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DAILY SOCIAL EXCHANGES AND AFFECT IN MIDDLE AND LATER ADULTHOOD: THE IMPACT OF LONELINESS AND AGE*

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Abstract

Although daily social exchanges are important for well-being, it is unclear how different types of exchanges affect daily well-being, as well as which factors influence the way in which individuals react to their daily social encounters. The present study included a sample of 705 adults aged 31 to 91, and using Multilevel Modeling analyses investigated whether loneliness or age moderate the relationship between daily affect and daily social exchanges with family and friends. Results indicated differences between events involving family and those involving friends. Furthermore, lonelier individuals benefitted more from positive events than less lonely adults but were not more negatively reactive to negative events. Moreover, results suggested that older adults' affect is more independent of both positive and negative social events compared to younger people. Implications are discussed for the importance of daily social exchanges, daily social stress vulnerability, and the influences of loneliness across middle and later adulthood.

Social interactions in everyday life are not always anticipated or avoidable, and how one reacts emotionally to these daily events has important implications for daily well-being in adulthood. Although daily social exchanges are generally important for daily mood, individual characteristics as well as elements of the social exchanges themselves may influence how individuals respond to their daily social events. In the present study, we assessed whether loneliness and age influence how daily social events relate to daily affect, and investigated whether there are different affective outcomes of social events depending on the social partner. A daily process design was used in which the relationships between daily exposure to social exchanges and daily affect were assessed in order to examine whether loneliness and age influence the emotional reactivity to social event exposure. Moreover, events were examined by source (e.g., family, friends) to investigate if these well-being relationships are different depending on whom the exchanges involve. In this way, the study contributes to the understanding of the impact of daily social events, crossover effects of positive and negative social exchanges on positive and negative affect, daily stress vulnerability, and the influence of loneliness on daily processes in middle-aged and older adults.

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Daily social events are indeed important for daily affect. Studies using daily surveys demonstrate that positive social exchanges are beneficial for positive affect, with the occurrence of positive social events associated with greater positive mood (Clark & Watson, 1988; Rook, 2001). Negative social events are likewise consequential for daily mood; in fact, negative social exchanges are actually associated with more daily distress than other types of daily stressors (Bolger, DeLongis, Kessler, & Shilling, 1989; Rook, 2001). For example, Bolger and colleagues (1989) found that although individuals habituated to other types of stressors over the course of several days, with emotional impact decreasing over the length of exposure, this was not the case for interpersonal distress. To the contrary, the emotional impact of a social event increased over time as the interpersonal conflict persisted.

Moreover, some have suggested that negative daily social exchanges may be even more potent than positive ones. Research investigating crossover effects, the ability for events to spill across affective domains, suggests that negative events (unlike positive events) can in fact cross over domains, with negative events eroding positive states and inciting negative ones (David, Green, Martin, & Suls, 1997; Rook, 2001; Taylor, 1991; for review, see Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001). This tendency for negative events (but not positive events) to influence both positive and negative well-being has been described as asymmetrical crossover effects, or negativity effects (Baumeister et al., 2001; Rook, 1990; Taylor, 1991). Further supporting studies for negativity effects suggest that undesirable social events exhibit a greater and longer-lasting influence than positive ones on mood (Baumister et al., 2001; David et al., 1997; Newsom, Nishishiba, Morgan, & Rook, 2003). Daily diary studies have likewise shown that there is a stronger relationship between negative events and well-being than between positive events and well-being, and specifically that negative social exchanges are more related to well-being and distress than positive exchanges are (Newsom, Rook, Nishishiba, Sorkin, & Mahan, 2005; Nezlek & Allen, 2006; Rook, 1984).

Although social events are important for daily affect, not all social events are perceived identically; individuals may differ from one another in the extent to which they react emotionally to the same social events (Bolger & Zuckerman, 1995; Rook, 1990, 2003). The distinction has therefore been made between exposure and reactivity to social events. With respect to social events, higher *exposure* indicates that more social exchanges occur, whereas higher *reactivity* suggests that the emotional response to those social exchanges is heightened (Bolger & Zuckerman, 1995; Rook, 2003). Research suggests that there are differences in the reactivity to daily stressors, and these vulnerabilities have been tied to biological, environmental, and personality characteristics (Bolger & Zuckerman, 1995; Cacioppo, Hawkey, Crawford, Ernst, Burleson, Kowaleski, et al., 2002; Hawkey, Burleson, Bernston, & Cacioppo, 2003; Hawkey & Cacioppo, 2007; Kessler, 1979; Rook, 2003; Sorkin & Rook, 2004). In the present study, it is investigated whether loneliness and age impact the emotional reactivity to exposure to social exchanges.

Loneliness can be conceptualized in different ways, and each understanding carries distinct implications. Although physical social isolation may be associated with loneliness, objective environmental indicators like time spent alone, number of friends, total size of social network, and even amount of social contact are not predictive of individuals' perception of loneliness (Fischer & Phillips, 1982; Hawkey et al., 2003; Jones, 1982; Wheeler, Reis, & Nezlek, 1983; for review see Heinrich & Gullone, 2006). That is, not all individuals with a small social network feel lonely, and some people who have a great deal of social contact still report loneliness. *Loneliness*, then, is distinct from objective aloneness or social isolation, and instead may be best described as an internal assessment of the meaning derived from social exchanges. When considered a personal assessment, loneliness is

understood as a feeling that social needs are unmet or unsatisfied, in quantity, quality, or both (Peplau & Perlman, 1982). Loneliness is a potential risk factor for a variety of physiological and psychological health outcomes, including decreased physical activity and higher obesity (Hawkley, Thisted, & Cacioppo, 2009; Lauder, Mummery, Jones, & Caperchione, 2006), poorer sleep (Cacioppo et al., 2002), higher blood pressure and cardiovascular risk (Cacioppo et al., 2002; Hawkley et al., 2003), increased physiological reactivity to negative emotions and socially-evaluative tasks (Cacioppo et al., 2002; Ong & Allaire, 2005), decreased self-esteem, greater levels of depression, pessimism, and anxiety, and lower levels of social skills (Cacioppo, Hawkley, Ernst, Burleson, Bernston, Nouriani, et al., 2006).

