Does the Relationship Between Affect Complexity and Self-Esteem Differ in Young-Old and Old-Old Participants?

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OBJECTIVES. This study examines whether the relationship between positive affect (PA) and negative affect (NA) is more complex among old-old than among young-old participants and whether the independence and potential co-occurrence of both PA and NA (affect complexity) is related to higher self-esteem (SE) among older participants.

METHOD. A convenience sample of 311 participants was divided into 2 groups: young-old, aged 65–79 years (n = 212), and old-old, aged 80–93 years (n = 99), participants. PA and NA were measured by the Positive and Negative Affect Schedule and SE was measured by the Self-Esteem Questionnaire.

RESULTS. The findings show that PA and NA are less strongly related and even positively related to each other among older people and that SE is higher among the young-old compared with the old-old participants. Finally, affect complexity is positively related to a higher degree of SE among the old-old participants.

DISCUSSION. These findings may imply that the affect complexity is associated with buffering the noxious effect of deteriorating SE in old age. Future studies should examine further the intrapersonal relationship between affect complexity and SE in late life.

KEY WORDS: Affect complexity—Negative affect—Positive affect—Self-esteem—Old age.

RECENTLY, there has been an increasing interest in the relationships between the affect systems in old age and the ability of elderly people to experience reality in a positive way (e.g., Charles & Carstensen, 2007, 2010; Lomranz, 1998; Ong & Bergeman, 2004). Nevertheless, the relations between the structure of the affects and self-esteem (SE) in old age have not yet been studied. SE is defined as “the extent to which one prizes, values, approves of, or likes oneself” (Blascovich & Tomaka, 1991, p. 115). Studies suggest that the level of SE begins to drop at around age 70 (e.g., McMullin & Cairney, 2004; Robins & Trzesniewski, 2005; Robins, Trzesniewski, Tracy, Gosling, & Potter, 2002; Trzesniewski, Donnellan, & Robins, 2003), due to losses in roles, in relationships, and in physical and economic functioning (e.g., retirement, loss of a spouse, and health and economic problems). This decline in SE was described by Erikson (1985) as reflecting a willingness to acknowledge faults and limitations and a reduction in the need to be approved of by others.

A decline in SE is part of depression (Dumenci & Windle, 1996; Kenny & Zautra, 2001), a very common diagnosis in old age (e.g., Byrne & Pachana, 2010). Therefore, the study of emotions and the way they relate to SE among older individuals is an important issue. Nevertheless, the relations between positive affect (PA) and negative affect (NA) with the individual’s sense of SE in old age are a neglected area. As the background for our discussion of this subject, we will first describe the interrelationship between PA and NA and discuss their contribution to optimal psychological functioning in adults in general (Charles & Carstensen, 2010; Lomranz, 1998; Ong & Bergeman, 2004). We will then describe the interrelationship between PA and NA in old age and elaborate upon their benefits for this stage of life. Finally, we will discuss possible associations between PA and SE in old age, from which we will draw our hypotheses.

AFFECT COMPLEXITY

The term “affect complexity,” which refers to the capacity to distinguish between discrete or general affect systems, is operationalized according to various perspectives (Ong & Bergeman, 2004; Ready, Åkerstedt, & Mroczek, 2012; Ready, Carvalho, & Weinberger, 2008; Reich, Zautra, & Davis, 2003). In this study, we use the perspective that defines affect complexity as the capacity to experience intensive PA and NA as independent yet potentially
Ong & Bergeman, 2004). In summary, SST argues that older people invest in meaningful activities that take place under time-limited conditions, and this investment elicits richly complex emotional experiences, rather than uniform negative or positive perceptions of occurrences. Therefore, as derived from the DMA model (Reich et al., 2003) and from the SST model (Carstensen et al., 2000, 2011), we hypothesize that affect complexity will be higher among old-old persons than among young-old individuals.

