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Harsh Environments, Life History Strategies, and Adjustment: A Longitudinal Study of Oregon Youth

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Abstract

We modeled the effects of harsh environments in childhood on adjustment in early emerging adulthood, through parenting style and the development of fast Life History Strategies (LHS; risky beliefs and behaviors) in adolescence. Participants were from the Oregon Youth Substance Use Project (N = 988; 85.7% White). Five cohorts of children in Grades 1–5 at recruitment were assessed through one-year post high school. Greater environmental harshness (neighborhood quality and family poverty) in Grades 1–6 predicted less parental investment at Grade 8. This parenting style was related to the development of fast LHS (favorable beliefs about substance users and willingness to use substances at Grade 9, and engagement in substance use and risky sexual behavior assessed across Grades 10–12). The indirect path from harsh environment through parenting and LHS to (less) psychological adjustment (indicated by lower life satisfaction, self-rated health, trait sociability, and higher depression) was significant (indirect effect −.024, p = .011, 95% CI = −.043, −.006.). This chain of development was comparable to that found by Gibbons et al. (2012) for an African-American sample that, unlike the present study, included perceived racial discrimination in the assessment of harsh environment.

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Keywords

evolutionary development theory; prototype willingness model; substance use; risky sex; emerging adulthood

Children growing up in in harsh environments face numerous disadvantages, including negative effects on mental and physical development that persist into adulthood. Harsh environments may have enduing effects through the increased likelihood of less parental investment and the development fast life history strategies (LHS) characterized by risky behaviors including substance use. This investigation drew from evolutionary development theory (Ellis & Bjorklund, 2012) and the prototype willingness model (Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008) to hypothesize a pathway to optimal development spanning childhood to early emerging adulthood. The model was tested on a predominantly White sample to evaluate whether environmental harshness experienced by White working class children had comparable effects on subsequent development to the harshness experienced by Black youth (Gibbons et al., 2012).

Gibbons et al. (2012) used a LHS framework from evolutionary developmental psychology (Ellis & Bjorklund, 2012) to guide their study of the effects of harsh environments on youth development. These strategies have evolved to maximize reproductive success under different environmental conditions (Belsky, Steinberg, & Draper, 1991; Brumbach, Figueredo, & Ellis, 2009; Ellis et al., 2012). A harsh environment signals the threat of a short life expectancy. In response, adaptation results in fast LHS that include aggression, dominance, risk taking, early puberty and sexual debut, which promote early reproductive fitness. In more benign environments, adaptation results in the development of slow strategies that promote long-term as opposed to short-term reproductive success by accumulating social, psychological, and tangible resources to invest in offspring. From an evolutionary perspective, adolescence is a particularly important developmental period in which to study LHS because pubertal changes mark the transition to reproductive maturity (Figueredo et al., 2006).

Risky sexual behavior, such as unprotected sex with multiple partners, often occurs in association with substance use and other problem behaviors (Hendershot, Magnan, & Bryan, 2010; Jessor & Jessor 1977). Previous research has demonstrated that these adolescent behaviors indicative of fast LHS are preceded by the development of beliefs that increase the likelihood of future risk taking through both intentional and reactive processes. According to the prototype willingness model (Gerrard et al., 2008), in addition to deliberately intending to take risks, risky behavior can occur as a result of being open to risk-taking if the opportunity arises (i.e., willingness). Also, having more positive images (i.e., prototypes) of those who engage risky activities increases the likelihood of risk taking. Consistent with the model, adolescents who believe they would be willing to use substances if offered them, and who have more favorable social images (prototypes) of their substance-using peers are more likely to become substance users themselves (Andrews, Hampson, & Peterson, 2011; Andrews, Hampson, Barckley, Gerrard & Gibbons, 2008; Gerrard, Gibbons, Stock, Vande Lune, & Cleveland, 2005).

