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The Development of Future Orientation is Associated with Faster Decline in Hopelessness during Adolescence

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Abstract

Hopelessness is implicated in multiple psychological disorders. Little is known, however, about the trajectory of hopelessness during adolescence or how emergent future orientation may influence its trajectory. Parallel process latent growth curve modelling tested whether (i) trajectories of future orientation and hopelessness and (ii) within-individual change in future orientation and hopelessness were related. The study was comprised of 472 adolescents [52% female, 47% Caucasian, 47% received free lunch] recruited at ages 12–13 who completed

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Authors' Contributions

NMG conceived of the study question, assisted in the analysis data and wrote a considerable proportion of the manuscript. JN and TMO played a lead role in advising and executing statistical analyses as well as considerable input into the preparation and revision of the manuscript. SS was involved in data preparation and cleaning, literature review and in writing of the manuscript. LBA and LYA were awarded the R01 grant (MH079369) which was the basis of data analysis; both authors provided considerable input into the formulation of the research question and revision of the manuscript.

Data Sharing Declaration

This manuscript's data will not be deposited.

Conflicts of Interest

The authors report no conflict of interests.

Ethical Approval

Data collection procedures were approved by Temple University's Institutional Review Board.

Informed consent

Written, informed consent was obtained from research staff

measures of future orientation and hopelessness at five annual assessments. The results indicate that a general decline in hopelessness across adolescence occurs quicker for those experiencing faster development of future orientation, when controlling for age, sex, low socio-economic status in addition to stressful life events in childhood and adolescence. Stressful childhood life events were associated with worse future orientation at baseline and negative life events experienced during adolescence were associated with both an increase in the trajectory of hopelessness as well as a decrease in the trajectory of future orientation. This study provides compelling evidence that the development of future orientation during adolescence is associated with a faster decline in hopelessness.

Introduction

The prevalence of mental health disorders increase substantially in adolescence (Hankin et al. 1998; Kessler et al. 2005). Half of all Americans will meet criteria for a DSM-IV diagnosis during their lifetime and 50% of these will experience first onset in adolescence (Kessler et al. 2005). It is likely that changes across biological (e.g., hormonal), psychological, both in terms of developing cognitive vulnerabilities (e.g., negative inferential style) and cognitive functioning (e.g., future orientation), as well as psychosocial (e.g., increased exposure to negative life events) domains elevate risk for psychopathology in adolescence (Ritschel et al. 2013). For example, increases in attentional capacity may improve an adolescent's ability to attend to negative stimuli (Alloy and Abramson 2007). Similarly, the development of neural reward circuitry may lead adolescents to pursue more distal rewards that are more easily frustrated than immediate rewards (Davey et al. 2008; Steinberg 2005). Little is known, however, about how the development of cognitive functioning in adolescence is related to hopelessness, an important transdiagnostic factor that increases risk for multiple psychological disorders and risk-taking behaviors.

Hopelessness

Hopelessness is a transdiagnostic psychological construct that emerges in adolescence and is characterized by rigid and persistently negative expectations about the future and helplessness to change future outcomes (Abramson et al. 1989; Beck et al. 1974). Hopelessness is associated with psychopathology and high–risk behaviors (Beck et al. 1974), including more severe depressive symptoms (Becker-Weidman et al. 2009), first onset of a major depressive episode (Mac Giollabhui et al. 2017), suicidal ideation (Ayub 2009; Beck et al. 1990; Daniel and Goldston 2012; Horwitz et al. 2017; Kwok et al. 2010), substance use (Bolland 2003), risky sexual behavior (Fedorowicz et al. 2014), and increased likelihood to engage in violence (Drummond et al. 2011; Stoddard, Henly, et al. 2011). Despite its implication in multiple forms of psychopathology, there are limited data characterizing trajectories of hopelessness in community samples of adolescents. Data from urban, low socio-economic status samples suggest that, at an aggregate level, hopelessness decreases slightly across adolescence (Bolland et al. 2001; Stoddard, Henly, et al. 2011). Given the strong association between hopelessness and negative outcomes in adolescence, it is important to better characterize the developmental trajectory of hopelessness as well as attendant risk and protective factors.

Hopelessness: Risk and Protective Factors

A significant body of research has examined risk factors for hopelessness. There is considerable evidence that cognitive vulnerabilities, such as a negative inferential style, increase the likelihood of developing hopelessness (Abela et al. 2009; Becker-Weidman et al. 2009). Other environmental factors, such as low socio-economic status (Han and Shek 2012; Landis et al. 2007), stress (LaFromboise et al. 2010; Stein et al. 2012), or emotional abuse (Courtney et al. 2008) also increase the likelihood of becoming hopeless. Evidence of gender differences in levels of hopelessness is mixed; while many studies indicate that females are more likely than males to experience hopelessness (Rodriguez-Naranjo and Cano 2016), others have shown males reporting on average higher scores (Bolland 2003; Lester 2015).

Less is known about protective factors that either mitigate the negative impact of hopelessness (on mood, suicidality, externalizing factors, etc.) or reduce hopelessness directly. Protective familial factors include: increased parent-adolescent communication (Kwok et al. 2010), greater parental warmth (Han and Shek 2012; Li et al. 2016), stronger parent-adolescent connection (Kliewer et al. 2001; Stoddard, Henly, et al. 2011), family stability (Ivanova and Israel 2005) and family support and community support (Grano et al. 2014). Familial support, however, may not be effective in highly uncertain and unstable situations (e.g., living in a refugee camp; Afifi et al. 2013; Kolarcik et al. 2012). Higher levels of optimism, life satisfaction, self-esteem, and social support all have been associated with decreased hopelessness (Ayub 2009; Bryan et al. 2013; Chioqueta and Stiles 2007). However, there has been considerably less research on protective psychological factors than risk factors for hopelessness. Despite the concurrent improvement in cognitive functioning and the changes in hopelessness across adolescence, few studies have tested whether cognitive functioning is associated with hopelessness.