Another hypothesis that we would like to suggest concerns the relationship between affect complexity and SE in old age. Following previous works, we expect SE to be higher among the young-old compared with the old-old individuals (McMullin & Cairney, 2004). Moreover, in spite of the wealth of findings supporting the relations between affect complexity in old age and optimal psychological functioning (Charles & Carstensen, 2007, 2010; Lomranz, 1998; Ong & Bergeman, 2004), to the best of our knowledge, the relations between affect complexity and SE in old age have not yet been studied. Because affect complexity has been related to optimal psychological functioning, we hypothesized that, in general, affect complexity will be associated with high SE. Additionally, independent yet potentially co-occurring PA and NA (higher affect complexity) may be associated with a higher degree with higher SE among older participants compared with young-old participants. This is because although affect polarity may create extremities in self-perceptions (i.e., feeling extremely positive may enhance SE, whereas feeling terribly negative may dampen SE), affect complexity may enable more balanced self-perceptions (i.e., the potential co-occurrence of PA and NA may maintain a more balanced sense of SE).

Based on the earlier literature, we hypothesized the following: (a) SE will be higher among the young-old compared with the old-old participants; (b) old-old participants will exhibit a higher level of affect complexity than young-old participants; (c) a higher level of affect complexity will be more strongly related to higher SE in older participants compared with young-old participants.

**Method**

**Participants**

The sample consisted of 311 participants. In order to present demographic differences regarding age, the sample was divided into two groups: young-old, aged 65–79 years \( (n = 212) \), and old-old, aged 80–93 years \( (n = 99) \), participants. This classification is widely accepted and is in accordance with the age divisions that have been utilized in broad studies on aging (e.g., Oswald, Jopp, Rott, & Wahl, 2010; Shrira et al., 2011). The mean age of the young-old group was 72.82 years \( (SD = 3.86) \) and the mean age of the old-old group was 84.06 years \( (SD = 3.37) \). Table 1 presents the descriptive statistics for the background characteristics of the study groups.
The two age groups differed in all background demographics. The old-old group consisted of a lower percentage of women (49.5), a higher percentage of living alone (41.4), and a lower percentage of Israeli born (27.1). They reported fewer years of education (mean = 14.52; SD = 3.24) and a lower subjective health status (M = 2.14; SD = 0.63).

Measures

Background characteristics included age, gender, years of education, marital status (dichotomized into currently married and unmarried), place of birth (dichotomized into Israeli-born vs. born in other countries), and self-rated health (see Benyamini & Idler, 1999) assessed by the question: “How do you rate your general health?” to which participants responded on a 4-point scale: “very poor” (1), “poor” (2), “good” (3), and “very good” (4).

PA and NA were measured using the Hebrew version (Tolmacz, & Mikulincer, 2011) of the Positive and Negative Affect Schedule (PANAS; Watson, Clark, & Tellegen, 1988). This scale consists of 20 items, 10 measuring PA (e.g., contented, joyful) and 10 NA (e.g., sad, angry). Each item was scored on a scale ranging from 1 (not at all or very slightly) to 5 (extremely). A mean score was computed for the positive (Cronbach’s α = 0.84) and for the negative items (Cronbach’s α = 0.87). Affect complexity was determined by the degree of inter-individual bipolarity between PA and NA or the strength of the inter-individual correlation between PA and NA. Greater bipolarity (i.e., greater negative correlation) indicated less complexity and a correlation closer to zero or positive correlation indicated greater complexity (Ready et al., 2012).

SE was measured by means of the Self-esteem Questionnaire (SEQ; Rosenberg, 1965). The SEQ is a long-established self-report inventory, which measures overall SE. Participants respond to 10 statements such as “I take a positive attitude toward myself” and score their level of agreement with these statements on a scale ranging from 1 (strongly disagree) to 4 (strongly agree). Five scores are reversed so that high scores indicate high SE. The questionnaire was translated into Hebrew and validated by Taubman-Ben-Ari, Florian, and Mikulincer (1999). In this study, the Cronbach’s internal consistency coefficients was α = 0.80.

Procedure

All the participants were contacted through the Organization of Retired Employees of the Ministry of Education, and after giving their preliminary agreement to participate, were provided with the questionnaires by mail or during general meetings. All returned the questionnaires by mail. Of the 350 questionnaires distributed, 311 were returned. This return rate (87%) was achieved due to the very assiduous telephone follow up of the research manager. The final number of fully completed questionnaires was 291. The study was approved by the ethical committee of the Bar Ilan University, and all participants gave their informed consent.

