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Ethnic Differences in Positive Alcohol Expectancies During Childhood: The Pittsburgh Girls Study

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Abstract

Background—Positive expectancies about alcohol's effects are more likely to be endorsed with increasing age through adolescence, and the strength of positive alcohol expectancies in children appears to differ by ethnicity. Little is known about the extent to which differences in a measure's psychometric properties as a function of development and ethnicity may account for changes that are observed over time and ethnic differences. This study used measurement invariance methods to examine ethnic differences in the development of alcohol expectancies, and examined risk factors associated with girls' positive expectancies.

Methods—African-American (56%) and Caucasian (44%) girls (n = 570) in the age 7 cohort of the Pittsburgh Girls Study, and the girl's primary caretaker, were followed annually for 4 years (ages 7−10). Girls reported on alcohol expectancies at each wave, and physical aggression at Year 1. In Year 1, caretakers reported on neighborhood drug use, their own substance-related problems, and depression in the girl. Structural equation modeling was used to examine measurement invariance of positive alcohol expectancies, and to test associations of risk factors to initial level and change in expectancies.

Results—Five of 8 positive alcohol expectancy items showed measurement equivalence for African-American and Caucasian girls in cross-sectional, but not longitudinal, analyses. Measurement equivalence over ages 7−10 was demonstrated for Caucasian girls, and over ages 7−8 and 9−10 (i.e., a two-part model) for African-American girls. Risk factor analyses indicated that, for Caucasian girls, greater physical aggression was associated with higher initial positive expectancies.

Conclusions—Some developmental change and ethnic differences in the performance of positive expectancy items were identified, highlighting the utility of measurement invariance methods. Risk factor analyses suggest the potential benefit of targeted alcohol prevention interventions for certain girls.

Keywords

Alcohol Expectancies; Ethnic Differences; Children; Girls

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ETHNIC DIFFERENCES IN POSITIVE ALCOHOL EXPECTANCIES DURING CHILDHOOD: THE PITTSBURGH GIRLS STUDY

ALCOHOL EXPECTANCIES, WHICH are beliefs about the effects of alcohol on an individual's behavior and emotions, play a role in motivating drinking behavior (Jones et al., 2001). Among children, expectancies about alcohol's effects exist in the absence of actual experience with alcohol (Lang and Stritzke, 1993). Children's alcohol expectancies may be acquired and shaped through observation (e.g., alcohol use in the family), assimilation of cultural messages, and actual drinking experiences (Goldman et al., 1987). Alcohol expectancies, positive expectancies in particular, appear to serve as risk factors for the initiation and maintenance of alcohol use in youth (Christiansen et al., 1989; Dunn and Goldman, 1998; Smith et al., 1995). The measurement of alcohol expectancies, however, presents certain methodological problems (Leigh, 1989), which may be especially salient when examining the development of alcohol expectancies in children, and examining differences in expectancies across ethnic groups.

Cross-sectional studies of alcohol expectancies indicate that children, adolescents, and adults share a basic underlying positive–negative expectancy structure (Dunn and Goldman, 1996, 1998). However, Dunn and Goldman (1996) found that younger children's expectancies are less differentiated than adolescents' and adults' expectancies, and are generally more negative. Longitudinal research has documented an overall increase in positive alcohol expectancies during childhood, which may signal increasing readiness to initiate alcohol use (Hipwell et al., 2005). Changes in alcohol expectancies during childhood, however, may reflect developmental change in the psychometric properties of a measure, due in part to developmental differences in item interpretation and meaning, rather than actual change in beliefs about alcohol's effects (Schell et al., 2005). For example, although second and fifth graders both recognized "wild" and "dangerous" as common alcohol effects, second graders associated these outcomes with negative effects (e.g., rude), whereas fifth graders associated the same outcomes with positive effects (e.g., cool, talkative) (Dunn and Goldman, 1998). A cross-sectional study that examined changes in the psychometric properties of an alcohol expectancy measure found that certain expectancies (e.g., friendly, looking cool) showed differential item functioning in fourth and ninth grade students (Schell et al., 2005). After controlling for psychometric differences using measurement invariance methods, older students, consistent with previous research, reported more positive alcohol expectancies than younger students (Schell et al., 2005). Few studies have applied measurement invariance methods to longitudinal data in order to distinguish between differences in the interpretation of a measure's items over development and actual change in beliefs about alcohol's effects, despite the role that expectancies appear to play in facilitating the onset of alcohol use in youth.

Much less is known about ethnic differences in the development of alcohol expectancies. A small study of second and third graders residing in lower income urban neighborhoods found that African-American students were more likely than Caucasian students to believe that alcohol intensifies feelings (e.g., if mad, become more mad) and that alcohol increases the likelihood of physical aggression (i.e., drinking alcohol makes it easier to fight) (Corvo, 2000). A larger study, however, found few differences between African-American and Caucasian children's expectancies for short-term alcohol effects (Rinehart et al., 2006). Another study found that African-American girls, compared to Caucasian girls, had higher rates of both negative and positive alcohol expectancies, as well as higher rates of early alcohol use (Hipwell et al., 2005). In one of the largest studies of alcohol expectancies involving African American youth (grades 6 through 12), African American children reported higher levels of positive alcohol expectancies than Caucasian children (Meier et al., 2007). The mixed results across studies may be explained by differences in the expectancy measures used, as well as the age ranges studied. An important confound that has not been addressed in the study

of ethnic differences in alcohol expectancies is the extent to which any observed differences by ethnicity in alcohol expectancies may be due to ethnic differences in the interpretation and meaning of alcohol expectancy items.

