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Influence of HIV Status and Age on Cognitive Representations of Others

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Abstract

In 2 studies the postulate that the perception of time left in life influences the ways that people conceptualize social relationships was explored. It was hypothesized that when time is limited, emotional aspects of relationships are highly salient. In Study 1, a card-sort paradigm involving similarity judgments demonstrated, for a sample of persons 18 to 88 years old, that the prominence of affect in the mental representations of prospective social partners is positively associated with age. In Study 2, the same experimental approach was applied to a sample of young gay men similar to one another in age, but notably different in their health status (that is, HIV negative; HIV positive, asymptomatic; and HIV positive, symptomatic). It was found that, with age held constant, increasing closeness to the end of life is also associated with an increasing prominence of affect in the mental representations of social partners. The results suggest that the perception of limited time, rather than chronological age, is the critical variable influencing mental representations of social partners.

Keywords

socioemotional selectivity theory; emotion; HIV status; aging

Understanding the social and cognitive processes involved in interpersonal relationships has been a central goal of many of psychology's subdisciplines. Not surprisingly, research emphasis has varied depending on the subdiscipline. In social psychology, emphasis has been on processes that govern relationships among strangers or acquaintances (e.g., Asch, 1956; Festinger, Schachter, & Back, 1950; Milgram, 1974; Ross & Nisbett, 1991), whereas developmental, personality, and clinical psychologists have focused on socioemotional processes involved in intimate relationships, such as parent-child attachments (e.g., Hetherington & Parke, 1975; Main, Kaplan, & Cassidy, 1985), psychotherapist-client relationships (Horowitz, Rosenberg, & Bartholomew, 1993), and relationships between husbands and wives (e.g., Carstensen, Gottman, & Levenson, 1995). In health psychology, primary emphasis has been placed on the ways in which individuals' perceptions of social support influence physical health status (Berkman & Syme, 1979) and disease course (Epping-Jordan, Compas, & Howell, 1994).

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We express our deep appreciation to Lonnie Nungesser for sharing his time and thoughts about this project prior to his death from AIDS in April 1992.

However, throughout life nearly all people encounter and maintain relationships with a wide range of social partners, spanning the most distant to the most intimate and involving social partners who are likable as well as those who are not and those who are informative as well as others who are less so. Some of these relationships are meaningful, and others are more superficial. Notably absent in the literature across subdisciplines is attention to the ways in which individuals conceive of the entire spectrum of social partners potentially available to them and the conditions under which preferences for social partners change.

Our earlier research revealed age differences in the ways in which people mentally represent this array of social partners. Older people, in comparison with younger people, appear to think about prospective social partners primarily in terms of their potential emotional value, whereas younger people place greater weight than do older people on additional dimensions, such as what they may learn from a person (Fredrickson & Carstensen, 1990). We have argued elsewhere that the apparent salience of emotion in later life results from the very real boundaries on time imposed by mortality (Carstensen, 1993; Carstensen, Isaacowitz, & Charles, in press).

This work represents an attempt to broaden the theoretical and practical relevance of our theoretical model by examining mental representations of social partners in individuals who, by virtue of different degrees of infirmity, have different life expectancies. We expound on the theoretical basis for this work, describe our empirical strategy, and present our results. We conclude that limitations on time activate complex motivational processes that serve to reorganize goal constellations. Regardless of chronological age, when time in life is limited, people focus selectively on the most important aspects of their lives. Therefore, limitations on time bring to the fore goals related to emotional meaning and emotional satisfaction.

Our program of research is grounded in socioemotional selectivity theory (Carstensen, 1993, 1995, 1998; Carstensen, Gross, & Fung, 1997; Carstensen et al., in press). According to the theory, a constellation of social goals motivates behavior throughout life. Regularly, goals compete with one another, for example, goals to feel good versus goals to learn difficult new information. The central tenet of the theory is that the salience of specific goals within the larger goal constellation varies as a function of the cognitive perception of future time. When the future is perceived as largely open-ended, there is a premium on acquiring information, not only for its immediate relevance but also for its potential future payoff. In contrast, under conditions that limit time, relatively short-term goals are prioritized. In this case, emotional goals, because they are often realized in the moment of contact, assume a relatively high priority.

The theory claims further that when emotional regulation is the primary goal, people are highly selective in their choice of social partners, nearly always preferring social partners who are familiar to them, because with these partners, emotions are predictable and often quite positive. In contrast, when information seeking is the primary goal, novel, unfamiliar social partners are often the best sources. Thus, when a person is exploring the world, trying to understand how it works, what the culture is like, how he or she compares to other people, and what other people are like, interactions with novel social partners have a greater potential to fulfill these goals than do interactions with familiar social partners.

Because of the inextricable negative association between chronological age and limitations on the future, socioemotional selectivity theory predicts age-related changes in social behavior and preferences for social partners that reflect the increasing importance of emotion in older persons. Empirical research conducted in recent years provides support for these claims. Older people, in comparison with younger people, have relatively smaller social networks that contain relatively more emotionally close social partners (Lang,

Staudinger, & Carstensen, 1998; Lang & Carstensen, 1994). In addition, older people appear to remember emotional material relatively better than neutral material, suggesting that emotional material is processed more deeply (Carstensen & Turk-Charles, 1994). Moreover, when directly asked about their social preferences, younger people choose a wide range of partners, whereas older people display a strong bias for familiar social partners (Fredrickson & Carstensen, 1990). Interestingly, younger people also display this familiarity bias when asked to choose social partners under experimental conditions that limit time (e.g., when asked to imagine an impending geographical move), and the reliable bias observed in older people disappears under experimental conditions that expand time (e.g., when they are asked to imagine a new medical breakthrough that will increase their life expectancy; Fung, Carstensen, & Lutz, 1998).

