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**The Effects of Feeling Rested After a Night's Sleep on Activities and Well-being in a Day:
Do Marriage and Gender Matter?**

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For many older adults, more time is spent asleep than on any other main activity in a day. Using three waves of 24-hour diary data collected in the American Time Use Study (ATUS), for example, Basner et al. (2007), estimated that average time spent asleep increased from less than 8 hours in the 50ies to almost 9 hours by age 75 and that older women generally slept longer than older men. Sleep plays a critical recuperative role in everyday life. Sleep is integral to sustaining the temporal dynamics of many diurnal hormonal and physiological systems and is essential for healthy functioning (e.g., Cappuccio, D'Elia, Strazzullo, & Miller, 2010; Luyster, Strollo Jr, Zee, & Walsh; 2012). Furthermore, much selective information sifting and memory consolidation of events in a day occurs during sleep (e.g., Lim & Dinges, 2011; Payne, Chambers, & Kensinger, 2012).

Getting an adequate amount of restful sleep is thus important for the maintenance of physical health, recovery from illness, cognitive performance, and well-being at all ages (e.g., Banks & Dinges, 2007; Cappuccio, D'Elia, Strazzullo, & Miller, 2010; Grandner et al., 2012). Chronic sleep deficiency elevates the risks for hypertension, cardiovascular illness, stroke, and mortality. Some researchers suggest that oscillations in biological sleep patterns due to changes in weekday-weekend schedules or restless nights contribute to a repetitive form of jet-lag which could accumulate over time with harmful consequences (Roenneberg, 2013)

Complaints about disturbed and unsatisfying sleep increase with age (Lemola, & Richter, 2013; Ohayon, Carskadon, Guilleminault, & Vitiello, 2004). A recent analysis of longitudinal data from the German Socio-Economic Panel Study revealed that despite a short period of increased sleep quality immediately after retirement, the trajectory of decline in subjective sleep quality continued into very old age (Lemola & Richter, 2013). These subjective evaluations are not always concordant with objective indicators (e.g., Lemola, Lederman & Friedman, 2013; Jackowska, Dockray, Hendrickx, & Steptoe, 2011) but do reflect the salience of sleep in later life for subjective well-being and the extent of personal distress associated with perceptions of inadequate sleep.

Previous studies have found that individuals who report poor sleep quality also report lower subjective well-being, higher levels of negative affect and more mood disturbances when compared to individuals who reported good sleep quality (e.g., Kahn, Sheppes & Sadeh, 2013; Steptoe, O'Donnell, Marmot, & Wardle, 2008 2008). Chronic sleep difficulties are common symptoms in many affective disorders including depression (Baglioni et al., 2010; Alexopoulos, 2005). In young adults, cumulative sleepiness across a week is associated with increases in anxiety, and less intense and less frequent positive mood (Dinges et al., 1997; Paterson et al., 2011). Kahn et al. (2013) suggest three mechanisms that may underlie these sleep-emotion associations: Namely, sleep loss may contribute to a) diminished ability to inhibit or regulate negative emotion; b) increase spillover from the previous day's negative emotional experiences because of reductions in selective processing and dampening overnight; and/or c) diminished cognitive-energy to allocate to emotional self-regulation during the waking day.

It is well-known that age-dependent changes in sleep homeostatic and wake-maintenance circadian processes and together with illnesses such as arthritis and lung disease contribute to sleep disturbances (e.g., Vitiello, 2009). However, beyond these obvious reasons, there are many social, environmental, and behavioral factors that contribute to non-restful sleep.

One important social factor in later life is marriage. Although 62% of the US population over age 50 are married and/or live with a partner (U.S. Census Bureau, 2006), most research linking perceived sleep quality to subjective well-being has focused on the individual. Older couples share lifestyles, environments, and exposure to life events and daily hassles which influence well-being. For example, in a subsample of couples aged 60 to 79 from the Panel Study of Income Dynamics, Freedman et al (2013) found that 58% of activities that spouses reported doing in a day between 8:00am and 8:00pm were joint activities.