Some evidence suggests that loneliness influences social stress response and appraisal. Hawkley and colleagues (2003) found, in fact, that it was the meaning of social events that most predicted loneliness, with lower self-reported meaningfulness of events associated with higher levels of loneliness. Furthermore, lonely individuals rate their daily activities as more stressful (Hawkley & Cacioppo, 2007) and specifically with regard to social engagement, lonely individuals rate social exchanges as more negative and more threatening (Cacioppo et al., 2002; Hawkley et al., 2003). Thus it has been suggested that lonely individuals exhibit stronger reactions to rejection and social threat (Cacioppo et al., 2006). Nevertheless, questions remain regarding the influence of loneliness on the outcomes of daily social exchanges. For instance, do lonely individuals rate and respond differently to positive social events as well as negative ones?

Age may also impact the way in which daily social exchanges are experienced. Older adults report fewer overall arguments and negative interpersonal interactions than younger adults do (Almeida, 2005; Almeida & Horn, 2004; Birditt & Fingerman, 2005). Additionally, older adults exhibit lower levels of anger and distress in response to the negative social exchanges they do experience (Birditt & Fingerman, 2005; Birditt, Fingerman, & Almeida, 2005). Nevertheless, although older adults demonstrate less anger to negative social exchanges, they may feel comparable levels of sadness (Charles & Carstensen, 2008). Furthermore, Carstensen and colleagues, as part of a larger Socioemotional Selectivity Theory, propose that different social goals are present in older adults (Carstensen, Isaacowitz, & Charles, 1999; Carstensen & Mikels, 2005). They argue that older adults, aware of less time available to them in life, and already having learned a substantial amount of factual information about others over the years, concentrate on emotional goals, and in particular focus on the emotional significance of social relationships. This theory is supported by studies indicating that older adults remember the emotions of social events better (Carstensen & Turk-Charles, 1994; Fung & Carstensen, 2003), use emotions more in interpersonal problem solving (Blanchard-Fields, Chen, & Norris, 1997), and consider prospective social partners based on affective criteria (Carstensen & Fredrickson, 1998). Studies investigating the effect of age on reactivity to events suggest that older adults' negative affect is less related to daily negative events than younger adults (Röcke, Li, & Smith, 2009; Stawski, Sliwinski, Almeida, & Smyth, 2008), providing support for the theory older adults are better at emotion regulation (Carstensen et al., 1999). Nevertheless, findings regarding reactivity to positive events are more mixed, with some studies finding no significant age effects (Stawski et al., 2008; Uchino, Berg, Smith, Pearce, & Skinner, 2006) and others finding older adults to be less reactive to positive events (Röcke et al., 2009). Although the bulk of prior investigations of age and reactivity have focused on extreme age groups designs, which compare young adults to older adults, it is also important to consider whether there are differences with age across a sample that includes middle and later life.

In addition to individual characteristics including loneliness and age, elements of the social events themselves are also important to consider. Although social exchanges have been

established as generally important for daily well-being, it is unclear if there are differential outcomes associated with specific types of social exchanges, because few studies have assessed the differences between social exchanges with different sources (Rook, 2001). Nevertheless, who the social exchange involves may be important; the relationship an individual has with the source of the exchange may determine how much the exchange affects their mood. Furthermore, age may influence how social exchanges with different sources relate to affect; for instance, exchanges with one source may be more influential for younger adults, but less so for older adults. Okun and Keith (1998) found evidence that the source of social exchanges had different influence on depressive symptoms in younger and middle-aged adults. Specifically, they found that for younger and middle-aged adults, positive social exchanges with one's spouse were tied to reduced depressive symptoms, but positive social exchanges with other relatives and friends and children were not. Of note is that this was not true for older adults; positive exchanges with various sources were all related to fewer depressive symptoms, suggesting that the source of exchanges may have varying influences for different age groups. Nevertheless, they did not examine the influence of daily social exchanges nor did they investigate daily mood; it remains to be established whether there are differences in the emotional impact of daily exchanges depending on whom the social event involves, for instance whether it matters if the exchanges occur with family or friends.

In sum, social exchanges are an important and unavoidable part of daily life. The present study assessed whether loneliness and age influence the vulnerability to the affective outcomes of daily social events. Daily positive and negative emotional outcomes of exposure to family and friend events were tested separately, to assess if daily relationships differ depending on whom the social exchange involves. By incorporating these components of adults' everyday lives, this study contributes to the understanding of the impact of daily social events, crossover effects of social exchanges and daily stress vulnerability on positive and negative affect, and the influence of loneliness and age on these daily processes across adulthood.

METHOD

Participants

Participants in the present study included 705 adults from a five-county region in northern Indiana. Of these participants, approximately 59% were female. The sample is 87% Caucasian, 9% African American, and the rest of the participants were Hispanic, Native American, Asian, or did not report their race. Participants range in age from 31 to 91 ($M = 59.3$, $SD = 10.0$). Approximately half of the sample is married (52.1%), 11.6% are widowed, 22.6% are divorced, 11.7% are single, and 1.8% are separated. With regard to education, 3% of the sample has less than a high school degree, 31.1% have completed high school, 8.3% have vocational training, 25.5% took some college classes, 18% have a college degree, and 14% have post-college training. Income is fairly normally distributed, with 4.3% reporting less than \$7,500 per year, 11.3% reporting between \$7,500 and \$14,999, 15.5% between \$15,000 and \$24,999, 23.6% between \$25,000 and \$39,999, 29% between \$40,000 and \$74,999, 8% between \$75,000 and \$99,999, and 8.3% making over \$100,000 per year.

Procedure

Subjects were recruited from a sampling frame purchased from Survey Sampling International. Participants were mailed packets that included a cover letter explaining the study, an invitation to participate, and a consent form. Also included in the packet were surveys for participants to complete and return if they chose to participate. Those who submitted the packet of measures received daily diary questionnaires to complete each day

for 56 days. Daily questionnaires were counterbalanced across and within participants so that individuals either received 1 week's, 2 weeks', or 3 weeks' worth of daily diaries to fill out. Participants were provided with postmarked envelopes to place all of their completed daily questionnaires; after sending those, individuals then received their next packet of 1 week's, 2 weeks', or 3 weeks' worth of daily questionnaires. Participants were instructed to fill out the daily diaries each night before going to bed, and to leave any days blank if they could not fill out the questionnaires that day. Participants were given \$20 for completion of the large questionnaire and \$10 per week of completed daily diaries, for a possible total of \$100.

