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**Effects of cable news watching on older adults'
physiological and self-reported stress and cognitive
function**

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Effects of cable news watching on older adults' physiological and self-reported stress and cognitive function

For Peer Review

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Abstract

Older adults are the largest consumer of cable news, which includes negative and politicized content and may constitute a daily stressor. As older adults are also vulnerable to the negative consequences of stress, we hypothesized that cable news-watching could induce a stress reaction and impair cognitive function. We tested exposures to cable news (i.e., Fox News and MSNBC) in a within-subject randomized controlled design in 34 healthy older adults. We also included negative (PBS) and positive (Trier Social Stress Test) controls. Cable news-watching had no effect on psychological stress, physiological stress, or cognitive function. This remained true even if the news exposures were discordant with participants' political affiliation. We conclude that brief cable news watching does not induce a physiological or subjective stress response or cognitive impairment among healthy older adults.

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Introduction

What are the implications of cable news-watching for the mental and cognitive health of older adults? Television viewing time is associated with negative consequences both psychological and physiological in older adults (Hamer, Poole, & Messerli-Burgy, 2013). Moreover, adults age 65 and older spend the greatest amount of time watching news of any age group – an average of 83 minutes daily (Pew Research Center, 2012). Cable news has highly negative and opinion-based content (Dorfman, Woodruff, Chavez, & Wallack, 1997; Klein, 2003; Holcomb & Mitchell, 2013; Jurkowitz et al., 2013; Vasterman, Yzermans, & Dirkzwager, 2005); therefore, we hypothesized that watching it may constitute a psychological stressor. News exposure to traumatic events has been linked to psychological distress (e.g., Garfin, Holman & Silver, 2015), and other exposures to acute and daily stressors are associated with psychological distress and poorer cognitive function in older adults (Wong & Shobo, 2017; Pulpulos, 2015; Prenderville, Kennedy, Dinan, & Cryan, 2015). Underlying these observations is the glucocorticoid excess theory (Sapolsky, Krey, & McEwen, 1986), which posits that certain psychological stressors cause a hypothalamic-pituitary-adrenal (HPA) axis response leading to increased cortisol production, resulting in decrements in memory and executive function (Lee et al., 2007; Lupien et al., 1997). Even everyday psychological stressors could have a measureable impact on both physiological and psychological stress (Neupert, Soederberg Miller, & Lachman, 2006).

We hypothesized that everyday cable news-watching would be stressful to older adults, and that it would increase cortisol and decrease cognitive function. We designed a cable news exposure experiment to test this hypothesis. Using a crossover experimental design, we exposed healthy older adults (n=34) to single 40-minute viewings of cable news (Fox News Channel and

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3 MSNBC). The Public Broadcasting Station (PBS) served as a negative control, since it is a non-
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5 cable, centrist news program (ORC International, 2015; Groseclose & Milyo, 2005). Finally
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7 participants underwent the Trier Social Stress Test (TSST) as a positive control condition. The
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9 TSST is known to produce a significant increase in cortisol in most adults, including older adults
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11 (Pulopulos et al., 2015). We hypothesized that cable news exposure and the TSST would
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13 produce both psychological distress (namely increased negative affect and subjective distress)
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15 and physiological stress (increased blood pressure and cortisol levels), and a reduction in
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17 memory and cognitive control performance. We also hypothesized that politically discordant
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19 exposures (e.g., Republicans watching MSNBC) would produce a greater increase in distress and
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21 other negative effects than politically concordant exposures (e.g., Democrats watching MSNBC).
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Method***Participants***

Adults aged 65 or older were recruited via advertisements and the university's volunteer pool from July 2014-May 2015 and provided informed consent approved by the university's Institutional Review Board. Exclusion criteria included language, visual, or hearing barriers to participation; diagnosis of dementia; lifetime psychotic or bipolar disorder; active substance abuse; corticosteroid use; and central nervous system medication use. Of 45 participants initially recruited, 11 did not complete the study (withdrew before being assigned to any condition due to time commitment, $n=6$; medication use that was exclusionary, $n=2$; discomfort with study procedures, $n=3$) leaving a final sample of 34 participants for analyses. Participants received \$100 remuneration for completing the study. The sample size was based on an a priori power calculation, assuming 0.05 two-tailed alpha and 80% power, based on a repeated measures ANOVA with the group x time interaction of primary interest (assuming a moderate effect size of $f=0.23$).