Especially relevant to the research that we describe here is that people appear to think about social partners differently at different ages (Fredrickson & Carstensen, 1990). In one of our first studies, adolescents and middle-aged people, as well as two groups of older adults (one infirm and one healthy), classified prospective social partners on the basis of similarity judgments. According to a multidimensional scaling analysis, three dimensions accounted for most of the variance in the way in which the participants classified social partners: (a) affective potential, (b) future possibilities, and (c) information seeking. Adolescents weighted the three dimensions fairly evenly in their classifications of social partners. In contrast, older adults placed greater importance on the affective potential of interactions. Relative to the adolescents, this finding was for middle-aged and healthy older research participants. It was especially true for infirm older research participants, who completed the classification task almost exclusively on the basis of affective criteria.

In our previous research described above, we conceptualized old age as the penultimate social ending and presumed that findings regarding the increase in emotional salience among age groups reflect the conscious or subconscious knowledge that time is limited. Theoretically, similar patterns of findings should be evident under time-limiting conditions independent of chronological age. We carried out two studies designed with the specific aim of disentangling age from closeness to death. The first study contrasts the mental representations of social partners in a demographically diverse sample spanning more than a 60-year age range. In the second study, age is held constant across subsamples of men who differ importantly in health status. Some of the men are HIV negative, some are HIV positive without symptoms of AIDS, and some are HIV positive with symptoms of AIDS. Therefore, the men in the second study do not differ in the time that they have lived since birth but very likely differ in their place in the life cycle. We hypothesized that the increased emphasis on emotion as a function of life expectancy would be evident in both samples. Thus, in combination, these studies allow for a strong test of the primary tenet of socioemotional selectivity theory: Time left in life, not chronological age, influences social cognitive processes.

Study 1

Method

Participants—A total of 240 healthy community-dwelling research participants were recruited by a San Francisco-based survey research firm and were each paid \$25 for participating in a 1-hr study. Thirty percent of the sample comprised blue-collar workers, and 70% comprised white-collar workers (as designated by the 1980 Census of the Population; U.S. Department of Commerce, 1982). We oversampled African Americans, who comprised 34% of the sample, and limited the remainder of the sample to Caucasian Americans. We also oversampled men in order to ensure equal numbers of men and women in the older age groups. People who did not speak English as their primary language were

excluded from recruitment. Thus, although the sample does not strictly represent the population living in the San Francisco Bay area, it does represent a relatively heterogeneous sample of a major urban U.S. west-coast community.

In order to ensure an even age and sex distribution across the life span, we constructed the sample to comprise four subgroups: 60 young adults 18 to 28 years old ($M = 23$), 60 middle-aged adults 35 to 45 years old ($M = 41$), 60 young-old adults 55 to 65 years old ($M = 60$), and 60 old adults 70 years old and older ($M = 75$). Younger subgroups were matched to older subgroups according to sex, socioeconomic status, and race. Women comprised 50% of the sample in each age subgroup.

Only participants who described themselves (to the survey research company during telephone recruitment) as being in the same health as or better health than most people their age were invited to the laboratory to participate in the study. Health status was also assessed by responses on the Wahler Physical Symptoms Inventory (Wahler, 1983), a 42-item physical symptoms checklist that surveys the type and frequency of physical complaints. Frequency on this inventory ranges from *never* to *every day*, reflecting the day-to-day experience of physical distress more than diagnostic health status. Given that we initially screened for healthy participants, not surprisingly, age differences in health status were not significant. Even so, a trend, $F(3,236) = 2.17, p < .09$, that suggested a curvilinear relationship between age and reported physical distress emerged: young and old persons endorsed the highest frequency of physical symptoms. Overall, though, participants were in very good health, and no two age groups were significantly different from one another.

On average, participants had 2 years of postsecondary education. Young and old participants had fewer years of education than did other participants, $F(3, 236) = 2.95, p < .03$, but again, absolute differences were minimal. Young adults had 14.16 years ($SD = 1.91$) of education, middle-aged adults had 15.28 years ($SD = 2.27$), young-old adults had 15.23 years ($SD = 3.26$), and old adults had 14.74 years ($SD = 3.11$).

Perceived social support was assessed with a subscale from the OARS Multidimensional Functional Assessment Questionnaire (Duke University Center for the Study of Aging and Human Development, 1978) with the following questions: “How many people do you know well enough to visit in their homes?” “How many times did you talk to someone (including relatives) on the telephone in the past week?” and “Do you have someone you can trust and confide in?” Responses to each question received a score ranging from 0 (*very little support*) to 3 (*a good deal of support*). On the basis of this assessment, age was positively associated with perceived support, $F(3, 236) = 2.59, p < .05$; older people were judged as having somewhat better social support networks than were younger people.

Experimental Task—Mental representations of potential social partners were assessed on the basis of similarity judgments derived from a card-sort procedure developed by Fredrickson and Carstensen (1990). The empirical approach has two important advantages. First, the card-sort procedure minimizes socially desirable responding by avoiding the leading questions inherent in some rating scales (e.g., “Would you enjoy spending time with your new neighbor?”). This aspect is particularly advantageous when investigators are working with older adults, who at times can be susceptible to social conformity pressures (Klein, 1972). Second, ordinal data generated by the method can be subjected to multidimensional scaling techniques that illuminate relevant organizing constructs. This method is especially appropriate when investigators wish to capture participants’ own cognitive distinctions among targets without presupposing the relevant dimensions. Put differently, analyzing similarity data with multidimensional scaling techniques enables

investigators to discover rather than impose relevant organizing constructs (see Rudy & Merluzzi, 1984; Shepard, 1974).

Brief descriptions of 18 potential social partners were printed individually on index cards (4 × 6 inches). The potential social partners are listed in the leftmost column of Table 1. Hypothetical social partners were described in such a way as to be meaningful and relevant to participants regardless of age, class, or ethnicity. In addition to the social partner card sort, we used two other sorts—one 5-item set of foods and one 18-item set of physical symptoms—to give participants a brief example and a parallel practice trial with the card-sort task and to confirm that aging was not associated with a tendency to sort cards into fewer piles. No age differences were observed on these trials.

