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Abstract

Drawing on the Prototype/Willingness Model of Adolescent Risk Behavior we used longitudinal data collected from North American Indigenous early adolescents (ages 10–12 years) to examine the interactive effects of favorable drinker prototypes, perceived drinking norms, and past year drinking behavior on subsequent drinking behavior (i.e., drinking behavior 1 year later and growth in drinking behavior from 1–5 years later). We found that the positive association between favorable drinker prototypes and drinking one year later was strongest for adolescents who were high in past year drinking and perceived low drinking norms. The interaction pattern for growth in drinking was more complex and suggested an important pattern; specifically, favorable drinker prototypes were positively associated with drinking five years later, but only for adolescents who reported no past year drinking and perceived low drinking norms. The theoretical and practical implications of these results are discussed.

Keywords

Prototype/Willingness Model; drinking; adolescents; Native Americans; Canadian First Nations

Early attempts to explain adolescent risk behaviors (e.g., drinking) relied heavily on rational decision making models (e.g., Ajzen, 1991; Fishbein & Ajzen, 1975). These models generally posit that the decision to engage in a given behavior results from a (predominately conscious) weighing of the costs and benefits associated with that behavior and is thus largely *planned* and *intentional*. Although rational decision making models have proven to be useful in predicting a number of behavioral outcomes, they do not always fare well in predicting adolescent risk behaviors (McEachan, Conner, Taylor, & Lawton, 2011). This is not too surprising, as scholars have long recognized that adolescent risk behaviors tend to

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occur in social settings when the opportunity to engage in such behaviors arise (e.g., Jessor & Jessor, 1977). Drawing on this observation, Gibbons, Gerrard, and their colleagues (Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008; Gibbons, Gerrard, Blanton, & Russell, 1998) argued that adolescent risk behaviors may be better understood as a function of risk-related beliefs that affect an adolescent's willingness to engage in risk behaviors. Willingness, in turn, is postulated to have a proximal influence on an adolescent's likelihood of engaging in risk behaviors when he or she is in a risk-conducive situation (e.g., at a party where other adolescents are drinking).

Gibbons, Gerrard and their colleagues formalized their argument in the Prototype/Willingness Model of Adolescent Risk Behavior (PWM; Gibbons et al., 1998). The PWM outlines risk-related cognitions and behaviors that are believed to be central to understanding an adolescent's willingness to engage in risk behaviors. Of specific relevance to the present paper, risk-related cognitions include beliefs about the prevalence of a given risk behavior among other adolescents (i.e., *perceived behavioral norms*) and beliefs about the (favorable and/or unfavorable) attributes possessed by the typical adolescent who engages in that risk behavior (i.e., *behavioral prototypes*). Moreover, unlike other theories of behavioral decision making (e.g., Ajzen, 1985; Fishbein, 1979), within the PWM, prior risk behavior is considered to be an important antecedent to behavioral willingness and subsequent risk behaviors (see Gerrard et al., 2008, p. 41). Ostensibly, an adolescent who believes that many or most other adolescents engage in a given risk behavior (i.e., *high* perceived behavioral norms), views the typical adolescent who engages in that behavior as having favorable attributes (i.e., *favorable* behavioral prototype), and has a history of engaging in that risk behavior should be more willing to engage in that behavior (i.e., *high* behavioral willingness) and thus at greater risk for engaging in that behavior.

The PWM has been tested, at least in part, across several longitudinal studies (e.g., Andrews, Hampson, Barckley, Gerrard, & Gibbons, 2008; Blanton, Gibbons, Gerrard, Conger, & Smith, 1997; Gibbons et al., 1998; Hukkelberg & Dykstra, 2009; for a review, see Gerrard et al., 2008). These studies have shown the PWM to be useful in predicting various risk behaviors, such as smoking (Andrews et al., 2008; Blanton et al., 1997; Gerrard, Gibbons, Stock, Vande Lune, & Cleveland, 2005; Hukkelberg & Dykstra, 2009), drinking (Andrews et al., 2008; Blanton et al., 1997; Gibbons et al., 2010; Ouellette, Gerrard, Gibbons, & Reis-Bergan, 1999; Spijkerman, Van Den Eijnden, Overbeek, & Engels, 2007; cf. Dal Cin et al., 2009, for partial exception), substance use (Cleveland, Gibbons, Gerrard, Pomery, & Brody, 2005; Stock et al., 2013), and unsafe sexual practices (Gibbons et al., 1998; Houlihan et al., 2008). Of importance to the present paper, using three-waves of data, we previously showed that perceived drinking norms, favorable drinker prototypes, and previous drinking behavior were each positively and significantly associated with subsequent drinking behavior among North American Indigenous adolescents (i.e., Native American and Canadian First Nations youths). Moreover, the associations from perceived drinking norms and favorable drinker prototypes to subsequent drinking behavior were partially mediated by future drinking expectations (i.e., reports of whether or not one will drink in the near future), which served as a proxy for willingness to drink (see Blanton et al.,

1997). These results speak to the generalizability of the PWM to North American Indigenous adolescents (hereafter referred to as Indigenous adolescents).[1]

In our search of the literature we found a few studies in which potential moderators of one or more of the associations outlined within the PWM were considered (e.g., race, Gibbons et al., 2010; need for belongingness, Litt, Stock, & Lewis, 2012), and additional moderators (e.g., parenting practices) were suggested in a recent review of the PWM literature (Gerrard et al., 2008). We found no examples or discussions, however, of the potential interactive effects between perceived behavioral norms, behavioral prototypes, and prior risk behavior in relation to behavioral willingness or subsequent risk behaviors. There thus appears to be an (implicit) assumption that perceived behavioral norms, behavioral prototypes, and prior risk behavior have only independent, additive effects on behavioral willingness and subsequent risk behaviors. To the best of our knowledge, this assumption is neither theoretically nor empirically grounded. Consequently, the goal of the present study was to test this (implicit) assumption.