Hopelessness and Adolescent Cognitive Development

Cognitive capabilities improve in early adolescence, particularly an “executive suite of capabilities…that allows for more…abstract, multidimensional, planned and hypothetical thinking” (Steinberg 2005). Consequently, adolescence may be a ‘perfect storm’, where newly emergent cognitive functions enable adolescents to appreciate the potential causes and consequences of negative life events, thus enabling them to become hopeless. Conversely, these new cognitive abilities may empower adolescents to better prevent, avoid, or problem-solve stressful life events that they encounter. Few empirical studies, however, have examined the relationship between cognitive functioning and hopelessness. Data that do exist suggest that better performance on cognitive tasks, such as superior problem solving ability and future orientation, may mitigate the effects of negative life events on hopelessness (Becker-Weidman et al. 2009; Dixon et al. 1991; Hamilton et al. 2015). However, it is unclear whether superior cognitive performance is protective across adolescence independently of stressful life events. No studies to date have examined longitudinal relationships between the trajectories of cognitive functioning and hopelessness across adolescence.

Hopelessness and Future Orientation

Orientation towards future events and outcomes is a quintessential human cognitive function that has been studied extensively over the past seventy years and has been shown to develop in adolescence (Gillespie and Allport 1955). Traditionally, future orientation has been conceptualized as a broad concept including motivational, cognitive, attitudinal and affective components; different conceptualizations emphasize the degree to which an individual can imagine the future, the extent to which one is optimistic about the future, as well as beliefs and appreciation that the future can be changed (Hirsch et al. 2007; Nurmi 1991; Steinberg et al. 2009; Trommsdorff and Lamm 1980). Unsurprisingly, studies that consider future orientation as an affectively valenced mode of future thinking (i.e., optimism/positive expectancies) have reported that hopelessness is characterized by the absence of positive, but not negative, future expectancies (O'Connor et al. 2000; O'Connor and Cassidy 2007). Given that future orientation is operationalized in these studies as affectively valenced (i.e., the opposite of the pessimistic future expectations that define hopelessness), it is not possible to either parse apart the cognitive and affective components of future orientation or examine associations between future orientation and hopelessness without notable confounds.

Steinberg et al. (2009) developed a measure of future orientation that assessed three domains: the degree to which one thinks about the future (Time Perspective), whether one makes plans before acting (Planning Ahead), and the extent to which an individual considers potential future consequences of their actions (Anticipation of Future Consequences). Significantly, this conceptualization of future orientation excludes affectively valenced dimensions of future orientation (i.e., optimism/pessimism) and thus, is not confounded with hopelessness (Steinberg et al. 2009). Studies have shown that, regardless of affective valence, greater future orientation is associated with a wide range of positive outcomes, including higher academic achievement, better school functioning, greater resilience against depressive symptoms and suicide, reduced likelihood of substance use and engaging in violent acts (Adelabu 2008; Birnbaum et al. 2003; Chin and Holden 2013; Robbins and Bryan 2004; Steinberg et al. 2009; Stoddard, Zimmerman, et al. 2011). Notably, these outcomes for which greater future orientation decreases risk, are outcomes for which hopelessness increases risk. Furthermore, research has shown that greater future orientation attenuates the effect of emotional victimization on the development of hopelessness (Hamilton et al. 2015).

Current Study

Hopelessness is an important construct for understanding adolescent mental health. There are no data, however, examining whether an emergent cognitive function in adolescence, future orientation, is associated with the trajectory of hopelessness across adolescence. Similarly, there are no data on how hopelessness changes across adolescence in diverse and generalizable samples of adolescents. Consequently, the present study tested whether the developmental trajectory of future orientation is associated with the trajectory of hopelessness in a racially and socioeconomically diverse sample of adolescents that were recruited at ages 12-13 and followed over five years. It was predicted that aggregate levels of

hopelessness would decline across adolescence and that greater future orientation would be associated with lower levels and faster decline of hopelessness.

Methods

Sample

The study sample was drawn from the Adolescent Cognition and Emotion (ACE) Project, an ongoing prospective, longitudinal, single cohort study examining risk factors for the emergence of depression from early to late adolescence. Data collection began in 2009 and is ongoing, scheduled to be completed in 2018. Male and female adolescents (12-13 years old) who identified as Caucasian or African American as well as their mothers or primary female caretakers were recruited from Philadelphia area middle schools (public and private). Recruitment was conducted through school mailings and follow up phone calls to families (68% of the sample) as well as advertisements in Philadelphia-area newspapers. Eligibility required that: (1) the adolescent was 12 or 13 years old, (2) the adolescent self-identified as Caucasian/White, African American/Black, or Biracial, and (3) the mother/primary female caregiver also agreed to participate in the study. Exclusion criteria were: (1) there was no mother/primary female caretaker available to participate, (2) the adolescent or their mother did not read or speak English well enough to complete study assessments, and (3) the adolescent or their mother had an intellectual disability or other cognitive impairment, had a severe developmental disorder (i.e. autism) or psychotic disorder, or exhibited any other medical or psychiatric problem that would prevent them from being able to complete the study requirements. Mothers and adolescents who met all study inclusion and exclusion criteria completed written consent and assent, respectively at baseline (Time 1).

Procedure

Adolescents completed questionnaires at Time 1 measuring future orientation and hopelessness. The adolescents' mothers reported demographic information (receipt of free school lunch and child's date of birth). Each of the four follow-up assessments (Times 2 – 5) were carried out annually, approximately, with participants attending an in-person assessment at Temple University. Participants in the current study consisted of 472 adolescents who had complete data on baseline measures of hopelessness, future orientation, and key demographic information [52% female, Mean age = 12.97 (*SD*=.79), 47% Caucasian, 47% received free lunch]. From the sample of 472 adolescents at Time 1, complete data were available for 224 at Time 2, 191 at Time 3, 148 at Time 4, and 124 at Time 5. Attrition analyses were carried out to determine whether systematic differences were observable in (a) those who dropped out of the study and (b) the number of assessments participants attended. Independent sample t-tests indicated that those who dropped out from the study did not differ from those who did not on number of childhood stressful life events, $t(459) = -.09$, $p = .93$, baseline total future orientation, $t(470) = -1.04$, $p = .30$, or hopelessness, $t(470) = .14$, $p = .89$. Chi-squared analyses indicated that no difference was observed comparing the analytic sample with the excluded sample on sex, $\chi^2(1, 472) = .001$, $p = .97$, or race, $\chi^2(1, 472) = .064$, $p = .80$; however, a trend towards significance was observed such that participants of lower socio-economic status were more likely to attrite, $\chi^2(1, 472) = 3.67$, $p = .06$. For those who did not drop-out of the study,

