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Effects of Positive and Negative Affect and Emotional Suppression on Short-term Life Satisfaction and Depression[1)]

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Introduction

In contrast to the detrimental influences of negative affect (NA) on health, positive affect (PA) has been found to play a crucial role in improving health (see Pressman & Cohen, 2005 for a review). However, it is highly likely that the relationship between affect[2)] and health is influenced by how emotions are processed or controlled. Accordingly, emotional regulation represents a crucial factor for optimal health. According to Gross (1998), "emotion regulation refers to the processes by which individuals influence which emotions they have, when they have them, and how they experience and express these emotions" (p.275). Among the many known strategies of emotional regulation, Gross (2001) previously focused on two widely used strategies, reappraisal and suppression. In the current study, we focused on emotional suppression (ES) since Gross (2001) considers ES a response-focused emotional regulation strategy that develops after emotions are initially evoked.

Previous research has shown that inhibiting expression of NA is negatively associated with various health indicators (e.g., Scuteri, Parsons, Chesney, & Anderson, 2001; Spielberger et al., 1985; Steffen, McNeilly, Anderson, & Sherwood, 2003). This finding suggests that although NA *per se* may be associated with health problems, its suppression could further exacerbate the detrimental effects of NA on health. Meanwhile, although there are few studies that have directly investigated the effects of PA suppression on health, a number of previous studies have attempted to determine the effects of PA expression on health (e.g., Barr, Kahn, & Schneider, 2008; Feng et al., 2007). These prior studies suggest that suppression of positive emotions may reduce the beneficial effects of PA on overall health.

Investigations into the effects of affect on health also need to consider another dimension of affect termed "activation." According to the two-factor model of affect, the first unrotated factor is interpreted as a Valence dimension and the second unrotated factor as an Activation or Arousal dimension (Larsen & Diener, 1992; Russell, 1980). Thus, PA and NA, which represent the opposite ends of the Valence dimension, also change in the Activation dimension, which allows us to consider different types of PA and NA, i.e., activated PA (e.g., enthusiastic, happy), deactivated PA (e.g., calm, satisfied), activated NA (e.g., nervous, angry), and deactivated NA (e.g., sluggish, sad). In recent years, a few studies have begun to discriminate the two types of affect along the activation axis (e.g., De Dreu, Baas, & Nijstad, 2008; Nezlek & Kuppens, 2008; Tsai, Knutson, & Fung, 2006), and these reports suggest distinct roles for activated and deactivated affect. Although no prior research has examined these differentiations in regard to health status, differential effects of activated and deactivated affect are plausible.

Thus, we conducted this study to examine the effects of activated and deactivated affect (PA and NA) and ES on health. We measured short-term life satisfaction (LS) along with depression as health measures. Since we targeted non-clinical subjects in this study, we attempted to employ measures sensitive enough to

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determine potential preconditions that could lead to health problems in the future. One of those candidate measures is life satisfaction (LS), which is a conscious cognitive judgment of one's life in which the criteria for judgment are up to the individual (Pavot & Diener, 1993). In fact, Siahpush, Spittal, and Singh (2008) showed that LS at baseline was positively associated with good health at a 2-year follow-up exam. The common assessment target of LS is the subjective whole past life. However, "life" in LS does not need to be defined as the past whole life. If one assesses LS for just the past week, the assessment would be more current and representative of the short-term status of satisfaction in life. It would be especially useful when employing short-term prospective research designs in natural settings, since it is likely that LS for short-term past periods, such as the past week, changes more easily than that associated with longer past periods.

