Multilevel risk factors and developmental assets for internalizing symptoms and self-esteem in disadvantaged adolescents: Modeling longitudinal trajectories from the Rural Adaptation Project

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Abstract

The current study filled significant gaps in our knowledge of developmental psychopathology by examining the influence of multilevel risk factors and developmental assets on longitudinal trajectories of internalizing symptoms and self-esteem in an exceptionally culturally diverse sample of rural adolescents. Integrating ecological and social capital theories, we explored if positive microsystem transactions are associated with self-esteem while negative microsystem transactions increase the chances of internalizing problems. Data came from the Rural Adaptation Project, a 5-year longitudinal panel study of more than 4,000 middle school students from 28 public schools in two rural, disadvantaged counties in North Carolina. Three-level hierarchical linear modeling models were estimated to predict internalizing symptoms (e.g., depression, anxiety) and self-esteem. Relative to other students, risk for internalizing problems and low self-esteem was elevated for aggressive adolescents, students who were hassled or bullied at school, and those who were rejected by peers or in conflict with their parents. Internalizing problems were also more common among adolescents from socioeconomically disadvantaged families and neighborhoods, among those in schools with more suspensions, in students who reported being pressured by peers, and in youth who required more teacher support. It is likely that these experiences left adolescents disengaged from developing social capital from ecological microsystems (e.g., family, school, peers). On the positive side, support from parents and friends and optimism about the future were key assets associated with lower internalizing symptoms and higher self-esteem. Self-esteem was also positively related to religious orientation, school satisfaction, and future optimism. These variables show active engagement with ecological microsystems. The implications and limitations were discussed.

Although the field of developmental psychopathology has grown dramatically over the past few decades, significant gaps remain in our research knowledge base. Leaders in the field have called for a broad, dynamic, systems-based, multiple levels of analysis perspective (Cicchetti & Toth, 2009); however, few studies have considered developmental influences from multiple ecological levels (e.g., cultural/societal, neighborhood, school, family, and individual psychological processes) in the same investigation. Further, compared to normative, middle class samples of urban and suburban adolescents, less is known about risk factors and developmental assets for disadvantaged, minority youth in rural environments. Even though developmental psychopathology is inherently about growth trajectories tracked over time, most research conducted is cross-sectional rather than longitudinal.

The current study seeks to fill some of these gaps by examining the influence of multilevel risk factors and developmental assets on longitudinal trajectories of internalizing symptoms (e.g., depression and anxiety) and self-esteem in an exceptionally culturally diverse sample of rural adolescents.

Research on the prevalence of and risk factors for psychiatric disorders in rural youth is lacking (Angold et al., 2002; Roberts, Attkisson, & Rossenblatt, 1998). Rural youth are a particularly vulnerable group who are more likely than urban or suburban youth to use tobacco, alcohol, and drugs; bring a weapon to school; have sexual intercourse (Atav & Spencer, 2002); and drop out of school (Provasnik et al., 2007). Given the increased stress of rural living (US Department of Justice, 2001), a greater research effort is needed to understand how stressors impact rural adolescent mental health.

The effects of childhood and adolescent internalizing disorders include decreased psychosocial and academic functioning and an increased risk for substance abuse and suicide (Birmaher et al., 1996). Depression is linked to low self-esteem and aggressive, antisocial, and delinquent behavior (Donnellan, Trzesniewski, Robins, Moffitt, & Caspi, 2005) as well as poor physical and mental health, economic problems, and criminal behavior that can persist into adulthood

(Trzesniewski et al., 2006). Anxiety is correlated with worry, difficulty concentrating, irritability, becoming easily fatigued, and sleep disturbances (American Psychiatric Association, 2013) that can be associated with decreased school performance (Owens, Stevenson, Hadwin, & Norgate, 2012) and increased aggression (Crick, Ostrov, & Werner, 2006; Marsee, Weems, & Taylor, 2008; Storch, Bagner, Geffken, & Baumeister, 2004; Vitaro, Brendgen, & Tremblay, 2002). The majority of these studies do not comprise rural samples, highlighting the pressing need to test if relationships found salient for urban and suburban adolescents are relevant for rural youth.

Given the lack of research on rural adolescent mental health coupled with the increased risk associated with rural living, it is incumbent upon researchers to examine what demographic, psychological, social, and environmental factors effect symptoms of depression and anxiety and levels of self-esteem in rural youth. Considering the multilevel nature of the current investigation, Bronfrenbrenner's ecological theory (1979) is a useful framework for understanding these complex relationships. Within ecological theory, we explore a systems-oriented transactional framework that suggests that much of adolescent growth centers on the development of social capital. Amassing social capital is the sign of being successfully engaged within ecological systems and furthering adolescent competence and self-esteem. Being blocked or disengaged from positive transactions within one's ecology fosters anxiety, depression, and other psychological or behavioral disorders. We examined this hypothesis by exploring the influence of positive and negative transactions across environmental systems on adolescent self-esteem and internalizing problems in a culturally diverse sample of rural youth.

Literature Review

Ecological theory and social capital formation

The current study takes an interdisciplinary stance to bring together ecological systems theories from psychology and concepts concerning social capital development from sociology. Ecological theory highlights the importance of viewing human development across multiple environments (Bronfrenbrenner, 1979). This theory focuses on the micro-, meso-, and macrosystems in the environment. Proximal processes (i.e., social interactions) across microsystems (e.g., school, family, peer group) are particularly important for adolescent development (Bronfrenbrenner, 1994). Social capital development is ecological and also involves transactions across multiple microsystem levels. Bourdieu (1986) wrote about the interaction of three sources of capital (economic, cultural, and social) with an emphasis on the role of access to institutional resources and relationships in influencing the development of social capital. Bourdieu's social capital concept focuses on how relationships allow the individual to claim economic, cultural, and social resources embedded within different ecological microsystems (e.g., family, school, workplaces; Dika & Singh, 2002; Portes, 1998).

Both frameworks suggest that positive microsystem interactions are associated with healthy social functioning, signaling engagement and social capital formation in the adolescent's ecological system. In support of this assertion, previous research on rural youth that utilized an ecological framework found that positive microsystem interactions with peers and parents were associated with decreased anxiety and aggression (Smokowski, Cotter, Robertson, & Guo, 2013). Negative, conflicted microsystem transactions result in the erosion of social capital. These deleterious proximal processes are marked by risk factors such as parent–child conflict and peer rejection, which have been associated with increased adolescent internalizing psychopathology (Suldo, Shaunessy, Thalji, Michalowski, & Shaffer, 2009), depression (Marmorstein & Iacono, 2004), and decreased adolescent self-esteem (Shagle & Barber, 1993; Shek, 1997). Ecological and social capital theories both stress the role of the macrosystem (e.g., neighborhood, community, culture) as larger environmental influences that impact adolescent mental health. However, distal macrosystem influences tend to be less influential than proximal processes in microsystem interactions. The developmental story posited by both of these frameworks is clear: (a) adolescents embedded and engaged within an ecological system are nurtured by positive transactions, resulting in social capital formation and psychological health (measured in the current study by self-esteem) and (b) adolescents blocked from positive proximal processes become disengaged, have little prosocial capital, and manifest internalizing problems as a result. In the following sections, we briefly review research evidence that supports these two broad hypotheses.

Demographic variables that influence social capital and psychopathological symptoms

Gender. Compared to males, females are at an increased risk of experiencing both depression (e.g., Glendinning, 1998; Hankin, 2006; Kessler et al, 1994; Negriff & Susman, 2011) and anxiety (e.g., Woodward & Fergusson, 2001). Adolescent females also report lower self-esteem (Puskar et al., 2010) in comparison with males. This disparity may be partially due to longstanding cultural biases against females that block them from opportunities in ecological systems that are open to males.

Race. The development of social capital is particularly difficult for minority groups who experience racial discrimination. Blocked social opportunities may impact both self-esteem and internalizing problems for minority adolescents. A meta-analysis of 310 samples totaling 61,424 children ages 8 to 16, found that Hispanic youth had significantly higher rates of depression compared with African American and Caucasian youth but that there were no differences in depression between African Americans and Caucasians (Twenge, & Nolen-Hoeksema, 2002; see also, Kessler et al., 1994; Roberts & Sobhan, 1992). Many Hispanic adolescents

are children of immigrants who do not have access to societal resources because they are not citizens. When American Indian youth are included in samples, their rates of depression exceed rates of other races. For example, in a nationally representative sample of about 10,000 youth, 29% of American Indian youth reported symptoms of depression compared with 22% of Hispanics, 18% of Caucasians, 17% of Asians, and 15% of African Americans (Saluja et al., 2004; see also Centers for Disease Control and Prevention, 2013). These marginalized groups may have a particularly difficult time developing social capital, which heightens internalizing problems and erodes self-esteem (Bachman, O'Malley, Freedman-Doan, Trzesniewski, & Donnellan, 2011; Twenge & Crocker, 2002).

