

Correlates of Levels and Patterns of Positive Life Changes Following Sexual Assault

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This study builds on previous work suggesting that many survivors report positive life changes soon after a sexual assault and that those who retain those changes over time report the least distress 1 year postassault (P. Frazier, A. Conlon, & T. Glaser, 2001). The purposes of this study were to assess correlates of early reports of positive life changes and individual trajectories of self-reported positive changes over time among female sexual assault survivors ($n = 171$) using hierarchical linear modeling. The factors most related to reporting positive life change soon after the assault were social support, approach and religious coping, and perceived control over the recovery process. Increases in these factors also were associated with increases in self-reported positive life changes over time. The relations between social support and positive change also were mediated by coping strategies and control appraisals, particularly perceived control over the recovery process.

A growing body of research demonstrates that traumatic experiences are not followed by unmitigated distress. Survivors of even quite horrific events also report positive life changes as a result of struggling to come to terms with those events (Tedeschi, Park, & Calhoun, 1998). Specifically, an average of 50% to 60% of trauma survivors endorse some positive life change, including changes in self, relationships, and spirituality or life philosophy (Tedeschi & Calhoun, 1995). Although these positive changes are important outcomes in and of themselves, survivors who report positive life change also are at less risk for developing trauma-related disorders, including posttraumatic stress disorder (e.g., Frazier, Conlon, & Glaser, 2001).¹

Early descriptive work was very important in raising awareness among researchers and clinicians that survivors may experience positive as well as negative life changes in the aftermath of a traumatic event. More recent work has contributed to our understanding of the *process* of positive change and has challenged some common assumptions in the literature. For example, contrary to the assumption that it takes months or years for survivors to report positive changes (e.g., Schaefer & Moos, 1998), many survivors do so as soon as a week or two after traumatic events (Affleck, Tennen, & Gershman, 1985; Thompson, 1985), including sexual assault (Frazier & Burnett, 1994; Frazier et al., 2001). In addition, early reports of positive life change, rather than reflecting denial (Cohen, Hettler, & Pane, 1998), appear to be associated with better long-term recovery (Affleck, Tennen, Croog, & Levine, 1987; McMillen, Smith, & Fisher, 1997;

Thompson, 1985). Nonetheless, not all survivors who report positive life change soon after a trauma maintain those changes over time. In fact, some trauma survivors report *fewer* positive life changes as time goes on (Davis, Nolen-Hoeksema, & Larson, 1998; Frazier et al., 2001). Moreover, differing *patterns* of self-reported positive changes over time have important implications for emotional recovery. For example, Davis et al. (1998) found that bereaved individuals who reported fewer positive changes at 12 months than at 6 months postloss reported increases in distress over time, with eventual distress levels comparable to those of individuals who never reported positive change. Conversely, those who reported more positive changes over time reported decreased distress over time, although they reported more distress than those who always reported positive changes. Frazier et al. (2001) reported similar findings in a longitudinal study of sexual assault survivors. Specifically, those who reported more positive changes at 2 weeks postassault, and maintained them over time, reported the least distress at 1 year postassault.

Calhoun and Tedeschi (1998) have argued that the next phase of research on positive life change should focus on the identification of correlates of positive changes and the processes through which they occur. The research described previously highlights the importance of both early reports of positive change and patterns of self-reported positive changes over time for later distress levels. Thus, the purpose of the present study was to assess factors associated with reporting positive life change soon after a trauma and with individual differences in patterns of self-reported positive changes over time. Specifically, this study builds on the previous work described (Frazier et al., 2001) by using data from the same longitudinal study of sexual assault survivors. Whereas the previous study documented the timing and course of positive change in sexual assault survivors and the relation between positive change

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¹ We chose to use the term *positive life change* versus the term *post-traumatic growth* because the latter seems less consistent with data showing that some individuals report decreasing levels of positive change as time goes on.

and distress, our goal in this study was to identify factors associated with reporting positive life change following a traumatic event like sexual assault. Ultimately, knowledge of factors associated with positive change can help us to develop clinical interventions to foster positive life changes following traumatic life events (see, e.g., Antoni et al., 2001).

Correlates of Positive Life Change

Several researchers have developed models that include various factors that may facilitate or hinder positive life change following traumatic events (see O'Leary, Alday, & Ickovics, 1998, for a review), including personal resources, environmental resources, and the individual's coping strategies and appraisal of the event. In Schaefer and Moos's (1998) model, personal and environmental resources are associated with positive change through their effects on coping and appraisal. In other words, coping and appraisal mediate the relations between personal and environmental resources and positive change. We next review research on several personal and environmental resources, as well as coping and appraisal processes, that often are mentioned in theory and research on positive change or that seem particularly important vis-à-vis sexual assault. We should note, however, that only one of these studies (Kennedy, Davis, & Taylor, 1998) assessed correlates of growth among sexual assault survivors. We then discuss other limitations of this research and describe the model tested in this study, which includes the general categories of variables outlined previously (i.e., personal resources, environmental resources, coping strategies, appraisals).

Personal Resources

In their review of models of positive life change, O'Leary et al. (1998) noted that prior trauma experience is one of the most frequently mentioned personal resources. This factor seems particularly important to study with regard to sexual assault, given that survivors of sexual assault often have experienced previous sexual victimization either as children or as adults (Breitenbecher, 2001; Roodman & Clum, 2001). According to Schaefer and Moos's (1998) model, prior experience with life crises should be associated with reporting more positive life changes following a subsequent trauma because prior crisis experience can enhance coping resources. However, Aldwin, Sutton, and Lachman (1996) proposed that traumatic events can lead either to enhanced coping resources or to depleted resources, depending on characteristics of the person, such as their initial levels of coping resources.

Research on the relation between prior crisis experience and positive life change following a subsequent trauma has been limited. In two studies, combat veterans reported that they learned to cope with adversity as a result of their experiences, but these studies did not assess whether participants actually reported more positive life changes following a subsequent trauma (Aldwin, Levenson, & Spiro, 1994; Elder & Clipp, 1989). Although Phifer and Norris (1989) found some evidence that prior crisis experience was associated with less distress following a subsequent crisis, the correlates of positive change may differ from the correlates of distress. Studies that have specifically looked at positive outcomes have not found that prior crisis experience facilitates positive change (Aldwin et al., 1996; Park, Cohen, & Murch, 1996).

