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Original article

## Does Delivering Preventive Services in Primary Care Reduce Adolescent Risky Behavior?

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### A B S T R A C T

**Purpose:** To determine whether the delivery of preventive services changes adolescent behavior. This exploratory study examined the trajectory of risk behavior among adolescents receiving care in three pediatric clinics, in which a preventive services intervention was delivered during well visits.

**Methods:** The intervention consisted of screening and brief counseling from a provider, followed by a health educator visit. At age 14 (year 1), 904 adolescents had a risk assessment and intervention, followed by a risk assessment 1 year later at age 15 (year 2). Outcomes were changes in adolescent behavior related to seat belt and helmet use; tobacco, alcohol, and drug use; and sexual behavior. Analysis involved age-related comparisons between the intervention and several cross-sectional comparison samples from the age of 14–15 years.

**Results:** The change in helmet use in the intervention sample was 100% higher ( $p < .05$ ), and the change in seat belt use among males was 50% higher ( $p = .14$ ); the change in smoking among males was 54% lower ( $p < .10$ ), in alcohol use was no different, and in drug use was 10% higher (not significant [NS]); and the change in rate of sexual intercourse was 18% and 22% lower than cohort comparison samples (NS).

**Conclusions:** The intervention had the strongest effect in the area of helmet use, shows promise for increasing seat belt use and reducing smoking among male adolescents, and indicates a nonsignificant trend toward delaying the onset of sexual activity. Participation in the intervention seemed to have no effect on the rates of experimentation with alcohol and drugs between the ages of 14 and 15 years.

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The majority of morbidity and mortality during adolescence is preventable and related to behaviors such as risky sexual activity, substance use, and vehicle-related injuries [1–3]. Most adolescents visit a health provider at least yearly, providing the opportunity to integrate prevention into clinical encounters [4].

Because repeated contacts with a primary care provider may occur over several years, clinicians have multiple opportunities to screen and counsel an adolescent patient for risky health behaviors [5].

Practice guidelines recommend that providers screen and counsel adolescents on a range of relevant health-promoting and risk-reducing behaviors during well visits [6–9]. Guidelines are based on the assumption that a decrease in risk behavior will result if services are delivered as recommended. Lower than recommended levels of screening [10–15] prompted the development of primary care interventions to increase screening for risky behaviors

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[16–20]. Research has shown that it is possible to increase preventive services to teenagers [21]. The key question is whether the delivery of these services improves adolescent health.

Evidence, although mixed, suggests that preventive interventions may show some success in improving adolescent behavior in certain risk areas [22]. Office-based interventions have increased condom use among adolescents, but have not shown significant effects for changing rates of sexual intercourse [23,24]; an intervention to reduce alcohol use resulted in educational benefits, but no reduction in actual use of alcohol [25]; and a safety intervention was unable to detect behavioral changes in seat belt and bicycle helmet use after 3 months [26].

Two clinical interventions that targeted more than one risk area had varying results: A pediatric intervention, in which practices were assigned to deliver either a substance use or safety intervention, showed increased use of bicycle helmets at 3-year follow-up evaluation, but no significant effects for the use of seat belts, alcohol, or tobacco [27]; an emergency room intervention that randomized adolescents to receive counseling in a single risk area increased the use of seat belts and bicycle helmets, but did not change drinking-related risk behavior over a 6-month period [28].

The body of research on preventive services almost entirely consists of studies that evaluate the efficacy of an intervention that targets a single risk area. However, because adolescent risk behaviors tend to co-occur [29] and increase with age [30], guidelines recommend the delivery of services targeting a range of behaviors. There is an increased focus on the need for practice-based evidence [31] through conducting research that takes into account the practicality and feasibility of interventions within real-life clinical settings involving typical patients. Further, there are calls for less reliance on the randomized controlled trial for examining the effect of healthcare interventions, with regard to issues such as contamination between intervention and usual care, external validity, and cost [32].