Procedures—After giving informed consent and relevant background information, participants completed health and social support questionnaires. Next, following the brief example with food items and the practice trial with physical symptom items, participants completed the social partner card sort. Instructions were as follows:

All of the people described on these cards refer to people you know or to people you might know. I'd like you to imagine that with each of these people, you have the chance to sit down and talk with him or her—perhaps over coffee or a snack—for half an hour or so.... What I'd like you to do is to sort these cards into piles based on how similar or alike you feel it would be for you to spend some time talking with these people—to interact socially with them—for this short time. You should put people with whom such interaction would be alike or similar into the same pile: For example, if you think that spending time with your sister is very much like spending time with a close friend, then you'd put those two cards in the same pile. Whereas, those who in some way would be different for you to interact with should go into a different pile.... You can use as many or as few piles as you need to represent your views—and it is okay to place a person in a pile all their own. Remember, what we're interested in is your own view of these people as those whom you might interact with socially, so there is no correct or incorrect sorting arrangement.

Participants were given the set of 18 cards in a predetermined random order. Their task was to arrange the cards so that similar social partners were sorted into the same groups and dissimilar social partners were sorted into different groups.

Results

Overview of Multidimensional Scaling—On average, participants sorted the 18 cards into 5 groups (range = 2 to 13; $SD = 2.0$). Age groups did not differ in the number of groups generated, $F(3, 236) = 1.24, ns$. We recorded the groupings of potential social partners made by each participant on a separate 18×18 similarity matrix with 0s and 1s so that 1 indicated that two cards had been placed in the same pile (see Rudy & Merluzzi, 1984). We then summed these similarity matrices across the individual participants in each age group to produce group-level similarity matrices. Finally, we analyzed these group matrices by using nonmetric three-way multidimensional scaling (MDS). MDS models arrange stimuli in multidimensional space according to perceived similarity so that stimuli that are frequently grouped as similar to one another are proximate and those that are frequently grouped as different from one another are distant. After the MDS procedure achieves a stable representation of the data, investigators interpret the dimensions that define the multidimensional space (Kruskal & Wish, 1978). Three-way MDS models have the added capability of describing group differences. These group differences are represented by

weights assigned to each group on each dimension of a multidimensional configuration that is common to all participants.

Our principal aim in this study was to examine the differences among the four age groups (i.e., young, middle-aged, young-old, and old). Therefore, three-way MDS analyses conducted with the four similarity matrices of these age groups comprised our primary analyses. In addition to conducting analyses by using the full sample, we explored the generality of our findings by conducting parallel age analyses separately for (a) men and women, (b) African American and Caucasian American participants, and (c) blue-collar and white-collar socioeconomic classes.

Scaling Results

Overall stimulus configuration: First, we analyzed the similarity matrices for the four age groups by using the Alternating Least Squares Scaling's (ALSCAL) nonmetric algorithm of three-way MDS (DeLeeuw, Young, and Takane, 1976). This analysis yielded a common three-dimensional configuration that accounted for 82% of the variance in the similarity data (percentage of variance accounted for provides a goodness-of-fit index for three-way MDS; Kruskal & Wish, 1978). This solution was considered appropriate because no interpretable relationships resulted from the addition of more dimensions to the solution. The coordinates for each of the 18 potential social partners in the overall stimulus configuration are given in Table 1.

Dimension 1 accounted for 45% of the variance in the similarity data. The distribution of potential social partners along Dimension 1, which we interpret as *affective potential*, distinguishes positive affect from negative affect in the anticipated interaction (Table 1). Potential social partners with positive values on Dimension 1 included all family members, the close friend, the "acquaintance with whom you seem to have much in common," and the poet or artist. In contrast, those with negative values on Dimension 1 included the "acquaintance with whom you seem to have nothing in common," the casual acquaintance, the stranger, the disliked person, the sales representative, and the aspiring local politician.

Dimension 2 accounted for 20% of the variance. The distribution of social partners along this dimension coincides with the dimension we have called *future contact* in our earlier work (Fredrickson and Carstensen, 1990; see Table 2). This dimension contrasts social partners with whom the likelihood of future social contact is high (e.g., all family members, close friend, casual acquaintance, attractive stranger, and much-in-common acquaintance) with those with whom future social contact is not likely (e.g., poet or artist, author, doctor, clergy member, local politician, and sales representative).

Dimension 3 accounted for 17% of the variance. The distribution of social partners along this dimension corresponds to the dimension we have called *information seeking* in our earlier work (Fredrickson and Carstensen, 1990; see Table 2). This dimension contrasts social partners from whom people would seek additional information in order to get better acquainted (e.g., casual acquaintance, attractive stranger, or new neighbor) with those from whom people would not typically seek additional information, either because they are already quite familiar (e.g., family members and close friend) or because they do not inspire such curiosity (e.g., disliked person).

Verifying dimension replication: Before examining age group differences, we wanted to verify statistically that the three dimensions revealed by the present scaling solution replicated the dimensions obtained in the Fredrickson and Carstensen (1990) study. To do this, we used a regression technique described by Kruskal and Wish (1978, pp. 35–41). Using multiple linear regression, we regressed the dimension coordinates obtained for each

of the 18 social partners in the 1990 study over the coordinates revealed by the present scaling solution. The results of this procedure are shown in Table 2.

Two conditions are required to establish dimension replication. First, the multiple correlation for each (original) dimension must be significant at $p < .01$, and second, each (original) dimension must have a high regression weight on one and only one dimension of the present scaling solution. By and large, our results satisfy both conditions. The last column in Table 2 indicates that the multiple correlations of all three original dimensions were significant at $p < .0001$. This result indicates that the original dimensions were well predicted by the coordinates of the present scaling solution. The optimum dimension weights corresponding to each multiple correlation are shown in the middle three columns of Table 2. The pattern of weights supports the conclusion that the present dimensions replicate the dimensions obtained in the Fredrickson and Carstensen (1990) study: Dimension 1 is best fit by the affective-potential dimension of the original 1990 scaling solution, Dimension 2 is best fit by the future-contact dimension of the original 1990 solution, and Dimension 3 is best fit by the information-seeking dimension of the original 1990 solution. It should be noted, however, that evidence for the replication of Dimensions 1 and 2 (affective potential and future contact) is clearer than that for Dimension 3 (information seeking; Table 2).

