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Testing the Adaptation to Poverty-Related Stress Model: Predicting Psychopathology Symptoms in Families Facing Economic Hardship

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This study tested the Adaptation to Poverty-related Stress Model and its proposed relations between poverty-related stress, effortful and involuntary stress responses, and symptoms of psychopathology in an ethnically diverse sample of low-income children and their parents. Prospective Hierarchical Linear Modeling analyses conducted with 98 families (300 family members: 136 adults, 82 adolescents and preadolescents, 82 school-age children) revealed that, consistent with the model, primary and secondary control coping were protective against poverty-related stress primarily for internalizing symptoms. Conversely, disengagement coping exacerbated externalizing symptoms over time. In addition, involuntary engagement stress responses exacerbated the effects of poverty-related stress for internalizing symptoms, whereas involuntary disengagement responses exacerbated externalizing symptoms. Age and gender effects were found in most models, reflecting more symptoms of both types for parents than children and higher levels of internalizing symptoms for girls.

The American Psychological Association (2008) recently issued a call for more research on the impact of poverty on mental health problems. A steady income-health gradient is evident across the world for both mental and physical health (Sapolsky, 2005). Each step down the socioeconomic ladder is accompanied by worse health. This gradient exists for children as well as adults and for a wide variety of physical and mental health problems (e.g., Kim, Conger, Elder, & Lorenz, 2003).

The stress of living with less than one needs appears to be a key mechanism of the socioeconomic status-health gradient (e.g., Almeida, Neupert, Banks, & Serido, 2005), but the process by which stress makes this linkage is not well understood.

The types of stress caused by poverty and low socioeconomic status (SES) are grueling and demoralizing. Research on Conger, Ge, Elder, and Lorenz's (1994) Family Stress Model has provided robust evidence for the pernicious effects of finance-related stress on adults and children in both acutely and chronically poor families (e.g., Conger et al., 2002). This model specifies that

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high levels of economic strain are caused by income losses; that this strain has detrimental effects on parental psychopathology, interparental conflict, and parenting; and that these parental problems damage children's mental health and well-being. Beyond these indirect effects of poverty-related stress on child and adolescent mental health, a few studies have also shown that children's own experiences of the stressors associated with growing up in poverty also negatively affect their mental and physical health (Wadsworth & Compas, 2002; Wadsworth et al., 2008). McLoyd's (1990) "context of stress" model asserts that the stress of poverty is much more than worries about money. It also involves hunger, violence, illness, and accidents. This is especially true for children and adolescents who are not responsible for paying the family's bills but are nevertheless subjected to food insufficiency, inadequate housing, and frustrated, irritable parents. Building on McLoyd's context construct, Wadsworth and Berger (2006) referred to the stressors created, exacerbated, and maintained by poverty collectively as "poverty-related stress" (PRS). Thus, consistent with the Family Stress Model, PRS contains economic strain, discrimination, victimization/violence exposure, family transitions/changes, and family conflict.

Although the Family Stress Model and similar work has highlighted the importance of stress in the transmission of SES-linked risk, few models have focused on processes that can lessen the impact of such stress and how stress can affect these protective processes. Given that research strongly supports stress as a central mechanism through which poverty confers risk, there is an urgent need to understand coping and stress response processes in this population. A full understanding of stress-and-coping processes will include consideration of both how coping and involuntary stress responses may buffer or exacerbate stress as well as how stress affects coping and other stress responses (e.g., Compas, Connor-Smith, Saltzman, Thomsen, & Wadsworth, 2001). For example, Wadsworth and colleagues have shown in multiple studies that a heavy PRS load is associated with poor coping utilization, suggesting that stress may interfere with the development and/or utilization of efficacious coping (Wadsworth, Raviv, Compas, & Connor-Smith, 2005; Wadsworth & Santiago, 2008). These studies also show that although such coping is related to better concurrent and prospective functioning, stress may constrain the use of effective coping skills (e.g., Gonzales, Tein, Sandler, & Friedman, 2001).

We have emerging understanding of the forms of coping that are effective for adjusting to poverty-related stress. In particular, primary and secondary control coping have demonstrated protective effects for this and other types of stress in multiple studies (e.g., Hall, Chipperfield, Perry, Ruthig, & Goetz, 2006; Jaser et al., 2008; Wadsworth & Santiago, 2008). Primary control

coping entails direct efforts to manage a stressful situation or one's reactions to it and includes strategies such as problem solving, emotional expression, and emotion regulation. Secondary control coping, on the other hand, involves adapting oneself to a stressful situation and includes strategies reflecting active acceptance, cognitive restructuring, distraction, and positive thinking (Band & Weisz, 1990). Both primary and secondary control coping predict fewer psychological problems in samples of children and adults coping with poverty-related stress. As yet, there are not clear specific patterns regarding the efficacy of primary and secondary control coping for internalizing versus externalizing symptoms (Wadsworth & Berger, 2006).