Sleep problems and relationship problems tend to co-occur in all age groups and stages of the marital history (e.g., Hasler & Troxel, 2010; Strawbridge, Shema, & Roberts, 2004; Troxel, 2010). Mistlberger and Skene (2004) suggest that daily joint activities (such as mealtimes), leisure, and prebedtime rituals may operate as social zeitgebers (time-keepers) that contribute to the entrainment of circadian and sleep-wake rhythms. Mismatched couples in terms of sleep-wake patterns (e.g., a morning lark and a night owl) tend to adjust to these behavioral discrepancies over time but it is more difficult for couples to adjust to some sleep problems such as snoring and apnea (e.g., Larson, Crane & Smith, 1991; Troxel, 2010). There is some suggestion that younger women's sleep may be particularly sensitive to their spouse's sleep patterns and problems (e.g., Burgard & Ailshire, 2003; Kiecolt-Glaser & Newton, 2001) but there is relatively little research with older couples on this topic (Meadows & Arber, 2012; Strawbridge et al., 2004). Spousal caregivers in later life are particularly at risk for experiencing disturbed sleep and sleep loss (e.g., Rees, O'Boyle, & MacDonagh; 2001)).

We focus on the perceived recuperative effects of a night's sleep in older married and single (i.e. widowed, divorced, never married) men and women. We examine if this sleep evaluation is associated with the waking day's activities and the feelings associated with these activities. Specifically we ask:

1. Is the perception of having had a restful sleep associated with that day's activities and activity-based positive and negative affect and does marital status and gender matter in this association?
   Based on the literature, we expected that not feeling well-rested in the morning would be associated with lower levels of activity-based positive affect and higher levels of activity-based negative affect, especially in married individuals. Our analyses control for multiple confounding sociodemographic and health factors.

2. Are there within-couple interdependencies in perceived sleep quality and activity-based affective experiences? Is each partner's experienced well-being influenced not only by their own but also their partner's perceived sleep quality (i.e. are there within-couple crossover effects)?

We use day reconstruction data collected from older individuals and couples aged 50 to 98 in a 2009 off-year HRS mail survey. The measure asked about the affective experiences associated with seven typical daily activities (watching TV, eating meals, work/volunteer away from home, exercising, other health-related activities, socializing with friends, and managing/spending money). Apart from being frequent in later life (e.g., Krantz-Kent & Stewart, 2007), these activities are also known to be associated with global well-being and health (e.g., Carlson, Parisi, Xia, Xue, Rebok, Bandeen-Roche, & Fried, 2012; Carstensen, 2003; Fratiglioni, Paillard-Borg, & Winblad, 2004; Hertzog, Kramer, Wilson, & Lindenberger, 2009; Wilson & Bennett, 2003). The HRS day reconstruction measure retains some of the features of the DRM devised by Kahneman et al (2004) but is shortened and adapted for use in large longitudinal panels of older adults. Previous work (Smith, Ryan, Queen, Becker, & Gonzalez, 2014) found that composite scores of activity-linked experiences of positive and negative affect derived from responses to this short HRS measure are reliable.
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Method

Participants

In 2009, a subsample of participants in the Health and Retirement Study responded to a short day reconstruction self-administered questionnaire. This measure of experienced well-being was included in a Fall

2009 mail survey of prescription medicine usage (renamed "Health and Well-being" Survey - HWB). The sample for HWB 2009 included participants from earlier Prescription Drug Surveys (2005/2007). This sample was supplemented with an additional 22% random selection of respondents who completed the 2008 HRS Core interview but were not included in another 2009 off-year survey. The final eligible sample size for HWB 2009 was 7417 respondents. It was determined that 337 persons died prior to the October 2009 start of the field period. Of the 7080 remaining eligible cases, 5333 returned questionnaires, for a study response rate of 75% (September 2012 release). Valid data for activities and experiences were available for 4605 participants. The final analytic sample was reduced to 4472 because of listwise missing information (3%): data was missing for 34 people (0.7%) on the well-rested item and an additional 102 cases had missing data on one of the covariates in the analyses. HRS has not released weights for these data.