Age. The risk of suffering from depression or anxiety increases with age (Merikangas et al., 2010; Substance Abuse and Mental Health Services Administration, 2011; Twenge & Nolen-Hoeksema, 2002). Self-esteem also increases with age (Wagner, Ludtke, Jonkmann, & Trautwein, 2013; Zeiders, Umaña-Taylor, & Derlan, 2013). Internalizing problems may proliferate as adolescents encounter increasingly complex social challenges. Overcoming those complex challenges correspondingly brings positive self-regard.

Socioeconomic status (SES). Low SES is commonly associated with an increased risk of suffering from depression (Goodman, Huang, Wade, & Kahn, 2003; Goodman, Slap, & Huang, 2003; Roberts, Roberts, & Chen, 1997) and an even stronger risk of anxiety (Kessler et al., 1994; Vine et al., 2012; Wiltfang & Scarbecz, 1990). Low SES groups are frequently cited in discussions of social capital. The lack of economic resources is one profound aspect of social marginalization that results in a long-term cumulative process of disengagement from high quality social institutions (Alexander, Entwisle, & Horsey, 1997). Low SES is commonly interpreted as a sign of low levels of social capital being transferred to youths who gradually become disengaged and increasingly frustrated. With few avenues for conventional success open to them, these youths commonly look to alternative sources of negative social capital that are readily available (e.g., gangs, associations with older delinquent peers; Dika & Singh, 2002).

Family structure. Living in a single-parent family may hamper the development of social capital and foster internalizing problems (Barrett & Turner, 2005; Garnefski & Diekstra, 1997; Miller & Taylor, 2012; National Survey of Children's Health, 2007). However, single-parent family structure does not appear to be related to self-esteem (Clark & Barber, 1994; Garnefski & Diekstra, 1997; Philips, 2012; Schmitz, 2006).

Positive proximal processes, social capital, and mental health

Future optimism. Future optimism is a personal assessment of how well the individual can meet challenges embedded in ecological social systems and often serves as a catalyst for adolescents to set goals, form plans, and make commitments (Nurmi, 1991; Seginer, 2008). Optimism about the future bolsters mental health functioning for vulnerable adolescents (McCabe & Barnett, 2000; Polgar & Auslander, 2009). People evaluate their chances of realizing their goals according to their present view of their social capital and capabilities to engage with social systems (Nurmi, 1991).

Parent support. Several studies have found that parent–child bonding is associated with lower levels of adolescent depression (Boutelle, Eisenberg, Gregory, & Neumark-Sztainer, 2009; Rueger, Malecki, & Demaray, 2008; Witherspoon, Scotland, Way, & Hughes, 2009) and higher levels of adolescent self-esteem (Boutelle et al., 2009; Rueger, Malecki, & Demaray, 2010). Coleman (1988) posits that it is the family's responsibility to adopt norms to advance children's life chances, considering parents as the primary players in transmitting social capital. Parent support facilitates adolescents' engagement with a variety of social systems (e.g., family, schools, churches, cultural institutions).

Friend support. Adolescence is characterized by increased autonomy and independence, suggesting that peer influence may be particularly salient during this time. Classmate support was significantly, inversely associated with internalizing behavior in a diverse sample of middle school students in Florida (Stewart & Suldo, 2011) and a majority White sample of middle school students in suburban Illinois (Rueger et al., 2008). In another study, decreased peer support over time was significantly associated with more internalizing symptoms for males in a sample of Hispanic and Black adolescents attending inner-city middle schools (Rosario, Salzinger, Feldman, & Ng-Mak, 2008). Several studies have also shown that friend support fosters self-esteem in adolescence (e.g., Arslan, 2009; Colarossi & Eccles, 2003; Laible, Carlo, & Roesch, 2004). Friend support from one's peer group is a key form of social capital during adolescence.

Teacher support. Supportive interactions with teachers have been associated with a variety of positive mental health outcomes (Colarossi & Eccles, 2003; Rueger et al., 2008; Stewart & Suldo, 2011) and with self-esteem (e.g., Arslan, 2009; Reddy, Rhodes, & Mulhall, 2003). Teachers facilitate the development of educational (e.g., knowledge and information), social (e.g., mentoring), and cultural capital.

School satisfaction. Schools are primary social institutions that facilitate social capital development in modern society. A high level of school connectedness is a protective factor for academic and health outcomes (Centers for Disease Control and Prevention, 2011; Resnick et al., 1997). School satisfaction is related to decreased depressive symptoms (Eamon, 2002; Witherspoon et al., 2009) and increased self-esteem (Huebner & Gilman, 2006). Teacher-based conveyance of social capital (e.g., supporting students' aspirations to succeed,

providing guidance on academic and personal matters) lowered the probability of dropping out by nearly half in a sample of 11,000 students from more than 1,000 schools (Croninger & Lee, 2001). Students at academic risk found relationships with teachers and informal talks outside of class to be particularly helpful. Finn (1989) proposed that low school satisfaction that leads to dropping out of school is the result of a withdrawal from school life. This disengagement blocks the transfer of educational and social capital.

Ethnic identity. Ethnic identity is an important form of cultural capital that manifests from strong psychological identification with a cultural or ethnic group. This affiliation is a sign of positive cultural group interactions with peers and adults, as well as, knowledge of the history, beliefs, and behaviors of that group. For Asian American and African American youth, ethnic identity is a protective factor that is inversely associated with depression (Kiang, Witkow, & Champagne, 2012; Street, Harris-Britt, & Walker-Barnes, 2009) and anxiety (Mandara, Richards, Gaylord-Harden, & Ragsdale, 2009; Tynes, Rose, Anderson, Umaña-Taylor, & Lin, 2012). Many researchers have also found a positive relationship between self-esteem and ethnic identity (Blash & Unger, 1995; Corenblum & Armstrong, 2012; Phinney & Chaviara, 1992; Phinney, Horenczyk, Liebkind, & Vedder, 2001; Umaña-Taylor & Updegraff, 2007).

Religious orientation. Churches serve as a key social institution for transfer of social and cultural capital. Participation in religious activities has been associated with decreased depression and increased self-esteem for Caucasian and African American youth (Le, Tov, & Taylor, 2007). A systematic review of the association between adolescent religiosity/spirituality and mental health found that 18 of the 20 articles reviewed reported that increased religiosity was associated with improved mental health functioning (i.e., decreased anxiety and depression and increased self-esteem; Rasic, Kisely, & Langille, 2011). Some researchers have found that increased participation in religious activities was associated with increased self-esteem (Bagley & Mallick, 1997; Smith, Weigert, & Thomas, 1979), while other studies failed to find this association (Donahue, 1995; Hunsberger, Pratt, & Pancer, 2001). Additional research is needed to understand the relationship between religious orientation and adolescent mental health.

Negative proximal processes, erosion of social capital, and mental health problems

Externalizing behavior. Researchers have connected adolescent aggressive behavior with depression (Kerr, Reinke, & Eddy, 2013), anxiety (Crick et al., 2006; Marsee et al., 2008; Storch et al., 2004; Vitaro et al., 2002) and low self-esteem (Zimmermann, Schutte, Taskinen, & Koller, 2013). Aggression erodes positive relationships with parents, peers,

teachers, and others, blocking the development of social capital and disengaging adolescents from prosocial institutions.

Parent–child conflict. Parent–child conflict has been associated with increased adolescent internalizing psychopathology (Suldo et al., 2009) and depression (Marmorstein & Iacono, 2004), and decreased adolescent self-esteem (Shagle & Barber, 1993; Shek, 1997). In a study examining multiple sources of social support (i.e., parent, teacher, and classmate support), low parent support was the strongest predictor of adolescent internalizing behavior (Stewart & Suldo, 2011). Moreover, in a longitudinal study of Hispanic and African American middle school students, decreases in guardian support over a 1-year period were associated with increased internalizing symptoms (Rosario et al., 2008). Without the security of strong relationships with parents, adolescents are more likely to become despondent and anxious and engage in risk-taking behavior (Green, Myrick, & Crenshaw, 2013). Given that parents are a primary provider of social capital, conflict in the parent–child relationship blocks this outlet for positive social capital development.

Negative transactions with peers.

Rejection, pressure, and delinquent friends. A number of studies have shown that peer rejection in adolescence can lead to poor mental and social development (Beeri & Lev-Wiesel, 2012; Kupersmidt & Coie, 1990; Lopez & DuBois, 2005; Parker & Asher, 1987). Susceptibility to peer pressure has also been connected to low self-esteem (Zimmerman, Copeland, Shope, & Dielman, 1997) and depressive symptoms (Allen, Porter, & McFarland, 2006). Rejection by positive peer groups blocks prosocial development, disengages youth from healthy sources of social capital, and causes adolescents to consider alternative affiliations with antisocial groups. According to Kaplan's (1980) self-enhancement hypothesis, although individuals with low self-esteem may seek out delinquent peers, subsequent involvement with delinquent peers can lead to increases in self-esteem and sense of belonging (Bynner, O'Malley, & Bachman, 1981; Mason, 2001). There is also evidence suggesting that delinquent peers are associated with symptoms of anxiety (La Greca & Harrison, 2005; Smokowski et al., 2013). These transactions with peers are critical to social capital development. Rejection by prosocial peers may lead to problems with mental health, self-esteem, and social identity development that make adolescents susceptible to negative peer pressure. The result is often a new antisocial peer group that might enhance self-esteem but further erodes social capital development and heightens internalizing symptoms.

