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Early Environmental Unpredictability: Implications for Youth's Perceptions and Social Functioning

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Abstract

According to an evolutionary perspective, early environmental unpredictability induces expectations in youth that their future is uncertain and increases their likelihood of engaging in opportunistic, impulsive, and aggressive social behaviors. Although considerable evidence supports the links between environmental unpredictability and such behaviors, less is known about how youth growing up in volatile environments actually perceive their lives and how these perceptions relate to their behavior. In this study, two samples of 10–17 year-olds, one with a history of maltreatment and removal from home (n=90; 52% female; 67% Hispanic-American) and one without (n=80; 54% female; 69% Hispanic-American), reported on their perceptions of unpredictability and social functioning. Maltreated youth endorsed greater perceptions of unpredictability than non-maltreated youth. For both groups, greater perceptions of unpredictability were associated with increased aggression and conduct problems and decreased prosociality. Findings advance understanding of a developmental pathway contributing to opportunistic and risky social behavior in youth.

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Authors' Contributions

Each author made substantial contributions to the present study. K.D. and J.Q. conceived of the study design, performed data collection and analysis, and drafted the manuscript. H.M. aided in data collection and helped prepare and revise the manuscript.

Data Sharing Declaration

This manuscript's data will not be deposited.

Compliance with Ethical Standards

Conflict of Interest

The authors declare that they have no conflict of interest.

Ethical Approval

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent

Informed consent procedures varied by sample. Because the maltreated youth were no longer in parental custody, the Presiding Judge of Juvenile Court granted permission for youth to be approached and invited to participate in the study. Staff who knew the youth confirmed their interest and eligibility on each day of data collection and youth provided written assent. Parents of youth in the comparison sample provided informed consent and the youth provided written assent.

Keywords

future perceptions; unpredictability; maltreatment; life history theory

Introduction

Children and adolescents thrive in stable and nurturing environments, the benefits of which extend across a range of developmental and health outcomes (Barton et al., 2019; Bachman, Coley, & Carrano, 2011; Coe, Davies, & Sturge‐ Apple, 2018). Some youth, however, grow up in environments characterized by conflict, instability, and uncertainty. These environments also exert a profound impact on functioning, often predicting impulsive, opportunistic, and socially deviant behaviors in youth, such as risk-taking, delinquency, and aggression, particularly across the transition to adolescence (Doom, Vanzomeren-Dohm, & Simpson, 2016; Figueredo & Jacobs, 2011). Although the links between early environmental unpredictability and such behaviors are well-established, far less is known about how youth perceive potential unpredictability in their lives and how those perceptions relate to their behavior.

The present study systematically examined youth's perceptions of unpredictability and tested the associations between these perceptions and youth's engagement in both risky and prosocial behaviors. The study focused specifically on youth who have experienced a high degree of objective uncertainty and instability and tend toward high levels of problematic behavior, namely youth living in congregate care as a result of maltreatment substantiated by social services and subsequent removal from home (e.g., Cicchetti & Toth, 2015; Pollak, 2015). These youth's perceptions were then compared to those of a demographically-matched sample of youth recruited from local communities who had likely experienced far lower levels of uncertainty. Of primary interest was whether youth's perceptions and the associations between those perceptions and social functioning differed between groups.

Early Environmental Unpredictability from an Evolutionary Perspective

Evolutionary models of human development, such as life history theory, propose that characteristics of one's early environment guide subsequent development and contribute to important individual differences in preferences, desires, and behaviors that emerge in later life and that are especially relevant to one's reproductive fitness (i.e., ability to pass on genes to subsequent generations; Belsky, 2012; Ellis & Del Giudice, 2014). Specifically, individuals make inferences about their probable future environment based on the conditions of their early environment and (non-consciously) calibrate their behavior accordingly, enacting faster or slower life history strategies to maximize reproductive success in their likely future context (Belsky, Schlomer, & Ellis, 2012). Fast strategies involve an opportunistic orientation, in which individuals tend to take more risks, engage in greater aggression, and pursue more immediate gratification, all of which should increase the individuals' probability of early reproduction (Ellis, Figueredo, Brumbach, & Schlomer, 2009; Griskevicius, Tybur, Delton, & Robertson, 2011). At the other end of the continuum, slow strategies are characterized by long-term planning, fewer risk-taking behaviors, reduced aggression, and greater willingness to invest in future outcomes, with such

behaviors tending to delay immediate reproduction (Belsky, Steinberg, Houts, Halpern-Felsher, 2010; Del Giudice, Gangestad, & Kaplan, 2015).