Study design and conditions

News exposures. We used a randomized cross-over design in which all participants were exposed to three news programs: Fox News Channel's *The Kelly File*, MSNBC's *The Rachel Maddow Show*, and PBS's *NewsHour*. The order of these news-watching exposures was randomized. We selected the cable news programs due to their relative popularity (the channels' second largest and largest primetime audience, respectively), opposite political viewpoints, and similarly politically skewed and opinion-heavy formats (Holcomb & Mitchell, 2013). PBS's *NewsHour*

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3 was chosen because it is politically centrist with similar content to cable news (ORC
4 International, 2015; Groseclose & Milyo, 2005). The gender of news anchors was the same
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6 across all programs. At each of the three news-watching visits, participants sat alone facing a
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8 large flat-panel TV screen, and watched 40 minutes of a program, fast-forwarding through
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10 commercials. Participants viewed programs within one working day of airing to maximize
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12 relevance and real-world validity, consistent with recommendations for research in media
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14 psychology (Reeves, Yeykelis, & Cummings, 2016). A rater was present to confirm that the
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16 participant was watching the show, to fast-forward through commercials, and to time and code
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18 each story in the program for general topic, story type, content/imagery, frame, anchor reporting
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20 style, alarmism, and political viewpoint (Wallack, Dorfman, Jernigan, & Themba, 1993). For
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22 more information on news coding procedure and news content analyses see **Supplementary**
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24 **Materials**. The rater also documented whether the participant had previously been exposed to
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26 the specific news program; this occurred only one time in the study.
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38 *Trier Social Stress Test (TSST)*. At the final visit, participants did not watch a news program but
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40 instead underwent the TSST (Kirschbaum, Pirke, & Hellhammer, 1993), a 15-minute test
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42 designed to induce moderate psychological and physiological stress. The test consists of a 5-
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44 minute speech preparation period, a 5-minute mock job interview, and a 5-minute arithmetic task
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46 all while both a video camera and a microphone simulate recording. The TSST exposure was
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48 conducted at the last visit to limit potential participant drop out due to its aversiveness. All visits
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50 were seven days apart.
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Neuropsychological battery. A brief, repeatable battery measuring memory and cognitive control was administered once at baseline and then immediately pre- and post- each news program or TSST exposure. Memory was assessed using immediate and delayed paragraph (Newcomer, Craft, Hershey, Askins, & Bardgett, 1994) and 16-word list recall tests (Storandt, Balota, Aschenbrenner, & Morris, 2014) with scores based on the total number of words accurately recalled; a different list and paragraph was given at each testing. A memory composite variable was created by computing means and standard deviations for each of the four memory measures separately (Immediate/Delayed Paragraph Recall and Immediate/Delayed List Recall). These z-scores were averaged for each participant to produce memory composite values for pre- and post-exposure time points. Cognitive control performance was assessed using the Consonant Vowel Odd Even (CVOE; Jackson, Balota, Duchek, & Head, 2012) computerized test, measuring reaction time and accuracy during a task switching trial. A cognitive control composite variable was created in a similar manner using the CVOE Switch Trial Accuracy and Global Cost Standardized Reaction Time.

Physiological stress measures. Saliva samples were collected from participants using Salivettes to assess cortisol. Saliva samples were taken at baseline (waking, 30 minutes after waking, at 2pm, and at bedtime) to measure basal circadian cortisol, and during each exposure visit: before the pre-exposure neuropsychological battery, immediately before the news exposure, mid-news exposure, post-exposure, and after the post-exposure neuropsychological battery. To control for circadian changes in cortisol, all study visits began between 12:30pm and 1pm so that post-exposure cortisol and neuropsychological testing would occur at approximately 2pm. cortisol was measured using enzyme-linked immunoabsorbent assay; intra- and inter-assay coefficients

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of variation (CV) were both low: 4.16% and 6.92%, respectively. For further assay details as well as baseline (pre-exposure) and full details of exposure-related cortisol values for the group, please refer to **Supplementary Material, Figures S1 and S2**. Blood pressure and heart rate were measured pre- and post-exposure using an arm or wrist cuff to similarly examine physiological response.

Self-report stress measures. We measured negative affect with an 8-item Negative Affect Scale consisting of three items (worried, tense, and relaxed which was reverse-coded) from the brief State Trait Anxiety Inventory-State (Spielberger, 1989) and five anxiety and stress-specific items (distressed, upset, scare, afraid, nervous) from the Positive and negative affect scale (Watson, Clark, & Tellegen, 1988). This Negative Affect Scale was administered before and after each exposure, with instructions to report affect in the present moment. As well, the Subjective Units of Distress Scale (SUDS; Wolpe, 1988), a self-report measure of current stress commonly conducted during exposure therapy, was assessed throughout the exposure visits alongside each saliva sample.

Statistical Analyses

To test the main hypothesis that changes between pre- and post-exposure scores for the memory and cognitive control composites are affected by the type of exposure (i.e., Condition), a repeated-measures Multivariate Analysis of Variance (MANOVA) model was constructed with Condition (i.e., Fox News, MSNBC, PBS, TSST), and Time (i.e., pre exposure, post exposure) as within participant factors, and cognitive control and memory as dependent variables. In this

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3 model, the main term of interest was the Condition by Time interaction. All significant
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5 interactions were further explored by rerunning the MANOVA model for each pair of exposures.
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8 In addition, all significant main effects and interactions were followed-up with univariate tests.
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10 In the event that the sphericity assumption was violated, the Greenhouse-Geisser correction was
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12 employed. Next, random effects models were used to explore the associations between cortisol
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14 reactivity and the memory and cognitive control composite variables. In these models, the
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16 composite variable at pre-exposure as well as cortisol at post-exposure were inserted as
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18 covariates while the composite variable at post-exposure was inserted as the dependent variable.
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22 SPSS V. 23 was employed for all statistical analyses.
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Results

Baseline information of the participants was: age (mean±SD)=70.1±5.4, gender equally distributed between male and female, race n=27 Caucasian, 7 African-American, Political party n=15 Democrat, 13 Republican, 5 independent (1 preferred not to answer), education 16.2±2.0 years. The participants watched an average of 0.5±0.8 hours of cable news daily prior to the study.