School hassles and bullying victimization. Relational problems with peers at school, such as being bullied or hassled, are associated with poor mental health functioning (for a review, see Smokowski & Kopasz, 2005). Forms of bullying victimization and being hassled are similar and in-

clude being called names, being physically assaulted, or being excluded; however, bullying victimization is an extreme form of being hassled that occurs repeatedly over time. Bullying victimization is associated with decreased self-esteem (Guerra, Williams, & Sadek, 2011; O'Moore & Kirkham, 2001) and increased internalizing disorders (Salmon, James, Cassidy, & Javaloyes, 2000; Smokowski & Kopasz, 2005; Sweeting, Young, West, & Der, 2006), such as depression and anxiety (Kaltiala-Heino, Rimpelä, Marttunen, Rimpelä, & Rantanen 1999; Seals & Young, 2003). Victims are typically excluded from prosocial peer groups, limiting their development of social capital.

Macrosystem influences: School and neighborhood characteristics.

School characteristics. Students generally report feeling less safe in larger schools (Lleras, 2008) likely due to the higher rates of violence (Ferris & West, 2004), crime, bullying, and vandalism (Walker & Gresham, 1997) present in larger schools. Farrell, Sijbenga, and Barrett (2009) found that students attending low SES schools reported significantly higher depression and significantly lower self-esteem than students attending high SES schools; however, students attending high SES schools reported significantly higher anxiety than those attending low SES schools. Walsemann, Bell, and Maitra (2011) found that African American adolescents reported more depressive and somatic symptoms when attending predominantly White schools than when attending predominantly non-White schools. Schools with high rates of teacher turnover tend to have lower quality teachers (Haycock, 1998). These school characteristics (school size, SES, racial composition, teacher turnover rates) negatively impact students' mental health functioning as well as the transfer of educational, cultural, and social capital.

Neighborhood characteristics. One group of researchers found that the effect of neighborhood poverty on adolescent depression was mediated by social support (Hurd, Stoddard, & Zimmerman, 2013). Given that adolescents from single-parent homes have poorer mental health outcomes compared with adolescents living with two parents (Barrett & Turner, 2005; Garnefski & Diekstra, 1997; Miller & Taylor, 2012; National Survey of Children's Health, 2007), it stands to reason that adolescents living in poor neighborhoods with a high percentage of single mothers and low-educated families would have many challenges developing social capital and would report poor mental health. Neighborhood effects have been investigated in urban areas, primarily with African American families. We extend this research to rural, multicultural families.

Hypotheses for current study

Our overarching thesis was that adolescents who are engaged in developing social capital through positive transactions across different levels of their ecology would report high self-esteem while adolescents who experience negative ecological transactions disengage from their ecology and manifest internalizing problems. Based on existing research, we tested the following hypotheses that were related to our thesis:

1. For demographic markers, being female, Hispanic or American Indian, older, from a single-parent household, and having a low SES will be risk factors associated with higher rates of internalizing symptoms and lower self-esteem. Older adolescents and African American youth may report higher self-esteem.
2. Positive ecological transactions resulting in ethnic identity, religious orientation, school satisfaction, and future optimism will be inversely associated with internalizing symptoms and positively related to self-esteem.
3. Social capital, measured by parent, friend, and teacher support, will be inversely associated with internalizing symptoms and positively related to self-esteem.
4. Negative ecological transactions evidenced by parent–adolescent conflict, school hassles, bullying victimization, peer rejection, peer pressure, delinquent peer association, and externalizing behavior will be positively associated with internalizing symptoms and inversely associated with self-esteem.
5. School and neighborhood characteristics will display effects that are weaker than proximal microsystem effects. School size, teacher turnover, low school SES, neighborhood poverty, and single parent family structure will be risk factors positively associated with internalizing symptoms and inversely associated with self-esteem.

These hypotheses are summarized in Tables 1 and 2.

Method

Current study

The current sample came from the North Carolina Academic Center for Excellence in Youth Violence Prevention Rural Adaptation Project, a 5-year longitudinal panel study of more than 5,000 middle school students from 28 public middle schools in two rural, economically disadvantaged counties in North Carolina. The present study used data that were collected in the spring of 2011, 2012, and 2013 (i.e., Years 1, 2, and 3 of the 5-year project, respectively). All middle school students in Grade 6 through Grade 8, a complete census in County 1, were included in the sample. Because County 2 was geographically bigger with a larger student population, a random sample of 40% of middle school students were included from County 2. The data collection procedure was identical in both counties, and data were collected using an online assessment tool. All students were advised that they were free to decline participation and assented to participate by reading and electronically signing an assent screen prior to completing the online assessment. Assessments were filled out in school computer labs that were closely monitored by

Table 1. *Log(internalizing)*

Fixed and Random Effects	Hypothesized Sign	Baseline Descriptives % or Mean (*SE*)	Estimation Based on	
			10 Imputed Files exp(*B*)	20 Imputed Files exp(*B*)
Fixed Effect				
Level 1: time				
Time (months since baseline)	−?		0.999**	0.999**
School hassles (time varying)	+	1.50 (0.007)	1.111***	1.111***
Externalizing behavior (time varying)	+	1.34 (0.006)	1.341***	1.342***
Parent child conflict (time varying)	+	2.05 (0.039)	1.031***	1.031***
Peer rejection (time varying)	+	1.29 (0.007)	1.065***	1.065***
Level 2: individual				
Race (White)		26.7%		
African American	+	23.3%	1.011	1.011
Hispanic	+	8.0%	1.048***	1.048***
Native American	+	28.4%	1.002	1.002
Mixed race and other	+	13.6%	1.020*	1.020*
Gender (male)		47.6%		
Female	+	52.4%	1.083***	1.082***
Age at baseline	−	12.80 (0.017)	1.008**	1.008**
Receipt of free/reduced lunch (no)				
Yes	−	85.8%	1.026**	1.026**
Family structure (other)				
Two-parent family	−	84.6%	1.009	1.009
Ethnic identity	−	3.32 (0.013)	1.007*	1.007*
Religious orientation	−	2.30 (0.009)	1.001	1.001
School satisfaction	−	2.36 (0.008)	1.006	1.007
Bullying victimization	+	0.23 (0.007)	1.021**	1.022**
Future optimism	−	3.46 (0.008)	0.980***	0.979***
Parent support	−	2.67 (0.008)	0.968***	0.968***
Teacher support	−	3.15 (0.009)	1.017**	1.018**
Friend support	−	2.47 (0.009)	0.983**	0.983**
Delinquent friends	+	1.40 (0.007)	0.993	0.993
Peer pressure	+	1.31 (0.006)	1.029***	1.029***
Level 3: school and neighborhood				
School size	+?	508.55 (3.697)	1.000	1.000
Students receiving free/reduced lunch (%)	+?	77.55 (0.153)	1.001*	1.001*
American Indian students in school (%)	?	31.88 (0.477)	1.000	1.000
African American students in school (%)	?	27.95 (0.288)	0.999*	0.999*
School students at grade level in reading (%)	−?	57.91 (0.146)	1.002†	1.001†
School students at grade level in math (%)	−?	75.28 (0.112)	0.999†	0.999†
Teacher turnover (%)	+?	11.35 (0.142)	0.999*	0.999*
Residents below poverty line (%)	+	30.13 (0.188)	1.001*	1.001*
Residents age 25 + with 9th–12th grade education no diploma (%)	+	16.66 (0.089)	0.999	0.999
Family households with single female head, no husband (%)	+	21.51 (0.118)	1.000	1.000
Short term out of school suspensions per 100 students	+	38.88 (0.361)	1.000**	1.000**
Intercept			0.577***	0.575***
Random Effect (Variance Component)				
Level 3 Intercept			0.000	0.000
Level 2 Intercept			0.016***	0.016***
Model Wald χ² (*df*) shown by 1 imputed file			9788.90 (34)***	9811.95 (34)***
Number of students				
Wave 1 (time = 0 months)			4036	4036
Wave 2 (time = 12 months)			4231	4231
Wave 3 (time = 24 months)			4229	4229
Number of schools				
Wave 1 (time = 0 months)			28	28

Note: The reference group for categorical variables is in parentheses after the variable name.

†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$. Two-tailed test for estimated regression coefficients.

