

2011

# Growth after the storm: cognitive processing and social support as mediators of the relation between religious coping and posttraumatic growth in hurricane-affected women

Julia Vigna Bosson

*Louisiana State University and Agricultural and Mechanical College, [julia.v.bosson@gmail.com](mailto:julia.v.bosson@gmail.com)*

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GROWTH AFTER THE STORM: COGNITIVE PROCESSING AND SOCIAL SUPPORT AS  
MEDIATORS OF THE RELATION BETWEEN RELIGIOUS COPING AND  
POSTTRAUMATIC GROWTH IN HURRICANE-AFFECTED WOMEN

A Dissertation

Submitted to the Graduate Faculty of the  
Louisiana State University and  
Agricultural and Mechanical College  
in partial fulfillment of the  
requirements for the degree of  
Doctor of Philosophy

in

The Department of Psychology

by  
Julia Vigna Bosson  
B.A., Tulane University, 2006  
M.A., Louisiana State University, 2008  
December 2011

## **DEDICATION**

*To Brock, my forever partner.*

## ACKNOWLEDGEMENTS

This dissertation is only one representation of a graduate journey marked by invaluable research and clinical experiences. I am indebted to several individuals, not only for their assistance in the production of this work, but more importantly, for the time and interested they have invested in me professionally and personally.

Special thanks to my advisor, Dr. Mary Lou Kelley, who continues to be the most fervent cheerleader of my career; to Dr. Alex Cohen, who is genuinely interested in the continual professional growth of all of his mentees; to Dr. Glenn Jones, for the generosity with which he shares his time and knowledge; to Dr. Frank Gresham, for his willingness to consult on methodological and statistical matters; to Dr. Drew Gouvier, for his enduring benevolence; and to Dr. Shannon Self-Brown, for her unending willingness to lend an ear and share advice.

I am always grateful to those students who have trekked this course with me, to those who came before me, and to those who will come after—we are joined by experiences inexplicable to the outside world.

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## **ABSTRACT**

Although many studies have detailed the maladies imposed by Hurricane Katrina, little work has examined potential benefits gleaned in the wake of the storm. Posttraumatic growth, a construct receiving increased attention in the literature, describes personal betterment or development following a traumatic event in areas such as perceived changes in self, a changed sense of relations with others, and a changed philosophy of life. Researchers have demonstrated a relation between posttraumatic growth and varying factors, including religious coping. The current study established a relation between religious coping and posttraumatic growth in a sample of hurricane-exposed women in Southeastern Louisiana and attempted to identify mediators of that relation. Results indicated that social support was not related to religious coping or posttraumatic growth and therefore did not mediate the relation between the two. However, in the final model, cognitive processing fully mediated the relation between religious coping and posttraumatic growth, such that religious coping would have no effect on posttraumatic growth were it not for its relation to cognitive processing.



## INTRODUCTION

The devastation caused by Hurricane Katrina has been studied vigorously since the storm hit in August 2005. Physical damage caused to homes and the infrastructure of New Orleans has been well documented (e.g., U.S. Department of Homeland Security, 2006, 2007), as has the psychological and emotional distress suffered by thousands of residents (see Norris et al., 2002). An alternate area of research concerns positive effects gleaned from the experience. Although potential positive effects of trauma represent an emerging field of study (Joseph & Linley, 2005), scant work has examined constructive outcomes reported by survivors of Hurricane Katrina living in and around New Orleans at the time of the storm.

Research indicates that religious coping influences psychological outcomes post-disaster (e.g., Pargament, Smith, Koenig, & Perez, 1999; Smith, Pargament, Brant, & Oliver, 2000). Though limited, studies have documented the role of spirituality or religion in Katrina survivors' lives specifically (Aten et al., 2008; Lawson & Thomas, 2007). Considering these budding lines of research, the current study supplements the literature by establishing a relation between religious coping and posttraumatic growth (PTG) among adult female hurricane survivors and by seeking to identify mechanisms through which PTG develops.

### **Overview of Posttraumatic Growth and Related Constructs**

PTG, which refers generally to personal betterment or development experienced in the face of trauma (Tedeschi & Calhoun, 1996, 2004), has received increasing attention from researchers and clinicians over the past two decades (Helgeson, Reynolds, & Tomich, 2006). Growth or positive outcomes have been reported following a variety of traumatic experiences, including motor vehicle accidents (Zoellner, Rabe, Karl, & Maercker, 2008), terrorist attacks (Park, Aldwin, Fenster, & Snyder, 2008), disaster (McMillen, Smith, & Fisher, 1997), assault

(Grubaugh & Resick, 2007), stroke (Gangstad, Norman, & Barton, 2009), HIV infection (Updegraff, Taylor, Kemeny, & Wyatt, 2002), bone marrow transplant (Fromm, Andykowski, & Hunt, 1996), and limb amputation (Phelps, Williams, Raichle, Turner, & Ehde, 2008).

According to Tedeschi and Calhoun (1996), PTG encompasses three broad categories of change, including perceived changes in self, a changed sense of relations with others, and a changed philosophy of life. These broad categories are comprised of five specific areas, including: relations with others; new possibilities; personal strength; appreciation of life; and spirituality. Trauma survivors may report improved relations with others not only through recognition of increased availability of social support, but also through an improved ability to empathize with others experiencing pain (Tedeschi & Calhoun, 2004). New possibilities may emerge in the form of alternate occupations that might not have been considered pre-trauma. Additionally, surviving trauma victims often report a sort of self-reliance of which they were not aware pre-trauma (Tedeschi & Calhoun, 2004). Further, individuals may report that they value life more after coming close to death. Finally, Tedeschi and Calhoun (2004) argued that both religious and non-religious individuals may experience growth in the realm of spirituality, either through a more developed relationship with God or through deepened existential questioning. Although some questions regarding uniqueness of these specific areas and the structure of PTG have been posed in the literature (e.g., Linley & Joseph, 2004), factor analytic studies of the Posttraumatic Growth Inventory (PTGI), commonly used to measure PTG, support this five-factor conceptualization (e.g., Taku et al., 2007).