poission regression indicated that sex did not predict attendance at fewer assessments, Exp(B) = .97, p = .79, nor did race, Exp(B) = 1.01, p = .93, nor SES, Exp(B) = 1.21, p = .11. Similarly, numbers of childhood stressful life events did not predict attendance of future assessments, Exp(B) = .99, p = .92, nor did future orientation, Exp(B) = 1.00, p = .27, nor hopelessness, Exp(B) = 1.03, p = .98.

Measures

Hopelessness—The Hopelessness Scale for Children (HSC) was used to measure current beliefs of hopelessness (Kazdin et al. 1983). For this measure, adolescents completed 17 true or false questions ("When things are going badly, I know that they won't be bad all of the time"; "I never get what I want, so it's dumb to want anything"), where true responses were scored as one and false responses scored as zero. All responses were summed and, consequently, higher summary scores indicate increased hopeless thinking. The HSC has demonstrated good internal consistency (Spirito et al. 1988) and validity (Kazdin et al. 1986). In the current sample, the internal consistency of the HSC was .59 at baseline assessment, .70 at first follow-up, .78 at second follow-up, .69 at third follow-up and .69 at fourth follow-up.

Future Orientation—The Future Orientation Scale (FOS) measured the degree to which adolescents tended to perceive, anticipate, and plan for the future (Steinberg et al. 2009). Adolescents were presented with a series of contrasting statements with the word "BUT" between them, and were asked to select the statement that best described them. After selecting the best self-describing statement, they were then asked to indicate whether the selected descriptor was *really true* or *sort of true*. Responses for each pair of statements were then coded on a 4-point Likert scale, ranging from *really true* for one descriptor to *really true* for the contrasting descriptor (i.e., "Some people like to think about all the possible good and bad things that can happen before making a decision" BUT "Other people don't think it's necessary to think about every little possibility before making a decision"). Four separate scores were calculated: Anticipation of Future Consequences, Planning Ahead, Time Perspective, and total future orientation (Total). Anticipation of Future Consequences assesses the extent to which an individual considers potential future consequences of their actions (e.g., "Some people like to think about all of the possible good and bad things that can happen before making a decision BUT Other people don't think it's necessary to think about every little possibility before making a decision"). Planning Ahead measures whether one makes plans before acting (e.g., "Some people think that planning things out in advance is a waste of time BUT Other people think that things work out better if they are planned out in advance"). Time Perspective quantifies the degree to which one thinks about the future (e.g., "Some people would rather be happy today than take their chances on what might happen in the future BUT Other people will give up their happiness now so that they can get what they want in the future"). Finally, total future orientation is the sum of the three sub-scales above (Total). Items were scored in such a way that higher scores indicated greater future orientation. The internal consistency of this measure in the current sample was adequate with a Cronbach's alpha of .71 observed at baseline, .77 at first follow-up, .79 at second follow-up, .82 at third follow-up, and .82 at fourth follow-up for the complete scale. The FOS has previously been found to be reliable and validity (Steinberg et al. 2009).

The Childhood Life Events Scale – Parent Report—The Childhood Life Events Scale – Parent Report (CLES-PR) assesses the occurrence of stressful life events during childhood reported by a parent (Crossfield et al. 2002). Parents respond 'yes' or 'no' to 50 childhood events deemed to be moderate-to-majorly stressful, including items of physical and sexual abuse, bereavement, poor school performance, achievement failures and negative emotional feedback. A total score was calculated by summing affirmations of the experience of a life stressor, with each affirmative answer scored as one; values for this measure range from zero to fifty. The CLES-PR has demonstrated predictive validity and has been associated with the subsequent development of a negative inferential style and worse cognitive functioning (Crossfield et al. 2002).

Life Event Interview—Negative life events (NLEs) were measured using the Life Events Interview (LEI) (Safford et al. 2007). The LEI is a structured interview conducted after both adolescents and their mothers complete separate versions of a self-report questionnaire, the Adolescent Life Events Questionnaire (ALEQ) (Hankin and Abramson 2002). The ALEQ ascertains the occurrence of 63 NLEs that commonly occur during adolescence and, subsequently, the LEI is conducted to determine whether events endorsed on the ALEQ by adolescents and/or their mothers meet event definition criteria for inclusion and occurred during the outlined time period. Objective event definition criteria were designed to reduce the effect of a negative reporter bias. Life events are categorized as interpersonal (e.g., romantic break-up), achievement (e.g., failed a test), independent (e.g., family member died) or dependent (e.g., fought with friend). Independent and dependent life events distinguish events that occur independently of the participant's actions and events that individuals can contribute towards. The current study examined the mean number of total NLEs for the follow-up assessments adolescents participated in between the baseline assessment and the final assessment; a mean number of NLEs was used because it was common for participants to miss at least one follow-up assessment. As a result, all analyses that include NLEs have a reduced sample (N = 368). Both the ALEQ and LEI have demonstrated validity and reliability (Hankin 2008; Safford et al. 2007).

Demographics—Demographic information, including age, sex and receipt of federal school lunch subsidy, was assessed via oral and written reports from the adolescent and the mother/primary female caregiver.