Towards this end, we used longitudinal data collected from a large sample of Indigenous early adolescents to examine the independent and interactive effects of perceived drinking norms, favorable drinker prototypes, and past year drinking behavior on subsequent drinking behavior (i.e., drinking behavior from one to five years later). In line with previous studies, we predicted that perceiving higher drinking norms (*hypothesis 1*), holding more favorable drinker prototypes (*hypothesis 2*), and having drank more frequently in the past year (*hypothesis 3*) during early adolescence (i.e., ages 11–13 years) would be associated with subsequent increases in drinking behavior; specifically, (a) increased frequency of drinking one year later and (b) a steeper increase in drinking frequency from one to five years later. As already noted, we are aware of no attempts to consider interactions between the variables outlined within the PWM. Nonetheless, interaction patterns may be suggested from studies that have tested interaction effects based on the variables outlined within the theory of planned behavior (TPB; Ajzen, 1985, 1991, 2012). For example, Hukkelberg, Hagtvet, and Kovac (2014) showed favorable attitudes towards quitting smoking (a variable akin to *favorable non-smoker prototypes*) were positively associated with intentions to quit smoking. This association, however, was stronger among individuals who believed that others wanted them to quit smoking (a variable akin to *perceived smoking norms*). These findings at least suggest that the positive association between favorable drinker prototypes and subsequent drinking behavior will become stronger with increases in perceived drinking norms (*hypothesis 4*).

In another study, Woolfson and Maguire (2010) showed that favorable attitudes towards binge drinking (a variable akin to *favorable binge drinker prototypes*) were positively associated with intentions to binge drink. This association, however, was only statistically significant for individuals who had a low to moderate history of binge drinking. These findings suggest that favorable drinker prototypes may have little predictive utility for

[1]We note that the data used in our prior paper is the same data used in for the present paper. Importantly, the explicit goal of our prior paper was to test the generalizability of the PWM to Indigenous adolescents. By contrast, the goal of the analyses reported in the present paper was to test the theoretical boundaries of the PWM.

individuals who have a high history of drinking behavior (i.e., high past year drinking; *hypothesis 5*). This pattern also may extend to perceived drinking norms. Specifically, perceived drinking norms may be positively associated with subsequent drinking behavior, but primarily among adolescents with a low to moderate history of drinking behavior (*hypothesis 6*).

In our review of the PWM and TPB literatures, we found no reported efforts to examine the three-way interaction between perceived behavioral norms (or related constructs), behavioral prototypes (or related constructs), and prior risk behavior on subsequent risk behavior. The findings of Woolfson and Maguire (2010) together with the findings of Hukkelberg et al. (2014), however, provide a plausible hypothesis. Specifically, it may be the case that the positive association between favorable drinker prototypes and subsequent drinking behaviors will become stronger with increasing levels of perceived drinking norms, but only for adolescents who reported low to moderate levels of past year drinking, while favorable drinker prototypes and perceived drinking norms may have little to no influence on subsequent drinking behavior for adolescents who reported high levels of past year drinking (*hypothesis 7*).

Method

Study Design

The data used for the present paper were drawn from an eight-year longitudinal study examining general and culture-specific risk and resilience factors among a sample of Indigenous adolescents who identified as members of a single Indigenous cultural group. The study was designed in partnership with three American Indian Reservations in the upper Midwestern United States and four First Nations Reserves in the adjoining region in Canada. As part of strict confidentiality agreements with the reservations and reserves, the names of the cultural group and participating sites are not provided, and no attempts were made to distinguish between adolescents from the various locations in our analyses. It is important to note, however, that the reservations and reserves are located in a similar region of North America, share a common cultural tradition, identify as members of a single cultural group, and share the same traditional language with only minor variations in dialects.

At each site Tribal advisory boards were responsible for advising the research team on questionnaire development and for handling personnel issues. The interviewers and site coordinators all were approved by advisory boards and were either enrolled tribal members or, in a very few cases, non-member spouses of enrollees. The interviewers were trained prior to each wave of data collection concerning methodological guidelines of personal interviewing and protection of human subjects.

Prior to the first wave of data collection each participating reservation/reserve provided the research team with a list of all families with at least one tribally-enrolled child between 10 and 12 years of age who lived on or near the reservations/reserves. An attempt to contact all families was made in an effort to obtain a representative sample of the population. The families were formally recruited through home visits, during which they were presented with a traditional cultural gift and an overview of the project. For those families who agreed to

participate (79.4% of those contacted), the adolescent and at least one adult caretaker were interviewed once per year for 8 years. As compensation for their participation, the families received US$40 per participant for each wave completed. The project was conducted in compliance with the ethical standards outlined by the American Psychological Association (2010) and was approved by Tribal advisory boards at each of the reservations/reserves and the institutional review board at the. The present paper also was reviewed by Tribal advisory boards at each of the reservations/reserves and was unanimously approved for publication.