A particularly salient component of one's early environment, and hence influence on the development of fast versus slow life history strategies and accompanying behaviors, concerns the level of chronic stress experienced in early rearing environments (Ellis et al., 2009). A high stress environment, such as one characterized by danger and unpredictability, signals an uncertain future and thus should lead individuals to enact faster life history strategies (Del Giudice et al., 2015; Figueredo, de Baca, & Woodley, 2013) in order to increase their odds of reproducing sooner (Mittal & Griskevicius, 2014). An early environment that is low in stress (i.e., stable, supportive, and well-resourced environments), in contrast, implies a more predictable future and a longer life span, leading to slower life history strategies (Ellis, Bianchi, Griskevicius, & Frankenhuis, 2017; Ellis et al., 2012).

Early Environmental Unpredictability, Behavior, and Perceptions

Findings from several lines of research are consistent with evolutionary models of human development. Unpredictable environments, such as those characterized by frequent changes in residence or family composition, are associated with behavioral outcomes theoretically linked to faster life history strategies. In unpredictable environments, for instance, children and adolescents often have an earlier sexual debut (age of first sexual intercourse), an earlier age of reproduction, and a greater number of sexual partners (Nettle, Coall, & Dickins, 2011; Simpson et al., 2012). Such youth also exhibit higher levels of externalizing symptoms, conduct problems, aggression, and delinquency than youth growing up in more stable family environments, even after controlling for multiple other risk factors (Fomby & Cherlin, 2007; Fomby & Osborne, 2017; Tither & Ellis, 2008). In adolescence specifically, youth who grew up in unpredictable environments are at risk for substance use, stealing, and property damage, and show poorer social skills (e.g. ability to make friends and follow social norms; Doom et al., 2016; Hartman, Sung, Simpson, Schlomer, & Belsky, 2017), all of which again suggest that, at some level, the youth have adopted faster life history strategies.

Of note, given that many of the risk-taking and other problematic behavioral correlates of faster life history strategies emerge in adolescence, it is useful to consider whether there are specific evolutionary advantages for risk-taking during this developmental window, particularly among youth residing in unsupportive and unpredictable contexts and hence for whom the future should be considered highly uncertain (Brumbach, Figueredo, & Ellis, 2009). Aggression, other externalizing and exploitative tendencies (e.g., delinquency), and substance use, for instance, may take on new meaning for these youth, helping them gain status with peers, especially youth who lack other means of doing so. Such behaviors may also garner attraction from potential sexual partners, perhaps increasing the probability of early reproduction (Ellis et al., 2012). Finally, regardless of experiences of environmental unpredictability, many risky behaviors, such as delinquency, increase for sizeable numbers of adolescents, leading to greater variability and hence the potential for stronger associations between earlier experiences and later behavior (Steinberg, 2007; 2008).

In combination, extant research provides strong support for the view that early environmental unpredictability directs subsequent development toward a suite of behaviors indicative of fast life history strategies, such as aggression, conduct problems, and delinquency. Many of these behaviors, moreover, become particularly apparent during the adolescent transition. What remains less clear, however, are the psychological processes that contribute to the associations between early environmental unpredictability and such behaviors. As discussed next, youth's own perceptions of the unpredictability of their lives may be one such contributor.

Theoretically, an unpredictable environment should induce perceptions that the world and future are uncertain, given the volatility such an environment signals (e.g., Cabeza de Baca & Ellis, 2017; Szepsenwol & Simpson, 2019). A few studies provide indirect support for this possibility. Adolescents and adults exposed to early family instability report greater orientation toward present rather than future circumstances (Hartman et al., 2017; Hill, Jenkins, & Farmer, 2008). Also, in adults, having a low sense of control, a construct subsumed by an unpredictability schema (i.e., a broad belief that the future is uncertain and unreliable; Ross & Hill, 2002), accounts in part for the associations between early life unpredictability and adult impulsivity (Mittal & Griskevicius, 2014). And finally, adults' retrospective reports of environmental unpredictability in childhood are correlated with greater tendencies toward future discounting (i.e., devaluation of future rewards in favor of immediate ones), and future discounting is positively correlated with sexual and non-sexual risk-taking (Hill, Jenkins, & Farmer, 2008).