Table 2. *Log(self-esteem)*

Fixed and Random Effects	Hypothesized Sign	Baseline Descriptives %or Mean (SE)	Estimation Based on 10 Imputed Files exp(B)	20 Imputed Files exp(B)
		Fixed Effect		
Level 1: time				
Time (months since baseline)	+?		0.998***	0.998***
School hassles (time varying)	−	1.50 (0.007)	0.966***	0.966***
Externalizing behavior (time varying)	−	1.34 (0.006)	0.979**	0.979***
Parent child conflict (time varying)	−	2.05 (0.039)	0.985***	0.985***
Peer rejection (time varying)	−	1.29 (0.007)	0.968***	0.968***
Level 2: individual				
Race (White)		27.0%		
African American	−	23.4%	1.053***	1.053***
Hispanic	−	7.9%	1.019*	1.020*
Native American	−	28.3%	1.025**	1.026***
Mixed race and other	−	13.9%	1.033***	1.033***
Gender (male)		47.9%		
Female	−	52.1%	0.974***	0.974***
Age at baseline	+	12.81 (0.017)	0.994**	0.994**
Receipt of free/reduced lunch (no)				
Yes	+	85.7%	1.011†	1.010
Family structure (other)				
Two-parent family	+	84.5%	0.998	0.999
Ethnic identity	+	3.32 (0.013)	1.017***	1.017***
Religious orientation	+	2.30 (0.009)	1.045***	1.045***
School satisfaction	+	2.36 (0.008)	1.037***	1.037***
Bullying victimization	−	0.23 (0.007)	0.997	0.996
Future optimism	+	3.46 (0.008)	1.055***	1.056***
Parent support	+	2.67 (0.008)	1.044***	1.045***
Teacher support	+	3.15 (0.009)	0.992†	0.991†
Friend support	+	2.47 (0.009)	1.021***	1.020***
Delinquent friends	−	1.39 (0.007)	1.028***	1.027***
Peer pressure	−	1.31 (0.006)	0.989†	0.989†
Level 3: School and neighborhood				
School size	−	508.94 (3.660)	1.000	1.000
Students receiving free/reduced lunch (%)	−?	77.56 (0.152)	1.001†	1.001†
American Indian students in school (%)	?	31.92 (0.472)	1.000	1.000
African American students in school (%)	?	27.91 (0.285)	1.000	1.000
School students at grade level in reading (%)	+?	57.90 (0.145)	1.000	1.000
School students at grade level in math (%)	+?	75.28 (0.110)	1.001	1.001
Teacher turnover (%)	?	11.33 (0.140)	1.001†	1.001*
Residents below poverty line (%)	−	30.17 (0.186)	1.000	1.000
Residents age 25 + with 9th–12th grade education no diploma (%)	−	16.67 (0.088)	1.000	1.000
Family households with single female head, no husband (%)	−	21.54 (0.117)	1.001	1.001
Short term out of school suspensions per 100 students	−	38.97 (0.358)	1.000	1.000
Intercept			1.577***	1.580***
		Random Effect (Variance Component)		
Level 3 intercept			0.000	0.000
Level 2 intercept			0.009***	0.009***
Model Wald χ^2 (df) shown by 1 imputed file			3360.80 (34)***	3294.43 (34)***
Number of students				
Wave 1 (time = 0 months)			4119	4119
Wave 2 (time = 12 months)			4286	4286
Wave 3 (time = 24 months)			4283	4283
Number of schools				
Wave 1 (time = 0 months)			28	28

Note: The reference group for categorical variables is in parentheses after the variable name.
†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$. Two-tailed test for estimated regression coefficients.

research staff. Confidentiality was maintained by giving students identification numbers so that no identifying information was collected.

The current study aims to analyze students' change on internalizing and self-esteem scores over a 2-year study period based on three-wave panel data. Only students who provided data for at least two waves were included in the analysis. Students who entered into the study at Wave 3 were excluded because they only provided data at one point in time.

Participants

Characteristics of the sample are shown in Table 1. The final sample for the analysis of *internalizing score* comprises 4,036 observations at baseline; 4,231 observations at Wave 2, or 12 months after the baseline; and 4,229 observations at Wave 3, or 24 months after the baseline. The final sample for the analysis of *self-esteem score* comprises 4,119 observations at baseline; 4,286 observations at Wave 2, or 12 months after the baseline; and 4,283 observations at Wave 3, or 24 months after the baseline. The study students are nested within 28 schools. The racial/ethnic diversity of the sample mirrored the surrounding community: 26.7% of participants identified as Caucasian, 28.4% identified as American Indian (Lumbee), 23.3% identified as African American, and 8% identified as Latino. The sample was almost evenly divided by gender, with 52% of participants identifying as female. The mean age of the sample was 12.8 years, and 85.8% of the sample received free/reduced price lunch.

Measures

The School Success Profile (SSP; Bowen & Richman, 2008) is a 195-item youth self-report assessment that measures perceptions and attitudes about school, friends, family, neighborhood, self, and health and well-being. This lengthy assessment contains many subscales for investigators to choose from to fit their study aims. The reliability and validity of the SSP are well documented given that it has been administered to tens of thousands of students since its creation in 1993 (Bowen, Rose, & Bowen, 2005). The current study used a modified version of the SSP, the SSP Plus, which included 152 of the SSP items and four additional subscales: (a) a modified version of the Rosenberg Self-Esteem Scale (Rosenberg, 1965); (b) the Multigroup Ethnic Identity Measure (Phinney & Ong, 2007); (c) subscales from the Youth Self-Report (YSR), which is the adolescent version of the Child Behavior Checklist (Achenbach & Rescorla, 2001); and (d) the Conflict Behavior Questionnaire (Prinz, Foster, Kent, & O'Leary, 1979) to measure parent–child conflict.

Dependent measures.

Self-esteem. This dependent variable was assessed using a five-item adapted version of the Rosenberg Self-Esteem Scale (Rosenberg, 1965). For brevity on a long assessment, five of the items from the original Rosenberg Self-Esteem Scale were deleted and other items were reworded for clarity for a low-literacy middle school population. Example items included, "I feel good about myself" and "I am able to do things as well as most other people." Each item was rated on a 3-point Likert scale (*not like me*, *a little like me*, or *a lot like me*) and the Cronbach α reliabilities were 0.87 in Year 1, 0.91 in Year 2, and 0.92 in Year 3 in this sample.

Internalizing symptoms. Internalizing symptoms were measured with seven items from the YSR (Achenbach & Rescorla, 2001) that assess symptoms of anxiety and depression. Items included "I often feel sad" and "I often feel nervous or tense." Each item was rated on a 3-point Likert-like scale (*not like me, a little like me*, or *a lot like me*) and the Cronbach α reliability was 0.89 in Year 1, 0.90 in Year 2, and 0.91 in Year 3 in this sample.

Time-varying covariates. One variable from each ecological microsystem level was chosen to serve as a time-varying covariate. Based on past research, we believe that these variables are the strongest risk factors that capture negative microsystem transactions.

Externalizing behaviors (psychological microsystem). Externalizing behaviors were measured by the modified 12-item aggression subscale from the YSR (Achenbach & Rescorla, 2001). Items included "I get in many fights" and "I break rules at home, school, or elsewhere." Each item was rated on a 3-point Likert scale (*not like me, a little like me,* and *a lot like me*); the Cronbach αs were 0.86 in Year 1, 0.87 in Year 2, and 0.86 in Year 3 in this sample.

Parent–child conflict (family microsystem). Parent–child conflict was measured using 10 of the 20 items from the Conflict Behavior Questionnaire (Prinz et al., 1979). This scale assessed the degree of conflict in the parent–child relationship. Items included "At least three times a week, my parent(s) and I get angry at each other" and "My parent(s) put me down." The responses for each item were *true* or *false* and the Cronbach α reliabilities were 0.82 in Year 1, 0.83 in Year 2, and 0.83 in Year 3 in the current sample.

Peer rejection (peer microsystem). The degree to which participants perceived that their peers rejected them was measured with the three-item peer rejection scale (Bowen & Richman, 2008). Example items included "I am made fun of by my friends" and "I wish my friends would show me more respect." Each item was rated on a 3-point Likert scale (*not like me, a little like me, or a lot like me*) and the Cronbach α reliabilities were 0.70 in Year 1, 0.74 in Year 2, and 0.75 in Year 3 in the current sample.

School hassles (school microsystem). The 13-item school hassles scale (Bowen & Richman, 2008) assessed the frequency with which students have endured peer harassment

at school over the past 30 days. Example items included "Someone treated you in a disrespectful way" and "Someone at school pushed, shoved, or hit you." The frequency of these events was measured on a 3-point Likert scale (*never, once or twice,* or *more than twice*) and the Cronbach α reliabilities were 0.90 in Year 1, 0.92 in Year 2, and 0.92 in Year 3 in this sample.

Individual level predictors. These variables are only measured at Time 1

Demographic variables that impact social capital. Age was measured in years. Receipt of free or reduced price lunch was used as a proxy for SES and was a dichotomized variable. Race/ethnicity was coded as four dichotomous variables: Hispanic, African American, American Indian, and mixed race (Caucasian students were the reference group). Family structure was a dichotomized variable measured as either two-parent household or other family situation. For gender, male was coded as 0 and female was coded as 1.

Positive proximal process measures that signify social capital development.