Data Structure and Analytic Sample

There were variations in the measures administered to the participants across the 8 waves of the study. The measure of favorable drinker prototypes was introduced into the study at Wave 2. We thus focused on adolescent reports of perceived drinking norms, favorable drinker prototypes, and past year drinking behavior at Wave 2 as predictors in our analyses. Importantly, only 12 participants dropped out of the study before the second wave. The adolescents reported on their (past year) drinking behavior again at Waves 3, 5, and 7 of the study, which served as our indicators of subsequent drinking behavior.

The final analytic sample included 636 participants at Wave 2 (*M* age = 12.09, *SD* = .86; 50.0% girls), 626 participants at Wave 3 (*M* age = 13.07, *SD* = .87; 50.4% girls), 605 participants at Wave 5 (*M* age = 15.27, *SD* = .97; 50.0% girls), and 569 participants at Wave 7 (*M* age = 17.23, *SD* = .88; 49.1% girls). At the first wave of the study, the primary caregivers reported an average annual per capita family income of $5,488 (*SD* = $4,044), had an average of 4.35 children (*SD* = 2.05; *M* children living at home = 2.56, *SD* = 1.84), and reported an average of 5.05 people (*SD* = 1.87) living in their household. In addition, 49.9% reported a gross annual household income below $25,000; 41.5% reported that they owned their home, 28.3% reported that they rented their home, 9.2% reported living at home rent free, and 2.3% reported living with friends or family. Readers are referred to (2014) for additional study details.

Measures

Perceived drinking norms were assessed at Wave 2 by asking participants to estimate the prevalence of drinking among their same-aged peers (i.e., *Of the kids in your grade at school, how many do you think drink alcohol?*). Responses were provided on a 3-point scale, anchored by 1 (*none*) and 3 (*most*). This item has been used as an indicator of perceived drinking norms in previous studies testing the PWM (e.g., Gibbons et al., 1998; Spijkerman et al., 2007). The sample mean for this item was 1.77 (*SD* = .66).

Favorable drinker prototypes were assessed at Wave 2 using the approach outlined by Gibbons, Gerrard and their colleagues (1998). Participants were first asked to think about kids their age who drink alcohol; they were instructed to think about their general image of kids who drink and not anyone in particular. They were then asked to indicate the degree to which they thought kids who drink are *popular*, *smart*, *cool*, *tough*, *good-looking*, *mature*, *dull or boring* (reverse-phrased), *independent*, and *self-confident*. Responses were provided on a 4-point scale, anchored by 1 (*not at all*) and 4 (*very*). Mean scale scores were computed

by averaging across the responses to the items, after reverse-scoring the single reverse-phrased item. The coefficient alpha for this measure was .84 (*M* = 1.88, *SD* = .59).

Past year drinking behavior was assessed at Waves 2, 3, 5, and 7. Participants were first asked if they had ever had a drink of alcohol (i.e., beer, wine, or any other alcoholic beverage) and (if so) had a drink of alcohol during the previous year. Participants who responded yes to these questions were then asked to indicate the frequency with which they had drank alcohol during the previous year. Responses were provided on a 6-point scale, anchored by (1) *one or two times* [in the previous year] and (6) *every day* [in the previous year]. Participants who indicated that they had never had a drink of alcohol or had not had a drink of alcohol during the previous year were coded as 0, reflecting a response of *no drinking during the past year*. The final drinking scores thus ranged from (0) *no drinking during the past year* to (6) *drank alcohol every day during the past year*. The sample means were .27 (*SD* = .70; Range = 0–5), .50 (*SD* = .98; Range = 0–5), 1.19 (*SD* = 1.44; Range = 0–5), and 1.53 (*SD* = 1.50; Range = 0–6) at Waves 2, 3, 5, and 7, respectively.[2] To avoid confusion, we henceforth refer to Wave 2 reports as *past year drinking behavior* and reports at Waves 3, 5, and 7 as *subsequent drinking behavior* (or, alternatively, drinking behavior 1, 3, and 5 years later, respectively).

Analytic Strategy

We conducted our analyses within Mplus Version 6.1 (Muthén & Muthén, 1998–2010) using maximum likelihood estimation with robust standard errors (MLR in Mplus) and the expectation maximization algorithm to account for data non-normality and missing data. We estimated the zero-order correlations and a series of conditional linear growth curve models (hereafter referred to as growth models). Reports of past year drinking at Waves 3, 5, and 7 served as indicators of the growth curve parameters, with Wave 3 serving as the intercept. Both fixed effects (i.e., mean intercept and growth curve) and random effects (i.e., variability around the fixed effects) were estimated. Given these model specifications, in relation to the predictor variables (i.e., perceived drinking norms, favorable drinker prototypes, and past year drinking behavior), the intercept reflects drinking 1 year later and the growth curve represents changes in drinking from 1 to 5 years later.

We estimated 3 growth models, with the intercept and growth parameters serving as outcome variables for each model. In the first model we included the main effects of perceived drinking norms, favorable drinker prototypes, and past year drinking behavior; that is, perceived drinking norms, favorable drinker prototypes, and past year drinking behavior served as predictors of the intercept and growth parameters. In the second model we included the two-way interactions between perceived drinking norms, favorable drinker prototypes, and past year drinking behavior as additional predictors. The three-way interaction between perceived drinking norms, favorable drinker prototypes, and past year drinking behavior was included in the final model. In order to control for potential age and

[2]It should also be noted that, of our sample, 17.2% reported some level of drinking at Wave 2, 27.1% at Wave 3, 50.7% at Wave 5, and 63.1% at Wave 7. As a result, the levels of skewness and kurtosis were somewhat high, particularly for drinking at Wave 2. As such, we computed the square root of our drinking variables, which reduced the levels of skewness and kurtosis to acceptable levels (i.e., < 3). Analyses using the transformed drinking variables did not alter the results of our analyses in any substantive manner. We opted to report the results of our analyses using the raw drinking scores in order to retain the original scale of the variables.

gender differences in drinking behavior, age and gender were included as covariates in each of the models.