The effectiveness of disengagement coping strategies such as avoidance, denial, and wishful thinking for poverty-related stress is less clear, and the efficacy of disengagement strategies may depend on several factors, such as type of stressor, measurement, and time course. For example, recent findings suggest that disengagement coping is unrelated to symptoms for low-income adolescents coping with family conflict and even associated with better functioning for adolescents coping with violence (Edlynn, Gaylord-Harden, Richards, & Miller, 2008) in the short term but is detrimental for adolescents' internalizing symptoms in the long term (Santiago & Wadsworth, 2009). Similarly, Wadsworth and Berger (2006) found prospective negative effects of disengagement coping on internalizing symptoms. Thus, although disengagement may be functional in the short term, the long-term effects of using disengagement strategies, uncoupled from any more positive strategies such as distraction or problem solving, is likely to be harmful for low-income adolescents. Similarly, avoidant coping attenuated the relationship between stress and externalizing symptoms in a sample of low-income African American boys, whereas it increased the relation between stress and internalizing symptoms for African American girls (Grant et al., 2000). Thus, gender may also play a role in determining the efficacy of different types of coping strategies.

In addition to effortful coping, responses to stress can occur automatically or without conscious, volitional effort. The Responses to Stress Model includes two involuntary dimensions, comprised of involuntary engagement (e.g., emotional and physiological arousal, rumination, intrusive thoughts, and impulsive action) and involuntary disengagement (e.g., cognitive interference, escape, emotional numbing, and inaction). These involuntary responses to stress are associated with increased emotional and behavioral problems in children, adolescents, and adults coping with social stress (Valiente, Lemery-Chalfant, & Swanson, 2009), parental depression (Jaser et al., 2005), and financial strain (Wolff, Santiago, & Wadsworth, 2009). Involuntary stress responses are thought to function as early warning

signs of stress to the individual, thereby notifying the individual that coping is needed (Compas, Connor, Harding, Saltzman, & Wadsworth, 1999). However, involuntary responses can interfere with coping, especially if they take an individual's attention away from a stressful situation or flood them with emotion.

The model we have constructed to understand the stress process found in poor families builds upon both the Family Stress Model (Conger et al., 1994) and the Responses to Stress Model (Connor-Smith, Compas, Wadsworth, Thomsen, & Saltzman, 2000). The resulting Adaptation to Poverty-related Stress Model posits that low SES and low income create stress for all members of a family. This stress has direct and indirect effects on both children and parents in a family, disrupting family relationships and processes, constraining the ability to cope effectively with stress and instead encouraging disengagement coping and involuntary responses, and contributing to psychological problems among all members. Coping and responses to stress have the potential to mediate or moderate the associations between stress and disruptions/symptoms.

Unlike most previous studies, the current study tested the Adaptation to Poverty-related Stress Model longitudinally. A primary purpose of the current study, therefore, was to examine the extent to which the model applies over time. Previous research on coping and adaptation to PRS that has employed longitudinal designs has been scant but promising. Wadsworth and Berger (2006), for example, found that all forms of coping were related to symptoms over time, albeit in interaction with initial symptoms and/or PRS.

A second issue to be explored in this study was the extent to which the model applies across age and gender. Rates of psychopathology differ by gender, as do coping utilization and reports of stressful events. Despite these gender differences in levels, there is little evidence to suggest that the interrelations among these variables will differ accordingly. For example, Wadsworth and Santiago (2008) found that the basic associations among PRS and symptoms of psychopathology held across developmental level but also found that age and gender moderated several of these links. Whereas adults had higher levels of most types of symptoms, the association between PRS and symptoms was significantly stronger for children and adolescents than for adults.

Similarly, preliminary evidence suggests that the model applies equally well to members of ethnic majority and minority groups. As yet, we have not found major ethnic differences in the effects of responses to stress on symptoms of psychopathology, but scant research has examined the full process of adapting to PRS. Conger and colleagues' (1994) Family Stress Model has been replicated with African American and Latino samples with only slight modifications (e.g.,

White, Roosa, Weaver, & Nair, 2009), suggesting that the basic underlying structure of the pernicious effects of PRS on families may hold up across ethnic groups. The current study tested the extent to which the Adaptation to Poverty-related Stress Model, which includes coping and stress responses, applies to individuals and families from diverse ethnic backgrounds.

The current study was designed to longitudinally examine the Adaptation to Poverty-related Stress Theoretical Model and its applicability by age (children vs. adolescents vs. adults), gender, and ethnicity. In particular, we tested the portion of the model pertaining to the prediction of psychopathology using indices of internalizing and externalizing symptomatology in order to gain a fuller understanding of the applicability of the model. The portion of the model that sets forth hypothesized processes through which PRS and the psychological distress it creates undermine effective coping and increases involuntary stress responses is tested in Santiago, Etter, Wadsworth, and Raviv (in press). We predicted that (a) the hierarchical linear modeling (HLM) models would explain a significant amount of variance in internalizing and externalizing symptoms over time; (b) PRS would predict more internalizing and externalizing symptoms, less primary and secondary control coping, and more disengagement coping and involuntary engagement and disengagement; (c) coping and involuntary stress responses would interact with PRS such that primary and secondary control coping would buffer the effects of PRS for both internalizing and externalizing symptoms, whereas (d) involuntary stress responses and disengagement coping would exacerbate the negative effects of PRS on both types of symptoms, (e) based on prior research main effects for age and gender would emerge showing higher levels of internalizing symptoms for females and increasing levels with age.