Tedeschi and Calhoun (1995) outlined seven principles that they hypothesized govern the PTG process. First, they noted that in order for PTG to occur, existing schemas must be challenged by the trauma. However, they acknowledged that some schemas may be more

resistant to change than others. For example, they argued that religious beliefs may allow for more flexibility because they are not subject to empirical disconfirmation. Next, they asserted that some type of positive evaluation regarding the traumatic experience must take place in order for growth to occur. They acknowledged that differing types of traumas might lead to different types of growth and that enduring personality traits can affect the potential for growth. They conjectured that PTG occurs only when the traumatic experience assumes a pivotal role in one's personal narrative or life story. Finally, they asserted that wisdom is a byproduct of the growth process (Tedeschi & Calhoun).

Some research has examined the effects of individual differences, such as personality, on PTG. Openness to new experiences, optimism, and extraversion have been identified as positive predictors of PTG (Tedeschi & Calhoun, 1996; Zoellner et al., 2008). Other characteristics, such as kindness, honesty, gratitude, and fairness, have also been associated with PTG (Peterson, Park, Pole, D'Andrea, & Seligman, 2008). Limited research has been conducted studying the effects of culture on PTG, but the extant evidence indicates that PTG is seen in Asian, Eastern, and Western cultures (Karanci & Acaturk, 2005; Schroevers & Teo, 2008). In one study, Hispanic women with cervical cancer demonstrated greater PTG than non-Hispanic Caucasian women with cervical cancer (Smith, Dalen, Bernard, & Baumgartner, 2008); however, spirituality acted as a partial mediator on this relation, such that a significant portion of the predictive value of race was accounted for by the Hispanic women's self-reported spirituality.

It is important to consider related concepts, such as resilience, in the study of posttraumatic growth. Westphal and Bonanno (2007) asserted that "resilient outcomes typically provide little need or opportunity for PTG" (p. 419). That is, the authors echoed Tedeschi and Calhoun's (1996, 2004) original conceptualization of PTG as a phenomenon that arises from a

disruption of schemas held prior to the traumatic event. Westphal and Bonanno argued that, while PTG represents development in the aforementioned domains after an individual has experienced a crisis, resilience represents *maintenance of* or a quick *return to* pre-trauma levels of functioning, rather than a growth beyond prior functioning levels. One study indicated that PTG and resilience were inversely related in their sample of Israeli adolescents exposed to terrorism and adults exposed to war (Levine, Laufer, Stein, Hamama-Raz, & Solomon, 2009). Specifically, those participants who reported the least PTG also reported the most resilience, as measured by an absence of posttraumatic stress disorder (PTSD) symptoms. Importantly, Westphal and Bonanno noted that neither PTG nor resilience is superior to the other; instead, the two constructs represent distinct phenomena experienced by subsets of people who respond to potentially traumatic events in different ways.

The concept of PTG has met some controversy among experts. Maercker and Zoellner (2004, *as cited in* Zoellner & Maercker, 2006) proposed a two-component model of PTG dubbed the “Janus Face Model.” According to this model, PTG comprises two co-existing elements, one of which is the functional, constructive side described by Tedeschi and Calhoun (1996, 2004). Maercker and Zoellner argued that the other facet of PTG is akin to an avoidant cognitive coping strategy employed by individuals who are floundering post-trauma in an attempt to palliate themselves. The latter component of PTG can be viewed as “illusory” (Zoellner & Maercker, p. 639), and the researchers posited that this illusory side may even be associated with denial and negative outcomes, such as anxiety. Implicit in their argument is that the transformative side of PTG may take longer to manifest than the illusory side. Hobfoll and colleagues (2007) furthered Zoellner and Maercker’s argument, purporting that action is required to maintain the constructive or transformative face of PTG. That is, individuals who simply use cognitive reframing in the

face of trauma are likely to manifest the illusory component of PTG, whereas those who put their cognitions into action will genuinely experience the benefits proposed by Tedeschi and Calhoun. In a response to Hobfoll and colleagues, Tedeschi, Calhoun, and Cann (2007) reasserted that: (1) PTG comes from theories that hold at their core the notion that traumatic experiences shatter assumptions held about the world (e.g., Janoff-Bulman, 1992), therefore integrally involving cognitive processes by definition, and (2) PTG as originally conceptualized in no way precludes behavioral action and, in many instances, leads to it.

Ample evidence exists to suggest that PTG is not simply illusory or palliative in nature. Among this evidence is data indicating that individuals report experiencing PTG and distress simultaneously post-trauma (e.g., Grubaugh & Resick, 2007; Solomon & Dekel, 2007), which demonstrates that trauma survivors do not report PTG solely in an attempt to feign recovery. Furthering this argument are data indicating that PTG is unrelated to social desirability (Park, Cohen, & Murch, 1996; Salsman, Segerstrom, Brechting, Carlson, & Andrykowski, 2008; Weinrib, Rothrock, Johnsen, & Lutgendorf, 2006) and that significant others often substantiate trauma survivors' self-reported PTG (Park et al., 1996; Shakespeare-Finch & Enders, 2008). Taken together, these studies illustrate that PTG does not simply represent deceptive and avoidant coping, but rather legitimate, observable changes.

A variety of terms have been used to describe positive outcomes in the face of adversity, including PTG, stress-related growth, benefit-finding, thriving, and perceived benefit (Helgeson et al., 2006; Linley & Joseph, 2004). Each term refers to a slightly different phenomenon. The current study used the term PTG and operationalized the construct as described by Tedeschi and Calhoun (2004). That is, PTG refers to betterment following a major crisis or trauma (e.g., Hurricane Katrina), rather than minor daily stressors; it describes a genuine outcome, rather than

illusory coping; it results from a re-examination of core beliefs necessitated by the splintering of schemas and assumptions post-trauma; and it can co-exist with psychological distress.

### **Religious Coping and Posttraumatic Growth**

Trauma survivors often turn to religion or spirituality to cope with their distress (Fallot, 1997). Religious coping can be conceptualized as strategies that draw on religion and are used in an effort to mitigate stressful life circumstances (Pargament, 1997), and it can be manifested in a multitude of ways (Pargament et al., 1999), such as through prayer, seeking God's guidance, or seeking support from one's congregation or clergy.

