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Planting the seed for marijuana use: Changes in exposure to medical marijuana advertising and subsequent adolescent marijuana use, cognitions, and consequences over seven years

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Abstract

Background: Marijuana use during adolescence is associated with neurocognitive deficits and poorer functioning across several domains. It is likely that more states will pass both medical and recreational marijuana legalization laws in the coming elections; therefore, we must begin to look more closely at the longitudinal effects of medical marijuana (MM) advertising on marijuana use among adolescents so that we can better understand effects that this advertising may have on their subsequent marijuana use and related outcomes.

Methods: We followed two cohorts of 7th and 8th graders (mean age 13) recruited from school districts in Southern California from 2010 until 2017 (mean age 19) to examine effects of MM advertising on adolescents' marijuana use, cognitions, and consequences over seven years. Latent growth models examined trajectories of self-reported exposure to medical marijuana ads in the past three months and trajectories of use, cognitions, and consequences.

Results: Higher average exposure to MM advertising was associated with higher average use, intentions to use, positive expectancies, and negative consequences. Similarly, higher rates of change in MM advertising exposure were associated with higher rates of change in use, intentions, expectancies, and consequences over seven years.

Conclusions: Results suggest that exposure to MM advertising may not only play a significant role in shaping attitudes about marijuana, but may also contribute to increased marijuana use and related negative consequences throughout adolescence. This highlights the importance of considering regulations for marijuana advertising, similar to regulations in place for the promotion of tobacco and alcohol in the U.S.

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Contributors
EJD conceptualized the idea and wrote the manuscript. AR conducted all analysis for the paper. JT, EP and RS all contributed substantially to the writing of the manuscript, discussing ideas during team meetings and editing drafts during the writing process. All authors have approved the final article.

Conflicts of interest
No conflict declared.

Keywords

Adolescents; Marijuana use; Advertising; Longitudinal; Marijuana legislation

1. Introduction

California became the first state to pass a comprehensive medical marijuana law (MML) in 1996, and as of 2017, 29 states in the United States and Washington, DC have legalized marijuana for medical purposes. Recent high-quality epidemiological studies have examined changes in overall marijuana use rates among adolescents before and after the passage of medical marijuana legalization laws in an attempt to examine whether marijuana use rates have increased, decreased, or stayed the same following legalization. Due to heterogeneity across studies (e.g., national versus single state) and nuances in policy (Pacula et al., 2013), there is no definitive conclusion (Borodovsky et al., 2017; Choo et al., 2014; Hall and Lynskey, 2016). What research has shown, however, is a strong trend towards more positive views of marijuana among teens over the past 14 years (Cavazos-Rehg et al., 2015; Fleming et al., 2016). For example, more than 50% of 10th and 12th graders across the United States now endorse the belief that *smoking* marijuana regularly does not carry great risk (note that this question does not address other ways of using marijuana, such as vaping or edibles) (Miech et al., 2016). Research has also shown that more positive views about marijuana among teens are associated with increased marijuana use rates in this age group (Merianos et al., 2017).

Many of these positive beliefs about marijuana may come from exposure to marijuana-positive messages on social media and through advertising (e.g., billboards, online), which has increased as MMLs have passed (D'Amico et al., 2017). For example, a 2014 social media study showed that among people ages 17–19 years, the popular pro-marijuana Twitter handle @stillblazingtho was in the top 10% of all Twitter handles followed (Cavazos-Rehg et al., 2014). One recent cross-sectional study asked 742 young adult marijuana users about the number of times they had seen or heard information about advertisements/promotions, coupons or discounts for a dispensary or for buying marijuana in the past 30 days (Krauss et al., 2017). Over half of those surveyed were exposed to marijuana advertising in the past month: 28% passively observed advertisements; 26% actively sought advertisements. Further, most respondents (77%) reported digital media (i.e., social media, online, text/emails) sources for advertisements, and about half observed advertisements via print, television, radio, and on dispensary storefronts. Cross-sectional results also indicated that young adults seeking advertisements (e.g., to find a dispensary to buy marijuana) were more likely to report the medical use of marijuana and to use marijuana several times per day compared to those who did not actively seek out ads (Krauss et al., 2017). Other work in this area has examined health claims made about marijuana use on Weedmaps, and demographics of Weedmaps' followers on social media sites (Bierut et al., 2017). Results indicated that 61% of retailers in Colorado and 44% of retailers in Washington made health claims about the benefits of using marijuana, including reduced anxiety and treatment for depression, insomnia, and pain/inflammation. The study also showed that most followers of

Weedmaps on Twitter and Instagram were male (60%) and age 20–29 (70%); however, about 1 in 6 followers of Weedmaps on Twitter were under age 20.

