Published in final edited form as:

Clin Gerontol. 2015 ; 38(1): 1–18. doi:10.1080/07317115.2014.970317.

Positive Affect and Social Anxiety Across the Lifespan: An Investigation of Age as a Moderator

JACLYN S. WEISMAN, MA,

Washington University in St. Louis, St. Louis, Missouri, USA

THOMAS L. RODEBAUGH, PhD,

Washington University in St. Louis, St. Louis, Missouri, USA

PATRICK J. BROWN, PhD, and

Columbia University College of Physicians and Surgeons and New York State Psychiatric Institute, New York, New York, USA

ELIZABETH A. MULLIGAN, PhD

VA Boston Healthcare System, Brockton, Massachusetts, USA

Abstract

Recent literature has supported a moderate, inverse relationship between social anxiety and positive affect. It has been proposed, but not clearly established, that the inverse relationship between the constructs may be stronger in younger adults than in adults who are older. We tested this hypothesis in two archival data sets of community participants. The expected age-related interaction was not found in Study 1, which used a measure capturing a conflation of valence and arousal known as activated positive affect. Conversely, the interaction was present in Study 2, in which the positive affect measure was primarily based on valence. We found only partial support for the hypothesis, and results highlight the need for a more comprehensive measure of positive affect.

Keywords

aging; anxiety disorders; positive affect; social anxiety; social phobia

Over the past several years, a growing body of research has examined the attenuated positive emotions that distinguish social anxiety disorder from other anxiety disorders. Watson, Clark, and Carey (1988) were among the first to provide evidence that lower levels of positive affect characterize individuals with higher social anxiety, whereas previous authors had often assumed positive affect was more related to depressive mood. Over time, an abundance of research, summarized by Kashdan, Weeks, and Savostyanova (2011), has shown that higher social anxiety is associated with less frequent, lower intensity, and less lasting positive experiences, as well as fear responses to overtly positive social experiences and events and distinct cognitive-processing biases that cause significant life impairment.

Kashdan (2007) conducted a meta-analysis evaluating the magnitude, consistency, and specificity of the relationship between social anxiety symptoms and positive affect. The analyses supported a moderate, inverse relationship between the constructs ($r = -.36$; 95% CI: $-.31$ to $-.40$). The one exception to the consistency of this finding was that the mean effect size significantly varied across sample type. The relationship between positive affect and social anxiety symptoms was largest in clinical samples ($r = -.41$), slightly lower in both youth and college samples ($r = -.35$), and smallest in community or non-clinical veteran samples ($r = -.27$). Kashdan hypothesized that these results reflect a stronger inverse relationship between positive affect and social anxiety symptoms in younger adults than adults who are older and not known to be diagnosed with a clinical disorder.

Kashdan (2007) attributed this effect to age differences in the quality of emotional experiences, citing a study by Carstensen and Mikels in which the authors reviewed socioemotional selectivity theory (2005). According to this theory, during youth, people focus on preparing for the future and value novelty, investing time and energy into acquiring information and seeking out new experiences. In contrast, older adults perceive limits on their time, causing them to direct attention to emotionally meaningful and reliable aspects of life, such as strengthening existing intimate social relationships. Given the findings of Carstensen and Mikels, we find plausible Kashdan's suggestion that differences in sources of happiness over time may account for the stronger relationship between positive affect and social anxiety symptoms in younger adults.

Kashdan's (2007) age moderation hypothesis is consistent with longitudinal research suggesting that whereas positive affect remains relatively stable, social anxiety symptoms decrease over time. In a literature review of age-related differences and change in positive affect over time, Charles, Reynolds, and Gatz (2001) point out that although the longitudinal data for positive affect are less consistent than those for negative affect, taken on the whole, previous research reflects few age differences in positive affect. This notion is supported by earlier work by Barrick, Hutchinson, and Deckers (1989) and Vaux and Meddin (1987), who found no significant differences in positive affect between younger and older adults.

Conversely, several large-scale epidemiologic studies have found that the lifetime prevalence of social anxiety disorder is greater for younger cohorts relative to older ones (e.g., Grant et al., 2004; Kessler et al., 2005). These results may be attributed to a combination of age and cohort effects, such that social anxiety disorder symptoms become less severe over time, and, additionally, the disorder is becoming more prevalent with recency of cohort (Heimberg, Stein, Hiripi & Kessler, 2000). It is important to note that both of these potential factors may contribute to any results for age found in cross-sectional data.

Taken together, all available studies support the notion that although levels of positive affect remain relatively constant across the lifespan, levels of social anxiety decline over time. If these findings accurately reflect the longitudinal nature of positive affect and social anxiety symptoms, then it is likely that the relationship between them decreases with age. The available data therefore provide what could be described as circumstantial evidence that positive affect and social anxiety may have a weaker relationship in older versus younger adults, yet a clear test of this effect is lacking in the literature.