Changes in memory and cognitive control performance after exposure to new conditions and the Trier Social Stress Test (TSST).

Table 1 shows the change in memory and cognitive control composite scores from pre- to post-exposure in all four conditions, along with the univariate results generated by the original repeated-measures MANOVA. These changes did not differ between conditions as evident by a lack of a significant Condition by Pre- vs Post-Exposure interaction ($F[6,28] = 0.6, p = 0.7$; Wilks' Lambda=0.9); thus, our hypothesis was not supported. There was a significant main effect of Pre- vs. Post-Exposure ($F[2,32] = 121.7, p < 0.0001$; Wilks' Lambda = 0.1), indicating that participants' memory scores worsened while their cognitive control scores improved, regardless of condition (this finding explained in Discussion section). There was also a significant main effect of Condition ($F[6,28] = 9.2, p < 0.0001$; Wilks' Lambda=0.3) which likely reflected that the TSST condition was always done last (allowing for higher memory and cognitive control scores both pre and post exposure because of practice effects). Table S2 in Supplementary Materials contains the individual neuropsychological variables for memory (immediate and delayed paragraph and list recalls) and cognitive control (switch trial accuracy, global cost standardized reaction time).

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Changes in other physiological and psychological stress measures with the exposures.

Table 1 also shows changes from pre- to post- exposure for all four conditions in systolic blood pressure, diastolic blood pressure, negative affect (PANAS-Negative), distress (SUDS), and cortisol, along with the univariate results generated by the original repeated-measures MANOVA. We observed a significant Condition by Pre- vs. Post-Exposure interaction ($F[15,19] = 11.6, p < 0.0001$; Wilks' Lambda = 0.1): TSST induced increases in blood pressure, negative affects, and distress (SUDS), but the news conditions did not.

Because only the TSST had a cortisol-increasing effect, we used an analysis of covariance (ANCOVA) to examine post-TSST cortisol's associations with memory and cognitive control performance. In the TSST condition, increased post-TSST cortisol was associated with decreased post-TSST memory ($F[1,31]=5.3, p=0.03$) after controlling for pre-exposure memory.

Conversely, post-TSST cortisol is not associated with post-TSST cognitive control ($F[1,31]=0.0, p=0.9$) after controlling for pre-exposure cognitive control. In other words, while TSST did not influence memory or cognitive control in the aggregate sample, there were greater reductions in memory performance (but not cognitive control performance) among participants reached higher cortisol levels from the TSST.

Political discordance effect

We created a MANOVA model consisting of a 3-level agreement (i.e., politically concordant, discordant, or neutral) variable and a 2-level Pre- vs. Post-Exposure variable. Again, the

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3 dependent variables were the memory and cognitive control composites and only the three news
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5 conditions were included. There was no significant interaction between Agreement and Pre- vs.
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7 Post-Exposure ($F[4,24] = 1.5, p = 0.2$; Wilks' Lambda = 0.8). Thus, watching politically
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9 discordant news programs did not affect memory or cognitive control performance.
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13 There was also no significant main effect of Agreement ($F[4,24] = 0.3, p = 0.9$; Wilks' Lambda
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15 = 0.95), and there remained a significant main effect of Pre- vs. Post-Exposure ($F[2,26] = 68.7, p$
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17 < 0.0001 ; Wilks' Lambda = 0.16) in the overall model and in the univariate models (Memory:
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19 $F[1,27] = 122.4, p < 0.0001$; Cognitive Control: $F[1,27] = 16.3, p < 0.0001$). We also looked for
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21 a political discordance effect on the physiologic and psychological stress variables. In these
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23 models, there was no interaction between Agreement and Pre- vs. Post-Exposure for any
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25 variable, indicating that watching politically discordant news did not cause a physiological or
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27 psychological stress effect (data not shown).
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Discussion

Is watching cable news bad for your brain? We tested whether brief exposures to cable news, namely Fox News Channel and MSNBC, elicited a stress response and decrements in cognitive performance in older adults. News-watching, cable or non-cable, did not produce a stress response or affect cognitive function. We expected cable news-watching and the TSST, but not PBS, to negatively impact memory performance and cognitive control performance. Instead, memory performance decreased, and cognitive control performance increased, for all four exposure conditions, including the neutral PBS. The pre- to post- exposure decrease in memory performance may be attributable to interference effects of the two neuropsychological batteries (i.e., the words from the pre-exposure list and paragraph recall tests were interfering with new words from the post-exposure list and paragraph); another explanation is that the media content itself interfered with memory performance, regardless of condition. Conversely, the pre- to post-exposure increase in cognitive control performance likely reflects within-session practice effects.