METHOD

Participants

Participants were 98 low-income families (300 total participants; at least 1 child and 1 parent or guardian per family; family size range = 2–7; 54 families had 1 child enrolled in the study, 23 families enrolled 2 children, 18 families enrolled 3 children, and 2 families enrolled 4 or more children). A total of 164 children/adolescents participated in the study (44% girls; 40 children ages 6–7; 42 children ages 8–10; 41 preadolescents ages 11–13; and 41 adolescents ages 14–18]. Ninety-eight primary caregivers participated in the study (95% women, M age = 34.9 years, $SD = 7.45$). For households with two caregivers in the home, efforts were made to recruit spouses, partners, or other family members significantly involved with caring

for children (e.g., grandparent). Thirty-eight secondary caregivers also participated in the study (85% men, M age $= 33.9$ years, $SD = 8.74$). Thus 136 total parents or guardians participated in the study and were included in these analyses (hereafter referred to as parents). Participants were 20% African American, 33.7% European American, 38.3% Latino, 2% Native American, and 5.3% Multiracial/Other. Families were drawn from the Colorado Project on Economic Strain conducted at the University of Denver, a 1-year prospective study examining family stress and functioning in the context of poverty.

Parents and children participating in the Colorado Project on Economic Strain were recruited from Denver-area Head Start centers and health clinics serving uninsured and underinsured families. Fliers advertising the opportunity to "earn money by participating in a study looking at stress and coping in families with financial difficulties" were distributed at these centers. Interested families contacted the research lab and were screened for income and family composition eligibility (self-reported family income at or below 150% of federal poverty line; at least one child aged 6–18 and one parent or guardian willing to participate in longitudinal study). Eighty-one percent (98/121) of eligible families who contacted the lab participated in the study. The mean monthly income for participating families in this sample was $1,615 ($SD = \$894$). In addition, 49.5% of the sample received food stamps, 55.6% had Medicaid insurance, and 14.1% were receiving Temporary Assistance for Needy Families benefits. Sixty-three percent of children in this sample were enrolled in their schools' free or reduced price lunch program. In terms of education, 17.4% of the parents in this sample had less than a high school education, 25.4% had a high school diploma, 37.6% had a training certificate or some college but no degree, and 13.1% had an associate's or bachelor's degree. An additional 3.6% were currently attending school.

Procedure

The research protocol was approved by the Institutional Review Board of the University of Denver. Written consent was obtained from parents, and children and adolescents (including preadolescents—hereafter referred to as adolescents) provided written assent. Families completed questionnaires at home prior to a lab or home visit. Three of the 98 families chose to have the first visit conducted at their home. During the 2.5-hr in-person visit, parents and children participated in individual interviews and videotaped family conversations (Time 1). A second in-person assessment (Time 2) was conducted 1 year after the Time 1 assessment. Four families chose to have this second assessment conducted at their home. Individual interviews were conducted with all family members and family discussions were videotaped.

For the present study, data were analyzed from Times 1 and 2. Several steps were taken to maximize the retention rate of participating families. First, research assistants outlined the duration and requirements of the study in the initial recruitment phone call and the informed consent procedure. Second, each family member received compensation upon completion of the data collection at each time point. Finally, all families provided names and telephone numbers of two individuals to contact if they moved or changed telephone numbers during the study. Twenty-nine families (comprising 101 parents and 112 children) that completed Time 1 did not complete Time 2, yielding a retention rate of 70%.

Measures

Family poverty-related stress. The Multicultural Events Schedule for Adolescents (MESA; Gonzales, Gunnoe, Samaniego, & Jackson, 1995; Gonzales et al., 2001) was used to measure PRS at Time 1. Parents reported on their children and adolescents' experiences of stress. Adolescents and preadolescents (ages 11–18—hereafter referred to as adolescents) also provided reports of their own stress, whereas parent-only report was utilized for children (ages 6–10) who did not give self-reports. The MESA consists of 84 items assessing daily hassles and major life events that commonly occur in the lives of poor, urban youths, divided into eight subscales. As in Wadsworth et al. (2008), a composite PRS variable was computed from the following five subscales: Economic Strain, Family Conflict, Family Transitions/Changes, Discrimination, and Victimization/Violence Exposure. These subscales were highly correlated with each other (rs ranged .35–.67). Additional scales not included in the PRS composite include Peer and Academic Stress. Because event items contained in stress checklists such as the MESA do not reflect an underlying psychological construct and are therefore causal indicators rather than effect indicators (of a latent construct), sum scores of discrete life events should not have any particular internal coherence. Hence, reliability was not assessed with internal consistency (coefficient alpha). Cross-scale and cross-informant correlations are informative, however, because these assess the volume of events across domains as well as informant agreement on domains and volume of stress, respectively. Parent and adolescent reports were highly correlated ($r = .51$) and thus averaged to create a composite score. The MESA was developed and validated using an ethnically diverse (including African American, European American, and both English- and Spanish-speaking Latino adolescents), low-income population and has demonstrated adequate 2-week test–retest reliability ($r = .71$). In addition, the MESA correlated significantly with symptoms of depression and conduct disorder for all four ethnic

groups (Gonzales et al., 2001) and with adolescent, mother, and father reports of adolescent distress (Barrera, Hageman, & Gonzales, 2004).

Parents were interviewed using the Economic Hardship Questionnaire (EHQ), a measure that assesses the number of constraints the family felt as a result of economic hardship and the adjustments they have had to make in order to make ends meet (Lempers, Clark-Lempers, & Simons, 1989). Questions were completed on a 5-point scale indicating how often each of 11 items was true for them in the last 6 months. Sample items include *We have had to sell possessions to make ends meet; We had to apply for federal assistance.* Cronbach's alpha was .74 in this sample. EHQ scores from parents and MESA scores from parents and adolescents were standardized and averaged to create an overall family PRS variable. Scores from the EHQ and MESA were significantly correlated ($r = .30$). Correlations between PRS and psychological problems were highly similar across informants, suggesting that the different measures of PRS captured similar constructs (analyses available upon request).

