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Positive Affect in the Midst of Distress: Implications for Role Functioning

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Abstract

Stress has been shown to deplete the self-regulation resources hypothesized to facilitate effective role functioning. However, recent research suggests that positive affect may help to replenish these vital self-regulation resources. Based on revised Stress and Coping theory and the Broaden-and-Build theory of positive emotion, three studies provide evidence of the potential adaptive function of positive affect in the performance of roles for participants experiencing stress. Participants were students (Study 1), caregivers of ill children (Study 2), and individuals recently diagnosed with HIV (Study 3). In cross sectional analyses, using role functioning as an indicator of self-regulation performance, we found that positive affect was significantly correlated with better self regulation performance, independent of the effects of negative affect. The effects were not as strong longitudinally, however, and there was little evidence of a reciprocal association between increases in positive affect and improvements in role functioning over time. The results provide some modest support for hypotheses stemming from the Broaden and Build model of positive emotion and revised Stress and Coping theory, both of which argue for unique adaptive functions of positive affect under stressful conditions.

Keywords

self-control; self-regulation; roles; relationships; positive emotions; affect

Introduction

A 35-year-old man experiencing fever and chills suspects he has the flu and is shocked to receive a diagnosis of HIV. After a long protracted period of suffering, a man's partner dies of AIDS. A mother cares for her young child, who has a serious chronic illness. It is not surprising that an extensive literature shows that highly stressful experiences such as these are associated with negative affect. For example, caregivers (Bachanas et al., 2001; Caliandro & Hughes, 1998; Folkman, Chesney, Cooke, Boccellari, & Collette, 1994; González Salvador et al., 2000; Land, Hudson, & Stiefel, 2003) and people coping with their own serious illness (Catz, Gore-Felton, & McClure, 2002; Kelly et al., 1998; Thompson, Collins, Newcomb, & Hunt, 1996) report high levels of stress and distress.

However, a growing body of research demonstrates that during periods of serious stress people retain the capacity to experience positive affect as well (Folkman, 1997; Folkman & Moskowitz, 2000). This ability to experience positive affect in the context of stress may serve to replenish vital personal and self-regulation resources that are depleted by stress,

thereby enabling individuals to manage the responsibilities associated with their daily roles and activities (Folkman & Moskowitz, 2000; Fredrickson, 1998). In this study we explore this hypothesized adaptive function of positive affect in the performance of roles of daily life in the context of stress.

Stress, self-regulation, and role functioning

Stressful life events have the potential to impair the self-regulation required for effective day-to-day functioning in a variety of roles that can involve work, home, or community tasks (e.g., student, worker, volunteer, homemaker) or social relationships (e.g., friend, partner, sibling, parent). Further, the deleterious effects of a stressful life event in one role domain can spill over or "proliferate" (Pearlin, Aneshensel, & LeBlanc, 1997) and adversely affect functioning in other domains. In the context of caregiving, for example, stress proliferation occurs when the stress associated with providing care to a loved-one has a negative impact on other roles such as one's job or relationships (Benson, 2006; Benson & Karlof, 2009; Knussen, Tolson, Swan, Stott, & Brogan, 2005).

Protector of one's own health, through self-care tasks, can also be considered a role people occupy and stress can negatively affect the performance of self-care tasks such as healthy eating and taking prescribed medications. For example, studies demonstrate that stress can impair efforts to manage eating and dieting behaviors, smoking, and substance use. Workers experiencing occupational stress are more likely to increase their smoking (Johansson, Johnson, & Hall, 1991), and dieters experiencing life stress are less able to follow a weight loss program than when they are not stressed (Wadden, Foster, & Letizia, 1992). Similarly, longitudinal studies show that stress triggers a relapse in smoking (Wills, Sandy, & Yaeger, 2002), in drinking among recovering alcoholics (Brown, Vik, Patterson, Grant, & Schuckit, 1995), and in heroin use among addicts (Marlatt & Gordon, 1980).