In the only longitudinal study to date to assess exposure to medical marijuana (MM) advertising among adolescents (n = 8000), D'Amico and colleagues (D'Amico et al., 2015b) found that middle school students' exposure to MM advertising was related to both increased intentions to use marijuana and marijuana use one year later. This work has been used to inform public policy surrounding advertising for this drug, and is cited in an act to amend Section 26152 of the Business and Professions Code relating to cannabis in California (Bill SB-162 Cannabis: Marketing), and has also been used to inform a recent cannabis advertising ordinance for the city of Los Angeles (CPC-2017–4546-CA), which both seek to regulate such advertising.

Marijuana use during adolescence is associated with numerous issues, including poorer mental health and academic performance, increased delinquency, higher likelihood of abuse or dependence in adulthood, and neurocognitive deficits (D'Amico et al., 2005, 2016b; Lisdahl and Price, 2012). It is likely that more states will pass both medical and recreational marijuana legalization laws in coming elections (D'Amico et al., 2017); therefore, we must begin to look more closely at the longitudinal effects of MM advertising on marijuana use among adolescents so that we can better understand the extent to which youth are exposed to advertising and the effects that this advertising may have on their subsequent marijuana use and related outcomes. Thus, the current study is highly significant as it is the first to directly examine the conjoint longitudinal change in MM advertising and adolescents' 1) marijuana use, 2) future intentions to use marijuana, 3) positive expectancies about marijuana use, and 4) negative consequences from marijuana use. These associations are examined over a seven-year period using parallel process growth curve models. Furthermore, this analysis will be informative for other states that may want to examine the effects of legislation on outcomes and must do so in the context of a fast-changing marketing landscape.

2. Method

2.1. Participants and procedures

This study focuses on two cohorts of youth who were in 6th and 7th grade (age 11–12) in 2008 and were followed until 2017 (age 19). Participants were initially recruited from 16 middle schools across three school districts in Southern California (D'Amico et al., 2012). Responses are protected by a Certificate of Confidentiality from the National Institutes of Health, and procedures were approved by schools and the institution's internal review board.

Schools were selected to obtain a diverse sample and have similar alcohol and other drug use rates at baseline. Schools were matched to their nearest neighbor school based on the squared Euclidean distance measure, estimated using publicly available information on ethnic diversity, approximate size, and standardized test scores (D'Amico et al., 2012). Detailed procedures are reported in the original prevention trial (D'Amico et al., 2012) and other trajectory work (D'Amico et al., 2016b; Dunbar et al., 2018). Briefly, adolescents completed waves 1 through 5 in middle school during PE class (wave 1: fall 2008, wave 2: spring 2009, wave 3: fall 2009, wave 4: spring 2010, and wave 5: spring 2011); follow-up rates ranged from 74% to 90%, excluding new youth that could have come in at a subsequent wave. Adolescents transitioned from 16 middle schools to over 200 high schools and were re-contacted and re-consented to complete annual web-based surveys. At Wave 6, 61% of teens participated in the follow-up survey. We retained 80% of the sample from wave 6–7, 91% of the sample from wave 7–8, and 89% of the sample from wave 8–9. If a participant did not complete a wave of data collection, they were still eligible to complete all subsequent waves. That is, they did not "dropout" of the study once they missed a survey wave; rather we fielded the full sample at every wave so that all participants had an opportunity to participate in each survey. Failure to complete a certain wave was not significantly associated with demographics or risk behaviors, such as drinking and marijuana use (D'Amico et al., 2016b; Dunbar et al., 2018).