Integrating evolutionary development theory with the prototype willingness model, beliefs and behaviors concerning substance use and risky sex may be viewed as part of a fast LHS (Olderbak & Figueredo, 2009; Olderbak, Gladdeen, Wolf, & Fugueredo, 2014). Those who develop faster LHS, are likely to be have poorer outcomes including being less well-adjusted, as defined by dominant, middle-class, Western values (Simpson, Griskevicius, Kuo, Sung, & Collins, 2012). Gibbons et al. (2012) tested this integrated model in an African-American sample: the Family and Community Health Study (FACHS; Wills, Gibbons, Gerrard, & Brody, 2000). They observed an indirect pathway from measures of childhood harsh environment (perceived racial discrimination, parental investment, and environmental risk) through adolescent LHS beliefs and behaviors to poorer adjustment at age 21–22. In the present study, we investigated a similar model for the primarily White participants in the Oregon Youth Substance Use Project, a major difference between studies being the measurement of harsh environments. We hypothesized that children with greater exposure to harsh environments (neighborhood quality and family poverty but no measure of discrimination) would experience less parental investment (less monitoring, more inconsistent discipline, less positive parenting) (Hypothesis 1), which would lead to faster LHS characterized by more favorable beliefs about substance users and greater willingness to use substances (Hypothesis 2), and higher and increasing levels of risky behaviors (risky sex and substance use) across late adolescence (Hypothesis 3). We predicted that high and increasing levels of risky behaviors would predict poorer adjustment (less life satisfaction, self-rated health, and sociability, more depression) measured in early emerging adulthood at one year post high school (Hypothesis 4).

Method

Participants

An average of 215 students in each of the 1st through 5th grades from one school district within a working class community in Western Oregon participated in the first assessment (T1). The average age for students at T1 was 9.0 years (SD = 1.45). The supplementary online material provides an overview of the cohort sequential design (see supplementary Table 1), the representativeness of the sample used here, attrition, and justification for collapsing across cohorts. In general, this sample was representative of students in the school district (for details, see Andrews, Tildesley, Hops, Duncan, & Severson, 2003). The sample analyzed here (N = 988; 490 males and 498 females) consisted of participants who responded to at least four of the items used to assess cognitions, behaviors, and adjustment, and had at least one parent who reported on parenting at Grade 8 (or Grade 7 if Grade 8 was missing. The participants were European American (85.7%), Hispanic (6.7%), African American (1%), and other or mixed-race identity (6%); 48% were eligible for free or reduced lunch, an indicator of low income, at some time in elementary school, and 71.2% of mothers had more than a high school education. One or two parents of 942 students in the sample completed at least one mailed questionnaire and, for 599 students, two parents completed a questionnaire on at least one of the assessments.

Assessment Procedures

The sample was assessed annually (except for one missing assessment due to a funding gap) through one-year post-high school. Students in the 1st through 3rd grades were assessed by interview, 4th grade and above by questionnaire (for further details on assessment procedures, see the online supplementary material).

Measures

Harsh environments (Grades 1–6)—Three indicators were used to measure this latent construct. (1) A neighborhood quality scale used Year 2000 census tract data for the child's address at the time of the first assessment: percent male unemployment, number of households in poverty, percent not graduating from high school, percent below the poverty line, and percent of vacant dwellings (Ennett, Flewelling, Lindrooth, & Norton, 1997). The variables were standardized within census tract and averaged to give each child's neighborhood quality score (α = .81). Neighborhood quality could only be determined for the first assessment because a record of the child's subsequent addresses was not maintained. (2) Two items from the Neighborhood Safety Scale (Greenberg et al., 1999) assessed how parents felt about their neighborhood (1 = "Very bad," 4 = "Very good") and their perception of frequency of crime in the neighborhood (1 = "Never," 5 = "Very often."). Mothers' and fathers' responses were significantly correlated ($p < .01$) at each assessment. Their responses were standardized and averaged, and the means of reports from one or both parents at each of Grades 1–6 were used as indicators of a latent construct of neighborhood safety. (3) Exposure to family poverty was assessed by a dichotomous variable indicating whether or not the child was eligible for the free or reduced lunch program, as indicated in school records, in each of Grades 1–6, and used as indictors of a latent construct of poverty.