Table 1 summarizes the descriptive information for married and not-married (i.e. widowed, separated/divorced, never married) in the sample. Because HRS samples by household and interviews both age-eligible spouses/partners, the married subsample included 760 couples (1520 individuals). The analysis sample to address our second question required that both spouses had reconstructed the same day. This reduced the sample to 331 couples (44% of married households)

Measures

The 2009 HRS HWB1-SAQ measure of experienced well-being
The experienced well-being questionnaire (HRS HWB1-SAQ) is available online: http://hrsonline.isr.umich.edu/modules/meta/pds/hwb2009/qnaire/HWB2009_English_Questionnaire_Sep2012. pdf. It begins with a short day reconstruction instruction. *Please think now about the things you did yesterday. Think about how you spent your time and how you felt.* It then moves on to ask about participation in seven activities selected from the ATUS taxonomy for their relevance to social engagement, physical and mental health, and successful aging in the population over age 50: *watching TV, eating meals, managing or spending money (e.g., shopping, banking, balancing a checkbook, paying bills), doing health-related activities (e.g., visit doctor, take medications, doing treatments), walking or exercising, socializing with friends, neighbors, or family (not counting your spouse or partner), and working or doing volunteer work away from home.* For each activity, participants were asked to estimate the total time spent on the activity: *How long did you spend yesterday (....activity)?* They then rated how strongly they felt *happy, interested, frustrated, nervous, calm, bored,* and *sad* (in the order listed) while doing the activity on a scale from 0 = *Did not experience the feeling at all* to 6 = *the feeling was extremely strong*.

Composites of Activity Participation and Affective Experiences
We examine three composite outcomes: number of activities reported, Activity-related Positive Affect and Activity-related Negative Affect. On average, participants reported participation in 4.47 (*SD* = 1.42; range 1-7) of the seven activities targeted in the HRS measure.
Individual-level scores were computed for each activity and aggregated across all activities to construct the two composites of affective experiences. For the Activity-Positive Affect score (Activity-PA), we first calculated individual-level means on the 0 to 6 rating scale across positive feelings (happy, interested, calm) for each activity the person reported then averaged across all the activities that he/she reported. A similar procedure was applied to form a score of Activity-Negative Affect (Activity-NA: frustrated, nervous, bored, sad). Cronbach alphas calculated for the positive (happy, interested, calm) and negative (frustrated, nervous, bored, sad) items for each activity revealed moderate to high inter-item consistencies (reliability). These ranged from α = .71 (TV) to α = .82 (Work) for positive affect and α = .70 (TV) to α = .83 (Socializing) for negative affect. Intraclass correlations (ICCs) obtained from multilevel models conducted for each affective experience across activities revealed that roughly half of the variance in the intensity of positive affect (calm, interested, and happy) is associated with between-person differences and half with within-person variability across activities. The between-person variance in reported negative affect is lower (around 35% across the different adjectives) suggesting that the specific activities done throughout a day contribute more to variance in intensity of negative affect. Additional information about these composites is reported in our previous paper (Smith et al., 2014)

Single-item of Sleep Quality: Feeling Well-rested in the Morning of the Day Reconstructed

The 2009 HRS-HWB1 included a single item indicator of sleep quality: *Did you feel well-rested yesterday morning, that is you slept well the night before (yes/no response)*. This item is an adaptation of one of the items in a sleep problem scale that has been validated and widely used in epidemiological surveys (Jenkins, Stanton, Niemcryk, & Rose, 1988). A similar item is included in the Gallop Healthways Well-being Index (http://www.gallup.com/strategicconsulting/156926/indexes-questions.aspx). The original Jenkins et al (1988) item asks about frequency in the last month ("how often in the past month did you wake up after your usual amount of sleep feeling tired and worn out"). A similar item is included in the health section of each biennial HRS interview. The panel item is: *How often do you feel really rested when you wake up in the morning? Would you say most of the time, sometimes, or rarely or never?*