The present study evaluates the effect of provider screening and counseling on adolescent behavior across multiple health risk areas within a large managed care organization. It does so by examining the trajectory of risk behavior among adolescents receiving care in a pediatric primary care setting in which a preventive services intervention was consistently delivered during well visits [20]. The intervention, informed by the “Five A’s” framework for behavioral counseling interventions [5] and social cognitive theory [33], focused on increasing adolescents’ self-efficacy to make healthy decisions and avoid risky behavior.

The study examined whether participation in the preventive services intervention resulted in a relative decrease in risky behavior compared with several cross-sectional comparison samples of adolescents who did not participate in the intervention. Specifically, it was hypothesized that between the ages of 14 and 15 years, adolescents who received the intervention would report a greater increase in rates of seat belt and helmet use and a lesser increase in rates of tobacco, alcohol and drug use, and onset of sexual activity, as compared to several cross-sectional comparison samples.

## Methods

All procedures were approved by the university and the managed care organization internal review boards.

## Design

### Study setting and intervention.

*Intervention clinic selection.* Health plan data were used to identify 10 pediatric clinics throughout Northern California that appeared feasible for the study in terms of large adolescent patient population. Through qualitative and quantitative data collection in nine interested clinics, three clinics were selected based on the following criteria: large number of teenagers, ethnic and geographic diversity, range of clinic services, adolescents maintained within pediatric clinic until a minimum of 17 years of age, no adolescent medicine clinic, anticipated stability over the next several years (e.g., not moving sites), and agreement to participate in a clinic-wide preventive services intervention.

*Initial phase of research—increasing the delivery of preventive services.* The initial phase of this research involved successfully increasing the delivery of preventive services to adolescent patients in the three clinics through: (1) provider training; (2) integrating screening and charting tools; and (3) providing the additional resources of a clinic health educator. The implementation of these components resulted in a dramatic increase in delivery of services, with providers discussing the six targeted behaviors with teenagers an average of 94% of the time [20]. Once the providers started delivering preventive services as intended, the formal evaluation of the behavioral effects of adolescents receiving preventive services began.

*Adolescent clinical preventive services intervention.* The adolescent intervention described in this article involved a primary care visit at the age of 14 years (year 1). Adolescents completed the confidential Adolescent Health Screening Questionnaire in the clinic immediately before their well visit. Relevant health behavior information from the questionnaire was transcribed onto a charting form to be used by the provider to conduct the preventive services intervention. The adolescent met with his/her provider during the scheduled well visit, followed by a brief session with the clinic health educator.

*Clinical encounter 1: the provider intervention.* The visit with the provider lasted for 24–30 minutes, depending on the time allocated in each clinic. The preventive care intervention, conducted as part of the well visit, followed the “Four A’s” principles—Ask, Advise, Assist, Arrange—originally developed for primary care tobacco interventions [34], and more recently modified to the “Five A’s” framework for behavioral counseling [5]. Clinicians confirmed (Ask) with the adolescent the risk information that had been indicated on the Adolescent Health Screening Questionnaire. If an adolescent was not engaging in a risk behavior, he/she received positive reinforcement for the healthy choice, encouragement to not initiate the risky behavior, and appropriate anticipatory guidance (Advise).

If an adolescent was engaging in risky behavior, the clinician assessed level of severity, expressed concern about the behavior, and provided information about risk consequences and a targeted advice message (Advise and Assist). Referrals were made as needed (Arrange), and the delivery of services was documented on a charting form, which became part of the adolescent’s medical record. Clinicians were instructed to review the risk information with the teenager without a parent in the room.

