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## A Brief Image-based Prevention Intervention for Adolescents

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### Abstract

**Purpose**—Evaluate the efficacy of a brief image-based prevention intervention and assess current drug use as a moderator of intervention effects.

**Methods**—A clinical trial with 416 high school-aged adolescents were randomized to either the brief intervention or usual care control with data collected at baseline and 3-month follow-up. The brief intervention consisted of a tailored in-person communication and a series of parent/guardian print materials based on the Behavior-Image Model.

**Results**—Health behavior goal setting increased for participants receiving the brief intervention, with an effect size in the small range ( $d=.33$ ). Overall effect sizes for cigarette smoking frequency and quantity, and alcohol use frequency and quantity were small ( $d$ 's=.16-.21) and in favor of the brief intervention. However, adolescents reporting current substance use who received the brief intervention reduced their frequency and heavy use of alcohol, frequency and quantity of cigarette

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smoking, and alcohol/drug problems, with larger effects ranging from small to approaching medium in size ( $d$ 's=.32-.43;  $p$ 's <.01).

**Conclusions**—This study suggests that brief image-based messages may increase health behavior goal setting and reduce substance use, particularly among drug using older adolescents.

### Keywords

Self-image; prevention; brief intervention; substance use; adolescents

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Late adolescence is often marked by significant involvement in high risk behaviors including the consumption of alcohol, cigarettes, and illicit drugs, particularly marijuana use (Centers for Disease Control and Prevention [CDC], 2008; Johnston, O'Malley, Bachman, & Schulenberg, 2008). One possible way to address multiple risk behaviors is to target images that can link co-occurring health risks. Studies have identified image as an important factor in the initiation and maintenance of youth substance use (Amos, Gray, Currie, & Elton, 1997; Gerrard, Gibbons, Stock, Vande Lune, & Cleveland, 2005; Kulbok et al., 2008; Slovic, Finucane, Peters, & MacGregor, 2002). While appealing images have long been used in marketing and advertising to affect purchasing behavior, including that of adolescents (Fox, Krugman, Fletcher, & Fischer, 1998; Kelly, Slater, & Karan, 2002; Shimp, 2000), few substance abuse prevention interventions have focused primarily on image to affect adolescent health behavior, or have used largely negative images.

Conceptual models for guiding the development of multiple behavior interventions have been lacking in the literature (Noar, Chabot, & Zimmerman, 2008; Orleans, 2004). The Behavior-Image Model (BIM) is a recently proposed paradigm for planning brief, multiple behavior interventions, based on the premise that activating existing or creating new images of attractive others (i.e., prototype or social images) and our possible selves (i.e., future self-images) can integrate and motivate change across divergent health behaviors (Werch, 2007b). The Behavior-Image Model is also founded on self-regulation theory of health (Scheier & Carver, 2003), with interventions based on BIM providing feedback on participants' health behaviors and self-images to increase commitment to setting concrete goals aimed at reducing discrepancy between health behaviors and social/self-images.

Several recent studies have indicated that targeting social and self-images in brief interventions can result in a reduction of substance use behaviors among adolescents (Werch et al., 2003; 2005; 2008). The current study tested two hypotheses examining the efficacy of a brief image-based intervention founded on the Behavior-Image Model as both a universal prevention intervention and a selective intervention for drug using youth. First, it was hypothesized that all adolescents in a high school setting receiving the brief multiple behavior intervention as a universal prevention program targeting social and self-images would demonstrate greater increases in health behavior goal setting and less drug use than control adolescents. Second, it was hypothesized that drug using students receiving the brief intervention as a selective prevention program would be more likely to increase goal setting and reduce drug use than drug users receiving the control. Drug use outcomes examined in this study included alcohol, cigarette and marijuana use behaviors and alcohol/drug use problems. Previous studies evaluating image-based prevention interventions found better outcomes found among adolescents who reported substance use (Werch et al., 2003; 2005).

## Methods

### Design

A randomized clinical trial was conducted using a within-school design at a single school with participants stratified by grade level and current drug use status and then individually randomly assigned to either the brief intervention or usual care control group. Baseline data were collected at the beginning of the fall semester 2007, and post-intervention data were collected 3-months after implementation of the intervention during the spring semester 2008. All outcome data were collected from participants assembled in small groups in a classroom by trained project staff following a standardized protocol. The research protocol was approved by the lead author's Institutional Review Board prior to implementing the study, and required all students to submit signed parental consents and youth assents prior to participation in the study.