The *Self-Control Strength Model* (Baumeister, Muraven, & Tice, 2000; Muraven & Baumeister, 2000) offers an explanation for the impairment of adaptive self-regulation under conditions of stress. The model suggests that individuals have a limited capacity for self-regulation and that any effort requiring self-control, such as resisting a delicious snack when dieting or a cigarette when trying to quit smoking, will deplete the resources and leave fewer resources for other self-regulation demands. In this way, it is hypothesized that self-control is not automatically self-renewing, but needs to be replenished (Muraven & Baumeister, 2000). Evidence in support of this hypothesis comes from laboratory studies in which participants who were required to exert self control (i.e. resist eating cookies) were less likely to persist at unsolvable tasks (Baumeister, Bratslavsky, Muraven, & Tice, 1998).

Stressful conditions can make self-regulation behaviors more challenging. In one study, participants who were asked to control their emotions while watching an excerpt from a disturbing film about sick and dying animals showed subsequent decrements in self-regulation, as measured by endurance on a physical stamina task involving squeezing a handgrip (Mark Muraven, Tice, & Baumeister, 1998). One longitudinal study explicitly tested the effect of stress on self regulation operationalized as role functioning (Oaten & Cheng, 2005). Students were assessed at baseline and 4 weeks later toward the beginning of their examination period. Results indicated that academic examination stress impaired role functioning, in both social and personal self-care roles. Specifically, students dealing with exam stress increased smoking and caffeine consumption, decreased healthy eating, physical activity, maintenance of household chores, and self-care habits (e.g., brushing and flossing teeth) compared with participants in the control group who were tested at two low stress times.

Positive affect in the context of stress

Positive affect in the context of stress may bolster self-regulation resources to prevent stress from spilling over or proliferating (Pearlin, et al., 1997) into other areas of the person's life and adversely influencing role functioning in these areas. Positive affect can be generated and maintained even in the most dire and stressful situations (Folkman, 1997; Folkman & Moskowitz, 2000; Viney, 1986; Viney, Henry, Walker, & Crooks, 1989; Wortman, 1987). For example, in a longitudinal study of caregiving and bereavement stress in men whose partners had AIDS, the caregivers reported positive affect as frequently as negative affect, with the exception of the time immediately surrounding the death of their partners, (Folkman, 1997; Moskowitz, Folkman, & Acree, 2003). Thirty years ago, Lazarus, Kanner, and Folkman (1980) considered the functional role that positive affect serves in the context of stressful events. They hypothesized that under stressful conditions, when negative affect is predominant, positive affect may provide a psychological break or respite, support continued coping efforts, and replenish resources that have been depleted by the stress.

Empirical evidence regarding the adaptive function of positive affect in the context of laboratory studies of self-regulation has begun to accumulate. In a series of four studies using a number of different manipulations of stress and measures of self-regulation, participants who were put through a stress manipulation followed by a positive mood induction performed better on a subsequent task of self-regulation than participants in negative mood, neutral mood, or brief rest period conditions (Tice, Baumeister, Shmueli, & Muraven, 2007). For example, in one study participants were stressed by having to resist the impulse to eat tempting, delicious snack foods. Half of the participants were then randomly assigned to watch a clip from a stand-up comedy routine, designed to induce positive affect, whereas the others watched an affectively neutral video on dolphin communication. Participants' self-regulation was then measured using a persistence measure involving a difficult and frustrating diagram tracing task. Results showed that those who watched the comedy persisted significantly longer on the tracing task than those who watched the neutral video. Thus, the positive affect induction appeared to counteract the effect of their earlier stressful self-regulatory resource depletion.

There is likely a bidirectional association between positive affect and self-regulation resources. Fredrickson and colleagues have proposed an "upwards spiral" association between positive emotion and personal resources like social support, broad-minded coping, or interpersonal trust (Burns et al., 2008; Fredrickson & Joiner, 2002; Kok & Fredrickson, 2010). The "Broaden-and-Build" model (Fredrickson, 1998) posits that positive emotions broaden the individual's attentional focus and behavioral repertoire and, as a consequence, build social, intellectual, and physical resources. These improved personal resources then increase positive emotion. The idea of a reciprocal association or "upwards spiral" association is consistent with the self-control strength model (Baumeister, et al., 2000; Muraven & Baumeister, 2000) in that self-control can be considered an interpersonal resource.

