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## Preadolescent Drug Use Resistance Skill Profiles, Substance Use, and Substance Use Prevention

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Since the early 1980's many school-based drug abuse prevention programs have adopted a social influence model to guide their curricula. Teaching resistance skills comprises a key component of these prevention programs (Botvin & Gilbert 2000). There is still debate however, about what constitutes effective resistance skills (Wolfe, Crooks, Chiodo, Hughes, & Ellis 2012). Surprisingly, no studies to date have taken a person- rather than a variable-centered approach to define resistance skills and to understand how resistance skill profiles may function protectively in relation to substance use.

The primary advantage of a person-centered approach to understanding effective resistance skills is the ability to simultaneously model: (a) familiarity with multiple resistance strategies, (b) context i.e., drug specific resistance strategies, and (c) confidence in applying these skills. Each of these aspects comprise important components of effective resistance skills (Wolfe et al. 2012; Wright, Nichols, Graber, Brooks-Gunn, & Botvin 2004). A person-centered approach such as latent class analysis (LCA) can describe the heterogeneity in individuals' responses to a broad set of resistance skill items by dividing the sample into latent subgroups comprised of similar individuals (Collins & Lanza 2010). Each subgroup, or latent class, is characterized by a particular profile, for example of resistance skills and refusal confidence that reflects their joint occurrence within individuals. An additional advantage of a person-centered approach is the ability to examine whether individuals in different subgroups respond differentially to treatment. An example might include examining whether certain types of preadolescents respond more favorably to a school-based substance abuse prevention program.

One evidence-based prevention program, keepin' it REAL (kiR), conceptualizes resistance skills as the ability to communicate competently in drug offer interactions (Miller, Alberts, Hecht, Krizek, & Trost 2000). The kiR curriculum is guided by communication competence theory (Spitzberg & Cupach 1984), which acknowledges the complex communication

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interactions involved in drug offers especially from important others (Miller et al. 2000). Being a highly competent communicator involves the ability to generate multiple resistance strategies in drug offer situations. This also is referred to as divergent responding or thinking (Wright et al. 2004). At the same time, confidence in one's skills in a given situation appears to be equally critical to being a competent communicator. Assertive responses in social situations have been linked to less adolescent risk-taking including the ability to resist peer pressure to use drugs (Caplan et al. 1992; Wills, Baker, & Botvin 1989). Jointly, drug specific refusal confidence and familiarity with multiple resistance strategies is expected to function protectively against drug use offers.

As part of the kiR curriculum, four prototypical resistance strategies and drug specific refusal confidence are taught (Alberts, Miller-Rassulo, & Hecht 1991; Miller et al. 2000). Derived from research identifying youth descriptions of the drug offer process, the resistance strategies include: (1) a simple or straight-forward refusal [refuse]; (2) providing an explanation when refusing (e.g., I have allergies) [explain], (3) avoiding situations altogether where drug offers are likely to occur [avoid], and (4) leaving situations when drug offers are made [leave](Miller et al. 2000). Drug specific refusal confidence also is taught for cigarette, alcohol, and marijuana offers made by friends, family and a school context. The skills component is similar to what is taught in other social influence programs such as Life Skills Training and All Stars that have been designated as evidence-based by the National Registry of Evidence-based Programs and Practices ([www.nrepp.samsha.gov](http://www.nrepp.samsha.gov)) and found to be relatively cost effective (Miller & Hendrie 2008). Thus, an examination of skills in this context should have broad implications.

In this study we set out to identify meaningful resistance skill profiles based on preadolescents' (5<sup>th</sup> grader) familiarity with the four prototypical resistance strategies taught in the program and their refusal confidence for three drug specific offer situations. Jointly these items are theorized to make-up highly competent communicators. We articulate three goals.

First, preadolescents are the focus given the study's prevention paradigm, which emphasizes the role of understanding how protective skills function prior to a high risk time period (in this case adolescence). The prevention paradigm underscores the importance of examining the extent to which preadolescents learn, generate, and apply drug offer resistance skills prior to exposure to high-risk situations. Studies of the REAL resistance skills have been conducted among adolescents ranging in age from 12 to 22 (Miller-Day et al, 2000). These studies examined skills separate from refusal confidence. Thus, the first goal of this study was to specify the skills component of social influence prevention interventions for preadolescents. This led to the first research question: Are there meaningful subgroups of skill profiles based on preadolescents' knowledge of the four prototypical resistance strategies and their refusal confidence for three specific drug offer situations?

