Does learning about the effects of alcohol on the developing brain affect children's alcohol use?

Alison Padget[1]

Mary Lou Bell[1]

Stephen R. Shamblen[2]

Christopher L. Ringwalt[3]

[1]Alison Padget, Ph.D., Research Scientist
Mary Lou Bell, M.B.A., M.A., President
The Bell Group
2315 Farnswood
Austin, TX 78704
alisonpadget@mac.com
(512) 441-4048

[2] Stephen R. Shamblen, Ph.D.
Pacific Institute for Research and Evaluation
1300 S. 4th Street, Suite 300
Louisville, KY 40208

[3]Christopher L. Ringwalt, Dr.P.H.
Pacific Institute for Research and Evaluation
1516 E. Franklin St., Suite 200
Chapel Hill, N.C. 27514-2812

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Abstract (217 words)

Protecting You/Protecting Me (PY/PM) is a classroom-based, alcohol-use prevention and vehicle safety program for students in grades 1-5 developed by Mothers Against Drunk Driving (MADD). PY/PM is one of the first alcohol prevention programs targeting children that incorporates emerging research on the adverse effects of alcohol on the developing brain. In this study, we surveyed fifth grade students, some of whom were exposed to their fifth consecutive year of PY/PM implementation. Results indicate that, relative to comparison students from matched schools, PY/PM students increased their knowledge of the effects of alcohol on the developing brain, their perception of the potential harm of alcohol use, and their vehicle safety skills. PY/PM students also exhibited increased negative attitudes toward underage drinking, increased their intentions not to use alcohol, and reported decreased riding with an impaired driver. PY/PM did not have an effect on alcohol use *per se* of these fifth graders. Path modeling revealed that knowledge of the effects of alcohol on the developing brain had both a direct and an indirect effect on alcohol use, the latter by increasing perceptions of the harm of underage alcohol use which, in turn affected intentions to use and use itself. Teaching children about the effects of alcohol on the developing brain appears to be a promising strategy for underage alcohol use prevention.

INTRODUCTION

Despite decades of efforts to prevent alcohol use by minors, underage drinking continues to be a national health concern. The problem often begins early in adolescence. Most students who are drinking alcohol at the age of 18 initiated use by the age of 13 (Office of Applied Studies [OAS], 1999). Some children begin earlier; 7% of sixth grade students report having consumed more than a few sips of alcohol before the age of 11 (Whalen et al., 2005). Early onset of alcohol use is related to serious long-term problems such as future driving fatalities, alcohol abuse in adolescence, and alcohol dependence (Hingson et al., 2002; Grant & Dawson, 1997; Gruber et al., 1996).

Emerging research in the fields of adolescent neuropsychology and brain imaging suggests that the adolescent brain is particularly vulnerable to the effects of alcohol (Smith, 2003; White & Swartzwelder, 2004). Though it was once thought that the human brain development was complete prior to adolescence, new research indicates that it continues to evolve well into early adulthood (Seeman, 1999; Giedd et al., 1999; Chugani, 1998; Luna et al., 2001). Alcohol use during this period can have a deleterious effect on brain development. Specifically, heavy alcohol use by adolescents can reduce the size of the hippocampus (De Bellis et al., 2000), decrease the ability to form new memories (White & Swarztwelder, 2004) and recall previously learned information (Brown, et al., 2000), and increase the amount of brain response needed to perform memory-related tasks (Tapert et al., 2004). The damage can

have long-lasting effects that decrease cognitive function in young adulthood (Tapert et al., 2002).

Protecting You/Protecting Me (PY/PM), an alcohol use prevention program for elementary students developed in 1999 by Mothers Against Drunk Driving (MADD), is the only prevention program targeting this population to incorporate recent findings from brain research. PY/PM's lessons and activities teach children about their brains (e.g., why their brain is important, how their brain continues to develop throughout childhood and adolescence, what alcohol does to the developing brain, and why it is important to protect their brain). Unlike many of the programs reviewed by Tobler and colleagues' (2000) meta-analysis, PY/PM is highly interactive and focuses on the immediate physiological effects of alcohol on the developing brain, rather than on long-term morbidity and mortality. PY/PM also teaches life skills (i.e., decision making, stress management, communication, refusal skills, and media literacy); as such skills have been shown to be effective at preventing or delaying substance use (Tobler et al., 2000; Botvin, et al., 2003). In addition, PY/PM teaches vehicle safety skills (i.e., how children can protect themselves if they ever ride with an impaired driver).