Measures

Loneliness—The Revised UCLA Loneliness Scale (UCLA) measures the extent to which one feels connected to others (Russell, Peplau, & Cutrona, 1980). Hereafter in the models of the present study it will be referred to as LON for easier recognition. LON is a 20-item measure in which respondents are presented with a statement about perceived social connectedness and are instructed to rate how often they feel the stated way, on a scale of 1, indicating “never,” to 4, indicating “often.” Sample statements include, “No one really knows me well,” “I feel isolated from others,” and “I feel part of a group of friends.” The measure is scored so that higher scores indicate greater feelings of loneliness. Cronbach's alpha for the LON measure in the present study was 0.93.

Daily Social Event Exposure—The Small Life Events Scale (SLE; Zautra, Guarnaccia, & Dohrenwend, 1986) measures positive and negative daily life events. Respondents are presented with a series of either upsetting or enjoyable events and are asked to indicate whether that event happened to them today. In the current study, both positive and negative daily social events subscales were used and organized into positive (12 items) and negative (9 items) interactions with family, and positive (7 items) and negative (6 items) interactions with friends. Sample items from the negative daily family event subscale include “I argued with my spouse/partner,” and from the negative friend event subscale, “A friend did not return a phone call.” Sample items from the positive friend event subscale include “I made a new friend or acquaintance,” and from the positive family event subscale “I visited with family members.” Number of events of each type endorsed were summed for each day's exposure score.

Daily Affect—The Positive and Negative Affect Schedule (PANAS) scale (Watson, Clark, & Tellegen, 1988) measures the presence and intensity of positive affect (PA) and negative affect (NA). It is a 20-item measure with 10 items measuring NA and 10 items measuring PA. Respondents are presented with an emotion, for example, “distressed,” “enthusiastic,” or “nervous,” and are instructed to indicate the extent to which they felt that emotion on a 5-point scale, with a response of 1 indicating “very slightly or not at all” and 5 indicating “extremely.” In the current study, subjects were instructed to indicate the extent to which they felt the stated emotions “today.” In the present sample, internal consistency for the NA scale was 0.87 and for the PA scale was 0.89.

Across the 56 days, 82.5% of PA and NA assessments were completed.

ANALYSES

Utilizing a daily process design, Multilevel Modeling (MLM; Bryk & Raudenbush, 1987) was used to assess the reactivity of individuals to exposure to social events. The data in the current study is hierarchical, with daily within-person data for each individual nested within person-level data across individuals. The use of MLM allows for both levels of data to be analyzed simultaneously, making it appropriate for the present analyses (Nezlek & Allen,

2006). MLM was used to assess the emotional reactivity of individuals to exposure to social events using SAS PROC MIXED. A series of analyses achieved this aim. First, at the within-person level (Level 1), the relationship between daily social exchanges and affect was confirmed, and the evidence for crossover effects between domains was assessed. The following equations were tested at Level 1:

$$\begin{aligned} PA_{ij} &= \beta_{0j} + \beta_{1j}(\text{day})_i + \beta_{2j}(\text{PSLE})_{ij} + \beta_{3j}(\text{NSLE})_{ij} + \varepsilon_{ij} \\ NA_{ij} &= \beta_{0j} + \beta_{1j}(\text{day})_i + \beta_{2j}(\text{PSLE})_{ij} + \beta_{3j}(\text{NSLE})_{ij} + \varepsilon_{ij} \end{aligned}$$

At this level, daily positive affect (PA) and daily negative affect (NA) were predicted separately for each person (j) on each day (i). The predictors of daily affect included the number of positive social events (PSLE) and negative social events (NSLE) that an individual experienced on a given day. The Level 1 model also included the intercept (β_{0j}), which reflects the predicted affect for an individual on day one when they have their typical number of social events, and the rate of change in daily affect (day) as predictors of daily affect. Of note is that both positive and negative social events were split into a) friend social events and b) family social events, so that there were a total of eight specific models tested; family and friend events were considered in separate models, to test if there were unique outcomes of each type of social exchange. Because data were collected over a typical 56 days, there was no theoretical expectation that a trend of increasing or decreasing affect across the study would be significant; nevertheless, if the slope in daily affect was found to be significant, it was retained in the model to detrend the data. Event predictor variables were centered on individual means (Byrk & Raudenbush, 1987); for example, a positive value for PSLE for a given participant indicated an above-average number of positive social exchanges for him or her. In this way, individuals are used as their own control; we test the reactivity (affective outcome) for an individual on days of above average social event exposure for him or her, specifically.

The second step in multilevel modeling is to assess (at Level 2) between-person differences in each of these Level 1 within-person parameters. First, the Level 1 relationships were predicted by the intercept and the variance at Level 2 alone, to assess if there was significant between-person variance in the within-person relationships. This is shown in the following series of equations,

$$\begin{aligned} [\text{INTERCEPT} \rightarrow \text{AFFECT}] \beta_{0j} &= \gamma_{00} + \zeta_{0j} \\ [\text{DAY} \rightarrow \text{AFFECT}] \beta_{1j} &= \gamma_{10} + \zeta_{1j} \\ [\text{PSLE} \rightarrow \text{AFFECT}] \beta_{2j} &= \gamma_{20} + \zeta_{2j} \\ [\text{NSLE} \rightarrow \text{AFFECT}] \beta_{3j} &= \gamma_{30} + \zeta_{3j} \end{aligned}$$

in which each outcome, (β), refers to the coefficient representing the relationship from the Level 1 model described in brackets. For example, β_{3j} refers to the random effect coefficient representing the within-person relationship between exposure to negative daily social exchanges and daily affect. Each of these outcomes was predicted by γ and ζ , which refer to the parameter estimate for the average person in the sample and the between-person variance in each daily relationship, respectively. All of the daily relationships were run separately for positive and negative affect and for family and friend events.