Beyond demonstrating that the same construct is being measured across development, and equivalently in different ethnic groups, there is a need to increase understanding of the factors that influence change in alcohol expectancies over time. Toward this end, a developmental model of risk and protection (e.g., Hawkins et al., 1992) proposes that environmental factors (e.g., observations of public intoxication in the neighborhood), family factors (e.g., parental substance use problems), and individual factors (e.g., alcohol use, psychopathology) may influence the development of beliefs about the effects of alcohol (Lang and Stritzke, 1993; Leigh, 1989). Among family factors, children of parents with alcohol problems (“high-risk” youth) entered adolescence with more positive alcohol expectancies than “low-risk” children, suggesting some familial transmission of alcohol-related beliefs (Shen et al., 2001). Among individual factors, drinking experience in adolescence has been associated with increases in positive expectancies (Dunn and Goldman, 1998; Smith et al., 1995). In addition, certain youth, such as those with high levels of physical aggression or depression, appear to be at higher risk for early alcohol use (Brook et al., 1992; Fothergilll and Ensminger, 2006), and may hold more positive alcohol expectancies. Few studies have examined the role that neighborhood context and psychopathology play in the development of alcohol expectancies.

Previous research from our group has documented changes in positive and negative alcohol expectancies, and differences in expectancies by ethnicity, in girls over ages 8−10 (Hipwell et al., 2005). The current study extends this work by addressing the need to demonstrate measurement invariance when characterizing change in alcohol expectancies over time, and when examining differences in alcohol expectancies by ethnicity. Further, this study seeks to identify environmental, family, and individual factors that may underlie possible ethnic differences in the development of positive alcohol expectancies. These analyses target positive alcohol expectancies because of their importance in predicting the onset of alcohol use in youth (e.g., Christiansen et al., 1989), and focus on the study of girls because of the narrowing gender gap in rates of alcohol use [National Survey on Drug Use and Health (NSDUH), 2005]. We hypothesized that risk factors assessed at study entry (i.e., age 7), which included the parent's perception of drug use and dealing in the neighborhood, parental substance use problems, girl's report of lifetime alcohol use at age 7, and child psychopathology (i.e., high levels of physical aggression and depression), would be associated with higher initial level and more rapid increase in pre-adolescent girls’ positive alcohol expectancies. We further predicted that African-American girls’ higher positive alcohol expectancies, compared to Caucasian girls, would be associated with perceived substance use problems in the neighborhood and low socioeconomic status.

METHODS

Participant Recruitment and Characteristics

African-American (55.6%) and Caucasian (44.4%) girls in the age 7 cohort (n = 570) of the Pittsburgh Girls Study (PGS; N = 2451), and a primary caretaker of the girl, were followed annually for 4 years. Girls of other ethnicity (n = 18) were excluded from these analyses. PGS recruitment procedures have been documented elsewhere (Hipwell et al., 2002, 2005). In brief, following an enumeration of 103,238 households in the city of Pittsburgh, with over-sampling of disadvantaged neighborhoods, 2,876 eligible girls were identified (i.e., ages 5−8), of whom 2,451 agreed to study participation (85% of identified eligible girls). Of the 4 age cohorts in the PGS, the age 7 cohort was selected for these analyses because this is the first cohort for which at least 4 waves of alcohol expectancy data were collected. Girls’ mean age at each assessment was 7.7 years (SD = 0.3), 8.5 (SD = 0.3), 9.6 (SD = 0.3) and 10.6 (SD = 0.3). In

Year 1, the majority of caretakers providing data were biological parents (94%) and female (92%), most (60%) were married or cohabiting, and about half (52%) completed more than 12 years of education. Retention over 4 years of follow-up was high, ranging from 95% (Year 4) to 97% (Year 2). There were no differences ($p > 0.05$) between retained and attrited participants on any of the variables used in these analyses.

Procedure

After obtaining written informed consent from the parent and assent from the girl, home-based interviews were conducted annually with the parent and the girl. Structured interviews were conducted separately with each informant by highly trained interviewers who entered interview responses directly into a computer. At Year 1 (girl age 7), parents provided information on demographic and neighborhood characteristics, their own substance-related problems, and past year symptoms of depression in the girl. At each assessment, the girl provided data on alcohol expectancies. At Year 1, girls reported on lifetime use alcohol without parent permission and physical aggression toward others. Participants were compensated for their time. The University's Institutional Review Board approved the study protocol.