Moreover, we employed a new short-term prospective research design to predict causality between the variables measured. Although two measurement points (Times 1 and 2; T1 and T2 in subsequent descriptions) are typically set in this kind of research design, in which changes in outcome variables from T1 to T2 are predicted by predictor variables from T1, this design is unable to take into account any new changes in predictor variables from T1 to T2. As Burns et al. (2008) suggested, use of the T1 version of the predictor captures processes occurring at T1 and before. Processes occurring between T1 and T2 would be more crucial when we predict changes from T1 to T2 in outcome variables by predictor variables. Burns et al. (2008) utilized the T1-T2 average (mean) of the predictor variable to evaluate these processes. However, since predictor and outcome variables are measured in an overlapping period (i.e., T2) in their method, a genuine prospective design is not established. Therefore, in this study, we set three measurement points (T1, T2, and T3) in which changes in outcome variables from T1 to T3 were predicted by changes in predictor variables from T1 to T2.

Taken together, the aim of the present study was to examine the effects of activated and deactivated affect (PA and NA) and ES on depression and short-term LS, utilizing a short-term prospective research design in which three measurement time points were set.

Methods

Participants and Procedure

Participants were 136 undergraduate students from a university in Japan. Incomplete data were obtained from five participants whose data were therefore excluded, so that the final sample included data collected from 131 participants (66 men and 65 women). The mean ages and *SD*s for this sample were 22.74 ± 3.81 years for men and 22.72 ± 6.31 years for women.

Participants in various group sizes (approximate group sizes varied from 2 to 20 students) completed five questionnaires on three occasions (T1 to T3), four weeks apart. All of the questionnaires were Japanese versions, answered in terms of experiences over the past week.

Measures

Activated and Deactivated PA and NA

Activated PA and NA were measured using the Japanese version of the Positive and Negative Affect Schedule (PANAS; Sato & Yasuda, 2001). The alphas were .82 and .84 for the PA and NA scales at T1 in this study, respectively. The construct validity of these scales was established by a study in which PA, NA and neutral affect were experimentally manipulated (Sato & Yasuda, 2001). Unlike the original version (Watson, Clark, & Tellegen, 1988), the Japanese version contains eight items for both PA (e.g., enthusiastic, proud, and excited) and NA (e.g., afraid, jittery, and scared), which are rated on a 6-point Likert scale (rated from "not at all" to "extremely"). Thus, scores on the PA and NA scales each ranged from 8

through 48. In this study, participants were instructed to indicate the extent to which each item represented the way they felt over the prior one-week period. Deactivated PA and NA were measured using the subscales of deactivated pleasure and boredom (respectively) from the Multiple Mood Scale (MMS: Terasaki, Kishimoto, & Koga, 1992). Each subscale contains five items (e.g., relaxed, calm, and placid for PA; dull, tired, and bored for NA), rated on a 4-point Likert scale (from "never felt" to "clearly felt") with score ranges of 5 through 20. In this study, participants were asked to rate how they experienced each emotion during the past week. The alphas were .89 and .77 for the PA and NA scales at T1 in this study, respectively. The concurrent validity of these subscales was established by Terasaki et al. (1992).

Emotional Suppression (ES)

ES was measured using the ES subscale from the Emotion Regulation Questionnaire (ERQ: Gross & John, 2003), which was translated into Japanese for this study. This subscale contains four items (e.g., "I controlled my emotions by not expressing them."). Participants rated each item on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Total scores ranged from 7 through 28. Participants were asked to rate how strongly they agreed with each item over the past week. The alpha was .73 at T1 in this study. The original scale has high internal reliability and both convergent and discriminant validity (Gross & John, 2003).

Short-term Life Satisfaction (LS)

LS was assessed by means of the Short-term Life Satisfaction Scale (SLSS), which was developed based on the Satisfaction with Life Scale (SWLS: Pavot & Diener, 1993). Although the SLSS includes similar instructions and contains five items similar to the SWLS, these elements were revised to allow for asking about the past week instead of the past whole life. Participants answered the five items pertaining to life during the past week on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Item examples include: "If I could relive the past week again, I would change almost nothing," and "I am satisfied with my life." Total scores ranged from 5 to 35. The alpha was .87 at T1 in this study. The original U.S. version of the scale has high reliability and both convergent and discriminant validity (Pavot & Diener, 1993).