PY/PM is based on the assumptions that children who understand the immediate effect of alcohol on their brains will develop negative attitudes toward underage alcohol use, which will in turn result in cessation of current alcohol use (if present) and intentions not to use alcohol in the future (Figure 1). The Theory of Planned Behavior (Ajzen, 1985, 1991, Ajzen & Fishbein, 1980) to explain alcohol use by children has been tested previously by Bridges et al. (2003) who

did not find a direct association between children's knowledge, attitudes, and intentions to use alcohol.

<INSERT FIGURE 1 ABOUT HERE>

Research on learning in young children suggests that they begin to acquire understanding and attitudes about alcohol at an early age often before they have any direct contact with alcohol (Lloyd, 1996; Noll et al., 1990; Jahoda & Cramond, 1972; Fossey, 1993). For example, the majority of kindergarten students recognize alcoholic beverages (Hahn et al., 2000), and children in grades one through five attribute a variety of ill effects to the long-term use of alcohol and cocaine, such as body damage, brain damage, death, and heart problems, but are unable to attribute specific effects to each type of drug (Sigelman et al., 2000). However, this knowledge has yet to be associated with children's attitudes or intentions to use alcohol (Sigelman et al., 2000). Two curricula designed to teach elementary students the scientific basis of how alcohol affects behavior and the long-term health effects of alcohol, though effective in changing knowledge, did not alter children's attitudes and intentions regarding alcohol use (Sigelman et al., 2003; Sigelman et al., 2004). Unlike PY/PM, these curricula were only three hours in length and focused on how alcohol affects behavior by way of the brain.

Children's attitudes towards alcohol use are typically negative in first and second grade, and become less so with age (Hutteman et al., 1992; Bridges et al., 2003; Pisano & Rooney, 1988). Young elementary and non-drinking students tend to associate alcohol use with negative, unpleasant effects, while older

elementary and middle school students, and those who have begun to drink, tend to associate alcohol use with positive, arousing effects (Dunn & Goldman, 1998). Intentions to use alcohol also increase with age and constitute an early warning sign for subsequence initiation of use (Andrews et al., 2003). Thus, though intentions to use alcohol have been linked to use by elementary students, a clear connection between knowledge, attitudes, intentions, and use has not been established.

The present study tests two hypotheses: 1) PY/PM is effective in changing elementary students' knowledge, attitudes, intentions, and behaviors regarding alcohol use and vehicle safety; and 2) Learning the effects of alcohol on the developing brain affects children's attitudes toward underage alcohol use, which in turn influences their alcohol-related intentions and behaviors. Prior evaluations of PY/PM have had mixed results, with one indicating gains in vehicle safety skills and media literacy only (Bell et al., 2004), and others indicating gains in vehicle safety skills in addition to improved knowledge of the brain and growth and development (Bohman et al., 2004; Bell et al., 2005; Bell et al., in press), improved attitudes against underage drinking, gains in stress management and decision-making skills (Bell et al., 2005), and increased perceptions of the harm of alcohol use (Bell et all., 2005; Bell et al., in press). The present study is the first opportunity to examine the effects of PY/PM when it is implemented for up to five years. It is also a chance to clarify conflicting results from previous studies and to explore the mechanisms by which PY/PM operates.

METHODS

Curriculum

PY/PM is a classroom-based, cumulative program for students in grades 1-5 consisting of 40 lessons (of which eight are administered each year). Topics include one lesson each on the Brain, Growth and Development, Health and Safety, Rules and Laws, Friends, Choices and Decisions, Media Awareness, and Communication. Lessons are tailored to developmental level of each grade. For example, while first and second grade students learn what the brain does and how it continues to develop throughout the teenage years, third through fifth grade students learn how alcohol affects the developing brain differently than the adult brain. Information about the brain is woven into many of the lessons. For example, fifth grade students learn about neurons and neurotransmitters during the Brain lesson, brain development and the effects of alcohol during the Growth and Development lesson, and the role of neurotransmitters in stress management in the Health and Safety lesson,

PYPM can be taught either by elementary teachers or high school students enrolled in a peer helping course. Each lesson includes interactive activities such as stories and role play in the younger grades and discussion, games, and group activities in the older grades. Each lesson also has additional reinforcement activities designed to encourage “ownership” of the information such as rhymes, raps, and cheers in the younger grades and role-playing and journaling in the older grades. More information can be found at www.pypm.org.