Data Analysis

Missing values for PA, NA, and SE were subjected to a multiple imputation procedure in order to account for sample loss. In order to explore the association between the study variables (PA, NA, and SE), a preliminary correlation matrix was generated. In addition, to test hypotheses 1 and 2, two sets of hierarchical multiple regression analyses were conducted. To rule out potential multicolinearity, a preliminary analysis was also performed. These analyses were in accordance with the rules used in the literature, stating that a tolerance rate ranging from 0.20 and/or a variance inflation factor (VIF) of 5 and greater indicates a multicollinearity problem (O’Brien, 2007). The preliminary analysis of hierarchical multiple regression yielded a tolerance rate ranging from 0.67 to 0.95 and a VIF of 1.05–1.49 for the first hypothesis and a tolerance rate ranging from 0.67 to 0.95 and VIF of 1.05–1.50 for the second hypothesis, results that indicate no multicollinearity problem.

Finally, in order to understand further the nature of the association between PA and NA among young-old and old-old participants, a structural equation model using the Analysis of Movement Structures 18.0 program was
employed. This analysis used the division of the sample into young-old participants (65–79 years) and old-old participants (80–93 years). The analysis examined whether the association between PA and NA was different among the young-old and the old-old participants. An unconstrained model was compared with a model in which the relationships between PA and NA were constrained across the two age groups. A significant difference between the unconstrained and the constrained model will suggest that age is a significant moderator in the relationship between the affects. Goodness of fit was assessed with three different fit indices: (a) the χ² likelihood ratio with degrees of freedom and p values; (b) the comparative fit index (CFI); and (c) the root mean square error of approximation (RMSEA). Scores greater than 0.90 indicate an acceptable fit (Finch & West, 1997), except for RMSEA, in which values lower than 0.10 indicate an adequate fit (Browne & Cudeck, 1993). As the CFI was lower than 0.90 in the original structure of PA and NA, we used the process of model modification to improve its fit. Using the modification index, we ended with the best available model fit that includes seven PA (the items “excited,” “inspired,” and “determined” were removed, Cronbach’s α = 0.80) and seven NA items (the items “scared,” “hostile,” and “nervous” were removed, Cronbach’s α = 0.83; Bollen, 1989; Sörbom, 1989). These seven items for PA and NA were used in all the presented analyses.

**RESULTS**

**Assessment of Study Variables and Hypothesis 1**

PA was positively correlated in both age groups with SE (young-old group, r = .52; old-old group, r = .62; and ps < .0001). NA was negatively correlated with SE (young-old group, r = −.38; old-old group, r = −.33; ps < .0001). Participants from the young-old group had a higher level of PA (M = 3.94, SD = 0.55) than did the old-old group (M = 3.60, SD = 0.63; t(168) = 4.59; p < .0001). However, no significant differences were found among the groups with regard to the level of NA (young-old group, M = 2.20, SD = 0.67; old-old group, M = 2.15, SD = 0.71; t(309) = .53, ns). In addition, in line with hypothesis 1, the young-old group had a higher level of SE (M = 3.51; SD = 0.35) than did the old-old group (M = 3.35, SD = 0.41; t(309) = 3.47; p < .01).

**Hypothesis 2: Relationship Between PA and NA in Young-Old and Old-Old Age Groups**

The second hypothesis predicted that, in line with previous studies, the relationship between PA and NA would be negative and stronger (a lower affect complexity) among the young-old participants than among the old-old participants. PA and NA were negatively correlated in the young-old group (n = 212) but not in the old-old group (n = 99), so that the PA–NA correlation was r = −.32, p < .0001 for the young-old group and r = .00, ns for the old-old group. The Fisher’s Z statistic found that the difference in the strength of the correlations of the two groups was significant (z = −2.66, p < .01). This means that in line with hypothesis 2, there was a lower negative correlation (higher complexity) between PA and NA among the old-old group than among the young-old group.

To test this hypothesis further, we performed a hierarchical multiple regression analysis for the two age groups. NA was regressed on background characteristics (sex, marital status, education, place of birth, and self-rated health) in Step 1, on age (continuous variable) and PA in Step 2, and on their respective two-way interaction (age × PA) in Step 3. As predicted, the age × PA interaction significantly predicted NA (B = 0.15, β = 0.24, SE = 0.04, R² = .11, ΔR² = .05, and p < .0001).