As well, the news conditions did not increase any measures of stress, physiological or psychological, with the exception of a mild increase in subjective distress with FoxNews. This finding runs somewhat counter to prior studies examining the acute impacts of everyday news exposures. Johnston and Davey (1997) found that a brief exposure (14 minutes) to negatively-valenced news coverage increased anxiety and sad mood. Also, a study of a 30-minute local evening news clip led to increased restlessness, but (like our study) no effects on cortisol levels (Ragonesi & Antick, 2008).

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3 The TSST produced stress reactions as expected, both in terms of self-reported distress and
4 elevations in cortisol and blood pressure. This agrees with much prior literature with respect to
5 increasing cortisol (Foley & Kirschbaum, 2010), decreasing mood and in many studies negative
6 impacts on performance on delayed memory recall tasks (Kuhlmann, Piel, & Wolf, 2005). The
7 TSST did not induce specific decrements in memory or cognitive control performance overall,
8 but we did find that memory performance declined more among individuals with higher post-
9 TSST cortisol, so it appears that high-magnitude cortisol increases are needed to affect cognitive
10 function in healthy older adults (Kirschbaum et al., 1993).
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26 Three limitations should be noted. First, our negative control, PBS did not control for exposure
27 to negative news content, only for the specific features of cable news (ie., negative framing and
28 political skew). Thus, we cannot exclude the possibility that all news-watching is deleterious for
29 memory. Second, as mentioned above, practice effects and interference effects in the
30 neuropsychological tests may have interfered with the study's ability to capture exposure-
31 attributable memory and cognitive control changes. It would be advisable to increase test
32 variance to prevent this in future studies. Third, the study participants were healthy individuals,
33 and a clinically depressed or anxious sample might be more vulnerable to negative impacts of
34 news.
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52 In conclusion, a brief period of watching cable news does not cause significant stress or
53 deleterious effects on cognitive functioning in healthy older adults. These findings should not be
54 construed as indicating that TV-watching is benign for cognitive functioning. Time spent on
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3 sedentary TV-watching has opportunity costs: the time is not spent engaging in potentially
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5 healthy and pro-cognitive activities such as physical activity (Prakash, Voss, Erickson, &
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7 Kramer, 2015), meaningful cognitive and social activities, or cognitive training (Maseda, Millán-
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9 Calenti, Lorenzo-López, & Núñez-Naveira, 2013). Nevertheless, brief bouts of news-watching
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11 are not acutely stressful or otherwise unhealthy for older adults.
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Table 1: Changes in cognitive performance and in physiological and psychological stress measures after exposure to news conditions and the Trier Social Stress Test (TSST). Cognitive performance did not differ between the conditions, while physiological and psychological stress increased with exposure to the TSST relative to the news conditions.

| VARIABLE | Condition (numbers are mean [SD] pre-to-post exposure changes) | | | | Pre/Post x Condition analysis | Significant pairwise differences |
|--|---|-----------------|------------------|------------------|------------------------------------|---|
| | FOX | MSNBC | PBS | TSST | | |
| Memory Composite (Z-Score) | -0.77 (0.69) | -0.58 (0.72) | -0.78 (0.63) | -0.82 (0.66) | F[3,99] = 0.81, 0.49 | ----- |
| Cognitive Control Composite (Z-Score) | 0.22 (0.50) | 0.18 (0.54) | 0.26 (0.37) | 0.15 (0.46) | F[3,99] = 0.34, p = 0.80 | ----- |
| Cortisol, ng/ml | -0.66 (1.34) | -0.39 (0.95) | -0.84 (1.22) | 1.21 (1.84) | F[2.19, 72.26] = 15.69, p < 0.0001 | TSST>Fox, MSNBC, PBS (p's <0.001) |
| Systolic Pressure, mm Hg | -1.74 (12.38) | 0.12 (14.00) | -5.06 (10.99) | 12.29 (15.34) | F[3,99] = 11.24, p < 0.0001 | TSST>Fox, MSNBC, PBS (p's <0.001) |
| Diastolic Pressure, mm Hg | -0.18 (9.88) | 0.56 (13.45) | -0.94 (8.48) | 4.85 (11.03) | F[3,99] = 1.95, p = 0.13 | ----- |
| Negative Affect (scale range 0-32) | 0.74 (5.29) | 0.24 (2.86) | -0.44 (3.30) | 3.56 (3.66) | F[2.47, 81.36] = 10.25, p < 0.0001 | TSST>Fox, MSNBC, PBS (p's <0.01) |
| Subjective Units of Distress Scale (SUDS, scale range 0-100) | 5.47 (13.37) | 1.79 (9.45) | -0.06 (7.64) | 17.91 (15.14) | F[2.39, 78.93] = 17.19, p < 0.0001 | TSST>Fox, MSNBC, PBS (p's <0.001) Fox>PBS (p = 0.03) |

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For Peer Review

CABLE NEWS AND COGNITIVE FUNCTION

SUPPLEMENTARY MATERIALS

Is cable news bad for your brain? A study of stress and cognitive function in older adults

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News coding procedure

News was coded for: title, topic, general topic, story type, content/imagery, frame, anchor reporting style, alarmism, political viewpoint, and length. Percent agreement between raters averaged 94.3% across all categories. This paper reports data for the items relevant to our hypotheses and they are further described below.