In the present study we aimed to test the age moderation hypothesis in two archival data sets of community participants. The samples were similar in demographic composition as well as age range, and both included measures of positive affect and social anxiety symptoms. We predicted that, in both data sets, the relationship between positive affect and social anxiety symptoms would be weaker in older adults compared with younger adults. If age does indeed moderate this relationship, it may call for differential treatment approaches for social anxiety symptoms dependent on the client's age. In other words, if the two constructs are more tightly linked in younger adulthood, perhaps it would be best to address the symptoms differently than in an older adult whose positive affect is less constrained by social anxiety. A need to address symptoms effectively in older adults is highlighted by findings that older adults who experience subthreshold anxiety symptoms report comparable deficits to quality of life as those who meet full clinical criteria (Preisig, Merikangas, & Angst, 2001; Van Zelst, De Beurs, Beekman, Van Dyck, & Deeg, 2006). Given prevalence estimates of late-life subclinical anxiety ranging from 15% to 52% in community samples (Bryant, Jackson, & Ames, 2009), there is a clear need for efficient and effective intervention that is sensitive to lifespan issues.

A secondary aim of the current study was to investigate if age might also moderate the relationship between positive affect and depressive symptoms. The role of diminished positive affectivity and reduced reactivity to positive stimuli in major depression has been well-documented in the literature (e.g., Brown, Chorpita, & Barlow, 1998; Bylsma, Morris, & Rottenberg, 2008; Kessler et al., 2005; Watson et al., 1995; see also the frequency of subclinical symptoms as reported by Lyness et al., 2006 and VanItallie, 2005). The age and cohort findings for depression parallel those for social anxiety disorder, opening the possibility that an age moderation effect should be present for depression as well as social anxiety.

STUDY 1

Method

Participants—Participants ($n = 489$) were recruited from two sources: a community-based, hospital-sponsored program to match volunteers with current research projects in a Midwestern metropolitan area, and the adult volunteer pool maintained by the Aging and Development Program within a private Midwestern university; these data have been used previously for other purposes (Brown & Roose, 2011; Rodebaugh et al., 2011). Participants were primarily women (71%) and Caucasian (90%) with a mean of 15.62 years of education. The sample ranged in age from 18–98, with a mean age of 61.46 years ($SD = 19.66$). A large proportion of the sample ($n = 289$, 59%) was over the age of 60.

Measures—Participants completed a packet of self-report questionnaires including measures of affect, mood and anxiety symptoms as detailed below.

The Positive and Negative Affect Schedule (PANAS): The PANAS (Watson, Clark, & Tellegen, 1988) is a measure of positive (e.g., *excited*; *proud*) and negative activated affect (e.g., *upset*; *scared*). Each type of activated affect is assessed through ten items on a 5-point Likert-type scale from 1 (*very slightly or not at all*) to 5 (*extremely*). Participants were

instructed to rate each adjective “to what extent do you feel this way at this moment.” The state instructions were employed to reduce the likelihood that responses would reflect retrospective bias. Watson et al. (1988) report good internal consistency, as well as good convergent and discriminant validity for this scale. The positive activated affect subscale was also internally consistent in the current sample ($\alpha = .91$). Ready and colleagues (2011) found that the broad higher order factors of positive and negative affect were evident and highly comparable in older and younger adults using an extended form of the PANAS (PANAS-X; Watson & Clark, 1999).

The Social Interaction Anxiety Scale (SIAS): The SIAS (Mattick & Clarke, 1998) is a 20-item measure employing a 0 (*not at all*) to 4 (*extremely*) Likert-type scale. The items describe anxiety-related reactions to a variety of social interaction situations. Research on this scale has suggested good to excellent reliability as well as good construct and convergent validity (see Heimberg & Turk, 2002, for a review). In light of recent evidence demonstrating problematic reliability and validity for the SIAS reverse-scored items (see, e.g., Rodebaugh et al., 2007, for a review and extension), the present studies utilized only the straightforward SIAS items (S-SIAS) for all analyses ($\alpha = .93$). To the best of our knowledge, no evidence has been found that the omission of the reverse-scored items of the SIAS results in reduced validity despite repeated tests (e.g., Rodebaugh et al., 2007).

The Geriatric Depression Scale (GDS): The GDS (Leshner & Berryhill, 1994) is a shorter 15-item version of the original scale (Yesavage et al., 1983) designed to screen for depression specifically in older adults. All questions are presented in a yes/no format. The scale includes items such as *have you dropped many of your activities and interests* and *do you feel that your situation is hopeless*. An investigation of the measure’s underlying structure found that the data best fit a two-factor model, with items loading on life satisfaction and general depressive affect dimensions (Brown, Woods, & Storandt, 2007). Accordingly, we totaled the 10 general depressive affect items (e.g., *do you feel that your life is empty* and *do you feel that your situation is hopeless*) as a measure of depressive affect (GDS-D; Kuder-Richardson formula 20 [*KR20*] value = .75). In a study using the original GDS, Rule, Harvey and Dobbs (1989) reported Cronbach’s alphas ranging from .80 to .85 across five age groups of 29- to 99-year-olds, providing psychometric support for the measure in younger adults as well.

Data analytic procedure—Linear regression models were used to test whether age moderates the relationship between positive affect and social anxiety; age, PANAS positive affect total ($M = 31.17$, $SD = 8.10$), and their interaction were entered into the model with S-SIAS scores ($M = 13.35$, $SD = 10.89$) as the outcome variable. Missing S-SIAS data occurred for 7 cases (1.4% of sample), which were excluded from analyses; other measures in this study did not show missing data. A similar model was used with GDS-D ($M = 1.33$, $SD = 1.86$) as the outcome variable to test whether age was a moderator of the relationship between positive affect and depressive symptoms. Standardized regression coefficients (b^*) and part r correlations are reported for all analyses.