Data Analytic Plan

Parallel process latent growth curve modelling analyses were conducted to examine relationships between growth factors (intercepts and slopes) of hopelessness and future orientation. Analyses were conducted using Mplus 7.1, using robust maximum likelihood. This estimation permitted inclusion of participants with missing data through full maximum likelihood estimation. Current conventions suggest that "excellent" fit is indicated by Comparative Fit Index (CFI) greater than .95 and a Root Mean Square Error of Approximation (RMSEA) below or equal to .05, "good" fit is indicated by a CFI between .90 and .95 and a RMSEA between .05 and .10 (Schermelleh-Engel et al. 2003). The Chi-Square test of model fit was reported, but not interpreted due to its oversensitivity to reject well-fitting models in large samples (Chen 2007; Cheung and Rensvold 2002). A data

analytic strategy was devised including four steps where, for each step, a set of four models was estimated to separately examine relationships between hopelessness and each dimension of future orientation measured by the FOS: Anticipation of Future Consequences (AFC), Time Perspective (TP), Planning Ahead (PA), and overall future orientation (Total).

First (Step 1), baseline parallel process latent growth models estimated (i) intercepts and slopes of hopelessness and future orientation (growth factors), (ii) associations between growth factors of hopelessness and future orientation, as well as (iii) association of covariates (Age at baseline, socioeconomic status, and sex) with growth factors of hopelessness and future orientation (see Figure 1).

Next, cross-lagged predictions at the observation level were added to baseline models (outlined above) to estimate the within-person effect of hopelessness on prospective future orientation and future orientation on prospective hopelessness, after controlling for covariates and between-person associations between growth factors. To parse apart the contribution of (i) hopelessness on prospective future orientation and (ii) future orientation on prospective hopelessness, three additional steps were taken. Step 2 added the unidirectional cross-lagged prediction of hopelessness to future orientation (Time 1 hopelessness to Time 2 future orientation, Time 2 hopelessness to Time 3 future orientation, etc.) to the baseline model. Step 3 added the unidirectional cross-lagged prediction of future orientation to hopelessness (Time 1 future orientation to Time 2 hopelessness, Time 2 future orientation to Time 3 hopelessness, etc.) to the baseline model. Step 4 included both unidirectional pathways specified in Steps 2 and 3 to estimate prospective cross-lagged prediction of both future orientation to hopelessness and hopelessness to future orientation. Finally, additional models were estimated that constrained all cross-lagged paths to be equal. Based on recommendations from Chen (2007), changes in the CFI of .010 or greater and/or changes in the RMSEA of .015 or greater compared to baseline models were interpreted as substantial changes in model fit. Similarly, improvements in chi-squared tests of fit also improved across all models.

All of these steps were replicated including (i) stressful childhood life events and (ii) recent negative life events experienced during the study. Complete information on these additional analyses is presented as supplementary information.

Results

Descriptive Statistics and Model Fit

Descriptive statistics are presented in Table 1. A zero order correlation matrix examining the associations between demographic information, life stress and hopelessness at each time point and total future orientation at each time point is presented in Supplementary Table 1. Examination of growth factor sample means suggest that, on average, decreases in hopelessness and increases in future orientation across time are observed during adolescence. Indices of model fit are presented in Table 2 for each of the four steps of analyses undertaken, including models where parameters are constrained to be equal. Fit indices (CFI, RMSEA) presented in Supplementary Table 2 and Supplementary Table 5 indicated good to excellent model fit across all four baseline models when childhood stress

and negative life events in adolescence are controlled for. Changes in model fit following the addition of prospective cross-lagged analyses (Step 2 – 4) are discussed below.

Step 1. Baseline parallel process latent growth models

When accounting for covariates in the baseline models, estimates of change over time were not statistically significant for either hopelessness or future orientation (see Table 3). However, there was significant variability in both the intercept and the slope of hopelessness and all dimensions of future orientation. Across dimensions of future orientation, significant inverse associations were observed between the intercept of future orientation and hopelessness. The slope of hopelessness also was significantly inversely associated with the slope of the Anticipation of Future Consequences and Planning Ahead dimensions of future orientation, as well as with Total future orientation. Predictions from the intercept of hopelessness to the slope of hopelessness were non-significant across the models. The intercept of the Planning Ahead dimension of future orientation was a significant predictor of the slope of Planning Ahead such that higher Planning Ahead at baseline was associated with less steep increase in Planning Ahead over time. This relationship also was demonstrated at a trend level for the Anticipation of Future Consequences dimension of future orientation. There were no significant predictions from the intercept to the slope across constructs (intercept of hopelessness to the slope of future orientation; intercept of future orientation to slope of hopelessness).

Steps 2-4. Testing prospective within-person effects through the addition of cross-lagged pathways

Model fit information for the sets of models exploring prospective within-person effects are shown in Table 2. Compared to baseline parallel process models, inclusion of the cross-lagged paths from hopelessness prospectively to future orientation (Step 2) improved model fit across the four dimensions of future orientation, with improvements in chi-square, CFI and RMSEA observed across all models. In particular, significant improvement in fit was observed for the Time Perspective subscale, with increase in CFI of .016 (>.10) and in the RMSEA by .016 (>.15). Inclusion of both sets of cross-lagged predictions simultaneously (Step 4) also resulted in a general pattern of fit improvement; however, significant improvement in both CFI and RMSEA were not observed for any subscale. Overall, changes in model fit and results were similar across the models tested in Step 2 and Step 4. However, the inclusion of cross-lagged paths from future orientation prospectively to hopelessness (Step 3) did not improve model fit compared to baseline models, and none of the paths tested were statistically significant. Application of equality constraints on the cross-lagged paths did not lead to significant decrement in model fit or change in results for any of the models in Steps 2-4. Thus, results from the simultaneous model including both cross-lagged paths with equality constraints applied (Step 4) are presented and described here. Results examining models without equality constraints are available from the first author upon request.

The results of the model testing the within-person effects of future orientation prospectively predicting hopelessness and hopelessness prospectively predicting future orientation are shown in Table 4. These results suggest that when these relationships are examined

simultaneously, there are no significant within person effects of future orientation prospectively predicting hopelessness. However, controlling for associations of between-person growth factors, there was a significant within-person relationship of hopelessness prospectively predicting the Time Perspective dimension of future orientation, such that higher hopelessness was associated with lower future orientation at the following time point. This effect also was seen at a trend level for the Total subscale of future orientation. For all other dimensions of future orientation, none of the cross-lagged paths modelling the within-person effects were significant, and associations between growth factors and with growth factors and covariates were consistent with baseline models.