### Sample

A total of 416 students attending a large, diverse public high school in northeast Florida participated in the Planned Success health promotion research project. Students in 10<sup>th</sup> and 11<sup>th</sup> grades were recruited to participate in a two-year trial using formal presentations regarding study aims, procedures, benefits, and risks. Of 465 adolescents recruited into the study, 89.4% (n=416) participated in the baseline data collection, with 25 students absent and 16 students either withdrawn from school or truant. Most participants were in the 10<sup>th</sup> grade (57.2%), with an average age of 15.8 years old (sd = 0.77). The majority was female (63.5%). Most students were Caucasian (46.1%), followed by "other" category (24.4%), African American (22.7%), and Asian (6.9%). Fifteen percent (15.0%) reported being Hispanic. More than one in five (22.5%) were enrolled in the free or reduced price lunch program indicating low income status. About one in four participants (24.5%) drank alcohol in the past 30 days, with 11.7% using marijuana and 9.4% smoking cigarettes in the same time period. The socio-demographic characteristics of the study sample were similar to those of the student population (See Table 1).

### Intervention

The Planned Success intervention consisted of a tailored in-person communication and a follow-up series of parent/guardian print materials. Content and strategies were based on the Behavior-Image Model (Werch, 2007b). Intervention content consisted primarily of printed text and scripted messages that were designed to elicit a social image of a successful young adult as one who sets life goals to increase positive behaviors while avoiding behaviors that interfere with being more successful. The brief intervention materials were designed to provide feedback on current health/personal development behaviors and help participants set concrete goals to improve targeted behaviors and achieve desired future self-images.

The in-person communication consisted of a screening survey, consultation, and goal plan. The intervention was administered during regular school hours in a designated study space. After randomization, trained personal success coaches implemented the intervention using fully scripted protocols. Success coaches consisted of nurses and certified health education specialists who received a two-day training that included demonstrations, role-playing and feedback on how to implement the brief intervention components. The mean length of the consultation was 20 minutes (sd=2.26). One week after implementation of brief interventions, parents/guardians of participants were sent three weekly mailings of five parent-youth cards with messages that paralleled those in the consultation. Those participants assigned to the usual care control received commercially available health promotion materials commonly used in schools.

## Intervention Quality

Consultation fidelity was monitored by conducting independent ratings of audio-taped segments of interventions by research staff. In addition, participant feedback on the consultation and control material was collected immediately after implementation for each student. Feedback was also collected on intervention and control materials mailed to participants' homes during the 3-month post-intervention data collection. Two key items measured student satisfaction with the consult and print materials, and another item measured whether or not the print materials influenced parent-youth discussion, with all items scored on a 4-point scale of: 1=excellent/yes, 2=good/maybe yes, 3=fair/maybe no, 4=poor/no. Participants rated the brief consult more favorably ( $m=1.43$ ,  $sd=0.55$ ) than the control materials ( $m=1.90$ ,  $sd=0.62$ ) on overall evaluation, and on whether they would recommend the consult ( $m=1.31$ ,  $sd=0.50$ ) or control materials ( $m=1.62$ ,  $sd=0.72$ ),  $p's<.001$ ) to others. The mailed intervention print materials were rated more favorably ( $m=1.88$ ,  $sd=0.62$ ) than the control print materials ( $m=2.05$ ,  $sd=0.70$ ) on overall evaluation, and on whether participants parents talked with them about the intervention ( $m=2.45$ ,  $sd=1.32$ ) or control materials ( $m=2.86$ ,  $sd=1.28$ ),  $p's<.05$ . No differences were found on whether participants would recommend the intervention or control mailed print materials to others.

## Measures

The Health & Personal Development Survey (Werch, 2007a) was used to collect data on multiple health and substance use behaviors. A previous version of this instrument was successfully used in a pilot study of an image-based prevention intervention for adolescents (Werch, et al., 2008). Substance use measures included alcohol, cigarette, and marijuana use items adopted from well known youth substance abuse research and standardized national drug surveys (Johnston et al., 2008; Substance Abuse and Mental Health Services Administration [SAMHSA], 2008; Spoth, Trudeau, Shin, & Redmond, 2008). Items on alcohol, cigarette, and marijuana use measured 30-day frequency (ordinal scale: 1=0 days through 11=28-30 days), 30-day quantity (ordinal scale: 1=0 drinks per day through 12=11 or more drinks per day), and 30-day heavy use of the substance (ordinal scale: 1=0 days through 11=28-30 days). Heavy use of alcohol was defined as 5 or more drinks in a row for males and 4 or more drinks in a row for females, whereas heavy use for smoking was a pack or more of cigarettes, and heavy use for marijuana was "getting really high or stoned from marijuana." A 17-item measure of alcohol and drug problems experienced during the past 30-days was also used in this study, scored as a total number of problems (Costa, Jessor, & Turbin, 1999; Werner, Walker, & Greene, 1996) ( $\text{Alpha}=.88$ ).