If the variance of ζ was significant, this indicated that there was variability in the random effects (the daily within person relationships), for example, that there was significant variation from the average relationship between family event exposure and negative affect in the sample. To attempt to explain some of that variability, loneliness and age were added as

predictors at Level 2, to assess the impact of each of these person-level variables on the within-person daily process assessed at Level 1. This analysis is represented in the following Level 2 equations,

$$\begin{aligned} [\text{INTERCEPT} \rightarrow \text{AFFECT}] \beta_{0j} &= \gamma_{00} + \gamma_{01} (\text{LON}) + \gamma_{02} (\text{AGE}) + \gamma_{03} (\overline{\text{PSLE}}) + \gamma_{04} (\overline{\text{NSLE}}) + \zeta_{0j} \\ [\text{DAY} \rightarrow \text{AFFECT}] \beta_{1j} &= \gamma_{10} + \zeta_{1j} \\ [\text{PSLE} \rightarrow \text{AFFECT}] \beta_{2j} &= \gamma_{20} + \gamma_{21} (\text{LON}) + \gamma_{22} (\text{AGE}) + \zeta_{2j} \\ [\text{NSLE} \rightarrow \text{AFFECT}] \beta_{3j} &= \gamma_{30} + \gamma_{31} (\text{LON}) + \gamma_{32} (\text{AGE}) + \zeta_{3j} \end{aligned}$$

in which each outcome (β) refers to the coefficient for each within-person daily relationship as described by the bracketed text. Of theoretical interest in the present study are the bottom two equations, in which the within-person relationships between exposure to positive daily social exchanges and affect and exposure to negative daily social exchanges and affect were predicted. As discussed, added predictors included an individual's degree of loneliness (LON), and an individual's age (AGE). Because individuals may vary in the average number of events they encounter, an individual's mean number of social events ($\overline{\text{PSLE}}$ and $\overline{\text{NSLE}}$) were also included as a control, as shown in the first equation. All of the daily relationships were examined separately for positive and negative affect and for family and friend events.

Subsequent to these analyses, an additional model including the interaction between age and loneliness (LON*AGE) at level two was tested. For example:

$$[\text{NSLE} \rightarrow \text{AFFECT}] \beta_{3j} = \gamma_{30} + \gamma_{31} (\text{LON}) + \gamma_{32} (\text{AGE}) + \gamma_{33} (\text{LON} * \text{AGE}) + \zeta_{3j}$$

This model tested whether the moderating influence of loneliness was different with age.

All Level 2 predictors were centered on group means (Raudenbush & Bryk, 2002). For example, positive loneliness scores indicated individuals who reported above average levels of loneliness. Using these Level 2 analyses, the between-person moderating influences of loneliness and age on the within-person relationships between daily social exchanges and daily affect were assessed. Specifically, it was assessed if individuals higher in loneliness or age have greater reactivity (greater levels of affect) on days of greater exposure to social events for them.

RESULTS

Descriptive Statistics

Descriptive statistics for and correlations between variables used in the present study are displayed in Table 1. ANOVA analyses were also conducted to assess the influence of gender, race, and income on individuals' average daily exposure to social exchanges. Significant correlations were found between age and negative family event exposure ($r = -0.11, p < .05$) and between age and positive friend event exposure ($r = 0.20, p < .01$). Men reported more positive events with family than women, $F(1, 638) = 10.92, p < .01$; results also indicated significant differences between income levels for exposure to positive friend events, $F(6, 638) = 2.56, p < .05$; and exposure to negative friend events, $F(6, 638) = 5.07, p < .01$, with the lowest income levels associated with greater exposure to friend events.

Preliminary Analyses

Unconditional intercept-only models were first analyzed for the daily affect variables; the intraclass correlations were 0.60 for NA and 0.67 for PA. These values suggest that there is

significant variance in daily affect between individuals but also that individuals vary from themselves day-to-day (e.g., 60% of the variance in NA is due to consistent individual differences, which could be related to age or loneliness; however a sizeable amount of variance, 40%, in NA remains to be explained by, for example, individuals' daily variation in exposure to events).

Preliminary models additionally indicated significant between-person variability in the daily relationship between exposure to events and affect; that is, there was variability between individuals in their reactivity to daily social events. Therefore, the full models were analyzed, in which LON and AGE (the person-level predictors at Level 2) were added to explain variability in the daily reactivity relationships.

Reactivity Model Results

Before discussing each model individually, it is useful to first report some consistent findings across models. In all models, loneliness was a significant main effect predictor of affect; higher levels of loneliness were related to higher levels of average daily NA and lower levels of average daily PA. Similarly, in almost every model, age was a significant main effect predictor of affect; older participants reported lower levels of daily NA and higher levels of daily PA. Loneliness and age main effects are displayed in the tables for each model but are not discussed again except for the few models in which age was not a significant main effect predictor. Finally, subsequent model results indicated that no interaction between age and loneliness (labeled (AGE*LON) in the Analyses section) significantly predicted any daily within-person relationship and thus was not included in final reported models.

As an aside, a distinct way to conceptualize daily social exchanges may be the daily appraisal of intensity of social exchanges. Individuals may differ not only in how many events they have on a given day, but also in how severe they perceive these daily events to be. In the current study, participants were also asked how stressful (for negative events) or enjoyable (for positive events) each encounter they reported was for them. Intensity scores, calculated as a daily average of the appraised stressfulness or enjoyment of the events endorsed that day, was then used in the place of exposure to social exchanges in all discussed models. In all models, intensity of social exchanges exhibited identical patterns to that of exposure to social exchanges. For this reason, the intensity results were omitted, but are available upon request.

Negative Affect and Exposure to Daily Social Events

Friend Event Exposure—Results from the full model testing the prediction of daily NA from friend event exposure are provided in Table 2. As shown, greater exposure to negative friend events was related to higher daily NA and greater exposure to positive friend events was related to reduced daily NA. Age was not a significant main effect predictor of NA in the current model, but there was a significant moderating effect of age on the relationship between daily negative friend exposure and NA. As shown in Figure 1, adults 60 and older had less of an increase in NA on days of greater exposure to negative friend events than the adults under age 60. Additionally, there was also a significant moderating effect of loneliness on the relationship between daily positive friend exposure and NA. As depicted in Figure 2, individuals with loneliness higher than the sample mean had a greater reduction in NA on days of greater exposure to positive friend events than did less lonely individuals.