Replication of these models including stressful childhood and recent negative life events

The results presented above were replicated using two measures of stress as covariates. The first model included stressful childhood life events as reported by the parent (CLES-PR) as a covariate. The second model used the mean number of negative life events (NLEs) experienced by adolescents over the course of the study. Complete details on these analyses are presented as supplementary information. When stressful childhood life events and recent negative life events were included as covariates as described above, indices of model fit were good or excellent and the overall pattern of results remained consistent – notably that higher levels of hopelessness were associated with worse future orientation at baseline and that as future orientation increased over time (except for the Time Perspective subscale), levels of hopelessness declined over time. In addition, the experience of a greater number of stressful childhood life events was associated with worse future orientation at baseline (except for the Time Perspective subscale). A greater mean level of negative life events during the course of the study was associated with a greater increase in hopelessness over time as well as slower development of two subscales of future orientation: Anticipation of Future Consequences and Planning Ahead.

Discussion

The experience of hopelessness during adolescence is a risk factor for a range of internalizing and externalizing disorders as well as high-risk behaviors. Little is known, however, about the trajectory of hopelessness in adolescence nor how it relates to one of the more distinguishable features of adolescence: rapid cognitive development. In a diverse sample of adolescents, hopelessness decreased over time. Moreover, higher future orientation at baseline was associated with lower hopelessness at baseline while faster development of multiple components of future orientation (anticipation of future consequences, planning ahead and overall future orientation) was associated with a more rapid decline in hopelessness. These results were shown to hold when stressful childhood life events experienced prior to study onset as well as negative life events experienced during the study were accounted for. Further, higher numbers of stressful childhood life events were associated with worse future orientation at baseline. Additionally, higher numbers of negative life events experienced during the study were associated with a slower decline in hopelessness as well as slower growth in the two dimensions of future orientation. Overall, these results provide compelling evidence that the development of future orientation reduces adolescent susceptibility to hopelessness.

To date, few studies have assessed hopelessness longitudinally in a diverse, community sample of adolescents; previous studies have predominantly examined hopelessness in extremely impoverished, urban samples. In the current study, levels of hopelessness declined modestly during adolescence in a socio-economically and racially diverse sample of urban adolescents, replicating the general pattern of results observed in impoverished samples (Bolland et al. 2001; Stoddard, Henly, et al. 2011). Likewise, the modest increase in all components of future orientation is in line with other adolescent samples (Steinberg et al. 2009). There is little empirical data about why hopelessness declines throughout adolescence. Previous researchers have suggested that, because early adolescence (ages 12 – 14) and hopelessness are both associated with stressful life events, a general decline in hopelessness may be attributable to an overall decline in the number of stressful life events (Compas 1987). Alternatively, the downward trajectory of hopelessness may reflect a growing mastery in the implementation of coping skills during adolescence (Compas et al. 2001).

This study indicates that as adolescents become more oriented towards their future, they are less likely to be hopeless, suggesting that the development of the cognitive capacity to orient towards the future may be a mechanism explaining the decline in hopelessness. Moreover, this association was shown to exist independently of the effect of life stress on both hopelessness and future orientation and while measuring the cognitive component of future orientation alone, thereby avoiding the potential confound of optimism (Steinberg et al. 2009). Consequently, adolescents may be at particular risk for hopelessness due to a more limited cognitive capacity to conceptualize and situate themselves in the future. This finding linking superior future orientation and lower hopelessness is in line with previous studies examining other internalizing and externalizing outcomes (Becker-Weidman et al. 2009; Dixon et al. 1991; Hamilton et al. 2015). It is worth noting that an association between stressful childhood life events and worse cognitive performance at baseline and an association between negative life events and hopelessness are also in line with previous research (Gibb and Abela 2008; Pechtel and Pizzagalli 2011).

Although there was no evidence that the development of the time perspective component of future orientation predicts faster decline in hopelessness at an aggregate level, there was some evidence that greater levels of hopelessness at an individual level prospectively predicted worse time perspective. It should be noted that, after controlling for stressful life events, this association was reduced to a trend level association. These findings suggest that there is no developmental relationship between the time perspective component of future orientation and hopelessness. Instead, individual level increases in hopelessness may actually worsen an adolescent's ability to conceptualize the future at each subsequent assessment. It is notable that the time perspective dimension of future orientation at baseline and across adolescence was unaffected by childhood and recent stress, not was it associated with aggregate levels of hopelessness over time. This pattern of results may indicate that it is the development of more executive components of future orientation (anticipation of future consequences and planning ahead) that are important in reducing hopelessness, in addition to being more susceptible to the deleterious effects of stress on cognition (Mac Giollabhui et al. 2017). Meanwhile, it may be that a separate mechanism implicated in hopelessness prospectively impairs the time perspective dimension of future orientation. Since previous

studies have shown that higher hopelessness is associated with higher preference for immediate high value rewards in depression groups, one putative mechanism may be that alterations in reward circuitry re-orient adolescents from the future to the present (Pulcu et al. 2014). Further research is needed to better elucidate the relationship between clinical features of psychological disorders and cognitive symptoms of internalizing disorders (Snyder et al. 2015).

These results should be considered in light of the limitations of the study. First, these data provided insight into the developmental trajectories of future orientation and hopelessness in a diverse sample of adolescents over five years. However, a corollary of recruiting a diverse sample tracked over five years is that significant attrition in the sample will occur over time in addition to missed assessments. Although attrition analyses did not identify any clear source of bias in patterns of attrition and attendance, trend level associations were observed such that low socio-economic status was associated with greater rates of attrition and attendance of fewer sessions. This should be kept in mind when considering the generalizability of findings to a similarly diverse population. However, this concern should be alleviated somewhat by the generally excellent fit of our data to the specified models. Further, replication of these findings in a sub-sample that attended at least one follow-up assessment, where negative life events were assessed, increases confidence that results are not biased by attrition. Second, although measures of future orientation and hopelessness used in this study have demonstrable validity and reliability, they are nevertheless self-report measures and, consequently, susceptible to the limitations of self-report. Finally, although we cannot rule out the possibility that the observed relationship between hopelessness and future orientation is actually attributable to an unmeasured third variable, replication of these results including putative confounding factors, stress and low socio-economic status, increases the strength of these conclusions.