Content/Imagery:

- The content/imagery of a story is the principal substance (as spoken words, videos, graphics, illustrations, data) treated in a news story i.e., small objective packages.
- Define content/ imagery in one of the following areas:
 - Negative:

The content discussed and images displayed throughout the story are not desirable or optimistic. For example, a story containing images or reports of disagreement, failure, protest, yelling, destruction, war, corruption, violence, downtrodden areas, tired, sick, or ill individuals, poor standards of living, or adversity would have negative content/imagery.
 - Positive:

The content discussed and images displayed throughout the story are good, affirmative, constructive, or universally desirable. For example, a story containing images or reports of success, strength, adaptation/adjustment, cohesiveness, happiness, well-being, and high standards of living would have positive content/imagery. Mention of “progress” does not necessarily mean that the story itself contains dominantly positive content/imagery.

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3 - Neutral:

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5 The content discussed and images displayed throughout the story are neither negative nor
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7 positive. The content/imagery should be rated as neutral, as well, if the content/imagery is
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9 equally negative and positive, which should be stated in the ratings justifications.
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15 *Frame*

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18 • A frame is a way of packaging and positioning an issue so that it conveys a certain meaning.
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20 A frame provides a basis upon which a story can be built or a central theme around which a
21
22 story can be arranged. The frame is what makes the story newsworthy in the mind of the
23
24 journalist. Consider the story as a whole.
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28 • The tone of a news story is the perspective or attitude that the anchor or producer adopts with
29
30 regards to a specific person, place or development. Tone can portray a variety of emotions
31
32 ranging from pessimistic, solemn, grave, and critical to optimistic, witty, upbeat, and
33
34 humorous. Tone helps the viewer ascertain the anchor or producer's feelings towards a
35
36 particular topic and this in turn influences the viewer's understanding of the news story.
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40 • Define access frame/tone in one of the following areas:
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42 - Negative:
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44 The story and the topic discussed are portrayed negatively. The reporter has a negative or
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46 pessimistic tone that may be solemn, grave, critical, or mocking. For example, a story
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48 reacting to an undesired bill's passing and a story degrading a political candidate would,
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50 most likely, both have a negative frame.
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54 - Positive:
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The story and the topic discussed are portrayed positively. The reporter has a positive or optimistic tone that may be witty, upbeat, or humorous. For example, a story celebrating a bill's passing and a story promoting a political candidate would, most likely, both have a positive frame.

- Neutral:

The story and the topic discussed are portrayed neutrally. The reporter has a neutral or matter-of-fact tone, often associated with announcements or updates given without commentary. For example, a story announcing a bill's passing and a story giving updates on an election would, most likely, both have a neutral frame. The frame should be rated as neutral, as well, if the tone is equally negative and positive, which should be stated in the ratings justifications.

Anchor Reporting Style

- The anchor reporting style is the degree of neutrality with which a story is presented by the reporter.
- Define the reporting style in one of the following areas:

- Commentary/Opinion:

The anchor presents the story from his or her point of view. Seemingly factual statements may be extrapolations. The anchor may tend to jump to conclusions or make conclusive statements without firm evidence or speculate wildly. As the anchor speaks, he or she might be considered to be "telling" or "casually informing" as opposed to "displaying" or "announcing" an impartial and formal report. The anchor's style may be seen as

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provocative, dynamic, convincing, enlivened, intense, or even forceful. More than 25% of the anchor's reporting includes opinionated statements.

- Factual Reporting:

The anchor presents the story as is, with almost flat-affect and no additional personal commentary. The anchor is considered to be "displaying", "announcing", or "presenting" an impartial and formal report. No more than 25% of the anchor's reporting includes opinionated statements.

Political Viewpoint

- Identify the one appropriate dominant political viewpoint.

- Democratic:

A story is from a democratic viewpoint if the story communicates democratic ideals or includes statements or images that portray Democrats or democratic policies positively or portray Republicans or republican policies negatively more than 25% of the time. Also consider whether statements or images are taken from democratic-biased sources or whether the story would have been considered newsworthy enough to be aired on a politically neutral network.

- Republican:

A story is from a republican viewpoint if the story communicates republican ideals or includes statements or images that portray Republicans or republican policies positively or portray Democrats or democratic policies negatively more than 25% of the time. Also consider whether statements or images are taken from republican-biased sources or whether the story would have been considered newsworthy enough to be aired on a politically neutral network.

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- Neutral:

A story is from a neutral political viewpoint if it does not favor or disfavor either political party. It portrays issues in an objective matter, it presents an equal amount of positive and negative democratic and republican points, or the story does not address any political topics.