Future optimism. Future optimism was assessed with the 12-item SSP future optimism scale (Bowen & Richman, 2008) that measures expectations for future success. Example items included "When I think about my future, I feel very positive" and "I see myself accomplishing great things in life." Each item was rated on a 4-point Likert scale (*strongly disagree, disagree, agree,* and *strongly agree*) and the Cronbach α reliability was 0.93 in Year 1 in this sample.

Parent support (engagement with family). The five-item Parent Support Scale (Bowen & Richman, 2008) measured the frequency over the preceding 30 days that an adult in the child's home provided emotional support. Example items included "How often did the adults in your home let you know that you were loved?" and "How often did the adults in your home tell you that you did a good job?" Each item was rated on a 3-point Likert scale (*never, once or twice, or more than twice*) and the Cronbach α reliability was 0.89 in the current sample.

Friend support (engagement with peers). Friend support was measured with a five-item scale (Bowen & Richman, 2008) that gauged students' perceptions of how supportive their friends are. Example items included "I can count on my friends for support" and "I can trust my friends." Each item was rated on a 3-point Likert scale (*not like me, a little like me, or a lot like me*), and the Cronbach α reliability was 0.89 in Year 1 in the current sample.

Teacher support (engagement at school). The eight-item Teacher Support scale (Bowen & Richman, 2008) measured students' perceptions of their teachers' supportive behavior.

Items included "My teachers care about me" and "My teachers give me a lot of encouragement." Each item was rated on a 4-point Likert scale (*strongly disagree, disagree, agree, or strongly agree*). The Cronbach α reliability was 0.88 in Year 1 in the current sample.

School satisfaction (engagement with school microsystem). The seven-item School Satisfaction Scale (Bowen & Richman, 2008) measured students' overall satisfaction with school experiences. Items included "I enjoy going to this school" and "I get along well with teachers at this school." Each item was rated on a 3-point Likert scale (*not like me, a little like me, or a lot like me*), and the Cronbach α reliability was 0.84 in Year 1 in the current sample.

Religious orientation (engagement at church). The importance of religion in students' lives was measured with the three-item religious orientation scale (Bowen & Richman, 2008). Items included "My religious faith gives me strength" and "My religious faith influences the decisions I make." Each item was rated on a 3-point Likert scale (*not like me, a little like me, or a lot like me*), and the Cronbach α reliability was 0.88 in Year 1 in this sample.

Ethnic identity (engagement with culture). Phinney's six-item Multigroup Ethnic Identity Measure (Phinney & Ong, 2007) was used to measure the strength of participants' ethnic identities. Example items included "I have a strong sense of belonging to my own ethnic group" and "I feel a strong attachment towards my ethnic group." Each item was rated on a 5-point Likert scale (*strongly disagree, disagree, neither agree nor disagree, agree,* and *strongly agree*), and the Cronbach α reliability was 0.92 in Year 1 in this sample.

Negative proximal processes that erode social capital.

Bullying victimization. Bullying victimization was measured by a dichotomized variable in Year 1 that asked students, "During the past 12-months, have you ever been bullied on school property?" The response options were *yes* (coded 1) or *no* (coded 0).

Delinquent friends. The delinquent friends subscale (Bowen & Richman, 2008) was a nine-item scale that measured the degree to which the participant's friends engaged in delinquent activities. Items included "I have friends who get in trouble with the police" and "I have friends who cut classes." Each item was rated on a 3-point Likert scale (*not like me, a little like me,* or *a lot like me*), and the Cronbach α reliability was 0.90 in Year 1 in the current sample.

Peer pressure. Peer pressure was measured with a five-item scale (Bowen & Richman, 2008) that measured the degree to which participants felt that their friends pressured them. Items included "I let my friends talk me into doing things I really don't want to do" and "I tend to go along

with the crowd." Each item was rated on a 3-point Likert scale (*not like me, a little like me,* or *a lot like me*). The Cronbach α reliability was 0.73 in Year 1 in the current sample.

Macrosystem influences: School and neighborhood characteristics.

School level variables. School level variables were obtained from administrative data and included school size, school SES (i.e., percentage of students who receive free or reduced price lunch), school racial composition (i.e., percentage of each racial group: American Indian, Asian, African American, Hispanic/Latino, Caucasian, and multiracial), percentage of students at or above grade level in reading and math, percentage of teacher turnover, and percentage of short-term, out-of-school suspensions.

Neighborhood level variables. Neighborhood level variables were collected from publicly available census data from 2010 and included the percentage of residents living below the poverty line, percentage of residents age 25 or older without a high school diploma, and percentage of families with single-female-headed households. Neighborhood variables characterized the census tract surrounding the participant's school and were not linked to the students' home addresses.

Analytic plan

The study data set has a typical nesting structure; study times (i.e., three waves or occasions) are nested within students, and students are nested within schools. To correct for the clustering effects and address the violation of the independent-observation assumption embedded in a linear regression model, we applied three-level hierarchical linear modeling (HLM) to the data analysis. The three-level HLM is shown by the following combined equation:

$$\ln(Y_{tij}) = \gamma_{000} + \gamma_{100}(\text{Time})_{tij} + \sum_{p=2}^{P} \gamma_{p00}(\text{TV})_{ptij}$$

$$+ \sum_{q=1}^{Q} \gamma_{0q0}(X)_{qij} + \sum_{r=1}^{R} \gamma_{00r}(W)_{rj} + u_{00j} + r_{0ij} + e_{tij}$$

where $\ln(Y_{tij})$ is the outcome variable of interest, $(\text{Time})t_{ij}$ is the time variable measured in months from baseline or Wave 1, $(\text{TV})_{ptij}$ are $P - 1$ time-varying variables, $(X)_{qij}$ are Q student-level variables, $(W)_{rj}$ are R school-level variables, r_{0ij} is a random effect for the ith student from the jth school, u_{00j} is a random effect for the jth school, and e_{tij} is a residual term incorporating temporal random effect for the ith student from the jth school at time t.

First, the two outcome variables of interest have skewed distributions and do not meet the normality assumption imposed by HLM for outcome variables. For internalizing

scores, skewness was 1.27 and kurtosis was 3.90. For self-esteem scores, skewness was –1.45 and kurtosis was 4.34. Consequently, we followed the convention in econometrics to take a natural-logarithm transformation of the dependent variable. A typical example in economics for a dependent variable with a skewed distributed is income, and economists often use "ln(income)" rather than "income" as the dependent variable in linear modeling (Greene, 2003).

Second, the analysis specifies a linear time variable only because quadratic or curvilinear modeling is not permitted for 3-point data (Raudenbush & Bryk, 2002). A special feature, and an advantage of the current analytic model, is the use of several time-varying variables, that is, $(\text{TV})_{ptij}$ variables, in Level 1. The inclusion of these time-varying variables investigates the relationship between a predictor and the outcome variable from a truly dynamic point of view and therefore best utilizes the rich information offered by this longitudinal data. Because of the complexity of this specification, many time-varying variables cannot be included in the analysis. We chose four time-varying covariates; including $(\text{Time})_{tij}$, the total number of predictors at Level 1 is 5, or $P = 5$. Supported by prior research, the four time-varying covariates we used are the most important predictors of outcome change from different microsystems: externalizing behavior, parent child conflict, peer rejection, and school hassles measures. These time-varying covariates represent individual behavior, family relationships, peer social status, and school experiences. All of them are negative microsystem transactions that can lead to disengagement.

Third, we chose $Q = 18$, or employed 18 predictor variables at Level 2. These 18 variables may be categorized into the following three categories: demographics, positive proximal processes, and negative proximal processes. All of these 18 variables were measured at the time when the student entered into the study (e.g., baseline Wave 1).

Fourth, at Level 3, we chose $R = 11$, or employed 11 school- or neighborhood-level variables to incorporate the influence of macrosettings on students' psychological change. All these variables are continuous.

Fifth, we used a three-level specification for both HLMs. The random effects at the school level for both models are extremely small and are not statistically significant. As such, the random effect at Level 3 may be removed, and the model may be reduced to a two-level HLM (i.e., with only time and student levels). However, we continued to treat our final model as three levels because this followed the ecological conceptual model, and the use of a three-level HLM does not hurt the model estimation (Guo, 2005; Raundenbush & Bryk, 2002).