Parenting (Grade 8)

Three scales from the Alabama Parenting Questionnaire (APQ; Shelton, Frick, & Wootton, 1996) were indicators of this latent construct. At Grade 8 (or Grade 7 if no parental report was available for Grade 8), parents reported frequency (1 = "Never," 5 = "Always") for monitoring/supervision (moms' α = .76, dads' α = .73), inconsistent discipline (moms' α = .76, dads'α = .75), and positive parenting (moms' α = .79, dads' α = .80). Higher scores on each scale represented less parental investment (i.e., less monitoring, more inconsistent discipline, and less positive parenting). Where scores from both parents were available, they were averaged.

LHS Beliefs about substances (Grade 9)

Social images of, and willingness to use, three substances were indicators of this latent construct. If their social images at Grade 9 were missing, their social images at Grade 8 were used. Participants were asked whether they believed kids who smoke cigarettes/drink alcohol/use marijuana are "cool or neat," "popular," and "exciting" (0 = "No," 1 = "Maybe," 2 = "Yes"); alphas ranged from .75–.82, and responses to the three items were summed with higher scores indicating more favorable social images (Andrews & Peterson, 2006). Participants rated their willingness to try each substance if they were offered it by a friend, 1 = "Not at all willing," 5 = "Very willing", and ratings were averaged across two items for

each substance (Andrews et al., 2008). Willingness at Grade 9 was used if Grade 8 willingness was missing. Correlations between the two items ranged from .69 for cigarettes at Grade 8 to .83 for marijuana at Grade 9.

LHS Risky behaviors (Grades 10–12)

Four indicators for constructs at each of Grades 10, 11, and 12 were: Engagement in risky sex in the past year was measured at each grade by the sum of two items: the number of people with whom they had sex without a condom, and the number of people with whom they had sex without a condom when high, stoned, or drunk, 0 = "None," 4 = "More than 10 people;" and ratings for extent of use of each substance (alcohol, cigarettes, and marijuana) in the past year, ranging from 0 = "Never" to 5 = "Some each day".

Adjustment (one-year post high school)

There were four indicators. (1) Life Satisfaction (Life Dimensions Questionnaire; Roberts, Pascoe, & Attkisson, 1983), measured how satisfied (1 = "Very dissatisfied," 5 = "Very satisfied") they were with different aspects of their lives (e.g., parents, friends, school, income), $\alpha = .90$. (2) Self-rated Health was assessed by the mean of two standardized items ($r = .48$): satisfaction with overall health (1 = "Very dissatisfied," 5 = "Very satisfied,") and how "strong and healthy" they felt (1 = "Does not describe me at all," 5 = "Describes me very well"). (3) Sociability was measured by the mean of self-ratings on four single-word items derived from the Big Five Inventory extraversion scale (*social/outgoing*, *energetic*, *friendly*, *helpful*) where 1 = "False," 2 = "Somewhat false," 3 = "Neither true nor false," 4 = "Somewhat true," and 5 = "True," $\alpha = .78$ (John, Naumann, & Soto, 2008). (4) Depressive Symptoms were assessed by the CES-D scale (Radloff, 1977) using the sum of ratings for 20 items 0 = "Rarely, none of the time," 3 = "Most or all of the time"), $\alpha = .92$.

Results

Measurement Models for Latent Constructs

The means and standard deviations of the indicators of the latent constructs are provided in Table 3 of the online supplementary materials. Bivariate correlations showed that indicators within-construct were generally highly correlated and more so than indicators between constructs (see supplementary Table 2). Mplus Version 7.0 (Muthén & Muthén, 1998–2012) with maximum likelihood estimation for missing data was used to test the fit of the measurement, growth, and structural models. Model fit was evaluated by the Chi-square statistic and, because it is sensitive to sample size, it was supplemented by the two-index approach recommended by Hu and Bentler (1999): the root mean square error of approximation (RMSEA), and the comparative fit index (CFI). They suggested cutoffs of . 95 for CFI, and .06 for RMSEA for excellent fit, and statistics close to these cutoffs are considered acceptable. Correlations between indicators at the same grade or between indicators assessing the same substance across grades were included in the models if indicated by modification indices. The bivariate scatterplots between the factor scores for the latent variables in the model were inspected for linearity.

Harsh environment (Grades 1–6)—The latent construct of harsh environment had excellent fit, χ^2 (58, N = 1075) = 153.044; CFI = .960; RMSEA = .039; 90% CI .032, .047, with significant variance, σ^2 = .020, S.E. = .006, p = <.001.

