early parent-child relationships on the later substance use outcomes. This paper aims to address this gap by examining both the direct and indirect effect that parent-child affective quality, established in middle as well as during high school, has on substance-related behaviors (i.e., drunkenness, smoking and illicit drug use) during the first two years following high school graduation.

Hypotheses

Hypothesized relationships among parent-child affective quality during adolescence and high school, early initiation/risk, and late adolescent substance use were examined through path analysis with structural equation modeling. The first hypothesis relates to the continuity of the effect of parent-child affective quality on substance use over the first two years following high school graduation. The first hypothesis suggests that higher levels of parent-child affective quality in high school will be negatively related to the frequency of substance use (measured by current frequency of drunkenness, smoking and past year illicit drug use) during the first and second year after high school graduation.

Consistent with results reported in prior research that link the association between early initiation and subsequent rates of involvement with alcohol, tobacco and illicit drugs, the second hypothesis posits that early initiation/risk will be positively related to the rates of drunkenness, smoking and illicit drug use during the two subsequent years following high school graduation.

Methods

Sample

The data for this study were from a randomized controlled trial of substance use interventions conducted in 24 rural schools in 22 counties in a Midwestern state. The schools were randomly assigned to the two experimental conditions: those receiving the 15-session, classroom-based Life Skills Training (LST; Botvin, 1996, 2000) plus the seven-session Strengthening Families Program: For Parents and Youth 10-14 (SFP: 10-14; Molgaard et al., 1997) or a minimal contact control condition (mailed leaflets on teen development). Following school matching and random assignment, schools and families were contacted and informed of the experimental condition to which they had been assigned.

The trial began in 1998 and involved children attending seventh grade who were followed through 2005 (or two years following high school graduation). For the purpose of the current study only a subset of the sample (approximately 20 families per school) that included children and parents interviewed at home was used. The sample included only children who took part in the baseline assessment of 1998 as well as assessments conducted during either of the last two years of high school, total $N=456$; 237 participants were male, 209 were female, and 10 participants chose not to disclose their sex. Approximately 99% of the surveyed population was Caucasian. Data also were collected from this sample the two subsequent years after high school graduation.

During the first post-high school year, approximately 37% of respondents reported enrollment into trade school or community college and 34% into a 4-year college (2% were still in high-school). A slight decline in these numbers was reported during the subsequent year – 31, 32 and 1% respectively. Thirty one percent of respondents lived with parents and 10% married or cohabitated with their significant others during the first year post high-school (23 and 14% respectively during year two). Seventy four and 90% respectively reported holding at least part-time employment during the two subsequent post-high school years.

Attrition analyses for both parents and their children found that approximately 20% did not complete every wave of data collection. There were no significant differences in outcomes among children who did not complete every wave, with the exception of smoking: smoking was significantly different between those who participated in every wave and those who did not (t -value = 2.07) during the last year of high school. Non-completers reported a higher level of smoking behavior during the year immediately following high school. Overall, fewer individuals participated in 12th grade ($n=371$) than participated following high school ($n=407$).

Measures

Study measures focused on parent-child affective quality, youth substance use, risk level, and inclusion in the intervention condition.

Parent-Child Affective Quality. For this study, two measures of PCAQ were used: the first was taken at baseline to control for the initial level of affective quality, and the second was taken at the last year of high school to determine the effects of PCAQ on substance use post high school. This measure was comprised of seven items. Three items assessed expressions of positive affect toward the child ($\alpha = .83$), such as parents letting child know they cared about him/her, appreciated him/her and acted loving and affectionate toward the child. The remaining four items focused on expressions of negative affect toward the child, such as parents getting angry at the child, losing temper, yelling or insulting/swearing at the child. These items were reverse coded ($\alpha = .82$). The items were completed by each parent to assess behaviors directed toward their youth, and the youth was asked to evaluate each parent's behavior. The reliability levels for each parent and child measure range between $\alpha = .85$ and $\alpha = .89$. The overall PCAQ measure is a mean score of child and combined parent report with correlations $r = .54$ at baseline and $r = .42$ at the last year of high school. When only one parent was available, that parent's score was used. Combining the two reports into one measure allows creating a multi-dimensional proxy for the quality of the parent-child affective relationship that considers both parties, and the moderate correlations between the items support the nature of the general direction of these relationship.