In Schaefer and Moos's (1998) model, demographic variables also are conceptualized as personal resources. Although there are numerous demographic variables that could be studied in relation to positive life change, we focus here on ethnic differences because of the need for research on the effects of race and ethnicity on reactions to trauma (e.g., Marsella, Friedman, Gerrity, & Scurfield, 1996). In addition, a previous study of sexual assault survivors reported ethnic group differences in self-reported positive life changes: African American (71%) survivors reported the most positive changes in spirituality, followed by Hispanic (54%) and White (38%) survivors (Kennedy et al., 1998).

Environmental Resources

Social support is the environmental resource most often mentioned in theories of positive change (O'Leary et al., 1998). Social support is thought to facilitate positive change because supportive others give individuals the opportunity to talk about and cognitively process the trauma (Cordova, Cunningham, Carlson, & Andrykowski, 2001). In Schaefer and Moos's (1998) model, social support is associated with more effective coping, which in turn is associated with reporting more positive change. Some studies have supported the hypothesis that social support is associated with positive change (e.g., Park et al., 1996). Other studies have found no significant associations (Joseph, Williams, & Yule, 1993) or mixed findings (Cordova et al., 2001; Revenson, Wollman, & Felton, 1983), although these studies lacked power to detect medium effects.

Appraisal and Coping

Appraisal and coping resources play a central role in many theories of positive change (O'Leary et al., 1998). In general, individuals who engage in more active approach-oriented coping are hypothesized to be more likely to report positive changes following a trauma, whereas those who engage in more avoidant coping should report fewer positive changes (Schaefer & Moos, 1998). Several studies support these hypothesized relations between positive change and various approach-oriented coping strategies (Aldwin et al., 1996; R. L. Collins, Taylor, & Skokan, 1990; Cordova et al., 2001; Mohr, Dick, Russo, Likosky, & Goodkin, 1999; Park et al., 1996). In the Park et al. (1996) study, approach coping strategies explained more variance in positive life change than any of the other categories of variables (e.g., personal resources, social support). However, results for avoidant coping have been more mixed. Specifically, avoidant strategies have been negatively related (Aldwin et al., 1996), positively related (R. L. Collins et al., 1990), and not related (Mohr et al., 1999; Park et al., 1996) to reporting positive change.

Although Schaefer and Moos (1998) focused on approach and avoidant coping, another coping-related variable that appears to be related to positive life change is religiosity. A religious worldview may help survivors to make sense of and find meaning in a traumatic event. Various aspects of religiosity are positively related to positive life change following traumatic events (Aldwin et al., 1996; Calhoun, Cann, Tedeschi, & McMillan, 2000; Park et al., 1996; Tedeschi & Calhoun, 1996), including sexual assault (Kennedy et al., 1998).

A final factor related to appraisal and coping is perceived control over the trauma. There are various aspects of a trauma over which survivors may feel that they have control, including the occurrence of the trauma (past control), the current impact of the trauma (present control), and whether they will experience future traumas (future control). In their review of the literature on perceived control and trauma, Frazier, Berman, and Steward (2002) found that these three aspects of control had differing relations with measures of posttrauma distress, with present control being the most adaptive. They hypothesized that survivors who feel that they have more control over the recovery process (which is one aspect of present control) may be particularly likely to report positive life changes posttrauma. Indeed, this was the only form of control related to positive life change in a study of bereaved individuals (Frazier, Steward, & Mortensen, in press). Control over current symptoms (another form of present control) also was associated with reporting more positive life change in a study of arthritis patients (Tennen, Affleck, Urrows, Higgins, & Mendola, 1992). With regard to the other types of control, Tedeschi (1999) hypothesized that self-blame (which can be thought of as control over the past event; see Frazier et al., 2002) would hinder positive change, but that a sense of future control would be associated with reporting more positive changes. Research on self-blame has been mixed, showing either no relation (Affleck et al., 1985; Joseph et al., 1993) or positive relations (Bulman & Wortman, 1977; Thompson, 1991) with positive life change posttrauma. Finally, one study found that a form of future control (control over the solution to the problem) was not associated with self-reported positive life changes (Abbey & Halman, 1995).

Limitations of Existing Research

As the preceding review suggests, few studies have examined these hypothesized correlates of positive life change posttrauma, and the existing research yields mixed findings. Research in this area also is limited in other respects. First, most of the studies reviewed assessed correlates of positive change long after the trauma occurred. Factors associated with reporting positive change early on may differ from those associated with finding positives more gradually (e.g., Tedeschi, 1999; Tennen & Affleck, 1998). Identifying correlates of early positive change is important because evidence suggests that these early reports are associated with better long-term recovery (e.g., Affleck et al., 1987). Second, most of the studies reviewed were cross-sectional. A few longitudinal studies have assessed whether factors assessed at one point predict later positive change (e.g., Cordova et al., 2001), but none have assessed correlates of patterns of positive life change over time (i.e., factors associated with change trajectories). As mentioned, patterns of change in self-reported positive life changes have important implications for ultimate distress levels (Davis et al., 1998; Frazier et al., 2001). In addition, the predictors of initial levels of positive change and change trajectories may differ (Stroebe & Schut, 2001). Third, existing studies have focused primarily on bivariate correlates of positive change. Research examining mediational models of the mechanisms by which personal and environmental resources are associated with positive change is virtually nonexistent. Finally, because of the difficulty of studying large numbers of trauma survivors, many studies have inadequate power to detect significant correlates of positive change or else use

samples (e.g., undergraduate students) that have not necessarily experienced the kinds of "seismic" traumatic events that may be more likely to lead to positive change. Research on correlates of positive change among such samples may not generalize to survivors of genuine traumas.

Present Study

The purposes of this study were to assess correlates of early (i.e., 2 weeks postassault) reports of positive life change and individual trajectories of self-reported positive change over time. The correlates measured included personal characteristics (prior victimization, survivor ethnicity), environmental resources (social support), coping (approach, avoidant, and religious), and control appraisals (behavioral self-blame, control over the recovery process, and taking precautions to prevent future assaults). Using hierarchical linear modeling, we assessed bivariate relations between these variables and both early reports of positive change (intercepts) and changes in self-reported positive life changes over time (slopes). When all conditions for mediation were met (see Kenny, Kashy, & Bolger, 1998), we assessed whether the relations between personal and environmental resource variables and positive change were mediated by coping and control appraisals.