Family Event Exposure—Results from the full model testing the prediction of daily NA from family event exposure are provided in Table 3. As shown, greater exposure to negative family events was related to higher levels of daily NA and greater exposure to positive

family events was related to lower levels of daily NA. There was also a significant moderating effect of age on the daily relationship between exposure to negative family events and NA. As shown in Figure 3, adults under the age of 60 had a greater increase in NA on days of greater exposure to negative family events than the older adults. Age was likewise a significant moderator of the daily relationship between exposure to positive family events and NA. As shown in Figure 4, older adults had a smaller reduction in NA on days of greater exposure to positive family events than younger individuals. Finally, there was also a significant moderating effect of loneliness on the daily relationship between exposure to positive family events and NA. As depicted in Figure 5, lonelier individuals had a greater reduction in NA on days of greater exposure to positive family events than less lonely individuals.

Positive Affect and Exposure to Daily Social Events

Friend Event Exposure—Results from the full model testing the prediction of daily PA from friend event exposure are provided in Table 4. As shown, greater exposure to positive friend events was related to higher levels of daily PA. Alternatively (and in contrast with the results of the same model predicting NA), exposure to negative friend events was not significantly associated with daily PA. There was also a significant moderating effect of age on the daily relationship between positive friend exposure and PA. As depicted in Figure 6, adults under age 60 experienced a greater increase in PA on days of greater exposure to positive friend events than older adults did. Loneliness, on the other hand, was not a significant moderator of the relationship between either positive or negative friend exposure and PA.

Family Event Exposure—Results from the full model testing the prediction of daily PA from family event exposure are shown in Table 5. As shown, greater exposure to positive family events was related to higher PA and exposure to negative family events was related to reduced PA. Furthermore, there was a significant moderating effect of age on the daily relationship between positive family events and PA. As depicted in Figure 7, adults under the age of 60 had a greater increase in PA on days of greater exposure to positive family events than younger adults. As was the case for friend exposure, loneliness was not a significant moderator of the relationship between either positive or negative family exposure and PA.

Post Hoc Analyses

Depression—It could be argued that loneliness is in fact serving as a proxy for depression, and that the present findings with regard to loneliness may be better explained by depression. Thus, post-hoc analyses were conducted using the Wald test in which depressive symptoms (using scores on the Center for Epidemiologic Studies Depression Scale; Devins & Orme, 1985) was added at Level 2 for each model in order to control for the impact of depression on daily affect. Results of these analyses indicated that after including depression in the models, all of the loneliness main effects and interactions remained statistically significant (albeit at a lesser magnitude), indicating that loneliness is not merely serving as a proxy for depression but rather contributes to daily affect above and beyond the influence of depression.

Likelihood of Daily Exposure and Daily Variability—Although the main focus of the present study was whether loneliness and age influence how exposure to different kinds of events is related to daily affect, additional analyses with the daily variables were conducted to better understand the reactivity analyses by exploring how age and loneliness are associated with the daily processes at play.

First, we examined the likelihood of experiencing a particular type of an event. In pursuing questions of how loneliness or age might affect a person's emotions following social experiences, it is important to explore whether people who are more lonely or older experience different rates of exposure to these experiences. In order to do this, separate multilevel logistic models (using SAS PROC GLIMMIX) were estimated predicting the different events. In these models, the dependent variable was whether or not an event of that type was experienced that day, coded 1 and 0 respectively. Age and loneliness were used as predictors individually in separate models at Level 2. Results are summarized for age in Table 6 and indicate that age is associated with a decreased likelihood of experiencing a negative family event on a given day, an increased likelihood of experiencing a positive friend event on a given day, an increased likelihood of experiencing a positive friend event and no significant difference in the likelihood of experiencing a negative friend event on a given day. Results are shown for loneliness in Table 7 and suggest that loneliness is associated with increased likelihood of experiencing a negative event (with friends and family) on a given day, and decreased likelihood of experiencing a positive event (with friends and family) on a given day.

Although individuals may be more likely to experience social exchanges due to individual characteristics, nevertheless there is still within-person variability in exposure; some days individuals have more events and some they have less. The amount of variability in this day-to-day exposure that is influenced by loneliness and age is important to establish prior to interpreting how age and loneliness influence the reactivity of individuals on days of greater events. This day-to-day variability may be important with regard to reactivity; for example, individuals may be more reactive to events because their lives fluctuate more in general; if his or her life is more variable, events may be unpredictable and thus may result in greater reactivity. Alternatively, having a relatively consistent daily life may make changes from the routine more poignant (in positive or negative ways). The influence of loneliness and age on variability in exposure to daily events was tested by examining whether within-person variance in event exposure is predicted by loneliness and age, using SAS PROC MIXED. Parameter estimates for these variability analyses can be found in Table 8. For negative events, age and loneliness were both significantly positively associated with variability in exposure. For positive events with both friends and family, loneliness was negatively associated with variability in exposure. On the other hand, the impact of age on variability in exposure to positive social experiences differed depending on whom the events involved; for positive events with family, age was associated with a less variable experience of events, but for positive events with friends, age was associated with a more variable experience of events.

Finally, variability in daily affect was explored using a similar procedure, with daily PA or NA as an outcome in place of number of a given type of events. In these models, the influences of all daily social exchanges on affect were controlled in order to investigate if loneliness and age predict any remaining unexplained variability. Parameter estimates for these variability analyses can be found in Table 8. Results indicated that, with increasing age, there was less variability in both negative affect and positive affect. Results indicated that with greater loneliness, there was greater variability in negative affect but reduced variability in positive affect.

DISCUSSION

Social exchanges are an integral part of daily life and are significant contributors to daily well-being. In the present study, it was assessed whether loneliness or age influence the affective reactivity to daily social events as well as whether there are differences in the

affective outcomes of social exchanges depending on whether the event involves family or friends.

First, the daily relationship between social event exposure and affect was assessed. Consistent with prior research, results showed that greater exposure to negative social exchanges on a given day was associated with higher levels of NA on that day and similarly that greater exposure to positive social exchanges on a given day was associated with higher levels of PA on that day. This was true in the present study for events involving both family and friends. Days with more positive and fewer negative social exchanges were related to better moods that day.