Age differences: To represent differences among groups, three-way MDS yields weights for each group on the dimensions revealed by the common stimulus configuration. These weights indicate the salience (or importance) of the three dimensions to each group of participants. We use these weights to gain insight into the distinctions among age groups in terms of their mental representations of potential social partners. High dimension weights indicate that the associated dimension is more important to a group of participants, whereas low dimension weights indicate that a dimension is less important to a group of participants.

Figure 1 represents the dimension weights for each of the four age groups. The pattern of dimension weights suggests that affective potential (Dimension 1, illustrated on the horizontal axes of Figure 1) becomes increasingly important with age. As hypothesized, the oldest participants assigned the greatest importance to the affective potential of interaction (0.78); the young-old (0.73), middle-aged (0.65), and (0.46) young participants placed less importance on this dimension. In direct contrast, the importance of future contact declined with age (Dimension 2, represented on the vertical axis of Figure 1A). Representations of the future were most important to the young (0.59) and middle-aged (0.50) participants, less important to the young-old participants (0.37), and least important to the oldest participants (0.23). Information seeking in order to get acquainted (Dimension 3, represented on the vertical axis of Figure 1B) was most important to the middle-aged participants (0.46) and less important to the young participants (0.42), young-old participants (0.40), and oldest participants (0.39).

Generalizability across sex, race, and socioeconomic status: Next, we explored whether the age-related increases in the salience of the affective potential of prospective social contacts would also be evident within each major demographic subsample. We conducted parallel MDS analyses by using separate age group matrices for (a) women and men, (b) African American and Caucasian American participants, and (c) blue-collar and white-collar socioeconomic classes. In each demographic subsample, affective potential accounted for a substantial variance (from 28% to 49%). More strikingly, across all demographic subsamples, affective potential always emerged as the most salient dimension for the oldest subgroup of participants and never emerged as the most salient dimension for the youngest subgroup of participants.

In sum, Study 1 replicated our previous findings. Consistent with socioemotional selectivity theory, our findings demonstrated that old age is associated with increased importance of the affective potential of social contacts relative to possibilities for future involvement and information gain. Replication of our earlier findings in this relatively large and diverse sample—as well as its constituent sub-samples—suggests that this age-linked phenomenon is reliable and robust.

Study 2

To decouple time since birth from time until death, in Study 2 we studied a second sample comprising gay men whose chronological ages were similar but who differed in their respective closeness to death by virtue of their HIV status. One group was HIV negative, a second group was HIV positive without symptoms of AIDS, and a third group was HIV positive with symptoms of AIDS. We hypothesized that the mental representations of social partners (again, conveyed in terms of similarity classifications) would be determined by closeness to death. That is, men who were HIV positive with symptoms of AIDS would place the greatest importance on the affective potential of social contacts. This pattern of results would suggest that a heightened salience of the emotional aspects of life is not unique to old age but instead is common to situations characterized by limited time, in this case, impending death.

Method

Participants—A total of 120 gay men between the ages of 23 and 66 years ($M = 38$; $SD = 7.80$) served as voluntary participants in this study and were each paid \$25. Prospective participants were told that the study was about mental and physical health and their links to social behavior. We also selected an additional age-matched sample of 40 men ($M = 35$ years old; $SD = 11.72$) from Study 1 to serve as an additional reference point for comparisons between Study 1 and Study 2. On the basis of base rate occurrences of homosexuality in the general population, we expected that the latter sample of men comprised primarily HIV-negative heterosexual men. Our presumption was that, in general, HIV-negative gay men would not differ from a heterogeneous group of men in their life expectancies and thus in their mental representations of social partners. However, because gay men do differ from heterosexual men in at least some social preferences, we included the age-matched comparison group in order to examine this idea directly.

Only gay men who knew their HIV status were invited to participate. Participants were assured that all of their responses, especially their HIV status, would remain fully confidential. A total of 40 ($M = 39$ years old; $SD = 8.39$) who reported that they had tested negative for HIV had comprised the HIV-negative group; 40 gay men ($M = 38$ years old; $SD = 7.57$) who disclosed that they had tested positive for HIV but were not experiencing any physical symptoms of AIDS comprised the HIV-positive, asymptomatic group; and 40 gay men ($M = 36$ years old; $SD = 7.42$) who disclosed that they had tested positive for HIV and were also experiencing physical symptoms of AIDS comprised the HIV-positive symptomatic group.

Health status, assessed by the Wahler Physical Symptoms Inventory as in Study 1, significantly differentiated the four subgroups, as expected, $F(3, 156) = 13.32$, $p < .0001$, with HIV-positive, symptomatic men endorsing more physical symptoms than all of the other subgroups. Means for the gay participants were 82.28 ($SD = 67.87$) for the HIV-negative subgroup, 93.70 ($SD = 65.94$) for the HIV-positive asymptomatic subgroup, and 159.90 ($SD = 98.10$) for the HIV-positive, symptomatic subgroup. The mean for the age-matched comparison group was 67.10 ($SD = 39.01$).

Members of the four subgroups did not differ in education. Mean years of education for the gay participants were 14.40 ($SD = 2.93$) for the HIV-negative subgroup, 14.87 ($SD = 2.36$) for the HIV-positive, asymptomatic subgroup, and 13.38 ($SD = 2.98$) for the HIV-positive, symptomatic subgroup. Mean years of education for the age-matched comparison group was comparable, at 14.42 ($SD = 1.82$).