Study Design and Sample Characteristics

We employed a quasi-experimental design for the present study. Participants were fifth grade students who attended four elementary schools in Texas and four elementary schools and one intermediate school in Montana in 2003-2004. The intervention schools consisted of two Texas schools and three Montana schools that had implemented PY/PM every year beginning in the 1999-2000 school year. We matched each intervention school to a comparison school of similar size, racial/ethnic composition, and percent of students eligible for a free or reduced price lunch. Table 1 displays the characteristics of the matched schools.

<INSERT TABLE 1 ABOUT HERE>

Prior to implementing PY/PM in 1999-2000, teachers attended a one-day training in brain development, alcohol prevention theory, the PY/PM curriculum, and evaluation procedures. Data for the results presented here come from the fifth and final year of the evaluation in which all fifth grade students were surveyed. The fifth grade teachers administered pretests to their classes following a standardized script and procedure one week before teaching the eight-week curriculum. The teachers administered posttests to their classes one week after the final PY/PM lesson. Teachers in comparison schools administered the pre- and posttests at approximately the same times as the PY/PM teachers.

Overall, 493 students completed the pretest (322 PY/PM and 171 comparison students). The majority of the students (283 PY/PM and 151 comparison students) completed both the pre- and posttests, yielding an attrition rate of about 12% for each group. An attrition analysis comparing students who

took both surveys with those who only took the pretest showed no relationship between attrition and intervention status, race/ethnicity, gender, or pretest scores.

The resulting intervention and comparison groups were similar in age and sex, but not in racial/ethnic composition. The intervention group was 51% male, 8% African American, 29% Hispanic, 44% White, 8% American Indian, and 9% Asian/Other, as compared to the comparison group, which was 43% male, 7% African American, 20% Hispanic, 51% White, 3% American Indian, and 14% Asian/other.

Instrument

We developed a survey to measure students' knowledge, attitudes, and behaviors with respect to underage drinking and vehicle safety. Due to the focus of this evaluation on the knowledge component of PY/PM, we did not include measures related to decision-making or stress management. We pilot-tested the instrument in one-on-one interviews with 15 students in grades 3-5, made appropriate revisions, and continued to revise the items based on our psychometric analyses after each of the first four years of evaluation.

Unless otherwise noted, items on the resulting survey were four point Likert-type scales with response options of "YES!," "yes," "no," and "NO!." We reverse-scored items when necessary and coded all responses from 1 to 4, with 4 representing the most desirable response. We used the means of the scores on the individual items to generate overall scale scores.

We measured *knowledge of the effects of alcohol* with a four-item scale: “Drinking alcohol: messes up how the brain and body communicate; changes the brain’s chemistry; changes how the brain works”; and “Drinking alcohol affects people the same regardless of their age.” Posttest Cronbach’s alpha revealed an internal consistency of .69.

To measure *vehicle safety skills*, we developed a three-item scale in which we asked students, “If you ever had to ride in a car with a driver who had been drinking alcohol (beer, wine, or liquor), what would you do: Talk to the driver; Sit in the front seat to be near the driver in case he or she needed help; Sit in the back seat.” Desired answers were not to talk to the driver, not to sit in the front seat, and to sit in the back seat. Posttest internal consistency was .59.

We assessed *media literacy* with a four-item scale : “Commercials on TV always tell the truth”; “Commercials on TV tell us what we need to know”; “Beer commercials on TV show what happens when people drink beer”; and “Commercials on TV leave out information that could hurt people”. Posttest Cronbach’s alpha showed an internal consistency of .67.

To measure *perceived harm of underage alcohol use*, we developed a scale adapting five pertinent items from the Monitoring the Future National Survey on Adolescent Drug Use (Johnston, et al., 2004). We asked students “How much do you think people under 21 years of age harm themselves if they: try one or two drinks of beer; try one or two drinks of wine; try one or two drinks of wine coolers or flavored alcohol drinks; try one or two drinks of liquor; and have one or two drinks of alcohol once a month.” Response options for this

scale were “A lot,” “Some,” “A little,” and “Not at all.” Posttest Cronbach’s alpha was .85.

We assessed attitudes toward *underage alcohol use* with a single item: “Drinking alcohol is okay for people under 21.” We measured *alcohol intentions* with a four-item scale: “In the future, do you think you will: drink beer; drink wine (other than at religious services); drink flavored alcohol drinks or wine coolers; drink liquor (whiskey, vodka, tequila, etc.) straight or in mixed drinks.” Response choices were “Never,” “Maybe,” and “Yes, I will.” Posttest Cronbach’s alpha was .86.

