Cognitive contributors to resilience in youth from underserved populations: A brief report

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Abstract

Purpose – *The study is a preliminary attempt to identify cognitive factors (e.g., executive functions and intelligence) promoting resilience in youth in an underprivileged population. Sample consisted of 26 adolescents (seven female, 19 male) between the ages of 13 and 19 years (M = 16.62, SD = 1.53) from an underserved population who live in circumstances of poverty and family dysfunction and who had experienced multiple traumas.*

Design/methodology/approach – *Resilience was measured with the Child and Youth Resilience Measure (CYRM)-28. Intelligence, working memory, and information processing speed were the cognitive factors of interest. Socioeconomic status was the environmental factor in interest.*

Findings – *The protective factors (i.e. individual skills, relationship with caregivers and contextual factors) promoting resilience were correlated with cognitive factors. Further analyses yielded gender differences in these relations.*

Originality/value – *Long-held beliefs that intelligence is positively associated with resilience are brought into question by these findings. The relationship between these concepts seems to differ in accordance with socioeconomic status.*

Keywords *Youth, Adolescent, Trauma, Resilience, Cognitive factors*

Paper type *Research paper*

Introduction

Youth from underprivileged backgrounds who are exposed to poverty, community violence, trauma, abuse and neglect are at high risk for a number of deleterious outcomes including early school dropout, involvement with law enforcement, drug use/dependence and various psychopathologies (e.g. posttraumatic stress disorder, attention problems and depression) (Kilpatrick *et al.*, 2003). Studies have revealed that although many youth at risk have poor outcomes, not all do. The question arises as to why certain individuals seem to achieve more resilient outcomes to adverse circumstances than others.

Although it was originally conceptualized as a single capacity for good adaptation in the context of significant hardship, recent research has revealed that resilience is a multi-component construct that feeds on several resources: the capacity of the individual to discover or recognize resources crucial for maintaining well-being, the capacity of the individual's surroundings to provide those resources; and the capacity of the individual, his family and community to agree on how to share and utilize those resources (Ungar *et al.*, 2008).

Resilient outcomes have been reported to be related to personality traits (e.g. Campbell-Sills *et al.*, 2006; Rutter, 1985) and family environment (Masten *et al.*, 1999) and have been

associated with the effective use of cognitive skills to cope with stress (Greenberg, 2006). Other research shows that resilience is positively associated with normal IQ, stable peer and family relationships, religious beliefs, and practice (Masten *et al.*, 1999).

The contribution of specific executive functions (EF) (i.e. a wide range of cognitive abilities including attentional control, working memory, processing speed, and inhibition) to resilience has been underexplored. EF are responsible for the regulation of cognitive processes. Although few in number and small in scope, initial studies suggest that EF make independent contributions to resilient outcomes and emphasize the need for additional investigations on this construct (Greenberg, 2006; Nigg *et al.*, 1998). Since the youth from underserved populations may lack stable family and neighborhood environments, it is important to understand the contributions of EF in guiding the youth's utilization of available resources or helping them to seek out resources that may facilitate positive adaptation.

The present pilot study is a preliminary attempt to identify EF (e.g. working memory, speed of processing, and inhibition) promoting resilient outcomes in youth exposed to multiple traumas and environmental stress. We anticipated the identification of specific EF that are correlated with resilience.

Method

Participants

Twenty-six adolescents (19 male) between the ages of 13 and 19 years ($M = 16.62$, $SD = 1.53$) who live with poverty, family dysfunction, and multiple traumas participated in the study. Youth with pre-existing diagnoses of serious neurological disorder or intellectual disability (IQ < 70) were excluded because of inability to complete the study tasks. Participants were recruited from two venues in Houston, Texas: Youth Advocates (YA), a peer-to-peer youth mentoring organization that provides a positive peer culture for youth in acute risk circumstances ($n = 15$; age = 15-19 years), and a diversion program for first-time offenders in the Harris County Juvenile Probation Department (JJ: HCJPD) ($n = 8$; age = 14-16 years).

YA youth were recruited passively via posters and brochures at the YA community center during group activities. Youth who expressed an interest were given brochures and a detailed description of the study to take home to their parents or legal guardians. Interested parents contacted the research coordinator, who then explained the study and went over the consent form to answer questions. Upon receiving the signed consent form, the youth was scheduled for assessment.