Measures

The Children's Expectancy Questionnaire-Revised (CEQ-R; Dunn and Goldman, 1996) assesses 8 positive (friendly, happy, pretty, smart, funny, cool, nice, good) and 11 negative (dangerous, dumb, mad, nasty, sad, scared, mean, sick, hurt others, crazy, stupid) alcohol expectancies. CEQ-R data were collected annually. The CEQ-R has been used with children ages 7 and older (Dunn and Goldman, 1996, 1998). For each expectancy, girls were asked “How often do people feel [effect] when they drink alcohol?” Responses were coded on a 4-point scale (1 = never, 2 = sometimes, 3 = usually, 4 = always). For measurement invariance analyses, the 4-point scale results in the estimation of 3 thresholds (e.g., the boundary or “threshold” between the response categories “never” and “sometimes”) for each item.

The Self-Reported Antisocial Behavior Scale (SRA; Loeber et al., 1989) collected information on girls’ lifetime use, without parent knowledge, of any beer, wine, or liquor at Year 1. The SRA has good concurrent validity, and have been used with children as young as age 6 (Loeber et al., 1989, 1998).

Year 1 measures of girls’ psychopathology included symptoms of depression and physical aggression. Physical aggression was measured by 4 items from the SRA. These items determined whether the child hit, slapped, shoved, scratched or pulled the hair of a child, sibling, parent, or an adult in school in the past year, and were rated on a 3-point scale: never, once or twice, more than twice. Physical aggression was determined by the number of (out of 4) different types of people toward whom the girl was physically aggressive in the past year to form a continuous measure of aggression. Girls’ depression was assessed by parent report of 11 items keyed to DSM-IV (American Psychiatric Association, 2000) criteria from the Children's Symptom Inventory-4 (CSI-4, Gadow and Sprafkin, 1994). The summed depression severity score has good test–retest reliability ($r = 0.56$). Cronbach's alpha for the depression summary score at Time 1 was 0.67.

At Year 1, parents reported on whether the family had received public assistance in the past year. Parents also reported on their perceptions of substance use in the neighborhood and the occurrence of drug dealing in the neighborhood at Year 1 in response to 2 items (3-point scale: “not a problem” to “a big problem”) from the Your Neighborhood measure (Loeber et al., 1998). This variable represents the parent's perception of the extent to which alcohol and other substance use (e.g., seeing “winos” on the street), and drug selling were problems in the area where the family lived. The proportion of parents who reported a “big problem” in response

to either item was used for the current analysis. In Year 1, the primary caretaker also reported (yes/no) on any past year substance-related problems that they had in response to an item on the Difficult Life Circumstances measure (Barnard, 1994), a measure that has good test–retest reliability and concurrent validity (Barnard, 1994).

Data Analysis

We conducted measurement invariance analyses for positive alcohol expectancies separately by ethnicity, at each of 4 ages (ages 7−10), using methods appropriate for ordered categorical data. First, items that were promising indicators of a single positive alcohol expectancy factor at each time point, and across ethnic groups, were identified in preliminary confirmatory factor analyses (CFA) of all 8 items. Based on the CFA results, a subset of 5 items was then examined for single factor structure separately by ethnicity, at each time point. Multiple group analyses were then used to test measurement invariance across ethnic groups at each time point. At the next step, which involved testing for measurement equivalence across time in the total sample, we did not find support for measurement equivalence. Thus, we examined measurement equivalence over time separately by ethnicity. After demonstration of measurement equivalence over time separately by ethnicity and specification of the growth model for each ethnic group, further analyses, conducted separately by ethnicity, examined the extent to which growth parameters (e.g., intercept and slope) were associated with selected demographic characteristics (e.g., receipt of public assistance), psychopathology (depression and physical aggression assessed at Year 1), the girl's report of lifetime alcohol use at Year 1, parent perception of neighborhood drug use and dealing, and parental substance use problems measured at Year 1.

Analyses were run using Mplus 4.2 (Muthén and Muthén, 1998−2006). In developing the measurement model, mean and variance-adjusted weighted least squares estimation (WLSMV) was used to handle ordered categorical data. Model fit was determined by several indices. Chi-square provides an indication of absolute fit of a specified model to the data, however, models may be rejected based on chi-square as an index of absolute fit due to large sample size (Cudeck and Browne, 1983). Thus, absolute fit of a model to the data also was evaluated using the Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Weighted Root Mean Residual (WRMR). Models with CFI and TLI > 0.90 indicate acceptable fit, and > 0.95 indicate good fit (e.g., Bentler, 1992). RMSEA < 0.05 and WRMR < 0.90 generally indicates adequate model fit (Muthén and Muthén, 1998−2006; Yu and Muthén, 2002). To test for differences between nested models (e.g., a freely estimated model and a factor loading constrained model) with ordered categorical data as the dependent variable (e.g., testing measurement invariance), the Mplus DIFFTEST procedure was used to determine the significance of changes in chi-square because the WSLMV estimator was used. Incomplete data were accommodated with maximum likelihood estimation procedures. Participants who provided expectancy data for at least one time point were included in longitudinal analyses.

Because full measurement invariance may not be a practical goal when a construct is expected to change with development (Pentz and Chou, 1994), we examined partial measurement invariance. In the cross-sectional multi-group case, at least 1 item in addition to the item used to set the scale of the factor (i.e., item for which the factor loading is set to 1) needs to be invariant to demonstrate partial measurement invariance (Baumgartner and Steenkamp, 1998; Byrne et al., 1989; Steenkamp and Baumgartner, 1998). The minimum of 2 invariant items per factor has been extended to longitudinal analyses (Baumgartner and Steenkamp, 1998), which at a minimum involved 2 adjacent time points for these analyses.