More specifically, based on previous theory and research, we hypothesized, first, that the following variables would be associated with higher levels of *early positive change*: social support, approach coping, religious coping, perceived control over the recovery process, taking precautions, and being African American. In contrast, we hypothesized that more initial avoidant coping and behavioral self-blame would be associated with fewer initial positive changes. Although research on the relations between behavioral self-blame and positive life change has been mixed, based on the consistent evidence that behavioral self-blame is associated with more distress in rape survivors (e.g., Frazier, 1990, 2000, 2003), we predicted that focusing on the past and how the assault could have been averted would hinder, rather than facilitate, positive life change (see also Tedeschi, 1999). Finally, although Schaefer and Moos (1998) hypothesized that prior crisis experience would facilitate positive change, we did not predict that this would be the case in our study, because previous sexual victimization is associated with the use of less effective coping strategies (e.g., Arata, 1999).

Second, we assessed both static and dynamic covariates of *positive change trajectories*. Static covariates typically are variables (i.e., prior victimization, survivor race) that do not change over time. However, initial levels of social support, coping, and control appraisals also can be assessed as static covariates, even though they may change over time. These analyses assess whether variables measured at the first time point predict patterns of change over time in self-reported positive life change. We predicted that variables associated with reporting more positive change initially (e.g., being African American) also would be associated with faster increases in positive changes over time. Conversely, variables hypothesized to be related to reporting fewer positive changes initially (e.g., avoidant coping) were thought to be associated with slower increases (or decreases) in reported positive changes over time. These hypotheses are consistent with Aldwin et al.'s (1996) deviation-amplification model, in which high initial levels of resources lead to positive, adaptive spirals and low initial

levels of resources lead to negative, maladaptive spirals. Because social support, coping, and perceived control were measured over time, we also examined these variables as time-varying or dynamic covariates. We predicted that social support, approach coping, religious coping, control over the recovery process, and taking precautions would covary positively over time with positive change, such that, for example, increases in social support would be associated with increases in self-reported positive life changes within individuals. We expected negative covariation between positive change and both avoidant coping and behavioral self-blame, such that decreases in these variables over time would be associated with increases in positive life changes within individuals.

Finally, when any of the personal and environmental resources were associated with self-reported positive changes, we assessed whether those relations were mediated by coping strategies or control appraisals. First, we hypothesized that African American survivors might report more positive change than White survivors because they use more religious coping (Blaine & Crocker, 1995), which is hypothesized to be associated with reporting more positive change. Given the dearth of theory and research on ethnic group differences in positive change posttrauma, other mediators were tested in an exploratory manner. Second, we hypothesized that social support would be related to reporting more positive change because it is associated with more approach coping, less avoidant coping, and more control over the recovery process. In addition, support networks may encourage religious coping and taking precautions to prevent future assaults and, possibly, discourage behavioral self-blame. Finally, because we did not expect prior victimization to be related to positive change, we did not hypothesize any mediators of the relations between measures of prior victimization and positive life change.

Method

Participants

The participants and procedures for this study have been described in two earlier reports (Frazier, 2003; Frazier et al., 2001). This study was conducted in conjunction with a program that provides services to sexual assault survivors seen in one of seven emergency rooms (ERs) in the Minneapolis/St. Paul, Minnesota metropolitan area. All survivors who came to a participating ER reporting a sexual assault met with a nurse examiner and were offered follow-up counseling sessions for up to 1 year postassault. Survivors who returned for at least one counseling session were asked to participate in the study. We collected data for more than 4 years to acquire a sample large enough to detect medium bivariate effects. During the data collection period, 1,518 female sexual assault survivors over the age of 16 were seen in the ER. Thirteen percent ($n = 203$) had one or more counseling sessions. Of those who received counseling, 69% ($n = 141$) consented to participate in the research project. Thirty clients already engaged in counseling also agreed to participate ($N = 171$). Participants were between 16 and 52 years old ($M = 27$ years). Seventy-seven percent were White, 15% were African American, and 8% were other. In 46% of the assaults the assailant was a stranger, 48% of the women were physically injured during the assault, and 24% of the assaults involved more than one assailant. There were no significant differences in survivor age, survivor relationship to the assailant, injuries incurred, or number of assailants between those survivors seen only at the ER and those who attended counseling or participated in the research (all $ps > .05$). White survivors were more likely to participate in both counseling and research, but the effect sizes were small.

Although those who participated in the study were quite similar to the entire ER sample, victims who seek help at an ER may differ from most victims, who do not seek help. Comparisons between the ER sample and characteristics of adult female rape victims from the National Violence Against Women (NVAW) Survey of 8,000 U.S. women (Tjaden & Thoennes, 2000) suggest that those seen in the ER were more likely than those in the NVAW survey to be raped by strangers (46% vs. 17%) and to have been injured (48% vs. 32%). The relations between these variables and self-reported positive life changes at each time period therefore were examined. There were no significant differences between victims of stranger and acquaintance rape (all $ps > .13$) or between injured and noninjured victims (all $ps > .45$) on positive life change at any time point. Victims of multiple offender rapes also did not differ from those assaulted by one person (all $ps > .28$).

Participants were given questionnaires during their counseling sessions at 2 weeks ($n = 88$), 2 months ($n = 98$), 6 months ($n = 89$), and 1 year ($n = 92$) after the assault. Because participants could enter the study at any point, the sample sizes varied across time. Sixty-five percent of the sample completed at least two questionnaires. The modal number of sessions attended was 1 (range: 1–50). The number of sessions attended was not related to positive change at any time period.

Measures

Prior victimization. Participants were asked to indicate whether they could recall any nonconsensual sexual experiences that occurred before age 12 (*yes* or *no*). Nonconsensual sexual experiences were defined as any sexual activity that they did not want to happen. Thirty-six percent of the sample reported previous victimization as a child. The average age at time of victimization was 7, whereas the average age of the perpetrators was 28. Most (55%) of the perpetrators were relatives. Participants also were asked whether their most recent assault (the one for which they had sought help) was the only nonconsensual sexual activity they had experienced after the age of 12 (*yes* or *no*). Fifty-three percent of the sample reported previous victimization as an adolescent or adult. The average age at time of victimization was 20; the average age of the perpetrators was 28. Most (72%) were friends, relatives, or other nonstrangers (e.g., a doctor).

Social support. Social support was measured with two items assessing overall ratings of the helpfulness of people who had provided support since the assault (0 = *not at all caring and helpful* to 10 = *very caring and helpful*) and amount (0 = *no support* to 10 = *a lot of support*) of support received since the assault. Ratings were made at all four time periods. The average alpha coefficient for the two-item social support scale across the four time periods was .81 (range: .78–.86).