Despite these hints, which have largely emerged in studies with adults, very little empirical work has examined what children or adolescents actually think about the unpredictability of their lives and how those thoughts relate to their behavior. And yet, children's experiences and perceptions are believed to play a crucial role in their emerging behavior and life strategies. One exception is a study conducted by Cabeza de Baca, Barnett, and Ellis (2016), who found that greater family chaos (i.e., instability of caregiver behavior and household routines) and more paternal transitions were associated with unpredictability schemas in children ages 9–12 from low-income backgrounds. Whether these same schemas predicted specific behavioral tendencies, though, was not explored.

Child Maltreatment as a Model of Environmental Unpredictability

A common proxy for early exposure to environmental unpredictability is childhood socioeconomic status (SES), given that children growing up in lower SES environments tend to experience a greater number of residential changes, more unpredictable routines, and more inconsistent caregiving than children growing up in higher SES environments (Evans, Gonnella, Marcynyszyn, Gentile, & Salpekar, 2005; Leventhal & Brooks-Gunn, 2000). The present study extends the focus to consider child maltreatment as a source of unpredictability, particularly maltreatment that has been substantiated (i.e., deemed true by social services) and led to juvenile justice system involvement.

Objectively, the lives of maltreated youth, particularly those ensnared in the dependency branch of the juvenile justice system as a result of the maltreatment's substantiation by social services, are quite unstable. Maltreated youth tend to experience harsh, inconsistent,

and unpredictable parenting (Milner, 2000; Shipman & Zeman, 2001), as well as chaotic home environments and frequent changes in residence (Herrenkohl, Herrenkohl, & Egolf, 2003). Once maltreatment is sufficiently severe to trigger legal intervention (e.g., contact with the juvenile dependency system), instability increases even further. Youth may be removed from home and placed with relatives or foster parents or in residential facilities. Particularly among older children and adolescents, changes in out-of-home placements are quite common, leading to repeated caregiver transitions and changes in schools, living environments, and family structure (Herrenkohl et al., 2003; McAuley & Trew, 2000). Juvenile dependency cases, as well, often span several years, during which time parents have various mandates regarding what they need to do for youth to be returned home. Youth are rarely informed of these mandates and often lack full understanding of their case, the court's plans for their future, and at times even with whom they will live (Quas, Wallin, Horwitz, Davis, & Lyon, 2009), leading to the common complaint from these children that they simply do not know what is going to happen in their lives (The Pew Commission on Children in Foster Care, 2003). Thus, maltreated youth may likely (and correctly) perceive their environment and future as unpredictable or at least far more unpredictable than youth who have not endured maltreatment requiring legal intervention.

Maltreated youth are also at substantial risk for a range of psychological and behavioral tendencies consistent with fast life history strategies, particularly across the transition to adolescence. They are more likely than non-maltreated youth to engage in risk-taking behaviors, including early sexual activity, unsafe sexual behavior, violence, delinquency, and substance use (Milojevich, Russell, & Quas, 2018; Vidal et al., 2017; Wekerle, Goldstein, Tanaka, & Tonmyr, 2017). Maltreated youth have difficulties in social relationship and interactions, often behaving defensively and aggressively rather than with empathy and prosociality (Alink, Cicchetti, Kim, & Rogosch, 2012; Koenig, Cicchetti, & Rogosch, 2004). And, while antisocial behaviors have been of predominant concern in research focused on early life unpredictability, it is likely that prosocial behaviors are also affected by such conditions. In unpredictable contexts, where life expectancy is shorter and social relationships are more fragile, the benefits of prosocial behavior are less certain, including the possibility of future reciprocity. Thus, prosocial tendencies may well be diminished (Durrant, 2017; Ellis et al., 2009), a possibility in need of direct investigation.

Present Study

The goals of the present study were twofold. First, the study aimed to investigate the relations between early life unpredictability and perceptions of future unpredictability in an important population of vulnerable youth, namely those who suffered maltreatment and were living in out-of-home care as a result. Second, the study aimed to examine whether youth's perceptions of unpredictability predicted not only risky behaviors, such as aggression and conduct problems, but also and significantly, prosocial capacities. To address these goals, maltreated youth (ages 10–17) and same-aged comparison youth completed in-person interviews about their background, perceptions of their future, and social functioning. It was expected that perceptions of unpredictability would be greater in maltreated youth relative to comparison youth, given that, objectively, the lives of maltreated youth are likely much more chaotic. It was also expected that, for both maltreated and comparison youth, greater

perceptions of unpredictability would be associated with higher levels of aggression and conduct problems and lower levels of prosocial tendencies. Finally, exploratory analyses investigated whether age was related to youth's perceptions and functioning, and whether the links between perceptions of unpredictability and social functioning differed across maltreated and comparison youth.