Results

Consistent with Kashdan's meta-analysis (2007) and our hypothesis, in a linear regression in which the S-SIAS was predicted by positive affect, age, and the interaction between them, positive affect significantly predicted the S-SIAS score ($b^* = -.27$, part $r = -.27$, $p < .001$). There was also a main effect of age ($b^* = -.14$, part $r = -.13$, $p = .003$). There was no significant interaction between positive affect and age predicting social interaction anxiety symptoms ($b^* = .01$, part $r = .01$, $p = .805$). Regression analyses with the GDS-D score as the dependent variable also yielded a nonsignificant interaction ($b^* = -.07$, part $r = -.07$, $p = .134$). Whereas positive affect did have a main effect in predicting depressive affect ($b^* = -.28$, part $r = -.28$, $p < .001$), there was only a trend-level effect for age ($b^* = -.08$, part $r = -.07$, $p = .088$).

Study 1 Discussion

We found no support in Study 1 for the hypothesis that age moderates the relationship between positive affect and social anxiety. This result may reflect that Kashdan's hypothesis is incorrect, and, in fact, age does not moderate the relationship between social anxiety symptoms and positive affect. However, it is also plausible that we did not find the effect because of the way positive affect was measured. It is important to note that whereas much of the literature on diminished positive affect in social anxiety refers to trait levels, the present study used the state instructions for the PANAS. That being said, Kashdan's meta-analysis included studies employing both trait and state measures of positive affect and found no significant differences between trait and state measures in terms of relationship with social anxiety.

Another explanation for the lack of significant results is that the PANAS captures activated positive affect, a conflation of valence and arousal (Barrett & Russell, 1998). This is reflected in Watson and colleagues' (1988) description of high positive affect as "a state of high energy, full concentration, and pleasurable engagement" (p. 1063). PANAS items such as *excited* and *enthusiastic* reflect both the pleasant quality of positive affect as well as a high level of activation. Examples of deactivated positive affect items include *relaxed* and *serene* (Barrett & Russell, 1998). It is possible that the hypothesized moderation effect may be in regard to *valence*, such that inclusion of high arousal in positive affect items might obscure the effect. If so, we would predict that we might not find the interaction if positive affect was assessed by a measure incorporating both valence and arousal (as in Study 1). Therefore, we aimed to test this revised hypothesis in another community sample using a measure of positive affect focusing on valence.

STUDY 2

Introduction

In Study 2, positive affect was assessed using the cheerfulness facet of the International Personality Item Pool (IPIP; Goldberg, 1999) extraversion scale. This subscale is comprised of four items: [*I radiate joy, have a lot of fun, love life, look at the bright side of life*]. The reasons for using this particular subscale were twofold: First, cheerfulness is a highly face-valid measure of the positive valence component of affect. Additionally, across the emotion

and personality literature, the general trait of extraversion has been shown to correlate moderately with positive affect (e.g., Diener & Lucas, 1999; Lucas & Fujita, 2000). A factor analysis by Vitterso and Nilsen (2002) indicated that the NEO-PI-R positive emotions facet of extraversion (Costa & McCrae, 1992), a comparable subscale, loaded strongly (.57) with four standard positive affect items (e.g., *happy, joyful*). These data suggest that the positive emotions facet, and, by extension, the cheerfulness subscale, are at least in part measuring the same construct as measures of positive affect.

At the same time, there are also reasons to expect that the cheerfulness subscale is not isomorphic with the positive activated affect subscale of the PANAS. Watson and Clark (1992) found weak to moderate correlations between the PANAS positive affect scale and each of the six IPIP extraversion facets, ranging from .16 (for excitement seeking) to .43 (for assertiveness). This means that the correlation between the PANAS scale and the cheerfulness facet likely lies between these two values (.16 and .43), and is thus moderately high at best. If this correlation was higher and was thus indicative of a strong relationship between the two scales, it would suggest that this facet is a good measure of positive activated affect as assessed by the PANAS. However, because this is not the case, the data are consistent with our hypothesis that the cheerfulness facet primarily captures valence. The fact that the correlation between the PANAS positive affect scale and the assertiveness subscale was the highest in the range is also consistent with our interpretation, because the assertiveness items (e.g., *[I] take charge; [I] take control of things*) appear to reflect activity and arousal, and should therefore be more related to activated positive affect than the cheerfulness items. We therefore hypothesized that the cheerfulness facet's relationship with social anxiety would be moderated by age, despite the lack of support for the age moderation hypothesis in Study 1.

Method

Participants—A total of 202 spousal and adult child caregivers of individuals with dementia completed questionnaires. Participants were recruited from several local organizations with services for dementia caregivers, including several chapters of the Alzheimer's Association. English-speaking caregivers of family members who had any dementia diagnosis for at least 6 months were included. The sample was primarily female (73%) and Caucasian (94%) with a mean of 15.03 years of education. Participants ranged in age from 31 to 92 years, with a mean age of 67.57 years ($SD = 11.52$). Although there is some evidence that caregivers differ from the rest of the population, particularly in regard to depression (e.g., Pinquart & Sörensen, 2003), even this evidence is somewhat equivocal (e.g., Robison, Fortinsky, Kleppinger, Shugrue, & Porter, 2009). There is some, although limited evidence for beneficial effects of caregiving, such as feelings of gratification and improvement in the caregiver's relationship with the care recipient (e.g., Kramer, 1997; Miller & Lawton, 1997). Consequently, Raschick and Ingersoll-Dayton have suggested that "In general, research on caregiving has emphasized more the costs of caregiving, and in so doing has obscured its rewards" (2004, p. 317). Additionally, we know of no specific reason to believe that the effects hypothesized regarding social anxiety and positive affect should differ in this population.