Pargament and colleagues (1999) noted the importance of determining the effects of religious coping patterns, rather than unique strategies, and distinguished between positive patterns and negative patterns. Drawing on existing theory, Pargament et al. defined positive religious coping as "an expression of a sense of spirituality, a secure relationship with God, a belief that there is meaning to be found in life, and a sense of spiritual connectedness with others" (p. 712). The authors viewed negative religious coping patterns as an expression of an insecure relationship with God and spiritual uncertainty. Using factor analysis across three samples, Pargament and colleagues determined that a positive religious coping pattern includes strategies such as seeking to ameliorate the problem together with God; seeking a sense of connectedness with God; seeking comfort from clergy or congregation members; trying to provide spiritual support to others; turning to religion for help in forgiving and letting go of losses; seeking spiritual purification through religious practices; and searching for benevolent or beneficial aspects of the stressor. Negative patterns of religious coping included expressions of confusion or dissatisfaction with God; interpreting the stressor as punishment from God;

dissatisfaction with clergy members; interpreting the stressor as an act from the devil; and a reappraisal of God's powers.

Research has shown that divergent patterns of religious coping strategies have differential effects on adjustment (Pargament et al., 1999), and an emerging literature base examines the relation between religious coping and PTG specifically. In a systematic review of the literature, Shaw, Joseph, and Linley (2005) determined that factors such as positive religious coping, religious participation, and intrinsic religiosity are generally positively related to PTG. Harris and colleagues (2008) studied a sample of churchgoers from varying Christian denominations who endorsed experiencing a traumatic event and found that the factor Seeking Spiritual Support (including various positive religious coping strategies) predicted PTG, while Religious Strain (including feelings of alienation from God, fear and guilt, and religious rifts) predicted PTSD symptoms (Harris et al.). Overcash, Calhoun, Cann, and Tedeschi (1996) suggested that the relationship seen between religion/spirituality and PTG may develop because religious beliefs provide a framework that can be used to help assimilate traumatic events into one's existing schemas, which points to a variable thought to be integral in the evolution of PTG—cognitive processing.

### **Cognitive Processing and Posttraumatic Growth**

Prevailing theories argue that traumatic events can challenge survivors' existing schemas and assumptions about the world (Janoff-Bulman, 1992). Such schemas might include beliefs that the world is just or that people are ultimately good. When a traumatic experience does not align with an individual's "assumptive world" (Janoff-Bulman, 1989), cognitive processes must take place to correct the mismatch between the event and the person's schema. When an individual amends her schema to incorporate the traumatic event, *accommodation* occurs;

*assimilation* describes an individual's adjusting her perception of the event itself to fit the existing schema (Payne, Joseph, & Tudway, 2007). Thus, cognitive processes of some kind are essential post-trauma, provided that the survivor's pre-existing assumptions were sufficiently challenged (Tedeschi & Calhoun, 1995).

As previously stated, cognitive processing is also considered integral to the development of PTG (Tedeschi & Calhoun, 1995; 2004). Tedeschi and Calhoun (2004) used the phrases cognitive processing and rumination interchangeably to describe deliberate cogitation about a traumatic event in an attempt to make meaning of the occurrence. This deliberate rumination or cognitive processing is distinguished from the involuntary, intrusive thoughts that are associated with PTSD. It entails making the experience manageable and comprehensible (Tedeschi & Calhoun, 1995) and involves questions such as, "What does this mean for my future?" and "How does this affect my view of the world?" It is posited that cognitive processing is the key variable in a complex model that includes individual personality variables, coping, self-disclosure, and social support (Tedeschi & Calhoun, 2004). According to this model, emotional distress and a disruption of schemas following a traumatic experience are necessary for PTG to occur because it is this schema-disruption that intentional cognitive processing mitigates.

Studies abound which support the role of cognitive processing in the development of PTG. In a study of bereaved Japanese college students, deliberate rumination in the few weeks following the death of a loved one predicted PTG, while intrusive rumination predicted psychological distress (Taku, Calhoun, Cann, & Tedeschi, 2008). Cognitive processing is also implicated in the development of PTG following medical stressors, including stroke (Gangstad et al., 2009) and colorectal cancer (Salsman et al., 2008). Phelps and colleagues (2008) further differentiated intentional cognitive processing into negative and positive types. Deliberate



negative cognitive processing comprises “Why me?” thoughts, blaming, denial, and thoughts about how one’s life would be different had the trauma not occurred. Positive cognitive processing entails intentional benefit-finding as already described. The researchers found that negative cognitive processing predicted PTSD but was not related to PTG, while positive cognitive processing predicted increased PTG (Phelps et al.). Thus, across a range of populations and traumatic experiences, intentional, positive cognitive processing has proven to be an important predictor in the expression of PTG.

### **Social Support, Religious Coping, and Posttraumatic Growth**

Although cognitive processing is hypothesized to be an underlying mechanism by which religious coping begets PTG, there likely are other vehicles underlying the beneficial effects of religious coping. One such vehicle is social support, which can be conceptualized as encouragement, assistance, or care provided to an individual by friends, family, or other sources, typically in a time of stress or need. Hood, Spilka, Hunsberger, and Gorush (1996) acknowledged the role that a sense of community plays in religious involvement, and Pargament (1997) echoed the views of other theorists with his statement that, “religions are, at heart, a social rather than a psychological, emotional, or physical matter” (p. 55). A plethora of studies have considered the relation between religious involvement and social support, although results are somewhat inconsistent (see George, Ellison, & Larson, 2002, for a review). In a qualitative study of female breast cancer survivors, most women reported social support to be an important facet of their own spirituality (Gall & Cornblat, 2002). In a study of African American domestic violence survivors, Watlington and Murphy (2006) found that women reporting higher levels of religious involvement also reported greater social support.

Varying theorists propose a relation between social support and PTG. Schaefer and Moos (1998) suggested that social and family support may contribute to PTG by affecting coping behavior, and Bloom (1998) noted the importance of social organizations for many individuals post-trauma. Tedeschi and Calhoun (2004) claimed social support to be integral in their model of PTG progression, asserting that the intimacy achieved through support groups and the requisite meaning-making that accompanies divulging one's personal narrative promote growth in individuals post-trauma. Moreover, empirical data supports the theoretical relations proposed. In a retrospective study of Holocaust survivors, Lev-Wiesel and Amir (2003) found that social support was related to PTG in the area of new possibilities. Social support is also predictive of PTG among Gulf War veterans (Maguen, Vogt, King, King, & Litz, 2005), prostate cancer survivors (Thornton & Perez, 2006), and breast cancer survivors (Weiss, 2004). Taken together, this literature suggests that social support is a crucial component in the evolution of PTG.