Conclusion

It is surprising that this study is the first to demonstrate that hopelessness declines over adolescence, given the clinical relevance of hopelessness in predicting serious, adverse outcomes, such as suicide and violent behavior. These results suggest that declining hopelessness during adolescence is, at least in part, attributable to the concurrent development of future orientation, particularly the more executive components of future orientation, such as the ability to anticipate future consequences and to plan ahead. This suggests that improvements in the ability to orient towards the future may reduce negative expectations about what that future may look like – significantly, this relationship was shown to hold when controlling for likely confounds, such as low socio-economic status and stress. Further, this study provides some evidence that higher levels of hopelessness may also prospectively predict worse capacity for time perspective, indicating that there may be a more time-limited effect of hopelessness on the cognitive functions needed to orient towards the future. Finally, these findings replicate well-known associations between stressful childhood life events and poor cognitive functioning as well as providing novel data suggesting a persistent effect of life stress on future orientation during a relatively less sensitive developmental period: adolescence.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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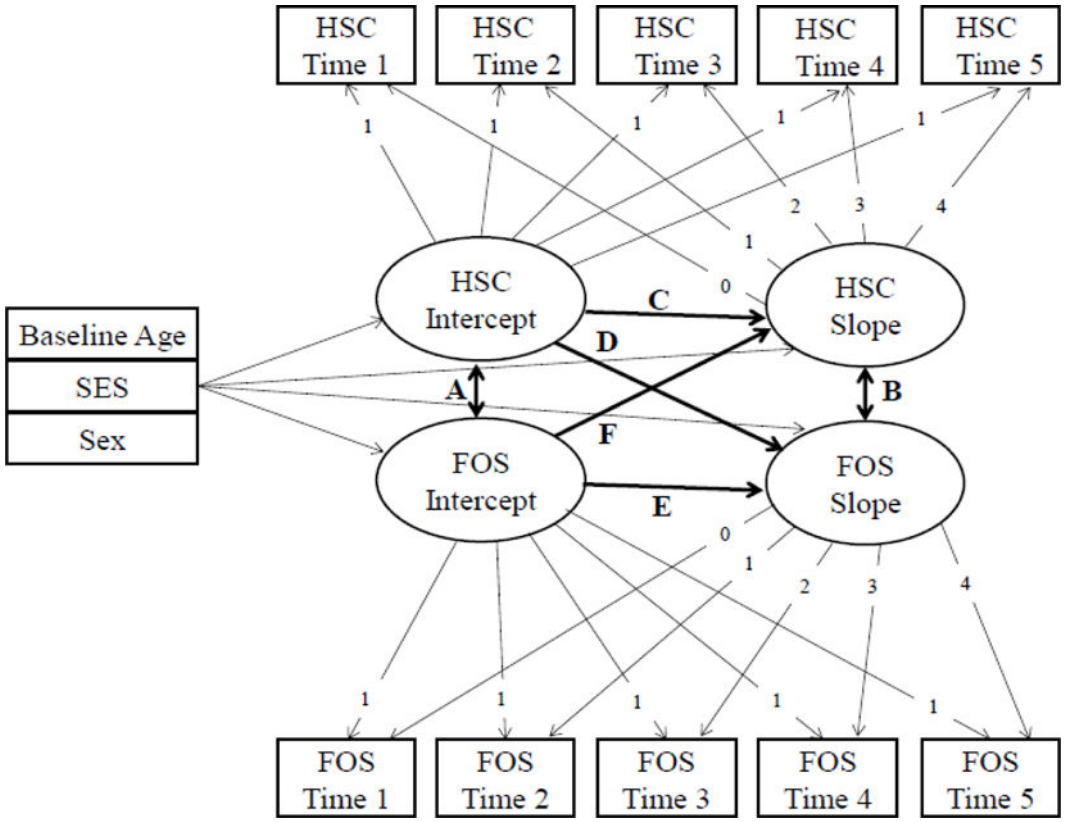

Figure 1.
Conceptual figure of baseline parallel process latent growth curve models.

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Table 1

Means and standard deviations of study variables.

Person-level demographics						
	Male	*Female*				
Sex	N = 225	N = 247				
	Lunch	*No Lunch*				
SES	N = 222	N = 250				
Person-level growth factor sample statistics (baseline models)						
	HSC*	AFC	PA	TP	Total	
	M (SD)	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	
Intercept	3.135 (0.994)	2.828 (0.279)	2.750 (0.292)	2.566 (0.256)	7.715 (0.209)	
Slope	−0.167 (0.361)	0.044 (0.092)	0.026 (0.104)	0.069 (0.086)	0.047 (0.077)	
Observation-level descriptives						
	HSC	AFC	PA	TP	Total	Age (years)
	M (SD)	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*
Baseline	3.136 (2.225)	2.848 (0.564)	2.792 (0.598)	2.586 (0.547)	2.742 (0.429)	13.028 (0.867)
Time 2	2.957 (2.486)	2.828 (0.647)	2.691 (0.665)	2.614 (0.582)	2.710 (0.489)	14.299 (0.964)
Time 3	2.964 (2.681)	2.930 (0.614)	2.751 (0.646)	2.702 (0.602)	2.794 (0.486)	15.090 (0.782)
Time 4	2.369 (2.252)	2.948 (0.592)	2.807 (0.661)	2.736 (0.602)	2.831 (0.503)	16.034 (0.705)
Time 5	2.234 (2.251)	2.974 (0.600)	2.929 (0.654)	2.883 (0.584)	2.928 (0.499)	17.083 (0.698)

Sex is a binary variable with female coded as 1; SES is a binary variable with eligibility for free lunch coded as 1;

*= Average HSC growth factor sample statistics across baseline models; HSC = Hopelessness Scale for Children; FOS = Future Orientation Scale; AFC = Anticipation of Future Consequences; PA = Planning Ahead; TP = Time Perspective.