Psychological syndromes.   Parents completed the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001) at Times 1 and 2 to assess their perceptions of children's emotional and behavioral problems. Adolescents completed the Youth Self Report (YSR; Achenbach & Rescorla, 2001) at Times 1 and 2 to assess their own psychological symptoms. Parents (both primary and secondary) completed the Adult Self Report (ASR; Achenbach, 2005) about their own psychological symptoms and the Adult Behavior Checklist (ABCL; Achenbach, 2005) about their partner's symptoms at Times 1 and 2. The CBCL contains 113 items, the YSR has 112 items, and the ASR and ABCL have 126 items. Items are rated on a 3-point Likert scale ranging 0 (*never true*), 1 (*sometimes true*), and 2 (*very often true*). The two broad-band scales of Internalizing and Externalizing were selected to assess a wide range of psychological problems relevant to family members ranging from school-aged children to adults. The ABCL, ASR, CBCL, and YSR are part of the Achenbach System of Empirically Based Assessment (ASEBA) and consistently demonstrate excellent reliability and validity. Adolescent self-reports were significantly correlated with parental reports ($rs = .28–.48$) and were thus averaged to create a composite score.

Coping and involuntary stress responses.   At Time 1, parents and adolescents completed the Responses to Stress Questionnaire (RSQ; Connor-Smith et al., 2000), a 57-item measure that assesses how a person responds to a stressful domain. For this study, the domain was economic strain. Parents reported on both their own coping/involuntary stress responses and on those of their children and adolescents. Adolescents reported on their own coping/

involuntary stress responses. The RSQ has demonstrated strong reliability and validity in multiple samples, including low-income and minority samples (e.g., Wadsworth, Rieckmann, Benson, & Compas, 2004). With this sample of adults and adolescents respectively, internal consistencies were α (primary control) = .75/.84, α (secondary control) = .81/.80, α (disengagement coping) = .78/.78, α (involuntary engagement) = .90/.92, α (involuntary disengagement) = .87/.83. As recommended by Connor-Smith et al., factor scores on the RSQ were computed as proportions of the total score for all responses (i.e., sum of scores on primary control items/sum of all items) to control for overall responding biases. Self-reports were utilized for parents, parent report of coping was used for children, and composite scores were utilized for adolescents who provided self-reports in addition to parent report. Parent and adolescent reports of coping were significantly correlated (*rs* ranged =.25–.40).

Data Analyses

Model.   HLMs were used to examine the primary research hypotheses. Level 1 of the model consisted of all family members (i.e., parents and children). Level 2 consisted of the family to which each person belongs. Family PRS was entered as a predictor at Level 2. Time 1 age, sex, ethnicity, and responses to stress for each family member were entered at Level 1 and their slopes were assumed to be similar across families. Initial levels of symptoms were also controlled for in the models. Outcome variables were Time 2 internalizing and Time 2 externalizing symptoms. Final models were as follows:

Coping Models

Level 1 : (Time 2 Internalizing

$\qquad$ /Externalizing Symptoms)$_{ij}$

$\qquad = \beta_{0j} + \beta_{1j}(\text{Age})_{ij} + \beta_{2j}(\text{Sex})_{ij} + \beta_{3j}(\text{Ethnicity})_{ij}$

$\qquad + \beta_{4j}(\text{Time 1 Internalizing/Externalizing})_{ij}$

$\qquad + \beta_{5j}(\text{Time 1 Primary Control})_{ij}$

$\qquad + \beta_{6j}(\text{Time 1 Secondary Control})_{ij}$

$\qquad + \beta_{7j}(\text{Time 1 Disengagement})_{ij} + r_{ij}$

Level 2 : $\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{Poverty-related stress})_j + \mu_{0j}$

$\qquad \beta_{1j} = \gamma_{10} + \gamma_{11}(\text{Poverty-related stress})_j$

$\qquad \beta_{2j} = \gamma_{20} + \gamma_{21}(\text{Poverty-related stress})_j$

$\qquad \beta_{3j} = \gamma_{30} + \gamma_{31}(\text{Poverty-related stress})_j$

$\qquad \beta_{4j} = \gamma_{40} + \gamma_{41}(\text{Poverty-related stress})_j$

$\qquad \beta_{5j} = \gamma_{50} + \gamma_{51}(\text{Poverty-related stress})_j$

$\qquad \beta_{6j} = \gamma_{60} + \gamma_{61}(\text{Poverty-related stress})_j$

$\qquad \beta_{7j} = \gamma_{70} + \gamma_{71}(\text{Poverty-related stress})_j$

Level 1 : (Time 2 Internalizing

$\quad$ /Externalizing Symptoms)$_{ij} = \beta_{0j} + \beta_{1j}(\text{Age})_{ij}$

$\quad + \beta_{2j}(\text{Sex})_{ij} + \beta_{3j}(\text{Ethnicity})_{ij}$

$\quad + \beta_{4j}(\text{Time 1 Internalizing/Externalizing})_{ij}$

$\quad + \beta_{5j}(\text{Time 1 Involuntary Engagement})_{ij}$

$\quad + \beta_{6j}(\text{Time 1 Involuntary Disengagement})_{ij} + r_{ij}$

Level 2 : $\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{Poverty-related stress})_j + \mu_{0j}$