Approach and avoidant coping. The Coping Strategies Inventory (CSI; Tobin, Holroyd, & Reynolds, 1984) was used to assess the coping behaviors used in response to the assault. Tobin et al. (1984) provided evidence of the predictive, criterion-related, and structural validity, and of the internal consistency and stability, of the CSI. The CSI contains eight 9-item subscales that measure various forms of approach and avoidant coping. Four subscales were chosen that seemed most relevant to sexual assault and that did not overlap with other measures. Approach coping was assessed with two scales that loaded on the higher order Engagement factor in factor analyses reported by Tobin et al.: Cognitive Restructuring (e.g., “I tried to get a new angle on the situation”) and Expressing Emotions (e.g., “I found ways to blow off steam”). Two items that are confounded with distress (Stanton, Danoff-Burg, Cameron, & Ellis, 1994) were removed from the Expressing Emotions Scale. Avoidant coping was measured with two scales that loaded on the higher order Disengagement factor: Problem Avoidance (e.g., “I went along as if nothing were happening”) and Social Withdrawal (e.g., “I avoided being with people”). All items were rated on a 1 (*not at all*) to 5 (*very much*) scale to reflect the extent to which each strategy was used to cope with the assault in the past week. Participants completed the CSI at all four time points. Alpha coefficients, averaged

across the four time points, were .91 for approach coping (16 items) and .84 for avoidant coping (18 items).

Religious coping. Ten items assessed religious coping thoughts and behaviors. These items were adapted from other measures of religious coping, including the Religious Coping Activities Scale (Pargament et al., 1990), Religious Problem-Solving Styles Questionnaire (Pargament et al., 1988), and the Religious Coping subscale from the COPE (Coping Orientations to Problems Experienced Scale; Carver, Scheier, & Weintraub, 1989). Sample items include "I sought God's help in dealing with the situation" and "I took control over what I could and let God help me with the rest." All items were rated from 1 (*not at all*) to 5 (*very much*) in terms of how much they were used in handling the stress of the assault. To distinguish between people who did not use these strategies because they did not believe in God and those who believe in God but were not using religious coping, we instructed participants to skip the religious coping questions if they did not believe in God (between 4% and 12% of the sample across time periods). Coefficient alpha for the Religious Coping Scale was .94, averaged across the four time points.

Perceived control. Three scales from the Rape Attribution Questionnaire (Frazier, 2002) were used to assess the extent to which survivors attributed the assault to their past behaviors (five items), felt control over the recovery process (five items), and reported engaging in behaviors to try to prevent future assaults (six items). Respondents rated the behavioral self-blame items on a 1 (*never*) to 5 (*very often*) scale using the following stem: "How often have you thought: I was assaulted because [I used poor judgment]." Items for the other two scales were rated from 1 (*strongly disagree*) to 5 (*strongly agree*). Sample items include "I know what I must do to help myself recover from my assault" (control over the recovery process) and "Since the assault I try not to put myself in potentially dangerous situations" (taking precautions). All items were judged by a panel of experts to be good indicators of the constructs (see Frazier, 2003, for more information, including all scale items). The average alpha coefficients for the three scales across the four time periods were .87 (Behavioral Self-Blame), .84 (Control Over Recovery), and .83 (Taking Precautions).

Positive life change. Fourteen items assessed the extent to which respondents reported that specific life domains had changed as a result of the assault. These items were taken from the 17-item life change scale used by Frazier et al. (2001), which was developed on the basis of open-ended responses of sexual assault survivors from an earlier study (Frazier & Burnett, 1994) and the broader literature on positive and negative changes following traumatic events. The items represented positive life changes in four life domains suggested by previous research: Self (7 items; e.g., "My ability to take care of myself"); Relationships (2 items; e.g., "My relationships with family"); Life Philosophy or Spirituality (4 items; e.g., "My sense of purpose in life"); and Empathy (1 item; "My concern for others in my similar situation"). The 3 items that assessed change in beliefs about the safety and fairness of the world, which generally changed in a negative direction, were not included in this study because our focus was on positive change. Participants rated each item on a bipolar 5-point scale (1 = *much worse now*, 2 = *a little worse now*, 3 = *no change*, 4 = *a little better now*, 5 = *much better now*). Thus, higher scores indicate positive change and lower scores indicate negative change. (This scoring differs from that used by Frazier et al., 2001, who created separate scales to assess the number of positive and negative life changes reported.)

The measure has good internal consistency (average $\alpha = .92$) and stability over a 6-month period ($r = .72$ from 6 to 12 months postassault). Evidence for content-related validity is the use of open-ended responses from sexual assault survivors to develop items. With regard to convergent and discriminant validity, in a sample of students reporting on positive life change following the terrorist attacks of September 11, 2001 (Frazier et al., 2003), an 11-item version of this measure was significantly correlated ($r = .47$, $p < .001$) with scores on another measure of positive life change (Perceived Benefits Scale; McMillen & Fisher, 1998). In addition, like

other measures of positive change (i.e., Post-Traumatic Growth Inventory; Tedeschi & Calhoun, 1996; Stress Related Growth Scale; Park et al., 1996), it was uncorrelated with neuroticism ($r = -.06$). Finally, evidence of predictive validity consists of data indicating that scores on our measure of positive life change predict later trauma recovery in sexual assault survivors (Frazier et al., 2001).

Results

Overview of Analyses

Hierarchical linear modeling (HLM; Raudenbush, Bryk, & Congdon, 2000) provides information about initial levels (i.e., intercepts) and patterns of change over time (i.e., slopes) in self-reported positive life changes posttrauma. However, unlike other data-analytic techniques, HLM also provides information on the degree of individual variability in intercepts and slopes. If there is significant individual variability in either intercepts or slopes, one can then add static or time-varying covariates to the model to assess whether they are associated with intercepts or slopes and thus help to explain individual variability. Another advantage of HLM is that, under the assumption that the data are missing at random (see L. Collins, Schafer, & Kam, 2001), maximum likelihood estimation methods can accommodate missing data. According to Raudenbush (2002), "One major advantage of the approach [HLM] is flexibility in handling time-series data. The analyst can make use of all the available data, so that any participant with one or more time points can be included in the analysis" (p. 26). Using empirical Bayes's estimation, individuals with more data are given more weight in the calculation of the parameter estimates. Using all available data and maximum likelihood estimation is preferred to using listwise or pairwise deletion, both of which have been "conclusively shown to perform poorly" (L. Collins et al., 2001, p. 330).

We first reported HLM analyses showing that there was significant individual variability in intercepts and slopes. We then used HLM to assess static covariates (e.g., prior victimization) of initial levels (i.e., intercepts) and trajectories (i.e., slopes) of positive life change, as well as time-varying covariates of positive life change trajectories. When a personal or environmental resource variable was associated with change trajectories, we assessed whether coping and control appraisals mediated the relationship. Average scores across time on all variables are reported in Table 1. For readers interested in technical details, all equations used in the HLM analyses are included and explained in the appendix.