Although no studies have examined the mediating effect of social support between religious coping and PTG specifically, several studies have identified social support as a mediator between religious coping and positive outcome more generally. In a sample of post-operative cardiac patients, Ai, Park, Huang, Rodgers, and Tice (2007) examined a path including general religiousness, religious coping, social support, and postoperative distress and found that social support fully mediated the relation between religious coping and reduced postoperative distress. Results from a study conducted with urban adolescents suggested that social support accounted for the relation seen between religious coping and decreased depressive symptoms (Carleton, Esparaza, Thaxton, & Grant, 2008). Thus, across a range of populations and stressors, social support has been identified as a mechanism through which religious coping leads to reduced distress.

## **Current Study and Hypotheses**

Although a burgeoning literature base has begun to examine religious coping, cognitive processing, and social support as predictors of PTG, few studies have identified mechanisms of change in the PTG process, and no published study has done so in a hurricane-affected population. Overcash and colleagues (1996) suggested that the relation between religious coping and PTG is accounted for in part by cognitive processing. They argued that, unlike many world assumptions, religious schemas are not highly susceptible to destruction in the face of trauma because they are inherently more subjective and less empirical, thus making them more difficult to disprove. Considering the relative incontestability of religious beliefs compared to empirical assumptions about the world (which presumably are more vulnerable to trauma-related re-examination), the authors suggested that religious beliefs can provide the scaffolding by which a traumatic experience is integrated into one's life. Thus, the current study advances the literature by empirically testing the notion that cognitive processing is a mechanism through which religious coping leads to PTG.

In addition, research suggests a relation between religious coping and social support and a relation between social support and PTG. Moreover, literature suggests that much of the utility of social support arises from opportunities to cognitively process one's traumatic experiences (Lepore & Helgeson, 1998; Lepore, Silver, Wortman, & Wayment, 1996; Tedeschi & Calhoun, 2004). Thus, this study also examined social support in the path among religious coping, cognitive processing, and PTG.

Figure 1 presents the proposed path and hypothesized relations among variables. As seen in the figure, it was hypothesized that as religious coping increased, PTG would also increase. It was also hypothesized that increases in religious coping would lead to more cognitive

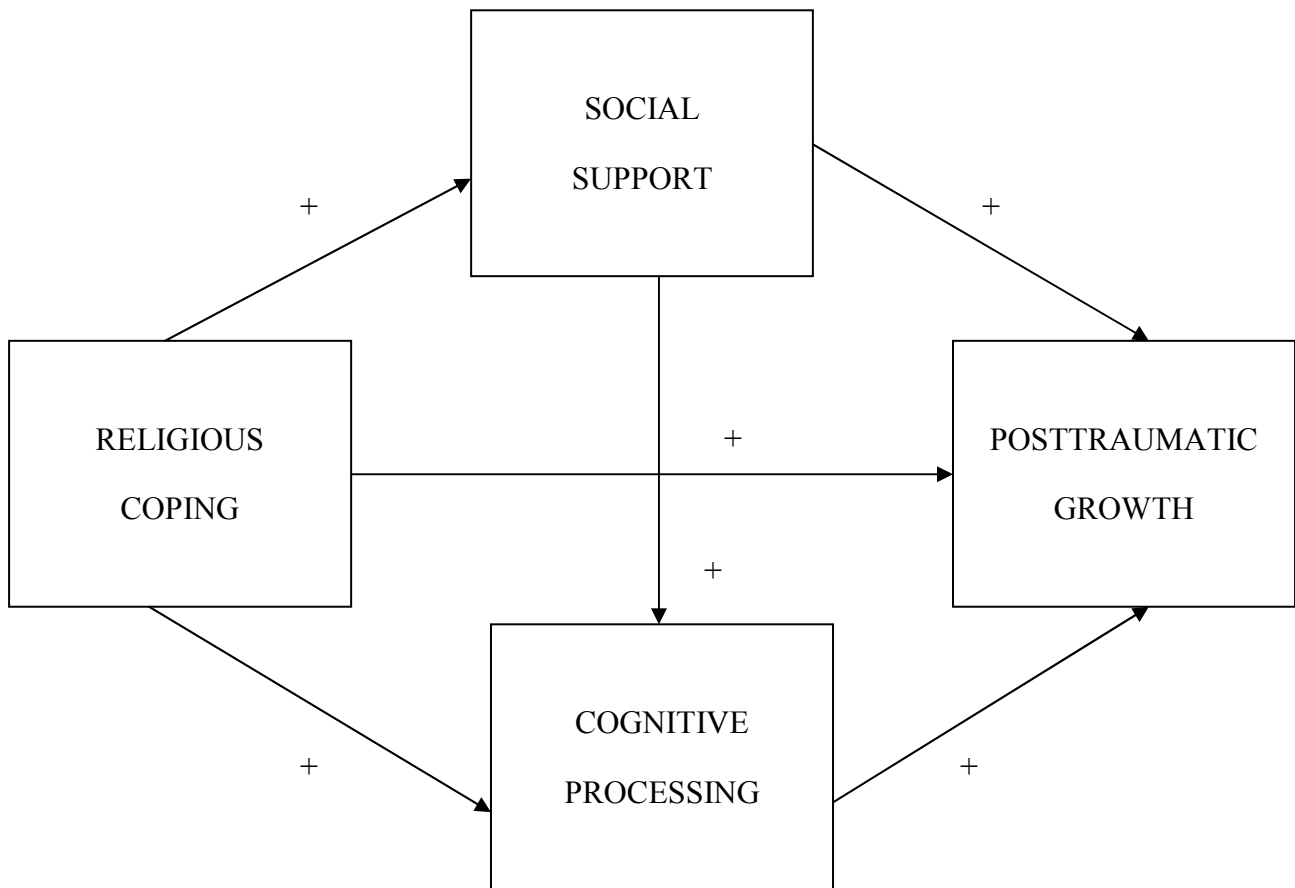


Figure 1: Hypothesized model: Predictors of PTG post-hurricane

processing, which in turn would lead to increases in PTG. Similarly, it was expected that increased religious coping would lead to heightened social support, which in turn would lead to greater PTG. Finally, it was hypothesized that as social support increased, cognitive processing would increase, and that social support would mediate an indirect relation between religious coping and cognitive processing.