RESULTS

Ethnic Differences in Demographic Characteristics, Alcohol Use, and Psychopathology

Table 1 presents Year 1 data on the family's receipt of public assistance, parent perception of drug use and dealing in the neighborhood, girls' self-reported lifetime alcohol use without parental permission, and psychopathology in the girl (i.e., depression and physical aggression scores) for the total sample, and by ethnicity. In Year 1, African-American families were significantly more likely to have received public assistance, and to perceive neighborhood drug dealing and substance use (e.g., intoxication in public) to be a significant problem. By age 7, 1% of the sample reported alcohol use without parents' knowledge, with no difference by ethnicity. Compared to Caucasian girls, African-American girls had, on average, higher scores on physical aggression and depression (physical aggression: 1.5 (SD = 1.7) versus 1.2 (SD = 1.6); depression: 4.5 (SD = 2.9) versus 3.9 (SD = 2.2), respectively).

Developing the Positive Alcohol Expectancy Measurement Model

Preliminary CFAs specifying a single latent factor underlying 8 positive alcohol expectancy items suggested some reduction in goodness of fit over time for both ethnic groups according to several fit indices. Among the 8 items, "friendly" consistently had the lowest loading across waves for African-American girls, and was among the items with the lowest loadings over time for Caucasian girls. "Cool" had the lowest loadings at ages 7 and 9 for Caucasian girls, and was among the items with the lowest loadings over time for African-American girls. There was less consistency regarding the item with the highest loading over time. For Caucasian girls, "happy" had the highest loading of the 8 items at ages 7 and 9, but was among the items with the highest loadings only at age 7 for African-American girls. For African-American girls, "good" was the item with the highest loading at ages 8 and 10. Examination of corrected item-total correlations indicated that "friendly," and "cool" did not have stably high correlations with the other positive items at each time point (i.e., corrected item-total correlations > 0.4 in the total sample, and separately by ethnicity, across all 4 waves). Inspection of item thresholds at each time point also indicated that there was a relatively large difference in the estimate of the first threshold for "funny" (i.e., between response categories "never" and "sometimes") across the 4 waves; preliminary analyses confirmed the utility of excluding "funny" when conducting invariance analyses. Thus, these 3 items were excluded from further analyses.

The 5 remaining positive expectancy items (i.e., happy, pretty, smart, nice, good) had good fit to a single factor structure when modeled separately for Caucasians and African-Americans, at each time point, according to most fit indices (Table 2). For both ethnic groups, at each wave, CFI and TLI were high (≥0.95) and WRMR was acceptable (≤0.9). All factor loadings were significant ($p < 0.05$). For both ethnic groups, no item consistently had the lowest or highest factor loading over time.

Multiple group analysis tested the equality of factor loadings and thresholds for the 5 positive expectancy items by ethnicity at each wave. We first fit a model (i.e., "free estimation") in both groups allowing all parameters to be free, except factor means, which were fixed to zero in both groups, and scale factors, which were fixed to one in both groups. We then fit a model (i.e., invariance model) in both groups holding factor loadings and thresholds equal across groups, with factor means fixed to zero in the first group and free in the other group, and scale factors fixed to one in the first group and free in the other group (Muthеń and Muthén, 2005). Because the constrained model was not significantly different from the freely estimated model at each time point, equality of factor loadings and thresholds by ethnicity was indicated, providing support for measurement invariance by ethnicity at each time point. Across the 4 cross-sectional invariance models, no item consistently had the highest or lowest loading.

After establishing measurement invariance cross-sectionally (i.e., at each wave) across the 2 ethnic groups, the total sample was used to test measurement invariance over time (i.e., stability of the construct over development). For the full invariance model, the magnitude of the factor loading and thresholds for the same item were constrained to be equal at each time point. For tests of partial invariance over time, factor loadings and thresholds for a given item at a specific time point were freed in tandem to relax invariance constraints, starting with the relaxation of parameters for items at the first and last waves, basedonthe notion that these waves would most likely differ due to developmental change. Using this procedure (Muthén and Muthén, 2005), we were not able to demonstrate measurement invariance (even partially) over time for the total sample, despite support for cross-sectional invariance across ethnic groups. Given prior reports of ethnic differences in change in expectancies over time based on raw scores (e.g., Hipwell et al., 2005), we attempted to demonstrate measurement invariance over time separately for each ethnic group, following procedures similar to that for the total sample.

For Caucasian girls, “smart” had a default factor loading of 1 at all time points, “happy” was constrained to be equal at the first 2 waves, “nice” was constrained at waves 2 and 3, “pretty” was constrained at waves 3 and 4, and “good” was constrained to be equal at waves 2−4 (Table 3). “Smart” was selected to set the scale at each time point because preliminary analyses indicated that setting the factor loading of “smart” to 1 at each time point permitted the largest number of parameters to be held equal over time for Caucasian girls. The resulting partial measurement invariance model for Caucasian girls over time was not significantly different from the baseline freely estimated model ($\Delta\chi^2$ = 26.75/17 df, p = 0.06). Factor scores for the 5 positive expectancy items in Caucasian girls increased over time [Year 1 = 0.02 (SD = 0.51), Year 2 = 0.06 (SD = 0.60), Year 3 = 0.12 (SD = 0.48), Year 4 = 0.28 (SD = 0.52)].