To assess *alcohol use behavior*, we used a four-item scale from the Monitoring the Future survey (Johnston, et al., 2004) which included the following items: “How recently, if ever, have you done the following: had beer; had wine (other than at religious services); had flavored alcohol drinks or wine coolers; had liquor (whiskey, vodka, tequila, etc.) straight or in mixed drinks.” Response options were “Never,” “At least once in the past month (past 30 days),” “At least once since school began in the fall,” and “At least once in your lifetime.” Posttest Cronbach’s alpha for the alcohol use scale was .61. We assessed *riding with an impaired driver* by using the same stem and adding the item: ridden in a car with a driver who has had any alcohol (beer, wine or liquor)? We ultimately scored alcohol use and riding with a drinking driver as dichotomous measures (i.e. consumed alcohol in the past 30 days vs. the other responses.) A copy of the questionnaire is available from the first author by written request.

Analysis

We conducted preliminary analyses to examine differences between the PY/PM and the comparison groups at baseline using independent groups *t*-tests. The groups did not differ on the outcomes of alcohol intentions, past 30-day drinking, riding with a drinking driver, or attitudes towards drinking. However, the PY/PM group did score higher than the comparison group ($p < .05$) on both knowledge about alcohol and perceived harm. As such, we controlled for these differences at pretests in all subsequent analyses.

In order to test the first hypothesis, that PY/PM was successful in changing students' outcomes regarding alcohol, we conducted six Hierarchical Linear Models (HLM) and two Hierarchical Non-Linear Models (HNLM) to determine if knowledge, attitudes, intentions, and behavior measures at posttest were predicted by their analogous measures at pretest and intervention status (PY/PM vs. comparison), controlling for the number of years of exposure to PY/PM, race (white vs. non-white), and gender. We performed the HNLMs for two dichotomous outcomes, past 30 day drinking and riding with a drinking driver. We fit all models using restricted maximum likelihood estimation due to the small number (i.e., eight) of level two units (Raudenbush & Bryk, 2002).

To test the second hypothesis concerning the role of knowledge, perceived harm, and attitudes in mediating the effects of PY/PM on alcohol use and intentions to use alcohol, we used path modeling with measured variables. We tested two models: the theoretical model proposed by the program developers and a more empirically based model suggested by the data. These

models used a dichotomous predictor representing exposure to PY/PM, pretest measures as exogenous variables, and posttest measures as endogenous variables. We specified paths *a priori* between the PY/PM and exogenous variables, while statistically controlling for each exogenous variable as assessed at pretest.

Missing data were inconsequential in the present study, as no more than 3% of the data were missing for any of the constructs of interest. For this reason, we used listwise deletion to limit all our analyses to those students for whom we had all available data.

RESULTS

Impact of PY/PM.

Comparing the PY/PM group to the comparison group, we found that knowledge about the effects of alcohol on the brain increased more in the PY/PM group than the comparison group, as shown in Table 2. PY/PM also positively affected attitudes toward underage alcohol use by generating less favorable attitudes towards drinking, created a greater perception of alcohol use to cause potential harm for underage persons, and attenuated intentions to drink. PY/PM had a positive effect on two key targeted behaviors, as it led to an increase in vehicle safety skills and a reduction in riding with drinking drivers. PY/PM also had a small, though non-significant, effect on past 30-day drinking.

<INSERT TABLE 2 ABOUT HERE>

We included a variable in our hierarchical modeling procedures representing the number of years each student was exposed to PY/PM. All eight

analyses indicated that the dichotomous indicator of PY/PM exposure was a stronger predictor of the outcomes than this continuous exposure variable. Further, the years of exposure variable significantly predicted only one outcome examined; PY/PM students manifested a lower level of intentions to use alcohol than comparison students.

Path Modeling

We began this series of analyses by calculating a covariance matrix, as displayed in Table 3, to examine the relationships among the measured variables. The theoretical model supporting PY/PM suggests that the program works through a variety of mediational paths. As can be seen in Figure 2, this model (with actual standardized path coefficients) suggests a causal chain that links PY/PM to knowledge, to perceived harm, and to attitudes towards use. In turn, attitudes are weakly related to past 30-day use and intentions to use.

<INSERT TABLE 3 AND FIGURE 2 ABOUT HERE>

While all paths were in the expected direction, we found that attitudes were not significantly related to intentions and behavior. Further, a significant chi-square [$\chi^2(30)=143.11$, $p < .0001$] and poor fit indices (RMSEA=.10, GFI=.94, AGFI=.87) for the model suggests that it did not adequately explain the observed data.