$\quad \beta_{1j} = \gamma_{10} + \gamma_{11}(\text{Poverty-related stress})_j$

$\quad \beta_{2j} = \gamma_{20} + \gamma_{21}(\text{Poverty-related stress})_j$

$\quad \beta_{3j} = \gamma_{30} + \gamma_{31}(\text{Poverty-related stress})_j$

$\quad \beta_{4j} = \gamma_{40} + \gamma_{41}(\text{Poverty-related stress})_j$

$\quad \beta_{5j} = \gamma_{50} + \gamma_{51}(\text{Poverty-related stress})_j$

$\quad \beta_{6j} = \gamma_{60} + \gamma_{61}(\text{Poverty-related stress})_j$

RESULTS

Preliminary Analyses

We conducted attrition analyses comparing families that completed and did not complete the study and found no significant differences at Time 1 on any key variables, including families' income-to-needs ratios, amount of time in poverty, current financial status, number of children in the home, education level of parent, and occupational prestige, as well as children's and parents' ages, genders, ethnicities, poverty-related stress levels, coping and involuntary stress responses, and symptoms. Hence, we were able to conclude that data were missing at random and did not need to include additional covariates of missingness in our models.

Descriptive statistics and correlations among variables are reported in Table 1. The data were checked for skewness and kurtosis as well as extreme outliers before primary analyses were conducted. Because data were missing at random, they were handled using imputation with PRELIS (Lisrel 8.52; Jöreskog & Sörbom, 2002). This approach yields unbiased and efficient estimates and is superior to listwise deletion and mean-substitution (Graham, Cumsille, & Elek-Fisk, 2003). The program successfully imputed all missing values. For all analyses, imputed scores are included.

Power was estimated using Optimal Design version 2.0, a program designed by Liu, Spybrook, Congdon, Martinez, and Raudenbush (2005) to estimate power (among other things) for multilevel designs. With $J = 98$ clusters (families), $n = 3.1$ persons per cluster (average family size), ρ (calculated range) $= 0.040$–0.0797, $\alpha = 0.05$, the power $(1 - \beta)$ to detect a small effect $(r = .10)$ was estimated to be approximately 0.4 for all models, whereas the power to detect medium or large effects $(r = .30$ or higher) approaches 1.0.

Models

Models were run using HLM (HLM 6.03 software; Raudenbush, Bryk, & Congdon, 2004). Four HLM models were estimated: (a) a model predicting changes in internalizing symptoms over time containing main and interactive effects of effortful coping, PRS, age, sex, and ethnicity; (b) a model predicting changes in externalizing symptoms over time containing main and interactive effects of effortful coping, PRS, age, sex, and ethnicity; (c) a model predicting changes in internalizing symptoms over time containing main and interactive effects of involuntary stress responses, PRS, age, sex, and ethnicity; (c) a model predicting changes in externalizing symptoms over time containing main and interactive effects of involuntary stress responses, PRS,

TABLE 1
Correlations and Descriptive Statistics

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
1. T1 Age	1.00										
2. T1 Internalizing Symptoms	−.06	1.00									
3. T1 Externalizing Symptoms	.42**	.36**	1.00								
4. T1 Primary Control Coping	−.03	−.20**	−.30**	1.00							
5. T1 Secondary Control Coping	−.27**	−.33**	−.38**	.25**	1.00						
6. T1 Disengagement Coping	−.23**	.20**	.01	−.33**	−.22**	1.00					
7. T1 Involuntary Engagement	.45**	.23**	.40**	−.26**	−.61**	.04	1.00				
8. T1 Involuntary Disengagement	.01	.22**	.25**	−.45**	−.40**	.34**	.39**	1.00			
9. T1 Poverty-Related Stress	.08	.28**	.25**	−.14*	−.24**	.02	.24**	−.01	1.00		
10. T2 Internalizing Symptoms	.48**	.34**	.62**	−.18**	−.34**	−.05	.37**	.10	.26**	1.00	
11. T2 Externalizing Symptoms	.16**	.31**	.50**	−.19**	−.18**	.10	.16**	.12*	.20**	.57**	1.00
M	21.63	8.57	13.79	.19	.26	.16	.24	.16	−.08	10.18	8.71
SD	13.28	7.45	11.45	.04	.05	.03	.05	.03	.81	9.62	7.41

Note: T1 = Time 1; T2 = Time 2.

$^*p < .05.$ $^{**}p < .01.$

TABLE 2
Hierarchical Linear Models: Regression Coefficients and Statistical Tests