Substance use. There were three measures of substance use: drunkenness, smoking, and illicit drug use. Scales used in measuring substance use were selected with consideration of typical frequencies of use and rates of increase in use during high school. Drunkenness and smoking were measured in terms of the

respondents' typical frequency of use ("How often do you..."). Drunkenness was measured on a scale from 0 to 6, with 0 being "not at all" and 6 being "about every day". The smoking item covered a broader range of use with 0 being "not at all" to 9 being "a pack or more each day". Due to the relatively lower frequencies and more occasional use of illegal drugs in the study population, rather than an actual frequency measure similar to those of drunkenness and smoking, a past year composite proxy variable was created. The measure was constructed from a Yes/No index that listed a wide range of past year illicit drug use, including marijuana, cocaine, ecstasy, meth, amphetamines other than meth, Vicodin, Oxycontin, Barbiturates, GHB, LSD, inhalants, paint and gas, where "Yes" was coded 1 and "No" was coded 0. The items then were summed.

Approximately 37% and 25% of the sample report never getting drunk at the first and second year post-high school assessment, respectively, while 9% of respondents reported drunkenness at least once a week at each year past high school. Seventy and 61% of the population reported that they were non-smokers, while 11 and 12% reported a habit of at least half a pack a day at the first and second year post-high school. In regard to illegal drug use, approximately 73% at each post-high school year reported no illegal substance use within the past 12 month, while 12 and 10% respectively admit to using one substance and about 5 and 6% report using two or more substances, indicating a heavier pattern of use.

Substance risk level. The risk variable was constructed to capture the effects of early initiation of gateway substances—alcohol, tobacco and marijuana. The initial measure was taken at baseline (seventh grade) and used to differentiate between lower-risk and higher-risk sub-populations. The lower-risk population was considered to be those who had tried none or one of the three substances at baseline and was scored as 0, while those who tried two to three substances were considered higher-risk and scored as 1. The study sample included 74 higher-risk and 333 lower-risk participants; 49 had missing risk data.

Analysis

Due to the hierarchical structure of the data, path analyses using structural equation modeling were conducted using Mplus 6.1, controlling for the nested data structure (individuals were nested within schools; Muthén and Muthén, 1998-2010) and adjusted for non-normality. Illicit drug use outcome variable did show skew and kurtosis during both years (skew $y_1=3.81$, $y_2=3.85$, kurtosis $y_1=16.8$, $y_2=17.17$), which is expected given the characteristics of the sample, but not so severe as to bias results (Curran et al., 1996).

Model fit was evaluated using a chi-square test statistic as well as Comparative Fit Index (CFI), the Tucker Lewis Index (TLI), and root-mean-square error of approximation (RSMEA). A relatively good model fit is described by a non-significant chi-square result, which indicates the absence of large differences between the model and the data (Bollen, 1989; Hu and Bentler, 1999), as well as values of CFI and TLI above .95 and RSMEA values below .06 (Hoyle, 1995; Kline, 2005). Analyses were conducted with an adjustment for non-normality using full-information maximum likelihood estimation (FIML), which is considered a viable strategy for addressing missing data (Allison, 2003; Schaefer and Graham, 2002).

To address the first hypothesis and investigate the effects of PCAQ on substance use during the two years immediately following high school graduation, six models were fitted. The same theoretical model (Figure 1) was tested for each of the three individual substances, estimating the direct effects of PCAQ in high school on substance use in two subsequent years. In addition, the indirect effect of PCAQ at pre-test and the direct effect of risk were tested. Additionally, a two-group model that compared constrained and unconstrained structural paths was fitted to ensure absence of interaction effects due to the intervention condition. No significant differences were found, which made it possible to combine the intervention and control groups for present study.