Other Covariates Entered in Regression Models

Information about age, gender, race, work status, education, household income, depressive symptoms, self-reported health, number of diagnosed illnesses, and functional limitations were drawn from the HRS 2008 core interview. For analyses, contrast codes were used to categorize gender (-1 = *men*; 1 = wo*men*), race (1 = *white*; -1 = *black/Other*), marital status (1 = *married*; -1 = *not married*); work status was dummy coded (1 = *employed*; 0 = *not working/retired*). Age cohorts were coded: 1 = *50 - 59 years*; 2 = *60 - 69* years; 3 = *70 -79 years*; and 4 = *80 - 101*). Categories 3 and 4 were collapsed in the couple analyses because of reduced cases above age 80. Education was coded in five categories (1 = *Less than high school*; 2 = *Some high school*; 3 = *High school graduate*; 4 = *Some college*; 5 = *College and beyond*). For regressions, the 70s age cohort group (3) and high school graduate (3) were the referent groups. We created quintiles from the RAND imputed variable for total household income in 2008 (1 = lowest; 5 = highest) and used the third quintile as the referent in regression models. Depressive symptoms in HRS are assessed with eight items adapted from the original Center for Epidemiologic Studies Depression (CESD) scale. Following Steffick (2000), we formed a dichotomous score to indicate the severity of symptoms (0 = less than 4; 1 = 4 or more symptoms). Self-reported health is assessed with a single item: *Would you say your health is excellent, very good, good, fair, or poor*? This is coded on a 5-point scale (5=excellent to 1= poor). To complement this global measure, we included an indicator of the potential impact of physical functioning on the ability to perform daily activities. In the HRS, physical functioning is assessed by items adapted from scales developed by Rosow and Breslau (1966), Nagi (1976), Katz, Ford, Moskowitz, Jackson, and Jaffe (1963), and Lawton and Brody (1969). Participants are asked if they have difficulty with a series of activities because of a health problem. The items range from running or jogging a mile, walking one block, and climbing one flight of stairs, to picking up a dime, shopping for groceries, dressing, and bathing (max = 23). We created a dichotomous score to reflect level of physical functioning (0 = *3 or less*; 1 = *4 or more limitations*). Given that previous day reconstruction research (e.g., Krueger et al, 2008) reports differences between weekday and weekend experiences, an indicator for this was included (1 = *weekday*; 0 = *weekend*). This was coded from participant's self reports of the day of the week reconstructed.

Analytic Strategy

Preliminary analyses evaluated the validity of the single-item indicator of sleep quality. Descriptive analyses compared participant's responses about the day reconstructed to those they had given to the similar global item in the 2008 wave of HRS. In addition, a logistic regression was conducted to examine factors related to feeling well-rested.

Separate linear mixed regression models were conducted to examine the effects of marital status, gender, feeling well-rested, and their interaction for the activity-related affect composites. Each model specified a random effects factor (i.e., an intercept) to indicate spouses/partners nested within households and included the covariates race, employment status, age cohort group, education, income, self-rated health, functional limitations, depressive symptoms, and whether the day reconstructed was a week- or weekend day.

To address the question about within-couple dependencies and effects, we calculated intraclass correlations and conducted multilevel models that decompose variance into individual and dyadic levels and examine the separate influence of actor and partner (e.g., Kenny et al, 2006; Gonzalez & Griffin, 1999).

Depending on discipline, these models are also known as the Actor-Partner Interdependence Model (Kenny et al, 2006) and Seemingly Unrelated Regressions (Green, 2011).

Results

Descriptive Analyses of Sleep Evaluation Item

To begin, we examined the validity of the single-item used to assess the perception of the night's sleep as restful or not. In total, 28% of participants reported that they had not felt well-rested in the morning of the target day reconstructed. Among these 1285, 23% had reported previously in the 2008 HRS core panel interview that they rarely or never felt well-rested in the morning, whereas 44% said this was sometimes the case, and 33% said they typically felt well-rested in the morning. In contrast, 68% of those who reported feeling well-rested on the day reconstructed reported in 2008 that they typically felt this way (r = 0.34, p < .001).

A logistic regression model predicting reporting feeling well-rested revealed that people in the age group 50 to 59 were less likely to report a restful sleep (OR = 0.52; CI 0.31 - 0.88 compared to older age groups) whereas those who were married (OR = 1.25; CI 1.05 - 1.48), white (OR = 1.32; CI 1.07 - 1.61), and who had no functional limitations (OR = 1.69; CI 1.35 - 2.11) and not depressed (OR = 2.45; CI 2.04 - 2.94) were more likely to report feeling that their sleep was restful. Gender, household income, education, working, and whether the day reported was a weekday or not were not significant as main effect predictors.

Q1: Associations Between Feeling Well-Rested, Marital Status, Gender, Activities, and Activity-based Affective Experiences

Findings from three separate linear mixed models are summarized in Table 2 and illustrated in Figure 1. These results are illustrated in Figure 1. Table 2 lists the coefficients for all variables in the model. The R^2 reported in this Table assesses the model fit of the fixed effect factors compared to a null model that only includes the random intercept using a maximum likelihood formulation. So, for example, the .179 for PA means that 17.9% of the variance is accounted for over and above the variance already accounted for by variation in household mean.