## METHOD

### Participants

Participants were 85 adult females living in and around New Orleans at the time of Hurricane Katrina. This study made use of an existing data set collected approximately 40 months post-Katrina. Participants in the current study represent a subset of individuals participating in a larger longitudinal study since October 2005 (original  $N = 379$ ). Sixty percent of the sample subset used in this study was African American, 34% was Caucasian, and the remaining 6% comprised other races. The average age of the participants was 43.5 years old ( $SD = 7.85$ ). Forty-seven percent of the sample was married and approximately 50% was single, divorced, or widowed. Approximately 34% of the sample had earned a college degree or higher, and approximately 14% reported having less than a high school diploma. Seventy-three percent of the sample reported being employed, and the reported income range from \$0 to over \$100,000 with the average reported total household income at approximately \$26,000. Given the goals of the larger study, all women were mothers with children between the ages of 12 and 18 ( $M = 14.27$ ,  $SD = 1.38$ ).

### Measures

Demographic questionnaire. Participants completed a questionnaire assessing demographic characteristics about themselves and their families. The measure assessed participant race, education and income levels, and employment status.

Posttraumatic Growth Inventory (PTGI; Tedeschi & Calhoun, 1996). The PTGI is a 21-item measure of posttraumatic growth. Participants rated the degree of change they experienced in each area post-trauma on a 6-point Likert scale ranging from 0 (“I did not experience this change as a result of my crisis”) to 5 (I experienced this change to a very great degree as a result

of my crisis”). The measure yields a total score in addition to five subscale scores: New Possibilities; Relating to Others; Personal Strength; Spiritual Change; and Appreciation of Life. The total score ( $\alpha = .96$  in the current sample) was used in this study.

Brief RCOPE (Pargament et al., 1999). The Brief RCOPE is a 14-item measure of religious coping behaviors. Participants rated the degree to which they use each coping strategy on a 4-point Likert scale ranging from 0 (“not at all”) to 3 (“a great deal”). The measure comprises scales of positive religious coping and negative religious coping. This study used the positive religious coping score ( $\alpha = .91$  in the current sample).

Event Related Rumination Inventory (ERRI; Cann, et al., 2011). The ERRI is a 20-item measure of cognitive processing adapted from Calhoun, Cann, Tedeschi, and McMillan’s (2000) original cognitive processing measure. Participants rate the degree to which they experienced certain thoughts on a 4-point Likert scale (0 = “not at all,” 3 = “often”). The measure comprises two factors: Intrusive Rumination (including items such as, “I could not keep images or thoughts about the event from entering my mind”) and Deliberate Rumination (including items such as, “I thought about the event and tried to understand what happened”). The current study used the Deliberate Rumination scale ( $\alpha = .93$  in the current sample).

Interpersonal Support Evaluation List (ISEL; Cohen & Hoberman, 1983). The ISEL is a 40-item measure of perceived social support. Participants rated the degree to which each statement is true for them on a 4-point Likert scale (0 = “definitely false;” 3 = “definitely true”). Some items are reverse-scored due to their phrasing. The measure yields a total score and four factor scores: Tangible Support, Self-Esteem, Appraisal, and Belonging. This study used the total score ( $\alpha = .96$  in current sample).

BriefCOPE (Carver, 1997). The BriefCOPE is a 28-item self-report measure of coping behavior. The measure comprises 14 subscales. Select subscales were used in correlation analyses in an attempt to establish convergent validity of predictor, mediator and outcome variable measures (Active Coping,  $\alpha=.81$ ; Emotional Support,  $\alpha=.75$ ; Instrumental Support,  $\alpha=.86$ ; Planning,  $\alpha=.79$ ; Positive Reframing,  $\alpha=.71$ ; and Religious Coping,  $\alpha=.89$ ; all  $\alpha$ 's given for current sample).

Alabama Parenting Questionnaire (APQ; Shelton, Frick, & Wootton, 1996). The APQ is a 42-item measure of parenting behavior comprising six subscales. The subscales were used in correlation analyses in an attempt to establish divergent validity of the outcome measure ( $\alpha$ 's ranging from .67 to .84).

### **Procedure**

Following institutional review board approval, participants were recruited from the original sample based on their participation in data collection during the 2.5 years following Hurricane Katrina. Renewed consent and assent were obtained from interested participants. Youth participants completed measures in their schools under the supervision of trained research assistants. Mothers were mailed a series of questionnaires, including the Demographic Questionnaire, PTGI, Brief RCOPE, PTG and Rumination, ISEL, BriefCOPE, and APQ. Completed questionnaires were returned via the United States Postal Service in postage-paid envelopes provided by the researchers. Participants were compensated with \$50. Names were removed from the data and questionnaire packets were coded to preserve anonymity.

## RESULTS

### Assumptions of Normality and Missing Data

Assumptions of univariate and multivariate normality were tested using SPSS. No observation deviated from the mean by greater than three and one-half standard deviations on any single measure, indicating no univariate outliers. Additionally, no multivariate outliers were identified using Mahalanobis distance (Tabachnik & Fidell, 2007). Diagnostic tests of multicollinearity were also conducted, and results indicated no excess overlap among predictor and criterion variables (Tolerance values ranging from .93 to .97).

Missing data (12 percent in this study) was handled using the expectation maximization (EM) technique. EM estimates data missing at random in two steps for each iteration; first, expected estimates of missing data are derived based on observed values and parameters. Next, maximum likelihood estimation of model parameters is performed (Tabachnik & Fidell, 2007). EM was conducted using EQS 6.1 software in this study.

### Descriptive Statistics and Zero-order Correlations

Bivariate correlations for all predictor and outcome variables are listed in Table 1 along

Table 1. Range, Means, Standard Deviations, Reliabilities (in parentheses) and Intercorrelations among Predictor and Outcome Variables

Variable	Range	Mean	SD	1	2	3	4
1. Positive Religious Coping	7 - 28	19.74	6.03	(.91)			
2. Deliberate Cognitive Processing	10 - 40	21.62	8.48	.242*	(.93)		
3. Social Support	0 - 120	90.37	22.25	-.109	-.159	(.96)	
4. Posttraumatic Growth	0 - 105	59.94	27.15	.263*	.513**	.049	(.96)

\*  $p < .05$

\*\*  $p < .01$



with the range, mean, standard deviation, and reliability estimate of each measure.

