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The Independence of Positive and Negative Affect

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Five studies on the relation between positive and negative affect are reported. In Studies 1 and 2 we found that positive feelings were remembered as being nearly independent of negative feelings in the past year, but the two types of affect were moderately negatively correlated for the past month. In Studies 3 and 5, subjects completed daily mood reports for 70 and 30 days, respectively. In Study 4, subjects completed three-week, daily, and moment mood reports and also filled out reports when they experienced strong emotions. The principal finding was that the relation between positive and negative affect differed greatly depending on the time frame. The strongest negative correlation between the two affects occurred during emotional times. The correlation decreased in a linear fashion as the time span covered increased logarithmically. It appears that positive and negative affect are independent in terms of how much people feel in their lives over longer time periods. Researchers need to focus on the processes that underlie both positive and negative affect and that are responsible for producing their relative independence.

Subjective well-being has become of widespread interest to psychologists in recent years. Although much work has been carried out at the survey level (Andrews & Withey, 1976; Campbell, Converse, & Rodgers, 1976), there remains an age-old debate on what happiness is and if it can be measured. Even so, researchers have begun to empirically explore the dimensions of subjective well-being (Campbell et al., 1976). Bradburn and his associates have offered evidence that happiness or subjective well-being is not a unitary construct, but is composed of two separate feelings: positive and negative affect. In a series of studies, Bradburn (1969; Bradburn & Caplovitz, 1965) used a scale consisting of ten items, five of which measured positive affect (the Positive Affect Scale, or PAS) and five of which measured negative affect (the Negative Affect Scale, or NAS). Respondents were asked to indicate whether they had experienced any of the ten feelings in the past few weeks. The major findings of Bradburn's studies were that (a) the correlation between positive and negative affect items was very low, (b) the correlation of items within positive and negative affect categories was much higher, and (c) the two dimensions of affect correlated differently with various external variables. For example, worry and anxiety correlated with NAS but not with PAS. Social participation and sociability correlated with PAS but not with NAS. Other researchers (Beiser, 1974; Cherlin & Reeder, 1975; Costa & McCrae, 1980; Moriwaki, 1974; Warr, Barter, & Brownbridge, 1983) have also found that positive and negative affect show different relations with external variables. Another important finding of Bradburn's studies was that whereas scores on the two dimensions were independent, both were separate predictors of self-reported happiness.

Bradburn's (1969; Bradburn & Caplovitz, 1965) findings have stirred considerable interest. Within the subjective well-being area, the results, if confirmed, would imply that happiness must be measured along two dimensions that vary relatively independently of each other. Thus Bradburn's findings are important to the debate about both how happiness should be conceptualized and how it should be measured. In addition, the finding

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of the independence of the two types of affect is not just of interest to those researchers working in the area of subjective well-being. The finding has practical and theoretical implications to other areas. For example, clinicians have often conceptualized distress and well-being as lying at opposite ends of a single continuum. But if these two dimensions are indeed independent, then the distress of clients could be alleviated without producing positive affect and vice-versa. Some clinical problems might result from the absence of positive affect, whereas others may result from the presence of excessive negative affect.

Partly because of their importance and partly because they are counterintuitive, Bradburn's (1969; Bradburn & Caplovitz, 1965) findings have ignited a controversy. Most people expect positive and negative affect to vary inversely and there are theoretical reasons as well for believing they should do so (Brenner, 1975). However, a number of researchers have found additional empirical support for the independence of the two dimensions (Andrews & Withey, 1976; Moriwaki, 1974). Typically, the PAS and NAS correlate inversely over a range of −.05 to −.30, which suggests that the two scales are not totally independent. However, the interitem correlations reveal that the two scales are nearly independent. Items within each scale usually correlate around .25, whereas items across scales typically correlate only about −.05 (Beiser, Feldman, & Egelhoff, 1972; Warr, 1978). Several improvements on Bradburn's scale have not altered the independence of the dimensions (e.g., Beiser, 1974).

Problems With the Bradburn Scale

Despite these ample supportive empirical findings, it still remains to be established whether positive and negative affect are truly independent. Bradburn's (1969; Bradburn & Caplovitz, 1965) scales have been criticized on a number of grounds, and it is possible that the independence of the two affects may be due to the particular items used. A number of problems can be briefly described:

1. Items on the PAS seem to reflect arousal and activity, whereas items on the NAS do not. Related to this is the criticism that there is not good domain or content sampling from the entire realm of positive and negative emotions. Furthermore, most of the items are very specific (e.g., "proud because someone complimented you"). It might be that only these specific feelings are independent, and that this is not so for affect measured in a broader way.

2. There appears to be a ceiling effect on positive affect and a floor effect on negative affect. This could attenuate correlations overall, by reducing the variability of scores.

3. Questions are answered in terms of a yes–no format, thus raising the possibility of contamination of results that is due to acquiescence.

4. Bradburn's (1969; Bradburn & Caplovitz, 1965) scale measures simple occurrence of the feelings, and fails to take into consideration the frequency and intensity with which the specific feelings are felt. Thus it is possible that a person may have felt both positive and negative affect, but this does not mean that both types of affect were felt in the same proportion.