The present set of studies aims to replicate, in more applied settings, the beneficial effects of positive emotion on self-regulatory behavior that were found in laboratory studies. As part of a larger program of research on stress, coping, and emotion, we examined whether positive affect is associated with improved role functioning in three samples: college students (Study 1), maternal caregivers (Study 2), and people newly diagnosed with HIV (Study 3). We tested two hypotheses regarding positive affect and role functioning.

1. Positive affect is significantly correlated with better self regulation performance, independent of the effects of negative affect (Studies 1, 2, and 3). Using role functioning as an indicator of self-regulation performance, we hypothesized that

positive affect would counteract the stress-related depletion of these resources and would be positively associated with better role functioning under conditions of stress.

2. Positive affect and role functioning are reciprocally related such that positive affect leads to improved role functioning which, in turn, leads to further increases in positive affect (Studies 2 and 3). We tested longitudinal associations between positive affect and role functioning to determine if there is evidence of an upwards spiral association.

Study 1: Undergraduate Students

Method

Participants—Participants were undergraduate students recruited from introductory psychology courses at two Midwestern universities ($N = 427$). Participants were tested once, during psychology classes, and received partial course credit for their participation.

Procedure—The study followed APA ethical standards in the treatment of the participants and all procedures were approved by the Institutional Review Board of the respective Universities. The investigator told participants that the purpose of the study was to examine people's role functioning and how they regulate their moods during stressful situations. After signing an informed consent form participants were given the paper-and-pencil questionnaire packets to complete.

Positive and Negative Affect. In order to assess intensity of positive and negative affect participants completed the 20-item Positive and Negative Affect Schedule (PANAS; (Watson, Clark, & Tellegen, 1988)). The scale consists of 10 positive affects (e.g., interested, proud, excited) and 10 negative affects (e.g., distressed, afraid, irritable). Respondents were asked to indicate how strongly they felt each affect during the past week on a scale from *not at all* (0) to *extremely* (4).

Stress. Participants were asked to report a stressful event they had experienced in the last 2 weeks and respond to nine appraisal items about the duration and magnitude of the event.

Role functioning. Role functioning is most commonly measured by clinician rating (Cornblatt et al., 2007; Goodman, Sewell, Cooley, & Leavitt, 1993) or by having participants self-report on role limitations due to physical or emotional health problems (e.g., Crystal, Fleishman, Hays, Shapiro, & Bozzette, 2000; Kazis et al., 2004; Stewart, Hays, & Ware Jr, 1988; Ware & Sherbourne, 1992). Recent work on self-regulation has combined scales reflecting health behaviors (e.g., cigarette smoking, healthy diet) and self-regulatory roles in other domains (e.g., household chores, self care behaviors; Oaten & Cheng, 2005, 2006). Similar to these self-regulation scales, the present role functioning measure consisted of a list of 18 roles that people might occupy in their daily lives (e.g., student, friend) as well as space for the participant to add roles that were not listed. For each role the participant first indicated whether he or she occupied that role or performed that activity, then rated the personal importance of the role under normal circumstances (as either: *not at all important*, *somewhat important*, or *very important*). Finally, the participant indicated how he or she performed in that role *during the stressful event that was just described* on a Likert-type scale ranging from *much worse than usual* (1) to *much better than usual* (5). The role functioning measure was scored by summing the responses on how the participant did in each role, and dividing by the number of roles that he or she occupied. In this way, participants with differing numbers of roles could be directly compared. Scores were then weighted by participants' reports of importance of the role. By incorporating participant ratings of the importance of each role, the measure taps into individual appraisals

which play a key role in the stress and coping process (Folkman, 1997; Lazarus & Folkman, 1984).