The current study focuses on wave 4 (2010) through 9 (2017). We began to collect data on exposure to MM advertising at wave 4 because a proposition to legalize marijuana was being discussed in the California Senate in January 2010 and was added to the California ballot in November 2010 (California Proposition 19, also known as the Regulate, Control, and Tax Cannabis Act). The mean age of the sample at wave 4 was 13. Youth are ethnically and racially diverse (e.g., 53% Hispanic; 18% Asian), and rates of marijuana use across waves are comparable to national samples (Table 1). Specifically, in Monitoring the Future, 16.4% of eighth graders reported lifetime marijuana use in 2011 (Johnston et al., 2012) compared with 15.8% in our 8th grade sample. The trajectory sample comes from a sample of youth who were in 6th or 7th grade at wave 1. As noted above, we use waves 4 through 9, and adolescents (N = 4946) were in 7th or 8th grade at wave 4.

2.2. Measures

2.2.1. Covariates—Covariates included age, gender, race/ethnicity, and intervention status. Race/ethnicity categories included non-Hispanic White, Hispanic, Asian, Black, and Other. For all analyses, these were dummy coded with non-Hispanic White as the reference group. Of note, there were no intervention effects on marijuana use, and initial intervention effects on alcohol use were no longer significant after wave 3 of the study (when we began collecting data on exposure to medical marijuana advertising); nonetheless, we controlled for intervention participation in present analyses.

2.2.2. Intentions and expectancies—Intentions for marijuana use were measured using one item asking adolescents, "Do you think you will use any marijuana in the next six months?" (response options ranged from 1 = *definitely no* to 4 = *definitely yes)* (D'Amico et al., 2015b). *Positive expectancies* comprised six items (e.g., using marijuana relaxes you, helps you get away from your problems) rated from 1 = *strongly disagree* to 4 = *strongly agree* (Pedersen et al., 2014). This scale has been used extensively with adolescents and is reliable (α = 0.88) and valid.

2.2.3. Marijuana use and consequences—Marijuana use and consequences were assessed using well-established measures with adolescents (D'Amico et al., 2016a). Youth reported number of days they used marijuana in the past month (1 = *0 days* to 8 = *20–30 days),* which was dichotomized (1 = *any use* versus 0 = *no use)* due to skewness at younger ages. They also rated how often they experienced each of four negative consequences due to marijuana use in the past year (e.g., had trouble concentrating on what you were doing, missed school, did something you later felt sorry for, got into trouble at school or home; 1 = *never* to 7 = *20 or more times),* also dichotomized (1 = *any consequences* versus 0 = *no consequences)* due to skewness at younger ages.

2.2.4. Exposure to medical marijuana advertising—Adolescents were asked: "In the past three months, how often have you seen advertisements for medical marijuana on billboards, in magazines, or somewhere else?" (response options ranged from 1 = *not at all* to 7 = *every day)* (D'Amico et al., 2015b). Exposure to MM advertising was highly skewed at younger ages and so we dichotomized this as 1 = *any exposure* versus 0 = *no exposure.* In 2010, 25% of adolescents reported being exposed to at least one MM ad. By 2017, this nearly tripled whereby 70% of adolescents reported being exposed to at least one MM ad. Of note, the Adult Use of Marijuana Act, which legalized the sale and distribution of recreational marijuana in California, passed in November 2016 but did not go into effect until January 2018. The survey data we collected between 2010 and 2017 therefore asked participants if they saw *medical marijuana* ads.

3. Statistical analysis

We used parallel process latent growth modeling (LGM) (Bollen and Curran, 2006) in a structural equation modeling framework to assess multivariate change over time. The majority of youth completed two or more survey waves (79.4%). We examined the association between dual trajectories of MM advertising exposure over-time with 1) trajectories for marijuana use, 2) intentions to use marijuana, 3) positive marijuana expectancies, and 4) marijuana negative consequences. The conceptual model is presented in Fig. 1. This framework uses observed scores to estimate latent growth factors, which in turn are used to model an individual's scores at each time point. In LGM, two growth factors are estimated: one latent factor for the intercept (i.e., level of the variable at the time of the intercept), and another latent growth factor for the slope, or rate of change.

A parallel process LGM is a relatively straightforward approach that simultaneously models multiple growth trajectories. A key feature is the ability to test associations among growth factors such that the growth factors in one process can be related to the growth factors of another. Thus, this model provides a powerful method for investigating change across time in multiple variables. This method was chosen over alternative techniques such as cross-lagged (CL) models as many of the limitations of the CL model arise from an emphasis on inter-individual differences and not on intra-individual change. Therefore, the CL model, while useful, must be considered with the caveat that it cannot easily incorporate a theory of intra-individual change, and that crosslagged effects are not specific to the type of individual-level change observed over time (Selig and Little, 2012). Additionally, the CL model is not ideal when the objective is to model the functional form of growth (e.g., linear or quadratic) or evaluate intra-individual change. An important advantage of LGMs is that the model allows one to examine inter-individual differences in intra-individual growth in longitudinal studies, with inter-individual differences being captured by the variances of the growth factors. Moreover, this model can assess the functional form over-time.