We then developed a data-driven model by examining the correlation matrix and modification indices, which indicates that attitudes do not strongly affect other variables; rather, knowledge directly affects perceived harm, which in turn affects intentions. Also, it appears that there is a direct relationship between

knowledge and current use. As can be seen in Figure 3, all paths in the data-driven model were statistically significant ($p < .05$). This revised model suggests that PY/PM directly affects knowledge, which in turn affects both attitudes towards use and perceived harm. Perceived harm, in turn, affects intentions to use, which in turn affects past 30-day use. Also, we found a direct effect of knowledge on past 30-day use of alcohol. Overall, this model had much more desirable fit indices (RMSEA=.05, GFI=.97, AGFI=.94), although the chi-square remained significant, [$\chi^2(29)=60.74$, p=.0005], which is not desirable. However, a chi-square difference test, [$\chi^2(1)=88.06$, p<.0001] indicated this model fit the data significantly better than the theoretical model.

<INSERT FIGURE 3 ABOUT HERE>

DISCUSSION

Past research has suggested that teaching children about the effects of alcohol does not change either their attitudes about or future intentions toward alcohol use (Sigelman et al., 2003; Sigelman et al., 2004). In this study of the effects of the PY/PM curriculum on fifth grade students, we found that PY/PM succeeded in changing students' knowledge of the effects of alcohol on the developing brain. The program also resulted in increased perceptions of the harm associated with underage alcohol use and increased anti-use attitudes. With respect to vehicle safety, students exposed to PY/PM displayed a greater understanding of vehicle safety skills and a lower rate of riding with an impaired driver. PY/PM had a significant effect on intentions to use alcohol, but did not

significantly affect past 30-day alcohol use. Thus, we found much, but not complete, support for the first hypothesis.

Our results indicate that children have strongly negative attitudes towards alcohol use. Previous studies have also found that children, and especially those who are not currently drinking, have negative attitudes toward underage alcohol use (Hutteman et al., 1992; Bridges et al., 2003; Pisano & Rooney, 1998). Only 6% of intervention students and 11% of comparison students indicated at pretest that they had consumed any alcohol in the past 30 days, as compared to 9% of intervention students and 15% of comparison students at posttest. Thus, our finding that PYPM was able to strengthen anti-use attitudes and intentions not to use alcohol are notable results, particularly as intentions to use alcohol were found by Andrews et al. (2003) to predict subsequent onset of use by children.

It is interesting to note the differences in pretest scores between the PY/PM and the comparison group. Since this evaluation represents the final year in a five-year program, we expected that the PY/PM group, some of whom had been exposed to the program for four previous years, would score significantly higher on all constructs at pretest. However, they only scored higher on two of the constructs: knowledge about the effects of alcohol on the brain and perceived harm of alcohol use. We suggest two possible reasons for this finding. First, the gains made each year might have decayed somewhat over time. Second, there was a large influx of students into one of the schools in Montana because two elementary K-4 grade schools, of which students in one were not exposed to PY/PM, fed the intermediate 5-8 grade school. Thus, the intervention group

contained a sub-sample of students (N=87), who had not been exposed to any PY/PM prior to taking the pretest. Only 34% of intervention students (N=110) received PY/PM all five years. This may well have lowered the mean scores of the intervention group at pretest.

We also expected that students who had received PY/PM for the full five years would have better outcomes than those who were exposed for fewer years. We found, however, that years of exposure predicted higher scores only on one measure, intentions not to use alcohol in the future. This suggests that any exposure to PY/PM may be more important than the amount of exposure. However, relatively few students were exposed to PY/PM for between two and four years, which limited the utility of this continuous variable.

We note that we used hierarchical modeling procedures as we were concerned that non-independence due to clustering effects might bias our hypothesis tests. We recognize that it is generally considered inadvisable to use such procedures with only eight second level units, given insuperable challenges to reliably estimating variance components with so few units (see Raudenbush & Bryk, 2002). Nevertheless, the benefits in this case are likely to have outweighed the costs, as preliminary analyses suggested that intraclass correlation coefficients were as large as .08—an indication of substantial non-independence (Murray, 1998). It is important to note that our tests of intervention effects were extremely conservative, as they are based on six degrees of freedom, but that we still reported significant findings.