5. In the questions there is a great deal of specific nonaffective content that could influence responses (Brenner, 1975). For example, in the case of "proud because someone complimented you," one could have been very happy and not have had this happen. Similarly, one can be proud without having been complimented. When Brenner (1975) used more general items such as "depressed" and "unhappy," and changed the wording to "in the past week," he obtained a significant inverse correlation between positive and negative affect of −.52.

6. One of the most frequent criticisms is that the independence may be linked to the time frame that the questions cover. Recall that respondents are asked to indicate which feelings they had experienced in the past few weeks. As the time periods asked about become shorter, positive and negative affect may become increasingly more inversely related.

To summarize, despite the numerous findings from Bradburn's (1969; Bradburn & Caplovitz, 1965) scale that support the independence of positive and negative affect, there are a number of arguments suggesting that this independence could stem from the scale itself. The major difficulties with the scale

are that the items do not adequately assess positive and negative affect and that only a single time period is sampled.

The first of these problems was addressed in a recent study by Zevon and Tellegen (1982). These investigators had 23 subjects complete daily mood checklists for a period of 90 consecutive days. They circumvented the problem of specificity of item content by using affect words selected to ensure adequate sampling of the domain of positive and negative affect. They accomplished this by selecting three affect words from each of 20 mood categories. The principal finding was that the structure of mood could best be interpreted as two *unipolar* dimensions, positive and negative affect. However, these investigators also sampled only a single time period.

Relevance of the Emotion Literature

There is an extensive literature of studies in which researchers have used affect adjective checklists and have explored the relation between various emotion words. These studies have focused on momentary moods as opposed to the long-term structure of affect. A number of researchers have found that happiness and sadness load on separate factors (Clyde, 1963; Lorr & Shea, 1979). However, the happiness and sadness factors are not independent and are usually highly inversely correlated. For instance, Lorr and Shea (1979) found that elation and sadness loaded on separate factors, but that these oblique factors were correlated −.55. Thus the emotion literature, in which a number of emotion factors are uncovered, cannot be taken as ready support of Bradburn's (1969; Bradburn & Caplovitz, 1965) position because the factors are usually moderately or strongly correlated.

Recently, Russell (1979, 1980; Russell & Mehrabian, 1977) argued in support of the idea that emotion falls along two bipolar dimensions: pleasantness–unpleasantness (positive–negative) and arousal. Sjoberg, Svensson, and Persson (1979) factor analyzed responses to an 86-item mood adjective checklist, using a Guttman simplex analysis (Guttman, 1954) instead of a common factor analysis. These investigators also report that mood is basically two dimensional, one dimension being pleasantness–unpleasantness and the other being activity or arousal. Thus the emotion literature does not support Bradburn. It suggests either only one dimension on which positive and negative affect are bipolar ends or else separate, highly correlated factors. In either case, it does not appear that positive and negative affect are independent.

Can the findings of the emotion literature be reconciled with those of Bradburn (1969; Bradburn & Caplovitz, 1965) and other subjective well-being researchers such as Zevon and Tellegen (1982)? We think so, but first an important distinction needs to be made. Bradburn and the other subjective well-being researchers are interested in how much of each emotion a person feels over a long time period. Thus it is quite possible that positive and negative affect could be strongly inversely related at particular moments in time—even perfectly negatively correlated—and still be independent in terms of how much people feel in their lives over a long period of time. In other words, the positive and negative affect *states* could be inversely correlated in a person's life. However, the longer term mean levels of affect that people experience (possibly more trait related) may be independent.

Our purpose, then, is to determine whether positive and negative affect are independent. We incorporated a number of improvements over previous studies in order to determine this. We used broad affective words such as *happy* and *unhappy* to avoid the sampling and specific content problems encountered by Bradburn (1969; Bradburn & Caplovitz, 1965). We also measured affect over different time periods (moments, days, weeks) to see if a conceptual bridge could be built between the findings of the emotion researchers and the subjective well-being researchers. We measured affect ecologically, at random moments and across days in people's everyday lives, so that the findings would show less influence of memory bias of the subjects. Perhaps Bradburn's findings are due to memory biases because emotions are highly salient and memorable and people may remember them disproportionately. Indeed, there is a great deal of evidence to suggest this is the case (Diener, Larsen, & Emmons, 1984a; Erdelyi & Goldberg, 1979; Matlin & Stang,

1978; Teasdale & Fogarty, 1979). We sought to determine if positive and negative affect are independent in people's everyday lives, not just among stronger and more memorable emotions.