Second, questions remain about the relationship between skills and substance use among preadolescents. Studies that have examined what happens when the REAL resistance strategies are used by adolescents suggest that substance users and nonusers differ in their repertoires of strategies (Alberts, Hecht, & Miller-Rassulo 1992; Hecht, Alberts, & Miller-

Rassulo 1992; Miller et al. 2000). Little is known about the degree to which preadolescents possessing skills and confidence jointly translates into reduced substance use (Elek, Wagstaff, & Hecht 2010; Herrmann & McWhirter 1997; Marsiglia, Kulis, Yabiku, Nieri, & Coleman 2010). Consequently, the second goal was to determine whether preadolescents who possess drug resistance skills and refusal confidence are less likely to use substances. This led us to posit hypothesis 1: Membership in the Highly Competent skill profile compared with membership in other skill profiles is predicted to correlate with lower rates of recent substance use.

Finally, a review of resistance skills training effects in school-based programs suggests that resistance skills training is beneficial for preadolescents especially those in 4<sup>th</sup>–6<sup>th</sup> grades (Herrmann & McWhirter 1997; Marsiglia et al. 2010). However, there is only modest evidence about the extent to which changes in these skills effectively reduces substance use initiation (Donaldson, Graham, Piccinin, & Hansen 1995; Hopfer et al. 2010). One study found that the resistance skills training increased skills but did not impact behavior (Donaldson, Graham, & Hansen 1994). Thus, the third goal of this study was to examine whether subgroups of preadolescents based on their refusal confidence and resistance skills may be differentially impacted by the kiR prevention program. This led to the second hypothesis: We expect an increase in membership of the Highly Competent Skill Profile between time 1 and 2 to occur to a greater degree in treatment than in control schools.

## Methods

### Participants

Participants were students from 29 schools in a large southwest suburban metropolitan area participating in a *group* randomized controlled trial of the *keepin' it REAL* program. A total of 1984 5<sup>th</sup> grade student responses were available for analysis. Of these, 138 responses were missing on the skill and confidence variables used for the analysis. The remaining 1846 students who participated in the 5<sup>th</sup> grade study had a mean age of 10, 50% of the sample was female, and a majority (76%) self-identified as Hispanic. At wave 1 in the beginning of 5<sup>th</sup> grade, 798 students were in control schools (n=13) while 1186 students were in schools receiving the intervention (n=16).

### *keepin' it REAL* 5<sup>th</sup> Grade Curriculum

The 5<sup>th</sup> grade *keepin' it REAL* prevention program consists of 12, 45-minute lessons including 5 videos (an introductory video and 4 videos each enacting narratives of the four resistance strategies- refuse, explain, avoid, leave). The content focuses on enhancing anti-drug norms, refusal self-efficacy, and on facilitating the development of decision-making and resistance skills (Spitzberg & Cupach, 1984). The adapted 5<sup>th</sup> grade version used the same basic curriculum content as the classic 7<sup>th</sup> grade multicultural version but differed in communication level and format, the concreteness of the presentation of concepts, the age-based relevance of the examples, and, had two additional lessons (for a total of 12) to enhance effects.

## Program Implementation Procedures

Schools were randomly assigned to condition (i.e., *group* randomized controlled trial). Assignment procedures included stratifying using a principal components analysis generated from seven school variables (e.g., %Hispanic, school enrollment) to form a composite score and then randomizing assignment of school condition as suggested by procedure protocol of Graham and colleagues (1984; Graham et al. 2013). Program implementation occurred during the fall of 2004/2005 academic school year using a staggered scheduling procedure across schools with the average implementation time within each school taking approximately 13 weeks to cover the 12 sessions.

## Measures

The dataset includes ordinal variables measuring drug refusal confidence and drug offer resistance skills. Survey items included hypothetical resistance and refusal confidence questions about alcohol, cigarettes, and marijuana from family members, close friends, and strangers at school. Resistance to hypothetical drug offers were used to measure drug resistance skills since 89% of 5<sup>th</sup> graders in this sample reported experiencing no drug offers.