Sixth, because the dependent variable in the final model takes a natural-logarithm transformation, we present the exponent of estimated coefficients, $\exp(\beta)$, in tables to ease the burden of interpretation of findings. The rationale for such presentation is that we control for all other variables included in the model at the level of zero. Doing so, all other coefficients are canceled out, and only the estimated intercept

and slope of interest remain in the equation. Using a ratio to compare two groups of a dichotomous variable, the estimated intercept is further dropped out. Assuming X is a dichotomous predictor variable, the ratio of model-predicted outcome values for the two groups of X under the condition of controlling for all other predictor variables at the zero level is

$$\frac{Y|X=1}{Y|X=0} = \frac{\exp{(\hat{\beta}_0 + \hat{\beta}_1)}}{\exp{(\hat{\beta}_0)}} = \exp{(\hat{\beta}_0 + \hat{\beta}_1 - \hat{\beta}_0)} = \exp{(\hat{\beta}_1)}$$

where $\hat{\beta}_0$, is the model-estimated intercept and $\hat{\beta}_1$ is the model-estimated slope for variable X. Thus, we can interpret the finding of the difference between $X = 1$ and $X = 0$ on the outcome Y as the group of $X = 1$ on average has an outcome that is $[100 - 100 \times \exp(\hat{\beta}_1)]\%$ lower than the outcome of the group of $X = 0$ when $\exp(\hat{\beta}_1) < 1$, and the group of $X = 1$ on average has an outcome that is $[100 \times \exp(\hat{\beta}_1) - 100]\%$ higher than the outcome of the group of $X = 0$ when $\exp(\hat{\beta}_1) > 1$. When X is a continuous variable, we interpret the resulting quantity as $[100 - 100 \times \exp(\hat{\beta}_1)]\%$ decrease or $[100 \times \exp(\hat{\beta}_1) - 100]\%$ increase on the outcome variable when X increases by one unit.

Results

The mean value of the internalizing score for the entire sample, including all three waves, was 1.446 ($SD = 0.008$), and the mean value of the self-esteem score for the entire sample, including all three waves, was 2.702 ($SD = 0.007$).

We ran a fully unconditional three-level HLM to partition the total variability for each outcome. Results showed that on the internalizing score, 51.2% of the variation was due to temporal change, 47.6% was due to students, and 1.2% was due to schools. On the self-esteem score, 62.0% of the variation was due to temporal change, 37.6% was due to students, and 0.4% was due to school. These results reveal two important findings. First, there was a high level of clustering of occasions within students, because 47.6% of the variation on internalizing score and 37.6% of the variation on self-esteem score lies between students; both are nontrivial, and therefore an HLM is necessary. Second, the most important source of the variation comes from time (51.2% for the internalizing score and 62.0% for the self-esteem score), indicating that over the 2-year study period, student reports changed significantly on both outcomes; the next important source comes from students, meaning that students have a large variability and schools do not vary to a large degree. Given these findings, a model specification using four time-varying covariates and several important predictors at the student level (i.e., demographics, positive and negative proximal processes) is appropriate.

Predictors of the change in internalizing scores

Table 1 presents the sample descriptive statistics and the estimated HLM coefficients on ln(internalizing). The model had

an excellent fit to the data with a Wald χ^2 of 9788.90 ($df = 34$) that was statistically significant at $p = .0001$. This statistic was based on 1 imputed file; the other 9 of the 10 imputed files and all 20 imputed files show similar results. The HLM analysis was based on both the 10 imputed files and the 20 imputed files. Table 1 displays aggregated results using Rubin's rule (Little & Rubin, 2002). The two sets of findings using 10 and 20 imputed files are similar, indicating that results were consistent and were not sensitive to problems concerning low relative efficiency caused by the use of fewer imputed files. Given this, the following summary used the results from the analysis of the 10 imputed files only.

In general, the results confirmed our hypothesized signs for the impacts of predictor variables. Over time, students, on average, decreased their internalizing score by 0.1% per month ($p < .01$). Other things being equal and at any point in time for the time-varying covariates, (a) for every one-unit increase in the externalizing behavior, the internalizing score increased by 34.1% ($p < .001$); (b) for every one-unit increase in the parent–child conflict scale, the internalizing score increased by 3.1% ($p < .001$); (c) for every one-unit increase in the peer rejection scale, the internalizing score increased by 6.5% ($p < .001$); and (d) for every one-unit increase in the school hassles scale, the internalizing score increased by 11.1% ($p < .001$).

For demographic predictors with all other factors held equal, (a) a Hispanic student's internalizing score was higher than a White student's by 4.8% ($p < .001$); (b) a student of mixed race had an internalizing score that was 2.0% higher than a White student's ($p < .05$); (c) a female student's internalizing score was higher than that of a male student by 8.3% ($p < .001$); (d) for every 1-year increase in age at entry into the study, the internalizing score increased by 0.8% ($p < .01$); and (e) students who received free and reduced lunch had an internalizing score that was 2.6% higher than those who didn't receive free and reduced lunch ($p < .01$).

For positive proximal processes with all other factors held equal, (a) for every one-unit increase in the future optimism scale, the internalizing score decreased by 2.0% ($p < .001$); (b) for every one-unit increase in the parent support scale, the internalizing score decreased by 3.2% ($p < .001$); (c) for every one-unit increase in the teacher support scale, the internalizing score increased by 1.7% ($p < .01$; this finding was contradictory to our hypothesis); (d) for every one-unit increase in the friend support scale, the internalizing score decreased by 1.7% ($p < .01$); and (e) for every one-unit increase in the ethnic identity scale, the internalizing score increased by 0.7% ($p < .05$; this finding was contradictory to our hypothesis).

For negative proximal processes with all other factors held equal, (a) the internalizing score for students who experienced bullying victimization was 2.1% higher than those who did not have such experience ($p < .01$), and (b) for every one-unit increase in the peer pressure scale, the internalizing score increased by 2.9% ($p < .01$).

For school and neighborhood predictors with other factors held equal, (a) for every 1% increase in the school's

percentage of African American students, internalizing scores decreased by 0.1% ($p < .05$); (b) for every 1% increase in the school's percentage of teacher turnover, the internalizing score decreased by 0.1% ($p < .05$); (c) for every 1% increase in the percentage of neighborhood residents below the poverty line, internalizing scores increased by 0.1% ($p < .05$); and (d) for every one-student increase in short-term out of school suspensions, internalizing scores increased by 0.05% ($p < .001$).

Predictors of the change in self-esteem scores

Table 2 presents the sample descriptive statistics and the estimated HLM coefficients on ln(self-esteem). The model has an excellent fit to the data, with a Wald χ^2 of 3360.80 ($df = 34$) that is statistically significant at the .0001 level. This statistic was based on one imputed file; all of the other 9 files of the 10 imputed files and all 20 imputed files show similar results.

Similar to the findings for internalizing scores, the two sets of findings using 10 and 20 imputed files on the self-esteem score are very close, indicating that our results are consistent and are not sensitive to potential problems that might arise from low relative efficiency caused by using fewer imputed files. The following summary uses the results from 10 imputed files only.

In general, the results confirmed our hypothesized signs for the impacts of predictor variables. Over time, students, on average, decreased their self-esteem score by 0.2% per month ($p < .001$). For the time-varying covariates with other things being equal and at any point in time, (a) every one-unit increase in the externalizing behavior was associated with a 2.1% decrease in the self-esteem score by ($p < .01$); (b) for every one-unit increase in the parent–child conflict scale, the self-esteem score decreased by 1.5% ($p < .001$); (c) for every one-unit increase in the peer rejection scale, the self-esteem score decreased by 3.2% ($p < .001$); and (d) for every one-unit increase in the school hassles scale, the self-esteem score decreased by 3.4% ($p < .001$).

For demographic predictors with all other factors held equal, (a) an African American student's self-esteem score was higher than that of a White student by 5.3% ($p < .001$, contradicting our hypothesis); (b) a Hispanic student's self-esteem score was higher than that of a White student by 1.9% ($p < .05$; contradicting our hypothesis); (c) an American Indian student's self-esteem score was higher than that of a White student by 2.5% ($p < .01$; contradicting our hypothesis); (d) a student of mixed race had a self-esteem score that was 3.3% higher than that of a White student ($p < .001$; contradicting our hypothesis); and (e) a female student's self-esteem score was lower than that of a male student by 2.6% ($p < .001$); (f) For every 1-year increase in age at baseline, the self-esteem score decreased by 0.6% ($p < .01$).

For positive proximal processes with all other factors held equal, (a) for every one-unit increase in the future optimism scale, the self-esteem score increased by 5.5% ($p < .001$);

(b) for every one-unit increase in the parent support scale, the self-esteem score increased by 4.4% ($p < .001$); (c) for every one-unit increase in the friend support scale, the self-esteem score increased by 2.1% ($p < .001$); (d) for every one-unit increase in the school satisfaction scale, the self-esteem score increased by 3.7% ($p < .001$); (e) for every one-unit increase in the ethnic identity scale, the self-esteem score increased by 1.7% ($p < .001$); and (f) for every one-unit increase in the religious orientation scale, the self-esteem score increased by 4.5% ($p < .001$).

In addition to the negative proximal processes captured by the time varying covariates, every one-unit increase in the delinquent friends scale was associated with a 2.8% increase in the self-esteem score ($p < .001$). None of the school and neighborhood variables displayed a statistically significant relationship with the self-esteem score at 0.05.

Discussion

The current study filled significant gaps in our current knowledge of developmental psychopathology by examining the influence of multilevel risk factors and developmental assets on longitudinal trajectories of internalizing symptoms and self-esteem in an exceptionally culturally diverse sample of rural adolescents. Our overarching thesis was that adolescents who are engaged in developing social capital through positive transactions across different levels of their ecology would report high self-esteem while adolescents who experience negative ecological transactions disengage from their ecology and manifest internalizing problems.