All models were estimated in Mplus v8 (Muthén and Muthén, 1998–2017) with the weighted least squares with mean and variance adjusted estimator (WLSMV), which can handle missing data and provide consistent and unbiased estimates. This estimation method provides model fit indices, which guide in the evaluation of overall model fit. For each model, we report on a combination of model fit indices including both relative and absolute indices. While χ^2 is traditionally reported, in large samples, it can be overpowered and detect even small deviations between the observed and model-implied covariance matrix (Bentler and Bonnet, 1980). Thus, we also report Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), and WRMR (Weighted Root Mean Square Residual) to provide a complete picture of model fit.

In LGM and its parallel process extension, the model intercept represents the predicted value of the outcome when the predictor is equal to zero. Because assessment waves were not evenly spaced across years (2010, 2011, 2013, 2014, 2015, 2016), we set this to zero at 3 years after the first assessment. That is, time was centered at the middle of the overall assessment waves (D'Amico et al., 2016b). Specifically, between waves 4 and 9, there were 6 total years, treated as follows in the growth models: wave 4 = − 3 years, wave 5 = − 2 years, wave 6=0 year, wave 7 = 1 year, wave 8 = 2 years, wave 9 = 3 years. Thus, for each LGM, the intercept can be interpreted as the average MM advertising exposure, marijuana use, intentions to use, positive expectancies and consequences. The slope represents the rate of change in the aforementioned outcomes. Covariates in each model included age, gender, race/ethnicity, and intervention status. This analytic framework allowed us to test whether changes in MM advertising exposure and marijuana use, intentions to use, positive expectancies, and consequences were associated over time.

4. Results

Model fit across all four parallel process latent growth models was good to excellent (Table 2). As a note, although we accounted for covariates in all models, they were not the focus of this research and are therefore not discussed. Across all models, average MM advertising exposure (intercept) was not significantly associated with rate of change in exposure to MM advertising (slope) ($r = 0.03$, $p = .48$).

4.1. Intercepts

Average MM advertising exposure co-varied significantly with average marijuana use ($r = 0.50$, $p < .01$), average intentions to use marijuana ($r = 0.45$, $p < .01$), average positive marijuana expectancies ($r = 0.41$, $p < .01$), and average marijuana negative consequences ($r=0.53$, $p < .01$). Overall, higher average exposure to MM advertising was associated with higher average use, intentions, positive expectancies, and negative consequences.

4.2. Slopes

We also examined associations between cross-process growth factor slopes. The slope for MM advertising exposure was significantly and positively correlated with slopes for marijuana use ($r = 0.50$, $p < .01$), intentions to use marijuana ($r = 0.39$, $p < .01$), positive marijuana expectancies ($r = 0.33$, $p < .01$), and marijuana negative consequences ($r = 0.49$, p

$< .01$). Results indicate that higher rates of change in MM advertising exposure were associated with higher rates of change for all four constructs: use, intentions, expectancies, and consequences. All associations were statistically significant; however, this trend was most pronounced for exposure to MM advertising and marijuana use.

4.3. Intercepts with slopes

Within each latent growth process, covariation between intercept and slope was evaluated. Although cross-process covariances were estimated (i.e., intercept in one process and slope in the other), we limit our discussion to within-process growth factors associations as these are of primary interest. Within each construct, with the exception of consequences, intercept and slope co-varied significantly such that the average for the construct (e.g., use, intentions, and expectancies) was positively associated with rate of change (use: $r = 0.09$; intentions: $r = 0.30$; expectancies: $r = 0.06$). That is, for youth with greater marijuana use, intentions to use, and positive expectancies, there was a greater increase over time than for those who reported lower marijuana use, intentions to use, and positive expectancies.