Evidence for crossover effects was also assessed to determine whether events “spill over” across affective domains. Although it was hypothesized that only negative events would exhibit crossover effects (an asymmetrical crossover), the results exhibited a different pattern. Results showed that positive exposure always exhibited crossover effects—greater exposure to positive social events (for both family and friends) was related to lower levels of daily NA. Conversely, the results for negative exposure were not as consistent; although exposure to negative family events was significantly associated with reduced daily PA, exposure to negative friend events was not. Two points can be made regarding these findings. First, these results challenge the presumption that negative social events are more important or potent than positive social events. Although previous studies suggest that negative social events (and not positive ones) spill over affective domains (e.g., Newsom et al., 2005; Rook, 2001), in the present study, there was more evidence for positive events exhibiting such crossover effects, although it was fairly well balanced. What might account for this difference between our study and prior studies? One possibility is that prior studies have asked people to report their exposure and appraised satisfaction of exchanges “in the past month” (Newsom et al., 2005) or have assessed daily events across only 14 days (Rook, 2001). In the present study, social events were measured on a daily basis for 56 days, allowing for greater power to detect the crossover effects of positive events. Another distinction may lie in the items used. For example, Rook (2001) used a daily event checklist, as did the present study. Nevertheless, social event items in the present study specifically included the source of the social exchange (family member or friend) whereas the majority of events in the study by Rook were described as something occurring with “someone” generally. A clearer picture of the impact of daily social exchanges may emerge when events are more explicitly described.

This is supported by the second point regarding the crossover findings; there were differences in the emotional outcomes associated with the exposure to negative events depending on whether they involved family or friends. Although both positive family and friend events were related to reduced NA, only negative event exposure with family (and not with friends) was related to reduced PA. Because previous research in this area combined support from friends and family, we conducted a post-hoc analysis combining family and friend events into one scale and rerunning our analyses, to better understand the potential differences across studies. Results of this post-hoc analyses indicated cross-over effects for both positive events ($\gamma = -.17, p < .001$) and negative events ($\gamma = -.17, p < .001$). This suggests that aggregated measures may fail to capture the unique results associated with particular events. In our study, only negative family event exposure (but not negative friend exposure) crossed over into PA; if we had aggregated the measures we would only have seen that negative events influence PA, and fail to see that friend events do not share that same impact. Once these distinct results are observed, however, the question becomes, why might negative friend events fail to reduce levels of positive affect in the same way that negative family events do? It may actually be that friend events are not interpreted in the same manner as family events. Studies suggest that whereas families are more important for

stable, dependable help, friends may be more involved with leisure activities and emotional support (Antonucci & Akiyama, 1995). Similarly, because friendships are jointly chosen, they may be more freely terminated if stressful or unpleasant (Antonucci, 1985). As such, negative exchanges with friends may not impact positive mood as much, because negative friendships need not continue. Bergeman and colleagues (2010) also found distinctions between family and friend events. Specifically, they found that positive friend exchanges buffered daily stress, in particular when adults had lower global expectations of social support; however, this was not the case for positive family exchanges. If individuals have a greater expectation that family will be a positive and stable presence, and that their family encounters should be positive, it may be more hurtful when such expectations are not fulfilled. If so, this may explain why adults are more buffered by positive friend exchanges (Bergeman et al., 2010) and why in the present study negative family exchanges were linked to reduced positive mood whereas negative friend exchanges were not.

Not surprising was the finding that loneliness was a significant predictor of affect such that higher loneliness was associated with lower PA and higher NA. The purpose of the present study was to move beyond the main effect relationship to examine whether loneliness moderated the daily relationships between social events and affect. It was expected that individuals with higher levels of loneliness would experience greater NA on days of greater exposure to negative social exchanges. Results, however, showed no evidence of a moderating effect of loneliness for negative event exposure with either friend or family events. It does not appear that lonely individuals react more negatively to negative social events than less lonely people do. Taken together with the results of post-hoc analyses, although lonelier individuals are more likely to experience negative events with both friends and family and are more variable in their experience of negative affect at the daily level, they are not more emotionally reactive on days of greater negative social exchanges.

It was also explored whether loneliness moderates the affective response to positive social events. Contrary to the results with negative events, results suggest that lonelier individuals indeed have a greater reduction in NA on days of greater exposure to positive events than did less lonely individuals. This was true of positive events involving both friends and family events. Taken together with the results for negative events, this pattern of findings is optimistic; it suggests that lonely individuals may not in fact be more sensitive to negative social events but instead receive a greater benefit at the daily level from these positive social encounters. Furthermore, post-hoc analyses revealed that lonelier individuals were less likely to experience positive events with both friends and family; nevertheless, when lonelier individuals do experience these events, the exchanges are especially helpful in promoting a better mood. Additionally, results of the post-hoc investigations of daily emotional variability indicated that although greater loneliness is associated with increased variability in negative affect, it is associated with reduced variability in positive affect. This is interesting, particularly noting that the benefit lonelier individuals received from experiencing positive events was observed as a reduction of negative affect, rather than an increase of positive affect. It may be that for lonelier individuals, positive events do not create positive mood, but these events do serve to reduce the negative emotions a lonelier individual experiences each day.

Although lonely individuals may in general rate social exchanges as more negative and more threatening (Cacioppo et al., 2002; Hawkley et al., 2003), the present study suggests that it is the positive exchanges that are more influential for daily affect in lonelier individuals. Nezelek and Allen (2006) have found a somewhat consistent finding studying depressive symptoms in young adults; college-aged individuals who reported more depressive symptoms reacted more to positive events, but not negative events. They suggest as an explanation that depressed individuals may have greater expectation that daily events will be

bad, and thus when their expectations are violated (by positive events occurring), they receive a greater benefit. With regard to the present study, lonely individuals may similarly expect social exchanges to be negative, so when they instead experience positive social encounters, they may react more strongly than individuals who do not have those same negative expectations. Future studies should explore this by examining the daily social expectations of lonely individuals. Of note is that, in the present study, the moderating effect of loneliness did not entirely compensate for the simple effect of loneliness on affect; even on days of greater exposure to positive social events, lonelier adults still exhibited higher levels of NA than less lonely individuals. Nevertheless, on days of above-average positive social events, the NA lonelier adults experienced was more reduced than less lonely individuals'. In other words, for lonely individuals, exposure to more positive social events than usual make days significantly less negative.