### **Validity Analyses**

Convergent validity. Bivariate correlations were conducted with subscales of the BriefCOPE to establish convergent validity for all study variables. Results supported convergent validity of the Brief RCOPE. The positive religious coping subscale was positively related to the Religious Coping subscale of the BriefCOPE ( $r=.66, p<.01$ ). Results also supported convergent validity for the PTGI. The Spirituality subscale was positively related to the religious coping scale of the BriefCOPE ( $r=.51, p<.01$ ). The Relations with Others subscale was positively related to the Emotional Support ( $r=.43, p<.01$ ) and the Instrumental Support ( $r=.43, p<.01$ ) subscales of the BriefCOPE. The Personal Strength subscale was positively related to the Planning ( $r=.39, p<.01$ ) and the Active Coping ( $r=.30, p<.01$ ) subscales of the BriefCOPE.

Results also supported convergent validity of the PTG and Rumination measure; the Deliberate Cognitive Processing scale was positively related to the Positive Reframing scale of the BriefCOPE ( $r=.32, p<.01$ ). The ISEL was not significantly related to either the Emotional Support or the Instrumental Support scales of the BriefCOPE.

Discriminant Validity. In an attempt to establish discriminant validity of the outcome measure, correlations were conducted between the PTGI total score and each subscale of the APQ. The PTGI total score was not significantly related to any APQ subscale (all  $p$ 's  $> .05$ ).

### **Path Analysis**

There was sufficient power to conduct a path analysis of four variables in this study, based on Bentler and Chou's (1988) recommendation of having five to 10 observations per variable. Analyses used the maximum likelihood estimation method for parameter estimates based on the covariance matrix. Derivation of the final model was driven by a combination of

theory and a conservative statistical approach. Analyses began with the saturated model, then tested the deletion of nonsignificant paths, and finally tested a fully mediated model.

Hypothesized model. The hypothesized model (see Figure 2) accounted for 31 percent of the variance ( $R^2 = .31, p < .05$ ), indicating that the set of predictors account for a fairly large amount of variability in PTG. The model included some significant direct effects. There was a

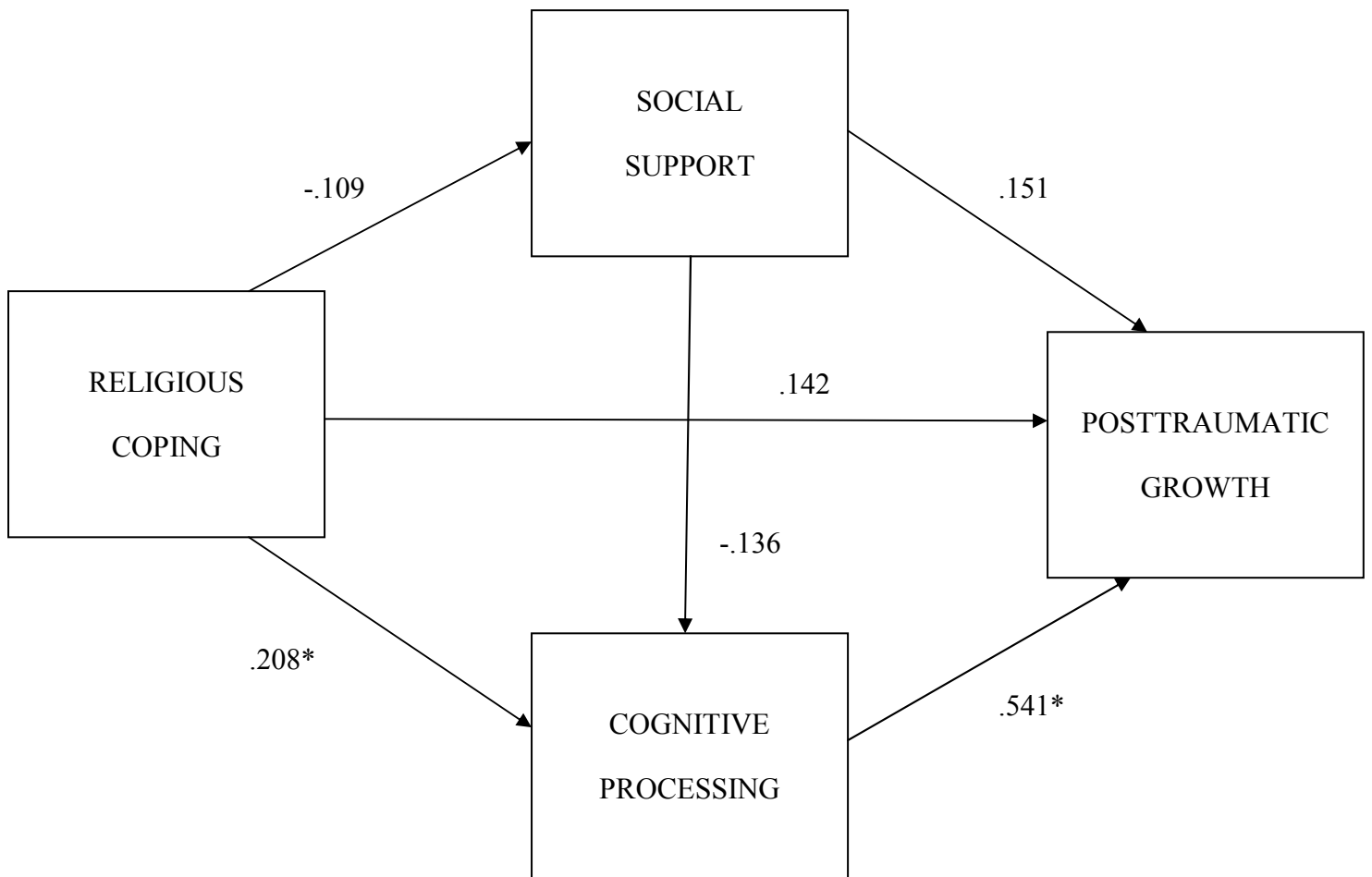


Figure 2: Hypothesized model with path coefficients: Predictors of PTG post-hurricane <sup>a</sup>

<sup>a</sup> All path coefficients are standardized

\* $p < .05$

direct effect of positive religious coping on deliberate cognitive processing ( $\beta = .21, p < .05$ ) such that an increase in positive religious coping was associated with an increase of .21 standard units

in deliberate cognitive processing. There was also a significant direct effect of deliberate cognitive processing on PTG ( $\beta = .54, p < .05$ ), such that an increase in deliberate cognitive processing was associated with a .54 standard unit increase in PTG. There was no direct effect of positive religious coping on PTG, and no paths involving social support were significant<sup>a</sup>.