Findings for Activity Engagement

The Linear Mixed Model for the number of activities reported revealed no significant differences in the number of activities reported associated with sleep quality, marital status, or gender, and no interactions between these factors. Among the covariates, higher income, education, reconstructing a weekday, and better health were associated with reporting participation in more activities, whereas working, and having four or more functional limitations were associated with fewer activities.

Findings for Activity-PA and Activity-NA

The separate Linear Mixed Models conducted for the affective experience composites revealed a different pattern of effects for Activity-PA and Activity-NA. Both models revealed significant main effects for feeling well-rested. Compared with those not well-rested, people who were well-rested reported higher positive (M = 3.63; CI 3.45 - 3.80 vs M = 3.22; CI 3.04 - 3.40) and lower negative affect (M = 0.61; CI 0.52 - 0.71 vs M = 0.88 CI 0.78 - 0.97) associated with their activities. Only the model for Activity-NA revealed associations with gender, an interaction between marriage and sleep quality. These effects were qualified by a significant three-way interaction between feeling well-rested, marital status, and gender. The direction of these findings are illustrated in Figure 1. Whereas both men and women reported higher levels of Activity-NA if they did not feel well-rested, this difference is magnified for older women who are not married and reduced for older men who are not married.

Q2: Associations of Individual and Spousal Rest Yesterday on Affect and Activities

To examine questions on the independent and combined effects of couples rest on individuals' activity participation and positive and negative affect, we selected a subsample of cases with data on both married

partners. Selecting only those couples where both partners provided data resulted in a subsample of N = 1520 individuals (760 couples). We then selected only those couples who reported completing the questionnaire on the same weekday in an attempt to assess the effects of being well-rested in both partners on the same day. This resulted in a final sample of 331 couples, 44% of the couple sample.

Do partners have similar patterns of activity participation? In 80% of couples both partners report having watched or not watched TV, 88% matched on eating meals, 59% matched on managing money yesterday, 62% for health-related activities, 62% for exercise, 71% for socializing, and 75% of couples had both partners report that they did or did not engage in work or volunteering yesterday. In addition, 69% of couples have matching reports of level of rest. Of those couples who matched, 80% were well-rested.

How much variance in our key variables is associated with within versus between couple differences? To examine this question we calculated intraclass correlations (ICCs) for activity-linked positive affect, activity-linked negative affect, and the total number of activities. The ICCs computed from a REML multilevel regression indicate that 39% of the variance in activity-linked positive affect was associated with within-couple variability rather than between-couple differences. Fifty percent of the variability in activity-linked negative affect was attributed to within-couple variability, whereas only 23% of the variability in the number of activities was associated with within-couple variability. These patterns suggest that partners are more similar (i.e., less variability) in the activities they engage in in a single day compared to the affective experiences they report while in activities in a day.

Are reports of being well-rested from both an individual and her/his spouse associated with the individual's activities and affective experiences in a day? To address this question we used the Actor Partner Interdependence Model (APIM; Kenny et al. 2006), which statistically adjust for within-couple data interdependencies and allow for tests of individual and spouse main effects, as well as individual by spousal interactions. As was the case in the analyses for question 1, our models controlled for an individual's age decade, race, education, work status, income quintiles, physical functional status, and depression. Our predictors of interest were well-rested in the individual and in the spouse. Because of an interest in examining whether the pattern of individual and spouse effects differ by gender, models were run with individual intercepts for men and women. We then tested gender interactions for each covariate and predictor in the model to obtain individual estimates for husbands and wives. Results are reported in Table 4. In addition to main effects of being well-rested, we also tested an individual by spousal by gender interaction to see whether the combination of one or both partners' rest-status was differentially associated with affect and number of activities. All variables in the model were centered. Table 3 reports the results for the three outcomes on our key variables. The individual by spouse by gender interaction was not significant for activity-linked positive affect and as such is not listed.

The results replicate a similar pattern as those for question 1, where an individual's own report on being well-rested yesterday was significantly positively associated with Activity-PA and the number of activities, and was negatively associated with Activity-NA. This effect was significant in both husbands and wives. When predicting the number of activities yesterday, however, a husband's own level of rest was not a significant predictor but the wife's own rest did predict her activities.