Method

The present data were collected as part of a large project examining socio-emotional functioning in maltreated children aged 6–17 years (e.g., Dickerson, Flynn, Levine, & Quas, 2018; Milojevich, Levine, Cathcart, & Quas, 2018). During one of the waves of data collection, questionnaires concerning unpredictability and future orientation were collected, and matched community youth were recruited. Only data collected during this wave with both samples are described here. In addition, although youth ages six and older were included in the larger study, given the complexity of some of the constructs (i.e., perceptions about the future) and measures, the latter of which have been predominantly validated with adolescent and adult samples, only youth ages 10 and older were administered key measures in the present study and are included here.

Participants

The sample was comprised of 170 adolescents, aged 10–17 (M = 13.42, SD = 2.17; 53% female). Ethnicity varied: 68% Hispanic-American, 10% multi-ethnic, 11% Anglo-American, 5% African-American, 2% Asian-American, and the remaining youth of "other" ethnicity. Youth incapable of communicating in English or who had an observable cognitive disability were not eligible. Power analysis confirmed that this sample size was sufficient to detect small to medium main effects and interactions with power = .80 and alpha = .05.

The maltreated sample (n = 90; 54% female) was comprised of youth living in a temporary residential facility in the western U.S. for children and adolescents removed from home due to substantiated maltreatment (in other waves of these data, a majority of the youth had documented experiences of neglect; 58–61%, Milojevich et al., 2018; Milojevich, Russell, & Quas, 2018; substantiation reports were not available for all youth included in the present sample, although addresses of former caregivers were able to be collected for matching purposes). Maltreated youth had been residing at the facility for at least three days to be eligible. Because the youth were no longer in parental custody, the Presiding Judge of Juvenile Court of the county where data were collected granted permission for youth to be approached and invited to participate in the study. Staff who knew the youth personally confirmed youth's interest and eligibility on each day of data collection before youth could be approached. Youth provided written assent.

Youth in the comparison sample (n = 80; 52% female) were recruited from neighborhoods demographically equivalent to those from which the maltreated youth had been removed, determined via matching zip codes and addresses between the samples. Eligibility criteria for comparison youth were identical to that of the maltreated sample with the additional requirement that comparison youth had always lived with at least one parent. This constraint reduced the possibility that comparison youth had experienced maltreatment severe enough

to warrant their removal from home, although it did not preclude potential experiences of maltreatment (any inclusion of maltreated youth in the comparison sample would only attenuate group differences; see Malloy, Quas, Lyon, & Ahern, 2014 for similar procedures). Parents of comparison youth provided written consent and youth provided written assent.

Procedure and Materials

The University's Institutional Review Board, Social Services, and the Presiding Judge of Juvenile Court approved of all study procedures. Once consent and assent were obtained, youth completed questionnaires during in-person interviews that lasted approximately one hour. Only measures relevant to the present study are discussed here.

Demographic information.—At the beginning of each interview, youth provided demographic information, including their age, gender, ethnicity, and grade in school.

Unpredictability schema.—Youth completed several measures assessing their tendencies toward an unpredictability schema (i.e., perception that the world and future are unpredictable). Given that this schema is believed to consist of several overlapping constructs (e.g., future orientation, locus of control, beliefs about unpredictability; Ross & Hill, 2002), three sets of questions were included. The first was a modified version of the Future Outlook Inventory (FOI; Cauffman & Woolard, 1991), an 8-item self-report scale that assesses youth's degree of future consideration and planning. The FOI has been validated with both low and high-risk adolescent samples (Cauffman et al., 2007; Hartman et al., 2017). Youth rated, on a 4-point scale (in the present study, ranging from 0 = *not at all true* to 3 = *definitely true*), how true certain statements were of them (e.g., "I think about how things might be in the future"; "I can see my life 10 years from now"). Two items were omitted ("I would rather save my money for a rainy day than spend it now on something fun" and "Before making a decision, I weigh the good versus bad"), one because of its potential irrelevance to the maltreatment sample and the other because it overlapped with a question from one of the other measures. Items were reverse coded and averaged to yield a composite score, with higher scores reflecting a greater orientation toward immediate circumstances rather than the future. Next was an item asking youth to rate, on a three-point scale (0 = *none at all* to 2= *a lot*), how much control they thought they had over their future (Inglehart et al., 2000). Responses were reverse coded, such that a higher score reflected greater beliefs that the future is uncontrollable. The third measure, which evaluated youth's beliefs about the unpredictability of their world and future, was adapted from prior work by Ross and Hill (2002). Youth indicated on a 1 (*strongly disagree*) to 5 (*strongly agree*) scale how much they agreed to two statements, "Basically the world is a stable and predictable place," and "I have a good idea about what is going to happen in my life." Items were reverse coded and averaged to create a mean score, with higher scores indicating greater beliefs of unpredictability. Youth's scores to the three measures assessing their tendencies toward an unpredictability schema (i.e., future orientation, locus of control, and beliefs of unpredictability) were standardized and averaged to create a single index reflecting youth's perceptions of their world and future. Part-whole correlations ranged from .30 − .73, ps < .001.