Intermediary model. Because the original model yielded several nonsignificant paths, a chi square goodness of fit analysis was conducted to determine whether the four individual nonsignificant paths were significant as a group or whether they could be deleted. When all of the nonsignificant paths (positive religious coping to PTG; positive religious coping to social support; social support to PTG; and social support to deliberate cognitive processing) were set to zero, the results indicated that the paths as a group had no significant predictive value in the model ( $\chi^2 = 7.06, p = .13, df = 4$ ), suggesting that those paths could be deleted from the model. Figure 3 depicts the intermediary model.

Fully mediated model. Following the results of the chi square goodness of fit analysis, a model of the relation between positive religious coping and posttraumatic growth fully mediated by deliberate cognitive processing was tested. The final model accounted for 26 percent of the variance ( $R^2 = .26, p < .05$ ). The direct effect between positive religious coping and deliberate cognitive processing was significant ( $\beta = .24, p < .05$ ), indicating that an increase in positive religious coping is accompanied by a .24 standard unit increase in deliberate cognitive processing. The direct effect of deliberate cognitive processing on PTG was also significant

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<sup>a</sup> Given the failure of social support to relate to any other study variable, additional analyses were conducted to rule out the possibility that the null findings were related primarily to measurement error. A proxy of social support was created using the BriefCOPE Emotional Support and Instrumental Support scales ( $\alpha = .88$ ). The proxy measure was used in the hypothesized model in place of the ISEL. Results confirmed that social support neither mediated the relation between religious coping and PTG nor was significantly related to either variable.

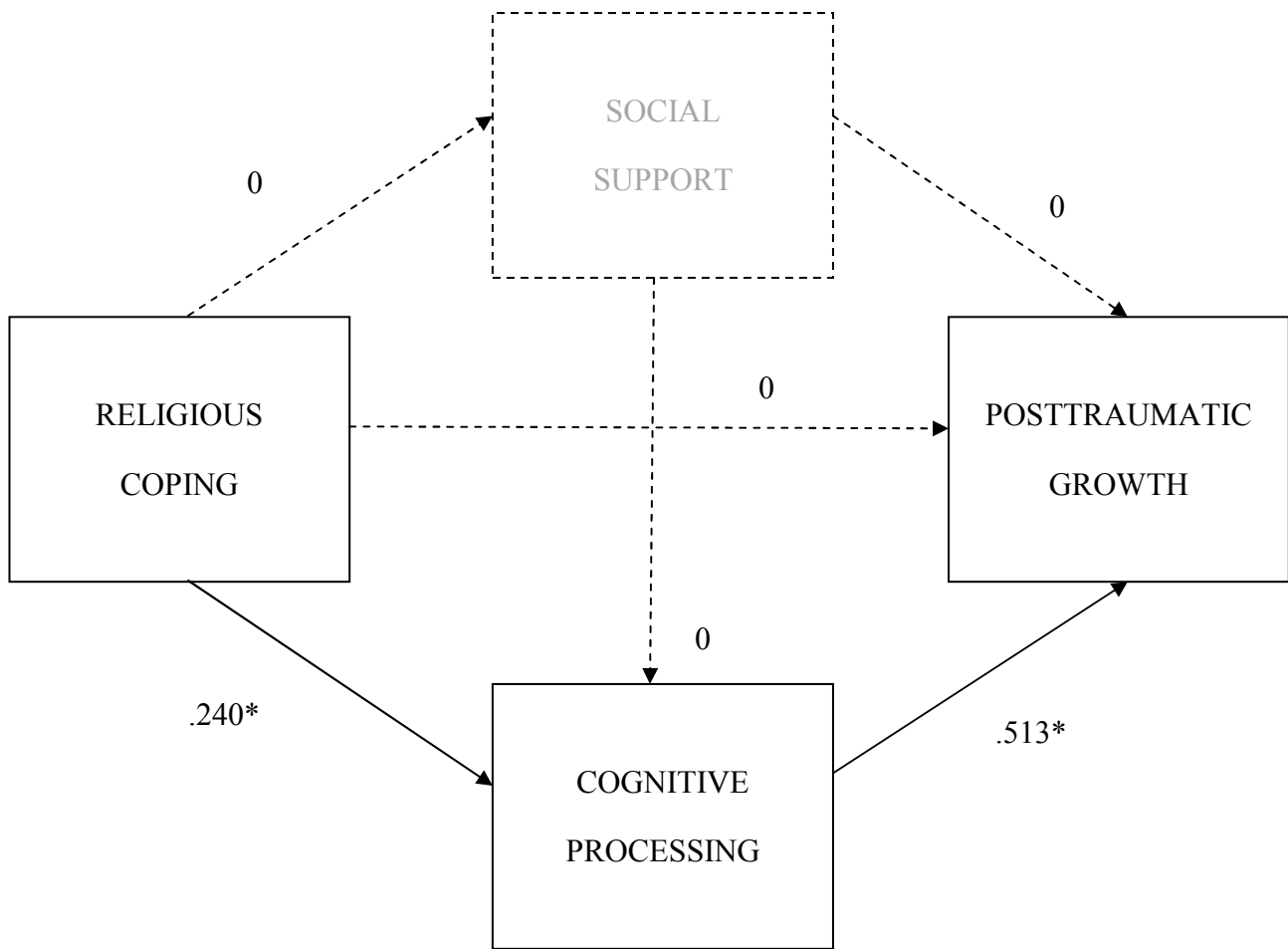


Figure 3: Intermediary model: Predictors of PTG post-hurricane<sup>a, b, c</sup>

<sup>a</sup> All path coefficients are standardized

<sup>b</sup> Dashed lines represent paths set to 0

<sup>c</sup>  $\chi^2 = 7.06, p = .13, df = 4$

\* $p < .05$

( $\beta = .51, p < .05$ ), indicating that an increase in deliberate cognitive processing is associated with a .51 standard unit increase in PTG. Additionally, the indirect effect of positive religious coping on PTG was significant ( $\beta = .12, p < .05$ ), and the chi square test of the direct path between positive religious coping and PTG was nonsignificant ( $\chi^2 = .09, p = .96, df = 1$ ), indicating that the effect of positive religious coping on PTG is fully mediated by deliberate cognitive processing. Figure 4 depicts the final, fully mediated model.