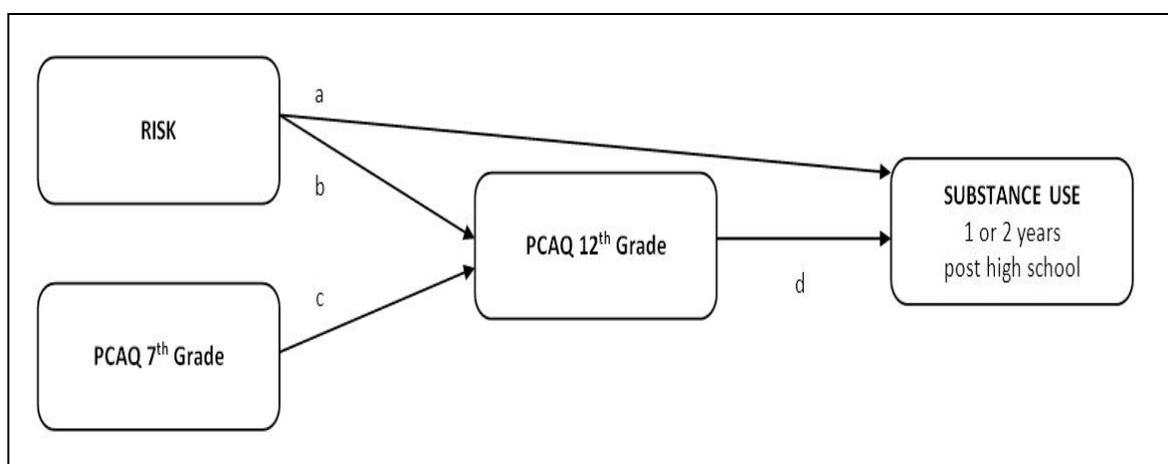


Figure 1. General model of PCAQ effect on subsequent substance use

Results

Initial analysis of inter-factor correlations (Table I) demonstrated an expected pattern of variable relations in which use of a particular substance within the previous year is strongly related to the use of the same substance during the following year (range $r=.60$ to $.73$). Of the three substance use variables, early initiation/risk has the highest correlation with the rates of smoking ($r=.407$, $p<.001$) and drug use ($r=.371$, $p<.001$) during the first post-high school year. Levels of parent-child affective quality during seventh grade correlate negatively with early initiation/risk ($r=-.164$, $ps<.001$).

Drunkenness. Both models provide an adequate fit to the data (Table II) with the relatively low values of chi-square, $p<.05$, and relatively high values of CFI and TLI indices. The value of RMSEA is below $.06$, which also indicates a good model fit (Bollen, 1989; Hoyle, 1995). However, the effects of parent-child affective quality had a significant direct effect on the rate of drunkenness (path d) only during the 1st year after graduating high school (respectively, $\beta_{y1}=-.126$, $p=.015$, $\beta_{y2}=-.077$, n.s.).

Table I. Inter-factor correlations, means, and standard deviations

	Risk	PCAQ 7 th Grade	PCAQ High School	Drunkenness 1 ypg	Smoking 1 ypg	Drug Use 1 ypg	Drunkenness 2 ypg	Smoking 2 ypg	Drug Use 2 ypg
Mean	0.182	0.025	0.093	1.318	1.681	0.307	1.563	1.899	0.329
Std. Dev.	0.386	0.882	0.864	1.466	3.029	0.828	1.411	3.201	0.92
Risk	1								
PCAQ 7 th Grade	-.164**	1							
PCAQ High School	0.021	.447**	1						
Drunkenness 1 ypg	.127*	-.142**	-.138**	1					
Smoking 1 ypg	.407**	-.210**	-.129*	.263**	1				
Drug Use 1 ypg	.351**	-.148**	-0.033	.257**	.477**	1			
Drunkenness 2 ypg	0.067	-.105*	-0.085	.603**	.142**	.132**	1		
Smoking 2 ypg	.342**	-.197**	-.121*	.153**	.733**	.389**	.202**	1	
Drug Use 2 ypg	.280**	-.145**	-.146**	.209**	.313**	.607**	.246**	.369**	1

**Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

Table II. PCAQ and risk effects on substance use during the first and second years post- high school graduation