It can be seen in Figure 1 that although among young-old participants there was a strong negative association between PA and NA, among the old-old group, a lower positive association was found between PA and NA, meaning that the affect complexity was increased in older individuals.

**Relationship Between PA and NA Among Two Age Groups**

As our concept of affect complexity was operationalized by the correlation between PA and NA and defined as the capacity to experience intensive PA and NA as independent yet potentially co-occurring (Carstensen et al., 2000, 2011; Ong & Bergeman, 2004), we wanted to examine further whether older participants present not only a lower correlation but also a greater positive co-occurrence of PA and NA. We performed two supplementary analyses. First, we divided the participants into 5-year groups (65–70, 71–76, 77–82, 83–88, and 89–93 years). For each group, we examined the correlation between PA and NA. Figure 2 presents the results for these correlations.

The results of this analysis show that the correlations between PA and NA are positive and marginally significant among the older group (the fifth group) and negative and significant among the younger group (the first group). In addition, in order to examine if the association between PA and NA differs among young-old and old-old participants, an unconstrained model was compared with a constrained model in which the association between PA and NA was constrained to be equal among the two age groups. As this analysis showed a lower than the acceptable fit, CFI, we used model modification process to improve its fit and ended with the best available model fit of seven PA and seven NA items. Using this PA and NA structure, we achieved acceptable fit for both the unconstrained model—χ²(152) = 274.80, p < .0001; CFI = 0.90; RMSEA = 0.05—and the constrained model—χ²(153) = 280.65, p < .0001; CFI = 0.90; RMSEA = 0.05. Yet, the unconstrained model showed a significantly better fit to the data than did the constrained
Figure 1. The two-way interaction between age group and positive affect (PA) on negative affect (NA) (standardized scores).

Figure 2. The correlations between positive affect (PA) and negative affect (NA) for 5-year age groups. Note: The correlations for the age groups were: $r = -0.340$, $n = 70$, $p < .01$; $r = -0.332$, $n = 95$, $p < .01$; $r = -0.154$, $n = 84$, $p = .163$; $r = 0.099$, $n = 49$, $p = .449$; and $r = 0.458$, $n = 13$, $p = .116$ for the 65–70, 71–76, 77–82, 83–88, and 89–93 age groups respectively.

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model, Δχ²(1) = 5.85, p < .05, indicating that the correlation between PA and NA differed in its magnitude among the two age groups. The correlation between the two factors (PA and NA) was −.29 among the young-old and −.21 among the old-old participants.

Hypothesis 3: Predicting SE by PA and NA in Young-Old and Old-Old Participants

The third hypothesis suggested that a lower association (higher complexity) between PA and NA will be related to higher SE in older participants. Following this hypothesis, a hierarchical multiple regression analysis was performed. SE was regressed on background characteristics (sex, marital status, education, place of birth, and self-rated health) in Step 1; on age, PA, and NA in Step 2; on their respective two-way interactions (age × PA, age × NA, and PA × NA) in Step 3; and on their three-way interaction (age × PA × NA) in Step 4. All continuous independent variables were standardized and interaction terms were calculated by multiplying the standardized scores. As predicted, the age × PA × NA interaction significantly predicted SE (B = 0.08, β = 0.35, SE = 0.03, R² = .12, p < .05; or for treating age as continuous variable: B = 0.04, β = 0.13, SE = 0.01, R² = .016, p < .01; see Table 2).

It can be seen from Figure 3A, which shows lower affect complexity (presented by the graph as the association between PA and low NA), that old-old participants (the continuous line) demonstrated lower association with SE compared with the young-old participants (the dashed line). Graphically, it can be seen that the continuous line is less steep, than the dashed line. However, when higher affect complexity was measured (presented by the graph as the association between PA and high NA, see Figure 3B), the old-old participants (the continuous line) demonstrated a higher association with SE compared with the young-old participants (the dashed line). Graphically, it can be seen that the continuous line is steeper, than the dashed line.