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News content analyses

We identified variables for the content analysis and coded each news exposure during this period for the average time per episode during which for the following variables were present:

content/imagery (negative, positive, neutral), frame (negative, positive, neutral), anchor reporting style (commentary/opinion, factual reporting), and political viewpoint (Democratic, Republican, neutral). An example of a negative frame is a story on the Syrian refugee crisis that emphasizes the tragic nature and suffering; a neutral frame would present the crises in terms of numbers without emotional sway, while a positive frame would refer to the improving situation or the assistance of good samaritans. Full details of the news conditions appear in Table S1 (next page).

As Table S1 shows, the news conditions differed significantly in story type, content/imagery, frame, anchor reporting style, and political viewpoint. There were more interviews at Fox News while MSNBC News and PBS had more news packages (taped news reports). All three news conditions had more negative content/imagery than neutral and positive content/imagery. Fox News and MSNBC News had more negative framing while PBS had more neutral framing. In terms of the anchor reporting styles, Fox News reporting style was more factual while MSNBC News was more commentary/opinion. PBS' reporting style was completely factual. Finally, Fox News viewpoints were more republican, MSNBC News viewpoints were more democrat and PBS viewpoints were mostly neutral.

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Table S1: Analysis of the content of the news conditions

| | FOX | MSNBC | PBS |
|---|--------------------------|-------------------------|--------------------------|
| Story Type (% , SD) | | | |
| Interview | 66.1 (22.4) | 9.1 (10.4) | 39.4 (21.1) |
| Package | 17.5 (21.5) | 76.7 (18.6) | 42.3 (21.8) |
| SL/VO-Sound Delivers Content | 4.2 (3.5) | 7.8 (5.5) | 7.1 (2.3) |
| Staff Live or Voiceover | 12.2 (9.0) | 6.4 (12.3) | 11.2 (6.3) |
| Content/Imagery (% , SD) | | | |
| Negative | 92.2 (10.2) | 85.9 (20.0) | 75.0 (19.0) |
| Neutral | 7.2 (10.4) | 12.2 (18.8) | 16.9 (14.8) |
| Positive | 0.6 (1.9) | 1.9 (5.9) | 8.1 (11.8) |
| Frame (% , SD) | | | |
| Negative | 73.2 (20.0) | 77.7 (26.8) | 37.0 (21.7) |
| Neutral | 21.8 (19.2) | 15.0 (22.4) | 47.9 (26.4) |
| Positive | 5.0 (9.6) | 7.3 (13.6) | 15.1 (15.3) |
| Anchor Reporting Style (% , SD) | | | |
| Commentary/Opinion | 28.3 (24.7) | 57.0 (32.7) | 0 (0.0) |
| Factual Reporting | 71.7 (24.7) | 43.0 (32.7) | 100 (0.0) |
| Political Viewpoint (% , SD) | | | |
| Democrat | 0 (0.0) | 58.1 (32.0) | 1.2 (5.1) |
| Neutral | 40.6 (19.5) | 41.8 (32.1) | 98.3 (6.0) |
| Republican | 58.4 (19.8) | 0 (0.0) | 0.5 (3.2) |
| Ferguson Content (% , SD, Range) | | | |
| Episodes with Ferguson Content | 26.5 | 11.8 | 20.6 |
| Time in Episodes with Ferguson Content | 24.9 (24.9, [2.3, 85.8]) | 40.7 (43.0, [3.3, 100]) | 10.8 (12.1, [0.8, 28.4]) |

Legend: We discovered that story type ($\chi^2(6, N = 1,147) = 236.73, p \leq 0.0001$), content/imagery ($\chi^2(4, N = 1,147) = 72.11, p \leq 0.0001$), frame ($\chi^2(4, N = 1,147) = 204.0, p \leq 0.0001$), anchor reporting style ($\chi^2(2, N = 1,147) = 238.9, p \leq 0.0001$) and political viewpoint ($\chi^2(4, N = 1,147) = 731.0, p \leq 0.0001$) were significantly dependent on condition (i.e., Fox News vs. MSNBC vs. PBS).

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Table S2: Memory and cognitive control functioning at baseline and before and after each of the exposures.