Study 1

Method

Subjects were University of Illinois undergraduates participating to fulfill an introductory psychology requirement. Although testing the independence of positive and negative affect, we were simultaneously trying to devise a scale with broadly based items to measure happiness. Two subject samples were administered a list of positive and negative affect words. The first, Sample A (n = 112), rated the extent to which they had felt each of 24 emotions over the past year. The second, Sample B (n = 346), rated the same words plus two additional emotions. Fourteen of these emotion words are shown in Table 1. The emotion words were selected from lists compiled by Russell (1979, 1980; Russell & Mehrabian, 1977) and Plutchik (1980) so as to represent the emotions that might most frequently be related to happiness and unhappiness. Potential items such as *surprised* or *sleepy* were excluded either because of their questionable nature as emotions or because they did not appear to be substantial sources of affect in everyday life. A number of additional items were included for other purposes (i.e. construction of a subjective well-being scale). In Sample A these items were sentences related to life satisfaction and in Sample B there were a large number of subjective well-being items in sentence form. Subjects were asked to indicate the degree to which they had experienced each of the moods during the past year on a scale of 1 (*not at all*) to 7 (*extremely much*). All subjects were tested in a group setting. A different sample of 167 undergraduates was administered the Bradburn PAS and NAS scales. Following completion of the questionnaires, subjects were thanked and given a written debriefing.

Results and Discussion

Responses to the happiness questionnaires were subjected to factor analyses with varimax rotation and squared multiple correlations used as communality estimates. The number of factors to be extracted was determined by a joint combination of the scree test (Cattell, 1966) and variance accounted for by each factor. After we inspected the items and their respective loadings, the factors were labeled *positive affect, negative affect,* and *satisfaction.* The satisfaction factor included items such as "The conditions of my life are excellent." This third factor is not germane to this study and is not included in our further presentation. In Sample A the two affect factors accounted for 47% of the variance, whereas the satisfaction factor accounted for 7%. In Sample B the two affect factors accounted for 53% of the variance in responses and the satisfaction factor 5%. The factor loadings of specific affect words are presented in Table 1 for Samples A and B.

Table 1
Selected Mood Adjective Affect Loadings

	Factor 1		Factor 2	
Affect words	Sample A	Sample B	Sample A	Sample B
Pleasant				
Happy	74	74	−08	−15
Joy	85	64	08	−06
Pleased	64	57	−12	−15
Enjoyment/Fun	78	60	−07	00
Glad	72	70	01	−09
Delighted	62	69	08	−10
Contented	45	57	−24	−25
Unpleasant				
Angry	00	03	52	60
Fear/anxiety	04	−15	73	59
Frustrated	−21	−19	63	62
Depressed	−29	−20	74	70
Annoyed	−01	−11	52	51
Sad	−15	−14	80	60
Gloomy	−11	−24	82	60

Note: Decimals are omitted. Sample A: N = 112, Sample B: N = 346

One can see from the relatively simple structure that the positive and negative affect words load on separate factors, thereby supporting Bradburn's position. The factor structures for the two samples were very similar. However, the lower loadings for Sample B and the lower interitem correlations (which are presented in Table 2) may be attributable to the mass setting in which these subjects completed the questionnaire, thus possibly leading to carelessness by some subjects. One can see that the interitem correlations within each category of affect are high and the correlations between the two classes of affect are much lower. These results provide evidence for the relative independence of positive and negative affect. In addition, we found that scores on the PAS and NAS were independent of each other (r = −.11, *ns*). Incidentally, there were no significant sex differences found in this study, nor were there any in the subsequent studies to be reported, so we do not discuss these further. In Study

Table 2
Average Interitem Correlations for the Affect-Adjective Scale

Sample	Time frame	Positive–negative	Positive–positive	Negative–negative
Study 1[a]				
$n = 112$	past year	−.15	.57	.54
$n = 346$	past year	−.10	.42	.40
Study 2[b]				
$n = 63$	past month	−.42	.71	.59
	past year	−.10	.58	.56

[a] University of Illinois [b] College of the Virgin Islands

2, we sought to analyze affect structure with a cross-cultural sample and we also examined an additional time period.

Study 2

Method

The subjects were 63 (45 female, 18 male) undergraduates enrolled in various psychology courses at the College of the Virgin Islands. Subjects were asked to indicate the degree to which they experienced 6 positive feelings (*delighted, happy, glad, content, satisfied,* and *pleased*) and 6 negative feelings (*annoyed, frustrated, miserable, sad, depressed,* and *gloomy*). Because the factor analytic studies had not been completed at this time, the items used in the Virgin Island sample were not based on the factor analyses. These terms were selected from Russell's (1980) to represent very pleasant and unpleasant emotions with roughly comparable arousal values. The words *miserable* and *satisfied* used in this study were not included in the factor analysis. In addition to subjects' rating for the past year, participants reported the extent to which they felt each of the 12 moods in the past month, using the same 7-point scale. Bradburn's (1969; Bradburn & Caplovitz, 1965) positive and negative affect scales were also administered.

Results and Discussion

Interitem correlations within and between the positive and negative affect items were computed for both the past year and the past month, and the averages of these interitem correlations are presented in Table 2. Also, the 6 positive and 6 negative affect words were summed, the mean positive and negative affect scores were computed for each subject for both time periods, and the two means correlated with each other across subjects for each time period.