DISCUSSION

In this study, we tested the strength of the relationship between PA and NA in late life and examined whether affect complexity, represented by low association (independence) or the potential co-occurrence of high PA and high NA (Ready et al., 2012) and measured inter-individually, is related to higher SE in older participants. As expected, and in line with the first hypothesis, SE was higher among the young-old group compared with the old-old group. Moreover, the findings of various statistical analyses of the data (i.e., a preliminary correlation matrix, an hierarchical multiple regression analysis, an examination of the correlations between PA and NA across 5-year groups, and a two-factor model across age) suggest stronger and inverse relationship between PA and NA among the young-old than among the older participants, indicating a higher level of affect complexity among the old-old participants. These findings are in accordance with the second hypothesis. Additionally, the positive association between affect complexity and SE was more pronounced in the old-old participants than in the young-old participants. This means that higher affect complexity was strongly related to a higher
relationship between trait resiliency and affect complexity that supports the idea that the ability to experience mixed emotional states in old age is a sign of trait resiliency and of an ability to cope with heightened stress levels. Their findings are consistent with our results regarding SE.

The results of this study are inconsistent with Labouvie-Vief’s developmental theory (Labouvie-Vief, 2003; Labouvie-Vief & Medler, 2002). This theory proposes that cognitive–emotional complexity is adversely affected by the decline in cognitive functioning that is associated with old age. According to Labouvie-Vief (2003), affect complexity requires elaborative, distinctive, and demanding cognitive functioning, and therefore, it is expected to show a curvilinear relationship with age, reaching a peak in middle age and then declining.

In line with Labouvie-Vief’s (2003) developmental theory, the co-occurrence of PA and NA may not be a sign of affect complexity but rather a result of the cognitive decline that occurs in old age. However, if affect complexity was a sign of cognitive decline, one would not expect it to predict SE positively. The current findings cannot support this explanation due the positive association between affect complexity and SE in older participants.

Our findings regarding the association between affect complexity and SE among the young-old and the old-old participants are intriguing. SE is known to decrease in old age, mainly due to psychosocial losses (McMullin & Cairney, 2004; Robins & Trzesniewski, 2005). Our findings may be interpreted as showing that high affect complexity buffers this tendency among older individuals. In line with SST, it can be assumed that shaping the social world, meaning being increasingly selective in one’s choice of social partner and engaging in smaller, but more emotionally meaningful social networks, can reduce one’s negative emotional experiences related to SE. Moreover, as suggested also by the strength and vulnerability integration model (see Charles, 2010), when facing negative experiences, such as social losses that are related to reduction in SE, the mature complex affective system can buffer negative implications.

We speculate that the relations between affect complexity and SE change during the second half of life. Until people reach old-old age, they can still more or less strengthen their sense of SE by focusing on positive emotional experiences as a way to negate negative emotional experiences (Meeks, Haitsma, Kostiwa, & Murrell, 2012). However, after the age of 80 years, individuals who maintain a realistic self-perception can no longer focus only on their positive emotions as a way to avoid negative ones because they are living in a more limited time frame in which negative experiences are more prevalent (Carstensen et al., 1999). Therefore, the ability to acknowledge the full span of their emotional experiences allows the old-old participants to preserve an adjustable and realistic sense of SE. This explanation has to be examined further in a longitudinally designed study.

Table 2. Hierarchical Multiple Regressions Predicting Self-Esteem (SE) by Positive Affect (PA), Negative Affect (NA), Age, and their Interactions

<table>
<thead>
<tr>
<th>Step 1</th>
<th>ΔR² = 0.096***</th>
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<tbody>
<tr>
<td>Gender</td>
<td>0.02</td>
</tr>
</tbody>
</table>
| Marital status
| Education | 0.15** |
| Place of birth | 0.02 |
| Self-rated health | 0.25*** |
| Step 2 | ΔR² = 0.327*** |
| Age | 0.10            |
| PA | 0.51***         |
| NA | 0.25***         |
| Step 3 | ΔR² = 0.008    |
| Age × PA | 0.06 |
| Age × NA | 0.06 |
| PA × NA | 0.01          |
| Step 4 | ΔR² = 0.016**  |
| Age group × PA × NA | 0.13** |
| R² = 0.446 |
| F(12,295) = 18.571*** |

Notes. All continuous independent variables were standardized.