Parenting (Grade 8)—A fully identified latent construct (hence no fit indices) assessing parenting at Grade 8 was measured by three indicators: monitoring, inconsistent punishment, and positive parenting. The variance of this construct was significant, σ^2 = 11.724, S.E. = 1.645, p = <.001.

LHS Beliefs about substances (Grade 9)—A latent construct assessing beliefs at Grade 9 was measured by six indicators: social images of users, and willingness to use each of cigarettes, alcohol, and marijuana. The CFI indicated excellent fit whereas the RMSEA was adequate, χ^2 (5, N = 976) = 53.47; CFI = .981; RMSEA = .100; 90% CI .981, .944. The construct had significant variance, σ^2 = .590, S.E. = .091, p <.001.

LHS Risky Behaviors (Grades 10–12)—Behaviors across Grades 10, 11, and 12 were modeled as a curve of factors (McArdle, 1988). A latent construct assessing behaviors at each grade (Grade 10, 11, and 12) was measured by four indicators: engaging in risky sex, and use of cigarettes, alcohol, and marijuana. The intercept (or level) and slope of a growth curve across the three assessments was then estimated. Within each model, the intercept was fixed to load equally on each assessment across all grades. Linear growth was set to 0 at the first assessment and moved incrementally by one to the last assessment. The model fit was good, the means of the intercept and slope differed significantly from zero, and the variances of the intercept and the slope were significant (see supplementary Table 4). Risky behaviors increased over the three grades, and the intercept and slope were not correlated, b^* = −.127, p = .06.

Adjustment (one-year post high-school)—Adjustment was measured by four indicators (life satisfaction, self-rated health, sociability, and depressive symptoms) with good model fit, χ^2 (2, N = 812) = 6.854; CFI = 1.000; RMSEA = .055; 90% CI .014, .102, with significant variance, σ^2 = .404, p <.001.

Structural Model

We tested a model that included all the hypothesized paths among the constructs: parenting was regressed on harsh environment (Hypothesis 1); LHS beliefs were regressed on harsh environment (Hypothesis 2); the intercept and slope of LHS behaviors were regressed on cognitions (Hypothesis 3); and adjustment was regressed on the intercept and slope of LHS behaviors (Hypothesis 4). The fit of this model was good, χ^2 (638, N = 988) = 1318.04; CFI = .952; RMSEA = .033; 90% CI .030, .035. The final, trimmed model with non-significant paths removed is shown in Figure 1. The fit of the trimmed model was also good, χ^2 (645, N = 988) = 1329.467; CFI = .951; RMSEA = .033; 90% CI .030, .035. Within MPlus, we tested the significance of all indirect paths using a bootstrapping method (Bollen & Stine, 1990; Shrout & Bolger, 2002).

Consistent with Hypothesis 1, the path from harsh environment to parenting was significant indicating that less parental investment was associated with more harsh environments. As

predicted by Hypothesis 2, less parental investment at Grade 8 was associated with more positive LHS beliefs at Grade 9. These beliefs predicted the intercept of LHS behaviors, consistent with hypothesis 3, but not the slope of behaviors. The intercept, but not the slope, of LHS behaviors predicted adjustment one-year post high school. That is, consistent with Hypothesis 4, youth who engaged in higher levels of LHS behavior in Grades 10 through 12 had poorer adjustment one-year post high school. The total standardized indirect effect was significant, −.024 p = .011, 95% CI = −.043, −.006. The indirect effect from harsh environment to adjustment through parenting, LHS beliefs and behaviors was significant, −.015, p = .011, 95% CI = −.026, −.003. Parenting predicted the intercept of LHS behaviors, and the indirect effect from harsh environment to adjustment through parenting and LHS behaviors was also significant, −.010, p= *.045*, 95% CI = −.019, −.000.

Discussion

The present study examined the effects of early, harsh, neighborhood environments on later adjustment hypothesizing an indirect pathway through constructs drawn from evolutionary development theory and the prototype willingness model. We observed an indirect pathway from a harsh environment in childhood to poor adjustment through fast LHS (risk-promoting beliefs and risky behaviors) in early emerging adulthood. The constructs in our model were derived from evolutionary development theory, but they are also comparable to constructs found in other contemporary approaches to developmental psychopathology (Dodge & Albert, 2012). Accordingly, while the present findings are consistent with an evolutionary developmental framework, they are not uniquely predicted by it.