JJ youth were recruited via HCJPD. After the youth had been accepted into the diversion program, the project investigators introduced the study to the youth and their parents and also made clear that participation was entirely voluntary and confidential, and had no bearing on the legal disposition of the youth. To ensure there was no possibility of coercion, parents were given a form on which they could accept or decline to participate in the study (with contact information if they decided to accept). All parents turned in a form (either filled out or not) and those who expressed interest were contacted. Officers and staff of HCJPD were not informed who chose to participate and who did not.

All testing took place in the Cognitive Neuroscience Laboratory at Baylor College of Medicine or in a quiet office at the YA facility. Assessments were administered by an experienced psychometrician trained and certified in Human Subjects Protection and data handling. All materials were kept strictly confidential. A Certificate of Confidentiality was obtained from the National Institutes of Health.

Measures

The Child and Youth Resilience Measure (CYRM; Ungar and Liebenberg, 2009)-28 is a 28-item, self-report questionnaire constructed to assess factors related to resilient outcomes across a variety of cultural contexts, and to explore the resources available to youth between the ages of 12 and 23 to bolster resilience. The resources are conceptualized and measured in three sub-scales: individual skills (IS) (e.g. attitudes and knowledge about self), relationship with caregivers (RC) (e.g. perceived support of family), and contextual factors (CF) (e.g. variables related to the

community and environment), with higher scores indicating greater resilience (see Table I for sample items). Cronbach's α reliability coefficient of CYRM-28 in our data was 0.73.

The Wechsler Abbreviated Intelligence Scale (WASI) (Psychological Cooperation, 1999) is a widely used, nationally standardized test of intelligence. The WASI two-factor version yields verbal IQ, performance IQ and a full-scale IQ. The internal reliability of WASI in our study was reported be 0.88.

The Keep Track Task (KTT) (Miyake *et al.*, 2000) measures working memory (the ability to maintain and manipulate information), and updating (the ability to keep only current, relevant information in working memory while discarding irrelevant information). Participants see a mixed list of 15 exemplars of seven semantic categories (e.g. animals or metals) and must remember the last-presented exemplar for 2, 3, or 4 target categories. Number of correct items per list are recorded.

The Flanker Task (Eriksen and Eriksen, 1974) measures baseline reaction time (FL_BR) and resistance to distraction (FL_Int). Participants see a central arrow on a computer screen and must press a key corresponding to the direction of the arrow both in the presence of distracters (the FL_Int condition) and in their absence (FL_BR condition). Smaller values indicate faster reaction times.

Symbol Digit Modalities Test (Smith, 1982) is a commonly used measure of complex processing speed. Using a reference key, the subject must pair specific numbers with given geometric figures. The measure is number of items completed in 90 seconds, with higher numbers indicating better performance.

UCLA PTSD Reaction Index Trauma Exposure Screen comprises 17 questions regarding types of trauma experienced (e.g. assault, arrest, war, family death, hospitalization, etc.).

Statistics and preliminary analyses

A large proportion of the adolescents tested had sustained multiple traumas and were from impoverished family backgrounds. In total, 33 percent of the sample indicated they had experienced at least one traumatic event, 58.5 percent of the sample stated their families received government aid and 64.5 percent had a history of arrest in the family. Three types of resilience scores, representing three factors promoting resilience, were generated based on CYRM-28 subscales: IS, RC and CF.

Since preliminary analysis revealed a gender effect, multiple Spearman correlation-coefficients as a function of gender were calculated. Due to limited sample size, no corrections were made. Observed effect sizes ranged from small (0.1) to moderate (0.3) to large (0.5 and up).

Results

Table II displays the means and standard deviations of gender on each subscale of CYRM-28. No significant differences were found.

Correlational analyses indicated that intelligence scores were negatively correlated with the RC subscale and marginally, and again, negatively, correlated with the CF. Processing speed, as

Table I Sample items from subscales of CYRM-28

The items	*Subscale*
I try to finish what I start	Individual skills
I am aware of my own strengths	Individual skills
My family stands by me during difficult times	Relationship with caregivers
I talk to my family/caregiver(s) about how I feel	Relationship with caregivers
I know where to go in my community to get help	Contextual factors
I think it is important to serve my community	Contextual factors

Note: CYRM-28, Child and Youth Resilience Measure

measured by reaction time in the neutral condition of the Flanker Task was marginally associated with the RC subscale (Table III).

Further analyses were conducted to explore gender differences in these measures. Female participants' intelligence scores were negatively correlated with the subscale of IS whereas males' intelligence scores were negatively related to the CF subscale. Processing speed was marginally related to the CYRM-28 only for male participants. Similarly, working memory as measured with the KTT was correlated with with the IS scale only for male participants, albeit marginally (Table IV).