Our second hypothesis was that knowledge of the effects of alcohol on the developing brain would lead to increased perceptions of the harm of underage alcohol use, which would then affect attitudes, intentions, and behaviors. The path, which was supported by our data, was slightly different. Our path modeling suggested that knowledge of the effects of alcohol on the brain led to increased perceptions of harm, which in turn, were predictive of intentions to use, and ultimately, current alcohol use. We further found knowledge about the brain directly affected current alcohol use. Knowledge also was predictive of attitudes toward underage alcohol use, but these attitudes did not predict any subsequent measures of perceptions of harm, intentions, or use. The lack of relationship may be a measurement issue, since our measure of attitudes towards underage alcohol use was limited to a single item. It is also unclear why future intentions predicted current use in the model. More research is needed to clarify this relationship.

Our revised data-driven model generally fit the observed data well, with the exception of a significant chi-square yielded by the model. This is a common scenario, as the chi-square test of model fit is much more heavily influenced by sample size than other model fit indices. When sample size is increased statistical power to detect differences is increased as well. For instance, with a sample size of around 127, we would have gotten a chi-square with $p = .06$ (just non-significant). However, we have a sample size of 408, so we have more power to detect differences if they exist. The model appears to be a good fit, as suggested by indices less influenced by sample size and as the model is based

on a covariance matrix from a sample large enough to assume that path coefficients are stable.

Previous studies have found that knowledge-only, non-interactive programs are not good strategies for alcohol use prevention (Tobler et al. 2000), and that simply teaching children about how drugs and alcohol affect their bodies with a few lessons does not change their attitudes and intentions towards alcohol use (Sigelman et al., 2003; Sigelman et al., 2004). Sigelman et al. (2004) did find that teaching children a scientific theory of how cocaine affects the body by way of the brain of influences attitudes and intentions to use cocaine, and Bridges and colleagues (2004) found that knowledge of cocaine helps explain attitudes, and attitudes predict intentions, but that such knowledge is not related to intentions, even through attitudes. We have found here that teaching children about the effects of alcohol on the developing brain through a highly interactive program not only affects attitudes and intentions, but affects alcohol use directly. This suggests that the type of information being taught and the delivery method are both important predictors of the success of knowledge-based programs. For PY/PM specifically, our results suggest the brain knowledge component is a valuable part of the program.

Our study's strengths include an ethnically and economically diverse sample and the inclusion of students who had received PY/PM for the full five years. PY/PM is a five-year, cumulative program, and this study was our first chance to evaluate its effects when carried out as designed. However, a study weakness lies in the inclusion of a large number of students in the intervention

group with no previous exposure to PY/PM. Another weakness is the lack of data to support the psychometric properties of some of our survey measures. Two of the scales yielded posttest Cronbach's alpha less than .65, and attitudes toward alcohol use was comprised of one item only. This problem is not unique to our study population; previous research has shown that children ages 9-10 tend to respond to surveys inconsistently with an average coefficient alpha of .65 (Borgers et al., 2000). Another study weakness was our inability to match individual student survey scores across the five years. The survey administered to this cohort when they were in first and second grade was shorter and simpler by necessity, and the surveys for grades 3-5 were improved each year as the students progressed through elementary school, making comparisons from year to year impossible. Comparing students' scores prior to PY/PM implementation to their scores after the study's fifth year would have constituted a better measure of the effect of PY/PM. Longer-term follow-up would also add confidence to the findings presented here. A follow-up study of the fifth-grade cohort that entered the seventh grade in the fall of 2005 is currently underway.

The developers of PY/PM theorized that an understanding of the effects of alcohol on the developing brain would change elementary school students' attitudes and behaviors where other alcohol use prevention programs have failed. Our fifth year of evaluation data indicate that PY/PM is successful in changing knowledge, attitudes, and intentions in regards to underage alcohol use and knowledge and behaviors in regards to vehicle safety. As empirically tested, PY/PM's chain of causality demonstrates the importance of teaching students

about the effects of alcohol on the developing brain in preventing underage alcohol use. Combining life skills with learning about the effects of alcohol on the developing brain appears to be a promising strategy for underage alcohol use prevention.