**Table 1**  
Descriptive statistics of intervention and comparison samples

Descriptive variables	Pediatric longitudinal intervention sample	Pediatric comparison sample for safety	Comparison sample: pediatric sample for sexual behavior	CHIS population-based sample
Total sample N	904	579	1,306	1,410
Age				
14	904	311	840	711
15	904	268	766	699
Gender				
Female	50.9	56.5	55.9	51.6
Male	49.1	43.5	44.1	48.4
Race/ethnicity				
White	47.5	29.5	46.9	58.4
Hispanic	19.2	26.2	19.6	24.4
Black	10.1	20.3	18.6	5.2
Asian/Pacific islander	12.8	14.7	—	6.5
Native American/Alaskan native	4.5	5.3	—	1.8
Other	6.0	4.0	14.9	3.6

*Clinical encounter 2: the health educator intervention.* All adolescents met with a study health educator within the pediatric clinic after the well visit with their provider. The health education intervention lasted for 15–30 minutes, depending on the adolescent's level of risk. The intervention, informed by social cognitive theory [35], reinforced the intervention prevention messages delivered by the provider, with a focus on increasing adolescents' self-efficacy to make healthy decisions and avoid risky behavior [33,36]. Personal efficacy—beliefs in one's capability to organize and execute specific courses of action—plays a pivotal role in determining behavior across diverse domains. The adolescent and health educator collaborated on setting realistic goals tailored toward an individual adolescent's risk areas. The sessions focused on building the skills and confidence to make healthy decisions and change specific behavior. Specific goals were reinforced through discussing potential scenarios that would enable adolescents to be successful in reaching these goals. The health educator also discussed how to use the health system, facilitated referrals, and distributed health brochures and a card with telephone numbers for available adolescent services.

#### *Study samples and assessments.*

*Adolescent intervention sample.* Adolescents who were either due or scheduled for a well visit in the three clinics were recruited for the study. Letters describing the study were mailed to teenagers and their parents, with follow-up recruitment calls made by research staff. Parental consent and adolescent assent were obtained at the time of the well visit. Approximately 68% of adolescents and their parents provisionally agreed by telephone to participate; of those, 86% completed the preventive services intervention at their scheduled well visit. Recruitment was ongoing over a 17-month period between 2000 and 2001.

To conduct age-specific analyses of differences between the intervention and cross-sectional comparison groups, we included a longitudinal sample of 904 teenagers who completed a risk assessment and received an intervention during a well visit in year 1 (age 14 years), and completed a risk assessment in year 2 when they were 15 years of age (The majority of risk assessments in year 2 [85%] were completed in the clinic. If a teenager was unable to return to the clinic in about 1 year, the Adolescent Health Screening Questionnaire was completed by mail). The Adolescent Health Screening Questionnaire administered by a research associate in the clinic at year 2 was completed before

the well visit; thus, the analyses reflect one intervention during year 1. Of those who fit criterion for inclusion (14 years in year 1, 15 years in year 2), sample retention was 83% at year 2, with changes in health plan or geographic location considered to be the major reasons for attrition.

*Assessment of adolescent behavioral outcomes.* The Adolescent Health Screening Questionnaire assessed the following:

- Seat belt use (“currently uses 100% of the time” vs. “does not currently use 100% of the time”).
- Helmet use (“currently uses 100% of the time” vs. “does not currently use 100% of the time”—derived from items asking the percentage of the time the adolescent uses a helmet when riding bicycles, skateboarding, or rollerblading).
- Tobacco use (“ever a regular smoker, defined as ever smoked one cigarette every day for 30 days”).
- Alcohol use (“ever drunk alcohol—had more than a few sips of beer, wine, mixed drinks, or liquor”).
- Drug use (“ever tried drugs—such as marijuana, cocaine, glue, or other drugs”).
- Sexual behavior (“ever had sexual intercourse”).

*Comparison samples.* Three separate data sets that assess adolescent risk behavior were used to serve as cross-sectional cohort comparison samples (see Table 1 for sample descriptives).

*Substance use: California Health Interview Survey population-based comparison sample.* To evaluate change in rates of tobacco, alcohol, and drug use, a comparison sample of adolescents ( $n = 1,410$ ) from the California Health Interview Survey (CHIS)—2001 was used. The CHIS, the largest state survey in the United States, is a random digit-dial telephone survey of the population conducted every two years, and includes a survey of adolescents aged 12–17 years.