Table 2

Model fit information for the estimated parallel process growth models

	AFC		PA		TP		Total	
Step 1: Baseline Models								
χ^2 (*df*=59)	97.481 **		81.356 *		80.171 *		105.538 **	
CFI	0.913		0.959		0.951		0.929	
	Est.	*90% CI*	*Est.*	*90% CI*	*Est.*	*90% CI*	*Est.*	*90% CI*
RMSEA	0.033	(0.021, 0.044)	0.025	(0.009, 0.037)	0.036	(0.025, 0.047)	0.036	(0.025, 0.047)
Step 2: Prospective Hopelessness to Future Orientation								
χ^2 (*df*=55)	93.569 **		68.855 †		69.279 †		93.776 **	
CFI	0.913		**0.975**		**0.967**		0.936	
	Est.	*90% CI*	*Est.*	*90% CI*	*Est.*	*90% CI*	*Est.*	*90% CI*
RMSEA	0.034	(0.022, 0.046)	0.020	(0.000, 0.034)	**0.021**	(0.000, 0.034)	0.035	(0.023, 0.047)
Equality Constraints Applied								
χ^2 (*df*=58)	97.129 **		79.490 *		74.970 †		101.737 **	
CFI	0.911		0.961		**0.961**		0.933	
	Est.	*90% CI*	*Est.*	*90% CI*	*Est.*	*90% CI*	*Est.*	*90% CI*
RMSEA	0.033	(0.021, 0.045)	0.025	(0.008, 0.037)	0.022	(0.000, 0.035)	0.035	(0.024, 0.046)
Step 3: Prospective Future Orientation to Hopelessness								
χ^2 (*df* =55)	92.578 **		79.518 *		77.135 *		101.728 **	
CFI	0.915		0.955		0.949		0.928	
	Est.	*90% CI*	*Est.*	*90% CI*	*Est.*	*90% CI*	*Est.*	*90% CI*
RMSEA	0.034	(0.021, 0.045)	0.027	(0.012, 0.040)	0.026	(0.009, 0.038)	0.037	(0.026, 0.049)
Equality Constraints Applied								
χ^2 (*df* =58)	96.356 **		80.888 *		79.739 **		104.898 **	
CFI	0.913		0.958		0.950		0.928	
	Est.	*90% CI*	*Est.*	*90% CI*	*Est.*	*90% CI*	*Est.*	*90% CI*
RMSEA	0.033	(0.021, 0.044)	0.025	(0.009, 0.038)	0.025	(0.008, 0.037)	0.036	(0.025, 0.047)
Step 4: Hopelessness to Future Orientation *and* Future Orientation to Hopelessness								

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	AFC		PA		TP		Total	
χ^2 (*df*=51)	88.812 **		66.556 †		67.371 †		92.833 **	
CFI	0.914		**0.972**		**0.962**		0.936	
	Est.	*90% CI*	*Est.*	*90% CI*	*Est.*	*90% CI*	*Est.*	*90% CI*
RMSEA	0.035	(0.022, 0.047)	0.022	(0.000, 0.036)	0.023	(0.000, 0.037)	0.037	(0.025, 0.048)
Equality Constraints Applied								
χ^2 (*df*=57)	96.055 **		79.021 *		74.631□		101.141 **	
CFI	0.912		0.960		0.959		0.932	
	Est.	*90% CI*	*Est.*	*90% CI*	*Est.*	*90% CI*	*Est.*	*90% CI*
RMSEA	0.034	(0.021, 0.045)	0.025	(0.009, 0.038)	0.023	(0.000, 0.036)	0.036	(0.024, 0.047)

Parameters in bold are substantially different from baseline models (Δ CFI ≥ .010; Δ RMSEA ≥ .015) CFI =Comparative Fit Index; RMSEA= Root Mean Square Error of Approximation; AFC = Anticipation of Future Consequences; PA = Planning Ahead; TP = Time Perspective

† *p*< .10;

* *p*< .05;

** *p*<.01

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Table 3

Parameter estimates for the four baseline parallel process growth models.

Intercepts	**AFC**		**PA**		**TP**		**Total**	
	Est.	***SE***	***Est.***	***SE***	***Est.***	***SE***	***Est.***	***SE***
IHSC	**3.771** **	1.249	**3.802** **	1.243	**3.787** **	1.246	**3.781** **	1.246
SHSC	−0.484	0.962	−0.700	0.857	−0.959	0.886	−0.747	0.933
IFOS	**2.943** **	0.381	**3.134** **	0.413	**1.804** **	0.39	**2.628** **	0.306
SFOS	−0.067	0.233	−0.208	0.232	0.097	0.207	−0.122	0.182
Residual Variances								
IHSC	**2.003** **	0.462	**2.048** **	0.461	**1.993** **	0.474	**1.986** **	0.465
SHSC	**0.114** *	0.067	**0.151** *	0.068	**0.149** *	0.068	**0.148** *	0.067
IFOS	**0.183** **	0.024	**0.228** **	0.025	**0.143** **	0.023	**0.126** **	0.015
SFOS	**0.010** **	0.003	**0.013** **	0.003	**0.009** **	0.003	**0.008** **	0.002
Growth Factor Associations								
A. IHSC w IFOS	**−0.170** **	0.053	**−0.138** *	0.060	**−0.114** *	0.049	**−0.139** **	0.040
B. SHSC w SFOS	**−0.017** **	0.006	**−0.016** *	0.007	−0.014	0.009	**−0.015** *	0.006
C. SHSC on IHSC	−0.081	0.066	−0.080	0.063	−0.068	0.071	−0.076	0.066
D. SHSC on IFOS	0.008	0.012	−0.013	0.013	−0.005	0.011	−0.002	0.010
E. SFOS on IFOS	−0.072 †	0.041	**−0.069** *	0.034	−0.043	0.049	−0.044	0.034
F. SFOS on IHSC	−0.078	0.117	−0.035	0.100	0.106	0.18	−0.024	0.147
Regression on Covariates								
HSC Intercept								
Age	−0.063	0.096	−0.065	0.095	−0.065	0.095	−0.064	0.095
Sex	0.179	0.171	0.177	0.172	0.178	0.171	0.179	0.171
SES	0.175	0.172	0.174	0.172	0.179	0.172	0.180	0.172
HSC Slope								
Age	0.055	0.061	0.062	0.060	0.051	0.062	0.062	0.060
Sex	0.083	0.076	0.092	0.077	0.087	0.078	0.091	0.077
SES	0.054	0.079	0.051	0.079	0.055	0.086	0.049	0.080
FOS Intercept								