*Coded as 1 = men and 2 = women.

*Coded as 1 = Israel and 2 = other countries.

*p < .05, **p < .01, ***p < .001.

degree of SE in older participants. These results support the third hypothesis. We now discuss our findings in more detail.

Higher levels of SE were reported by the young-old group compared with the old-old group. These findings are in accordance with the results of previous studies. These studies found a decline in SE in old age (e.g., McMullin & Cairney, 2004; Robins & Trzesniewski, 2005; Robins, Trzesniewski, Tracy, Gosling, & Potter, 2002; Trzesniewski et al., 2003). Their findings indicate only the general differences in SE regarding to age. However, as will be presented, affect complexity moderate these relations.

Our findings also replicate those of previous studies (Ong & Bergeman, 2004; Ong, Bergeman, & Bissconti, 2006; Carstensen et al., 2011) that support the main contention of SST (Carstensen et al., 2000) that more advanced age is associated with a greater potential for the co-occurrence of PA and NA. Additionally, they show that this tendency toward affect complexity is even stronger among the old-old participants than among the young-old participants. This specific comparison between young-old and old-old participants had not been examined previously by Carstensen and colleagues (2011), who examined adults in a wider age range (18–94 years), or by Ong and Bergeman (2004) and Ong and colleagues (2006), who focused on adults in the age range of 60–85 years. Carstensen and colleagues (2011) raised the possibility that the ability to experience mixed emotional states may mediate extreme highs and lows and thereby contribute to the individual’s emotional well-being in old age. Ong and Bergeman (2004) and Ong and colleagues (2006) present evidence of the relationship between trait resiliency and affect complexity...
In addition to these findings, we also found that PA was positively correlated in both age groups with SE, whereas NA was negatively correlated. These findings are in line with previous findings (e.g., Greenberg et al., 1992; Lightsey, Burke, Ervin, Henderson, & Yee, 2006; Tesser, 2000) that low SE is associated with NAs, whereas high SE is associated with PAs. In addition, we found a higher level of PA among participants from the young-old group than the old-old group, and this is also in line with the previous findings (Meeks et al., 2012), and may be explained by the increase in age-related problems in old-old age (Carstensen et al., 2011; Charles, Reynolds, & Gatz, 2001). We did not, however, find, a significant level of NA among the old-old participants compared with the young-old participants, and this is also in accordance with previous investigations (e.g., Charles et al., 2001).

Several limitations of this study should be considered. First, we used a cross-sectional design, which did not allow us to examine within-person effects and complexity or to separate age-related and cohort-related effects. Accordingly, we also cannot rule out the possibility that lifetime adversity, which may be related to self-perceptions and affect complexity (e.g., Lomranz, 1998), contributed to the findings. Therefore, our results need to be examined further in future studies using this intra-individual longitudinal method. Nevertheless, we followed other studies (Ready et al., 2012; Reich et al., 2003) that have used a similar measurement method of affect complexity (an one time measure of affect complexity), which is based on the operative definitions of affect complexity of Reich and colleagues (2003) and Ready and colleagues (2012). Moreover, a contemporary study (Röcke, Hoppmann, & Klumb, 2011) showed that an one time measure of PA is associated with intra-individual longitudinal measurement of PA. Second, we did not control for personality differences, or for physical illness, disability, and cognitive functioning, variables that might have contributed to age-related effects. We did, however, control for self-rated health, which is considered as a major marker of physical functioning (Benyamini & Idler, 1999). In addition, the study design does not rule out the possibility that SE affected affect complexity. This possibility can be supported by previous findings that demonstrate the causal role of SE in controlling positive and negative emotions (Robins, Trzensniewski, Tracy, Gosling, & Potter, 2002). Nevertheless, SE in older age is an important psychological structure that is highly associated with mood changes (Dumenci & Windle, 1996; Kenny & Zautra, 2001), and as far as we know, this is the first study that has examined the relationship between affect complexity and SE in healthy old adults.

In summary, our study showed lower affect complexity among the young-old group than among the old-old group. It was also found, for the first time, that affect complexity was positively related to high SE among older participants. Future studies should examine further the mechanisms and conditions that promote emotionally beneficial combinations of SE in different phases of the late-life period.

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