The final three-way interaction model is shown in Figure 1. All measures were included as observed variables and the interaction terms were computed by centering the predictor variables on their respective sample means and multiplying them together accordingly (Aiken & West, 1991). In addition, age was centered on the mean age of the sample in order to provide an intercept that falls within the age range of the sample and gender was coded −1 for boys and 1 for girls.

The fit of the models to the data was evaluated based on the chi-square (χ^2) test of model fit. Given the sensitivity of the χ^2 test (Bollen, 1989), however, we also relied on the comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root mean squared residual (SRMR) as indicators of model fit. Following the recommendations of Hu and Bentler (1999), we determined that a model provided a good fit to the data with a CFI value close to or greater than .95, RMSEA value close to or below .06, and SRMR value close to or below .08.

Results

Zero-order Correlations

The zero-order correlations among the study variables are reported in Table 1. As can be seen, perceived drinking norms, favorable drinker prototypes, and past year drinking behavior (i.e., Wave 2 reports) were positively and significantly correlated with each other, and these three variables were positively and significantly correlated with the three subsequent drinking behavior variables (i.e., Waves 3, 5, and 7 reports). The three subsequent drinking behavior variables also were positively and significantly correlated with each other. In addition, gender was positively and significantly correlated (point-biserial) with perceived drinking norms, indicating that girls believed that drinking was more prevalent than did boys. Finally, age was positively and significantly correlated with perceived drinking norms, favorable drinker prototypes, past year drinking behavior, drinking behavior 1 year later, and drinking behavior 3 years later.

Main Effects Model

The main effects model provided an acceptable to good fit to the data, χ^2 (6) = 13.48, p = .04, CFI = .97, RMSEA = .05, SRMR = .02. As shown in Table 2 (*Model 1*), favorable drinker prototypes and past year drinking were positively and significantly associated with drinking behavior 1 year later, as indicated by the significant associations with the intercept. Perceived drinking norms, however, were not significantly associated with drinking behavior 1 year later. In addition, perceived drinking norms, favorable drinker prototypes, and past year drinking behavior were not significantly associated with the growth in drinking behavior from 1–5 years later.

Two-way Interaction Model

The two-way interaction model provided an acceptable to good fit to the data, χ^2 (9) = 21.48, p = .01, CFI = .94, RMSEA = .05, SRMR = .02. As shown in Table 2 (*Model 2*), none of the two-way interactions were statistically significant. This was the case for drinking behavior 1 year later and the growth in drinking behavior from 1–5 years later.

Three-way Interaction Model

The three-way interaction model provided an acceptable to good fit to the data, χ^2 (10) = 21.01, p = .02, CFI = .95, RMSEA = .04, SRMR = .02. As shown in Table 2 (*Model 3*), the three-way interaction was statistically significant for drinking behavior 1 year later (intercept) and the growth in drinking behavior from 1–5 years later. We examined the three-way interaction for drinking behavior 1 year later by estimating the simple slopes of favorable drinker prototypes at one standard deviation below (low) and above (high) the sample mean of perceived drinking norms and at *no drinking* (because 1 standard deviation below the mean fell below no reported drinking) and 1 standard deviation above (high) the mean of past year drinking behavior. We examined the three-way interaction predicting the growth in drinking behavior from 1–5 years later by estimating the mean growth curve for each possible combination of low (one standard deviation below the sample mean) and high (one standard deviation above the sample mean) perceived drinking norms and favorable drinker prototypes and no and high (one standard deviation above the sample mean) past year drinking behavior.

Drinking 1 Year Later (Intercept)—As shown in Figure 2, favorable drinker prototypes were positively associated with drinking 1 year later, regardless of variations in drinking norms and past year drinking behavior. The strength of this association, however, differed as a function of drinking norms and past year drinking behavior. The strongest association occurred for adolescents who were high in past year drinking behavior but low in perceived drinking norms, b = .32, SE = .15, β = .39, p = .03. The second strongest association occurred for adolescents who reported no past year drinking but high perceived drinking norms, b = .24, SE = .07, β = .30, p = .001. The third strongest association occurred for adolescents who were high in past year drinking behavior and high in perceived drinking norms, b = .20, SE = .08, β = .24, p = .02. The weakest association occurred for adolescents who reported no past year drinking behavior and low perceived drinking norms, b = .12, SE = .06, β = .14, p = .05.

5-Year Growth in Drinking—The mean growth curves for each combination of low and high on the predictor variables (no and high for past year drinking behavior; see above) are reported in Table 3. We ordered the results in terms of the magnitude of the growth rates, with the pattern that had the steepest growth reported first. It should be noted that the growth in drinking behavior was positive and statistically significant regardless of the combinations of the predictor variables, indicating that there was a significant increase in drinking behavior for the sample as a whole. The steepest growth occurred for adolescents who were low in favorable drinker prototypes and low in perceived drinking norms but were high in prior drinking behavior. The next steepest growth occurred for adolescents who were low in favorable drinker prototypes but perceived high drinking norms, with the magnitude of

growth similar for adolescents who reported no and high past year drinking behavior. This was followed by adolescents who were high in favorable drinker prototypes but low in perceived drinking norms, with the magnitude of growth somewhat similar for adolescents who reported no and high past year drinking behavior. The next steepest growth occurred for adolescents who reported no past year drinking behavior and reported either (a) low favorable drinker prototypes and low perceived drinking norms or (b) high favorable drinker prototypes and high perceived drinking norms. Interestingly, the least positive growth occurred for adolescents who were high in favorable drinker prototypes, high in perceived drinking norms, and high in past year drinking behavior.