Measures—Participants completed a packet of self-report questionnaires including measures of personality, mood and anxiety symptoms as detailed below. Data for S-SIAS item 4 (*I find it difficult to mix comfortably with the people I work with*) was missing in 19 cases, which may indicate that some participants omitted this item because it was not applicable to them (e.g., retirees). In order to avoid excluding a substantial proportion of the sample, we created a revised scale of the remaining straightforward SIAS items ($M = 9.95$, $SD = 9.97$). The revised scale showed high internal consistency ($\alpha = .94$). Notably, results given below were substantively identical if the participants who did not answer item 4 were excluded.¹ Four cases (1.9% of the sample) were excluded for missing data on one or more of the other S-SIAS items.

The International Personality Item Pool (IPIP): The IPIP (Goldberg, 1999) is a 120-item instrument designed to measure the Big Five personality traits (NEO-PI-R; Costa & McCrae, 1992). For the present study, the 4-item cheerfulness facet of the extraversion trait scale was used to measure positive affect. Participants rate how accurately each item describes them on a scale from 1 (*very inaccurate*) to 5 (*very accurate*), and these items are summed to create a subscale score. The trait scores had acceptable internal consistency in both a previous sample of college students (alphas ranging from .78 to .90; Donnellan, Oswald, Baird, & Lucas, 2006) and in the current sample ($\alpha = .81$).

The Beck Depression Inventory-II (BDI-II): The BDI-II (Beck, Steer & Brown, 1996) is a 21-item measure used to assess emotional, cognitive, and physical symptoms of depression. Participants respond to items on a Likert-type scale from 0 to 3. A sum of all items is calculated, with larger totals indicating more intense depressive symptoms. The BDI-II has shown high internal consistency, with an average coefficient alpha of .91 (see Dozois & Covin, 2004). Additionally, the BDI-II correlates highly with other indices of depression and depression-related constructs (i.e., Beck et al., 1996; Osman, Barrios, Gutierrez, Williams, & Bailey, 2008). An older version of the instrument, the BDI (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961) had good reported internal consistency in a sample of dementia caregivers ($\alpha = .87$; Marwit & Meuser, 2002). The internal consistency of the BDI-II in the current sample was .88.

Results

Consistent with Study 1, multiple regression analyses with the BDI-II score ($M = 10.91$, $SD = 7.16$) as the dependent variable did not yield a significant interaction ($b^* = .10$, part $r = .09$, $p = .146$). Also consistent with Study 1, positive affect did have a main effect in predicting depression ($b^* = -.45$, part $r = -.44$, $p < .001$), but there was no significant main effect of age ($b^* = -.11$, part $r = -.11$, $p = .100$). Further, turning to social anxiety, positive affect significantly predicted the S-SIAS score ($b^* = -.45$, part $r = -.44$, $p < .001$). However, the main effect of age was a trend rather than fully statistically significant ($b^* = -.12$, part $r = -.12$, $p = .071$). Additionally, unlike in Study 1, and as hypothesized, the interaction between age and positive affect as measured by the IPIP cheerfulness facet of extraversion

¹Results were also substantively identical for Study 1 when analyses were conducted using this revised S-SIAS scale.

($M = 14.70$, $SD = 3.28$) significantly predicted social anxiety symptoms ($b^* = .16$, part $r = .15$, $p = .018$).

In order to probe the interaction in regard to social anxiety at different ages, we examined the data set and created age groups that would ensure a sufficient number of individuals in each one. The follow-up analyses were conducted on the following groups: ages 54 and below, ages 55–74, and ages 75 and above. Figure 1 shows the correlations for each of the selected age ranges. The strength of the inverse relationship between positive affect and social anxiety symptoms decreased from the youngest age group to the oldest age group, which is indicated by the points becoming higher on the figure (e.g., closer to zero).²

Next, we aimed to determine if the interaction between age and positive affect in predicting social interaction anxiety is specific to the cheerfulness facet of the IPIP or attributable to the trait of extraversion in general. To this end, we conducted additional regressions with each of the five other extraversion subscales. Analyses of the gregariousness ($b^* = .12$, part $r = .11$, $p = .078$), assertiveness ($b^* = .01$, part $r = .01$, $p = .888$), activity level ($b^* = .03$, part $r = .03$, $p = .635$), and excitement-seeking ($b^* = .09$, part $r = .09$, $p = .209$) subscales revealed that the interaction between age and each of the other extraversion facets did not significantly predict S-SIAS scores. As we discussed above, the assertiveness facet has the strongest correlation with the PANAS positive affect scale (.43; Watson & Clark, 1992) of the IPIP extraversion facets, which may indicate that this subscale most strongly encompasses both valence and arousal components. If this is indeed the case, it is consistent with our hypothesis that an interaction with that facet would not be present. The analysis of the friendliness subscale, which includes items such as [I] *make friends easily* and [I] *feel comfortable around people*, did yield a significant interaction ($b^* = .12$, part $r = .11$, $p = .046$). This finding may be reflective of overlap between the cheerfulness and friendliness facets.