Depression

The Japanese version of the CES-D (Center for Epidemiologic Studies Depression Scale; Shima, Shikano, Kitamura, & Asai, 1985), which was originally developed by Radloff (1977), was utilized to measure depression. The CES-D is a 20-item self-report scale inquiring about the participant's experiences of negative mood states during the previous week. Each response is graded on a 4-point scale from 0= "rarely or none of the time" to 3= "most or all of the time." The alpha was .69 at T1 in this study. Shima et al. (1985) demonstrated the reliability of CES-D using correlations by test-retest and split-halves methods, and demonstrated validity by comparing scores between normal participants and depressed patients.

Results

Table 1 shows the correlations between all measures at T1 for both men and women, along with the means and standard deviations of each measure. In both sexes, short-term LS displayed significantly negative correlations with both activated NA (r = -.41, p < .01 and r = -.24, p < .05, for men and women, respectively) and deactivated NA (rs = -.48 and -.34, ps < .01, for men and women, respectively) and significantly positive correlations with activated (not deactivated) PA (r = .53, p < .01 and r = .31, p < .05, for men and women, respectively). Depression scores were positively correlated with both activated NA (rs = .48 and .34, ps < .01, for men and women, respectively) and deactivated NA (rs = .42 and .53, ps < .01, for men and women, respectively) in both sexes and negatively correlated with deactivated

Table 1. Correlations between Measures with Means and Standard Deviations (*SD*) for Men and Women at Time 1

Measures	1	2	3	4	5	6	7	Men		Women		
								Mean	(*SD*)	*Mean*	(*SD*)	$\|t_{129}\|$
1. a-PA		-.13	.10	-.34**	-.14	.53**	-.14	28.2	8.9	27.3	5.7	.7
2. a-NA	-.06		-.18	.48**	.16	-.41**	.48**	26.5	7.0	27.1	6.2	.6
3. d-PA	-.22	-.16		-.13	.22	.12	-.28**	12.1	3.3	12.7	3.7	1.0
4. d-NA	-.31*	.37**	.14		.14	-.48**	.42**	12.6	3.2	13.2	3.3	1.1
5. ES	-.04	.31*	.18	.13		-.05	.10	13.4	4.2	14.2	4.4	1.1
6. LS	.31*	-.24*	.09	-.34**	.03		-.24	16.3	6.4	17.9	7.1	1.3
7. DEP	-.22	.34**	-.06	.53**	.15	-.38**		17.4	7.0	17.6	6.3	.2

a: activated, d: deactivated, PA: positive affect, NA: negative affect, ES: emotional suppression, LS: life satisfaction, DEP: depression
N = (66 men and 65 women). Correlations are shown above the diagonal for men, and below the diagonal for women. *$p < .05$. **$p < .01$.

Table 2. Predicting T3 Short-term Life Satisfaction *via* Activated Affect and Emotional Suppression

Steps and Variables Entered		Step 1 β	Step 2 β	Step 3 β	R^2	R^2 change
Men						
Step 1	T1 a-PA	.13	.01	.06		
	T1 a-NA	-.16	.14	-.14		
	T1 ES	.06	.15	.14		
	T1 LS	-.00	.04	.02	.05	
2	T2 a-PA		.13	.10		
	T2 a-NA		.10	.10		
	T2 ES		-.35*	-.32*	.15	.10
3	T2 a-PA x T2 ES			-.11		
	T2 a-NA x T2 ES			-.02	.16	.01
Women						
Step 1	T1 a-PA	.14	.04	.03		
	T1 a-NA	.15	.18	.19		
	T1 ES	-.08	-.17	-.18		
	T1 LS	.36**	.36**	.37**	.17*	
2	T2 a-PA		.17	.15		
	T2 a-NA		-.13	-.14		
	T2 ES		.26*	.27*	.25*	.08
3	T2 a-PA x T2 ES			.01		
	T2 a-NA x T2 ES			.08	.25*	.01

a: activated, d: deactivated, PA: positive affect, NA: negative affect, ES: emotional suppression, LS: life satisfaction, DEP: depression, T1: Time 1, T2: Time 2, T3: Time 3
N = (66 men and 65 women). *$p < .05$. **$p < .01$.