For African-American girls, “nice” had a default factor loading of 1 at all time points; “smart,” “pretty,” “happy,” and “good” were constrained to be equal at waves 1and 2; and “smart” and “pretty” were constrained to be equal at waves 3 and 4. This partial measurement invariance model for African-American girls over time was not significantly different from the baseline model ($\Delta\chi^2$ = 20.72/17 df, p = 0.24). We note that there was no item that could be constrained to be equal over waves 2 and 3 (in addition to the item fixed at 1 to set the scale for a factor) that would result in a nonsignificant difference from the baseline model. Factor scores for the 5 positive expectancy items in African-American girls reflect this two-part (i.e., waves 1 and 2, and waves 3 and 4) structure [Year 1 = 0.02 (SD = 0.58), Year 2 = 0.03 (SD = 0.54), Year 3 = 1.09 (SD = 0.48), Year 4 = 1.09 (SD = 0.42)]. These results suggest a lack of measurement invariance for positive alcohol expectancies between ages 8 and 9 in this sample of African-American girls, thus, growth models were not pursued for this subsample.

Before proceeding to risk factor analyses, we tested the fit of linear and quadratic models to the longitudinal data for Caucasian girls. For Caucasian girls, a linear model did not have good absolute fit to the data (χ^2 = 56.26, df = 5, p = 0.00; CFI = 0.85, TLI = 0.82, RMSEA = 0.20). However, the quadratic model had good absolute fit to the data (χ^2 = 1.15, df = 1, p = 0.28; CFI = 1.00, TLI = 1.00, RMSEA = 0.02). The mean for the quadratic slope parameter was significant (β = 0.22, $p < 0.05$), but means for intercept and linear slope were not. Intercept and linear slope were negatively correlated (β = −0.75, $p < 0.05$), indicating that Caucasian girls who reported lower positive expectancies in Year 1 tended to show greater increases than those who reported higher levels initially.

Predictors of Year 1 Positive Expectancies and Change in Positive Expectancies

We tested the hypothesis, separately for each ethnic group, that specific risk factors (i.e., parent perception of neighborhood drug use and dealing, parental substance use problems, high levels of physical aggression and depression in the girl, and girl's report of any lifetime alcohol use at age 7) would be associated with higher initial level (in both Caucasian and African-American

girls) and more rapid increase (Caucasian girls only) in positive alcohol expectancies, controlling for certain demographic characteristics (i.e., Year 1 receipt of public assistance). For Caucasian girls, the conditional quadratic growth model had good absolute fit to the data (χ^2 [7, N = 253]=5.58, p = 0.59; CFI = 1.00; RMSEA = 0.00); results are presented in Table 4. Intercept was predicted by neighborhood drug problem (β = −0.32, $p < 0.05$), such that Caucasian girls living in neighborhoods where the parent perceived a big drug problem had lower positive alcohol expectancies. Intercept also was predicted by physical aggression (β = 0.06, $p < 0.05$), such that Caucasian girls high in physical aggression had more positive alcohol expectancies. Contrary to hypotheses regarding predictors of change in positive expectancies, slope and quadratic growth parameters were not predicted by the risk factors included in the model.

For African-American girls, because we did not pursue a growth curve model, we conducted 2 regression analyses in which all independent variables (i.e., Year 1 variables of receipt of public assistance, parent drug problem, perceived neighborhood drug problem, girl's depression and physical aggression scores, and girl's report of lifetime alcohol use) were entered simultaneously to predict Year 1 positive expectancy factor score in the first regression model, then Year 4 positive expectancy factor score in the second model. The regression model predicting Year 1 positive expectancy factor score was not significant overall [F(6, 305) = 1.64], and the Year 4 regression model also was not significant overall [F(6, 305) = 1.93).

DISCUSSION

To our knowledge, this is the first longitudinal study to attempt to identify a set of positive alcohol expectancy items that demonstrated measurement equivalence over ages 7 to 10, and in African-American and Caucasian ethnic groups. Whereas prior research documented an increase in positive expectancies during childhood, as well as more positive alcohol expectancies among African-American than Caucasian children (Hipwell et al., 2005), results from this study provide some support for these earlier findings (e.g., increase in positive expectancies for Caucasian girls), but also suggest the need for some caution when interpreting change in positive expectancies over ages 7−10 in this subsample of African-American girls. Examination of factors within each ethnic group in the development of positive alcohol expectancies in childhood suggests the importance of high levels of physical aggression in Caucasian girls as a predictor of positive alcohol expectancies in childhood.