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FIGURE CAPTIONS LIST

Table 1

Characteristics of Matched Schools in the 2003-2004 PY/PM Evaluation

School	Number of students	Economic disadvantage*	Race				
			African American	Hispanic	White	Asian/Other	American Indian
Intervention 1	856	41	8	52	37	3	<1
Comparison 1	634	48	9	48	39	4	<1
Intervention 2	623	80	27	63	9	0	<1
Comparison 2	151	72	39	39	19	<1	3
Intervention 3	339	30	1	2	94	0	2
Comparison 3	415	65	1	3	94	0	3
Intervention 4	271	55	0	2	56	0	42
Intervention 5 (Intermediate school)	247	51	<1	2	66	1	32
Mean of intervention 4-5	259	53	<1	2	61	<1	37
Comparison	117	67	0	0	67	4	29

*Defined as children eligible for free or reduced price meals under the National School Lunch and Child Nutrition Program.

Table 2

PY/PM intervention effects with means, standard deviations, effect sizes (β & *OR*), and tests of statistical significance.

	PYPM				Comparison				
	M_{pre}	SD_{pre}	M_{post}	SD_{post}	M_{pre}	SD_{pre}	M_{post}	SD_{post}	*Effect Size*
Knowledge about brain and alcohol	3.61	.41	3.74	.35	3.48	.46	3.38	.55	.25**
Perceived harm of underage alcohol use	2.98	.74	3.00	.77	2.71	.71	2.72	.75	.10*
Alcohol intentions	2.41	.54	2.40	.58	2.43	.55	2.35	.58	.10*
Media literacy	3.25	.54	3.44	.50	3.12	.53	3.22	.54	.09+
Vehicle safety skills	3.40	.72	3.62	.56	3.11	.75	3.07	.72	.17**
Attitudes towards underage drinking	3.75	.60	3.80	.54	3.69	.69	3.61	.82	.11*
Drank past 30 days (current use)	.06	.24	.09	.28	.11	.31	.15	.36	1.40
Riding with a drinking driver	.18	.39	.13	.34	.13	.34	.23	.42	1.62*

+ p < .10, * *p* < .05, ** *p* < .01 (1-tailed)

NOTE: Tests of significance are based on 6 *dfs*. Effects sizes are the transformation of the *t*-value to an effect size *r* (see Cohen, 1988), except past 30 day alcohol use and riding with a drinking driver, which are Odds Ratios. The more conservative 376 *dfs* were used in calculating *r* (DuToit, personal communication, April, 2002). *N*s range between 277 and 283 for the PYPM group and between 142 and 151 for the comparison group.

Table 3

Correlations between PY/PM intervention effects, mediating variables, and outcomes.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
1) PYPM	--										
2) Knowledge about alcohol (pre)	.14	--									
3) Knowledge about alcohol (post)	.38	.43	--								
4) Perceived harm (pre)	.16	.30	.23	--							
5) Perceived harm (post)	.17	.17	.31	.48	--						
6) Alcohol intentions (pre)	-.01	.26	.22	.11	.22	--					
7) Alcohol intentions (post)	.04	.24	.26	.17	.28	.73	--				
8) Drank past 30 days (pre current use)	-.09	-.20	-.18	-.16	-.09	-.18	-.17	--			
9) Drank past 30 days (post current use)	-.10	-.11	-.24	-.12	-.19	-.15	-.29	.27	--		
10) Attitudes towards drinking (pre)	.03	.29	.16	.17	.09	.10	.11	-.19	-.15	--	
11) Attitudes towards drinking (post)	.16	.27	.37	.24	.20	.17	.18	-.19	-.12	.30	--
Mean	.31	3.58	3.62	2.89	2.90	2.40	2.37	.08	.11	3.73	3.74
SD	.95	.42	.46	.74	.77	.54	.58	.27	.31	.63	.66

NOTE: All correlations larger than .10 or less than -.10 are statistically significant ($p < .05$, 1-tailed); $N = 408$, listwise
T1 indicates pretest; T2 indicates posttest.