Antisocial behavior.—Antisocial behavior was assessed via two measures. The first was the Reactive-Proactive Aggression Questionnaire (RPQ; Raine et al., 2006), a widely used and well-validated measure of youth's tendencies toward aggression. Youth indicated how often they engaged in reactive (e.g., "Yelled at others when they have annoyed you") and proactive (e.g., "Taken things from other students") aggression on a 3-point scale, with 0 = *never* and 2 = *often*. Responses were averaged to yield a total aggression score, with higher scores suggestive of greater aggressive tendencies. The second measure was the conduct problems subscale of the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997), which indexed youth's engagement in behaviors reflective of conduct problems (e.g., lying, stealing, fighting, and cheating). Youth rated how well a series of items (e.g., "I am often accused of lying or cheating") described them on a three-point scale (0= *never true* to 2= *very true*). Some items are reverse coded. Items were averaged to produce a composite score. Higher scores indicate greater problem behaviors. Youth's responses to the RPQ and conduct problems subscale of the SDQ were highly correlated ($r = .62$, $p < .001$) and were thus averaged to yield a total antisocial behavior score (Cronbach's alpha = .89). Part-whole correlations ranged from .36 − .73, ps < .001.

Prosocial behavior.—Youth's tendencies toward prosociality were assessed by the prosocial subscale of the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). Youth rated five items (e.g., "I often offer to help others") based on how true each statement was of them on a scale ranging from 0 (*never true*) to 2 (*very true*). Items were averaged to yield a composite score, with higher scores indicating greater prosociality (Cronbach's alpha = .68).

After youth completed all measures, they were thanked and returned to their residence or parents. Questions were answered, and any concerns the youth or parents raised were addressed directly and in conjunction with the staff.

Results

Preliminary Analyses

Means across potential covariates and the main predictors and outcomes for the maltreated and comparison youth are presented in Table 1. As can be seen, maltreated and comparison youth were similar in age, gender, and percentage Hispanic-American ethnicity, $ps > 0.05$. Age was unrelated to both youth's perceptions of unpredictability and their social functioning, as reflected in self-reported aggression, conduct problems, and prosocial tendencies. Thus, age is not considered further. Consistent with prior work (Laible, Carlo, & Roesch, 2004; Wentzel, Filisetti, & Looney, 2007), gender was associated with youth's prosocial behavior, with male youth reporting significantly lower ($M = 1.47$, $SD = 0.36$) levels of helpful and caring behavior than female youth ($M = 1.64$, $SD = 0.37$), $t(168) = 2.88$, $p < .01$. However, gender was unrelated to the other independent and dependent variables, and no interactions involving gender emerged. Thus, gender is not included in subsequent analyses. The outcome measures, antisocial and prosocial behavior, were negatively correlated, $r(168) = −.26$, $p = .001$, as would be expected.

Main Analyses

The overarching purpose of the present study was to evaluate first, whether perceptions of environmental unpredictability differed between maltreated and comparison youth and second, the extent to which youth's perceptions of unpredictability were associated with their antisocial and prosocial tendencies. The first aim was addressed via bivariate regression analysis, with maltreatment status (0 = comparison, 1 = maltreated) as a predictor and the standardized composite measure of youth's unpredictability schema as an outcome. A significant main effect of maltreatment status indicated that, as expected, maltreated youth reported higher perceptions of unpredictability than comparison youth, $b = 0.22$ ($\beta = .18$), $SE = .09$, $t(166) = 2.31$, $p = 0.02$, 95% CI [0.03, 0.41], overall model, $F(1, 166) = 5.34$, $p = 0.02$, $R^2 = 0.03$.