Results

Stressful Event—Participants reported a variety of stressful events. Eighty-two percent of the stressful events were described as “extremely stressful” (46.7%) or “quite stressful” (34.9%). Sixty-two percent of participants reported that the situation was ongoing.

Role Functioning—On average, the students reported that they occupied about 9 roles ($M = 8.88$, $SD = 2.42$) and their average functioning in those roles during the stressful event that they described was slightly worse than usual ($M = 2.90$, $SD = .49$). The percent of the sample reporting each role appears in Table 1.

Positive affect was significantly correlated with role functioning, but negative affect was not ($r = -.069$, $p = .16$). As predicted, the correlation between positive affect and role functioning remained significant even when negative affect was partialled out (partial correlation $r = .36$, $p < .0001$). That is, students who experienced positive affect more intensely, as measured by the PANAS, reported better role functioning and this effect was independent of the effect of negative affect.

Study 1 demonstrates that positive affect was cross-sectionally associated with better role functioning in a student sample, independent of the effects of negative affect, supporting Hypothesis 1. In Study 2, we test both the cross sectional and longitudinal hypotheses in a sample experiencing the stress of providing care to a chronically ill child or a healthy child.

Study 2: Maternal Caregivers

Method

Participants—This multi-center convenience sample consisted of 267 maternal caregivers, defined as the primary female home caregiver of a child including biological, foster, or adoptive mothers or other female kin (Heyman et al., 2004; Moskowitz et al., 2007; Wilson et al., 2005). Participants were recruited from general and specialty pediatric clinics in New York City, San Francisco, and Oakland, California. Eighty-six participants were caregivers of children with HIV, 92 were caregivers of children with any moderate to severe chronic disease except HIV, and 89 were caregivers of healthy children. To be included in the study, caregivers had to be female; English- or Spanish-speaking; living with a child age 18 or younger with HIV, another chronic illness, or a healthy child; and be the primary caregiver of the child in the home.

Participants were interviewed three times – at entry into the study, then again at 3 and 6 months after entry. This article focuses on data collected from the 3- and 6-month interviews when the role functioning measure was administered. The study followed APA ethical standards in the treatment of the participants and all procedures were approved by the Institutional Review Boards of the respective universities.

Measures—*Positive and negative affect* and *role functioning* were measured as described in Study 1.

Stress. Participants were asked to report a stressful event they had in the last 2 weeks, which was related to caring for their child.

Results and Discussion

Sample Characteristics—Participants in the study were all female caregivers. The average age of the caregiver's child was 7.6 years ($SD=4.1$). The sample of caregivers was demographically diverse, with 35.3% Caucasian, 37.2% African American, 19.9% Hispanic, and 7.5% reporting another racial category. The mean age of the sample was 41.1 years ($SD=11.0$), 77.6% had completed high school, 49.4% were married at the time of the study, and the median annual income was between \$25,000 and \$30,000.

Cross-sectional analyses—*At the three-month interview*, on average, the maternal caregivers reported occupying about 11 roles ($M=11.48$, $SD=1.96$), and their average functioning in those roles during the stressful event they described was about the same as usual ($M=3.24$, $SD=0.66$). See Table 1 for percent of the sample reporting each role. As in Study 1, positive affect was cross-sectionally associated with role functioning at the same time point, ($r=.20$), $p<.01$. Negative affect at that same assessment point was not related to role functioning ($r=-.022$). As predicted, the correlation between positive affect and role functioning remained significant even when negative affect was partialled out, (part correlation $r=.21$, $p=.0009$). That is, caregivers who experienced positive affect more intensely, as measured by the PANAS during the 3-month interview, reported higher role functioning, as measured with the role functioning scale. This is consistent with the idea that under conditions of caregiving stress positive affect may bolster self-regulation resources, and be associated with better role functioning.