Finally, the impact of age on the daily relationships was also assessed in the present study, to investigate whether the affective reactivity to social exchanges is influenced by age. In general, there was a main effect of age such that older adults had higher daily PA and lower daily NA. This is consistent with evidence underlying Socioemotional Selectivity Theory, which has shown that older adults exhibit lower levels of negative mood and better emotion regulation (for review, see Carstensen et al., 1999). Nevertheless, results from the present study suggest that although older adults have more optimal mood levels, their mood seems to be less influenced by the social events they experience. Consistent with prior investigations, results revealed that older adults had lower levels of NA on days of greater exposure to negative events (involving both family and friends) than the younger adults. Moreover, older adults were less reactive to positive events; older adults experienced lower PA on days of greater exposure to positive events (again involving both family and friends) and a smaller reduction in NA on days of greater exposure to positive family events than younger individuals. These positive event reactivity findings in the present study provide support for the investigation by Röcke and colleagues (2009) comparing young adults (20-30 years of age) and older adults (70-80 years of age) and further shows that older adults are not only less reactive when compared to young adults, but also relative to middle-aged adults. Overall, the age findings in the present study suggest that older adults are less negatively impacted by negative social events, but also experience less of a "boost" affectively from positive social events. Taken together with the results of the post-hoc analyses, older adults were less variable in exposure to positive events and more variable in exposure to negative events, but they were less reactive to both types of events. Although the reduced affective lift from positive events may seem harmful, this resistance may help promote the greater emotional stability we observed older adults. It may be that the reduced reactivity to events serves to bolster against fluctuations in emotional experience (Röcke, Li, & Smith, 2009).

The question remains, however: if older adults are indeed less reactive to events, how do they achieve this emotional resistance? Research with Socioemotional Selectivity Theory and older adults' response to negative social exchanges have found that older adults report less distress and lower reactivity to social conflict (Almeida, 2005; Birditt et al., 2005). Similarly, older adults make fewer conjectures about the thoughts and actions of the people who make disparaging comments in interpersonal conflict (Charles & Carstensen, 2008). If older adults focus less on forming inferences about the context of negative exchanges, it may also be that they focus less on the content and reasons behind positive events, as well. If so, this reduced conjecture by older adults about the explanations or motivations underlying social events may also reduce the emotional impact of these exchanges. That is, because older adults ruminate less on the reasons behind social events, these events may be taken more at face value, and are not interpreted to be as significant or consequential as they are

for younger adults. This may result in less emotional impact of day-to-day events for older adults.

With regard to the relationship between age and loneliness, prior studies (Hawkley & Cacioppo, 2007; Pinquart & Sorenson, 2001) have suggested a potential increase in loneliness or a curvilinear trend in loneliness throughout adulthood; in the present study, however, older adults reported lower levels of loneliness overall, and there was no significant curvilinear trend in loneliness across age. It may be that because the age range was limited to adults in middle and later life, curvature in the relationship was not captured because only part of the trend could be assessed. Also of note is that in the present study, although loneliness and age each moderated daily relationships between social events and affect, the moderation of loneliness itself did not change with age. Although age and loneliness each influence how social exchanges are experienced, they do not appear to interact in their moderating influence.

A few limitations of the present study should be noted. First, although we used an established measure of daily social exchanges, because the positive and negative social exchanges were not perfectly balanced in extremity and wording, differences between positive and negative interactions may be due to the differences in the questions (Newsom et al., 2005) rather than in the valence of the items. Such differences could influence how positive and negative exchanges differentially relate to affect.

Additionally, the findings suggest age differences in the way social events influence daily affect. Although informative, these results are cross-sectional, limiting what can be said about age-related change. Future studies should expand these findings by assessing social events and daily affect longitudinally. Indeed, analyses of this type will be assessed in the present sample as repeated burst data becomes available. Relatedly, the present sample did not include young adults. Future studies should therefore investigate the entire adult lifespan, to explore how such relationships may change across the full range of adulthood.

Finally, the present study was based on self-report data. That is, at the end of each day, participants indicated their affect that day, and whether a series of events occurred to them. This type of self-report is beneficial, because it allows individuals to recall individual events that day and to rate the severity of each event, as opposed to recalling past experiences that occurred over more extended periods of time. It should be noted, however, that the daily data used in the present study were not time stamped, so it is not known exactly when the participant completed the questionnaire; it is possible, therefore, that participants did not complete the measures each day, as directed. Nevertheless, subjects were instructed to leave a page blank if they were unable to complete it on the day requested, and many did so. Furthermore, individuals must still recall their day's events, and must report accurately about what has occurred. It is possible, for example, that affect reports in the moment an event occurs may differ from assessments at the end of a day, after some time has passed since the event. Studies assessing more immediate appraisals of events or employing event-contingent designs are better equipped to address this issue.

In conclusion, the findings from the present study contribute to the information on the impact of daily social events, daily stress vulnerability, and the influence of loneliness and age on daily processes in middle age and older adulthood. Results suggest that looking at daily social events as a homogeneous group may be inappropriate; family and friend events had observably different relationships with daily affect. Thus, future studies should likewise consider assessing social events in a more precise and specified manner to better understand the emotional impact of unique types of events. Additionally, results suggest that positive social events may not be less potent than negative social events as previously reported in the

literature. Positive events may in fact be especially important for lonely individuals, and thus promoting positive social exchanges may be particularly valuable for these individuals. Finally, older adults may not react as strongly to daily social-exchanges as younger adults; future studies should explore why this might be and additionally investigate what factors may more strongly impact the daily well-being of older adults. Daily life involves contact with others, in both positive and negative ways, and these social exchanges impact daily psychological well-being. Individual characteristics and features of the social exchanges themselves are important for how social events impact daily mood, and continued investigations are necessary to explore the dynamics of these daily processes.

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Figure 1.
Moderating effect of age on the relationship between negative friend event exposure and negative affect.

Figure 2.
Moderating effect of loneliness on the relationship between positive friend event exposure and negative affect.