The second aim, which concerned the links between the youth's perceptions of unpredictability and their social functioning, was addressed via linear regression analyses. Maltreatment status, youth's unpredictability schemas, and their interaction were included as predictors, with separate models being conducted for the two outcome measures: antisocial behavior and prosociality. None of the interactions was significant. Thus, only the main effect models are reported (see also Table 2).

Regarding antisocial behavior, main effects of maltreatment status and holding an unpredictability schema emerged, overall model, $F(2, 165) = 13.64$, $p < 0.001$, $R^2 = 0.14$. Maltreated youth reported greater aggressive and exploitative behavior than comparison youth, $b = 0.10$ ($\beta = 0.18$), $SE = 0.04$, $t(165) = 2.51$, $p = .01$, 95% CI [0.02, 0.18]. Also, regardless of maltreatment history, youth who believed that their world and future were unpredictable tended to report higher levels of aggressive behavior than those who believed that their future was more stable, $b = 0.13$ ($\beta = 0.30$), $SE = 0.03$, $t(165) = 4.07$, $p < .001$, 95% CI [0.07, 0.20].

Regarding prosocial behavior, analyses revealed, somewhat surprisingly, no significant differences between maltreated and comparison youth's reported tendencies toward helping and caring behaviors, $b = -0.03$ ($\beta = -0.04$), $SE = 0.06$, $t(165) = -0.58$, $p = .56$, 95% CI [−0.14, 0.08], overall model, $F(2, 165) = 13.15$, $p < 0.001$, $R^2 = 0.14$. However, consistent with predictions, an unpredictability schema was significantly associated with lower levels of prosocial behavior, $b = -0.22$ ($\beta = -0.36$), $SE = 0.04$, $t(165) = -4.91$, $p < .001$, 95% CI [−0.30, −0.13].

Subsequent sensitivity analyses tested whether results including individual measures rather than the composites substantively altered the results reported here. When analyses included each of the three individual components of the unpredictability schema composite (i.e., i.e., the measures of future orientation, locus of control, and beliefs about unpredictability) as predictors of youth functioning in separate regressions, the trends were identical, ps < .05. Likewise, when the composite outcome measures, aggression and conduct problems, were analyzed in separate models, results were identical across the two.

Discussion

Although considerable evidence indicates that early environmental unpredictability is associated with the development of opportunistic, impulsive, and aggressive social behavior, especially during the adolescent transition, little is known about the psychological processes contributing to these associations. The present study explored one such process, namely youth's perceptions of their future, directly testing evolutionary predictions that early unpredictability induces expectations in youth that the future is also uncertain and shifts them toward opportunistic and risk-taking behavior, including aggression and conduct problems (Cabeza de Baca & Ellis, 2017; Ellis et al., 2009). An additional and important focus of the study concerned how perceptions of unpredictability related to prosocial tendencies in youth, given theoretical reasons to expect that both actual unpredictability and perceptions of unpredictability would reduce these tendencies as well. Finally, these perceptions were examined in a unique sample of maltreated adolescents who had likely experienced a high degree of uncertainty early in development, due not only to the maltreatment per se, but also to the experiences that occurred after the maltreatment was discovered and the youth were removed from home and placed in out-of-home residential facilities. By comparing these youth's perceptions and behaviors to those of community-matched youth, novel insight directly relevant to evolutionary theories about human behavior was gained.

First, the present findings indeed showed that youth's perceptions of their future varied substantially: Some youth endorsed a view that their future would be relatively stable, while others believed that their futures would be much less certain. This variability was explained in large part by group status. Maltreated youth perceived their future as more unpredictable than community youth, a difference that likely reflects the reality of the former youth's circumstances. They came from maltreating homes, typically characterized by chaos, unpredictability, and threat (e.g., Cicchetti & Valentino, 2006), and these experiences were then compounded with removal from home, placement into foster care, and ensuing changes in caregivers and living arrangements (Herrenkohl et al., 2003; Koh, Rolock, Cross, & Eblen-Manning, 2014). Such experiences could certainly lead to relatively accurate perceptions of their current circumstances as unpredictable. These youth, though, applied the same perceptions to their future, also viewing it as unpredictable and uncontrollable. Similar perceptions have been uncovered in adults who retrospectively describe childhood experiences consistent with the lives of the maltreated youth in this sample (Mittal & Griskevicius, 2014). Finally, because developmental differences were not observed in youth's perceptions of future unpredictability, it appears that these beliefs operate by at least age 10 in maltreated youth. Some work has suggested that middle childhood is a key window within which life history strategies emerge (Del Giudice, 2015), a developmental period slightly below the ages of the youth in the present sample. It will be important in the future to examine more directly, at what age perceptions and behaviors relevant to life history strategies emerge and at what age they become stable (Ellis et al., 2009; Ross & Hill, 2002).