The results for the rating of the past year are very similar to those obtained in Study 1. One can see that for a long time period such as a year, it appears that specific positive and negative affect words are relatively independent, but over a shorter time period such as a month, the two types of affect are moderately inversely related ($r = -.42$, $p < .01$). When the items were summed into overall positive and negative affect scales, we found that for the month period the scales correlated −.63, whereas for the year period they correlated only −.18 (*ns*). The correlation between Bradburn's (1969; Bradburn & Caplovitz, 1965) PAS and NAS was low but significant ($r = -.23$, $p < .05$).

So, with a cross-cultural sample consisting largely of black Caribbean students, positive and negative affect were relatively independent only over a longer time period. However, the results obtained may be partly due to memory distortion. Some people may remember more of all affective experiences, regardless of how much they actually experience. Similarly, some people may recall more positive experiences, others more negative. In addition, the longer the time period that is reported, the more likely selective recall and other biases are to influence the reports. To eliminate the possible alternative explanation that the independence of the two types of affect is due to memory distortion, in the next three studies we assessed actual affect on a regular basis over an extended period of time.

Study 3

Method

Subjects were 26 (15 female, 11 male) University of Illinois undergraduates participating in order to obtain research credit in a project on happiness and life satisfaction. Participants completed mood reports daily for 10 consecutive weeks. Mood reports were filled out at the end of each day just before subjects went to sleep. If it was impossible to complete the form at this time,

Table 3
Average Between-Subject and Within-Subject Interitem Correlations for Daily Studies

Sample time frame	Positive-negative item correlations		Positive-positive item correlations		Negative-negative item correlations	
	Between-subject	Within-subject	Between-subject	Within-subject	Between-subject	Within-subject
Fall 1981[a] Daily	.17	−.35	.67	.62	.60	.52
Spring 1982[b] Emotion	−.17	−.65	.83	.83	.70	.60
Moment	.14	−.37	.74	.57	.74	.50
Daily	.10	−.37	.78	.64	.71	.51
Three-week	.04	−.10	.74	.63	.56	.46
Summer 1982[c] Daily	−.20	−.22	.89	.43	.74	.25

[a] $n = 26$. [b] $n = 42$. [c] $n = 34$.

subjects were allowed to fill it out no later than the following morning. Each subject was required to turn in their form every day in order to ensure daily completion.

The mood report consisted of 43 self-report scales, 25 monopolar and 18 bipolar. Eight of the monopolar scales were mood words selected from Study 1, and were answered on a scale ranging from 0 (*not at all*) to 6 (*extremely much*). Several criteria were used to select the affect words used in this study. First, the selected affect words had to have substantial factor loadings on the appropriate factor. Second, we tried to select words so that positive and negative ones would overall have approximately the same arousal value. Third, we attempted to include several discrete emotions (Plutchik, 1980) that appear to have substantial impact on everyday happiness (e.g., *anger*) but we excluded emotions that appear to be less frequent (e.g., *disgust*). We combined into one rating category some emotions because of their apparent similarity (e.g., *angry* and *hostile; worried* and *anxious*). Thus four category ratings were chosen to represent positive affect (*happy, joyful, pleased,* and *enjoyment/fun*) and five were chosen to represent negative affect (*depressed/blue, unhappy, frustrated, angry/hostile,* and *worried/anxious*). An additional broad negative affect item, *unhappy,* was added to the list because we believed that it represents the most global level of negative affect. It had been inadvertently omitted from the factor analytic studies. This list of positive and negative affect items covered many or most of the major feelings of happiness and unhappiness of our subjects. These items loaded distinctly on separate factors in Study 1 and were roughly comparable in arousal value. Subjects were instructed to recall what their day had been like and to rate their day as a whole when filling out the form. For each daily report for each subject, a composite positive affect score was obtained by summing the four positive affect words and a composite negative affect score was obtained by summing the five negative affect words. A number of other self-rating scales were included on the daily report, but are not relevant to the present study. A total of 1,835 daily mood reports were collected.

To examine the correlates of positive and negative affect, we administered a number of personality tests, which included the Eysenck Personality Inventory (Eysenck & Eysenck, 1968), the Sixteen Personality Factor Questionnaire (Cattell, Eber, & Tatsuoka, 1970), the Rosenberg Self-Esteem Scale (Rosenberg, 1965), a symptom checklist similar to the Hopkins inventory (Derogatis, Lipman, Rickels, Uhlenhuth, & Covi, 1974), the Bem Sex Role Inventory (Bem, 1974), and selected others.

Results and Discussion

We computed between-subject correlations across the means that were based on subject's daily positive and negative affect scores. In addition, we calculated within-subject correlations by converting each subject's scores to standard scores around the individual's mean, so that each individual had a mean of zero and a standard deviation of one on both positive and negative affect. This eliminated between-subject variability so that these correlations were based on within-subject variation across all subjects for all days. Table 3 shows the average interitem correlations for positive and negative affect, computed both between and within subjects.