Discussion

This pilot study was a preliminary effort to investigate relations among measures of resilience and EF in underserved youth.

Table II Mean and standard deviations of scores on CYRM-28 subscales as a function of gender

	Females		*Males*	
CYRM-28 subscales	*Mean*	*SD*	*Mean*	*SD*
Individual skills	13.17	1.48	13.16	1.36
Caregivers	7.38	1.89	7.55	1.13
Contextual	11.69	2.51	10.86	1.27

Notes: $n = 26$, 19 males and 7 females. CYRM-28, Child and Youth Resilience Measure.

Table III Correlations between CYRM-28 subscales and cognitive measures

CYRM-28 subscales	*WASI-V*	*WASI-MR*	*WASI-T*	*KTT*	*FL_Int*	*FL_BR*	*SDMT*
Individual skills	−0.16	−0.1	−0.22	0.17	−0.12	0.03	0.01
Caregivers	*−0.52**	−0.02	*−0.49**	0.09	0.08	0.16	0.06
Contextual	*−0.35***	−0.17	*−0.35***	0.01	*0.40***	*0.37***	0.17

Notes: $n = 26$. CYRM-28, Child and Youth Resilience Measure; WASI, Wechsler Abbreviated Scale of Intelligence; MR, matrix reasoning; V, verbal; T, total; KTT, Keep Track Task; FL_Int, interference score at Flanker task; FL_BR, base rate of Flanker task; SDMT, Symbol Digit Modality. Significance level was set at 0.05. Moderate to large effect sizes are italicized. Effect sizes: small = 0-0.2; moderate = 0.3; large = 0.5. *,**Statistically significant and marginally significant, respectively.

Table IV Correlation between CYRM-28 subscales and cognitive measures as a function of gender

	CYRM-28 subscales	*WASI-V*	*WASI-MR*	*WASI-T*	*KTT*	*FL_Int*	*FL_BR*	*SDMT*
Females	Individual skills	*−0.87**	0.09	*−0.75***	−0.20	−0.19	0.005	0.31
	Caregivers	*−0.47*	−0.38	*−0.77***	*−0.52*	−0.14	−0.26	*0.54*
	Contextual	*−0.49*	−0.05	*−0.49*	−0.28	0.29	0.18	0.08
Males	Individual skills	0.07	−0.14	−0.07	*0.43***	−0.24	−0.07	0.02
	Caregivers	*−0.60**	0.02	*−0.52**	0.36	0.19	*0.43***	−0.13
	Contextual	−0.34	−0.33	−0.39	0.01	*0.47***	*0.49**	0.05

Notes: $n = 26$, 19 males and 7 females. CYRM-28, Child and Youth Resilience Measure; WASI, Wechsler Abbreviated Scale of Intelligence; MR, matrix reasoning; V, verbal; T, total; KTT, Keep Track Task; FL_Int, interference score of Flanker task; FL_BR, base rate of Flanker task; SDMT, Symbol Digit Modality. Significance level was set at 0.05. Moderate to large effect sizes are italicized. Effect sizes: small = 0-0.2; moderate = 0.3; large = 0.5. *,**Statistically significant and marginally significant, respectively.

Counterintuitively, and in contrast to other studies reporting a positive correlation between IQ and resilience (Masten *et al.*, 1999), we found a negative relation between verbal IQ and resilience in underserved youth. Our data support Luthar (1991), who argued that more intelligent individuals tend to have higher levels of sensitivity to their environment, which translates to higher susceptibility to stressors. Our findings might indicate that greater sensitivity to environment in higher IQ may create tension between parents and these adolescents.

Working memory was more strongly associated with measures of resilience in males, although the small sample sizes emphasize the need for cautious interpretation. Resilience may involve the effective use of cognitive skills to cope with stress (Greenberg, 2006) or ability to seek out appropriate resources (i.e. working memory), which might lead to greater resilient outcomes.

An interesting pattern concerning inhibition was found: Individuals less resistant to distraction showed higher resilience. It may be speculated that in uncertain environments the ability to detach easily from focus is adaptive and perhaps related to hypervigilance.

This study suggests that some components of EF (i.e. working memory capacity) promote resilience whereas the other components (i.e. inhibition skills) impair resilience in youth at risk. Further, these relationships seem to be gender specific. The small sample size forbids firm conclusions, but emphasizes the need for future studies with larger sample sizes.

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