Across all three outcomes and for both husbands and wives, there were no significant cross-over effects for a spouse's level of rest on her/his partner. However, the models did detect significant individual rest by spouse rest by gender interactions for Activity-NA and number of activities. Specifically, husbands report significantly less negative affect when both spouses are well-rested, but this effect was not significant in wives. Regarding the number of activities, wives report more activities when they are well-rested and when the husband is *not* well-rested. This pattern was not significant in the husbands.

Discussion

Consistent with our hypothesis and the literature, we found that not feeling well-rested in the morning was associated with lower levels of positive affect linked to activities and higher activity-linked negative affect. These effects were independent of multiple factors (at least in the form of main effects) known to be related to affective well-being, in particular depression, age, physical health, functional limitations, and whether the reconstructed day was during the weekday or on the weekend. Indeed, as shown in Table 3, depression, age, and physical health were consistently significant and there was a weekday-weekend effect for Activity-PA. Previous research has primarily focused on young adults using either diary assessments over a week or more or experimental manipulation of sleep loss in controlled sleep laboratories (e.g., Dinges et al, 1997; Patterson et al., 2011). One field study, for example, monitored the sleep hours and sleep interruptions in young medical residents.

Somewhat unexpected was the finding that neither feeling well-rested, marriage, not gender mattered for the number of activities reported. In part, this may be attributed to the questionnaire which only asked about participation in seven (albeit highly frequent) activities.

Contrary to our expectations, although in general marriage and gender seem not to matter, a significant three-way interaction emerged for Activity-PA when we compared married and singles in the larger sample and a spousal crossover effect in the couple analysis. Further researcher is needed to understand this seemingly different impact on activity-linked negative affect in single older men and women. One possibility, for example, is that, when not feeling well-rested, single older men are more selective about the activities they chose to do or spend less time on frustrating activities (for example) than single older women.

The three-way interactions found in the analyses of married couples (i.e., Individual-Rest x Spouse-Rest x Gender) for Activity-NA and number of activities are intriguing. While the data do not allow us to disentangle potential mechanisms or causal directions, there are several possible explanations. It may be that when husbands are tired, wives have more time to pursue other activities independently. It may also be that if a husband is particularly tired, the wife tries to compensate by taking up more of the necessary activities that day to allow her partner some rest. Future research can test different mechanisms underlying these findings.

Limitations

Limitations to our study include a lack of more detailed data about the hours of sleep, particular problems sleeping, wake time, waking hours in the day reconstructed and whether the participant napped during that day. Nor do we have information about how many hours in the day they felt tired and about sleeping arrangements in the household. In addition, in selecting the subsample of couples for the question 2 analyses, we had only self-reported information about concordance of reporting about the same day of the week. Ideally, future studies should collect complete information about the day's date to determine this.

Furthermore, it is important to acknowledge that these data are cross-sectional. Although the question about feeling well-rested explicitly states a morning context (i.e. feeling on waking), it is impossible to determine the causal order of this feeling on activity participation and experience that day. Other events from previous days which are unknown, for example, may not have impacted sleep but nevertheless spilled-over to activity participation and activity-related experiences on the day reconstructed.

The HRS 2009 measure sampled only a small set of activities and affective experiences. We need to learn much more about the validity of these particular activities and feelings as snapshots of a day's affective experiences in older adults. Unlike the DRM and the 24-hour diary studies of experienced well-being, the short HRS measure provides only a partial coverage of an individual's waking hours in a day. It also assumes that individuals categorize activities in similar ways. Although focus groups and cognitive testing of the HRS pilot measure were conducted in an affiliated project, more research is needed to determine appropriate ways to describe activities such as exercise, health-related activities, managing/spending money, and socializing, which occupy time in an older adult's day. Further research is also needed to determine specific limitations due both to the restricted set of feelings included in the HRS measure and to the bounded recall and other memory

biases involved in remembering activity-specific experiences from the previous day (e.g., Bradburn, Rips, & Shevell, 1987: Tourangeau, Rips, & Rasinski, 2000). For example, in ratings of health-related activities (e.g., doctor's visits, treatments), in particular, we may have missed feelings such as fear, anxiety, hope, or pain. In the context of other activities, feeling annoyed, irritated, impatient, cheerful, excited, or amused may have been relevant for some older participants. In addition, unlike previous day reconstruction studies, we did not weight the composites based on time in activity. The extent that time allocation may contribute to differences in findings about associations with correlates awaits future research (see also Diener & Tay, 2013).