Model	N	χ^2	df	p	CFI	RMSEA	Path a		Path b		Path c		Path d		Path cd	
							β	t	β	t	β	t	β	t	β	t
Drunkenness Y1	456	.978	1	.322	1.000	.000	.133	1.822	.112*	2.367	.498*	7.782	-.126*	-2.439	-.063*	-2.658
Drunkenness Y2	456	.385	1	.535	1.000	.000	.070	1.311	.113*	2.370	.499*	7.803	-.077	-1.442	-.039	-1.553
Smoking Y1	456	1.347	1	.245	.997	.030	.418*	6.646	.109*	2.314	.500*	7.819	-.119*	-2.328	-.059*	-2.208
Smoking Y2	456	1.294	1	.255	.997	.028	.353*	6.207	.110*	2.325	.500*	7.841	-.146*	-2.770	-.073*	-2.538
Illicit Drugs Y1	456	1.204	1	.273	.998	.023	.360*	5.523	.111	2.331	.500*	7.829	-.048	-.707	-.024	-.702
Illicit Drugs Y2	456	.008	1	.930	1.000	.000	.290*	4.078	.114*	2.394	.501*	7.893	-.165*	-3.007	-.083	-2.903

Note. CFI = comparative fit index; RMSEA =root-mean-square error of approximation; * $p < .05$.

The stability of PCAQ from baseline to 12th grade was highly significant (path c). While PCAQ at baseline is a strong predictor of PCAQ later on, it also has a small negative indirect effect on drunkenness during the first year after graduating high school (path cd; $\beta_1 = -.063$, $p = .008$). Early initiation/risk did not have a significant effect on drunkenness in either model (path a; $\beta_1 = .133$, $p = n.s.$, $\beta_2 = .070$, $p = n.s.$).

Smoking. Both models fit the data well (Table II), as is demonstrated by the low values of chi-square, $p < .05$, high values of CFI and TLI and values of RMSEA $< .06$. There is a small negative statistically

significant direct effect of PCAQ on smoking that remains stable over both years following high school graduation (path *d*; respectively, $\beta_{y1}=-.119$, $p=.020$, $\beta_{y2}=-.146$, $p=.006$). Similar to the effects revealed in the year one drunkenness model, levels of PCAQ at baseline have a small negative indirect effect on smoking during both years tested (path *cd*; $\beta_{y1}=-.059$, $p=.027$, $\beta_{y2}=-.073$, $p=.011$). In contrast to the drunkenness model, early initiation/risk is the single strongest predictor of smoking after high school graduation – a statistically significant direct effect is stable across both years (path *a*; $\beta_{y1}=.418$; $\beta_{y2}=.353$, $p_s<.001$).

Illicit drug use. The two models demonstrated a good fit to the data (Table II). There was a small negative statistically significant direct effect of PCAQ on illicit drug use (path *d*; $\beta_{y2}=-.165$, $p=.003$) during the second year post-high school. This effect was absent during the first post-graduation year. There was an additional small negative indirect effect of PCAQ at baseline on illicit drug use during the second year (path *cd*; $\beta_{y2}=-.083$, $p=.004$). Similar to the results from the analyses of smoking behavior, early initiation risk was the strongest predictor of illicit drug use after high school graduation: a statistically significant direct effect was present across both years (path *a*; $\beta_{y1}=.360$; $\beta_{y2}=.290$, $p_s<.001$).

In summary, each model demonstrated a good fit to the data, while the significance level of the 12th grade PCAQ (path *d*) varied across time and across substances. For example, while the effect of PCAQ was significant during the first year following high school graduation for the drunkenness outcome, this relationship was not significant during the second year. This sequence was the opposite for illicit drug use; that is, there was no PCAQ effect on illicit drug use during the first year after high school graduation, but there was a significant effect at two years after high school. The effect was stable during both years for smoking with significant PCAQ effects on both time points. The effects of early initiation/risk, as posited by the second hypothesis (path *a*), were statistically significant for smoking and illicit drug use during both years following high school graduation. However, there was no statistically significant effect in case of drunkenness. In addition, for each substance and each year, there was a positive stability quotient for parent-child affective quality at the baseline (seventh grade) and parent-child affective quality during the last year of high school (β -values range from .498 to .501, $p_s>.001$).

Discussion

Previous literature indicates that, while the influence of parents diminishes over time as youth gain more independence, peer effects and early initiation become a more prominent and often deciding factor in substance-related behavioral choices. This paper, however, aimed to explore an understudied question of whether parent-child affective quality formed during adolescence could play a role in helping to protect young people from substance use when parental influence wanes.