## Analysis

Repeated measures MANOVAs and ANOVAs were used to test intervention effects over time. MANOVAs are recommended as the appropriate multivariate method for analyzing group differences in means on dependent variables when individual measures which do not have underlying constructs are grouped to form meaningful conglomerate indexes (Green & Thompson, 2006). Three repeated measures MANOVAs were performed to more efficiently address the multiple drug use behaviors targeted by the intervention (i.e., alcohol, cigarettes, and marijuana use behaviors). In addition, we used a Bonferroni-adjustment for three family-wise comparisons within each MANOVA conducted separately for alcohol, cigarette, and marijuana use behaviors ( $p's = .016$ ). Factorial repeated measures MANOVAs and ANOVAs were used to examine interaction effects of baseline drug use (past 30-day alcohol, cigarette or marijuana use) by treatment group on outcome measures. Effect sizes were calculated using Cohen's  $d$  statistic (Cohen, 1988) and procedures recommended when employing pre-posttest control group designs (Morris, 2008). Secondary analyses that included age, gender, ethnicity, and an indicator of socio-economic status as covariates did not change the results, therefore

results of analyses without these covariates are presented. All analyses were performed using SPSS version 17.0 (SPSS, Inc., 2008).

## Results

### Baseline and Attrition Analyses

No significant differences were found on any of the socio-demographic or substance use measures between groups. Eighty-seven percent of participants ( $n=360$ ) successfully completed the post-intervention data collection. Of those who were lost to follow up, 14 participants (45%) withdrew from school and 13 (42%) were lost due to truancy or absences. No differences were found in the proportion of attrition between treatment groups.

### Outcome Analysis

Table 2 shows estimated marginal means and standard errors of outcome measures by treatment group and time. Health behavior goal setting increased over time for participants receiving the brief intervention and decreased for those receiving usual care,  $F(1,358)=8.84, p=.001$ , with this effect small in size ( $d=.33$ ). None of the omnibus repeated measures MANOVAs were significant for treatment by time interactions on drug use. A significant Bonferroni-adjusted univariate analysis was found for frequency of smoking cigarettes, with those receiving the brief intervention smoking less frequently and those in the usual care smoking more frequently  $F(1,356)=7.39, p=.01$ . Effect sizes for cigarette smoking frequency and quantity, and alcohol use frequency and quantity were small ( $d's=.16-.21$ ). No differences were found between treatment groups on alcohol and marijuana use, and alcohol/drug problems.

### Moderation Analysis

Table 3 shows estimated marginal means and standard errors of outcome measures by treatment, time and current drug use status. Omnibus repeated measures factorial MANOVA interaction effects were found for alcohol use,  $F(3,353)=2.83, p=.04$ , and cigarette smoking,  $F(3,352)=5.15, p=.001$ , with more positive effects for drug using adolescents who received Planned Success. In particular, univariate tests showed students who used alcohol, cigarettes, or marijuana prior to receiving the brief intervention reduced their frequency of alcohol use,  $F(1,355)=6.09, p=.01$ , and heavy use of alcohol,  $F(1,355)=7.26, p=.01$ , as well their frequency of smoking cigarettes,  $F(1,354)=14.22, p=.001$ , and quantity of cigarette smoking,  $F(1,354)=8.00, p=.01$ , with each of these effects small in size ( $d's=.32-.39$ ). A repeated measures ANOVA found that drug using students receiving Planned Success also experienced less alcohol/drug problems than drug using adolescents receiving usual care,  $F(1,355)=7.81, p=.01$ . This reduction was nearly medium in size ( $d=.43$ ) and consisted of greater than one less alcohol/drug problem over time for drug using youth receiving the brief intervention. No treatment by time by drug use interactions were found on marijuana use and health behavior goal setting, although goal setting increases among drug using youth receiving the brief intervention was medium in size ( $d=.54$ ).