As in Study 1, perceived social support was assessed with a subscale from the OARS Multidimensional Functional Assessment Questionnaire. Subsample members differed on this index, $F(3, 155) = 3.85, p < .05$, with the HIV-positive, asymptomatic participants being judged as having somewhat less social support than the HIV-negative and HIV-positive, symptomatic participants. However, the social support ratings of the age-matched representative sample of men drawn from Study 1 did not differ from these of any of the subgroups of gay men.

Measures and Procedures—Experimental measures and procedures were identical to those described for Study 1.

Results

Overall Stimulus Configuration—We analyzed the similarity matrices for the three gay groups along with the age-matched comparison group by using ALSCAL's nonmetric algorithm of three-way MDS, as in Study 1 (DeLeeuw et al., 1976). This analysis yielded a common three-dimensional configuration that accounted for 82% of the variance in the similarity data. This solution was considered appropriate because no interpretable relationships resulted from the addition of more dimensions to the solution. Dimension 1 accounted for 43% of the variance in the scaling solution, Dimension 2 accounted for 24% of the variance, and Dimension 3 accounted for 14% of the variance.

Verifying Dimension Replication—As in Study 1, we tested whether the three dimensions revealed by this scaling solution replicated the dimensions obtained in Fredrickson and Carstensen's (1990) study. We again used multiple linear regression to regress the dimension coordinates of the 1990 scaling solution over the coordinates revealed by the present scaling solution. The results of this procedure are shown in Table 3.

As in Study 1, our regression results satisfy the two conditions necessary to establish dimension replication. The multiple correlations of all three original dimensions were significant, and the optimum dimension weights corresponding to each multiple correlation were uniquely related to the dimensions obtained in the Fredrickson and Carstensen (1990) study. The primary difference between the scaling solution of this study and that of the 1990 study is that here the information-seeking dimension accounted for relatively more variance than did the future-contact dimension (24 and 14% of the variances accounted for, respectively, in this study, compared to 14 and 18% of the variances accounted for, respectively, in the 1990 study).

Group Differences—Figure 2 depicts the dimension weights that represent the importance (or salience) of each of the three dimensions to the three subgroups of gay men and the men in the age-matched comparison group. The pattern of dimension weights supports the hypothesis that affective potential (Dimension 1, illustrated on the horizontal axes of Figure 2) is most important to those who are closest to the end of their lives. The HIV-positive gay men with symptoms of AIDS assigned the greatest importance to affective potential (0.74); men in the age-matched comparison group (0.66), the HIV-negative gay men (0.63), and the HIV-positive gay men without symptoms of AIDS (0.59) placed less importance on this dimension. Information seeking (Dimension 2, represented on the

vertical axis of Figure 2A) was most important to the HIV-positive gay men without symptoms of AIDS (0.56) and least important to the HIV-positive gay men with symptoms of AIDS (0.44), with men in the age-matched comparison group and the HIV-negative gay men falling in between (0.47 each). The importance of future contact (Dimension 3, represented on the vertical axis of Figure 2B) declined with closeness to death. It was most important to men in the age-matched comparison group (0.45) and the HIV-negative gay men (0.43) and less important to the HIV-positive gay men without symptoms of AIDS (0.37); possibilities for future contact were least important to the HIV-positive gay men with symptoms of AIDS (0.24).

In sum, the data from Study 2 demonstrate that closeness to death, as indexed by AIDS symptomatology, is associated with increased importance of the affective potential of social contacts. Each of the subgroups of men in this study were of comparable chronological age, but they faced very different life expectancies. In other words, if place in the life cycle is indexed by time until death instead of time since birth, the subgroups in Study 2 are comparable to the age-graded subgroups in Study 1.

General Discussion

The studies described here were designed to investigate the central tenet of socioemotional selectivity theory, namely, that constraints on time prompt enhanced attention to emotional aspects of life. Findings from both studies provide support for this contention. Study 1 and Study 2 show that when people approach the end of life, whether because of age or illness, they think about social partners along emotional dimensions. Emotion was weighted more heavily among people nearing the end of the life cycle in all of the subgroups that we examined—Caucasian Americans and African Americans, blue-collar and white-collar workers, men and women, and young men facing premature death from AIDS. The replicability of this central finding across these diverse and real-world subgroups suggests that the central finding is reliable and robust.

When people approach the end of life because of illness or age, attention to emotion—especially when choosing social partners—may be particularly adaptive. The derivation of existential meaning in later life has long been considered a central developmental task of old age (Erickson, Erickson, & Kivnick, 1986). To the extent that contact with loved ones facilitates this process, mental representations of social partners along emotional dimensions can be construed as a cognitive precursor to the selection of social partners who are most likely to provide a social climate in which a person feels validated and loved.

We also suspect that selective social interactions with emotionally close social partners may reduce the social demand to inhibit emotional responses and thus quell psychophysiological activity associated with negative emotions (Gross & Levenson, 1997). It seems logical that interactions with novel social partners demand greater emotional inhibition than do interactions with familiar social partners. This situation may be particularly true when a disease carries with it social stigma. One study of gay men, for example, showed that those who concealed their sexual identity had a higher incidence of cancer, pneumonia, bronchitis, and sinusitis in a 1-year period than did those who did not conceal their sexual identity (Cole, Kemeny, Taylor, & Visscher, 1996). Research by Pennebaker and colleagues suggested that disclosure itself may have positive effects on health (Davison & Pennebaker, 1996; Pennebaker, 1990). Thus, our findings, when considered conjointly with other research findings in health psychology, point to ways in which antecedent control of emotion through management of the social environment may have both psychological and physical benefits.

An alternative explanation for our findings is that identified differences in mental representations reflect differences in the availability of social partners rather than active preferences for them. The combined effects of social discrimination and failing health—common to both older people and gay men with illnesses—may place barriers to social contacts with novel social partners. Although we recognize the potential influence of these factors and acknowledge that the methods that we used in this study cannot rule out this explanation, we believe that the broader profile of findings in the literature renders it unlikely. First, numerous studies have shown that older people are highly satisfied with their social relationships, indeed more so than younger and middle-aged adults (Carstensen, 1993; Field & Minkler, 1988). Second, and we believe more compelling, experimental studies of social preferences have shown that the social choices of young and old people are altered when perceptions of future time are limited or expanded (Fredrickson & Carstensen, 1990; Fung et al., 1998).