Post Hoc Analyses

Potential measure limitations—Recent research on the assessment of social anxiety across the lifespan has brought to light potential limitations to traditional measures of the disorder (e.g., Gould, Gerolimos, Ciliberti, Edelstein, & Smith, 2012; Gretarsdottir, Woodruff-Borden, Meeks, & Depp, 2004; Therrien & Hunsley, 2012). Specifically, Gould and colleagues (2012) question whether existing measures capture the range and content of anxiety-provoking situations encountered by older adults, given that many anxiety assessment measures were often created for young or middle-aged adults, with few, if any, older adults included in their development.

In light of this research, we hypothesized that certain straightforward SIAS items may not be relevant to a substantial number of older adults included in the present study, thereby creating a potential age-related measurement error. One such item is *I get nervous if I have to speak with someone in authority (teacher, boss, etc.)*. In order to test this hypothesis, we created two subscales: one consisting of items we expected to be context-sensitive (such as the aforementioned) that may not be as applicable to older adults, and the other consisting of

²This probing procedure was repeated with the Study 1 sample, but did not yield significant results.

apparently more context-irrelevant items (e.g., *I have difficulty making eye contact with others*) that should capture social anxiety symptoms regardless of age.

For the subscale consisting of items that are more expected to show age effects ($\alpha = .71$), the interaction between age and positive affect significantly predicted social anxiety symptoms ($b^* = .19$, part $r = .19$, $p = .006$). Similarly, the regression using the apparently less context-dependent subscale ($\alpha = .64$) also yielded significant results ($b^* = .22$, part $r = .21$, $p = .001$). We therefore found no evidence that the interaction was due merely to measurement problems. Notably, we repeated this post hoc analysis with the Study 1 sample and the interaction was nonsignificant for both subscales.

Contribution of study sample differences—There was a significant difference in age between Study 1 ($M = 61.46$, $SD = 19.66$) and Study 2 ($M = 67.57$, $SD = 11.52$); $t(607.984) = -5.074$, $p < .001$. Additionally, the Study 1 sample was characterized by higher revised S-SIAS scores, on the average, compared with the Study 2 sample ($M = 12.78$, $SD = 10.36$ and $M = 9.95$, $SD = 9.97$, respectively). To evaluate if this apparent variation in S-SIAS score could be attributed to between-study differences in age composition, we selected an age range available in both data sets (40–92) and conducted a one-way analysis of covariance (ANCOVA) with age as a covariate. There was a significant difference in revised S-SIAS score between Study 1 and Study 2 after controlling for age, $F(1, 584) = 7.06$, $p = .008$.

In order to address the aforementioned study sample differences as well as concerns regarding the use of varying positive affect and depression measures, we conducted multiple imputation analyses using AMELIA II (Honaker, King, & Blackwell, 2014). Multiple imputation involves generating values for all missing items in an incomplete data set, thereby greatly reducing the biases, inefficiencies and inaccurate uncertainty estimates that may result from excluding partially observed data from analysis (Honaker et al., 2014). Specifically, the program replaces each missing item with a set of plausible values that are subsequently averaged to properly reflect uncertainty about the missing data. For the present study, this technique used overlapping information (e.g., SIAS items, age) to estimate as well as possible what may have happened if the same measures has been used across data sets. Multiple regression analyses with the imputed data using Mplus® (Muthén & Muthén, 1998–2014) resulted in a significant interaction between age and IPIP cheerfulness facet score in predicting social interaction anxiety ($p < .001$), whereas there was no interaction when positive affect was measured by the PANAS ($p = .386$). The robustness of the age-cheerfulness interaction even after the prediction of missing data coupled with the lack thereof for the PANAS provides further evidence in support of the strength of this relationship. Finally, there was a lack of significant moderation by study for either of these interactions (both $ps > .439$), indicating no evidence that findings would vary across samples.

GENERAL DISCUSSION

In the present study, we tested Kashdan's (2007) hypothesis that there is a stronger inverse relationship between positive affect and social anxiety symptoms in younger adults than in their older counterparts. The apparently conflicting results of studies 1 and 2 suggest that

age may only moderate the relationship between positive affect and social anxiety symptoms when the former refers primarily to the activation-independent, pleasant quality of affect. The results of regression analyses for each of the IPIP extraversion facets were also consistent with this notion; Whereas the interaction was present for the friendliness subscale, which is related to cheerfulness and based more on valence than arousal, there was no interaction for the assertiveness subscale, which is moderately correlated with the PANAS positive affect scale and may incorporate both valence and arousal components. This interaction effect was not large, but generally supports Kashdan's hypothesis. Notably, if Kashdan's hypothesis were taken to imply at least a medium or large effect of age, our findings run counter to this implication and clarify that any such effect appears to be small to medium.

The weaker correlation between the constructs in older adults is consistent with socioemotional selectivity theory as discussed by Carstensen and Mikels (2005). This theory posits that older adults become more selective of social situations over time, so as to maximize their experience of positive emotions as their time perspective shortens. This change in viewpoint may also mean that older adults do not let anxiety about social interactions with people who are less personally meaningful to them bother them as much as during early adulthood. Consistent with this notion, Carstensen, Isaacowitz, and Charles suggest that as individuals age, "More social contacts feel superficial—trivial—in contrast to the ever-deepening ties of existing close relationships" (1999, p.165). In sum, having more control over where and with whom they spend their time may mean that social anxiety symptoms do not constrain positive affect as much in this population as in their younger counterparts.