Changes in cognitive development during childhood, as well as possible differences in the interpretation and meaning of certain items across ethnic groups, highlight the importance of demonstrating measurement equivalence in the assessment of alcohol expectancies. Among the positive alcohol expectancies studied, “cool,” “friendly,” and “funny” were excluded from analyses either because they showed differential associations to other positive expectancy items over ages 7 to 10 (i.e., cool, friendly), or relatively large change in item threshold over time (i.e., funny). These findings are consistent with previous research indicating that “cool” had a low loading on a positive expectancy factor among both fourth and ninth graders (Schell et al., 2005), and that “cool” was an expectancy more likely to be activated by high school students than third and sixth graders (Dunn and Goldman, 1998). In addition, the low loading of “friendly” in this study of girls over ages 7−10 is similar to reports that “friendly” was judged a more likely outcome by older (e.g., ninth graders) than younger (e.g., third to fourth graders) students (e.g., Dunn and Goldman, 1998; Schell et al., 2005). The exclusion of “funny” in these analyses also is in accord with work by Dunn and Goldman (1996, 1998), which showed that endorsement of “funny” differed for younger and older children.

In both ethnic groups, there was little consistency over ages 7−10 in the highest and lowest loading positive expectancy items. This inconsistency over time in factor loadings suggests

that, during this age range, “positive” expectancies regarding alcohol's effects are still developing, and are not focused around any specific “positive” effect, likely due to limited actual drinking experience and largely opportunistic exposure to alcohol's effects on other people. Further research is needed to understand how actual alcohol experience and accumulating observations of alcohol's effects on others impact the structure and content of positive alcohol expectancies as a function of age.

Although partial measurement equivalence could be demonstrated in Caucasian girls over ages 7−10, this conclusion was based on a minimum of 2 invariant items per factor for a minimum of 2 adjacent time points, and not across the entire set of 4 time points. Total measurement invariance may be an unrealistic goal in longitudinal research when participants and constructs are expected to show developmental changes over time (Pentz and Chou, 1994). If this is the case, as in this study's analyses, conceptual considerations also need to be taken into account when evaluating measurement invariance (Byrne et al., 1989; Pentz and Chou, 1994). Thus, we based our conclusion of partial measurement invariance on certain statistical criteria (e.g., chi-square difference test), and on the general concordance of our results with prior research, which has described changes in positive expectancies with development (e.g., Dunn and Goldman, 1998). It is important to note, however, that the relatively small number of common items over time may result in relatively large standard errors for the latent variable, resulting in reduced ability to predict change in expectancies over time, despite relatively large sample size.

In contrast to results for Caucasian girls, there appeared to be some discontinuity in the endorsement of positive expectancies between ages 8 and 9 for African-American girls, which precluded the use of growth modeling for this subgroup and subsequent tests of ethnic differences in risk factors associated with growth in positive alcohol expectancies. The measurement equivalence results obtained in this study warrant replication in other cohorts of the PGS, in both Caucasian and African-American girls; as well as in other longitudinal studies of children. The discontinuity in positive expectancies that was identified for African-American girls in this PGS cohort, however, suggests the importance of identifying positive expectancy items that can “bridge” the gap between ages 8 and 9, perhaps through qualitative research to identify an expanded set of positive expectancy items that may provide more consistency as indicators of the construct during this developmental period. Given that positive alcohol expectancies are just beginning to develop in childhood, and often exist in the absence of actual alcohol consumption, some lack of invariance over time for the construct may be expected.

Analyses within each ethnic group suggested the influence of certain risk factors as predictors of positive alcohol expectancies in girls. For Caucasian girls, parent perception of a problem with drugs and drug dealing in the neighborhood was associated with lower initial level of positive expectancies. This result suggests that, rather than promoting beliefs about the positive effects of alcohol, perceptions of problematic alcohol and drug use in the neighborhood may foster a girl's belief that alcohol has few positive effects on behavior, either through direct observation or exposure to parent complaints and concern about substance use and drug dealing in the neighborhood.

Among Caucasian girls, the finding that greater physical aggression was associated with more initial positive alcohol expectancies is in accord with reports that physical aggression predicted early alcohol use in adolescents (e.g., Brook et al., 1992), and that the association between delinquency and alcohol use in sixth to eleventh graders was mediated by positive alcohol expectancies (Meier et al., 2007). This study adds to this literature by showing that physical aggression at an early age in Caucasian girls is associated with a cognitive precursor of alcohol use. The finding also appears to fit into the acquired preparedness model of problematic alcohol

use (e.g., McCarthy et al., 2001), which proposes that trait disinhibition (which may be manifested by physical aggression) in combination with learning about alcohol's effects (through one's own consumption and vicarious learning) may increase the likelihood of problematic drinking. However, whereas McCarthy et al. (2001) found that alcohol expectancies mediated the relationship between disinhibition and alcohol use in Caucasian and African-American college students, the association of physical aggression and positive expectancies was observed only for Caucasian girls in this study. Differences in participant age and experience with alcohol may underlie inconsistency in the findings across the 2 studies.

In contrast to results for Caucasian girls, none of the risk factors that were examined predicted positive alcohol expectancies at Year 1 (age 7) or Year 4 (age 10) for African-American girls. The null findings with regard to the risk factor analyses for African-American girls suggests that more sensitive measures of substance use in the neighborhood and family may be needed, and that other risk factors (e.g., peer substance use), which were not included in the analyses, need to be considered. In addition, it is possible that psychopathology as a predictor of positive alcohol expectancies may emerge later among African-American girls.