We plotted the eight growth curves in an effort to better understand these results. As shown in Figure 3, a very clear pattern emerged. Specifically, although the rates of change varied as a function of perceived drinking norms, favorable drinker prototypes, and past year drinking behavior, the level of drinking 5 years later (i.e., at Wave 7) was similar among those adolescents who reported high past year drinking behavior. Likewise, the level of drinking 5 years later was similar among adolescents who reported no past year drinking behavior. The one exception was for adolescents who reported no past year drinking behavior, were low in perceived drinking norms, and were low in favorable drinker prototypes, for which drinking 5 years later appeared to be substantially lower than the remainder of the sample. Based on these observations, we re-estimated our model with the intercept set to Wave 7 drinking in order to examine the three-way interaction pattern for drinking 5 years later.

Drinking 5 Years Later (Intercept)—As shown at the bottom of Table 2, the three-way interaction (*Model 3*) was statistically significant for drinking 5 years later (i.e., the intercept). As shown in Figure 4, favorable drinker prototypes were not significantly associated with drinking 5 years later for adolescents who perceived low drinking norms but reported high past year drinking behavior, $b = -.06$, $SE = .11$, $\beta = -.05$, $p = .62$, or for adolescents who perceived high drinking norms, regardless of their past year drinking behavior, $b = -.02$, $SE = .11$, $\beta = -.02$, $p = .85$ for no past year drinking behavior and $b = -.12$, $SE = .10$, $\beta = -.12$, $p = .22$ for high past year drinking behavior. Favorable drinker prototypes were only positively and significantly associated with drinking 5 years later for adolescents who reported no past year drinking behavior and perceived low drinking norms, $b = .24$, $SE = .10$, $\beta = .23$, $p = .02$. As is clear in Figure 4, adolescents who reported no past year drinking behavior, were low in perceived drinking norms, and were low in favorable drinker prototypes had the lowest levels of drinking 5 years later. It should also be noted that, regardless of perceived drinking norms and favorable drinker prototypes, adolescents who reported high past year drinking were higher in drinking 5 years later than were adolescents who reported no past year drinking, as indicated by the significant main effect of past year drinking behavior, and visually evident in Figure 4.

Discussion

The Prototype/Willingness Model of Adolescent Risk Behavior (PWM; Gerrard et al., 2008; Gibbons et al., 1998) postulates that perceived behavioral norms, behavioral prototypes, and prior risk behavior increase adolescents' willingness to engage in a given risk behavior and, consequently, increases the probability of engaging in that risk behavior when in a risk-

conducive situation (e.g., at a party where other adolescents are drinking). An implicit assumption within the PWM literature is that perceived behavioral norms, behavioral prototypes, and prior risk behavior have only independent effects on behavioral willingness and subsequent risk behavior. In the present study we tested this assumption by examining the interactive effects of perceived drinking norms, favorable drinker prototypes, and past year drinking behavior on subsequent drinking behavior among a sample of Indigenous early adolescents. Using longitudinal data, we considered subsequent drinking behavior in two ways: [a] drinking behavior 1 year later and [b] the growth in drinking behavior from one to five years later. In describing our hypotheses below, we will use “a” when referring to drinking behavior 1 year later as the outcome and “b” when referring to the growth in drinking behavior as the outcome.

As expected, and consistent with the PWM, favorable drinker prototypes (*hypothesis 1a*) and past year drinking behavior (*hypothesis 3a*) positively predicted drinking 1 year later, even after controlling for age and gender. Although perceived drinking norms were not significantly associated with drinking 1 year later when considered with the remaining predictors (*hypothesis 2a*), the zero-order correlation between perceived drinking norms and drinking 1 year later was positive and statistically significant. In contrast to our predictions, however, perceived drinking norms, favorable drinker prototypes, and past year drinking behavior were not significantly associated with the growth in drinking behavior from 1–5 years later (*hypotheses 1-3b*). Our predictions regarding the two-way interactions between the variables (*hypotheses 4-6a/b*) also were not supported, as none of the two-way interactions significantly predicted drinking behavior 1 year later or the growth in drinking behavior from 1–5 years later.

Our final prediction (*hypothesis 5a/b*) was that the positive association between favorable drinker prototypes and subsequent drinking behavior would become stronger with increasing levels of perceived drinking norms, but primarily for adolescents who reported low to moderate prior drinking behavior; favorable drinker prototypes and perceived drinking norms were not expected to influence subsequent drinking behavior for adolescents high in prior drinking behavior. This hypothesis was not clearly supported. A seemingly more important pattern was evident, however, when examining the growth curves (see Figure 3). Specifically, (a) there was an increase in drinking behavior across time for the entire sample, (b) compared to adolescents who reported no past year drinking, adolescents who reported high past year drinking reported higher levels of drinking behavior 5 years later, (c) adolescents who reported high past year drinking reached a similar level of drinking behavior 5 years later, regardless of their perceived drinking norms and favorable drinker prototypes, and (d) adolescents who reported no past year drinking reached a similar level of drinking behavior 5 years later, regardless of their favorable drinker prototypes and perceived drinker norms, with one exception, as discussed next.