Figure 3.
Moderating effect of age on the relationship between negative family event exposure and NA.

Figure 4.
Moderating effect of age on the relationship between positive family event exposure and NA.

Figure 5.
Moderating effect of loneliness on the relationship between exposure to positive family events and NA.

Figure 6.
Moderating effect of age on the relationship between positive friend exposure and NA.

Figure 7.
Moderating effect of age on the relationship between positive family event exposure and PA.

Table 1

Means, Standard Deviations, and Correlations

Variable	Mean	SD	1	2	3	4	5	6	7	8
1 Negative Family Events	0.62	1.30	—							
2 Positive Family Events	2.32	2.04	0.21**	—						
3 Negative Friend Events	0.46	0.91	0.41**	0.19**	—					
4 Positive Friend Events	1.30	1.52	0.15*	0.33**	0.26**	—				
5 NA	13.6	5.01	0.10	-0.03	0.25*	-0.02)	—			
6 PA	31.7	7.64	-0.05	0.11**	0.004	0.18	-0.29**	—		
7 Loneliness	37.9	10.7	0.07	-0.08*	0.13**	-0.07	0.35**	-0.37**	—	
8 Age	59.5	9.95	-0.04	0.002	-0.03	0.09*	-0.12**	0.17**	-0.14**	—

Note: All daily variables are person-means across the study. NA = Negative Affect. PA = Positive Affect.

* $p < .05$

** $p < .01$.

Table 2

Parameter Estimates for Daily Negative Affect Using Daily Friend Exposure as the Daily Predictor

	Random effect	Fixed effect
Intercept	11.98 ***	13.19 ***
Day	0.003 ***	−0.01 **
Exposure to negative friend events	1.28 ***	0.70 ***
Exposure to positive friend events	0.14 ***	−0.24 ***
Mean exposure to negative friend events	—	3.00 **
Mean exposure to positive friend events	—	−0.63 *
Age	—	−0.03
Loneliness	—	0.13 ***
Age × exposure to positive friend events	—	0.005
Age × exposure to negative friend events	—	−0.03 ***
Loneliness × exposure to positive friend events	—	−0.01 ***
Loneliness × exposure to negative friend events	—	0.005

Note: Daily predictors were centered on individual means, and global predictors were centered on sample means.

*
 $p < .05$

**
 $p < .01$

 $p < .001$.

Table 3

Parameter Estimates for Daily Negative Affect Using Daily Family Exposure as the Daily Predictor

	Random effect	Fixed effect
Intercept	11.61 ***	13.01 ***
Day	0.003 ***	-0.01 **
Exposure to negative family events	.84 ***	0.78 ***
Exposure to positive family events	0.08 ***	-0.14 ***
Mean exposure to negative family events	—	1.77 ***
Mean exposure to positive family events	—	-0.26 *
Age	—	-0.03 *
Loneliness	—	0.13 ***
Age × exposure to positive family events	—	0.01 **
Age × exposure to negative family events	—	-0.01 *
Loneliness × exposure to positive family events	—	-0.01
Loneliness × exposure to negative family events	—	0.003

Note: Daily predictors were centered on individual means, and global predictors were centered on sample means.*
 $p < .05$ **
 $p < .01$ ***
 $p < .001$.

Table 4

Parameter Estimates for Daily Positive Affect Using Daily Friend Exposure as the Daily Predictor

	Random effect	Fixed effect
Intercept	37.01 **	28.59 ***
Day	0.01 **	-0.02 ***
Exposure to positive friend events	0.59 **	0.87 ***
Exposure to negative friend events	0.39 **	0.03
Mean exposure to positive friend events	—	1.78 **
Mean exposure to negative friend events	—	-1.85 *
Age	—	0.10 ***
Loneliness	—	-0.22 ***
Age × exposure to positive friend events	—	-0.01 **
Age × exposure to negative friend events	—	0.01
Loneliness × exposure to positive friend events	—	-0.002
Loneliness × exposure to negative friend events	—	0.002

Note: Daily predictors were centered on individual means, and global predictors were centered on sample means.

*
 $p < .05$

**
 $p < .01$

 $p < .001$.

Table 5

Parameter Estimates for Daily Positive Affect Using Daily Family Exposure as the Daily Predictor

	Random effect	Fixed effect
Intercept	37.44 **	28.53 ***
Day	0.01 **	-0.02 ***
Exposure to positive family events	-0.004 **	0.61 ***
Exposure to negative family events	0.38 **	-0.45 ***
Mean exposure to positive family events	—	0.90 ***
Mean exposure to negative family events	—	-0.51
Age	—	0.12 ***
Loneliness	—	-0.21 ***
Age × exposure to positive family events	—	-0.01 **
Age × exposure to negative family events	—	0.01
Loneliness × exposure to positive family events	—	0.004
Loneliness × exposure to negative family events	—	0.01

Note: Daily predictors were centered on individual means, and global predictors were centered on sample means.

*
 $p < .05$

**
 $p < .01$

 $p < .001$.

Table 6

Influence of Age on the Likelihood of Experiencing Social Events

	Estimate of influence of age	Odds ratio of event corresponding to the comparison of age 80 and 60
Negative family event	−0.01 *	0.75
Positive family event	0.02 *	1.37
Negative friend event	−0.004	0.92
Positive friend event	0.03 **	1.72

*
 $p < .05$ **
 $p < .01$.

Table 7

Influence of Loneliness on the Likelihood of Experiencing Social Events

	Estimate of influence of loneliness	Odds ratio of event corresponding to the comparison of 1 <i>SD</i> above the mean and the mean
Negative family event	0.02 **	1.27
Positive family event	-0.03 **	0.73
Negative friend event	0.02 **	1.24
Positive friend event	-0.02 **	0.79

*
 $p < .05$ **
 $p < .01$.

Table 8

Relationship between Age and loneliness with Variability in Daily Variables

	NA	PA	Positive friend events	Negative friend events	Positive family events	Negative family events
Age	-0.02 **	-0.01 **	0.01 **	0.01 **	-0.003 **	0.03 **
Loneliness	0.04 **	-0.01 **	-0.01 **	0.02 **	-0.01 **	0.02 **

*
 $p < .05$ **
 $p < .01$.