In several respects, the results of this study mirrored Gibbons et al.'s (2012) findings for African-American youth in the FACHS, suggesting that some processes by which childhood harsh environments are associated with later adjustment are generalizable across these two ethnicities despite the many differences in their developmental experiences. Whereas both studies included neighborhood-quality variables in the measure of environmental harshness, the FACHS also used a measure of perceived racial discrimination and the three elements of environmental harshness (discrimination, parenting, and neighborhood) were not combined. For African-Americans, perceived racial discrimination is a powerful stressor related to negative outcomes including substance use and depression (e.g., Hurd, Varner, Caldwell, & Zimmerman, 2014). Despite the absence of measured racial discrimination in the present White sample, similar to the FACHS, a pathway from harsh environments to later adjustment through fast FHS was observed. Further investigation to determine whether discrimination is integral to harsh childhood environments or is an independent stressor is warranted.

It is noteworthy that in the present study, harsh environments were assessed later in childhood (i.e., elementary school age) than is typical of evolutionary development studies. For example, Simpson et al. (2012) showed that harsh or unpredictable environmental exposure in the first five years of life affected risky behavior at age 23 whereas exposure later in childhood and adolescence did not. One interpretation of the present findings is that neurobiological adjustments in response to harsh environments can occur at elementary school age.

Alternatively, harsh environments may tend to remain stable over childhood such that environments assessed in elementary school reflect earlier environmental conditions, which were the origins of neurobiological changes. Determining more precisely when in childhood the experience of harsh environments is most damaging for subsequent development, and whether the effects are cumulative, would be valuable for prevention efforts.

We modeled risky behaviors as a growth curve across three assessments, and predicted that the slope as well as the intercept would be involved in the indirect path to adjustment. However, only the level of behaviors across Grades 10 – 12, but not the rate of increase, was predicted by risky beliefs (favorable social images and willingness). This pattern of results suggests that variables other than risky beliefs may predict rate of increase in risky behaviors across mid-adolescence. For example, one mechanism not examined in this study is the influence of pubertal maturation on risky behaviors. Early maturation was identified previously as a risk factor for cigarette and alcohol use in this sample (Westling, Andrews, Hampson, & Peterson, 2008) suggesting that early maturing youth develop risky behaviors more rapidly than on time or later maturing youth. Further, only the initial level of risky behaviors, but not the increase over time in these behaviors, predicted adjustment. Risky behaviors may continue to increase beyond Grades 10–12 (Patrick, O'Malley, Johnston, Terry-McElrath, & Schulenberg, 2012; Saff et al., 2010), in part because neurological development associated with impulse control is not complete until the mid-twenties (Steinberg, 2008). It would be valuable to extend the growth curve of risky behaviors to include early emerging adulthood and relate the slope of this curve to subsequent adjustment. Such a study would test whether an increasingly steep rate of development of risky behaviors is observed over this extended developmental period and whether it has further detrimental effects on adjustment in addition to the level of risky behaviors.

The value and novelty of these findings lies in the demonstration of a temporally ordered chain of development extending from childhood harsh environment through parenting and fast LHS (risky beliefs and risky behavior) to poorer adjustment in early emerging adulthood. These findings for White youth that was comparable to those observed previously for African-American youth. Despite the cultural difference between the youth in these two studies, the findings suggest there may be similarities across these groups in the broad developmental processes leading to individual differences in adjustment.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Highlights

- Evolutionary development theory and the prototype willingness model framed this study.
- Harsh environments in childhood impacted adjustment one-year post high school.
- Parental investment and fast life history strategies in adolescence were mediators.
- These findings for White working class youth were comparable to a previous study of Black youth.