**Hypothetical resistance skills**—Drug offer resistance strategies were measured by four items asking participants how they would respond to hypothetical drug offer scenarios. The stem for each item asked, “If your friend offered you a beer at a party, would you ...say no without giving a reason why?” [refuse strategy], “...give an explanation or excuse to turn down the beer?” [explain strategy], “...avoid getting into that situation because you think beer might be offered there?” [avoid strategy], and “...just leave the situation without accepting the beer?” [leave strategy]. The four response categories were “definitely” “probably” “probably not” and “definitely not”. Participants were asked if they could use each REAL strategy for each hypothetical offer situation. We dichotomized the response categories since conceptually it was important to know whether or not preadolescents used skills at baseline. This decision is consistent with the bimodal distribution that emerged in the dataset with only 15–18% of the responses in the middle two response categories for each skill item.

**Drug offer refusal confidence**—Confidence refusing substance offers was measured by asking: “Are you sure you would say no if...a family member offered you alcohol?”, “...a close friend offered you marijuana?”, and “a kid at school offered you a cigarette?” There were four response categories of “very sure” and “sure” coded as 1 and “not sure” and “not at all sure” coded as 0.

**Recent substance use**—Recent substance use was measured in response to the following questions “How many times have you drunk more than a sip of alcohol (beer, wine, or liquor) in the last 30 days?” “How many times have you smoked cigarettes in the last 30 days?”, and “How many times have you smoked marijuana (pot, weed) in the last 30 days?” Response categories ranged from 1=0 times, to 2=1–2, 3=3–5, 4=6–9, 5=10–19, 6=20–39, and 7=40 or more. If any response provided to any of the three questions was greater than 1 the variable was coded as 1. If any of the responses to the three items equaled

1 or 0 then the variable was coded as 0. The recent substance use variable used for the analysis came from the end of 8<sup>th</sup> grade since reported substance use levels were low until 8<sup>th</sup> grade. Recent substance use was recoded as 0/1 given that 81% of the responses were in the “0 times” categories.

### Statistical Analyses

Data preparation involved collapsing the multicultural (MC) and the acculturation enhanced (AE) versions of the *kiR* program. The two versions of the 5<sup>th</sup> grade curriculum differ by 1 of the 10 lessons in which the MC version focuses on individual responsibility and decision making while the AE version presents bilingualism, multiculturalism, and cultural diversity as advantages. The other nine lessons of the intervention are the same. Analyses comparing the MC and AE interventions showed no significant differences between them in relation to substance use (Elek, Wagstaff, Hecht, 2010). As a result, these two versions were collapsed for the purpose of performing analyses in this study.

The study first used latent class analysis (LCA) to establish a model of resistance skill profiles (research question one) that best fit the structure of the data and that represented meaningful patterns of skill profiles (Collins & Lanza, 2010). Clustering of schools was taken into account and a pseudo-likelihood algorithm used to estimate parameters. The LCA identified resistance skill profiles based on preadolescent responses to seven indicators: use of four resistance skill strategies (refuse, explain, avoid, leave) and three items measuring confidence to refuse drug offers for cigarettes, alcohol, and marijuana. In the LCA, two criteria were used to evaluate the overall pattern of item response probabilities: homogeneity and latent class separation. Strong homogeneity was indicated by values close to 0 or 1.

Fit statistics were also examined including the likelihood-ratio test statistic  $G^2$ , degrees of freedom, and three information criteria: the Akaike Information Criterion (AIC), the consistent AIC (CAIC), the Bayesian information criterion (BIC). Lower AIC, CAIC, and BIC provide information about the best fitting model. Skill profile models with two, three, four and five latent class solutions were compared to establish the number of underlying subgroups that provide the optimal balance of fit and parsimony. Model identification was addressed by using 1000 random sets of starting values. This permits an indication of confidence that the pseudo-likelihood solution was identified. Latent class models were estimated using SAS PROC LCA Version 1.2.7 (Lanza, Dziak, Huang, Xu, & Collins 2011). For the latent class analysis, 6.9% for the resistance skill indicators were missing; data were assumed to be missing at random and accounted for using a full-information maximum likelihood procedure (Graham, Cumsille, & Elek-Fisk, 2003).