4.4. Growth factor variability

There was significant variability in intercept and slope growth factors across all outcomes (Table 2). Across waves 4–9, there was significant variability in each of the trajectories. Fig. 2 provides data for a random sample of 1000 individuals across MM advertising exposure and use. The variability around intercepts reflects that among individuals, there were varying degrees of average exposure to MM advertising and marijuana use. Note that plots also look similar for intentions to use marijuana, positive marijuana expectancies, and marijuana negative consequences. Moreover, for slopes, in addition to the rate of change for each outcome being significant indicating a nonzero slope, there was also significant variability around the slopes, which highlights that individuals had differential rates of change on each of the outcome measures.

5. Discussion

This is the first longitudinal study to examine effects of exposure to MM advertising across seven years on adolescents' marijuana use, intentions to use marijuana, positive expectancies about marijuana, and negative consequences from using marijuana. Adolescents that reported higher than average exposure to MM ads also tended to report greater marijuana use, stronger intentions to use marijuana in the future, stronger positive expectancies about marijuana use, and more negative consequences from use. In addition, adolescents who reported increased exposure to MM ads over the seven-year period also reported increases in their marijuana use, intentions to use, positive expectancies, and negative consequences. This association was particularly strong for exposure to MM ads and marijuana use. Overall, results suggest that exposure to MM advertising may not only play a significant role in shaping attitudes about marijuana, but may also contribute to increased marijuana use and related negative consequences throughout adolescence. The association between exposure to MM ads and past year consequences likely occurred because youth who were exposed to MM ads were then more likely to use marijuana more heavily and therefore experience more negative consequences. Future work should begin to explore mechanisms for these associations.

Overall, our findings mirror those from the alcohol and tobacco fields, which have shown that increased exposure to advertising for these products is associated with increased use among adolescents (Anderson et al., 2009; Giovenco et al., 2016). This highlights the importance of beginning to think about regulations for marijuana advertising (D'Amico et al., 2015b), similar to regulations that are in place for tobacco and alcohol (Pacula et al., 2014).

Findings must be understood in the context of the changing legal landscape of marijuana in the United States. For example, it is important to note that marijuana use and consequences may be viewed differently than alcohol use and consequences, as teens tend to associate marijuana use with fewer negative consequences than alcohol use (D'Amico et al., 2015a). For example, nearly one in five teens report driving under the influence of marijuana, one-third of whom believed their driving ability was improved after marijuana use (Loehrke, 2013), and younger drivers are especially likely to believe that driving under the influence of marijuana is socially acceptable and safe (Arnold and Tefft, 2016). Given the health claims that are made for marijuana use (Bierut et al., 2017), and the effects of advertising we found over this seven-year period, it is crucial to address perceptions about marijuana effects and the potential consequences from use as part of our prevention and intervention efforts with adolescents. One recent study found, for example, that when adults communicated with youth about information in anti-marijuana ads using moderate, nondirective language, this was more effective in decreasing adolescents' intentions to use marijuana than when adults used more extreme, directive language (Crano et al., 2017). Teachers, parents, and community leaders need to be ready to provide teens with up-to-date information on both medical and recreational marijuana to help youth better understand that although there may be some benefits medically for adults (National Academies of Sciences, Engineering and Medicine, 2017), marijuana use during adolescence can affect functioning during the teen years (D'Amico et al., 2016b) as the brain is still developing (Camchong et al., 2017), and is also associated with impairment in young adulthood and adulthood (Volkow et al., 2014).

Findings from this study are an important first step in understanding the long-term effects of MM advertising; however, there are limitations to our work. As the data indicated, there is a great degree of variability in exposure to MM ads, use, cognitions, and consequences, which is likely due to the fact that other factors are associated with these constructs, such as parental monitoring, peer use, or where an adolescent may live. Future work could begin to examine how these factors, along with advertising, may affect these associations over time. In addition, we cannot draw conclusions from this study about the reciprocal associations of exposure to MM ads with marijuana use and related cognitions. Our previous longitudinal work examined these associations using cross-lagged analyses over one year and found a reciprocal association such that teens exposed to MM ads reported greater marijuana use, and teens who reported greater marijuana use were also more likely to report exposure to MM ads (D'Amico et al., 2015b). In this study, we were more interested in capturing inter-individual differences in intra-individual growth, as well as modeling the functional form of growth. The parallel process LGMs used in current analyses allow us to do that by focusing on *conjoint* longitudinal change in MM advertising and adolescents’ marijuana use, intentions, positive expectancies and negative consequences. It is also important to note that we only had one item measuring exposure to MM advertising. Future work could ask more detailed questions about where exposure to ads occurred (e.g., billboard, magazine, marijuana dispensary) to rule out recall bias. Another limitation is that we relied exclusively on self-reported marijuana use. However, the limits of self-report are often exaggerated (Chan, 2008), and recent work with young adults 18–21 has shown that self-reported alcohol use can be corroborated by biomarkers (Simons et al., 2015). In addition, our sample’s marijuana use rates match those seen for national samples (Johnston et al., 2012). Finally, this sample was limited geographically to adolescents living in southern California, thus, generalizability may be restricted.