Based on the observed pattern of results for the three-way interaction predicting the growth in drinking behavior from 1–5 years later, we re-estimated our model with drinking behavior 5 years later set as the intercept. This allowed us to examine whether perceived drinking norms, favorable drinker prototypes, and past year drinking behavior interactively predicted drinking 5 years later. The three-way interaction was statistically significant. Follow-up

analyses showed that holding more favorable drinker prototypes was associated with increased drinking 5 years later, but specifically for adolescents who perceived low drinking norms and reported no past year drinking (see Figure 4). Thus, favorable drinker prototypes increased the risk for drinking behavior in a distal time-frame, but primarily for those who, during early adolescence (i.e., ages 11–13), had not drank alcohol in the past year and believed that few of their peers drank alcohol.

We would like to highlight that none of our a priori hypotheses regarding the two- and three-way interactions between perceived drinking norms, favorable drinker prototypes, and past year drinking were supported. In considering this, it is also important to recognize that our hypotheses were indirectly derived from the results of studies (Hukkelberg et al., 2014; Woolfson & Maguire, 2010) that have tested interactions between variables outlined within the theory of planned behavior (Ajzen, 1985, 1991, 2012), rather than the PWM. In the end, it may be more accurate to view our analyses as exploratory in nature. Despite this fact, we note that our final results are sensible. We also note that the core associations outlined within the PWM were generally upheld in predicting drinking 1 year later, although the association between perceived drinking norms and drinking 1 year later dropped to a level of non-significance when considered in combination with the remaining study variables. Nonetheless, we suggest that the results of our three-way interaction be interpreted with caution pending replication.

Limitations

Three limitations to our study should be noted. First, we are the first (to our knowledge) to consider interactive effects within the PWM and our study included a culturally homogeneous sample of Indigenous early adolescents who lived on or near their cultural group's reservation/reserve. Thus, as already noted, replication of our findings will be necessary before drawing any firm conclusions. Whether or not our results will generalize to older adolescents, Indigenous early adolescents residing in non-reservation/reserve contexts, and/or members of other ethno-cultural groups are empirical questions that require attention.

Second, although our measure of perceived drinking norms is consistent with the conceptualization of perceived behavioral norms as discussed within the PWM (Gerrard et al., 2008), we nonetheless relied on a single item. Although some single-item indicators of psychological constructs have shown to be useful (e.g., Robins, Hendin, & Trzesniewski, 2001), multi-item measures improve the accuracy with which constructs are assessed (de Ayala, 2009; Lord & Novick, 1968).

Finally, we considered the effects of early adolescent cognitions (i.e., perceived drinking norms and favorable drinker prototypes at ages 11–13 years) on the development of drinking behavior through late adolescence (from ages 12–14 years to 16–18 years). Perceived drinking norms and drinker prototypes, however, are not static constructs (Andrews et al., 2008), and one may reasonably expect them to change throughout adolescence based on personal experiences. We should note, however, that our results do demonstrate that there is some utility to considering the variables outlined in the PWM in predicting distal drinking behavior, as has also been suggested by Andrews and her colleagues (2008).

Implications and Conclusion

Despite these limitations, our results suggest that the core associations outlined within the PWM may be more complex than is currently suggested within the literature. This should be of central concern to scholars as they aim to further develop and refine the PWM (e.g., Rivis, Sheeran, & Armitage, 2006; Zimmermann & Sieverding, 2010). This is especially true given that scholars have started drawing on the PWM to supplement existing prevention and intervention programs aimed at reducing risk behaviors among adolescents (e.g., Gerrard et al., 2006). For example, as our findings suggest, it may be the case that efforts to reduce the risk for drinking by modifying alcohol-related cognitions will be most effective for adolescents who have no recent history of drinking. In contrast, such efforts may be less effective for adolescents who, for example, attend court-ordered treatment programs because they have been arrested for underage drinking.

As already noted, our results require replication before drawing any firm conclusions, but also highlight the critical need to consider potential interactive effects between the core variables outlined within the PWM. Beyond attempts to replicate our results, it will be important to consider whether and how other constructs discussed within the PWM literature (e.g., negative images of individuals who engage in a given risk behavior, positive and negative images of individuals who abstain from a given risk behavior, and perceived vulnerability) interact with perceived behavioral norms, favorable behavioral prototypes, and prior risk behavior to predict subsequent risk behavior. Moreover, it will be important to consider whether, as suggested by the PWM, behavioral willingness mediates, or perhaps further moderates, any interactive effects on subsequent risk behavior. Such efforts do not necessarily require the collection of new data; rather, data from existing studies provide ample opportunities to verify, disconfirm, or augment our results (e.g., Andrews et al., 2008; Blanton et al., 1997; Cleveland et al., 2005; Gibbons et al., 1998; Hukkelberg & Dykstra, 2009; Ouellette et al., 1999; Rivis et al., 2006; Spijkerman et al., 2007). We urge scholars to consider revisiting those data with a focus on identifying potential interactive effects within the PWM.