For the identification of resistance skill profiles, the four-class solution was compared to the five-class solution. Although the five-class solution was statistically supported, we felt that the additional information it provided was not critical for this study. Specifically, the 5-class solution separated the High Competent group into two smaller subgroups. One of these subgroups showed strong homogeneity on all four strategies similar to the 4-class solution while the other subgroup showed strong homogeneity only for LEAVE and AVOID resistance items (LEAVE=.90, AVOID=.86; REFUSE =.45 and EXPLAIN = .55). The 4-class solution showed strong homogeneity on all four resistance skill items as characteristic

of the highly skilled (LEAVE=.95, AVOID=.91, EXPLAIN=.85 and REFUSE=.80). Considering the goal of having a parsimonious model and that the 5-class solution did not add additional insight into latent subgroups the 4-class solution was retained.

Following the LCA, skill profiles established at the beginning of 5<sup>th</sup> grade (wave 1) were used to predict grade 8 recent substance use (hypothesis 1). While 1984 student responses were available for the 5<sup>th</sup> grade sample (wave 1), only 797 student responses were available for the 8<sup>th</sup> grade sample on the recent substance use question. Attrition analysis was performed to evaluate whether the 797 students retained were representative of the baseline 5<sup>th</sup> grade sample. For the analysis of latent skill profiles predicting substance use, a multiple pseudo-class draws technique was used (Lanza, Xianming, & Bray 2011). *Baseline (beginning of 5<sup>th</sup> grade) substance use was included as a covariate in the analysis to control for this variable.*

Finally, latent transition analysis (using SAS PROC LTA version 1.2.7) was performed to evaluate differential treatment effects of the *kiR* prevention program on skill acquisition over time. Schools were coded as either treatment or control and were entered as a grouping variable in the LTA. Measurement invariance was imposed across time to ensure stable interpretation of the latent skill profile transition probabilities. The transition probabilities, which reflect the probability of transitioning from a latent status at time  $t$  to another latent status at time  $t + 1$ , were constrained to be equal across the two treatment group conditions to test hypothesis two: namely, whether preadolescents receiving *kiR* who were not highly competent prior to the intervention would be more likely to transition into the highly competent profile by the end of 6<sup>th</sup> grade after receiving the intervention than students in control schools. Transition probabilities and chi square difference tests of the change in log likelihood between control and treatment transition probabilities for each of the skill profiles are reported to answer hypothesis two.

## Results

### Preadolescent Resistance Skill Profiles

To answer whether meaningful resistance skill profiles were identified latent class analysis was conducted and the four-class model was retained (see Table 1 for comparative fit indices and Table 2 for model parameters). Slightly greater than half of preadolescents (53%) demonstrated high likelihood of being familiar with all four resistance skill strategies (refuse, explain, avoid, leave) and demonstrated high confidence to apply these skills in real-world settings. This skill profile was labeled as *Highly Competent* in accordance with communication competence theory. The preadolescent group who reported a high familiarity with the four prototypical resistance skills but had low confidence to apply these skills were labeled as *Skillful* (15% prevalence). The group reporting high confidence but low knowledge of skills was labeled *Confident* (18% prevalence). Finally, 15% comprised the subgroup of students whose knowledge of skills and their confidence to refuse drug offers were low. This subgroup was labeled *Low Competence*.



### Skill Profiles Predicting Future Substance Use

Membership in the Highly Competent skill profile was predicted to correlate with lower rates of recent substance use (H1). An overall test of the relationship between skill profiles and future (8<sup>th</sup> grade) recent substance use supported skill profiles significantly predicting recent substance use (change in twice the loglikelihood = 17.59,  $df=3$ ,  $p = .0005$ ). The probability of recent substance use among the Highly Competent group was significantly lower than the overall population's probability of recent substance use (.40 compared to .47). The three less competent skill profiles showed higher rates of recent substance use than the population mean substance use (.55, .58, and .51 compared to .47).

### Comparing 5<sup>th</sup> grade students who remained in the study through 8<sup>th</sup> grade and 5<sup>th</sup> grade students who dropped out

The sample of 8<sup>th</sup> grade students retained in the study was smaller than the sample at baseline in 5<sup>th</sup> grade (797 students compared to 1984). Accordingly, an attrition analysis was performed. Of the 797 students in 8<sup>th</sup> grade reporting on recent substance use, 365 (46%) were in control schools and 432 (54%) were in treatment schools. Chi Square tests revealed no significant differences ( $p>.05$ ) between 5<sup>th</sup> graders who remained in the study through 8<sup>th</sup> grade and 5<sup>th</sup> graders who dropped out, on variables associated with drop out including recent substance use ( $p = 0.512$ ), receiving free lunch – a proxy for low socioeconomic status ( $p = 0.078$ ), experiencing acculturation stress ( $p = 0.655$ ), educational aspirations ( $p = 0.344$ ), knowledge of resistance skills ( $p = 0.329$ ), born in the U.S. ( $p = 0.169$ ), gender ( $p = 0.076$ ) mother's education ( $p=.39$ ), and father's education ( $p=.91$ ). Significant differences between groups were reported only for age, with the 797 students retained being slightly older (6 months) on average ( $p = 0.038$ ) and students retained having slightly higher grades ( $p = 0.001$ ).