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Intercepts	AFC		PA		TP		Total	
	Est.	*SE*	*Est.*	*SE*	*Est.*	*SE*	*Est.*	*SE*
Age	−0.007	0.029	−0.034	0.032	**0.062** *	0.030	0.007	0.023
Sex	−0.002	0.049	0.095 †	0.052	0.034	0.046	0.041	0.038
SES	−0.043	0.049	0.016	0.052	**−0.123** **	0.046	−0.050	0.038
FOS Slope								
Age	0.023	0.013	**0.035** *	0.013	0.007	0.014	**0.022** *	0.010
Sex	−0.011	0.018	0.019	0.020	−0.015	0.018	−0.002	0.015
SES	0.006	0.018	0.001	0.013	0.028	0.019	0.008	0.015

HSC = Hopelessness Scale for Children; FOS = Future Orientation Scale; AFC = Anticipation of Future Consequences; PA = Planning Ahead; TP = Time Perspective; I = Intercept; S = Slope; SES is a binary variable with eligibility for free lunch coded as 1; Sex is a binary variable with female coded as 1

† p< .10;

* p< .05;

** p<.01

Table 4

Parameter estimates for parallel process growth models with addition of prospective cross−lagged association between hopelessness and future orientation as well as future orientation and hopelessness (equality constraints applied)

Intercepts		**AFC**		**PA**		**TP**		**Total**	
		Est.	***SE***	***Est.***	***SE***	***Est.***	***SE***	***Est.***	***SE***
	IHSC	**3.738****	1.250	**3.788****	1.245	**3.770****	1.247	**3.773****	1.248
	SHSC	−0.368	0.973	−0.607	0.869	−0.827	0.888	−0.593	0.947
	IFOS	**2.944****	0.380	**3.133****	0.412	**1.801****	0.387	**2.627****	0.304
	SFOS	−0.073	0.233	−0.220	0.230	0.078	0.206	−0.132	0.180
Residual Variances									
	IHSC	**2.041****	0.477	**2.075***	0.475	**2.023****	0.488	**2.028****	0.481
	SHSC	**0.150***	0.067	**0.154***	0.069	**0.157***	0.069	**0.155***	0.067
	IFOS	**0.182****	0.024	**0.227****	0.025	**0.140****	0.023	**0.125****	0.015
	SFOS	**0.009****	0.003	**0.013****	0.003	**0.009****	0.003	**0.008****	0.002
Growth Factor Associations									
A.	IHSC w IFOS	**−0.167****	0.006	**−0.129***	0.060	**−0.098***	0.049	**−0.129****	0.041
B.	SHSC w SFOS	**−0.016***	0.006	**−0.015***	0.007	−0.011	0.009	**−0.013***	0.006
C.	SHSC on IHSC	−0.089	0.066	−0.085	0.063	−0.078	0.070	−0.087	0.066
D.	SHSC on IFOS	−0.107	0.122	−0.057	0.106	0.056	0.184	−0.068	0.154
E.	SFOS on IFOS	−0.072†	0.041	**−0.069***	0.033	−0.041	0.049	−0.045	0.033
F.	SFOS on IHSC	0.010	0.012	−0.010	0.013	−0.001	0.011	0.001	0.010
Regression on Covariates									
HSC Intercept									
	Age	−0.062	0.096	−0.065	0.095	−0.065	0.095	−0.065	0.096
	Sex	0.176	0.171	0.172	0.172	0.176	0.171	0.175	0.172
	SES	0.177	0.173	0.173	0.172	0.180	0.172	0.179	0.172
HSC Slope									
	Age	0.050	0.061	0.058	0.060	0.051	0.062	0.059	0.060
	Sex	0.083	0.076	0.094	0.077	0.088	0.078	0.093	0.077
	SES	0.054	0.079	0.053	0.079	0.051	0.086	0.050	0.079

Intercepts	AFC		PA		TP		Total	
	Est.	*SE*	*Est.*	*SE*	*Est.*	*SE*	*Est.*	*SE*
FOS Intercept								
Age	−0.007	0.029	−0.033	0.032	**0.063** *	0.030	0.008	0.023
Sex	−0.002	0.049	0.096 †	0.052	0.036	0.046	0.041	0.038
SES	−0.044	0.049	0.016	0.052	**−0.124** **	0.046	−0.050	0.038
FOS Slope								
Age	0.023 †	0.013	**0.036** **	0.013	0.008	0.014	**0.023** *	0.010
Sex	−0.011	0.018	0.019	0.020	−0.013	0.018	−0.001	0.015
SES	0.006	0.018	0.001	0.019	0.029	0.019	0.008	0.014
Prospective Cross-Lagged Regression (equality constraints applied)								
HSC (T2, T3, T4, T5) on FOS (T1, T2, T3, T4)								
	0.054	0.059	0.037	0.061	0.040	0.069	0.042	0.064
FOS (T2, T3, T4, T5) on HSC (T1, T2, T3, T4)								
	−0.006	0.008	−0.011	0.008	**−0.017** *	0.009	−0.011 †	0.006

HSC = Hopelessness Scale for Children; FOS = Future Orientation Scale; AFC = Anticipation of Future Consequences; PA = Planning Ahead; TP = Time Perspective; I = Intercept; S = Slope; SES is a binary variable with eligibility for free lunch coded as 1; Sex is a binary variable with female coded as 1

† $p < .10$;

* $p < .05$;

** $p < .01$