PA in men (r = -.28, p < .01). ES was not significantly correlated with any PA or NA measure in either sex except for activated NA in women (r = .31, p < .05). No sex differences were found in any variables measured.

Next, in order to examine the effects of affect and ES on short-term LS, hierarchical regression analyses were conducted with short-term LS at T3 regressed on PA, NA, and ES at T2. Following the recommendation of Aiken and West (1991), the predictor variables were standardized to avoid multicollinearity between the predictors and the interaction terms. In the hierarchical regression analyses, using short-term LS at T3 or depression at T3 as an outcome variable, PA, NA, ES, and short-term LS at T1 were entered on the first step, followed by PA, NA, ES, and short-term LS at T2 on the second step, and then PA x ES and NA x ES at T2 on the third step, for both men and women. In these analyses, we attempted to predict changes in outcomes from T1 to T3 via changes in predictors from T1 to T2.

Tables 2 and 3 show the results of the hierarchical analyses for short-term LS in terms of activated affect (Table 2) and deactivated affect (Table 3). In both Tables 2 and 3, ES showed significantly negative βs for men and significantly positive βs for women on Step 2. However, only the significant positive β in deactivated affect for women (.31, p < .05) was accompanied by a significant R^2 change (.15, p < .05) on Step 2. Regarding the effects of affect on short-term LS, deactivated PA showed a significantly positive β (.25, p < .05) on Step 2, along with a significant R^2 change (.15, p < .05) in women only. No significant βs for interactions between affect and ES were found.

Table 3. Predicting T3 Short-term Life Satisfaction *via* Deactivated Affect and Emotional Suppression

Steps and Variables Entered		Step 1 β	Step 2 β	Step 3 β	R^2	R^2 change
Men						
Step 1	T1 d-PA	.03	.02	.01		
	T1 d-NA	-.17	-.07	-.06		
	T1 ES	.04	.10	.11		
	T1 LS	.05	.05	.06	.04	
2	T2 d-PA		.08	.09		
	T2 d-NA		-.09	-.09		
	T2 ES		-.28*	-.29*	.14	.10
3	T2 d-PA x T2 ES			-.02		
	T2 d-NA x T2 ES			-.08	.15	.01
Women						
Step 1	T1 d-PA	-.04	-.12	-.12		
	T1 d-NA	.15	.01	-.01		
	T1 ES	-.01	-.12	-.11		
	T1 LS	.32*	.31*	.32*	.16*	
2	T2 d-PA		.25*	.25*		
	T2 d-NA		-.25	-.28*		
	T2 ES		.31*	.30*	.31**	.15*
3	T2 d-PA x T2 ES			-.09		
	T2 d-NA x T2 ES			.10	.33**	.02

a: activated, d: deactivated, PA: positive affect, NA: negative affect, ES: emotional suppression, LS: life satisfaction, DEP: depression, T1: Time 1, T2: Time 2, T3: Time 3

N= (66 men and 65 women). *p < .05. **p < .01.