Cross sectional analyses of the 6 month data revealed a slightly different pattern of results. Although the caregivers again reported occupying approximately 11 roles, ($M=11.37$, $SD=2.10$), and their average functioning in those roles during the stressful event they described was about the same as usual ($M=3.18$, $SD=0.70$), at 6 months, positive affect was not cross-sectionally associated with role functioning, ($r=.094$, *ns*), though negative affect was ($r=-.13$, $p=.052$). Controlling for negative affect did not significantly change the association of positive affect and role functioning (partial $r=.037$, *ns*).

Longitudinal analyses. Longitudinal correlations of positive affect, negative affect, and role functioning are in Table 2. There was no significant association of positive or negative affect at 3 months with role functioning at 6 months, although role functioning at 3 months was modestly associated with subsequent positive affect ($r=.15$, $p=.02$). In order to test the upward spiral associations of positive affect and role functioning, we followed the procedures of Fredrickson and colleagues (Burns, et al., 2008; Fredrickson & Joiner, 2002; Kok & Fredrickson, 2010) and conducted a series of stepwise regression analyses. Role functioning at the 6-month interview was first regressed on role functioning at the 3 month interview. Then in Step 2, we added change in positive affect from Month 3 to Month 6. Change in positive affect was not significantly predictive of role functioning at 6 months over and above role functioning at 3 months (part correlation = .075). Controlling for the change in negative affect made no material difference. Similarly, change in role functioning did not predict positive affect at 6 months over and above positive affect at 3 months (part correlation = .036). Based on these regressions, there was no evidence of an upward spiral association between positive affect and role functioning over this three month period.

In study 3 we test both cross-sectional and longitudinal hypotheses in a sample of people newly diagnosed with HIV.

Study 3: The CHAI Study

Method

Participants—Participants were 127 HIV+ men and women who were enrolled in the Coping, HIV, and Affect Interview (CHAI) Study. This longitudinal cohort study included participants who (a) had been informed they were HIV positive within the previous 8 weeks; (b) spoke English; (c) were 18 years or older; (d) had the ability to provide informed consent to be a research participant. HIV status and date of disclosure were verified with the clinic from which they were recruited. Evidence of a severe cognitive impairment or active psychosis resulted in exclusion from the study. Participants were recruited in the San Francisco Bay area through local HIV testing sites, clinics, and a county hospital emergency room. Participants received \$30 at the completion of each interview.

Procedures—Participants were interviewed face-to-face using Computer Assisted Personal Interview (CAPI) software 7 times over the course of 18 months post-diagnosis. Interviews were conducted at 1, 2, 3, 6, 9, 12, and 18 months post diagnosis. Positive and negative affect were assessed at every time point. Role functioning was assessed at Months 2 and 18.

The study was designed in compliance with HIPAA regulations, and all procedures involving human subjects were approved by the Institutional Review Board of the University of California, San Francisco.

Measures—*Differential Emotions Scale* (DES). Frequency of positive and negative affect were assessed using a version of the DES which was modified by Fredrickson (Fredrickson, Tugade, Waugh, & Larkin, 2003) to include additional positive affect items as well as those that are likely to tap into trait positive affectivity. The full scale assesses anger, shame, contempt, disgust, guilt, sadness, fear, amusement, awe, contentment, gladness, gratitude, hope, interest, love, and pride. Participants were asked to respond to each item in terms of how frequently they felt that particular affect in the past week on a 5-point scale from *never* (0) to *most of the time* (4). In CHAI this modified DES has shown good reliability with the positive affect subscale $\alpha = .89$ and the negative affect subscale $\alpha = .86$.

Role Functioning was assessed as in Studies 1 and 2. The role functioning measure was administered at two of the seven interviews: 2 months and 18 months after diagnosis.

Stress. At both month 2 and 18, participants were asked to report an HIV-related stressful event they experienced in the last 2 weeks.