Data from a sub-sample of CHIS 14- and 15-year-old adolescents who reported a well visit within the past year were analyzed: 14-year-old adolescents of the CHIS sample were used to compare with the 14-year-old adolescents in year 1 of the intervention sample, and 15-year-old adolescents of the CHIS sample were used to compare with the 15-year-old adolescents in year 2 of the intervention sample (1-year follow-up to intervention). Comparisons for each substance use area were made using variables parallel to those in the intervention assessments.

**Table 2**  
Comparing changes in risk behaviors between the intervention and comparison samples<sup>a,b,c</sup>

Risk behavior	Intervention sample		Comparison sample: pediatric sample for safety		Odds ratios, 95% confidence intervals		
	2000	2001	2001–2002		Overall	Males	Females
	Age 14 (904)	Age 15 (904)	Age 14 (311)	Age 15 (268)	Age 14–15	Age 14–15	Age 14–15
<b>Safety</b>							
% current seat belt use (uses 100%)	50.5	59.9	48.9	53.8	1.2 (.84–1.7)	1.5 <sup>a</sup> (.87–2.6)	.94 (.58–1.5)
% current helmet use (uses 100%)	16.8	23.7	14.1	11.2	2.0 <sup>b</sup> (1.1–3.7)	1.5 (.60–3.7)	2.4 <sup>b</sup> (.99–5.6)
<b>Comparison sample: CHIS</b>							
	Age 14 (904)	Age 15 (904)	2001		Age 14–15	Age 14–15	Age 14–15
			Age 14 (711)	Age 15 (699)			
<b>Substance use</b>							
% ever used tobacco regularly	3.2	5.0	3.4	7.0	.73 (.40–1.3)	.45 <sup>c</sup> (.18–1.17)	.98 (.44–2.2)
% ever used alcohol	26.9	37.5	29.0	39.6	1.0 (.78–1.3)	.97 (.67–1.4)	1.0 (.74–1.5)
% ever used drugs	14.0	23.4	12.9	20.3	1.1 (.79–1.5)	1.1 (.68–1.7)	1.1 (.68–1.7)
<b>Sexual behavior</b>							
% ever had intercourse	5.6	13.2	5.6	15.2	.82 (.52–1.3)	.84 (.45–1.5)	.75 (.39–1.5)
<b>Comparison sample: pediatric sample for sexual behavior (2000)</b>							
	Age 14 (904)	Age 15 (904)	Age 14 (840)	Age 15 (766)	Age 14–15	Age 14–15	Age 14–15
% ever had intercourse	5.6	13.2	6.3	17.3	.78 (.52–1.2)	.94 (.49–1.8)	.81 (.47–1.4)

<sup>a</sup>  $p < .10$ –.14.

<sup>b</sup>  $p \leq .05$ .

<sup>c</sup>  $p < .10$ .

*Sexual behavior: CHIS and the pediatric comparison sample for sexual behavior.* To evaluate the intervention changes in sexual intercourse rates, two different comparison samples were used: (1) the CHIS sample, using the item “Have you ever had sexual intercourse?” and (2) the Pediatric Comparison Sample for Sexual Behavior (2000): 1,306 adolescents aged 14 and 15 years from nonintervention pediatric clinics in the same managed care plan. In a separate study, conducted at the same time as the intervention, adolescents completed exit surveys after well visits, reporting whether they had ever engaged in sexual intercourse [37].

*Safety: pediatric comparison sample for safety.* Because the items on safety in the CHIS dataset were not consistent with the survey items in the intervention assessment, to evaluate changes in safety, an additional comparison sample of adolescents who had attended well visits in four nonintervention pediatric clinics within the same managed care organization was used (2001–2002). In a separate study, adolescents completed exit surveys that queried about seat belt and helmet use immediately after their well visits. Survey items contained wording identical to that in the intervention sample.

#### Statistical analyses

Changes in behavior rates across time of adolescents aged 14–15 years (year 1–2) in the intervention sample were compared with those in the comparison samples. Outcome measures were adolescent behavior in the six target areas. Each behavior area was evaluated separately. Generalized estimating equations were used as implemented in the SAS GENMOD (SAS Institute,

Inc., Cary, NC) procedure to account for the correlational nature of the data from the intervention sample.