Figure 1

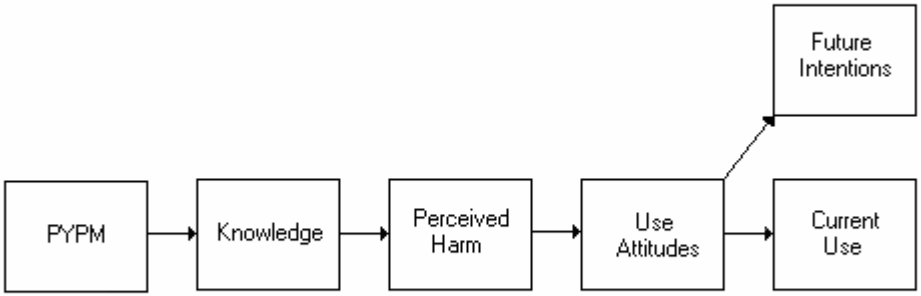
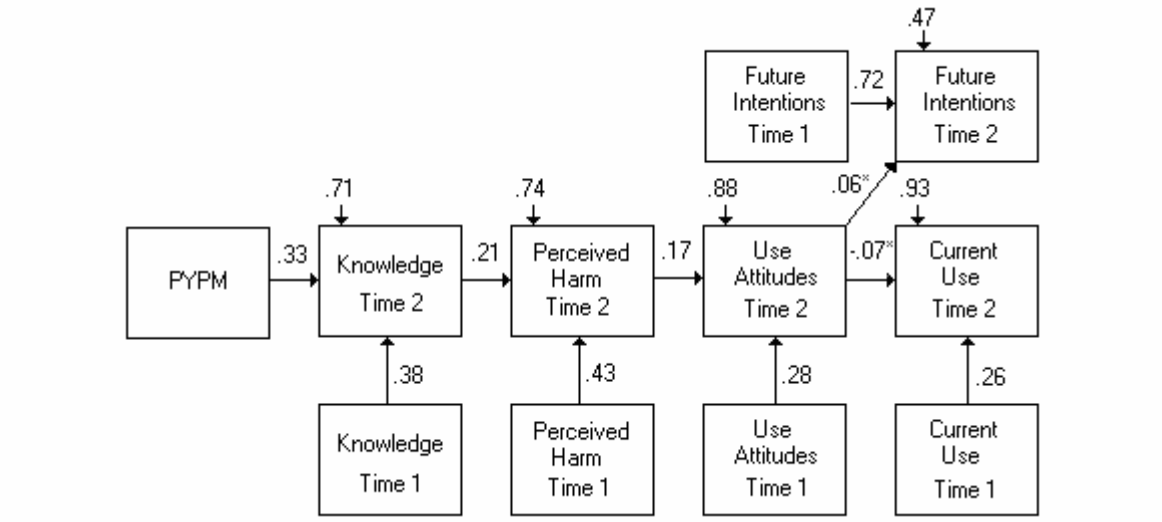

PYPM
Knowledge
Perceived Harm
Use Attitudes
Future Intentions
Current Use

Figure 2

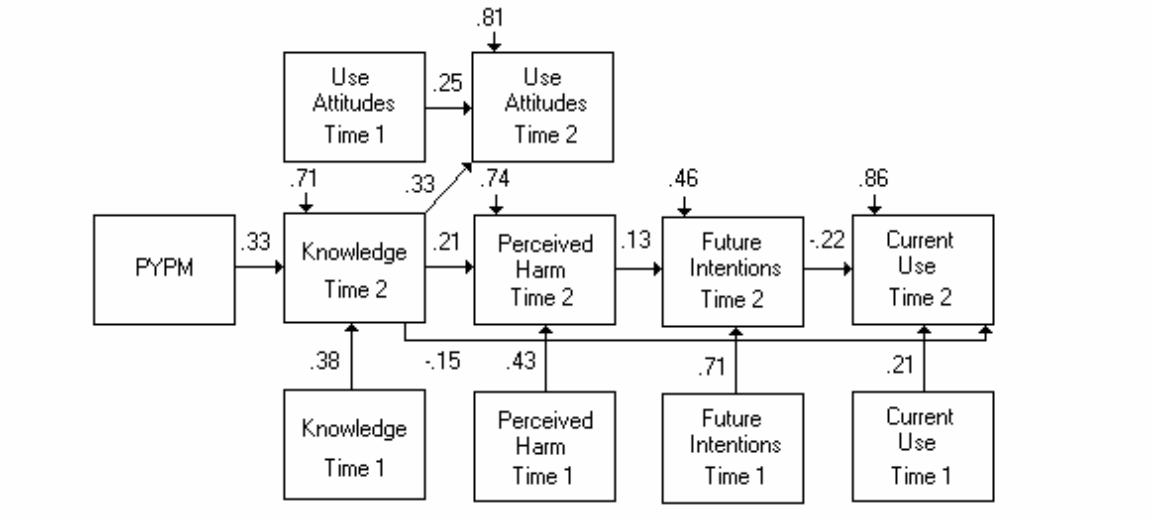


N = 408

*Statistically non-significant

NOTE: For ease of interpretation, implicit exogenous covariances are not depicted.

Figure 3



N = 408

NOTE: For ease of interpretation, implicit exogenous covariances are not depicted and all coefficients are statistically significant.