The risk factor analyses conducted provide some preliminary data on correlates of childhood positive alcohol expectancies. However, the developmental factors associated with changes in positive alcohol expectancies during childhood remain unclear. Actual drinking experience and peer alcohol use, may facilitate increases in positive expectancies (e.g. Cumsille et al., 2000; Smith et al., 1995), and were not included in the model. The negative findings for parental alcohol use on girls' positive expectancies are in line with other research, which suggests that extra-familial influences may have greater impact than parental alcohol use on adolescents' report of positive alcohol expectancies (e.g., Slutske et al., 2002). Instead of using parental report of alcohol-related problems, assessment of the girl's perceptions of parental alcohol use may provide a more direct method of determining how parental alcohol use may impact the development of alcohol expectancies in children. Overall, study findings suggest the potential benefit of targeted interventions (e.g., for Caucasian girls with high levels of physical aggression) to delay the onset of alcohol use in high-risk girls.

Certain study limitations warrant consideration. Analyses demonstrated statistical measurement equivalence across over ages 7 to 10 in Caucasian girls, and over ages 7−8 and 9−10 in African-American girls. However, qualitative research on children's developing beliefs and attitudes related to alcohol effects is needed to further reduce measurement error in the assessment of alcohol expectancies in children, and to obtain a better understanding of how cognitive development, social, and individual factors influence the shift to more positive alcohol expectancies through adolescence. Analyses of ethnic differences also assumed greater homogeneity within, than between, African-American and Caucasian ethnic groups (Barrera et al., 1999), although this limitation may be mitigated by the use of a regional (rather than national) population sample. Child reports of own alcohol use may be subject to biased reporting, but have demonstrated reliability and concurrent validity (Donovan et al., 2004). Given these limitations, cross-validation and replication of results in other longitudinal studies is recommended (MacCallum et al., 1992). In addition, this study did not examine the development of negative alcohol expectancies, although consideration of both positive and negative expectancies may be essential to understanding youths' increasing readiness to initiate alcohol use through adolescence, and to guiding the development of effective prevention programs.

Measurement invariance analyses indicated some developmental change in the performance of certain positive alcohol expectancy items. Differences in risk factors predicting initial level and rate of change in positive expectancies in analyses conducted separately within each ethnic group suggest the potential utility of interventions that target early beliefs about alcohol in

high-risk girls (e.g., for the Caucasian subsample, those with high levels of physical aggression). In this study's relatively limited observation window, a fairly complex picture of the development of positive alcohol expectancies emerges. Further research is needed to better understand the factors that influence change in positive alcohol expectancies through adolescence and young adulthood, and to examine how the developmental interplay of both positive and negative alcohol expectancies confers risk for early initiation to alcohol use.

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Table 1

Descriptive Statistics for Year 1 Socioeconomic Status, Girls' Report of Lifetime Alcohol Use, and Psychopathology

Variable	Total sample	African-American	Caucasian	Difference by ethnicity
Received public assistance (%)	40.9	61.5	15.0	$\chi^2(1\ N = 570) = 125.86^{**}$
Neighborhood substance use/ dealing (%)	21.2	30.6	9.5	$\chi^2(1, N = 570) = 37.51^{**}$
Parent alcohol or drug problem (%)	2.5	3.5	1.2	$\chi^2(1, N = 570) = 3.06$
Girl self-reported lifetime alcohol use	1.1	1.3	0.8	$\chi^2(1, N = 559) = 0.03$
Physical aggression, Mean (SD)	1.4 (1.7)	1.5 (1.7)	1.2 (1.6)	$t(567.8, N = 570) = -3.10^{**}$
Depression, Mean (SD)	4.2 (2.6)	4.5 (2.9)	3.9 (2.2)	$t(553.6, N = 570) = -2.43^{*}$

SD, standard deviation.

$^{*}p < 0.05$

$^{**}p < 0.01$

Table 2

Standardized Parameter Estimates and Fit Indices for Confirmatory Factor Analysis of Single Factor Structure for 5 Positive Alcohol Expectancy Items Fit to a Single Factor by Age and Ethnicity

	Caucasian Girls			
	Age 7 (*N* = 209)	**Age 8 (*N* = 207)**	**Age 9 (*N* = 220)**	**Age 10 (*N* = 222)**
Happy	0.72	0.74	0.76	0.61
Pretty	0.74	0.73	0.63	0.70
Smart	0.71	0.74	0.59	0.68
Nice	0.70	0.76	0.58	0.77
Good	0.64	0.78	0.71	0.63
χ^2	5.55 (df = 4), $p = 0.24$	3.54 (df = 5), $p = 0.62$	12.27 (df = 5), $p = 0.03$	10.38 (df = 5), $p = 0.06$
CFI	0.99	1.00	0.98	0.98
TLI	0.99	1.00	0.97	0.99
RMSEA	0.04	0.00	0.08	0.07
WRMR	0.39	0.25	0.52	0.46