Despite these limitations, these HRS day reconstruction data provide new insights into the role of sleep quality on the activities and activity-related affective experiences in the lives of older men and women. Because the questions ask specifically about a particular day (yesterday), the information is assumed to be relatively intact in episodic memory thus helping to minimize some of the difficulties with response and memory biases associated with global estimations of the frequency of sleep problems and how they impact activities.

Table 1:
Characteristics of Married and Not Married (ie. Widowed, Divorced, Never Married) Participants

	Married N = 2809; 63%	Not Married N = 1663; 37%	p <
Mean Age (range)	68.9 (51-98)	72.7 (51-98)	.001
% age 50-59	17	13	
% age 60-69	35	26	
% age 70-79	34	36	
% age 80+	13	26	
% Women	51	74	.001
% White	89	78	.001
% HS or less	51	61	.001
% working	39	28	.001
Mean Household Income	82,869	35,453	.001
% 4 or more limitations	33	46	.001
% good-excellent health	80	70	.001
% 4 or more depressive symptoms	13	23	.001
% report a weekday	66	68	ns
% well-rested yesterday	72	72	ns
% typically well-rested	60	56	.05

Table 2
Relationship of Marital Status, Feeling Well-rested in the Morning, and Gender with Three Indicators of Experienced Well-being (Unstandardized Coefficients and Standard Errors)

	Activity-PA		Activity-NA		# Activities	
	Beta	*SE*	*Beta*	*SE*	*Beta*	*SE*
Well-rested	-0.45***	0.07	0.21***	0.04	- 0.13	0.08
Married	-0.06	0.07	-0.03	0.04	0.06	0.07
Gender	-0.04	0.06	0.06*	0.03	0.08	0.06
Married x Well-rested	-0.06	0.11	-0.19**	0.06	-0.07	0.12
Married x Gender	-0.09	0.11	-0.04	0.06	-0.03	0.11
Well-Rested x Gender	0.10	0.11	-0.06	0.06	-0.08	0.12
Married x Well-Rested x Gender	0.12	0.21	-0.29**	0.11	0.29	0.22
Covariates						
Age Decade (ref = 70)	-0.08***	0.02	-0.08***	0.01	-0.04	0.03
White	0.03	0.03	0.03*	0.02	-0.03	0.03
Older Worker	-0.01	0.01	0.01	0.01	-0.04**	0.01
Income Quintile (ref = 3)	0.05*	0.02	-0.01	0.01	0.02	0.02
Education (ref = HS)	0.10***	0.02	0.02*	0.01	0.17***	0.02
Self-rated health (ref = good)	0.17***	0.02	0.07***	0.01	0.09***	0.02
$\geq$ Functional Limitations	-0.01	0.03	0.09***	0.02	0.07*	0.03
$\geq$ 4 Depressive Symptoms	-0.27***	0.06	0.33***	0.03	-0.20**	0.06
Weekday	-0.16***	0.04	0.04	0.02	0.35***	0.05
Random Intercept Variance	0.43***	0.06	0.10***	0.02	0.36***	0.08
Intercept	3.69	0.08	0.51	0.04	4.34	0.08
n	4472		4472		4472	
BIC	15467.60		10195.34		16046.08	
R^2	0.179		0.164		0.153	

NOTE: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. See text for how variables were coded.

Table 3.

Results from the Multilevel Model Examining Individual (I), Spousal (S), and Spousal Crossover (IxS) Effects of Feeling Well-rested on Number of Activities and Activity-linked PA and NA.

	Activity-linked PA		Activity-linked NA		Number of Activities	
	B	SE	B	SE	B	SE
Husbands						
Individual Well-rested	0.23*	0.10	-.12*	0.05	0.12	0.10
Spousal Well-rested	0.04	0.09	0.04	0.05	-0.07	0.10
IxS Well-rested	--		-.12*	0.05	-0.07	0.10
Wives						
Individual Well-rested	0.31***	0.09	-.13**	0.05	0.27**	0.10
Spousal Well-rested	0.12	0.09	0.08	0.05	0.02	0.10
IxS Well-rested	--		-.01	0.05	-0.21*	0.10

Note: The Actor partner interdependence models each controlled for an individual's age decade, race, education, work status, income quintiles, physical functional status, and depression.