The correlations between the positive and negative affect sums were also computed and are presented in Table 4. The most striking finding is that the between-subject and within-subject correlations between positive and negative affect are in different directions for both the interitem correlations and the correlations based on the summed positive and negative affect scores. These within-subject correlations indicate that positive and negative affect do vary inversely within days for people. However, how much people feel overall—that is, their mean levels of positive and negative affect—are not inversely related. Indeed, in this sample the two are positively related,

Table 4
Product-Moment Correlations Between Summed Positive and Negative Affect for Daily Studies

Sample Time frame	Between-subject	Within-subject
Fall 1981[a] Daily	.26	−.54
Spring 1982[b] Emotion	−.15	−.85
Moment	.19	−.57
Daily	.09	−.31
Three-Week	−.08	−.10
Summer 1982[c] Daily	−.23	−.45

[a] $n = 26$. [b] $n = 42$. [c] $n = 34$.

though not significantly so. It is important to point out that the between-subject correlations represent the entire 10-week period because they are based on the summed positive and negative affect scales. Thus it does seem that within days there is a negative correlation between positive and negative affect, a finding that supports emotion theorists. When a person is experiencing either positive or negative affect, he or she is less likely to experience the other type of affect. The positive correlation across subjects, although nonsignificant, was unexpected. The nonsignificant positive correlation actually suggests that in this group the higher an individual was on one mean (e.g., positive affect), the higher he or she would be on the other as well. The picture is beginning to clear up, but unanswered questions remain. Two problems with this study are the small sample ($n = 26$) and that only a single time period was sampled in the daily rating. In the next study, a larger sample is obtained and additional time periods are sampled in order to more clearly examine the relation between positive and negative affect in regard to the time frame covered.

Study 4

Method

The subjects were 42 undergraduates at the University of Illinois participating in order to obtain research credit in a semester-long project on the structure of happiness and life satisfaction. Subjects received three hours of credit for their participation.

Participants completed mood reports daily for six consecutive weeks. They followed the same procedure as in Study 3. The participants also completed mood reports at two random times every day for the six-week period, a total of three mood reports each day. The time of day during which the mood report was to be filled out was determined by a randomly generated sample of times between the hours of 9:00 a.m. and 11:00 p.m. Every ten-minute period during the waking day was sampled at least once over the six weeks. Each subject was provided with an alarm watch that was preset each day so that the first time in a day would come in the morning and the second in late afternoon or evening. Each subject was provided with a list of times to which to set their watch each day. When the alarm went off they were to focus on their feelings at that moment and to complete the mood report immediately. If it was impossible to do so immediately, it could be postponed up until one hour later. Because of the possibility of memory distortion, under no circumstances could the form be filled out later than one hour after the alarm.

In addition to moment and daily reports, one other time period was also sampled. Subjects completed mood reports at three-week intervals, a total of four times throughout the semester. Hence these reports included time when daily reports were not being filled out. They were instructed to rate their past three weeks as a whole and to try to remember their overall feelings, and not how they had responded to the forms. In addition, mood reports were also filled out when the subject felt any strong emotion, either positive or negative, no more often than once a day. Subjects were instructed to fill out a report when they were experiencing what they thought for themselves was a strong emotion. These emotion times were included because the random moments were usually likely to miss these, and these times were also rather unique in that most emotion research is based on rather low levels of affect. Over the course of the semester, 1,416 emotion, 3,528 moment, 1,748 daily, and 168 three-week mood reports were collected from the 42 subjects.

The mood report was very similar to the one used in Study 3. It consisted of a number of unipolar and bipolar affect scales. The same affect words were summed to form the composite positive and negative affect scores. In addition, we included a number of artifact measures to check on the possibility of response style bias. We administered the Crowne–Marlowe (Crowne & Marlowe, 1964) scale of social desirability as well as a number of measures designed to assess how subjects used the scale numbers. A response style of using high or low numbers could potentially affect the correlation between positive and negative affect. On one measure, subjects rated 57 positive affect words on the level of intensity implicit in their meaning. In this rating task any consistent tendency to use either high or low numbers had to be due to how people used the numbers of the scale and not to differences in their affective states because the same words served as stimuli for everyone. Because subjects were rating the words per se in terms of intensity, a tendency to use high numbers would indicate a tendency to use high numbers when responding to emotion words on the mood rating forms. On another measure, subjects wrote descriptions in detail of how they felt when they had marked both a 2 and a 4 on both positive and negative affect. These four descriptions were then rated on a −100 to 100 scale for intensity of affect by two raters who showed high interrater agreement for both the positive and negative descriptions ($rs = .90$ and .92). These ratings indicated the degree to which subjects used the number scale in a

conservative or liberal fashion in describing their feelings. In the last artifact check, subjects indicated where each of their scale numbers from zero through six would be on a line marked continuously with positive affect words that had been prescaled for intensity. This provided subjects another opportunity to indicate the intensity of feeling they meant by their number responses. These artifact checks are also described by Diener and Larsen (1984).