Results and Discussion

Sample Characteristics—The sample was demographically diverse, with 49% Caucasian, 27% African American, 9.3% Hispanic, 4.3% Asian or Pacific Islander, 2.9% reporting another racial category, including multi-racial, and 7.9% who did not answer. The majority of the sample (89%) was male. The mean age of the sample was 37.8 years old ($SD=8.84$), 96% had completed high school, and the median annual income was between \$20,000 and \$30,000. Of the participants, 68% self-reported as gay, 17% heterosexual, 12% bisexual, and 3.6% as either unsure or another category. Average perceived stress was 6.40 ($SD = 3.33$), which is elevated compared to the general population level of 4.49 ($SD = 2.96$; Cohen, 1988).

Role Functioning—*Cross Sectional analyses*. At 2 months post-diagnosis, on average, participants reported occupying about 8 roles ($M = 7.78$, $SD = 1.91$) and their average

functioning in those roles during the stressful event they described was about the same as usual ($M = 3.10$, $SD = .59$). The percent of the sample reporting each role appears in Table 1. Cross-sectional correlations of role functioning with positive and negative affect appear in Table 3. Role functioning was significantly correlated with positive affect ($r = .42$, $p < .0001$) and negative affect ($r = -.24$, $p = .007$). The correlation between positive affect and role functioning remained significant when negative affect was partialled out (part correlation $r = .34$, $p < .0001$). That is, individuals who experienced positive affect more frequently, as measured by the DES at the interview 2 months after HIV diagnosis, reported higher role functioning at the same timepoint, as measured with the role functioning scale, controlling for the effect of negative affect.

At 18 months post-diagnosis, participants reported an average of 8.19 ($SD = 1.62$) roles, and their average functioning across roles was about the same as usual ($M = 3.13$; $SD = .65$). Role functioning was positively correlated with positive affect ($r = .34$, $p = .002$) though not with negative affect ($r = -.12$, ns). As with the 2-month data, the part correlation of role functioning with positive affect, with negative affect partialled out of positive, remained statistically significant, $r = .33$ ($p = .0025$).

Longitudinal analyses. Longitudinal correlations of positive affect, negative affect, and role functioning are in Table 3. Positive and negative affect at 2 months were not correlated with role functioning at 18 months, but role functioning at 2 months was correlated with both positive ($r = .32$, $p = .004$) and negative ($r = -.23$, $p = .04$) at 18 months. As in Study 2, in order to test the upward spiral associations of positive affect and role functioning we conducted a series of stepwise regression analyses. Role functioning at 18 months post diagnosis was first regressed on role functioning at 2 months post diagnosis. Then in Step 2 we added the change in positive affect from Month 2 to Month 18. Change in positive affect was significantly predictive of role functioning at month 18 over and above role functioning at month 2 (part correlation = $.28$, $p = .014$). When we controlled for the change in negative affect from Month 2 to Month 18 the results were marginally significant (part correlation = $.20$, $p = .08$).

To test the possibility that increases in positive affect at Month 18 were a function of improvements in role functioning, we regressed Month 18 positive affect on Month 2 positive affect, then we entered change in role functioning from Month 2 to Month 18. Only positive affect at month 2 predicted positive affect at month 18. Based on these regressions there was little evidence of an upward spiral between positive affect and role functioning over this 16 month period. The data indicate that increases in positive affect were predictive of improvements in role functioning, but the reciprocal effect of improvements in role functioning predicting changes in positive affect was not statistically significant.

General Discussion

Research has demonstrated that positive emotion serves a variety of important functions, among them encouraging greater creativity (Isen, Daubman, & Nowicki, 1987) and more efficient decision making (Isen, 1993), eliciting social support (Keltner & Bonanno, 1997), and counteracting the potentially damaging physiological effects of negative emotion (Fredrickson & Levenson, 1998). Furthermore, there is increasing evidence that positive emotion increases social, cognitive, and behavioral resources which feed back to subsequently increase positive emotion in an upwards spiral (Burns et al., 2008; Fredrickson & Joiner, 2002; Kok & Fredrickson, 2010). The present studies are consistent with the idea that positive emotion may limit the proliferation of stress from the specific stressful context into other role areas, suggesting another route by which positive emotion has adaptive effects on psychological and physical well-being. In 4 of the 5 cross-sectional tests, (with