	Coefficient	SE	t Ratio	Effect Size (r)
Internalizing-Coping Model				
Intercept	10.9920	.8083	13.59**	0.81
PRS	1.7910	1.0787	1.66	0.17
Ethnicity	0.4450	1.0769	0.41	0.02
Ethnicity × PRS	−1.0697	1.5807	−0.68	0.04
Age	0.2970	0.0383	7.76**	0.42
Age × PRS	−0.0201	0.0437	−0.46	0.03
Sex	−2.3218	0.8617	−2.69**	0.16
Sex × PRS	−1.4634	1.0658	−1.37	0.08
T1 Internalizing	0.3534	0.0814	4.34**	0.25
T1 Internalizing × PRS	−0.0781	0.1080	−0.72	0.04
Primary Control	−31.6659	16.3904	−1.93*	0.11
Primary Control × PRS	−20.8213	22.2921	−0.91	0.05
Secondary Control	−17.0714	9.5101	−1.79	0.11
Secondary Control × PRS	−25.1549	11.7847	−2.14*	0.13
Disengagement	−25.0033	19.2524	−1.29	0.08
Disengagement × PRS	−26.1261	29.3278	−0.89	0.05
Internalizing-Involuntary Model				
Intercept	10.8750	0.8283	13.13**	0.80
PRS	1.8127	1.1064	1.11	0.11
Ethnicity	0.6324	1.0746	0.59	0.03
Ethnicity × PRS	−1.3581	1.5117	−0.89	0.05
Age	0.3053	0.0455	6.71**	0.37
Age × PRS	−0.0315	0.0487	−0.65	0.04
Sex	−2.3212	0.8351	−2.78**	0.16
Sex × PRS	−1.1982	1.0523	−1.14	0.07
T1 Internalizing	0.3752	0.0876	4.28**	0.25
T1 Internalizing × PRS	−0.0943	0.1190	−0.79	0.05
Involuntary Engagement	14.4783	12.6002	1.15	0.07
Involuntary Engagement × PRS	40.9771	17.1602	2.39*	0.14
Involuntary Disengagement	11.2298	17.0390	0.66	0.04
Involuntary Disengagement × PRS	12.4178	23.8359	0.52	0.03

	Coefficient	SE	t Ratio	Effect Size (r)
Externalizing-Coping Model				
Intercept	7.8020	0.6252	12.48**	0.79
PRS	0.3961	0.5999	0.66	0.07
Ethnicity	0.5645	0.8092	0.69	0.04
Ethnicity × PRS	1.3373	1.2564	1.06	0.06
Age	0.0025	0.0292	0.08	0.00
Age × PRS	−0.0445	0.0389	−1.14	0.07
Sex	1.4295	0.9571	1.49	0.09
Sex × PRS	0.0322	1.2818	0.03	0.00
T1 Externalizing	0.3215	0.0441	7.23**	0.39
T1 Externalizing × PRS	0.0616	0.0557	1.11	0.07
Primary Control	−8.5880	15.3064	−0.56	0.03
Primary Control × PRS	4.8083	22.3123	0.21	0.01
Secondary Control	3.8530	8.7103	0.44	0.03
Secondary Control × PRS	−3.0427	10.2037	−0.30	0.02
Disengagement	28.5983	14.3363	1.99*	0.12
Disengagement × PRS	13.0147	16.0410	0.81	0.05
Externalizing–Involuntary Model				
Intercept	7.9719	0.6644	11.99**	0.77
PRS	0.5113	0.6353	0.81	0.08
Ethnicity	0.4260	0.8369	0.51	0.03
Ethnicity × PRS	1.2891	1.2007	1.07	0.06
Age	−0.0126	0.0324	−0.39	0.02
Age × PRS	−0.0275	0.0429	−0.64	0.04
Sex	1.4659	0.9018	1.63	0.10
Sex × PRS	−0.0996	1.1987	−0.08	0.00
T1 Externalizing	0.3287	0.0459	7.15**	0.39
T1 Externalizing × PRS	0.0333	0.0627	0.53	0.03
Involuntary Engagement	−3.3173	8.4584	−0.39	0.02
Involuntary Engagement × PRS	−7.7087	10.6964	−0.72	0.04
Involuntary Disengagement	5.7104	11.6227	0.49	0.03
Involuntary Disengagement × PRS	−33.4519	14.8680	2.25*	0.13

Note: T1 = Time 1; PRS = poverty-related stress.
*$p < .05$. **$p < .01$.

age, sex, and ethnicity. PRS was entered at Level 2 as a family-level variable. At Level 1, responses to stress (coping or involuntary), age, sex, and ethnicity were entered. Table 2 contains full results from the four HLM analyses.

Internalizing with coping model.   Main effects were found for age, sex, Time 1 internalizing, and primary control coping reflecting larger increases in symptoms over time for older individuals, female individuals, and those with prior symptoms and fewer symptoms for those using primary control coping. In addition, as depicted in Figure 1, an interaction between PRS and secondary control coping was found, showing a buffering effect of secondary control coping.

Internalizing with involuntary responses to stress model.   Main effects were found for age, sex, and prior symptoms as in the previous model. In addition, an interaction between PRS and involuntary engagement stress responses was found, showing that involuntary engagement responses heightened the negative effect of PRS on symptoms over time.

Externalizing with coping model.   Main effects were found for Time 1 externalizing and disengagement coping, reflecting larger increases in symptoms over time for those with more disengagement coping and those with prior symptoms.

Externalizing with involuntary responses to stress model.   A main effect was found for prior symptoms as in the previous model, and the main effect for gender approached significance. In addition, as shown in Figure 2, an interaction between PRS and involuntary
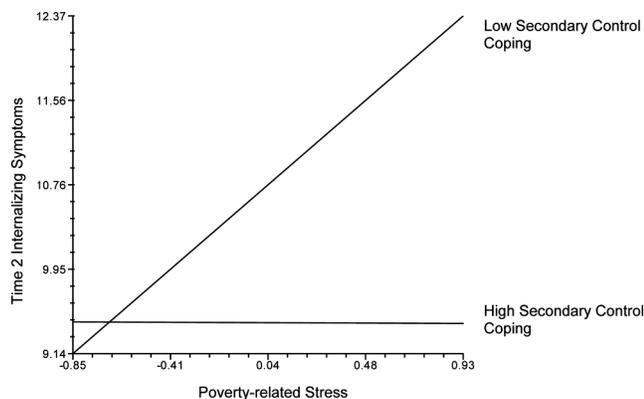