Table 4. Predicting T3 Depression *via* Activated Affect and Emotional Suppression

Steps and Variables Entered		Step 1 β	Step 2 β	Step 3 β	R^2	R^2 change
Men						
Step 1	T1 a-PA	.24**	.19	.20		
	T1 a-NA	-.03	-.04	-.04		
	T1 ES	.04	.03	.03		
	T1 DEP	.75**	.74**	.74**	.56**	
2	T2 a-PA		.10	.09		
	T2 a-NA		.06	.06		
	T2 ES		.03	.04	.57**	.01
3	T2 a-PA x T2 ES			-.05		
	T2 a-NA x T2 ES			-.01	.58**	.00
Women						
Step 1	T1 a-PA	.08	.09	.12		
	T1 a-NA	.06	.01	-.01		
	T1 ES	.06	.11	.11		
	T1 DEP	.49**	.44**	.46**	.27**	
2	T2 a-PA		.01	.08		
	T2 a-NA		.18	.22		
	T2 ES		-.20	-.24	.33**	.06
3	T2 a-PA x T2 ES			-.04		
	T2 a-NA x T2 ES			-.23	.37**	.05

a: activated, d: deactivated, PA: positive affect, NA: negative affect, ES: emotional suppression, LS: life satisfaction, DEP: depression, T1: Time 1, T2: Time 2, T3: Time 3
N= (66 men and 65 women). *p < .05. **p < .01.

Tables 4 and 5 show the results of the hierarchical analyses for depression in terms of activated affect (Table 4) and deactivated affect (Table 5). Hierarchical regression analyses were conducted using methods similar to those utilized in the data presented in Tables 2 and 3. In Steps 2 and 3, no significant βs were found for affect, ES, or their interaction.

Discussion

In this study, the effects of affect (PA and NA) and ES on short-term LS and depression were examined using a prospective research design. We also considered the dimension of affect activation. ES was positively associated with short-term LS in women. No ES x affect interactions were found. Also, deactivated PA was positively associated with short-term LS in women. Regarding depression, no significant findings were obtained.

Since in general, ES is more socially acceptable for women than for men, these findings are difficult to interpret. However, emotional displays such as crying and shouting reflect a status in which emotions are out of control. Even in women, if they are unable to control emotions, it might indicate that the stress they experience is not under control, resulting in a more unsatisfied life. However, this phenomenon was not found in men. The discrepancy in findings between men and women might result from the fact that it is socially natural for men to suppress emotions such that ES may not be related to life satisfaction. Moreover, it is likely that depression did not show any relation with ES because most participants were

Table 5. Predicting T3 Depression *via* Deactivated Affect and Emotional Suppression

Steps and Variables Entered		Step 1 β	Step 2 β	Step 3 β	R^2	R^2 change
Men						
Step 1	T1 d-PA	-.06	-.06	-.05		
	T1 d-NA	-.14	-.20	-.19		
	T1 ES	.04	.05	.05		
	T1 DEP	.75**	.72**	.72**	.52**	
2	T2 d-PA		.02	.00		
	T2 d-NA		.15	.16		
	T2 ES		.01	.00	.54**	.02
3	T2 d-PA x T2 ES			-.05		
	T2 d-NA x T2 ES			.10	.56**	.01
Women						
Step 1	T1 d-PA	.09	.06	.08		
	T1 d-NA	-.10	-.14	-.12		
	T1 ES	.07	.14	.16		
	T1 DEP	.55**	.57**	.55**	.27**	
2	T2 d-PA		.07	.03		
	T2 d-NA		.04	.04		
	T2 ES		-.20	-.20	.31**	.04
3	T2 d-PA x T2 ES			-.06		
	T2 d-NA x T2 ES			-.13	.32**	.02

a: activated, d: deactivated, PA: positive affect, NA: negative affect, ES: emotional suppression, LS: life satisfaction, DEP: depression, T 1: Time 1, T2: Time 2, T3: Time 3
N= (66 men and 65 women). *p < .05. **p < .01.

mentally healthy in this study. The finding that no interaction between affect and emotional suppression was obtained did not support our hypotheses suggesting that the detrimental effects of NA on health and adjustment would be enhanced by ES, and that the beneficial effects of PA would be impaired by it. Since the above predictions are simply based on speculation, we may need further research to better examine them.