The two hypotheses were supported, at least partially, by the analyses, suggesting that parent-child affective quality could provide some degree of protection against excessive substance use. Generally speaking, levels of PCAQ during the last year of high school had a small negative or protective effect on the

rates of the young person's drunkenness, smoking and illicit drug use during the two years following high school graduation. The relative strength and pattern of these protective effects, however, differed based on the type of substance, degree of early substance use risk and the post-graduation year.

The first hypothesis stated that higher levels of PCAQ in high school will be negatively associated with the rates of substance use during the two subsequent years following graduation. Consistent with the hypothesis, this association was found across all the three substances. More stable effects, with negative association between levels of PCAQ were observed in the case of smoking, with stronger effects during the second post high school year. Direct effects of PCAQ on drunkenness dissipated by the second year. It is interesting that the opposite was observed in the case of the rates of illicit drug use: the significant association was seen only during the second post-high school year.

Existing literature concludes that the quality of the parent-child relationship typically remains unchanged or even improves after the youth's transition out of high school (e.g., Aseltine and Gore, 1993; Sullivan and Sullivan, 1980). Schulenberg and Maggs (2001) emphasize that behavioral choices in regard to drinking and other substance use are associated with the extent to which a young person has internalized the norms invoked by their parents. With continuous support from parents, youth "might be expected to make wiser choices in the long-term" (p.23). In addition, an earlier study by Kenny (1987) notes that, after leaving home, late adolescents continue to seek parental support in times of stress, suggesting that youth with an established history of positive parent-child affective quality will have an additional way of coping with transitions into adulthood. This interpretation is consistent with our findings supporting the continuity in PCAQ over time, suggesting that relationships formed between parents and children in early adolescence (in the case of this study, before or during the seventh grade) remain stable. This finding is consistent with earlier conclusions by Hovee and colleagues (2009) and Lac and colleagues (2009) about the importance of early established parental influences on problem behaviors later in life. On average, the quality of parent-child relationships earlier in childhood is a strong predictor of this type of relationship later in the young person's life, and, to a limited extent, can help predict the likelihood of substance misuse upon graduating high school. This pattern of findings suggests that it is helpful to cultivate such relationships earlier in the youth's life, prior to high school, in order to maximize the protective effect of PCAQ over time.

This could be of a special importance in the prevention of illicit drug use. Current results demonstrated that the protective effect of PCAQ during the last year of high school on the youth's use of illicit drugs during the first year after graduation was nil; however, a stronger direct effect emerged during year two. This finding could be interpreted that, perhaps, the initial impact of weakening parental monitoring and increased independence that typically follows high school graduation and is associated with experimenting with substances cannot be immediately countered by the earlier quality of the parent-child relationship. However, the delayed effect that appears during the subsequent year might be of increased relevance, as the initial experimentation phase diminishes.

The second hypothesis posited that early initiation into substance use will be positively related to the rates of drunkenness, smoking and illicit drug use during the two years following high school graduation. The results supported this relationship for two out of the three substances. Consistent with previous research (Agrawal et al., 2006; Kandel and Yamaguchi, 1993), adolescents who initiated more than one of the three gateway substances by 7th grade were more likely to smoke or use illicit drugs upon graduating high school.

While the strength of the direct effects of early initiation on both smoking and use of illicit drugs subsided slightly by the second year post-high school, the strength of the effect was larger in the case of smoking, which is in line with the earlier findings by Auld (2005). In regard to the decrease in association between early initiation and smoking rates over time, it seems likely that a variety of external constraints imposed on smokers contributed to this result. For example, young people often change roles and statuses post high school (e.g., gain some form of employment or choose to continue their education); through this process they are likely to be subject to public smoking bans, smoke-free campus ordinances, and employer-enforced rules in regard to smoking that, in turn, may affect the frequency of smoking, decreasing the direct effects of early initiation (Auld, 2005).

The slight decrease in the strength of the relationship between early initiation and illicit drug use also is consistent with the life course trajectory results reported by Johnston et al. (2004). Their study found that the use of illicit drugs tends to peak around age 20. In this case of the present study, the weakening of the effect of early initiation could mean that those lower-risk youth, who initiated only one or none of the three substances by seventh grade, have begun experimenting after parental influences have decreased, making the early initiation risk variable less predictive.