Age and developmental trajectories

Even though developmental psychopathology is inherently about growth trajectories tracked over time (Cicchetti & Toth, 2009), extant research remains largely cross-sectional rather than longitudinal. Results showed that 51.2% of the variation on the internalizing scores and 62.0% for the self-esteem scores was due to temporal change. Over time, students, on average, decreased both their internalizing score by 0.1% per month ($p < .01$) and their self-esteem score by 0.2% per month ($p < .001$). These findings highlight the importance of examining longitudinal rather than cross-sectional data and underscore the importance of extending current knowledge to diverse environments.

Previous research with urban and suburban youth led us to hypothesize that internalizing problems and self-esteem would both increase over time (see Hypothesis 1 and background literature above on age: Merikangas et al., 2010; Substance Abuse and Mental Health Services Administration, 2011; Twenge & Nolen-Hoeksema, 2002). However, for impoverished rural adolescents in our sample, we observed the opposite trend with both outcomes decreasing over time. For internalizing symptoms, this is a positive difference where rural adolescents report less anxiety and depression over time whereas their urban and suburban counterparts manifest

increasing rates. Perhaps rural environments provide more straightforward developmental challenges (e.g., stabile relationships, a bounded set of expectations and specific employment opportunities) compared to complex urban and suburban environments. These circumscribed resources and opportunities, however, may also limit adolescents' development of diverse skills and aptitudes, decreasing feelings of overall self-esteem. Rural youth often experience higher rates of poverty, have less access to college prep classes and educational counseling resources, and have less-educated parents who espouse lower academic expectations than do their urban counterparts (Byun, Meece, & Irvin, 2012). Consequently, urban students are twice as likely to complete a Bachelor's degree compared with rural students. Our model shows that this type of environmental disparity marked by fewer resources and lower expectations in rural contexts keeps anxiety and depression low and limits the development of self-esteem that comes with meeting new challenges in achievement.

Demographic subgroups

Hispanic and mixed-race adolescents had a higher likelihood of reporting internalizing problems. This effect was hypothesized and is in line with previous research indicating that Hispanics suffer from affective disorders at higher rates than African Americans and Caucasians (Kessler et al., 1994; Roberts & Sobhan, 1992; Twenge, & Nolen-Hoeksema, 2002). In contrast to previous studies, Native American adolescents did not report elevated levels of internalizing problems. This may be because the current study was conducted in a community with a very high percentage of Native American (Lumbee) youth. Surrounded by a large number of people sharing their cultural traditions, Native American adolescents are likely to manifest less anxiety and depression.

Also reflecting the importance of being surrounded by a community that shares one's cultural heritage, African American, Hispanic, Native American, and mixed-race youth all reported higher levels of self-esteem relative to Caucasian adolescents. Past research has shown that African Americans scored higher than Caucasians on measures of self-esteem followed by, in descending order, Hispanics, Asians, and American Indians (Bachman et al., 2011; Twenge & Crocker, 2002). However, it is extraordinary to have all minority groups score higher than Caucasians on self-esteem. This is likely to be a reflection of conducting the current study in a minority–majority community where Caucasian adolescents have lost their majority status and lack the strong cultural institutions that the other groups have (e.g., African American churches, the Lumbee tribal government). With the number of minority–majority counties growing rapidly across the United States, this may be a dynamic that is seen more regularly in the future.

As predicted, females reported significantly higher internalizing symptoms and lower self-esteem compared with males. Students who received free or reduced lunch (a proxy for SES) also reported more internalizing problems. These effects are well documented in past research (Glendinning, 1998; Goodman, Huang, et al., 2003; Goodman, Slap, et al., 2003; Hankin, 2006; Kessler, et al, 1994; Twenge & Nolen-Hoeksema, 2002) and appear to function similarly in this rural setting with culturally diverse adolescents. However, single-parent family status was not associated with either outcome.

Positive proximal processes, social capital, and mental health

Future optimism. Future optimism, the ability to think about and imagine a positive future, at baseline was a developmental asset associated with positive trajectories for self-esteem and lower trajectories in internalizing problems. This confirms past research (McCabe & Barnett, 2000; Nurmi, 1991; Seginer, 2008) and extends our knowledge on rural adolescents. The theory of possible selves helps to explain these effects by positing that adolescents who are able to envision opportunities and project images of themselves into the future tend to attribute both their current and future success to personal initiative and are more likely to look farther into the future (Nurmi & Pulliainen, 1991). Envisioning these possible selves allows adolescents to set goals, form plans for engaging individuals and microsystems, and make commitments earlier in their developmental process, which enhances their optimistic feelings of movement toward their dreams, increases positive self-regard, and reduces anxiety/depression about the future.

Parent support. Positive engagement with parent(s) at baseline was associated with enhanced self-esteem and lower internalizing problems over the subsequent 2-year period. The interpretation is clear: with the security of strong attachment bonds with parents, adolescents are likely to thrive, showing many signs of positive development; however, conflict that disrupts these bonds and attenuates parent support pushes adolescents to be self-critical, despondent, anxious, and engage in risk-taking behavior (Green et al., 2013). Parents are a primary source of all types of social capital (e.g., social, educational, cultural, financial capital) development. When this key relationship is functioning well, adolescents appear to thrive, thinking highly of themselves and avoiding depression and anxiety.

Friend support. Friend support was related to high self-esteem and protected against internalizing problems. Healthy connections to supportive peers were associated with positive development. The effects for friend support were nearly as strong as those for parent support, suggesting that peers are a key source of social capital development, and they impact both positive and negative indicators of adolescent mental health.

Teacher support. As posited by the ecological model, teacher support was more distal and less powerful than parent support. This form of social capital was certainly enigmatic in

the current study. There was only a statistical trend for the negative relationship between teacher support and self-esteem and teacher support was positively associated with internalizing problems. Both of these results contradicted our hypotheses. These effects suggest that teachers may provide more support to students who are performing poorly. Those students may be anxious and depressed about their performance; these feelings may increase when they are singled out for extra help. Receiving more help from teachers may make students feel inadequate, and this negative self-evaluation endured over the course of the study. This finding reframes teacher support as a risk factor in rural settings, contradicting previous research done in the Midwestern United States (Colarossi & Eccles, 2003; Reddy et al., 2003) and warranting further investigation.

School satisfaction. Contradicting our hypothesis of an inverse relationship, school satisfaction displayed no statistically significant relationship with internalizing symptoms. However, our hypothesis that school satisfaction would be related to self-esteem was supported. Being satisfied with school is an important sign of affiliation and emergence of this part of an adolescent's intellectual identity. Adolescents feel better about themselves when there is a good fit with the school they are attending. This represents an effective flow of educational and social capital development with a key social institution.

Ethnic identity. As in past research, we found ethnic identity strongly associated with self-esteem. This association is highly consistent (Blash & Unger, 1995; Corenblum & Armstrong, 2012; Phinney & Chaviara, 1992; Phinney et al., 2001; Umaña-Taylor & Updegraff, 2007); however, little previous research has focused on Native American or rural youth. In direct contrast to past research showing ethnic identity to be a protective factor that was inversely associated with depression and anxiety (Kiang et al., 2012; Street et al., 2009; Yip, Sellers, & Seaton, 2006), we found ethnic identity was positively related to internalizing symptoms. Taken together, these effects may indicate that both the strong intragroup relationships and heightened cultural awareness that comes with ethnic identity help adolescents to hold themselves in higher regard and engender more anxiety/depression about their standing. This anxiety/depression may result from the youth's higher investment in her/his ethnic group, causing sensitivity to discrimination, anxiety about future success for oneself and one's group, and concern about the status of the close relationships that have been forged with members of one's cultural group.

Religious orientation. In our predictive models, religious orientation was significantly tied to self-esteem but displayed no relationship with internalizing problems. Past results in this area have been equivocal with some researchers reporting that increased participation in religious activities was associated with increased self-esteem (Bagley & Mallick, 1997;

Smith et al., 1979), but other studies failed to find this association (Donahue, 1995; Hunsberger et al., 2001). In this multicultural, rural area, we observed a positive effect for religious orientation that was similar to the benefit of ethnic identity. Churches in the study areas were commonly segregated by race, leaving religion closely tied to culture and ethnic identity. Religious and cultural affiliations helped adolescents feel strongly about their emerging identities and were connected to social support, encouraging higher self-esteem. However, the connection between religious orientation and anxiety/depression was not significant. This is an example of how some risk factors and developmental assets may only impact certain domains of positive or negative mental health. Future research should consider domain specificity in closer detail.