Figure 4. Final, fully mediated, model: Predictors of PTG post-hurricane <sup>a, b</sup>

<sup>a</sup> All path coefficients are standardized

<sup>b</sup>  $\chi^2 = .09, p = .96, df = 1$

\*  $p < .05$

## **DISCUSSION**

This study sought to supplement the literature by identifying mechanisms underlying the relation between religious coping and PTG. Using a sample of hurricane-exposed adults, the study examined social support and deliberate cognitive processing as potential mediators of the religious coping-PTG relation. The original model hypothesized that positive religious coping would have a direct effect on PTG, but that it would also have indirect effects on PTG mediated through social support and through deliberate cognitive processing. The model also hypothesized that social support would have a direct effect on cognitive processing and that it would mediate an indirect effect of religious coping on cognitive processing. Hypotheses were partially supported.

### **Religious Coping, Social Support, and PTG**

Results of the original model indicated no direct effect between positive religious coping and PTG; however, the overall model was significant and explained nearly one third of the variance seen in PTG, indicating that there were significant mediators of the relation between religious coping and PTG. Even so, no significant direct or indirect relations were found involving social support. That is, contrary to the study's hypotheses, positive religious coping was not significantly related to social support; social support was not significantly related to PTG; and social support was not significantly related to deliberate cognitive processing.

Considering the abundance of literature documenting the importance of social support in adjustment post-disaster (see Norris et al., 2002, for a review), it is surprising that social support as measured in the current study did not play a significant role in the development of PTG. Several factors may help elucidate this unexpected finding. Despite literature supporting a relation between religiosity and social support (e.g., Watlington & Murphy, 2006), it is possible

that the particular type of religious coping assessed in this study (i.e., looking for a stronger relationship with God; seeking God's love and care) relies less on social connectedness and more on a personal, private relationship with one's God, which would help to explain the lack of relation seen between religious coping and social support. The null relation found between social support and PTG is more difficult to explain, given the plethora of studies detailing the predictive role that support plays in the development of PTG. However, even when an alternate measure of social support was used, the construct did not foster PTG, which could shed doubt upon existing PTG theory. It is possible that such a relation does not hold true in the predominantly low-income, mostly African American, female sample participating in this study. Other studies have found a null relation between social support and PTG in specific samples such as Vietnam prisoners of war (Feder et al., 2008), Australian students and non-students (Wilson & Boden, 2008), and breast cancer survivors (Cordova, Cunningham, Carlson, & Andrykowski, 2001), suggesting that the importance of social support in the evolution of PTG might not be as universal as originally conceptualized.

### **Religious Coping, Deliberate Cognitive Processing, and PTG**

This study's results suggest that the relation between positive religious coping and PTG works entirely through cognitive processing. That is, religious coping predicted cognitive processing, which in turn predicted PTG; furthermore, religious coping did not have a direct relation with PTG. These findings partially support the study's hypotheses.

The importance of cognitive processing to PTG in this study is consistent with existing literature (e.g., Taku et al., 2008; Tedeschi & Calhoun, 2004), and the mediational role that cognitive processing played in the relation between positive religious coping and PTG supports Overcash and colleagues' (1996) theory that religious beliefs work as a framework through

which traumatic events are processed. It was expected that cognitive processing would partially, not fully, mediate this relation, and thus, it is surprising that religious coping had no direct predictive power on PTG once cognitive processing was considered. This finding might be interpreted to suggest that the practice of religious coping is unnecessary and that the same result can be achieved simply through deliberate processing of the event. While this may be true in some cases, for many individuals, the involvement of religion or God in their recovery post-trauma might facilitate the cognitive processing that appears necessary in the development of PTG. Additionally, it could be that cognitive processing is not possible or inefficient in a particular population, and religious coping instead leads to a sense of comfort or freedom from responsibility, which in turn predicts PTG. In such a case, the exclusion of religious coping from one's post-trauma behavior in favor cognitive processing only might preclude the development of PTG.

### **Limitations**

Several limitations to this study must be noted. First, the study included self-report data only and no observational or interview data. Similarly, although path analysis typically permits the inference of causality (Klem, 2005), this is not a controlled, experimentally manipulated study, and results must, therefore, be interpreted in this light. Other limitations pertain to the sample employed. The sample was relatively small and somewhat restricted in terms of socioeconomic status, type of trauma experienced, and sex, thus potentially limiting the generalizability of these results. Due in part to the small sample size and in part to a lack of theoretical basis, potential moderators of the relations explored in this study were not tested.

### **Implications and Future Directions**

The finding that positive religious coping did not have a direct effect on PTG but did have indirect effects suggests that the salutary consequences of religious coping for PTG



demonstrated in this population occur exclusively through an alternate, underlying mechanism. These results suggest that religious coping would not contribute to the progression of PTG in low-income, hurricane-affected women were it not for its connection with deliberate cognitive processing. This information may be useful clinically in an instance in which a trauma survivor is not religious or chooses not to engage in religious coping for a particular reason but hopes to derive tangible benefit from the traumatic experience. A better understanding of the factors driving the relation between religious coping and PTG will eventually assist researchers and clinicians in identifying methods of promoting PTG.

As noted above, the lack of involvement of social support in the development of PTG in this study is puzzling and contrary to much of the extant literature. If replicated, this finding will necessarily cast doubt on portions of existing PTG theory. Future work might attempt to identify potential moderators, such as sex, race, prior trauma, or education level, in the development of growth post-trauma to help elucidate these findings.

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## VITA

Born in 1984, Julia Bosson (nee Vigna) was raised in Cherry Hill, New Jersey. She attended Tulane University in New Orleans, Louisiana and graduated *summa cum laude* with Honors in psychology in 2006. Her undergraduate honors thesis focused on the moderating roles of coping and attributional style on the relation between community violence exposure and child aggression.

Upon graduating from Tulane, Julia entered the doctoral program in clinical psychology at Louisiana State University. There, she earned her master's degree in 2008. Her master's thesis studied the interaction of Hurricane Katrina with varying risk and protective factors and its effect on conduct problems in youth.

After defending her dissertation in May 2010, Julia completed her clinical residency at the Atlanta VA Medical Center in Decatur, Georgia, and she subsequently accepted a post-doctoral fellowship with the Trauma Recovery Program at the Baltimore VA Medical Center. Professional interests include applied research and clinical work with adults and children experiencing traumatic stress.