## Discussion

This study provided a departure from mainstream prevention research by evaluating an innovative brief prevention intervention targeting multiple commonly used drugs using positive social and future self-images related to health promoting and personal development habits among adolescents in a high school setting. Such interventions might provide a more feasible and acceptable alternative to typical lengthy and involved prevention programs found in school settings, or brief interventions limited to single risk behaviors found in clinical settings. This study supports the contention that image-based messages in potentially cost-effective and translatable brief intervention formats may increase health behavior goal setting

and reduce substance use, particularly among older drug using adolescents in greatest need for prevention intervention.

These findings support previous studies showing that brief interventions targeting social and self-images result in small reductions in substance use among adolescents (Werch et al., 2003; 2005; 2008). This study's findings also support prior research suggesting that substance using adolescents may differentially benefit from brief image-based interventions (Werch et al., 2003; 2005). These findings indicate that brief interventions targeting positive images linking health promoting behaviors with substance use avoidance should be examined for their use as selective interventions for the secondary prevention of drug use among adolescents already engaged in alcohol, cigarette, or illicit drug consumption.

Results on the student rated quality of the brief intervention in this study support the validity of the Behavior-Image Model to construct high quality, appealing messages using positive images to couple health promoting behaviors with substance use avoidance, thereby overcoming previous known barriers to targeting image in prevention interventions. In addition, increases in goal setting among adolescents receiving the brief intervention suggests BIM is potentially useful as a self-regulation framework for enhancing the selection of self-concordant goals based on desired image. This finding supports earlier research evaluating a brief image-based intervention for young adults who found increases in goal setting on eight of 10 target health behaviors among participants receiving a consultation based on BIM with or without a goal plan (Werch et al., 2007).

This study had a number of limitations. One was that it included a relatively small sample from a single high school in the southeast. While this school was large and had a relatively diverse student body, additional studies are needed using a broader variety of high schools to determine the generalizability of these findings. In addition, due to the small sample size and number of drug users, this study was underpowered to detect most of the moderation effects. This study was also limited to a 3-month follow-up, thereby restricting our understanding of the longer term sustainability of the outcomes found in this study. Yet another limitation of this study was that because the Planned Success intervention included both an in-person communication and a follow-up series of parent/guardian print materials, it is not known which of these strategies individually or in combination resulted in the positive changes found among those receiving the intervention. Research is needed deconstructing these two components to determine their individual contribution to the reduction of drug use and increase in behavioral health goal setting among adolescents and particularly drug using adolescents.

Future work should continue in developing and evaluating brief interventions which target multiple commonly used licit and illicit drugs among older adolescents. Prevention efforts oftentimes are aimed at either younger adolescents or older college-aged young adults, leaving high school adolescents without critical programs designed to increase and maintain motivation to avoid harmful substance use. In addition, studies translating these brief, easily administered image-based interventions to drug using adolescents in various settings, including alternative schools, juvenile justice settings, adolescent drug treatment, and in homes where youth might be suspected of using alcohol or drugs, are needed to increase our understanding of the potential of these novel strategies for preventing harm and promoting health among high-risk youth populations. Lastly, additional research is required to explore the potential of the Behavior-Image Model for developing other types of brief asset-based prevention interventions, and enhancing the self-regulation of additional health behaviors and health outcomes among adolescents and young adults.

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**Table 1**

## Characteristics of participants at baseline

Characteristic	<b>Total sample (n = 416)</b>	
	<i>n</i>	%
Gender		
Male	152	36.5
Female	264	63.5
Ethnicity		
Hispanic/Latino	62	15.0
Race		
Asian	28	6.9
Black/African American	92	22.7
White	187	46.1
Other	99	24.4
Age (M/SD)	15.80/.77	
Social economic status: free lunch		
Yes	91	22.5
Last 30-day alcohol use (Yes)	102	24.5
Last 30-day cigarettes use (Yes)	39	9.4
Last 30-day marijuana use (Yes)	48	11.7
Any alcohol or drug problem	127	30.5

*Note:* "Other" racial category included American Indian, Hispanics, Native Hawaiian, and multiracial.