Our findings are consistent with a common paradoxical finding in health psychology, namely, that people living with life-threatening diseases often describe life as better than ever and display striking optimism about the future (Taylor, 1989; Taylor & Brown, 1988; Taylor et al., 1992). Such optimism is consistent with our own observation that emotional experiences assume paramount importance, whereas other types of experiences are afforded a lower priority when people face the end of life. If the shifts in social preferences that we observed represent a near-death phenomenon rather than an old-age phenomenon, applications drawn from the psychological literature on aging may also be helpful to those designing interventions for people with other life-threatening diseases, such as AIDS. Specifically, interventions aimed at enhancing emotionally meaningful contact may be especially useful.

It is important to note that socioemotional selectivity theory adheres conceptually to the cardinal principle of life span developmental psychology: Age itself is not an explanatory variable (Wohlwill, 1970). Rather, the life span approach presumes that development is a lifelong process in which (a) adaptations rely fundamentally on selections, (b) selections (or specializations) inevitably involve both gains and losses, and (c) development is multidimensional, multidirectional, and multifunctional (P. B. Baltes, 1987; P. Baltes, 1991; M. M. Baltes & Carstensen, 1996). In the life span view, adaptation is not a static process but is contoured to the proximal conditions of a particular environmental or social niche. Within the framework of socioemotional selectivity, age-related reductions in social contacts and preferences for emotionally close social partners are context dependent, are closely tied to psychological conceptions of the future, and reflect selections that maximize emotional gains at the expense of other potentials. We expect that for most healthy people, age serves as an implicit marker of the amount of time left in life and goals are selected and pursued with this time frame in mind.

Notably, the finding that emotion is more central toward the end of life is consistent with gerontological literature suggesting a relative superiority of memory for emotional versus nonemotional material (Carstensen & Turk-Charles, 1994; Hashtroudi, Johnson, & Chrosniak, 1990). It also adds to recent discussions about temporal influences on emotion. Fredrickson, Kahneman, and colleagues (Fredrickson, 1991, 1995; Fredrickson & Kahneman, 1993; Kahneman, Fredrickson, Schreiber, & Redelmeier, 1993) have shown that when people make global evaluations of past social and emotional experiences, they draw heavily from the affect associated with the endings of those past experiences. Complementing these findings, the findings of this study suggest that affect also becomes increasingly central as endings come into view. Therefore, from both prospective and retrospective vantage points, affect associated with endings appears to have a greater

influence on people's social evaluations and choices than does affect associated with other portions of time.

In summary, our findings suggest that behavioral changes in old age may not simply reflect coping with loss and/or the passive response of a decaying organism but instead may reflect active adaptation to a specific social and environmental niche in which the recognition of time is central. The life span developmental framework offered by socioemotional selectivity theory suggests that it may be fruitful to conceptualize old age as providing a set of conditions that frequently alter behavioral, cognitive, and emotional goals and bring to the fore different, but nevertheless basic, human processes that operate throughout life.

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References

- Asch S. Opinions and social pressure. *Scientific American*. 1956; 193:31–35.
- Baltes MM, Carstensen LL. The process of successful ageing. *Ageing and Society*. 1996; 16:397–422.
- Baltes P. The many faces of human aging: Toward a psychological culture of old age. *Psychological Medicine*. 1991; 21:837–854. [PubMed: 1780400]
- Baltes PB. Theoretical propositions of life-span developmental psychology: On the dynamics between growth and decline. *Developmental Psychology*. 1987; 23:611–626.
- Berkman L, Syme SL. Social networks, host resistance and mortality: A nine year follow-up study of Alameda County residents. *American Journal of Epidemiology*. 1979; 109:186–204. [PubMed: 425958]
- Carstensen, LL. Motivation for social contact across the life span: A theory of socioemotional selectivity. In: Jacobs, J., editor. *Nebraska symposium on motivation: Vol. 40. Developmental perspectives on motivation*. Lincoln: University of Nebraska Press; 1993. p. 209-254.
- Carstensen LL. Evidence for a life-span theory of socioemotional selectivity. *Current Directions in Psychological Science*. 1995; 4:151–156.
- Carstensen, LL. A life-span approach to social motivation. In: Heckhausen, J.; Dweck, C., editors. *Motivation and self-regulation across the life span*. New York: Cambridge University Press; 1998. p. 341-364.
- Carstensen LL, Gottman JM, Levenson RW. Emotional behavior in long-term marriage. *Psychology and Aging*. 1995; 10:140–149. [PubMed: 7779311]
- Carstensen LL, Gross J, Fung H. The social context of emotion. *Annual Review of Gerontology and Geriatrics*. 1997; 17:325–352.
- Carstensen LL, Isaacowitz D, Charles ST. Taking time seriously: A theory of socioemotional selectivity. *American Psychologist*. (in press).
- Carstensen LL, Turk-Charles S. The salience of emotion across the adult life course. *Psychology and Aging*. 1994; 9:259–264. [PubMed: 8054174]
- Cole SW, Kemeny ME, Taylor SE, Visscher BR. Elevated physical health risk among gay men who conceal their homosexual identity. *Health Psychology*. 1996; 15:243–251. [PubMed: 8818670]
- Davison K, Pennebaker J. Emotions, thoughts and healing: After Dafer. *Advances*. 1996; 12:19–23.
- DeLeeuw J, Young FW, Takane Y. Additive structure in qualitative data: Alternating least squares method with optimal scaling features. *Psychometrika*. 1976; 41:471–503.