FIGURE 1   Interaction between poverty-related stress and secondary control coping in predicting prospective changes in internalizing symptoms.
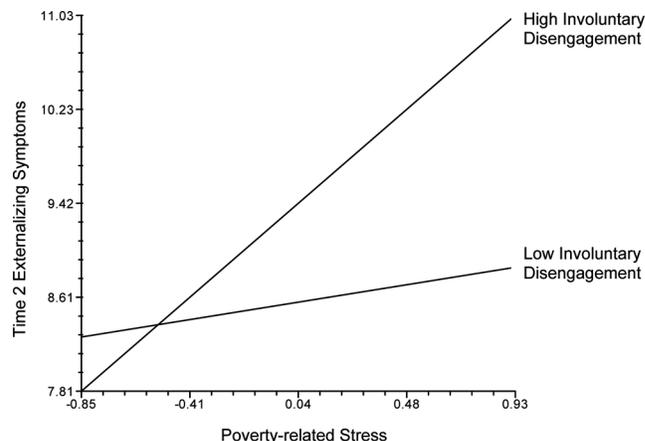

FIGURE 2   Interaction between poverty-related stress and involuntary disengagement in predicting prospective changes in externalizing symptoms.

disengagement stress responses was found, showing that involuntary disengagement responses heightened the negative effect of PRS on symptoms over time.

DISCUSSION

This study provided longitudinal support for the main tenets of the Adaptation to Poverty-related Stress Model. Elaboration of this theoretical model contributes to our knowledge about the ways that poverty confers stress for children and parents as well as how this stress contributes to psychological symptoms among children and adults. Furthermore, it identifies protective coping processes as well as responses to stress that heighten these negative effects. The analyses reported herein expand on previous research by examining the model across time, utilizing multiple informants for key constructs, incorporating children's perspectives on stress and coping, and including both effortful coping and automatic responses to stress.

Findings revealed that PRS influenced the psychological functioning of children and adults through its interaction with certain responses to stress. In contrast to our previous cross-sectional research, PRS did not exert direct effects on the psychological functioning of children and adults in this prospective analysis. Rather, it primarily acted in concert with responses to stress to heighten risk for psychological dysfunction among those with poor coping or heightened stress reactivity.

These results help expand family economic stress models beyond describing risk processes by including a potential source of resiliency (i.e., coping). Coping effectively with the stressors created and exacerbated by poverty has the potential to buffer families from developing various types of problems. Two types of

coping in particular appear to have efficacy for coping with PRS, as primary and secondary control coping both predicted fewer internalizing symptoms, even while accounting for previous symptoms and the pernicious effects of PRS. Primary control coping was directly associated with fewer internalizing symptoms, whereas secondary control coping interacted with PRS to show a true buffering effect. These results suggest that, although taking steps to directly solve the financial problem or manage one's emotions is related to better functioning, the lack of opportunities for such direct action probably limits the effectiveness of primary control coping somewhat. Secondary control coping, on the other hand, is something that individuals can implement anywhere, anytime, perhaps boosting its effectiveness for this type of stress in particular. Bolstering the ability of adults in a family to cope with PRS has the potential to break key links in the family economic stress models by reducing the psychological distress that ties PRS to the rest of the problems that wreak havoc on a family (such as conflict and disrupted parenting). Simultaneously bolstering children's own ability to cope with PRS can provide further armor against the development of psychological problems in the face of PRS.

However, these results also confirm that heightened involuntary responses to stress can exacerbate the already-damaging effects of PRS on the mental health of children and families. Symptom specificity was found, such that high levels of involuntary engagement responses (i.e., physiological arousal, rumination, impulsive action, and intrusive thoughts) interact with PRS to predict internalizing symptoms, whereas it is the involuntary disengagement stress responses (i.e., cognitive interference, escape, emotional numbing, and inaction) that are particularly implicated in externalizing symptoms. These findings are particularly discouraging because exposure to PRS has been shown to dysregulate stress response systems, making involuntary responses to stress more likely to occur (Evans, Kim, & Ting, 2007). When combined with continuing exposure to high levels of the stresses associated with poverty, these dysregulated stress responses increase the likelihood of psychological problems. Although these relations paint a bleak picture of the cyclical nature of the associations among poverty, stress reactivity, and psychopathology, understanding the important role of involuntary stress responses may direct the development of prevention programs that focus not only on enhancing coping but also on reducing involuntary stress responses.

Differential relations between specific stress responses and symptom profiles were found. Consistent with previous cross-sectional research (Wadsworth et al., 2005), primary and secondary control coping were most beneficial in protecting against the development of internalizing symptoms. Also consistent with previous

research was the finding that involuntary engagement stress responses interacted with PRS to predict more internalizing symptoms. However, contrary to previous cross-sectional research, these responses to stress were not prospectively related to externalizing symptoms. Rather, disengagement coping and involuntary disengagement stress responses demonstrated links with externalizing symptoms, with both types of responses increasing levels of externalizing. Wolff and colleagues (2009) have shown that involuntary engagement stress responses show symptom specificity in favor of internalizing symptoms, and in general it appears that patterns of heightened or exaggerated physiological reactivity partially indexed by our involuntary engagement scale may be more characteristic of internalizing than externalizing disorders. Similarly, one study found that more highly reactive individuals were more likely to be high internalizers, whereas less reactive individuals were more likely to be high externalizers (Boyce et al., 2001).