If our findings accurately reflect affective changes over time, social anxiety would continue to constrain activated positive affect (e.g., *proud, excited*) as people age, but the more deactivated positive affect (e.g., *pleased, happy*), would no longer be constrained. Recent research has demonstrated that, compared with younger adults, older adults tend to process positive information more thoroughly than negative information and to give more importance to the former when forming impressions and making decisions (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001). Given that this age-related positivity effect relates more to the activation-orthogonal, pleasant component of affect, it makes sense that social anxiety would no longer constrain this dimension of the construct over time. This effect is also consistent with the notion that information furthering emotional satisfaction is favored exclusively in older adults (Carstensen & Mikels, 2005).

A secondary aim of the current study was to investigate if age might also moderate the relationship between positive affect and depressive symptoms as measured by the GDS-D in Study 1 and the BDI-II in Study 2. Consistent with the literature, both sets of analyses showed a main effect of positive affect in predicting depression. However, the interaction between positive affect and age predicting depressive symptoms was not significant in either study. These results suggest that age may not moderate this relationship, especially given that we did not find the effect using two different indices of depression and positive affect. Furthermore, these findings contrast with those for social anxiety, which may reflect

differences in the nature of the longitudinal relationship between positive affect and depression compared with the relationship between the former and social anxiety.

The studies we present here should be interpreted in light of their limitations. Two different measures of positive affect were used in two different, albeit demographically similar, samples. In particular, there was a significant difference in age composition such that Study 2 participants had a higher mean age ($M = 67.57$ compared with $M = 61.46$) and more narrow range (31–92 years compared with 18–98 years). That being said, if this between-sample variation did provide a significant limitation, it would make the Study 2 findings less likely to have occurred, due to the smaller age range providing more limited power to detect an effect across the lifespan.

Furthermore, if positive affect had been assessed using the same valence-based and combined valence and arousal measure in both studies (the cheerfulness facet of the IPIP and the PANAS, respectively), it would provide stronger evidence in favor of the hypothesis that the proposed interaction is related primarily to valence. That being said, multiple imputation analyses aimed at estimating what may have happened if the same measures were used across studies did not provide evidence that the conflicting results could be attributed to an inherent difference between the samples. Nevertheless, it is worth noting that there may be between-sample differences not captured by the variables observed in the study, in which case multiple imputation could not have appropriately modeled said differences.

It is also important to note that neither of these measures captures all components of positive affect as it is currently theorized, and thus, there are components of the construct (e.g., anticipatory positive affect) that are not addressed in the present study. Additionally, we acknowledge that although it was advantageous to use community samples, both were nevertheless convenience samples. It would have been preferable to use community samples designed specifically for this study. Furthermore, given the temporal nature of our hypotheses, it would have been optimal to use longitudinal data sets as opposed to cross-sectional ones.

A final potential limitation is the use of the straightforward SIAS items to measure social anxiety symptoms. As we discussed above, it is questionable whether the existing measures capture social anxiety symptoms experienced by older adults as accurately as in their younger counterparts (e.g., Gould, Gerolimos, Ciliberti, Edelstein, & Smith, 2012). That being said, the fact that the interaction was still significant when the apparently context-irrelevant S-SIAS items were used to assess social anxiety suggests that age does indeed moderate the relationship between positive affect and social anxiety as hypothesized. Further research on the psychometric properties of the straightforward SIAS in older adults would provide us with more insight into whether or not the scale accurately captures social anxiety in this population.

To conclude, the present study has offered preliminary support in favor of Kashdan's (2007) hypothesis that age moderates the relationship between positive affect and social anxiety symptoms, but the nature and specificity of this interaction in terms of bidimensional

valence and arousal theory requires further examination. We view our study as an initial examination of the issues at hand. The relationship between social anxiety and the proposed dimensions underlying positive affect, particularly across the lifespan, is clearly an area in need of further research.

Acknowledgments

FUNDING

This research was supported by grants from the National Institute of Aging (grant number 5 T32AG0030) and the National Institute of Mental Health (grant number T32 MH20004), as well as a Washington University dissertation fellowship.