6. Conclusions

In summary, findings provide important data on the effects of exposure to MM advertising and adolescents’ subsequent use, cognitions, and consequences. History from the alcohol and tobacco industries shows the importance of regulations. In fact, Pacula and colleagues (Pacula et al., 2014) have indicated specific areas that policymakers may want to address regarding marijuana legalization including: developing regulations that help reduce access, availability, and use by adolescents; driving under the influence; and concurrent use of marijuana and alcohol, particularly in public places. As more states add legalization of marijuana for both medical and recreational purposes to their ballots, we must begin to think carefully about the best ways to address regulation of marijuana advertising so that we can decrease the chances of harm occurring, particularly for adolescents.

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Abbreviations:

AOD	alcohol and other drug use
MM	medical marijuana
MML	medical marijuana legalization laws

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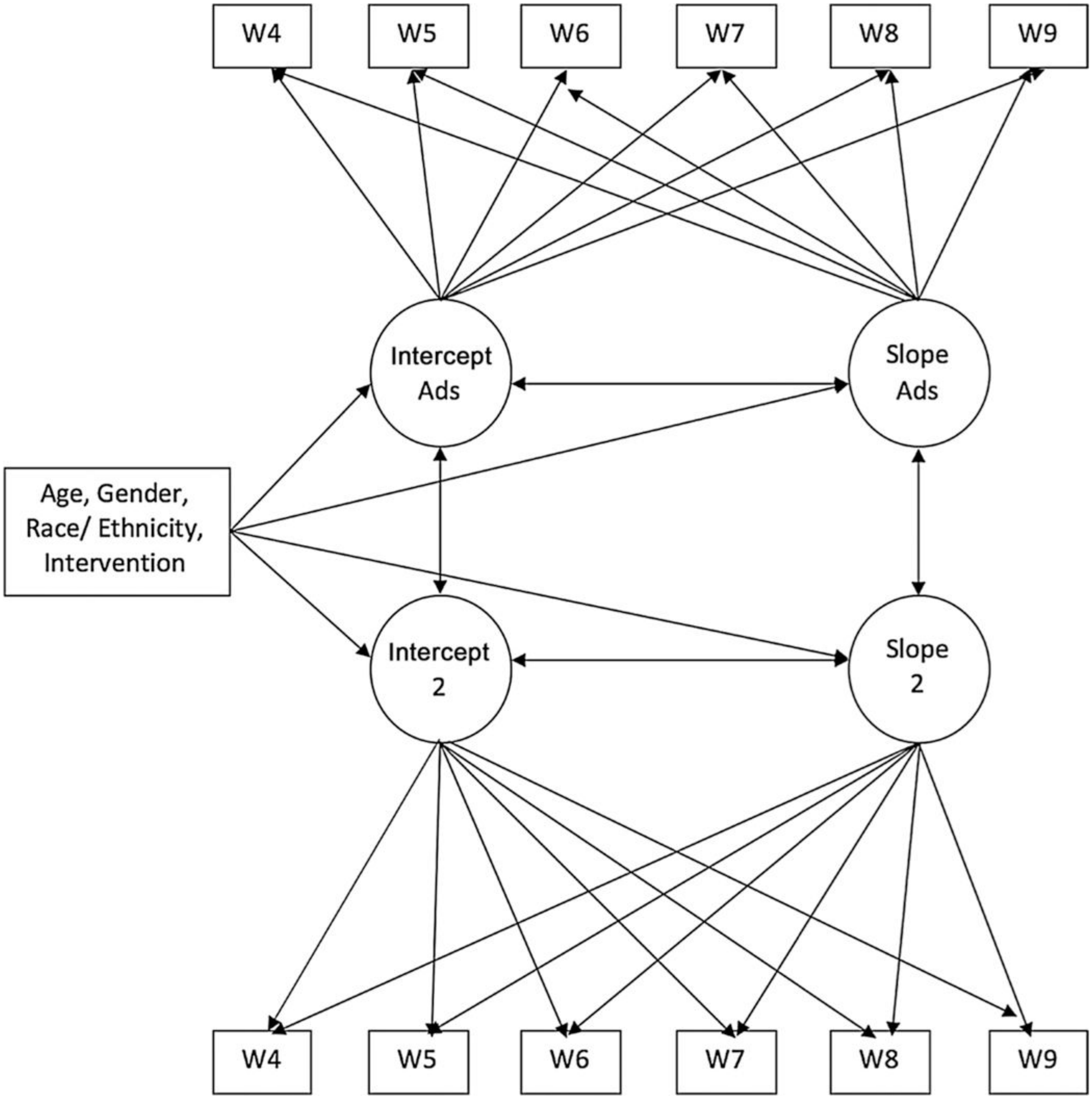