Unfortunately, there is no consistent pattern of relations between disengagement coping and either internalizing or externalizing symptoms in the extant literature. A comprehensive review revealed that the research examining the associations between disengagement coping and adjustment has (a) been largely cross-sectional, (b) focused on internalizing problems such as depression and anxiety, and (c) been as likely to find negative relations between disengagement coping and symptoms (e.g., Edlynn et al., 2008) as a positive relationship (Compas et al., 2001). The widely varying findings from different studies likely reflect differences in both measurement and type of stressor. Of course, it is certainly possible that sampling and measurement error may have also contributed to these inconsistencies (Schmidt, 2010). However, the consistency in findings regarding the other coping constructs discussed suggests that there may be something beyond error contributing to the disengagement differences. The only other study to use similar measurement and stressors and to utilize prospective data (e.g., Wadsworth & Berger, 2006) found disengagement coping to be primarily related to internalizing symptoms. Thus, our findings contradict Wadsworth and Berger (2006), but it is too early to interpret this difference. Instead it appears that disengagement coping may be relevant for both types of symptoms and further research is needed to determine the conditions that determine specificity. Overall, these findings indicate that enhancing adaptive primary and secondary control coping strategies and reducing involuntary engagement responses may be beneficial primarily for reducing internalizing symptoms, whereas targeting and reducing disengagement responses, both voluntary and involuntary, in the face of PRS may be a more beneficial strategy for curbing externalizing symptoms.

Another significant contribution of this study is its examination of the model in a multiethnic sample that included male and female individuals as well as children, adolescents, and parents. This permitted the examination of the degree to which the model applied across these various demographic factors. On the whole, the Adaptation to Poverty-related Stress Model was supported within this diverse sample, with demographic factors playing a relatively minor role. As was found in cross-sectional research (e.g., Wadsworth & Santiago, 2008), a significant main effect of age indicated that older individuals demonstrated more internalizing symptoms; however, this effect did not emerge for externalizing symptoms. As with epidemiological data on the rates of depression (Kuehner, 2003), being female predicted more internalizing symptoms. Finally, consistent with previous cross-sectional research (Wadsworth & Santiago, 2008), no significant ethnic differences were found, either in rates of psychological symptoms or in the relationships between PRS, responses to stress, and outcomes. We would not, however, characterize our White–non-White dichotomy as a strong test of ethnic differences, and in light of preliminary findings suggesting the importance of culturally specific coping in certain circumstances (e.g., Gaylord-Harden & Cunningham, 2009), we certainly recommend additional attention to this crucial issue.

Although this study provided strong evidence for the Adaptation to Poverty-related Stress Model, limitations must be noted. First, although the sample represented a wide age range and diverse ethnic composition, the sample size was relatively small, and our power to detect small effects was limited. Despite this, the analyses revealed numerous small and medium effects that supported the study hypotheses, which is promising. That said, however, it is possible that some important effects were not detected with the current analysis. Future tests of the Adaptation to Poverty-related Stress Model should be designed to maximize power to detect small effects. Second, the current study did not uncover significant differences based on ethnicity. However, due to the limited sample size, we were able to examine ethnicity only as a dichotomous variable indicating whether or not the participant was an ethnic minority. Future research using a more nuanced coding of ethnicity and that includes measures of acculturation or ethnic identity would help shed additional light on the ways in which ethnicity does or does not influence stress, coping, and symptoms of psychopathology. Finally, although this study attempted to include father figures, the number of fathers who participated was relatively small. This is, in part due to the high number of single mothers participating in the study. Research examining the ways in which fathers are affected by PRS is needed.

Finally, as with all research, some degree of error is introduced by both measurement and sampling. In this study and our past efforts to build the Adaptation to Poverty-related Stress Model, we have attempted to minimize such error in several ways. First, we have used cross-informant reports of key constructs whenever possible to minimize method variance problems. Second, we have used data reduction techniques to create stable estimates of variables of interest, hence our construction of composite variables for several key constructs in this study. However, such efforts are not without cost. Composite variables created with averaging techniques necessarily lose a degree of unique information provided by different reporters. A latent variable approach would likely better capture the construct of poverty-related stress, for example, allowing for both the unique and overlapping contributions of all reporters. Clearly our sample was not large enough for a latent variable approach, but this would be a logical advance to make in future tests of the Adaptation to Poverty-related Stress Model.

Implications for Research, Policy, and Practice

Future research with the Adaptation to Poverty-related Stress Model should attempt to capture the development of these processes as they unfold over time. More molecular analyses of the kind that can be conducted with more frequent assessments, such as daily diaries, will allow for examination of the strategies individuals try to use when faced with PRS and the extent to which fixed coping styles might develop prior to adulthood. In addition, future research of this type may be useful in determining the conditions under which disengagement coping may be helpful or harmful and in specifying relations with specific symptoms. In addition, tests of the model's applicability across ethnic groups are needed to ensure that application of the model to prevention work appropriately addresses the needs and strengths of families from different cultural groups.

The Adaptation to Poverty-related Stress Model was developed with the explicit intent to identify risk and resilience processes that are amenable to intervention. Research has shown that coping skills are teachable (Wadsworth et al., 2010) and that improvements in coping translate into improved mental health (Raviv & Wadsworth, 2010). In addition, mounting evidence suggests that stress and coping are highly relevant targets for prevention with families in poverty. Thus, programming that targets improving primary and secondary control coping and reducing disengagement and involuntary stress responses has the potential to mitigate some of the ravages of poverty as children and families navigate their way toward healthier futures.

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