**Table 2**  
Means and standard errors of outcome measures for treatment by time interaction

Outcome Measures	Intervention (n =179)				Control (n =181)				d	p
	Pretest		Posttest		Pretest		Posttest			
	M	SE	M	SE	M	SE	M	SE		
<b>Alcohol</b>										
Frequency	1.49	.08	1.35	.07	1.31	.08	1.39	.07	.21	.06
Quantity	2.05	.16	1.89	.16	1.61	.16	1.83	.16	.18	.05
Heavy use	1.32	.08	1.20	.05	1.17	.08	1.15	.05	.08	.44
<b>Cigarettes</b>										
Frequency	1.67	.15	1.54	.15	1.31	.15	1.53	.15	.17	.01
Quantity	1.35	.07	1.32	.07	1.17	.07	1.30	.07	.16	.10
Heavy use	1.09	.05	1.11	.06	1.08	.05	1.13	.06	.04	.66
<b>Marijuana</b>										
Frequency	1.46	.12	1.47	.12	1.29	.12	1.41	.12	.07	.53
Quantity	1.47	.12	1.53	.13	1.25	.12	1.34	.13	.02	.85
Heavy use	1.38	.10	1.37	.10	1.19	.10	1.28	.10	.04	.48
<b>Alcohol/drug problems</b>										
	1.35	.20	1.11	.20	1.22	.20	1.11	.20	.05	.65
<b>Goal setting</b>										
	6.75	.22	7.29	.24	6.96	.22	6.52	.24	.33	.00

Note. p values = treatment \* time interaction effects. d= effect size. Frequency and heavy use items were scored as: 1 = 0 days, 11 = 28-30days. Quantity of alcohol use item was scored as: 1 = 0 drinks per day, 12 = 11 or more drinks per day. Quantity of cigarette smoking item was scored as: 1 = 0 cigarettes per day, 12 = 28-30 cigarettes per day. Quantity of marijuana use item was scored as: 1 = 0 times, 12 = 31 or more times.

**Table 3**  
Moderation analysis results: Means and standard errors of outcome measures for treatment by time by drug use interaction

Outcome Measures	Intervention (n = 179)						Control (n = 181)											
	Non-user (n = 124)			User (n = 55)			Non-user (n = 135)			User (n = 46)								
	Pretest	Posttest	M	SE	Pretest	Posttest	M	SE	Pretest	Posttest	M	SE	Pretest	Posttest	M	SE	d	p
<b>Alcohol</b>																		
Frequency	1.00	.08	1.15	.08	2.58	.11	1.82	.12	1.00	.07	1.16	.07	2.22	.12	2.07	.13	.39	.01
Quantity	1.06	.15	1.37	.18	4.27	.23	3.06	.27	1.03	.14	1.44	.17	3.30	.25	2.96	.29	.28	.07
Heavy use	1.00	.10	1.08	.06	2.02	.14	1.47	.09	1.07	.09	1.04	.06	1.46	.16	1.48	.10	.32	.01
<b>Cigarettes</b>																		
Frequency	1.00	.16	1.06	.16	3.20	.24	2.65	.25	1.00	.15	1.10	.16	2.22	.26	2.76	.27	.32	.00
Quantity	1.01	.08	1.12	.08	2.11	.11	1.78	.12	1.00	.07	1.10	.08	1.67	.12	1.89	.13	.35	.01
Heavy use	1.00	.06	1.06	.07	1.30	.09	1.24	.11	1.00	.06	1.01	.07	1.33	.10	1.50	.12	.18	.04
<b>Marijuana</b>																		
Frequency	1.00	.13	1.18	.14	2.50	.20	2.15	.21	1.00	.13	1.17	.13	2.16	.22	2.11	.23	.11	.35
Quantity	1.00	.14	1.22	.15	2.56	.21	2.24	.22	1.01	.13	1.11	.14	1.96	.23	2.00	.24	.12	.23
Heavy use	1.00	.12	1.12	.12	2.26	.17	1.94	.17	1.00	.11	1.07	.11	1.73	.19	1.89	.19	.20	.10
<b>Alcohol/drug problems</b>																		
	.44	.22	.62	.22	3.40	.33	2.20	.33	.76	.21	.54	.21	2.60	.36	2.82	.37	.43	.01
<b>Goal setting</b>																		
	7.08	.26	7.53	.29	6.00	.39	6.73	.43	6.96	.25	6.67	.27	6.98	.43	6.07	.47	.54	.22

Note. p values = treatment \* time \* current drug use interaction effects. d = effect size for drug users. Frequency and heavy use items were scored as: 1 = 0 days, 11 = 28-30days. Quantity of alcohol use item was scored as: 1 = 0 drinks per day, 12 = 11 or more drinks per day. Quantity of cigarette smoking item was scored as: 1 = 0 cigarettes per day, 12 = 28-30 cigarettes per day. Quantity of marijuana use item was scored as: 1 = 0 times, 12 = 31 or more times.