Change in Self-Reported Positive Life Changes Over Time

We first assessed whether positive life change scores changed over time by comparing a model with linear change terms with a baseline model that included only the intercept and an error term. Time was coded as the number of weeks postassault minus 2 (i.e., 0, 6, 24, 50) so that intercept scores (scores when time = 0) represent scores at the initial assessment at 2 weeks postassault. The HLM program provides fit statistics for each model that are compared to assess whether the model with the linear change terms provides a better fit to the data than the baseline model. If the omnibus test is significant, the individual fixed and random effects

Table 1
Means Scores on All Variables Across Time

Variable	2 weeks (<i>n</i> = 88) <i>M</i> (<i>SD</i>)	2 months (<i>n</i> = 98) <i>M</i> (<i>SD</i>)	6 months (<i>n</i> = 89) <i>M</i> (<i>SD</i>)	12 months (<i>n</i> = 92) <i>M</i> (<i>SD</i>)
Social support ^a	8.28 (1.78)	7.57 (2.46)	7.68 (1.88)	7.55 (2.05)
Approach coping ^b	2.63 (0.73)	2.75 (0.76)	2.75 (0.83)	2.74 (0.91)
Avoidant coping ^b	2.67 (0.68)	2.77 (0.64)	2.70 (0.77)	2.49 (0.69)
Religious coping ^b	2.57 (1.04)	2.84 (1.19)	2.75 (1.12)	2.56 (1.14)
Behavioral self-blame ^c	3.54 (1.18)	3.37 (1.07)	3.07 (1.14)	2.88 (1.10)
Control over recovery process ^d	3.65 (0.87)	3.89 (0.80)	3.85 (0.90)	4.00 (0.87)
Taking precautions ^d	4.07 (0.63)	4.23 (0.64)	4.13 (0.72)	4.12 (0.64)
Positive life changes ^e	2.70 (0.85)	3.19 (0.84)	3.16 (0.82)	3.24 (0.88)

^a Scale = 1 to 10 with higher scores indicating more support. ^b Scale = 1 (*not at all*) to 5 (*very much*).
^c Scale = 1 (*never*) to 5 (*very often*). ^d Scale = 1 (*strongly disagree*) to 5 (*strongly agree*). ^e Scale = 1 (*much worse now*) to 5 (*much better now*).

are examined for significance.² Fixed effects are average effects (e.g., average change over time), whereas random effects refer to individual effects (e.g., individual variability in change over time). In other words, if the omnibus test is significant, there is significant linear change over time on average or significant individual variability in patterns of change over time, or both.

The omnibus test comparing the baseline (intercept only) model with the model with the intercept and the linear terms was significant, indicating that the latter model was a better fit to the data, $\chi^2(3, N = 169) = 29.10, p < .001$.³ (See Equations 1 through 3 in the appendix.) The slope coefficient (.01) was significantly different from zero, $t(168) = 3.25, p = .002$, indicating that, on average, survivors reported more positive life changes over time. The slope coefficient means that there was a .01 unit change on the positive life change measure per week (i.e., a .52 change on the 5-point scale over the course of the study). Comparing this with the average standard deviation on the scale over time (.85), this translates to a change of .61 standard deviations (which would be considered a medium effect). However, there also was substantial individual variability in slopes over time, $\chi^2(109, N = 110) = 211.14, p < .001$. In other words, although on average the number of positive life changes increased over time, there was significant deviation from this trajectory, with some individuals not changing or even reporting fewer positive changes over time. There was also significant individual variability in intercepts (i.e., number of positive changes reported at 2 weeks postassault), $\chi^2(109, N = 110) = 429.48, p < .001$. This significant individual variability in slopes and intercepts led us to examine factors that may predict this variability.

Static Covariates of Positive Life Change Intercepts and Slopes

In the next set of analyses, we estimated the associations between truly static covariates (i.e., ethnicity, prior victimization) and positive change intercepts and slopes. We also used initial levels of the seven social support, coping, and perceived control variables as static covariates. Although scores on these variables may change over time, these analyses assess whether initial scores on these variables are associated with positive change intercepts and slopes. In all of these analyses, the omnibus tests compare a

baseline model with only intercept and linear slope terms with models that also contain the static covariate terms. If the model with the covariate provides a better fit to the data, then the covariate (e.g., initial levels of social support) is related either to initial scores or to linear change over time or both (see Equations 4 and 5 in the appendix).

The results of these analyses are presented in Table 2. Because of the multiple tests, an adjusted alpha level of .005 (.05/10) was used to assess the significance of the omnibus tests, as well as the tests of the relations between the covariates and both intercepts and slopes.⁴ Using this criterion, the omnibus tests for ethnicity,⁵ child victimization, adult victimization, avoidant coping, behavioral self-blame, and taking precautions were not significant. Thus, we found no evidence that these variables were related to positive change intercepts (positive change scores at 2 weeks postassault) or slopes (linear change in self-reported positive changes over time).

The omnibus tests for four variables—social support, approach coping, religious coping, and control over the recovery process—were significant. In all four cases, higher initial scores on these variables were associated with higher positive change intercepts (i.e., more self-reported positive life changes at 2 weeks postassault). However, none of these variables were associated with positive life change slopes; that is, they did not predict patterns of change in self-reported positive change over time.

² A model with linear and quadratic (i.e., [number of weeks – 2]²) change terms also was compared with the model with only the linear change terms. This model did not provide a better fit to the data than the model with only the linear change terms.

³ Frazier et al. (2001) found similar results using a different scoring of the positive change measure.

⁴ To simplify the table, only the relations between the static covariates and the intercepts and slopes are presented in Table 2. The full table is available from Patricia Frazier.

⁵ In analyses assessing racial differences, we compared African American participants (*n* = 25) with White participants (*n* = 134) because there were too few survivors in other ethnic groups for meaningful analyses.