Figure 1

Estimated Means (95% CI) for Number of Activities, Activity-related Positive (PA) and Activity-related Negative (NA) Affect for the Gender x Married x Well-Rested Factor with covariates held at the values specified in Table 2.
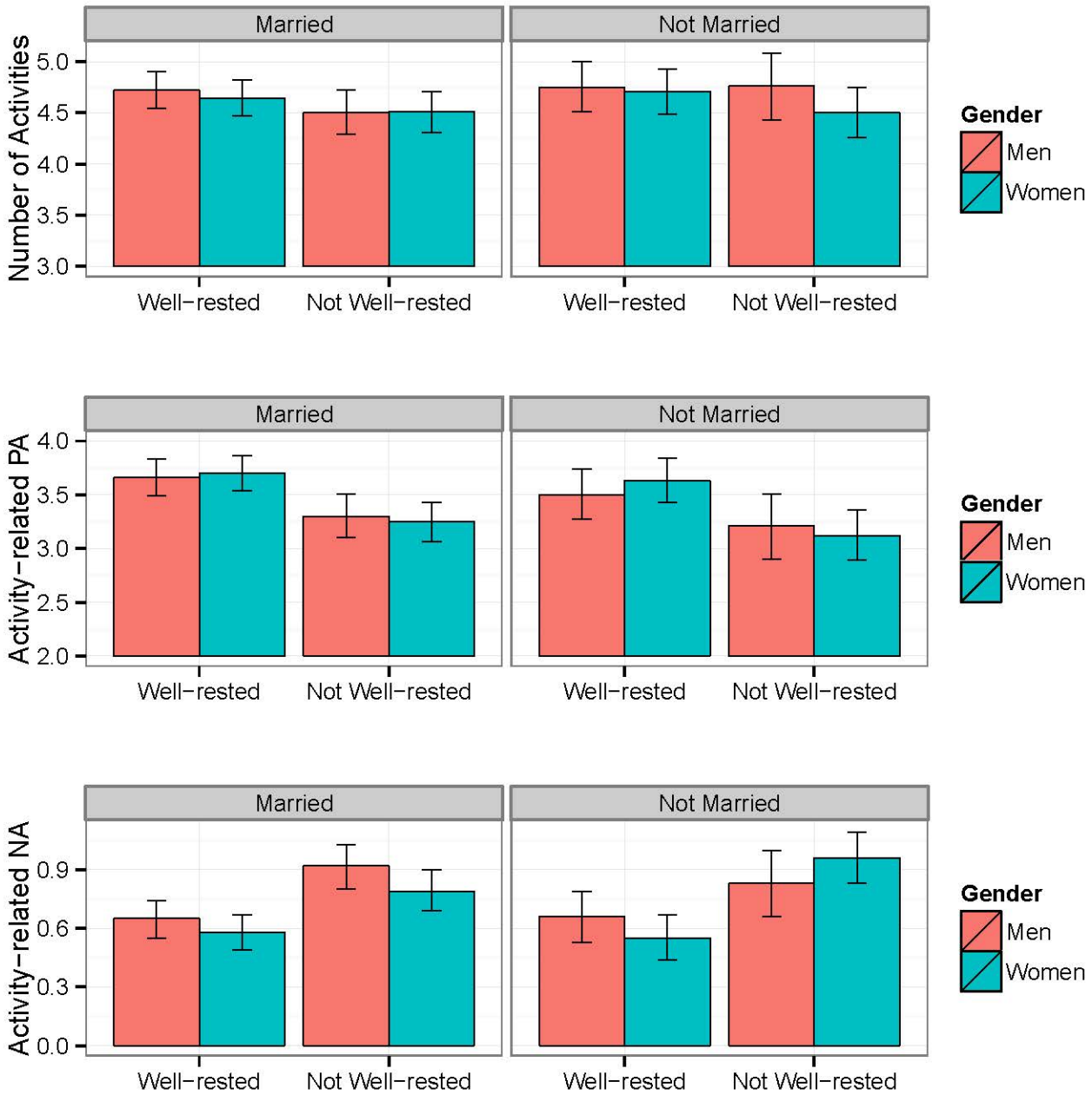
NOTE: Model includes a random effect intercept to specify spouses/partners nested within households and included the following covariates: race, age cohort group, education, income, employment status, self-rated health, functional limitations, depressive symptoms, and an indicator of the day reported (weekday vs. or weekend).

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