Negative proximal processes that erode social capital

Externalizing behavior. Even though externalizing and internalizing behaviors are often thought to be separate areas for research, we found these domains of mental health functioning to be strongly tied together. Externalizing behavior as a time-varying covariate was related to significantly more internalizing symptoms and lower self-esteem. These relationships held over time as initially higher levels of internalizing symptoms were related with growth in externalizing behaviors over time, confirming previous studies (Kerr et al., 2013; Zimmermann, et al., 2013) and extending our knowledge to rural environments. Low self-esteem and high propensity toward anxiety/depression may impact the cognitive models that aggressive teenagers develop. Aggressive responses to environmental cues may be the result of low regard for one's personal well-being combined with anxiety that demands a fast response without the extended time that it takes to think through the situation. The reverse may also be true: aggressive adolescents may act first and then feel bad about themselves once they have time to evaluate their situation. This is a recipe for adolescent recklessness. More research is warranted to examine how this cluster of cognitions (aggressive impulses, anxiety/depression, and self-esteem) comes together to influence adolescent development.

Parent–child conflict. Confirming past research and the most basic tenets of attachment theory, parent–child conflict was one of the strongest risk factors connected to internalizing problems and low adolescent self-esteem. Because parent–child conflict was a time-varying covariate, this relationship held at any point in time during the 2-year trajectory. This was a stringent test of the endurance of this risk factor. Conflict in the parent–child relationship profoundly disturbs adolescent developmental processes; this is a highly consistent finding that applies for both genders, across all races, and in urban, suburban, and rural environments (Marmorstein & Iacono, 2004; Suldo et al., 2009; Smokowski & Bacallao, 2007). Conflict in the parent–child relationship effectively cuts off a key conduit for social capital formation.

School hassles and bullying victimization. As predicted, school hassles and bullying victimization were positively associated with internalizing symptoms. Reporting more school hassles was also related to having lower self-esteem. These findings build on past research (see Smokowski & Kopasz, 2005, for a review) by examining school hassles as a time-varying covariate. Not only was there a deleterious cross-sectional relationship between negative school interactions (e.g., hassles) and mental health functioning, but this relationship was salient over a two-year trajectory for internalizing symptoms. Being victimized by a bully at baseline predicted internalizing symptoms 2 years later. These effects underscore how interpersonal victimization serves as a source of trauma that may become deeply embedded in memory and heighten anxiety, depression, and stress long after the event is over. Poor relationships at school also disrupt social capital development from a key microsystem.

Negative transactions with peers: Rejection, pressure, and delinquent friends. Peer influences have long been considered a critical developmental touchstone for adolescents. Our effects in this domain are in line with past research, confirming the power of negative peer relationships. Peer rejection was a key risk factor positively related to internalizing problems and negatively related to self-esteem. Peer pressure was significantly associated with internalizing problems but only displayed a trend toward significance in models for self-esteem. Delinquent friends were positively related to self-esteem but were not related to internalizing problems. On the positive side, friend support promoted self-esteem and protected against internalizing problems. This confirmed the hypothesized pattern of peer effects based on prior research (e.g., Arslan, 2009; Beeri & Lev-Wiesel, 2012; Kupersmidt & Coie, 1990; Laible et al., 2004; Parker & Asher, 1987). Healthy connections to supportive peers foster positive development while rejection and pressure place adolescents outside prosocial networks, fostering anxiety and depression when access to nurturing relationships is limited. Providing evidence for Kaplan's (1980) self-enhancement hypothesis, adolescents with little access to prosocial groups may seek out delinquent peers. These new affiliations with delinquent friends can lead to increases in self-esteem and sense of belonging. Acceptance through infamous notoriety, negative social capital, is more acceptable to the development of adolescent identity than painful isolation (e.g., being socially bankrupt; Bynner et al., 1981; Mason, 2001).

School and neighborhood characteristics

As hypothesized from the ecological model, school and neighborhood effects were weaker than psychological or microsystem transactions. Only 1.2% of the variation in internalizing scores and 0.4% of variation in self-esteem scores was due to school and neighborhood effects. There were no statistically significant relationships between school and neighborhood factors and self-esteem. Personal evaluations of self-worth are based on criteria that are closer to the individual (psychological attributes, interactions with parents and peers).

At the same time, school and neighborhood characteristics impacted internalizing symptoms. Indicators of socioeconomic disadvantage and school violence, specifically the percentage of students in school receiving free or reduced lunch, the percent of residents in the neighborhood below the federal poverty line, and the number of short-term out-of-school suspensions, were risk factors for internalizing symptoms. These findings are in line with Farrell et al.'s (2009) research, which found that students attending troubled low SES schools reported significantly higher depression and significantly lower self-esteem than students attending high SES schools. Students in poorer and more violent environments see the lack of resources and opportunities around them and become depressed about their current circumstances or anxious about how they can find a way out. Neighborhood disadvantage effects like these have been linked by prior studies to anxiety/depression in urban areas, primarily with African American families (Hurd et al., 2013). The current results illustrated similar dynamics in rural, multicultural families.

Similar to the discussion of racial effects above, the percentage of African American students in a school was inversely related to internalizing problems. The large number of minority adolescents in our sample likely drove this effect. Being surrounded by minority peers was associated with reports of lower anxiety/depression. This dynamic is similar to Walsemann et al.'s (2011) results showing that African American adolescents reported more depressive and somatic symptoms when attending predominantly White schools. Students surrounded by same race peers may feel less discrimination and more kinship, decreasing internalizing problems.

In contrast to previous research, we found teacher turnover rates to be inversely associated with internalizing symptoms. Teacher turnover is usually thought of as an indicator of school health, with high rates of turnover reflecting lower quality teachers, lower school functioning and less student achievement (Guin, 2004; Haycock, 1998). This may be the case; however, losing these higher quality teachers may actually lower student anxiety. The parade of temporary, less-skilled teachers or long-term substitutes may be less demanding and more permissive. Teachers with high standards may become frustrated quickly and move on, leaving students relieved that they do not have to perform to a higher level. This is not healthy for academic development, but it may leave students who are not challenged less anxious and depressed in the short term. More research is needed to confirm and interpret this dynamic.

Limitations

This study's findings must be understood in light of specific limitations. Although the scales we used to measure dependent variables were empirically validated (Bowen &

Richman, 2008; Rosenberg, 1965), depression/anxiety and self-esteem are complex constructs. The internalizing scale does not evaluate clinical levels of depression or anxiety; it measures depressive/anxiety symptoms. Thus, including more comprehensive measures of depression, anxiety, and self-esteem would have strengthened our study. However, this was not possible given the time constraints around administration of the SSP Plus survey. Even though researchers took every precaution to make the survey a confidential experience, it is possible that students were influenced by the presence of peers and were not entirely honest in their responses. Under ideal circumstances, participants would complete surveys in private rooms; however, this arrangement was not possible for such a large sample. Instead, adults closely supervised groups of students who completed the assessment at the same time. Our sample was unique, consisting of nearly equal numbers of different racial and ethnic groups from impoverished, rural counties in the Southeastern United States. Although this provides new information on groups that are rarely studied (e.g., Lumbee Indians), caution is warranted in generalizing the results. The study is based primarily on youth self-report data, possibly inflating the associations between the variables. Given that this was a correlational study in a naturalistic setting, the direction of effects could be bidirectional or mediated by omitted factors. Further research is needed to ascertain the causal relationships between variables. This is a common limitation in social science studies.

Conclusions

Few studies have considered developmental influences from multiple ecological levels (e.g., cultural/societal, neighborhood, school, family and individual psychological processes) in the same investigation. Compared with normative, middle class samples of urban and suburban adolescents, less is known about risk factors and developmental assets for disadvantaged, minority youth in rural environments. The current investigation contributed to filling these gaps in our knowledge of development and psychopathology.

Following Cicchetti and Toth's (2009) call for developmental psychopathologists to strive for multidomain, multi-level analyses that elucidate normal and abnormal forms of ontogenesis across developing systems, this investigation explored whether adolescents who are engaged in developing social capital through positive transactions across different levels of their ecology would report high self-esteem while adolescents who experience negative ecological transactions disengage from their ecology and manifest internalizing problems. Integrating social capital concepts within the ecological model, our results showed that developmental change and proximal microsystem influences contributed the most to predictive models for adolescent internalizing problems and self-esteem. Relative to other students, risk for internalizing problems and low self-esteem was elevated for aggressive adolescents, students who were hassled or bullied at school, those who were rejected by peers or in conflict with their parents. Internalizing problems were also more common among adolescents from socioeconomically disadvantaged families and neighborhoods, among those in schools with more suspensions, in students who reported being pressured by peers, and in youth who required more teacher support. It is likely that these experiences left adolescents disengaged from developing social capital from key ecological microsystems (i.e., family, school, peers). On the positive side, support from parents and friends and optimism about the future were key assets associated with lower internalizing symptoms and higher self-esteem. Students who had stronger ethnic identities reported higher self-esteem but also had more internalizing problems. Self-esteem was also positively related to religious orientation, school satisfaction, and future optimism. These variables show active engagement with key ecological systems.

These profiles for risk factors and developmental assets can guide prevention programming to promote healthy adolescent functioning. Because school and neighborhood variables explained very little variation in internalizing problems or self-esteem scores, we recommend focusing on family-oriented programs that target microsystem transactions such as enhancing parent support and decreasing parent child conflict. Cognitive behavioral programs that help to increase future optimism, decrease aggressive behavior, and enhance school satisfaction are also warranted.

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