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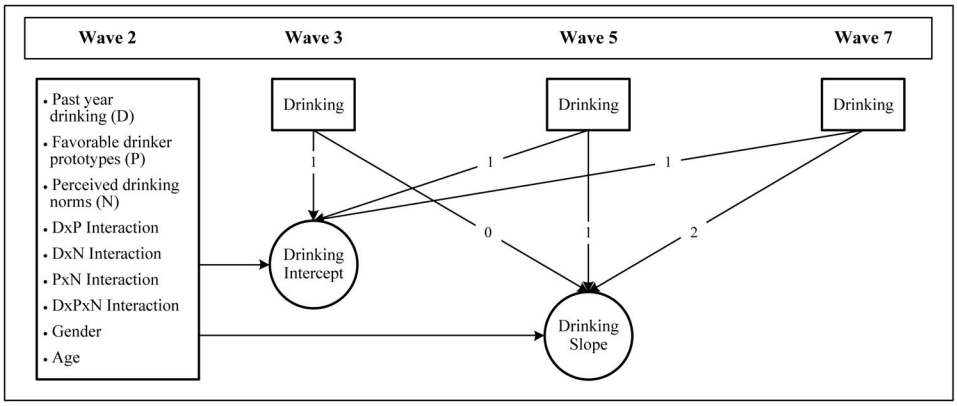

Figure 1.
Final conditional linear growth model

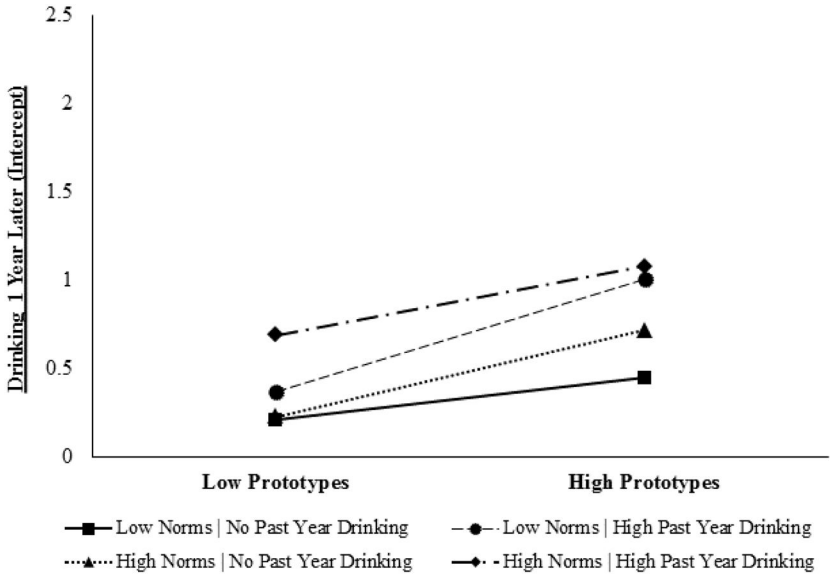

Figure 2.

Simple effects of favorable drinker prototypes on Year 2 drinking (growth model intercept set to Year 2) plotted at 1 standard deviation below (low) and above (high) the sample means of favorable drinker prototypes and perceived drinking norms for adolescents reporting (a) no past year drinking and (b) one standard deviation above (high) the sample mean past year drinking

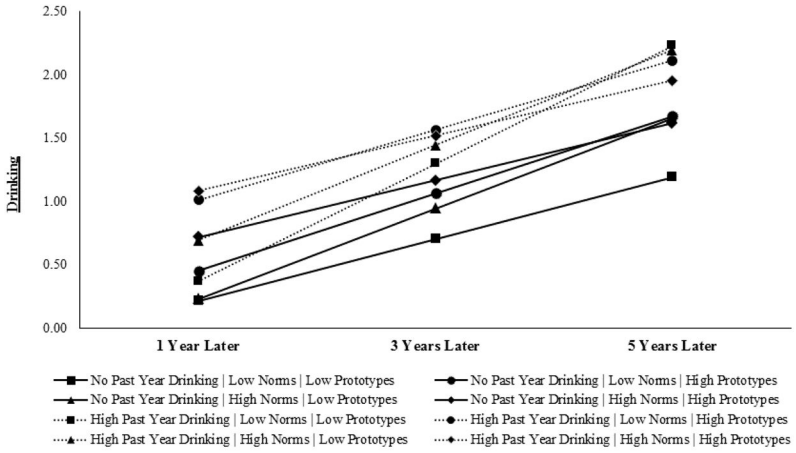

Figure 3.

Growth curves plotted at 1 standard deviation below (low) and above (high) the means of favorable drinker prototypes and perceived drinking norms for adolescents reporting (a) no drinking past year drinking and (b) one standard deviation above (high) the sample mean of past year drinking