Finally, early initiation was not a significant predictor in the case of drunkenness. Unlike smoking or use of illicit substance, drinking is considered a more socially acceptable and normative behavior both in high-school and throughout adulthood. Earlier studies (Johnston et al., 1999; Schulenberg et al., 1994) report that in the years immediately following high-school, college-bound students tend to demonstrate higher rates of alcohol use in general, along with binge drinking – behaviors closely linked with drunkenness – than their non-college counterparts. Additionally, the study by White and colleagues (2006) demonstrated that similar behavior was found in non-college bound students who lived outside of the parents' home (e.g., with friends or significant others). In the current sample, more than 70% of graduates were enrolled in either community or a 4-year college and approximately 70% lived outside of their parents' homes. This could have affected the predictive power of early initiation, given that heavy drinking behavior is naturally expected at this particular stage of youth's life, regardless of the timing of initiation.

Limitations and future directions.

Although the study produced meaningful results that contribute to the gap in existing research, there is a set of limitations that should be considered for more accurate interpretation. The first group of limitations

is related to the sample. Considering that the population in the study was rural and primarily white, results could be different for youth and families from urban areas and/or of other racio-ethnic backgrounds. Additionally, the present sample included a relatively small group of early initiators and heavy substance users, which amplifies the necessity for caution when interpreting results. We recommend replication and closer investigation in the future with a more diverse larger sample of early initiators and youth with higher levels of substance use. Another limitation pertains to the measure of PCAQ. In the current study, an overall PCAQ measure was used that captures the average levels of PCAQ, as reported by parents and their child. To determine the specific effects of positive versus negative affective quality it could be beneficial to separate the construct into Positive and Negative scales to get a more precise answer. Further, Trudeau and colleagues (in preparation) discusses the differential effects of father's and mother's parenting on their child's association with deviant peers and conduct problems, which suggests that exploring the influences of PCAQ for each parent separately might add new information to the existing research on parental support and youth substance use after high school.

Additionally, to further current understanding of the early initiation, which remains the strongest predictor of continued tobacco and illicit drug use, it could be helpful to disaggregate the risk measure used for the analyses. Exploring effects of each individual substance on their use later in adolescent life, in conjunction with effects of PCAQ, could complement the existing body of research.

Finally, consistent with existing research that explores other specific developmental milestones following graduation from high school – such as pursuing higher education, moving out of parent's house, marriage or birth of children – we suggest examining the influences of such life events in conjunction with parent-child affective quality. Geographical implications might be important for gaining further understanding regarding the PCAQ effects on youth and their substance-related behavioral choices. For instance, it could be important to understand whether levels of PCAQ affect residential choices, determining whether they settle closer to or farther away from their parents, which, in turn, could affect the frequency and pattern of their substance use. Considering prior findings that relationships between parents and children are affected by a variety of life course events and the current finding that over time these relationships remain relatively stable, future investigation of the current models is warranted. A model with included demographic and life course variables could provide additional insight into the intricate relationships between youth development, substance misuse and parent-child affective quality.

Conclusions are that, overall, the results of this study reinforce the importance of cultivating positive affective relationships between parents and children as one of the natural devices that help protect youth from engaging in risky behaviors later in life. Although the levels of protection are relatively small, they are helpful in countering some of the harmful effects of early initiation into gateway substances that lead to higher rates of drunkenness, smoking and illicit drug use when youth gain independence.

The practical implications of these findings are such that, while the direct effects of PCAQ on the rates of substance use by young people are relatively small, they could be meaningful in providing protection against the forces that may promote greater licit or illicit substance use. As most parents experience, it could be difficult to maintain a warm and supportive relationship with a child who misbehaves, especially regarding substance use. The results of this study emphasize that in such situations, it is especially important to maintain a high quality of parent-child affective relationship, as parental support and engagement in the child's life throughout middle and high school produces a natural way to counteract the influences of the early initiation risk.

Years of intervention research demonstrate that improving family relationships is possible through prevention programming that engages both parents and their children (Botvin, 2000; Molgaard et al., 1997). As a result, the increased mutual warmth and support provide an additional barrier for later problematic substance use, a barrier that is not associated with any additional prevention costs and is delivered through routine interactions between family members in their daily lives.

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