- Duke University Center for the Study of Aging and Human Development. Multidimensional Functional Assessment: The OARS Methodology. 2. Durham, NC: Duke University Medical Center; 1978.
- Epping-Jordan JE, Compas BE, Howell DE. Predictors of cancer progression in young adult men and women: Avoidance of intrusive thoughts and psychological symptoms. *Health Psychology*. 1994; 13:539–547. [PubMed: 7889909]
- Erickson, E.; Erickson, J.; Kivnick, H. *Vital involvement in old age*. New York: Norton; 1986.
- Festinger, L.; Schachter, S.; Back, K. *Social processes in informal groups: A study of human factors in housing*. New York: Harper; 1950.
- Field D, Minkler M. Continuity and change in social support between young-old and old-old or very-old age. *Journal of Gerontology: Psychological Sciences*. 1988; 43:100–106.
- Fredrickson BL. *Anticipated endings: An explanation for selective social interaction* (Doctoral dissertation, Stanford University, 1990). *Dissertation Abstracts International*. 1991; 3:AAD91-00818.
- Fredrickson BL. Socioemotional behavior at the end of college life. *Journal of Social and Personal Relationships*. 1995; 12:261–276.
- Fredrickson BL, Carstensen LL. Choosing social partners: How old age and anticipated endings make us more selective. *Psychology and Aging*. 1990; 5:335–347. [PubMed: 2242238]
- Fredrickson BL, Kahneman D. Duration neglect in retrospective evaluations of affective episodes. *Journal of Personality and Social Psychology*. 1993; 65:45–55. [PubMed: 8355141]
- Fung, H.; Carstensen, LL.; Lutz, A. *Social partner preferences under time-limiting and time-expanding conditions*. Stanford University; Stanford, CA: 1998. Manuscript submitted for publication
- Gross JJ, Levenson RW. Hiding feelings: The acute effects of inhibiting negative and positive emotion. *Journal of Abnormal Psychology*. 1997; 106:95–103. [PubMed: 9103721]
- Hashtroudi S, Johnson M, Chrosniak L. Aging and qualitative characteristics of memories for perceived and imagined complex events. *Psychology and Aging*. 1990; 5:119–126. [PubMed: 2317290]
- Hetherington, M.; Parke, R. *Child psychology: A contemporary viewpoint*. New York: McGraw-Hill; 1975.
- Horowitz L, Rosenberg SE, Bartholomew K. Interpersonal problems, attachment styles, and outcome in brief dynamic psychotherapy. *Journal of Consulting and Clinical Psychology*. 1993; 61:549–560. [PubMed: 8370851]
- Kahneman D, Fredrickson BL, Schreiber CA, Redelmeier DA. When more pain is preferred to less: Adding a better end. *Psychological Science*. 1993; 4:401–405.
- Klein RL. Age, sex and task difficulty as predictors of social conformity. *Journal of Gerontology*. 1972; 27:229–236. [PubMed: 5060727]
- Kruskal, JB.; Wish, M. *Sage University Paper Series on Quantitative Applications in the Social Sciences, Series No. 07-011*. Beverly Hills, CA: Sage; 1978. Multidimensional scaling.
- Lang F, Staudinger U, Carstensen LL. Socioemotional selectivity in late life: How personality and social context do (and do not) make a difference. *Journal of Gerontology: Psychological Sciences*. 1998; 53:21–30.
- Lang FR, Carstensen LL. Close emotional relationships in late life: Further support for proactive aging in the social domain. *Psychology and Aging*. 1994; 9:315–324. [PubMed: 8054179]
- Main M, Kaplan N, Cassidy J. Security in infancy, childhood and adulthood: A move to the level of representation. *Monographs of the Society for Research in Child Development*. 1985; 4:66–104.
- Milgram, S. *Obedience to authority*. New York: Harper & Row; 1974.
- Pennebaker, JW. *Opening up: The healing power of confiding in others*. New York: William Morrow; 1990.
- Ross, L.; Nisbett, R. *The person and the situation: Perspectives in social psychology*. New York: McGraw-Hill; 1991.
- Rudy TE, Merluzzi TV. Recovering social-cognitive schemata: Descriptions and applications of multidimensional scaling for clinical research. *Advances in Cognitive-Behavioral Research and Therapy*. 1984; 3:61–102.

- Shepard RN. Representation of structure in similarity data. Problems and prospects. *Psychometrika*. 1974; 39:373–421.
- Taylor, S. *Positive illusions: Creative self-deception and the healthy mind*. New York: Basic Books; 1989.
- Taylor S, Brown J. Illusion and well-being: A social psychological perspective on mental health. *Psychological Bulletin*. 1988; 103:193–210. [PubMed: 3283814]
- Taylor S, Kemeny ME, Aspinwall LG, Schneider SG, Rodriguez R, Herbert M. Optimism, coping, psychological distress, and high-risk sexual behavior among men at risk for AIDS. *Journal of Personality and Social Psychology*. 1992; 63:460–473. [PubMed: 1403625]
- U. S. Department of Commerce. Publication No. PHC80-R3. Washington, DC: Author; 1982. 1980 Census of population: Alphabetical index of industries and occupations.
- Wahler, HJ. *Wahler Physical Symptoms Inventory*. Los Angeles: Western Psychological Services; 1983.
- Wohlwill JF. The age variable in psychological research. *Psychological Review*. 1970; 77:49–64.