	African-American Girls			
	Age 7 (*N* = 273)	**Age 8 (*N* = 278)**	**Age 9 (*N* = 284)**	**Age 10 (*N* = 287)**
Happy	0.72	0.63	0.58	0.61
Pretty	0.63	0.60	0.74	0.57
Smart	0.70	0.71	0.70	0.65
Nice	0.77	0.66	0.58	0.61
Good	0.64	0.65	0.63	0.73
χ^2	9.53 (df = 5), $p = 0.09$	6.36 (df = 5), $p = 0.27$	10.26 (df = 5), $p = 0.07$	9.22 (df = 4), $p = 0.06$
CFI	0.99	0.99	0.98	0.98
TLI	0.99	0.99	0.98	0.97
RMSEA	0.06	0.03	0.06	0.07
WRMR	0.44	0.40	0.47	0.49

All factor loadings are significant at $p < 0.05$.

df, degrees of freedom; CFI, Confirmatory Fit Index; TLI, Tucker Lewis Index; RMSEA, Root Mean Square Error of Approximation; WRMR, Weighted Root Mean Residual.

Table 3

Unstandardized Parameter Estimates and Fit Indices for Longitudinal Measurement Invariance Models of 5 Positive Expectancy Items by Ethnicity

Model fit indices	χ^2	df	*p*	CFI	TLI	RMSEA	WRMR	χ^2 Difference
Caucasian (*N* = 253)								
Free estimation	106.81	56	0.00	0.95	0.95	0.06	0.94	
Full invariance	178.13	69	0.00	0.89	0.93	0.08	1.31	128.94 (df = 32), *p* = 0.00
Partial invariance	115.00	62	0.00	0.94	0.96	0.06	1.01	26.75 (df = 17), *p* = 0.06
African-American (*N* = 317)								
Free estimation	95.74	77	0.07	0.98	0.98	0.03	0.77	
Full invariance	181.22	92	0.00	0.89	0.93	0.06	1.14	127.35 (df = 33), *p* = 0.00
Partial invariance	105.32	85	0.06	0.97	0.98	0.03	0.83	20.72 (df = 17), *p* = 0.24

Caucasian Girls: Factor Loadings for Partial Measurement Invariance Over Time

	Age 7, Unstandardized (SE)	Age 8, Unstandardized (SE)	Age 9, Unstandardized (SE)	Age 10, Unstandardized (SE)
Smart	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)
Pretty	1.15 (0.14)	0.97 (0.09)	1.03 (0.08)	1.03 (0.08)
Happy	1.04 (0.07)	1.04 (0.07)	1.17 (0.12)	1.09 (0.09)
Nice	1.24 (0.13)	1.08 (0.07)	1.08 (0.07)	1.19 (0.09)
Good	0.98 (0.12)	1.06 (0.06)	1.06 (0.06)	1.06 (0.06)

African-American Girls: Factor Loadings for Partial Measurement Invariance Over Time

	Age 7, Unstandardized (SE)	Age 8, Unstandardized (SE)	Age 9, Unstandardized (SE)	Age 10, Unstandardized (SE)
Smart	0.92 (0.08)	0.92 (0.08)	1.26 (0.12)	1.26 (0.12)
Pretty	0.84 (0.07)	0.84 (0.07)	1.28 (0.12)	1.28 (0.12)
Happy	0.94 (0.07)	0.94 (0.07)	0.90 (0.12)	1.18 (0.14)
Nice	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)	1.00 (0.00)
Good	0.91 (0.07)	0.91 (0.07)	1.00 (0.13)	1.38 (0.15)

Note: All factor loadings for both ethnic groups were significant, $p < 0.05$. Unstandardized estimates are reported because standardized esti-mates varied across waves due to freely estimated factor variances, which are used in computing the standardized loadings

df, degrees of freedom; CFI, Confirmatory Fit Index; TLI, Tucker Lewis Index; RMSEA, Root Mean Square Error of Approximation; WRMR, Weighted Root Mean Residual; SE, standard error.

Table 4

Summary of Variables Predicting Initial Level and Growth in Positive Alcohol Expectancies for Caucasian Girls

	Caucasian (*N* = 253)		
	B	**SE B**	**β**
Intercept			
Public assistance	−0.08	0.09	−0.11
Parent drug problem	0.21	0.28	0.30
Neighborhood drug problem	−0.22	0.10	−0.32*
Depression	0.01	0.01	0.02
Physical aggression	0.04	0.02	0.06*
Lifetime alcohol use at Year 1	−0.10	0.33	−0.14
Slope			
Public assistance	−0.08	0.10	−0.14
Parent drug problem	−0.06	0.32	−0.10
Neighborhood drug problem	0.17	0.12	0.27
Depression	0.02	0.02	0.03
Physical aggression	−0.01	0.02	−0.01
Lifetime alcohol use at Year 1	−0.27	0.37	−0.43
Quadratic			
Public assistance	0.02	0.03	0.16
Parent drug problem	0.02	0.10	0.16
Neighborhood drug problem	−0.05	0.04	−0.34
Depression	0.00	0.00	−0.03
Physical aggression	0.00	0.01	−0.03
Lifetime alcohol use at Year 1	0.09	0.12	0.62

Year 1 corresponds to the girl at age 7. A growth model was not identified for African-American girls due to lack of measurement invari-ance over time.

B, unstandardized parameter estimate; *β*, standardized parameter estimate; SE, standard error.

* $p < 0.05$.