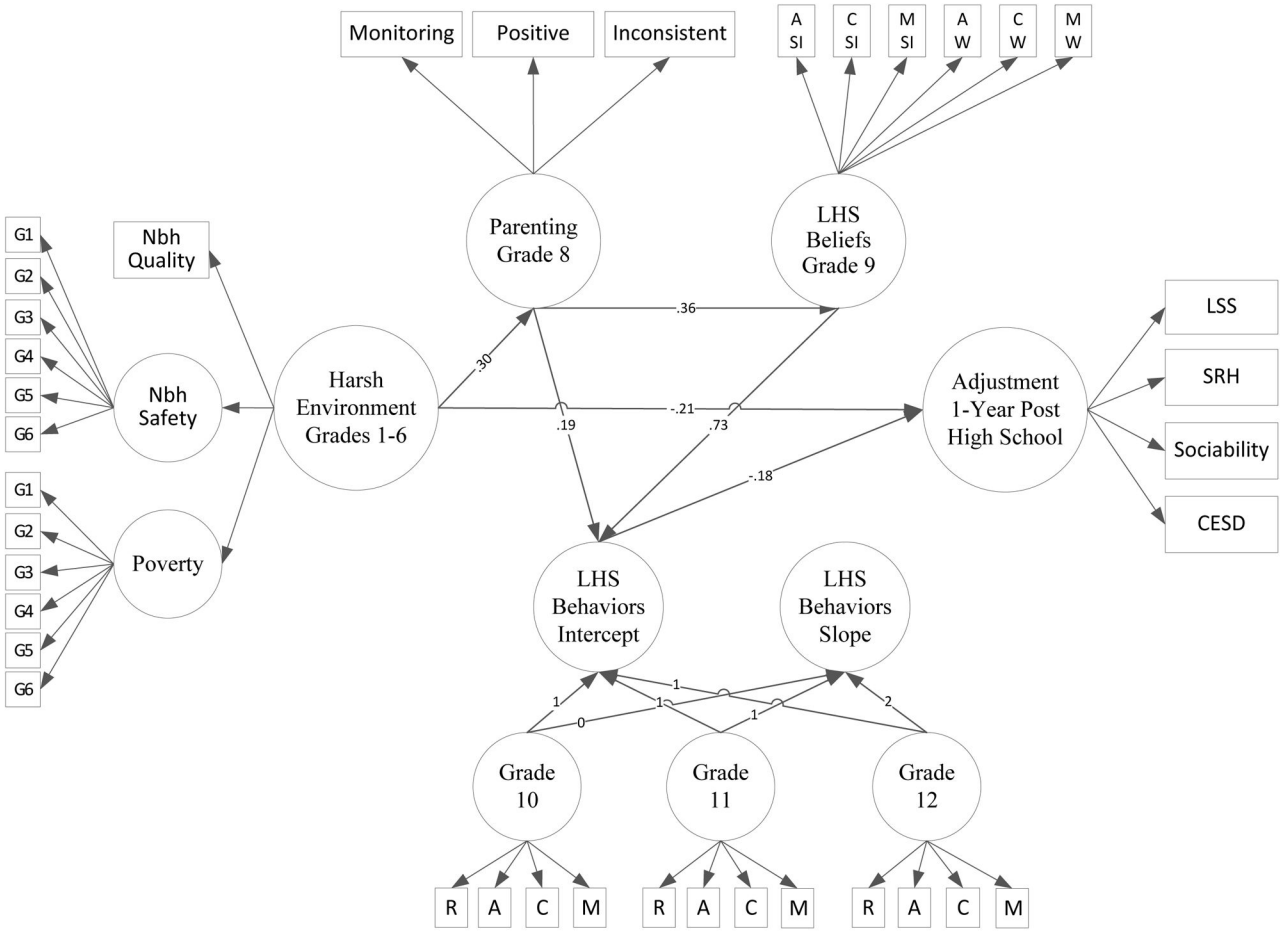

Figure 1.

Final model (significant paths only) predicting adjustment one-year post high school from childhood harsh environment with indirect paths through parenting, beliefs about substances, and risky behaviors.

Standardized path coefficients are shown. G1–G6 = assessments at Grades 1 through 6, LHS = life history strategies, A = alcohol, C = cigarettes, I = intercept, M = marijuana, R = risky sex, S = slope, SI = social images, W = willingness, Nbh = neighborhood, LSS = Life Satisfaction Scale, SRH = self-rated health, CESD = depression scale.