Table 2
Hierarchical Linear Modeling Analyses of Static Covariates of Positive Life Change Posttrauma

Variable	Omnibus test χ^2	Covariate intercept effect		Covariate slope effect	
		$\lambda 01$ (SE)	<i>t</i> test	$\lambda 11$ (SE)	<i>t</i> test
Ethnicity ^a	7.41	.45 (.21)	2.16	-.018 (.007)	-2.68
Child victimization ^b	4.04	-.28 (.15)	-1.89	.002 (.005)	0.48
Adult victimization ^b	0.96	.03 (.14)	0.21	-.004 (.004)	-0.92
Social support ^c	26.51 ^d	.22 (.04)	5.37 ^d	-.002 (.002)	-1.09
Approach coping ^c	52.59 ^d	.70 (.08)	8.54 ^d	-.011 (.004)	-2.63
Avoidant coping ^c	1.35	-.11 (.12)	-0.90	.005 (.004)	1.08
Religious coping ^c	35.88 ^d	.42 (.07)	6.32 ^d	-.003 (.003)	-0.84
Behavioral self-blame ^c	6.95	-.19 (.07)	-2.67	.004 (.003)	1.39
Control over recovery ^c	29.48 ^d	.56 (.09)	5.92 ^d	-.009 (.004)	-2.17
Taking precautions ^c	1.75	.13 (.13)	0.93	-.007 (.005)	-1.27

Note. For the chi-square tests, all *dfs* = 2; *Ns* for the first three variables range between 155 and 157; *Ns* for the last seven variables range between 81 and 87. For the *t* tests, *dfs* for the first three variables range between 153 and 155; *dfs* for the last seven range between 79 and 85.

^a 0 = White, 1 = African American. ^b 0 = no previous victimization, 1 = previous victimization. ^c Data measured at 2 weeks postassault. ^d *p* < .005 (Bonferroni-corrected alpha level).

Time-Varying Covariates of Positive Change Trajectories

The next step in our analyses was to assess whether social support, coping, and control appraisals covaried over time with positive change trajectories (see Equation 6 in the appendix). In these analyses, the coefficient for the dynamic covariate was tested for significance. A significant test indicates that the covariate and self-reported positive life change significantly covary over time. A positive coefficient indicates two variables change in similar ways (e.g., as one increases the other does as well), whereas a negative coefficient indicates the two variables change in opposite ways (e.g., as one increases the other decreases). HLM analyses examining time-varying covariates are reported in Table 3. An adjusted alpha level of .007 (.05/7) was used to assess significance. Using this criterion, we found that all of the time-varying covariates were significantly associated with positive-change trajectories. Specifically, trajectories of social support, approach coping, religious coping, control over the recovery process, and taking precautions were all positively associated with positive-change trajectories, suggesting that, within individuals, increases in these variables were associated with increases in self-reported positive life changes over time. Avoidant coping and behavioral self-blame

trajectories were negatively associated with positive-change trajectories, suggesting that decreases in avoidant coping and behavioral self-blame were associated with increases in self-reported positive life changes over time.

Mediational Analyses

The final step in our analyses was to assess whether any significant relations between personal and environmental resources and positive change were mediated by coping and control appraisals. The following conditions must be met to establish mediation: (a) the predictor variable must be associated with the outcome variable; (b) the predictor variable must be associated with the mediator; (c) the mediator must be associated with the outcome variable, after controlling for the relation between the predictor and outcome; and (d) the addition of the mediator variable must significantly decrease the association between the predictor and outcome variable (Kenny et al., 1998). We followed the procedures for testing mediation in HLM described by Krull and MacKinnon (2001). The outcome variable was positive-change trajectories; the hypothesized predictors were survivor ethnicity, prior victimization, and social support; and the hypothesized mediators were coping and control appraisals.

With regard to the first condition for mediation, of the hypothesized predictors (i.e., ethnicity, prior victimization, initial levels of social support, social support trajectories) only social support trajectories were associated with positive change trajectories (see Tables 2 and 3). As described previously, increases in social support were associated with increases in self-reported positive life changes over time.

To assess the second criterion for mediation, we examined the relations among social support trajectories and the six potential mediators. In these analyses, the mediator variable was the outcome variable and social support was the time-varying covariate (see Equation 6 in the appendix). These analyses assess whether changes in social support over time are associated with changes in the hypothesized mediators over time. Using an adjusted alpha level of .008 (.05/6), we found that social support trajectories were

Table 3
Hierarchical Linear Modeling Analyses of Dynamic Covariates of Positive Life Changes Posttrauma

Variable	Dynamic covariate effect	
	$\lambda 10$ (SE)	<i>t</i> test
Social support	.11 (.03)	4.47
Approach coping	.64 (.06)	11.12
Avoidant coping	-.39 (.07)	-5.29
Religious coping	.37 (.05)	7.24
Behavioral self-blame	-.16 (.05)	-3.30
Control over recovery	.63 (.04)	15.12
Taking precautions	.28 (.08)	3.47

Note. All *t* test *ps* < .007 (Bonferroni-corrected alpha level).

associated with the trajectories of four of the mediators: approach coping, $t(166) = 4.40, p < .0001$, avoidant coping, $t(166) = -6.10, p < .0001$, control over the recovery process, $t(169) = 7.47, p < .0001$, and taking precautions, $t(169) = 3.25, p < .001$. In other words, increases in social support over time were associated with increases in approach coping, control over the recovery process, and taking precautions, and decreases in avoidant coping. The covariation between social support and behavioral self-blame, $t(169) = -2.07, p = .04$, and religious coping, $t(147) = 1.66, p = .10$, was not significant with the adjusted alpha level.

Analyses testing the third and fourth conditions for mediation are included in Table 4. In these analyses, social support and one of the four mediator variables were entered as time-varying covariates of positive change. With regard to the third condition for mediation, which requires that the mediator be associated with the outcome with the predictor in the model, all of the hypothesized mediators (i.e., coping and control appraisals) were associated with positive change trajectories. To assess the fourth condition for mediation, we compared the coefficients reflecting the covariation between social support and positive change for models with and without the covariates (see Equations 7 and 8 in the appendix). As mentioned, for mediation to occur, the addition of the mediator variable must significantly decrease the association between the predictor and outcome variable, which is assessed by comparing the coefficients for social support for the two models.

The significance of the mediational relationship was assessed by dividing the difference in the social support coefficients for the two models by a standard error term described by Sobel (1982). The mediated effect divided by its standard error yields a z score

of the mediated effect. If the z score is greater than 1.96, the effect is significant at the .05 level. Sobel's test was significant for all of the analyses. For approach and avoidant coping and taking precautions, the social support coefficient was smaller when the mediator was in the model, but social support was still significant, suggesting that these variables each partially mediated the relation between social support trajectories and positive change trajectories. However, when control over the recovery process was entered, social support no longer was significant, suggesting complete mediation. In other words, social support trajectories were associated with positive change trajectories primarily because support was associated with control over the recovery process.