Three types of reliability coefficients on the positive and negative affect scales were computed. The alpha coefficients (Cronbach, 1951) for positive and negative affect were .89 and .84, respectively. We also computed two types of temporal stability coefficients: We computed an odd–even reliability by comparing odd versus even days across subjects, and we computed three-week stability coefficients by comparing the first three weeks of the study with the second three weeks. The coefficients obtained were .83 and .79 for positive affect and .87 and .81 for negative affect, respectively. It thus appears that the positive and negative affect scales have adequate reliability.

To assess the correlates of positive and negative affect, we administered a number of personality inventories, the majority of which were given in Study 3. Following the six-week period, participants were informed as to the objectives of the study, and were given feedback on their personality test scores.

Results and Discussion

Both between-subject and within-subject correlations between the summed positive and the summed negative affect scores were computed for each of the four time periods. These product–moment correlations are presented in Table 4.

The principal finding is that the correlations differ greatly depending on the time period. Regarding the within-subject correlations, the strongest negative correlation between the two affects occurs during the emotion times ($r = -.85$). This correlation decreases as the time period covered increases. The smallest correlation between positive and negative affect was for the three-week period (−.10). So the shorter the time period is, the more negatively correlated are the two types of affect. In other words, it is highly unlikely that one can feel both positive and negative affect at the same time, especially at strong levels. The emotion times are the most polarized in this respect. None of the between-subject correlations, on the other hand, are significantly different from zero. This finding is not all that surprising, considering that these between-subject correlations are based on the longest time span of all because they are computed using the six-week averages of positive and negative affect. Thus the between-subject correlations are based on overall mean differences between subjects. Although different reports are being averaged for the various time frames, the between-subject correlations always reflect the means for each subject for that type of report for the entire study.

The average interitem correlations between and within each class of affect for each time period were also computed and are presented in Table 3. The pattern of the within-subject interitem correlations is very similar to the within-subject correlations based on the summed positive and negative affect scores, though the pattern is not as clearly marked because the latter, of course, are based on summing across all of the items.

Because the correlation between positive and negative affect is negatively related to the time frame covered, we decided to aggregate across moments and compute the correlation between the mean of the two affects at different points in time. What we did was to aggregate over adjacent time periods—computing the correlation between positive and negative affect first for 2 adjacent moments, then 4, 8, 16, 32, and 64 adjacent moments. This has the effect of enabling us to examine the correlation between positive and negative affect as longer and longer time periods are considered. The nonstandardized summed affect scores for moments were used in this aggregation procedure. We used 64 moments per subject and looked at aggregates across all subjects for all moments.

In Figure 1 we present the correlation coefficients obtained between positive and negative affect as a function of the number of moments over which we averaged. One can see that the correlations drop off rapidly as the number of moments in the aggregates increases. Although the same moments are being used, they are aggregated into progressively longer time periods. In addition, the correlations form a linear pattern when number of occasions is plotted on a logarithmic scale.

The product–moment correlations between selected personality tests and mean daily positive and negative affect scores are presented in Table 5. Also in Table 5 are the correlations between selected items of the daily mood

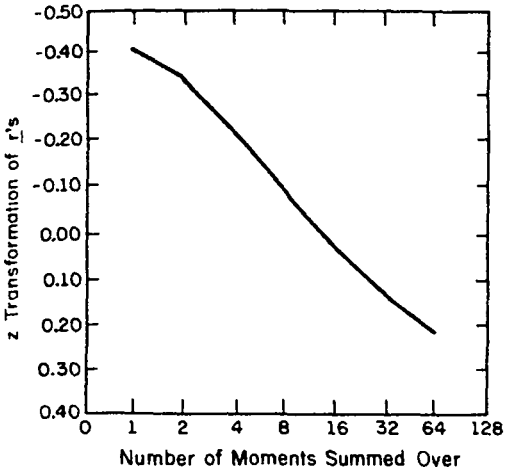

Figure 1 Relation of positive and negative affect as a function of time.

report and positive and negative affect. Although some measures correlate positively with one affect and negatively with the other (e.g., *self-esteem, self-confident*) in roughly inverse ways, others tend to correlate with positive or negative affect and not with the other (e.g., *extraversion, neuroticism, intelligence*), and some tend to correlate in the same direction with both affects (e.g., *productive*). *Self-confidence* and *self-esteem* show the inverse pattern: they apparently affect both types of feelings in roughly opposite ways. Perhaps they derive from the feelings. Productive, active, and domineering people seem to experience both more positive and more negative affect. Thus positive and negative affect sometimes correlate in the same direction with some variables. Most frequently, however, one type of affect will correlate with an external variable, whereas the correlation for the other type of affect is close to zero. These differential correlations with external variables also clearly suggest that positive and negative affect are independent whenever they are examined over long time periods.