References

- Barrett LF, Russell JA. Independence and bipolarity in the structure of affect. *Journal of Personality and Social Psychology*. 1998; 74:967–984.
- Barrick A, Hutchinson R, Deckers L. Age effects on positive and negative emotions. *Journal of Social Behavior and Personality*. 1989; 4:421–429.
- Baumeister RF, Bratslavsky E, Finkenauer C, Vohs KD. Bad is stronger than good. *Review of General Psychology*. 2001; 5:323–370.
- Beck, AT.; Steer, RA.; Brown, GK. *Manual for Beck Depression Inventory–II*. San Antonio, TX: Psychological Corporation; 1996.
- Beck AT, Ward CH, Mendelson M, Mock J, Erbaugh J. An inventory for measuring depression. *Archives of General Psychiatry*. 1961; 53:561–571. [PubMed: 13688369]
- Brown PJ, Roose SP. Age and anxiety and depressive symptoms: The effect on domains of quality of life. *International Journal of Geriatric Psychiatry*. 2011; 26:1260–1266. [PubMed: 21351152]
- Brown PJ, Woods CM, Storandt M. Model stability of the 15-item Geriatric Depression Scale across cognitive impairment and severe depression. *Psychology and Aging*. 2007; 22:372–379. [PubMed: 17563192]
- Brown TA, Chorpita BF, Barlow DH. Structural relationships among dimensions of the *DSM-IV* anxiety and mood disorders and dimensions of negative affect, positive affect, and autonomic arousal. *Journal of Abnormal Psychology*. 1998; 107:179–192. [PubMed: 9604548]
- Bryant C, Jackson H, Ames D. Depression and anxiety in medically unwell older adults: Prevalence and short-term course. *International Psychogeriatrics*. 2009; 21:754–763. [PubMed: 19505353]
- Bylsma LM, Morris BH, Rottenberg J. A meta-analysis of emotional reactivity in major depressive disorder. *Clinical Psychology Review*. 2008; 28:676–691. [PubMed: 18006196]
- Carstensen LL, Isaacowitz DM, Charles ST. Taking time seriously—A theory of socioemotional selectivity. *American Psychologist*. 1999; 54:165–181. [PubMed: 10199217]
- Carstensen LL, Mikels JA. At the intersection of emotion and cognition: Aging and the positivity effect. *Current Directions in Psychological Science*. 2005; 14:117–121.
- Charles ST, Reynolds CA, Gatz M. Age-related differences and change in positive and negative affect over 23 years. *Journal of Personality and Social Psychology*. 2001; 80:136–151. [PubMed: 11195886]
- Costa, PT., Jr; McCrae, RR. *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (NEO-FFI) professional manual*. Odessa, FL: Psychological Assessment Resources, Inc; 1992.
- Diener, E.; Lucas, RE. Personality and subjective well-being. In: Kahneman, D.; Diener, E.; Schwarz, N., editors. *Well-being: The foundations of a hedonic psychology*. New York: Russell Sage Foundation; 1999. p. 213–229.
- Donnellan MB, Oswald FL, Baird BM, Lucas RE. The Mini-IPIP scales: Tiny-yet-effective measures of the big five factors of personality. *Psychological Assessment*. 2006; 18:192–203. [PubMed: 16768595]

- Dozois, DJA.; Covin, R. The Beck Depression Inventory-II (BDI-II), Beck Hopelessness Scale (BHS), and Beck Scale for Suicide Ideation (BSS). In: Hersen, M.; Hilsenroth, MJ.; Segal, DL., editors. Comprehensive handbook of psychological assessment: Personality assessment. New York: John Wiley & Sons, Inc; 2004. p. 50-69.
- Goldberg, LR. A broad-bandwidth, public-domain, personality inventory measuring the lower-level facets of several five-factor models. In: Mervielde, I.; Deary, IJ.; De Fruyt, F.; Ostendorf, F., editors. Personality psychology in Europe. Tilburg, The Netherlands: Tilburg University Press; 1999. p. 7-28.
- Gould CE, Gerolimatos LA, Ciliberti CM, Edelstein BA, Smith MD. Initial evaluation of the Older Adult Social Evaluative Situations Questionnaire: A measure of social anxiety in older adults. *International Psychogeriatrics*. 2012; 24:2009–2018. DOI: 10.1017/S1041610212001275 [PubMed: 22846411]
- Grant BF, Stinson FS, Dawson DA, Chou SP, Dufour MC, Compton W, ... Kaplan K. Prevalence and co-occurrence of substance use disorders and independent mood and anxiety disorders: Results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Archives of General Psychiatry*. 2004; 61:807–816. [PubMed: 15289279]
- Gretarsdottir E, Woodruff-Borden J, Meeks S, Depp C. Social anxiety in older adults: Phenomenology, prevalence, and measurement. *Behaviour Research and Therapy*. 2004; 42:459–475. [PubMed: 14998739]
- Heimberg RG, Stein MB, Hiripi E, Kessler RC. Trends in the prevalence of social phobia in the United States: A synthetic cohort analysis of change over four decades. *European Psychiatry*. 2000; 15:29–37. [PubMed: 10713800]
- Heimberg, RG.; Turk, CL. Assessment of social phobia. In: Heimberg, RG.; Becker, RE., editors. Cognitive-behavioral group therapy for social phobia: Basic mechanisms and clinical strategies. New York, NY: Guilford Press; 2002. p. 107-126.
- Honaker, J.; King, G.; Blackwell, M. AMELIA II: A program for missing data. Version 1.7.3. 2014. Retrieved from <http://cran.r-project.org/web/packages/Amelia/vignettes/amelia.pdf>
- Kashdan TB. Social anxiety spectrum and diminished positive experiences: Theoretical synthesis and meta-analysis. *Clinical Psychology Review*. 2007; 27:348–365. [PubMed: 17222490]
- Kashdan TB, Weeks JW, Savostyanova AA. Whether, how, and when social anxiety shapes positive experiences and events: A self-regulatory framework and treatment implications. *Clinical Psychology Review*. 2011; 31:786–799. [PubMed: 21529701]
- Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Archives of General Psychiatry*. 2005; 62:593–602. [PubMed: 15939837]
- Kramer BJ. Gain in the caregiving experience: Where are we? What next? *The Gerontologist*. 1997; 37:218–232. [PubMed: 9127978]
- Leshner EL, Berryhill JS. Validation of the Geriatric Depression Scale–short form among inpatients. *Journal of Clinical Psychology*. 1994; 50:256–260. [PubMed: 8014251]
- Lucas RE, Fujita F. Factors influencing the relation between extraversion and pleasant affect. *Journal of Personality and Social Psychology*. 2000; 79:1039–1056. [PubMed: 11138753]
- Lyness JM, Moonseong H, Datto CJ, Ten Have TR, Katz IR, Drayer R, ... Bruce ML. Outcomes of minor and subsyndromal depression among elderly patients in primary care settings. *Annals of Internal Medicine*. 2006; 144:496–504. [PubMed: 16585663]
- Marwit SJ, Meuser TM. Development and initial validation of an inventory to assess grief in caregivers of persons with Alzheimer's disease. *The Gerontologist*. 2002; 42:751–765. [PubMed: 12451156]
- Mattick RP, Clarke JC. Development and validation of measures of social phobia scrutiny fear and social interaction anxiety. *Behaviour Research and Therapy*. 1998; 36:455–470. [PubMed: 9670605]
- Miller B, Lawton MP. Introduction: Finding balance in caregiver research. *The Gerontologist*. 1997; 37:216–217.
- Osman A, Barrios FX, Gutierrez PM, Williams JE, Bailey J. Psychometric properties of the Beck Depression Inventory–II in nonclinical adolescent samples. *Journal of Clinical Psychology*. 2008; 64:83–102. [PubMed: 18161034]