### Examining Program Effects on Skill Transition Probabilities

To answer H2, we examined (a) changes in prevalence of Highly Competent skill profile between time 1 and 2, and (b) transition probabilities of the Highly Competent skill profile at time 2 comparing treatment and control schools (Table 3). Prevalence of the Highly Competent skill profile increased to a greater degree in treatment than in control schools between time 1 and 2. There was a 9% increase in the Highly Competent skill profile among treatment schools while only a 2% increase among control schools (Table 3 first panel). There is no statistical test however, to examine whether this change in prevalence of profiles is significant.

Transition probabilities are reported next. Here we report the probability of moving into the Highly Competent skill profile from each of the initial skill profiles (Table 3, last column, panel 2 for treatment and panel 3 for control) comparing treatment and control schools. The transition probability for moving from conditional Low Competence at the beginning of 5<sup>th</sup> grade to the probability of transitioning into the Highly Competent profile at the end of 6<sup>th</sup> grade was .31 for control students and .33 for treatment students. The chi square difference test for the change in log likelihood between control and treatment transition probabilities was  $-9140.18$ ,  $df=1$ ,  $p = .77$ . The transition probability for initial membership in the Confident profile transitioning into the Highly Competent profile at time 2 was .51 for



control students and .57 for treatment students. The chi square difference test of this change in log likelihood was  $-9140.18$ ,  $df=1$ ,  $p = .34$ . The transition probability for initial membership in the Skillful profile transitioning into the Highly Competent profile was .37 for control and .46 for treatment students. The chi square difference test of the change in log likelihood between control and treatment transition probabilities was  $-9139.82$ ,  $df=1$ ,  $p = .20$ . Finally, the transition probability for remaining in the Highly Competent profile at the end of 6<sup>th</sup> grade was .66 for control and .72 for treatment students. The chi square difference test of the change in log likelihood was  $-9138.99$ ,  $df=1$ ,  $p = .80$ . For H2 then, while an increase in the prevalence of the Highly Competent skill profile was observed to a greater degree in treatment than control schools, the difference in transition probabilities between treatment and control schools was not significant. Hypothesis two therefore, was not supported.

## Discussion

To our knowledge, this study is the first to define preadolescents' resistance skills through the use of latent class analysis. By using a latent class approach we were able to characterize the different stages of learning resistance skills and refusal confidence. The study extends the resistance and school-base substance abuse prevention literature by modeling simultaneously preadolescents' familiarity with several resistance strategies and their drug-specific refusal confidence. Possessing the seven characteristics simultaneously as represented in the Highly Competent skill profile was correlated with reduced future (8<sup>th</sup> grade) substance use in this study sample. These findings are consistent with the literature suggesting that the ability to generate multiple responses (also referred to as divergent responding) may be more important than the ability to respond consistently with one skill in assertively prosocial ways (Wright et al. 2004). Furthermore, the findings suggest that teaching skilled social interactions as early as preadolescence can bring beneficial effects i.e., reduced future substance use.

Contrary to previous studies are the findings regarding the use of specific resistance strategies. Prior studies showed that simple refusal and explaining were effective resistance strategies for adolescents (Sallis, Elder, & Wildey 1990; Turner, Burciaga, Sussman, & Klein-Selski 1993). In this study, latent class analysis indicates that LEAVE and AVOID strategies appear to drive the observed effects in defining skill profiles more so than REFUSE and EXPLAIN in this sample. These differences in the utility of specific skill strategies could be due to a number of factors. Differences could be related to this study sample being predominantly Hispanic and from a suburban/urban population of a particular region of the U.S. reflecting cultural differences. The effectiveness and cultural appropriateness of different resistance strategies varying depending on culture have been observed in prior literature (Kulis, Marsiglia, Castillo, Becerra, & Nieri 2008). Differences in skill strategies between this study and prior ones could also be due to this study sample being preadolescent. Preadolescents may simply find LEAVE and AVOID strategies easier to implement than EXPLAIN or REFUSE in the face of important others. Alternatively differences in skill strategies used by this study sample may be related to other as of yet unknown factors. What is clear from the study sample is that familiarity with all four

prototypical resistance strategies taught by *kiR* and drug specific refusal confidence is necessary for these skills to function protectively.