Regarding the direct effects of affect on health measures, it is noteworthy that only deactivated affect was associated with short-term LS in women. Deactivated affect generally lasts longer than activated affect, and this longer continuation of deactivated affect might have influenced LS more strongly compared to activated emotional states. Many previous studies have utilized the PANAS to assess PA and NA. PANAS mainly measures activated PA and NA (Huelsman & Furr, 2003; Huelsman, Nemanick, & Munz, 1998). The present finding suggests that we need to assess deactivated PA and NA when considering the effect of affect on health and adjustment. However, this effect was not found in men. In line with the above finding that ES was influential only in women, it seems likely that ES is much more crucial for women's health compared to men's.

Finally, some cautions are indicated for future research. The present research attempted to predict causal relationships between affect (or ES) and short-term LS (or depression), utilizing a special prospective research design. Generally, in this kind of short-term prospective design, two measurement points (T1 and T2) are set, in which a predictor variable at T1 predicts an outcome variable at T2, with the outcome

variable at T1 controlled for (e.g., Fredrickson & Joiner, 2002). However, as Burns et al. (2008) suggested, we cannot utilize the information on what takes place between T1 and T2. So, we set up another measurement point between these two points, by which we attempted to predict the change of an outcome variable from T1 to T3 from the change of a predictor variable from T1 to T2. However, this new prospective design has another fault like the extant prospective design in that if no stressful event that can influence the outcome variable during the period from T1 to T3 takes place, any causal relations would not be extracted because changes in the outcome variable are completely lost by controlling for the outcome variable at T1. In order to overcome this design flaw, it is necessary that some stressful event take place just before T3, as described in Fredrickson, Tugade, Waugh, and Larkin (2003), in which the September 11th terrorist attacks took place before the final measurement point.

Moreover, since emotional suppression of PA and NA might play differential functional roles as demonstrated by Nezlek and Kuppen (2008), we need to discriminate between these two kinds of suppression. Although it is true that many previous studies focused on the expression or suppression of NA or negative events, a few studies have begun to investigate the suppression of PA (e.g., Nezlek & Kuppens, 2008; Simpson & Stroh, 2004). However, no prior research has discriminated between the expression or suppression of PA and NA across the dimensions of affect activation, which would be a fruitful avenue for future research. Finally, utilizing various direct health measures in clinical subjects or individuals at high risk for health impairment, we should conduct longitudinal research to conclude whether the findings in the present study are consistently observed. If we find similar roles of activated/deactivated affect and ES in future studies, we could then move forward towards prevention or interventional research that might enhance health and adjustment in practical settings.

Note

1) This research was supported by a grant from the Japan Society for the Promotion of Science (No. 21530730).

2) The terms “affect” and “emotions” are often used interchangeably, although these concepts can be discriminated (Fredrickson, 2001). In general, affect is measured utilizing emotions such as “happy” and “sad.” In this paper, the word “affect” was primarily used because the evaluation of discrete emotions was not targeted in the current study. So, even where we use the term “emotional suppression,” it is applicable to affect since we measured affect resulting from emotional regulation in this study.

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Effects of Positive and Negative Affect and Emotional Suppression on Short-term Life Satisfaction and Depression

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Relationships between emotional experiences and health/adjustment are influenced by many variables, with emotional suppression (ES) being one of the most influential. In the current study, we examined the effects of affect and ES on short-term life satisfaction (LS) and depression. We also considered the dimension of activation status for both positive affect (PA) and negative affect (NA). The final sample included data collected from 131 undergraduates (66 men and 65 women). Participants answered five questionnaires to assess activated and deactivated PA and NA, ES, short-term LS, and depression on three occasions separated by approximately five weeks. In each case, the questionnaires determined experiences over the previous week. Hierarchical regression analyses demonstrated that ES was positively associated with short-term LS in women, with no ES x affect interaction. Also, in women, deactivated PA was positively associated with short-term LS, while deactivated NA was negatively associated with short-term LS. With respect to depression, no significant findings were obtained. Limitations of this study, along with the necessity of interventional methods in future research, are discussed.

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