#### Results

Descriptive statistics for the intervention and comparison samples are presented in Table 1. Although there are some differences in the percentage of adolescents in each race/ethnic group across the samples, the patterns of proportions are, for the most part, similar between samples. In three of four of the data sets, about half the respondents were white adolescents, whereas the Pediatric Comparison Safety sample was more evenly divided between white (30%), Hispanic (26%), black (20%), and Asian/Pacific Islander (15%) adolescents.

Self-reported behavior rates for each age-related comparison are presented in Table 2. There are no significant differences in behavior rates between samples at 14 years of age. Overall change rates between 14 and 15 years of age for each behavior are presented in the following paragraphs.

#### Seat belt use (always use)

Between ages 14 to 15, seat belt use increased by 9.4% points in the intervention sample and by 4.9% in the comparison sample, an increase 20% higher (odds ratio [OR]: 1.2) in the intervention sample (not significant [NS]). Among the sample of male adolescents, the increase in seat belt use in the intervention sample was 50% higher (OR: 1.5) than in the comparison sample, reaching borderline significance ( $p = .14$ ).

Among female adolescents, the increase was similar between intervention and comparison samples (OR: .95).

#### *Helmet use (always use)*

Between ages 14 to 15, helmet use increased by 6.9% points in the intervention sample and decreased by 2.9% in the comparison sample, an increase 100% higher (OR: 2.0) in the intervention sample ( $p < .05$ ). The increase was 50% higher (OR: 1.5; NS) among the sample of male adolescents, whereas among female adolescents, the increase in helmet use in the intervention sample was 140% higher (OR: 2.4) than in the comparison sample ( $p = .05$ ).

#### *Tobacco use (ever smoked regularly)*

Between ages 14 to 15, regular smoking increased by 1.8% points in the intervention sample and by 3.6% points in the comparison sample, an increase 27% lower (OR: .73) in the overall intervention sample (NS). Among male adolescents, smoking increased by .2% points in the intervention sample and by 4.3% points in the comparison sample, an increase 55% lower (OR: .45) in the intervention sample, approaching significance ( $p < .10$ ). Among female adolescents, the increase was similar between intervention and comparison samples (OR: .98).

#### *Alcohol use (ever more than a few sips)*

Between ages 14 to 15, alcohol use increased 10.6% points in the intervention sample and 10.6% points in the comparison sample, with the increase in alcohol use similar (OR: 1.0) in both samples. The pattern among male and female samples was similar to the overall pattern.

#### *Drug use (ever used)*

Between ages 14 to 15, drug use increased 9.4% points in the intervention sample and 7.4% points in the comparison sample, an increase 10% higher (OR: 1.1) in the intervention sample (NS). Male and female samples were similar to the overall pattern.

#### *Sexual behavior (ever had sexual intercourse)*

This analysis included two comparison groups: (1) the CHIS sample and (2) the Pediatric Comparison Sample for Sexual Behavior. Between 14 and 15 years of age, rates of sexual intercourse increased 8.1% points in the intervention sample, 9.6% in the CHIS sample, and 11.0% in the Pediatric Comparison Sample; the increase in the intervention sample was 18% lower than that in the CHIS sample (OR: .82; NS) and 22% lower than that in the Pediatric Comparison Sample (OR: .78; NS). The pattern among male and female samples was relatively similar to the overall pattern.

## **Discussion**

This is the first study to integrate a broad range of clinical services into primary care practice and then follow adolescent patients longitudinally to assess the behavior of adolescents receiving clinical preventive services. The intervention—involving screening and brief counseling from a primary care clinician,

followed by reinforcement and goal setting with a health educator—had mixed outcomes across the range of risk areas.

The intervention had the strongest effect in the area of helmet use; shows promise for increasing seat belt use and reducing smoking among male adolescents; and indicates a nonsignificant trend toward delaying the onset of sexual activity. Participation in the intervention appeared to have no effect on rates of experimentation with alcohol and drugs between the ages of 14 and 15 years.