Fig. 1.

Conceptual diagram of parallel process latent growth model estimated for exposure to marijuana advertising and each of the four outcomes of interest (i.e., marijuana use, intentions to use marijuana, positive expectancies, and consequences). Intercept 2 = intercept for each marijuana outcome, Slope 2 = Slope for each marijuana outcome.

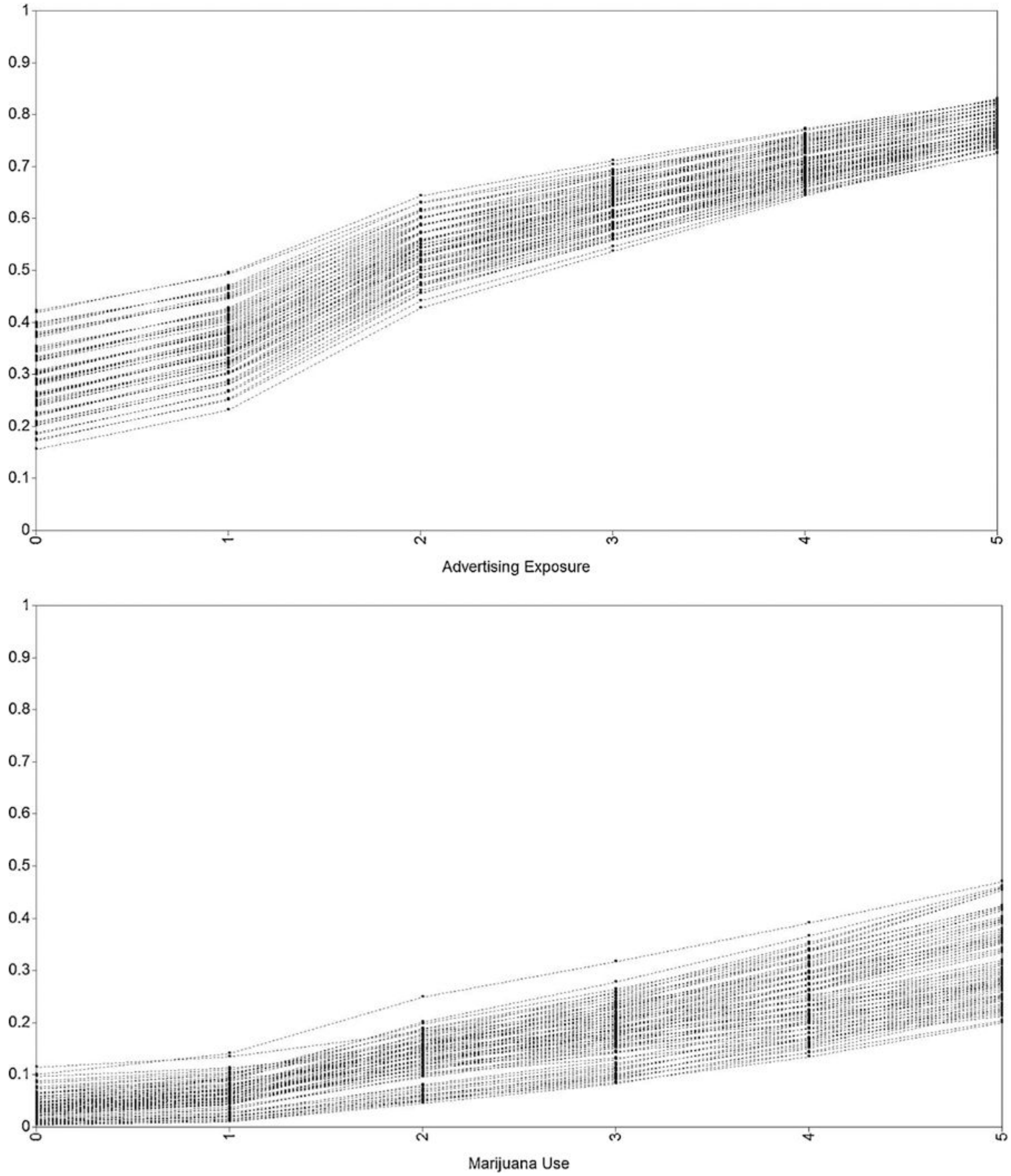

Fig. 2.

Estimated probabilities for exposure to medical marijuana advertising and marijuana use from wave 4 to wave 9.

Table 1

Sample Characteristics for Medical Marijuana Advertisement Exposure, Marijuana Outcomes, and Covariates (Trajectory sample N = 4946).

	Wave 4 n= 4946	**Wave 5 n = 3903**	**Wave 6 n = 2537**	**Wave 7 n = 2491**	**Wave 8 n = 2509**	**Wave 9 n = 2429**
Medical marijuana Ad exposure (%)	25.3	35.8	61.8	68.2	67.5	70.2
Past month marijuana use (%)	4.7	6.2	11.8	16.8	23.7	28.6
Intentions to use	1.45 (0.96)	1.54 (1.03)	1.51 (0.91)	1.70 (1.02)	1.91 (1.12)	2.08 (1.17)
Expectancies positive	2.94 (2.85)	3.47 (3.05)	4.24 (2.94)	4.86 (2.87)	5.29 (2.78)	5.62 (2.68)
Past year consequences (%)	3.4	5.1	15.3	12.3	15.6	17.6
Covariates*						
Age	13.2 (0.75)	–	–	–	–	–
Male (%)	49.1	–	–	–	–	–
Hispanic (%)	52.9	–	–	–	–	–
White (%)	15.4	–	–	–	–	–
Black (%)	3.0	–	–	–	–	–
Asian (%)	17.7	–	–	–	–	–
Other (%)	11.0	–	–	–	–	–

Note: The trajectory sample of 4946 includes youth in 7th or 8th grade at wave 4. When not denoted (%), means and standard deviations (SD) are presented.