Second, in line with evolutionary theories of human development, significant associations between youth's perceptions of future unpredictability and social functioning were

uncovered. When antisocial behaviors were considered, maltreatment independently predicted increases in such problems, consistent with a large body of work (e.g., Alink et al., 2012; Cicchetti, 2016). Greater perceptions of unpredictability also directly predicted increased engagement in aggressive and exploitative (e.g., lying, cheating, stealing) behaviors—those often considered indicative of faster life history strategies. Lower beliefs of unpredictability, in contrast, were related to fewer aggressive and conduct problems, consistent with slower life history strategies. These associations were evident in both the maltreated and community samples, suggesting that youth's perceptions of their future operate similarly across groups, despite likely objective differences in overall level of experiences of unpredictability.

And third, a particularly novel focus of the present study concerned its test of the links between perceptions of unpredictability and prosocial tendencies. Extant work has primarily considered antisocial outcomes when testing evolutionary predictions regarding the effects of early unpredictability on behavior (e.g., Doom et al., 2016; Hartman et al., 2017). Theoretically, however, early life unpredictability and resulting perceptions could also directly relate to youth's tendencies toward prosociality. If the future is perceived as uncertain, it is unlikely adaptive for youth to place others' needs above their own (Ellis et al., 2009). The present findings provide some support of this notion. Again, in both maltreated and community youth, greater perceptions of future unpredictability were associated with lower engagement in helping, sharing, and comforting behaviors, all of which are reflective of slower life history strategies (Figueredo et al., 2006). Thus, perceptions of future unpredictability may well play a broad role in shaping behaviors across multiple domains of functioning, including positive tendencies that serve a critical function in promoting and maintaining social relationships (Decety, Bartal, Uzefovsky, & Knafo-Noam, 2016).

It is worth noting that the maltreated and community samples of youth did not differ in their reported levels of prosociality. Such was surprising in light of prior work suggesting that maltreated children tend to be less prosocial (e.g., Alink et al., 2012; Koenig et al., 2004). However, prior work has typically measured prosociality via behavioral ratings of children by their peers or counselors. Perhaps the self-report scale used in the present study was not as sensitive to the range of prosocial behaviors in which youth might engage and hence might be noticeable to others, or perhaps maltreated youth inflated their perceptions of their own prosociality (they did not exhibit a uniform positivity bias, however, as is evident from their higher ratings of negative behaviors relative to the comparison youth). Nonetheless, given the potential for early environmental unpredictability to alter even positive behavioral strategies, future work should consider prosocial behavior more comprehensively, including via observational and behavioral methods, across samples with varying levels of unpredictable early experiences.

It is also important, particularly when comparing these findings to those of other work evaluating components of evolutionary theories of human development, to consider variations in how environmental unpredictability is conceptualized. Some prior work has relied on childhood socioeconomic status as a proxy for environmental unpredictability, given that individuals growing up in low SES environments are often exposed to higher levels of family turmoil, chaos, and residential instability than individuals growing up in

high SES environments (e.g., Evans et al., 2005). Other work has conceptualized unpredictability as unstable home or caregiver routines or changes in caregivers or residences (e.g., Cabeza de Baca, Barnett, & Ellis, 2016; Simpson et al., 2012). While these experiences undoubtedly contribute to uncertainty in youths' current situation and have been linked to the enactment of faster life history strategies in both adolescents and adults (e.g., Doom et al., 2016; Mittal & Griskevicius, 2014), the experience of maltreatment, especially unanticipated violence, combined with removal from home and placement in a group home setting likely represents, for most youth, an extreme form of unpredictability. These experiences not only signal, but in fact reflect, significant changes in youth's lives over which they have virtually no control. Their lack of knowledge about their current (e.g., legal case) and future situations (e.g., The Pew Commission on Children in Foster Care, 2003; Quas et al., 2009) may exacerbate their perceptions of their future as being unpredictable. Whether there is a compounding effect of multiple types of chaos and uncertainty in their living situation(s) on perceptions and behaviors, or whether certain experiences shift youth more strongly toward unpredictability schemas and faster life history trajectories is a paramount topic of future inquiry.