The increase in helmet use among teenagers in the intervention sample was 100% higher than rates for teenagers within the same healthcare system who did not participate in the intervention. This is the first study to evaluate changes in helmet use as part of a primary care intervention that focuses on multiple risk areas; however, our research supports previous findings [27,28] indicating that brief interventions can have an effect on teenagers' use of bicycle helmets. The consistency of these findings indicates that helmet use is an area in which a relatively brief focus may have a significant behavioral impact.

Notably, although seat belt use increased at a greater rate among teenagers in the intervention group, reported use of seat belts also increased in the comparison sample. National data indicate increased use of seat belts in the 10th grade [38], suggesting that early to mid-adolescence seems to be a prime time to positively influence seat belt use because the focus on adolescents' taking responsibility for their health is consistent with the increasing autonomy and responsibility of learning to drive.

In contrast to positive trends in helmet and seat belt use, engagement in sexual activity and experimentation with substances increase throughout adolescence. Our results indicate a nonsignificant trend toward the intervention delaying the onset of sexual activity, as compared with two cross-sectional comparison samples. Given the risks associated with teenagers having sex, delaying initiation even 1 year can have a considerable effect on reducing pregnancy and sexually transmitted infections [39].

The effectiveness of the intervention on adolescents' use of substances varied by type of substance. Adolescents in California have relatively low rates of smoking; however, when compared with a state sample, change in regular smoking among male teenagers in the intervention group was lower between the ages of 14 and 15 years, suggesting an impact above and beyond the effects of state-wide legislative and educational public health efforts. The pattern of change in rates of smoking between girls in the intervention and comparison groups was more similar. The limited data on primary care interventions for teenage smokers suggest that further attention to this differential effect of the intervention is warranted [22].

The intervention did not appear to have a significant effect on experimentation with alcohol or drugs. Our measures assessed "ever tried alcohol or drugs." Given the nature of experimentation among teenagers, it may not be realistic for a provider to influence a teenager's decision to ever try alcohol or drugs. Perhaps a focus on teenagers who were regular users of alcohol or drugs, and/or following teenagers to an older age where there is increased use of substances, might have discriminated more between the intervention and comparison groups. However, our results are consistent with previous findings suggesting that although office-based interventions increase adolescents' refusal of peer pressure to drink, they have not been found to be effective at reducing the alcohol use among teenagers [25].

There are several strengths to the design of this study. The research involved a carefully evaluated implementation phase,

with preventive services delivered to the teenagers in the intended manner [20]. The adolescents in the intervention group attended annual pediatric well visits and were followed longitudinally for 1 year. With few exceptions [27], most clinical interventions have used a 3–6-month evaluation period.

Limitations to the study involve the lack of a longitudinal comparison group, and the use of both population-based and clinic-based comparison samples. At 14 years of age, the intervention group adolescents were similar to the comparison group adolescents in every area, indicating that the samples were similar in overall tendency to engage in risky behavior. However, comparing adolescents in a longitudinal study with cross-sectional cohort comparison samples results in uncertainty about the similarity of the samples over time.

This study represents a first step in examining the trajectory of risk behavior among adolescents receiving a preventive primary care intervention. Although the results are promising, the behavior change among adolescents is modest. Based on this initial work, future work could extend and strengthen this research by including longitudinal comparison groups that enable teenagers to be followed for a longer period to assess the effect of multiple points of contact with the primary care system. The intervention might also be strengthened by varying the intensity of the primary care intervention depending on the risk level of the teenager.

The primary care intervention was a systems intervention, involving the provider and a clinic health educator. Our model is consistent with guideline recommendations that the primary care system provides preventive care to adolescent patients, without designating who provides each service [7]. Our findings suggest that one primary care preventive services intervention at age 14 resulted in positive behavioral outcomes in teenagers in some risk areas. As developmental trajectories and “teachable moments” may vary [15], we need to take full advantage of the repeated contacts that adolescents have with the primary care system. Continued work is needed to help ensure that every adolescent clinical encounter is health promoting.

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