Discussion

The purpose of this study was to identify factors that are related to experiencing positive life changes following a traumatic life event. This study builds on a previous report from this data set, in which we found that many survivors report positive life changes soon after a sexual assault, that not all survivors maintain those changes over time, and that those who report early positive changes and who retain those changes over time report the lowest levels of depression and posttraumatic stress disorder symptoms 1 year after the assault (Frazier et al., 2001). Thus, our goal in this study was to identify factors associated with reporting positive change soon after a trauma and with patterns of change over time in self-reported positive life changes. In contrast, most studies have examined concurrent correlates of positive change long after the trauma occurred. We also improved on previous studies by

Table 4
Coping and Control as Mediators of the Covariation Between Social Support and Positive Change Trajectories

Mediator	Slope coefficient (SE)	t test	Mediated effect test
Approach coping			
Equation 1			
1. Social support alone	.11 (.03)	4.42***	
Equation 2			
1. Social support	.05 (.02)	2.07*	
2. Approach coping	.61 (.06)	10.38***	4.05***
Avoidant coping			
Equation 1			
1. Social support alone	.11 (.03)	4.42***	
Equation 2			
1. Social support	.09 (.03)	3.19**	
2. Avoidant coping	-.21 (.08)	-2.74**	2.50*
Control over recovery process			
Equation 1			
1. Social support alone	.12 (.03)	4.48***	
Equation 2			
1. Social support	-.00 (.02)	-0.21	
2. Control over recovery	.63 (.05)	13.47***	6.53***
Taking precautions			
Equation 1			
1. Social support alone	.12 (.03)	4.48***	
Equation 2			
1. Social support	.09 (.03)	3.72***	
2. Taking precautions	.23 (.08)	2.97*	2.22*

Note. For the t tests, dfs for the first two sets of analyses are 166; dfs for the last two sets are 168.
* $p < .05$. ** $p < .01$. *** $p < .001$.

assessing a wide range of potential correlates, including some that have received little attention to date (e.g., ethnicity), evaluating more complex mediational models of the positive change process and collecting data from a relatively large number of women who had recently experienced a severe trauma. We next discuss our findings regarding the correlates of early positive change and change trajectories, implications for theory and practice, and limitations and directions for future research.

Correlates of Early Positive Change

Several of our findings are consistent with previous research on the correlates of positive change. First, survivors who initially rate their support network as more helpful also report more initial positive life changes. These data are consistent with previous research showing a positive relation between social support and positive change (e.g., Park et al., 1996). As mentioned, other studies may have failed to find this relation because of small sample sizes (e.g., Joseph et al., 1993; $n = 35$; Revenson et al., 1983; $n = 32$). Second, survivors who initially use more approach-oriented coping strategies, such as cognitive restructuring and expressing emotions, report more positive life changes soon after the assault (see also R. L. Collins et al., 1990; Mohr et al., 1999; Park et al., 1996). Finally, those who rely on their religious faith to cope also report more positive life changes, consistent with the one previous study that specifically examined religious coping strategies (Park et al., 1996). Of these factors, approach coping is most strongly related to initial levels of self-reported positive change.

Our findings also clarify the relations between different aspects of control and positive life change posttrauma. Specifically, survivors who perceive that they have more control over their recovery process (rather than the assault itself) tend to report more positive life changes (see also Frazier et al., in press). Other aspects of present control, such as control over physical symptoms of disease, also are associated with positive change (Tennen et al., 1992). The other forms of control (i.e., behavioral self-blame, taking precautions) are not associated with early positive change, although they do covary with positive change over time, as discussed below.

Finally, some of the variables we assessed were not associated with initial levels of positive change in the ways predicted by existing theories. For example, Schaefer and Moos (1998) hypothesized that individuals who have experienced prior traumas will have learned coping strategies that will help them to cope more effectively with subsequent traumas. Our data do not support this hypothesis, nor do other studies that have specifically examined the relation between prior crisis experience and positive change following a subsequent trauma (Aldwin et al., 1996; Park et al., 1996). Although some trauma survivors may develop coping resources that can help them cope with subsequent events, this is not necessarily the case. In fact, previous studies have found that prior sexual victimization is associated with less effective coping (e.g., Arata, 1999). Prior trauma experience would only be expected to facilitate adjustment to a subsequent trauma if the prior trauma had been successfully resolved. Second, avoidant coping is not associated with initial reports of positive change (although it does covary with positive change over time). Past cross-sectional studies of the relation between avoidant coping and positive change have been mixed, which may be because of differences in the ways

in which avoidant coping has been operationalized (Aldwin et al., 1996; R. L. Collins et al., 1990; Park et al., 1996). Finally, although one previous study found that African American sexual assault survivors report more posttraumatic positive change than do Whites (Kennedy et al., 1998), this trend is only marginally significant in our study.

Correlates of Positive Change Trajectories

Although several of the static covariates we assessed are associated with higher initial levels of positive change, they are not related to increases in positive life changes over time as we had predicted on the basis of the deviation-amplification model (Aldwin et al., 1996). For example, survivors who initially have more social support report more positive life changes at 2 weeks post-assault, but these initial levels of support do not predict positive change trajectories. Although initial levels of social support, coping, and control appraisals do not predict change over time, these variables do covary with positive change over time. Specifically, individuals who report increases in social support, approach coping, religious coping, control over the recovery process, and taking precautions also report increases in positive change. In addition, individuals who report decreases in avoidant coping and behavioral self-blame report increases in positive life change, although neither of these factors is associated with initial levels of positive change. It may be that both avoiding dealing with the assault and focusing on the past and how the assault could have been prevented are less adaptive as time goes on (Roth & Cohen, 1986).

The final step in our analyses was to test the hypothesis that coping strategies and control appraisals mediate the relations between personal and environmental resources and positive change. Social support is the only personal or environmental resource variable associated with positive change trajectories. Increases in social support over time are associated with increases in approach coping, control over the recovery process, and taking precautions to avoid future assaults and with decreases in avoidant coping. Although these variables are all significant mediators, the variable that most completely mediates the relation between social support and positive change is control over the recovery process. These analyses suggest that the primary reason social support is associated with positive change is that survivors who have more support feel that their recovery process is more under their control and that they have the resources to deal with the assault. However, it should also be acknowledged that we cannot empirically distinguish this model from a model in which social support mediates the relation between control over the recovery process and positive change. Nonetheless, it is true that when both variables are in the model, social support no longer is significant.