This study takes a person-centered approach to examine how effectively the prevention program *kiR* teaches resistance skills and instills refusal confidence. Latent transition analysis showed that students' skills and refusal confidence increased over time as expected, and that membership into the Highly Competent group increased to a larger degree in treatment than control schools. Trends were in the expected direction, which is important, however differences between treatment and control schools were not statistically significant in this sample. Current analyses as well as previous outcomes of the 5<sup>th</sup> grade *kiR* intervention (Hecht et al. 2008) suggest that a focus on teaching resistance skills and refusal confidence (i.e., the social influence strategy) may not be powerful enough to drive effects for this age group (preadolescents). Social influence prevention interventions are one of the predominant strategies and frequently demonstrate significant effects on drug use among adolescents (Hansen, Dusenbury, Bishop, & Derzon 2007). Perhaps a more developmentally appropriate strategy would be guided by socio-emotional learning (SEL) theory (Elias et al. 1997) in which communication skills including resistance would be conceptualized as one of five main areas to be addressed. This more integrative approach may teach the necessary set of skills to drive substance use effects. Unfortunately, the dataset does not include measures of SEL components and thus this hypothesis cannot be tested without further research. Other studies of SEL interventions however, suggest that if similar analyses were applied this hypothesis would be supported.

Noteworthy, is the high prevalence (53%) of preadolescent students in the Highly Competent skill profile even before receiving the school-based intervention. These students could already be learning resistance skills at home from family members, through the media or from exposure to other elementary prevention programs. Based on the descriptive characteristics of the Highly Competent skill profile, there is a slightly higher prevalence of girls (55%) and a higher prevalence of Hispanic preadolescents (76%). These factors possibly play a role in earlier familiarity with and learning about drug offer resistance skills and refusal confidence.

## Limitations

Several limitations should be noted. First, a great deal of attrition occurred in our sample between waves 1 and 6 (5<sup>th</sup> to 8<sup>th</sup> grade) and we found some significant differences between those who remained in the study through 8<sup>th</sup> grade on age and grades. Those who remained in the study were slightly older and on average had higher grades. However, attrition analysis comparing the 5<sup>th</sup> grade sample of those retained and those who dropped out showed importantly, that the two samples did not differ on all variables available to us that were associated with school drop out including substance use, educational aspirations, free lunch (a proxy for poverty), acculturation stress, born in the U.S., and mother's and father's education (indicators of SES). As a result, we cannot rule out the effects of attrition on analyses performed in this study even though the groups are similar on most relevant variables. A second limitation of these analyses includes the use of a dichotomized substance use outcome. Although examining substance abuse levels is desirable especially

in older samples, given the low level of use in the preadolescent sample (81% did not report use at baseline), it was unrealistic to focus on problematic levels of use. Rather the dichotomized measure of substance use matches appropriately the goal of distinguishing users from non-users. Finally, there is a limitation in terms of generalizability. The predominantly Hispanic sample may not generalize to other ethnic and racial groups.

## Conclusion

In conclusion, authors addressed the three goals in this study and found: (1) *meaningful subgroups of preadolescents were identified by modeling jointly their knowledge of multiple resistance skills and their drug specific refusal confidence*, (2) *a positive relationship between Highly Competent skill profile and future substance use was shown as theory predicted*, and (3) *differential treatment effects of the kiR program were examined using a novel latent moderator approach with trends observed in the expected direction but the degree of magnitude was weak*. The first goal set out to address a gap in the literature about what constitutes effective resistance among preadolescents by taking a novel person-centered approach and examining changes in qualitatively different states over time rather than mean level changes in single measures. The second goal involved confirming that possessing resistance skills as early as preadolescence can have beneficial effects i.e., be associated with reduced future substance use. The third goal in which authors examine differential program effects by subgroup is inherently a question of moderation, where in this case the moderator was latent resistance skills class. These analyses are suggestive of effects because although findings were in the predicted direction, analyses approached but did not achieve statistical significance. A study of differential treatment effects is critical for maximizing the impact we can expect to achieve through school-based substance abuse prevention programs. A person-centered approach, which models multiple behaviors simultaneously, is better suited to capturing the complexities inherent in rapid developmental changes and in learning resistance skills as they relate to effectively preventing substance use initiation. A description of preadolescent skill profiles provides information about the genesis of these resistance i.e., communication skills. The findings can be used in the design of early adolescent prevention interventions as well as the development of more sophisticated social theories of substance use.