Table 5
Selected Correlates of Positive and Negative Affect

Personality scales	Fall 1981 (n = 26)		Spring 1982 (n = 42)	
	Positive affect	Negative affect	Positive affect	Negative affect
Sixteen Personality Factor Questionnaire				
Warmth	.03	$-.43^{**}$	.09	$-.21$
Intelligence	.03	$.36^{*}$	$-.10_{a}$	$.42_{b}^{**}$
Dominance	.30	.05	$.26^{*}$	.17
Guilt Proneness	$-.19_{a}$	$.34_{b}^{*}$	.04	$.34^{**}$
Suspicious	$-.11$	.23	$.01_{a}$	$.39_{b}^{**}$
Symptom checklist				
Obsessive–compulsive items	.11	$.39^{**}$	$-.17$	.16
Interpersonal sensitivity items	$-.16_{a}$	$.53_{b}^{**}$	.22	.11
Depression items	$-.02_{a}$	$.53_{b}^{**}$	$-.05$	.10
Anxiety items	.21	53^{**}	$-.13_{a}$	$.31_{b}^{**}$
Neuroticism	$-.21_{a}$	$.46_{b}^{**}$	$-.05$	.13
Extraversion	$.52_{a}^{**}$	$-.05_{b}$	$.28^{*}$	.00
Rosenberg S–E	$.35_{a}^{*}$	$-.31_{b}$	.13	$-.08$
Masculinity	$.39^{**}$	$-.16$	$.35^{**}$	.04
Femininity	$-.29$	$-.04$	$-.20$	$-.26^{*}$
Daily Mood Report				
Self-confident	$.36_{a}^{*}$	$-.34_{b}^{*}$	$.36_{a}^{**}$	$-.58_{b}^{**}$
Self-esteem	$.46_{a}^{**}$	$-.40_{b}^{**}$	$.34_{a}^{**}$	$-.46_{b}^{**}$
Productive	$.56^{**}$	$.42^{**}$	$.56^{**}$	.12
Domineering	$.57^{**}$	.12	$.37^{**}$	.24
Active	$.41^{**}$	.30	$.47^{**}$	.21

Note. Differing subscripts denote correlations significantly different from each other, two-tailed t test.
$^{*}p < .05$. $^{**}p < .01$.

The Crowne–Marlowe correlated with negative affect ($r = -.38$), but not with positive affect ($r = -.01$). Our three number-use artifact measures correlated with negative affect .08, .07, and −.02, and with positive affect .02, −.38, and −.14. None of the correlation patterns help explain why positive and negative affect are independent over longer time periods. When the measures of potential response bias were partialed out of the positive–negative relations for each of the time periods, there were virtually no changes in the size of the correlations.

The results seem clear and convincing, yet note that we performed each of these four studies using college students as subjects. Can these results be replicated with another, more heterogeneous sample? In Study 5 we examined the issue of generalizability, using a sample of adults in the local community.

Study 5

Method

Subjects were 34 (24 female, 10 male) adults from the local community. They ranged in age from 33 to 85 years, with a mean age of 65 years. They were recruited through both a senior citizen center and a volunteer organization. The majority of the participants were retired, though still active in the community. All were living independently and were in fairly good health.

Mood reports were completed daily for 30 consecutive days. The forms were returned weekly via self-addressed, stamped envelopes provided to each subject. If any days were missed, they were made up at the end of the 30 days so that each subject completed an equal number of reports. The nine mood items were identical to those used in Studies 3 and 4, but the ancillary items were different (for purposes of other studies) The print of the form was enlarged in order to facilitate its readability. For their participation, the senior citizen center and the volunteer organization received $25 for each participant they recruited.

Results and Discussion

As in Studies 3 and 4, between- and within-subject correlations were computed for both the interitem and the summed positive and negative affect scores. These correlations are presented at the bottoms of Tables 3 and 4, respectively. The within-subject correlations between summed positive and negative affect for days (−.45) is similar to the correlations obtained in the two previous studies (−.54 and −.31). However, the between-subject correlation between the sums was negative (−.23), though nonsignificant, whereas in Studies 3 and 4 the between-subject correlations were in the positive direction but also nonsignificant. One can see in Table 3 that the within-subject average interitem correlations within each class of affect are considerably lower than in the previous two studies. We believe this resulted from the small amount of variance in affect scores. Almost all subjects reported considerably more positive than negative affect each day, and several reported no negative affect at all on any day. In other words, there was a restriction of range on many negative affect items that was due to a floor effect. This is revealed by the low within-subject correlation between negative affect items (.25).

It appears that these results confirm the earlier ones based on college student populations. Positive and negative feelings vary inversely within the same day, but are more unrelated across subjects over longer time periods.

General Discussion

It is now clear that if one uses adequate measures of positive and negative affect and samples several different time periods, the findings of the emotion researchers can be reconciled with those of the subjective well-being researchers. The relation between positive and negative affect depends on the time period being considered. Positive and negative affect states do vary inversely, but only over short time spans; the two are unlikely to occur together within the same person at the same moment. Our results clearly show that the strongest inverse correlations are found when one feels strongly emotional, and that the correlation between positive and negative affect decreases in a linear fashion as the logarithm of the time span covered increases. For long time periods of weeks or more, the two types of affect become relatively independent: How much a person feels of one is unrelated to how much he or she feels of the other. All of the across-subject correlations between positive and negative affect were low, and most were in the positive direction. The within-subject correlations were highly negative only when short time periods were considered. The factor analytic results, the inter-

item correlations, the correlations between the summed affect means, and the correlations with external variables all suggest the major finding: that positive and negative affect are relatively independent in people's lives. This finding held up with the use of different scales—Bradburn's (1969; Bradburn & Caplovitz, 1965) and our own—as well as with very different samples. Although mean levels of affect over longer periods may be due to personality traits, this conjecture remains uncertain because those levels could also be due to longer term external factors in peoples' lives.