| RAW SCORES | Baseline | FOX | | MSNBC | | PBS | | TSST | |
|---|-------------|--------------|--------------|-------------|--------------|-------------|--------------|-------------|--------------|
| | | PRE | POST | PRE | POST | PRE | POST | PRE | POST |
| Memory Composite (mean, SD) | ----- | 0.29 (0.68) | -0.48 (0.66) | 0.11 (0.75) | -0.47 (0.78) | 0.16 (0.67) | -0.62 (0.65) | 0.40 (0.68) | -0.42 (0.80) |
| Immediate Paragraph Recall ¹ | 24.6 (5.2) | 25.9 (4.9) | 21.4 (4.6) | 24.8 (6.2) | 22.2 (4.8) | 24.6 (5.1) | 21.0 (5.3) | 26.6 (4.5) | 21.7 (6.3) |
| Delayed Paragraph Recall | 23.1 (4.4) | 24.0 (2.9) | 18.5 (4.2) | 22.3 (5.5) | 16.9 (7.7) | 22.4 (4.7) | 17.3 (6.1) | 24.7 (4.4) | 19.6 (5.6) |
| Immediate List Recall ² | 31.4 (6.8) | 36.2 (10.1) | 32.9 (9.4) | 37.5 (8.7) | 34.0 (9.1) | 37.2 (8.4) | 32.5 (7.4) | 39.1 (9.5) | 32.5 (10.9) |
| Delayed List Recall ³ | 6.7 (2.9) | 9.0 (3.7) | 5.9 (3.6) | 8.0 (3.4) | 6.4 (3.7) | 8.9 (3.2) | 5.3 (3.5) | 8.6 (3.3) | 6.0 (3.8) |
| Cognitive Control Composite (mean, SD) | ----- | -0.21 (0.49) | 0.01 (0.54) | 0.08 (0.49) | 0.26 (0.51) | 0.04 (0.50) | 0.30 (0.47) | 0.35 (0.50) | 0.50 (0.46) |
| Switch Trial Accuracy ⁴ | 0.86 (0.20) | 0.92 (0.14) | 0.93 (0.13) | 0.95 (0.12) | 0.96 (0.08) | 0.96 (0.05) | 0.97 (0.05) | 0.97 (0.06) | 0.98 (0.04) |
| Global Cost Standardized Reaction Time ⁵ | 1.50 (0.65) | 1.68 (0.51) | 1.52 (0.46) | 1.52 (0.35) | 1.36 (0.52) | 1.60 (0.45) | 1.39 (0.45) | 1.32 (0.44) | 1.20 (0.40) |

Table 2: ¹Verbatim + Paraphrase; Range = 0-44. ²Total words recalled across 4 learning trials; Range = 0-64. ³Total words recalled in single delayed trial; Range = 0-16. ⁴Range = 0-1. Average for older adults = 0.9. ⁵Higher scores reflect increased cognitive effort required. Average for older adults = 1.2 (Huff et al., 2015).

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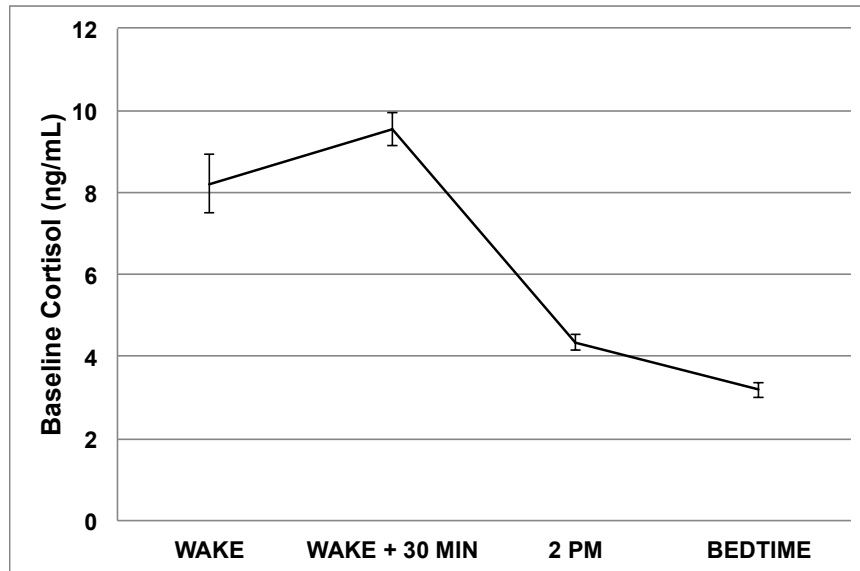
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Cortisol assay procedure

Prior to use, kits, reagents, and samples were brought to room temperature. Samples were centrifuged (3,000 g) for 10 minutes. Next, 120 μL of each sample, standards (0.0, 2.0, 5.0, 10.0, 20.0, 40.0, 80.0 ng/mL), and high and low cortisol control samples (to allow for inter-plate comparison) were aliquoted to a 96 well plate. Then, 100 μL from each well was then transferred to a 96 well ELISA plate pre-coated with mouse anti-cortisol antiserum, which was used for the remainder of the assay. Horseradish peroxidase-conjugated cortisol (200 μL) was added to each well on the ELISA plate and incubated on a mixer for 60 minutes. After emptying well contents, plates were washed 3 times with wash solution (400 $\mu\text{L}/\text{well}$) using an ELx50 plate washer (BioTek; Winooski, Vermont, USA). Residual wash solution was removed before 200 μL of tetramethylbenzidine (TMB) substrate solution was added to each well. The plate was then incubated on a mixer for 30 minutes. The reaction was stopped by adding 400 μL of 0.5M H_2SO_4 stop solution and then read at 450 nm using an Epoch microplate spectrophotometer (BioTek; Winooski, Vermont, USA) and calculated using Gen5 software (BioTek; Winooski, Vermont, USA). Cortisol concentrations (ng/mL) were calculated from the optical densities by the Gen5 software using 4-parameter logistic regression. During the assay procedure, the room temperature was between 21-22° C; humidity was between 62-65%. One sample read above the standard curve and had to be diluted and another sample only had sufficient volume to be run in singlet. Three samples had insufficient volume to be run and were excluded from analyses. Samples (n=19; 1.80%) with more than 15% coefficient of variation (CV) were re-assayed and the average of the 3 most similar estimates was used for analyses (all CVs < 15%).