- Pinquart M, Sörensen S. Differences between caregivers and non-caregivers in psychological health and physical health: A meta-analysis. *Psychological Aging*. 2003; 18:250–267.
- Preisig M, Merikangas KR, Angst J. Clinical significance and comorbidity of subthreshold depression and anxiety in the community. *Acta Psychiatrica Scandinavica*. 2001; 104:96–103.
- Raschick M, Ingersoll-Dayton B. The costs and rewards of caregiving among aging spouses and adult children. *Family Relations*. 2004; 53(3):317–325.
- Ready RE, Vaidya JG, Watson D, Latzman RD, Koffel EA, Clark LA. Age-group differences in facets of positive and negative affect. *Aging and Mental Health*. 2011; 15(6):784–795. [PubMed: 21547744]
- Robison J, Fortinsky R, Kleppinger A, Shugrue N, Porter M. A broader view of family caregiving: Effects of caregiving and caregivers conditions on depressive symptoms, health, work, and social isolation. *Journal of Gerontology: Social Sciences*. 2009; 64B:788–798.
- Rodebaugh TL, Heimberg RG, Brown PJ, Fernandez KC, Blanco C, Schneier FR, Liebowitz MR. More reasons to be straightforward: Findings and norms for two scales relevant to social anxiety. *Journal of Anxiety Disorders*. 2011; 25:623–630. [PubMed: 21388781]
- Rodebaugh TL, Woods CM, Heimberg RG. The reverse of social anxiety is not always the opposite: The reverse scored items of the Social Interaction Anxiety Scale do not belong. *Behavior Therapy*. 2007; 38:192–206. [PubMed: 17499085]
- Rule BG, Harvey HC, Dobbs AR. Reliability of the Geriatric Depression Scale for younger adults. *Clinical Gerontologist*. 1989; 9:37–43.
- Therrien Z, Hunsley J. Assessment of anxiety in older adults: A systematic review of commonly used measures. *Aging and Mental Health*. 2012; 16(1):1–16. [PubMed: 21838650]
- VanItallie TB. Subsyndromal depression in the elderly: Underdiagnosed and undertreated. *Depression: Genetics, Pathophysiology, and Clinical Manifestations*. 2005; 54:39–44.
- Van Zelst WH, De Beurs E, Beekman ATF, Van Dyck R, Deeg D. Well-being, physical functioning and use of health services in the elderly with PTSD and subthreshold PTSD. *International Geriatric Psychiatry*. 2006; 21:180–188.
- Vaux A, Meddin J. Positive and negative life change and positive and negative affect among the rural elderly. *Journal of Community Psychology*. 1987; 15:447–458.
- Vitterso J, Nilsen F. The conceptual and relational structure of subjective well-being, neuroticism, and extraversion: Once again, neuroticism is the important predictor of happiness. *Social Indicators Research*. 2002; 57:89–118.
- Watson D, Clark LA. On traits and temperament: General and specific factors of emotional experience and their relation to the five-factor model. *Journal of Personality*. 1992; 60:441–476. [PubMed: 1635050]
- Watson, D.; Clark, LA. Manual for the Positive and Negative Affect Schedule–expanded form. Iowa City, IA: The University of Iowa; 1999.
- Watson D, Clark LA, Carey G. Positive and negative affect and their relation to anxiety and depressive disorders. *Journal of Abnormal Psychology*. 1988; 97:346–353. [PubMed: 3192830]
- Watson D, Clark LA, Tellegen A. Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology*. 1988; 54:1063–1070. [PubMed: 3397865]
- Watson D, Clark LA, Weber K, Assenheimer JM, Strauss ME, McCormick RA. Testing a tripartite model: I. Evaluating the convergent and discriminant validity of anxiety and depression symptom scales. *Journal of Abnormal Psychology*. 1995; 104:3–14. [PubMed: 7897050]
- Yesavage JA, Brink TL, Rose T, Lum O, Huang O, Adey V, Leirer V. Development and validation of a geriatric depression screening scale: A preliminary report. *Journal of Psychiatric Research*. 1983; 17:37–49. [PubMed: 7183759]

FIGURE 1.

Correlations between positive affect and social anxiety in the selected age groups.

Differences between the correlations are reflective of a statistically significant interaction ($p = .018$); Points lower on the figure indicate a stronger correlation.