Summary and Implications

In summary, our data suggest that the individuals who are most likely to report positive life change following the assault are those who use more approach-oriented coping strategies and who perceive that the recovery process is under their control. Although most theories (e.g., Schaefer & Moos, 1998) focus on approach coping, control over the recovery process actually covaries more closely with changes in self-reported positive change over time. This is particularly interesting given the conceptual overlap be-

tween aspects of approach coping (i.e., positive reappraisal) and reports of positive life changes. Although control has long been implicated in the trauma recovery process, past theories (e.g., Foa, Zinbarg, & Rothbaum, 1992) have focused on control over the event itself (past control). Frazier et al.'s (2002) review of the trauma literature suggested that present control—one form of which is control over the recovery process—is the one type of control consistently associated with lower distress levels, perhaps because the present is in fact more controllable than the past or the future. This form of control deserves more attention in theories of both positive life change and distress. In addition, clinicians working with survivors struggling to regain a sense of control might help them to identify what they can control in the present.

The use of religious coping is another factor associated with higher levels of initial positive change and with increases in positive change over time. This factor also deserves more attention in theories of the positive change process. Religious coping strategies also may be a resource for clinicians to assess when working with trauma survivors. In fact, means on the coping measures suggest that survivors use religious coping about as much as approach-oriented coping (i.e., cognitive restructuring and expressing emotions). Finally, given the covariation between social support and positive change over time, it may be useful to include support providers in trauma counseling so that they understand the continuing need to provide support.

Limitations and Future Directions

Although this study improved on previous research in various ways, it also was limited in several respects. The first limitation relates to the amount of missing data. The validity of the HLM analysis is predicated on the untestable assumption of random missingness. If participant dropout was nonrandom, the HLM results are biased to an unknown degree. The second limitation is the correlational nature of the data. Even sophisticated modeling of longitudinal data cannot establish causation. Thus, as mentioned, we cannot determine, for example, whether individuals who have more support use more approach coping or whether individuals who use more approach coping have more support. Third, there are many other variables that may be associated with positive change that we did not assess, including personality factors such as optimism (see O'Leary et al., 1998, for a list of factors most often mentioned in theories of positive change). Fourth, in an effort to limit the length of the questionnaire completed by the survivors in our study, some of the measures were not as extensive as they could have been. For example, social support was assessed using a face-valid and internally consistent two-item measure rather than a longer standardized scale, and prior sexual victimization was assessed with one-item dichotomous measures. Given the nature of the sample, it also was not feasible to gather additional data on the validity of the self-reports of positive change (e.g., pretrauma measures, informant reports). Thus, it is difficult to determine the extent to which the respondents' self-reports reflect actual life changes. Finally, these results can only be generalized to female sexual assault survivors, as the correlates of positive change may differ for men and following other events. In addition, the survivors in this study all sought help in an ER, and the results therefore may not generalize to other survivors.

Our data also suggest several important research directions. First, additional research examining ethnic differences in responses to trauma is needed, given the trend for African Americans to report higher initial levels of self-reported positive change than White survivors. Potential mediators of these differences also should be assessed. Second, further research also is needed on the role of support providers in the positive change process. Although survivors who have more support report more positive changes following the assault, it is not helpful for support providers to minimize a trauma and focus on its positive aspects (Ingram, Betz, Mindes, Schmitt, & Smith, 2001). Therefore, we need to know more about how support providers can facilitate positive change without minimizing the event. Third, more attention should be paid to control appraisals in theory and research on positive change, and particularly to present control, which is an important, yet neglected, factor in research on both positive life change and distress. Finally, additional research is needed that examines more complex models of the relations among psychosocial resources (e.g., social support, coping, perceived control), positive life change, and distress and their temporal sequence.

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Appendix

Equations for HLM Analyses

The following Level 1 equation was used to assess whether posttraumatic growth scores changed over time:

$$Y_{ij} = \beta_{0i} + \beta_{1i}(\text{time}) + e_{ij} \text{ (Equation 1, Level 1),}$$

in which Y_{ij} is the posttraumatic growth score of person i at time j , β_{0i} is the intercept for person i , β_{1i} is the linear slope coefficient for person i , and e_{ij} is person i 's residual at time j . The e_{ij} are assumed to be normally distributed with a mean of zero.

In HLM, the parameters in the Level 1 model become the outcome variables in the Level 2 model. The Level 2 equation for β_{0i} is

$$\beta_{0i} = \lambda_{00} + u_{0i} \text{ (Equation 2, Level 2),}$$

where λ_{00} is the average intercept (i.e., score at 2 weeks postassault) and u_{0i} is the deviation of respondent i 's intercept from the average intercept. The Level 2 equation for β_{1i} is

$$\beta_{1i} = \lambda_{10} + u_{1i} \text{ (Equation 3, Level 2),}$$

where λ_{10} is the average linear slope and u_{1i} is the deviation of respondent i 's linear slope from the average slope. The λ_{00} and λ_{10} terms are the fixed effects and the u_{0i} and u_{1i} terms are the random effects.

The following equations at Level 2 describe estimations of the associations between static covariates (e.g., prior victimization) and positive change intercepts and slopes:

$$\beta_{0i} = \lambda_{00} + \lambda_{01} \text{ (static covariate)} + u_{0i} \text{ (Equation 4, Level 2)}$$

$$\beta_{1i} = \lambda_{10} + \lambda_{11} \text{ (static covariate)} + u_{1i} \text{ (Equation 5, Level 2),}$$

in which λ_{01} is the association between prior victimization and initial levels of posttraumatic growth and λ_{11} is the association between prior victimization and linear change in posttraumatic growth.

To assess whether social support, coping, and control appraisals covaried over time with posttraumatic growth, we used the following equation:

$$Y_{ij} = \beta_{0i} + \beta_{1i} \text{ (time-varying covariate)} + e_{ij} \text{ (Equation 6, Level 1),}$$

in which β_{1i} represents the covariation between, for example, social support trajectories and posttraumatic growth trajectories.

To assess the fourth condition for mediation, we compared the coefficients reflecting the covariation between social support and growth for the models with (Equation 8) and without (Equation 7) the covariates. The equations for these analyses were as follows:

$$Y_{ij} = \beta_{0i} + \beta_{1i} \text{ (social support)} + e_{ij} \text{ (Equation 7, Level 1)}$$

$$Y_{ij} = \beta_{0i} + \beta_{1i} \text{ (social support)} + \beta_{2i} \text{ (mediator)} + e_{ij} \text{ (Equation 8, Level 1),}$$

in which β_{1i} represents the covariation between social support trajectories and posttraumatic growth trajectories and β_{2i} represents the covariation between the specific mediators (e.g., coping) and posttraumatic growth trajectories.

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