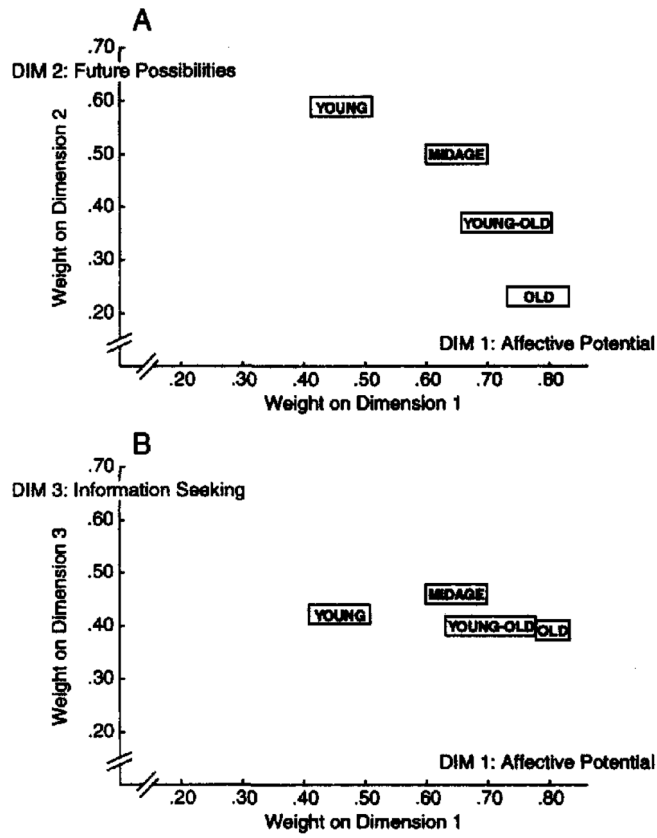


Figure 1. Dimension (DIM) weights indicating the salience of the three dimensions for separate age groups. (A) Weights for Dimension 1 and Dimension 2. (B) Weights for Dimension 1 and Dimension 3.

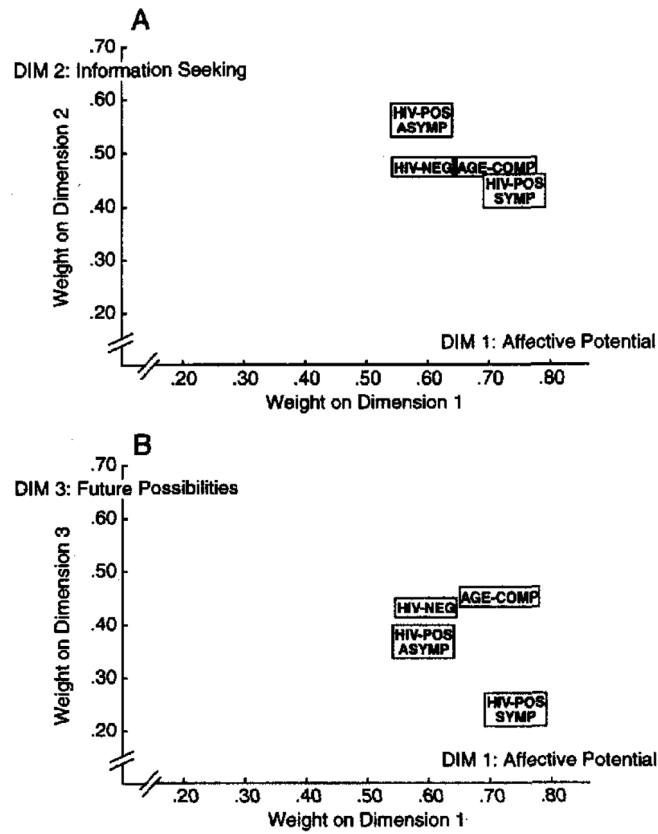


Figure 2. Dimension (DIM) weights indicating the salience of the three dimensions for each HIV group. (A) Weights for Dimension 1 and Dimension 2. (B) Weights for Dimension 1 and Dimension 3. AGE-COMP = age-matched comparison group; ASYMP = asymptomatic; SYMP = symptomatic; NEG = negative; POS = positive.

Table 1

Potential Social Partners and Stimulus Coordinates From Overall Stimulus Configuration in Study 1

Description of potential social partner	Stimulus coordinate on dimension		
	1	2	3
Close friend of yours	1.12	1.07	-1.28
Recent acquaintance with whom you seem to have nothing in common	-1.83	-0.02	0.47
Your doctor	0.42	-1.31	-0.41
Member of your immediate family	0.84	1.17	-1.54
Casual acquaintance of yours	0.12	0.65	1.77
Person that you know but dislike	-2.06	-0.07	-0.83
Attractive person that you do not know	-0.53	0.38	1.46
Relative not in your immediate family	0.75	1.28	-0.06
Recent acquaintance with whom you seem to have much in common	1.02	0.86	0.24
Sales representative	-1.55	-0.94	-0.12
New neighbor	0.27	-0.42	1.59
Author of a book you've read	0.46	-1.29	0.16
Your sibling	0.75	1.19	-1.45
Poet or artist whose work you like	0.75	-1.25	-0.12
Stranger about your age	-0.57	-0.36	1.41
Clergy member (e.g., pastor, rabbi, priest)	0.55	-1.01	-0.61
Younger relative (e.g., niece, nephew, cousin)	0.84	1.43	-0.72
Person running for a local political position	-1.11	-1.37	0.03

Table 2

Multiple Regression of Original (Fredrickson and Carstensen, 1990) Dimension Coordinates on Dimensions of the Social Partner Scaling Solution for Study 1

Original dimension	Regression weights (direction cosines): Dimension			<i>R</i>
	1	2	3	
Affective potential	.858	.027	.515	.968*
Future contact	.173	.975	.138	.974*
Information seeking	.623	.160	.767	.961*

Note. Direction cosines are regression coefficients that have been normalized so that their sum of squares equals 1.00 for every dimension.

* $p < .0001$.

Table 3

Multiple Regression of Original (Fredrickson and Carstensen, 1990) Dimension Coordinates on Dimensions of the Social Partner Scaling Solution for Study 2

Original dimension	<u>Regression weight (direction cosines): Dimension</u>			<i>R</i>
	1	2	3	
Affective potential	.997	.001	.000	.959*
Future contact	.010	.569	.817	.959*
Information seeking	.153	.830	.536	.969*

Note. Direction cosines are regression coefficients that have been normalized so that their sum of squares equals 1.00 for every dimension.

* $p < .0001$.