the exception of the cross sectional correlation at the month 6 interview in maternal caregivers) the present studies showed that positive emotion was associated with better self-reported role functioning performance, despite the potentially depleting effects of the stressful situations. The significant correlation of positive emotion and role functioning remained even when the effects of negative emotion were partialled out. This is consistent with previous studies demonstrating that the effects of positive emotion are independent of negative emotion (Chida & Steptoe, 2008; Cohen, Alper, Doyle, Treanor, & Turner, 2006; Fredrickson, 1998; Moskowitz, 2003; Moskowitz, Epel, & Acree, 2008; Ong, Bergeman, Bisconti, & Wallace, 2006; Ostir, Berges, Markides, & Ottenbacher, 2006; Pressman & Cohen, 2005).

Although it is not clear why the magnitude of the association of positive emotion and role functioning tended to be smaller among the maternal caregivers compared to the other samples, we know that the maternal caregivers sample differed in a number of ways from the other two samples. For example, the caregivers were all female and they occupied, on average, more roles than the other two samples (11 compared to 9 in the students and 8 in the people living with HIV). A finer-grained examination of which roles were affected by stress and in what way could potentially reveal an explanation for the weaker effects in the caregiver sample. For example, caregiving stress may have led caregivers to focus their attention (and resources) on their caregiving role at the expense of other roles which resulted in better role functioning with respect to caregiving but poorer performance in other, less central, roles. In calculating an overall role functioning score, differing effects on different role domains are masked and may have led to a smaller apparent effect of positive emotion.

Our observational data cannot speak definitively to direction of causality. Following on earlier laboratory work (Tice, et al., 2007), we presented the results to be consistent with the hypothesis that positive emotion leads to better role functioning. However, it is certainly possible that individuals who were functioning better in their day-to-day roles experienced higher levels of positive emotion as a consequence of their successful role functioning. In fact, there was some evidence in the present data that higher role functioning predicted subsequent positive affect. Our analyses exploring a potential reciprocal association between increases in positive emotion and improvements in role functioning over time were not significant, however, so additional investigation of the direction of effect is warranted. Longitudinal studies in which participants are assessed at shorter intervals may reveal more, ultimately, randomized trials in which participants are assigned to conditions which increase their positive emotion or improve their role functioning could help to disentangle the association. Recently a number of interventions that specifically target positive emotion have been developed (Moskowitz, 2010a; Sin & Lyubomirsky, 2009) and some are currently being tested in people experiencing significant life stress (Moskowitz, 2010b) with the goal of improving psychological well being as well as role functioning among these highly stressed samples.

We used a measure of role functioning as an indirect indicator of self-control resources. Currently, there are no measures that directly measure depletion or replenishment of self-regulation resources. Instead, they are measured indirectly by observing individuals' performance on subsequent self-regulation tasks. In this manner, previous studies have demonstrated that stress depletes self-regulation resources, supporting our assumptions for the present studies. Although the role functioning measure used in the present studies has not been extensively validated, evidence from three very different samples indicates that the measure is face valid, acceptable to the participants, feasible to administer in a variety of samples, and is related in sensible ways to measures of positive and negative emotion. Most existing measures of role functioning are either clinician reported for psychiatric samples (Cornblatt, et al., 2007; Goodman, et al., 1993) or focused on health-related decrements in

activities of daily living (Crystal, et al., 2000; Kazis, et al., 2004; Stewart, et al., 1988; Ware Jr & Sherbourne, 1992). Similar to the self-regulation measure used by Oaten & Cheng (2005), and the stress proliferation measure developed by Benson (2006) the present measure lists a wide variety of common roles and responsibilities. In addition, however, our measure adds an appraisal of the importance of each role for the individual. Our rationale for including the importance of each role in the assessment is that if a stress-related decrement occurs in a role that has little personal importance to the individual, then the decrement itself will have little consequence. However, decrements in performance on roles that are important to the individual are likely to cause further difficulties and should be addressed if possible. The results of the present set of studies support further testing of the role functioning measure.