Although the present study advances understanding of the links among early environmental unpredictability, perceptions, and youth's social functioning, limitations must also be noted. First, according to the present findings, both maltreatment and perceptions often operated concurrently rather than interactively in shaping youth behavior (i.e., they did not interact to predict behavior). However, further research needs to consider other factors that may moderate the associations among early experiences, perceptions, and behaviors, including development across a longer time frame (i.e., from earlier in childhood into adolescence), duration or type of unpredictable experiences, or symptoms of psychopathology. For instance, post-traumatic or other stress-related symptomatology may be accompanied by a foreshortened sense of future, that is, a pervasive belief that one will not live long (e.g., Kleim, Graham, Fihosy, Stott, & Ehlers, 2014), and may directly shape youth behaviors (including potentially aggression but also prosocial tendencies). By considering psychopathology and perceptions in vulnerable youth, greater insight into how complex sets of cognitions and experiences shape life history strategies can be gained. Second, as with all cross-sectional studies, the present study was unable to test mediation or evaluate whether perceptions changed over time. A critical next step in this important and novel line of work will be to investigate patterns of experiences, perceptions, and behaviors prospectively, tracking youth from early in development through adolescence and young adulthood. Such would allow for a strong test of whether early experiences of unpredictability predict differences in youth's perceptions about their future, and whether these differences, in turn, account for variations in social functioning across the lifespan.

Conclusion

Early exposure to unpredictable environments is associated with the development of behaviors reflective of faster life history strategies, including aggression and conduct problems, behaviors that often emerge and proliferate during adolescence (e.g., Steinberg, 2008). Drawing on an evolutionary perspective, the present study tested a potential contributor to the links between early unpredictability and such behaviors, namely youth's

own perceptions of the unpredictability of their future. The study tested this potential contributor, moreover, in a population prone to behaviors indicative of fast life history strategies. Collectively, findings suggest that heightened perceptions of unpredictability are evident in youth exposed to early environmental unpredictability, namely maltreatment, and that these perceptions may play an important role in youth's tendencies toward both antisocial and prosocial behavior. When youth perceive their future as uncertain, they may be more likely to engage in aggressive and exploitative behaviors and less likely to respond prosocially toward others. These findings have significant implications for understanding potential antecedents of adolescent risk-taking and social dysfunction and may inform interventions and policies designed to reduce risky behavior and build positive capacities in vulnerable youth.

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Table 1

Sample Characteristics by Maltreatment Status

	Maltreated Youth (*n* = 90)		Comparison Youth (*n* = 80)		
	M	**SD**	**M**	**SD**	***p***
Demographics					
Age	13.69	2.04	13.11	2.28	*ns*
% Female	52.00		54.00		*ns*
% Hispanic-American	66.70		68.80		*ns*
Perceptions					
Unpredictability Schema	0.09	0.67	−0.13	0.56	< .05
Social Functioning					
Antisocial Behavior	0.47	0.30	0.34	0.22	< .05
Prosocial Behavior	1.52	0.42	1.61	0.32	*ns*

Note. The variable reflecting youth's unpredictability schema is standardized. *NS* indicates non-significant comparisons.

Table 2

Regression Analyses Predicting Youth's Social Functioning (N = 170)

	Antisocial Behavior				Prosocial Behavior			
Predictors	**B**	**SE B**	**β**	**t**	**B**	**SE B**	**β**	**t**
Model 1								
Maltreatment	0.10	0.04	0.18	2.51*	−0.03	0.06	−0.04	−0.58
Perceptions	0.13	0.03	0.30	4.07***	−0.22	0.04	−0.36	−4.91***
Overall Model	$F(2, 165) = 13.64, p < .001, R^2 = .14$				$F(2, 165) = 13.15, p < .001, R^2 = .14$			
Model 2								
Maltreatment	0.10	0.04	0.18	2.53*	−0.04	0.06	−0.05	−0.68
Perceptions	0.11	0.05	0.26	2.17*	−0.15	0.07	−0.25	−2.07*
Maltreatment x Perceptions	0.03	0.07	0.05	0.41	−0.11	0.09	−0.14	−1.22
Overall Model	$F(3, 164) = 9.10, p < .001, R^2 = .14, \Delta R^2 = 0.001, p = 0.67$				$F(3, 164) = 9.29, p < .001, R^2 = .15, \Delta R^2 = 0.008, p = .22$			

Note. For the maltreatment variable, comparison youth comprise the reference group. The perceptions variable refers to perceptions of unpredictability, with a higher score reflective of a greater unpredictability schema.

* $p < .05$

** $p < .01$

*** $p < .001$