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**Table 1**

Goodness of Fit Indices Comparing 2,3,4 and 5 Latent Skill Profile Models

Classes	$G^2$	df	AIC	BIC	CAIC	%seeds
2	2380.55	112	2410.55	2493.36	2508.36	40
3	1035.43	104	1081.43	1208.41	1231.41	45
4	282.32	96	344.32	515.46	546.98	95
5	157.08	88	235.08	450.39	489.39	95

*Note:* Solution % is the percentage of times solution was selected out of 1000 random sets of starting values.

**Table 2**

Parameter Estimates for the Four-Class LCA Model of Preadolescent Resistance Skills at Baseline (Beginning of 5<sup>th</sup> Grade)

	<i>Latent Classes</i>			
	<b>Low Competence</b>	<b>Confident</b>	<b>Skillful</b>	<b>Highly Competent</b>
	<i>Latent Class Prevalences</i>			
	15.0%	17.7%	15.3%	52.7%
<i>(observed variable)</i>	<i>Item Response Probabilities</i>			
Refusal Confidence (Marijuana)	.07	<b>.94</b>	.11	<b>.96</b>
Refusal Confidence (Alcohol)	.00	<b>.98</b>	.05	<b>.99</b>
Refusal Confidence (Cigarettes)	.02	<b>.98</b>	.05	<b>.99</b>
Resist Skill (Refuse)	.04	.13	<b>.69</b>	<b>.80</b>
Resist Skill (Explain)	.06	.08	<b>.82</b>	<b>.85</b>
Resist Skill (Avoid)	.03	.08	<b>.88</b>	<b>.91</b>
Resist Skill (Leave)	.09	.19	<b>.90</b>	<b>.95</b>
	<i>N</i> = 1984			

*Note.* Item response probabilities greater than .50 appear in bold to facilitate interpretation.



**Table 3**

Prevalence of Resistance Skill Profiles for Treatment and Control Groups at Time 1 (beginning of 5<sup>th</sup> grade) and Time 2 (end of 6<sup>th</sup> grade)

Latent Profiles	Low Competence	Confident	Skillfull	Highly Competent
<i>Skill Profile Prevalences</i>				
<i>5<sup>th</sup> Grade Control</i>				
Time 1	.1475	.1785	.1571	<b>.5170</b>
Time 2	.1428	.2152	.1045	<b>.5374</b>
<i>5<sup>th</sup> Grade keepin' it REAL</i>				
Time 1	.1540	.1944	.1428	<b>.5087</b>
Time 2	.1113	.1862	.1072	<b>.5954</b>
<i>Transition probabilities</i>				
<i>Control</i>	Time2⇒			
Time 1 ↓				
Low Competence	.2231	.3216	.1421	<b>.3131</b>
Confident	.1014	.2875	.0974	<b>.5137</b>
Skillfull	.2575	.1893	.1819	<b>.3713</b>
Highly Competent	.0994	.1678	.0728	<b>.6600</b>
N = 798				
<i>Transition probabilities</i>				
<i>keepin' it REAL</i>	Time2⇒			
Time 1 ↓				
Low Competence	.2347	.2763	.1632	<b>.3258</b>
Confident	.1227	.1851	.1198	<b>.5724</b>
Skillfull	.1398	.2267	.1721	<b>.4615</b>
Highly Competent	.0615	.1479	.0672	<b>.7234</b>
N=1186				

*Note.* Time 1 = beginning of 5<sup>th</sup> grade (prior to receiving intervention) Time 2 = end of 6<sup>th</sup> grade (after receiving *keepin' it REAL* intervention). The top panel shows changes in prevalence of skill profiles over time. Bottom two panels show the transition probability conditional on initial skill profile membership, of moving into the same or different skill profile at Time 2. Transition probabilities for the likelihood of membership into the Highly Competent group at Time 2 are highlighted since membership into this skill profile over time is of theoretical interest.