Our studies demonstrate the importance of studying mood within individuals over an extended period of time (see also Diener, Larsen, & Emmons, 1984b). If we had relied solely on the memory of the subjects the results may have been different. That is, in memory positive and negative affect could be coded such that they were strongly inversely related—even over longer time periods—because of people's implicit theories about how positive and negative affect go together. In fact, the room for such memory distortions could become larger the longer the time period sampled is, and this could make positive and negative affect appear more inversely correlated because memory distortion and judgmental bias can be greater the longer the time period is.

There are a number of reasons to believe that the present results are valid and are not due to artifacts or unreliability of the measures. Both the internal consistency and the temporal stability of the positive and negative affect measures was quite high. Another argument against an unreliability explanation is that the daily results become less correlated when aggregated over time even though such aggregates are more reliable than single measures. Last, we found that correlations decreased as the assessed time period increased, even though measures with which we assessed longer time periods were not less reliable. Thus the relative independence of positive and negative affect over time could not be due to low reliability of the scales. In addition, we used a number of artifact checks because response style had been a problem in some emotion research. The modest correlations that did appear cannot explain why positive and negative affect would be independent over time, and partialing out the artifacts made absolutely no difference in our findings. These artifact checks in general showed low correlations with our affect measures. Therefore, response style cannot explain the relative independence of the two types of affect. Most important, we found a decreasing correlation between positive and negative affect over time within subjects. This occurred both when we aggregated daily measures and when we used measures that enabled us to assess different time periods. Because the within-subject correlations are not subject to individual differences in response bias, this finding is a convincing argument that our results are not spurious. Also, the differences in correlations between the different time periods could not be due to individual response biases because the same subjects were completing the different assessments.

The present findings have implications for the emotion literature. The high polarity of responses during emotion times indicates that positive–negative is a fundamental dimension of momentary emotion, as suggested by Russell (1980). Polarization usually occurs during strong emotions in which a person feels either positive or negative. Nevertheless, it is possible at times to feel "mixed emotions" that include both specific positive and negative elements (Plutchik, 1980). Positive and negative affect may load on separate factors in any factor analytic study because within the same affect, items correlate highly with each other, and because the factors can be oblique. However, the two are normally not independent as experienced in emotion.

Although positive and negative affect seem to be experienced in a bipolar way during emotion times, this does not mean that there may not be a number of neurologically more specific emotions. However, we have found very high correlations between reports of emotions of the same polarity. For example, when people experience anger, they also tend to report other negative feelings. Unlike the positive–negative relation, the correlations between emotions of the same polarity remained high no matter how long or how short the time period examined was. This may mean either that the conditions that lead to a positive emotion also tend to lead to

other positive ones (and the same for negative) or it could mean that the positive emotions tend to blend together in experience, as do the negative. In any event, whether for moments or weeks, emotions of the same polarity seem to covary strongly.

The strength of the negative correlation within subjects for emotion times suggests that when one affect is dominant there may be some mechanism that suppresses the other. This suppressive mechanism occurs at the moment emotions are being experienced, but one type of affect does not seem to suppress the likelihood of the other occurring later in time. In other words, the suppression of the opposite affect occurs only for a short period of time. Diener and Iran-Nejad (1984) argue that there is a mutual incompatibility between positive and negative affect, but not a linear inverse relationship. The suppressive mechanism could be biological in origin or related to phenomena such as attentional focus. On the other hand, it could be that extremely good and extremely bad events are rare and therefore unlikely to occur together. These various explanations of the suppressive mechanism await further research. The polarity implied by the suppressive mechanism is captured by circumplex models (e.g. Plutchik, 1980) that postulate that certain emotions are opposites.

Finally, we need to ask why might positive and negative affect be independent across persons. Separate processes must influence both, and we need to search for the processes that lead to both types of affect. We believe that important components of person affect are the frequency and intensity with which both affects are felt. Frequency may vary inversely, whereas intensity of affect may covary across persons. In other words, those who feel one type of affect strongly may also experience more intense levels of the other affect (Diener, Larsen, Levine, & Emmons, in press). Thus mean levels of the two types of affect do not correlate when longer time spans are considered because the influence of frequency and intensity cancel each other out. This model suggests that positive and negative affect may actually be controlled by the same processes but are structured in such a way that they are independent in expression across persons. A primary task of those working in the area of subjective well-being (Diener, 1984) should be to uncover the processes that are responsible for producing the independence of the two types of affect.

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