Summary. Self-regulation is vital to successful performance in life, including effective functioning in the variety of roles that individuals occupy. Baumeister and colleagues' (Baumeister, Muraven, & Tice, 2000; Muraven & Baumeister, 2000) model of self- suggests that individuals possess a limited self-regulation resource (akin to energy or strength) that can be depleted by stress and impair self-regulation efforts required for optimal day-to-day role functioning. Findings of our present studies were consistent with previous laboratory work and demonstrate that both intensity and frequency of positive emotion may have helped overcome the effects of depletion and resulted in better performance on role functioning. Additionally, our studies extend previous work by investigating positive emotions as they occur naturally (rather than through laboratory mood induction procedures), as well as measuring self-regulation by performance in daily roles rather than laboratory tasks. Thus, these present studies help to generalize earlier work and demonstrate the robustness of the findings in a more applied context. The results support hypotheses stemming from the Broaden and Build model of positive emotion (Fredrickson, 1998) and revised stress and coping theory (Folkman, 1997) both of which argue for unique adaptive functions of positive emotion under stressful conditions.

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Table 1

Percent of Each Sample who reported each role

Role	Study 1 Students N=427	Study 2 Maternal Caregivers 3 month interview N=267	Study 2 Maternal Caregivers 6 month interview N = 243	Study 3 People with HIV 2 months post diagnosis N=127	Study 3 People with HIV 18 months post diagnosis N = 84
Student	97.5%			12.3%	15.5%
Friend	96.8%	96.6%	97.1%	95.1%	96.4%
Worker	55.4%	50.8%	50.2%	58.2%	61.9%
Daughter/Son	91.1%	76.7%	74.2%	84.4%	86.9%
Sibling	86.5%	89.3%	89.7%	86.9%	91.7%
Girlfriend/Boyfriend, Spouse, or Partner	48.0%	70.2%	70.0%	36.1%	36.9%
Parent/Guardian	6.2%	100%	98.8%	14.8%	13.1%
Sports Team Member	16.2%				
Extracurricular Group	33.6%				
Regular Exerciser	57.2%	50.8%	52.3%	67.2%	75.0%
Eating Well	70.3%	75.2%	79.8%	87.7%	89.3%
Taking Prescribed Medication	23.3%	54.2%	55.1%	68.9%	79.8%
Taking Vitamins	29.5%	46.6%	48.2%		
Pet Owner	30.0%	46.6%	43.6%	27.9%	36.9
Religious Group Member	39.4%	51.9%	50.2%	18.1%	20.2
Volunteer	14.9%	37.8%	34.6%	23.0%	22.6
Household Upkeep	85.4%	98.5%	97.9%	85.3%	84.5

Table 2

Correlations of Positive affect, negative affect, and role functioning at two time points in maternal caregivers.

	PA 3 months	NA 3 months	Role functioning 3 months	PA 6 months	NA 6 months
Positive Affect 3 months					
Negative Affect 3 months	-.41 ***				
Role functioning 3 months	.20 **	-.022			
Positive Affect 6 months	.61 ***	-.30 ***	.15 *		
Negative Affect 6 months	-.29 ***	.62 ***	-.023	-.42 ***	
Role functioning 6 months	.020	-.035	.49 ***	.078	-.13 (p =.052)

* p<.05;
** p<.01;
*** p<.001

Table 3

Correlations of positive affect, negative affect, and role functioning in people with HIV at two and 18 months after diagnosis

	PA 2 months	NA 2 months	Role functioning 3 months	PA 18 months	NA 18 months
Positive Affect 2months					
Negative Affect 2 months	-.63***				
Role functioning 2 months	.42***	-.24 (.007)			
Positive Affect 18 months	.52***	-.22*	.32**		
Negative Affect 18 months	-.40***	.44***	-.23*	-.61***	
Role functioning 18 months	.089	.044	.23*	.34**	-.12

* p<.05;
** p<.01;
*** p<.001