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Figure S1: Average basal cortisol secretion across three days sampled at baseline (before first exposure visits).

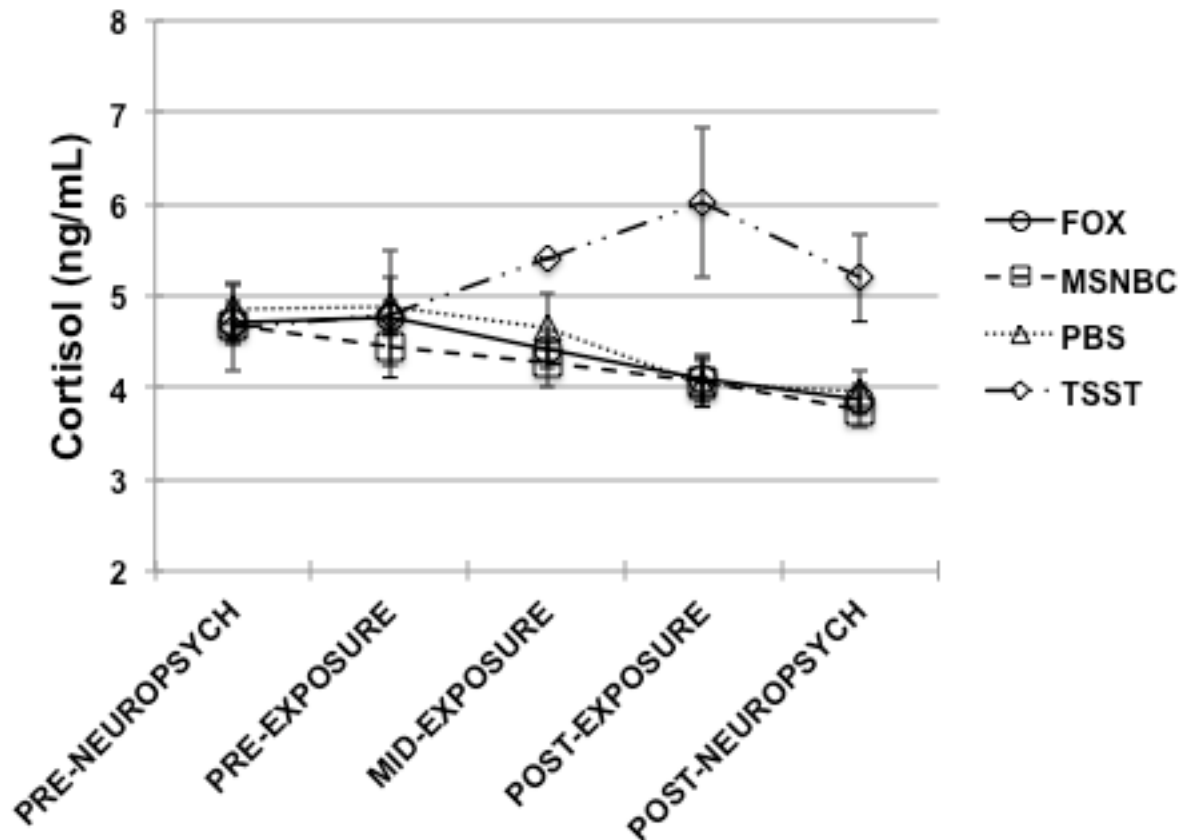


Legend: There was a significant main effect of time ($F[3,96] = 89.8, p < 0.0001$), including the following significant pairwise comparisons: Wake vs. Wake+30 ($p = 0.03$), Wake vs. 2 p.m. ($p < 0.0001$), Wake vs. Bedtime ($p < 0.0001$), Wake+30 vs. 2 p.m. ($p < 0.0001$), Wake+30 vs. Bedtime ($p < 0.0001$), and 2 p.m. vs. Bedtime ($p < 0.0001$).

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Figure S2: Cortisol values before, during, and after the news condition and TSST exposures. Cortisol increased with the TSST exposure, but not with any of the news exposures.



Legend: In a repeated measures mixed model with a heterogeneous first-order autoregressive covariance structure, there was a significant Condition by Pre- vs. Post-Exposure interaction ($F[3,91.8] = 3.3, p = 0.02$) with no significant main effects of condition ($F[3,99.5] = 1.4, p = 0.2$) or time ($F[1,97.7] = 1.2, p = 0.3$). The significant interaction term is further explained by the following significant pairwise comparisons: Fox vs. TSST ($p = 0.003$), MSNBC vs. TSST ($p = 0.006$) and PBS vs. TSST ($p = 0.004$).