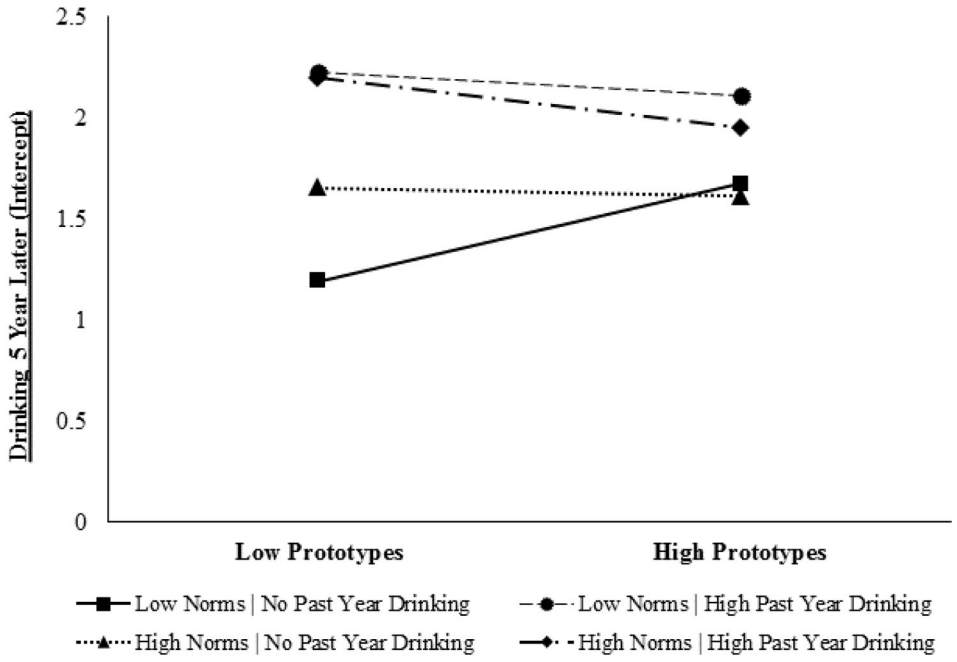

Figure 4.

Simple effects of favorable drinker prototypes on drinking 5 years later plotted at 1 standard deviation below (low) and above (high) the means of favorable drinker prototypes and perceived drinking norms for adolescents reporting (a) no past year drinking and (b) one standard deviation above (high) the sample mean of past year drinking

Table 1

Zero-order correlations among the study variables

	1	2	3	4	5	6	7
1. Favorable drinker prototypes	--						
2. Perceived drinking norms	.37**	--					
3. Past year drinking	.27**	.28**	--				
4. Drinking 1 year later	.31**	.24**	.36**	--			
5. Drinking 3 years later	.14**	.19**	.24**	.34**	--		
6. Drinking 5 years later	.13**	.09*	.19**	.19**	.35**	--	
7. Gender	.06	.08*	.05	.06	.01	−.05	--
8. Age	.25**	.44**	.25**	.24**	.19**	.05	−.05

** $p \leq .01$;

* $p \leq .05$

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Table 2

Results for conditional linear growth curve models

	Model 1			Model 2			Model 3		
	b	***SE***	**β**	***b***	***SE***	**β**	***b***	***SE***	**β**
Drinking Intercept (Wave 3)									
Positive Drinker Prototypes (P)	.19	.04	.23**	.19	.05	.23**	.18	.05	.22**
Perceived Drinking Norms (N)	.06	.05	.07	.08	.05	.09	.07	.05	.09
Past Year Drinking (D)	.38	.09	.33**	.47	.11	.41**	.39	.11	.33**
PxN interaction	--	--	--	.04	.05	.04	.06	.05	.07
PxD interaction	--	--	--	−.04	.09	−.05	.08	.10	.09
NxD interaction	--	--	--	−.09	.07	−.11	.03	.09	.03
PxNxD interaction	--	--	--	--	--	--	−.13	.06	−.23*
Drinking Growth									
Positive Drinker Prototypes (P)	−.05	.04	−.10	−.04	.04	−.08	−.04	.04	−.07
Perceived Drinking Norms (N)	.01	.04	.02	.01	.04	.02	.02	.04	.03
Past Year Drinking (D)	−.01	.06	−.01	.02	.08	.03	.10	.07	.13
PxN interaction	--	--	--	−.07	.04	−.13	−.10	.05	−.17*
PxD interaction	--	--	--	−.03	.08	−.06	−.14	.07	−.25
NxD interaction	--	--	--	.02	.06	.03	−.09	.07	−.16
PxNxD interaction	--	--	--	--	--	--	.11	.05	.31*
Drinking Intercept (Wave 7)									
Positive Drinker Prototypes (P)	.08	.07	.08	.08	.07	.07	.06	.07	.05
Perceived Drinking Norms (N)	.08	.07	.07	.08	.07	.08	.06	.07	.06
Past Year Drinking (D)	.25	.06	.24**	.36	.08	.35**	.41	.07	.39**
PxN interaction	--	--	--	−.11	.08	−.10	−.10	.07	−.09
PxD interaction	--	--	--	−.07	.06	−.09	−.14	.05	−.17**
NxD interaction	--	--	--	−.04	.06	−.05	−.10	.07	−.13
PxNxD interaction	--	--	--	--	--	--	.07	.04	.13*

** $p \leq .01$;

* $p \leq .05$

Table 3

Average growth rate in drinking at 1 standard deviation below (low) and above (high) the sample means of perceived drinking norms and favorable drinker prototypes for adolescents reporting (a) no past year drinking and (b) 1 standard deviation above (high) the sample mean of past year drinking, organized from strongest to weakest growth rate

	b	*SE*	β
Low Prototypes | Low Norms | High Past Year Drinking	.93	.19	1.70**
Low Prototypes | High Norms | High Past Year Drinking	.75	.12	1.38**
Low Prototypes | High Norms | No Past Year Drinking	.71	.10	1.31**
High Prototypes | Low Norms | No Past Year Drinking	.61	.09	1.12**
High Prototypes | Low Norms | High Past Year Drinking	.55	.12	1.01**
Low Prototypes | Low Norms | No Past Year Drinking	.49	.06	.90**
High Prototypes | High Norms | No Past Year Drinking	.49	.09	.82**
High Prototypes | High Norms | High Past Year Drinking	.44	.08	.80**

** $p \leq .01$.

Note: *b* = unstandardized coefficient; *SE* = standard error; β = standardized coefficient.