*Covariates were modeled using wave 4 values. Marijuana use was based on any past 30-day use. Intentions were measured from 1 = *definitely no* to 4 = *definitely yes*. Expectancies were measured from 1 = *strongly disagree* to 4 = *strongly agree*. Consequences were based on the percent of youth that reported any negative consequences in the past year.

Table 2

Growth Factor Estimates for Intercepts/Slopes.

	MM Ad exposure	Past 30-day use	Intentions	Expectancies	Past year consequences
Growth factors					
Mean	0.08/0.21	−1.17/0.20	−0.41/0.15	4.35/0.45	−0.13/0.15
Variance	0.39/0.02	0.64/0.02	0.56/0.02	3.30/0.20	0.62/0.03

Note: Marijuana use was based on any past 30-day use. Intentions were measured from 1 = *definitely no* to 4 = *definitely yes*. Expectancies were measured from 1 = *strongly disagree* to 4 = *strongly agree*. Consequences were based on whether youth experienced any consequences in the past year. All growth factor estimates are significant at $p < .05$. Model fit indices: Use ($\chi^2 = 250.84$, $p < .05$, RMSEA = 0.01, CFI = 0.98, WRMR = 1.17); Intentions ($\chi^2 = 421.54$, $p < .05$, RMSEA = 0.02, CFI = 0.98, WRMR = 1.45); Expectancies ($\chi^2 = 274.57$, $p < .05$, RMSEA = 0.01, CFI = 0.97 WRMR = 1.17); Consequences ($\chi^2 = 277.08$, $p < .05$, RMSEA = 0.01, CFI = 0.97, WRMR = 1.24).