

**Is television addiction a byproduct of fireside evolution?:
Physiological responses to small fires and multimedia**

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4 **Is television addiction a byproduct of fireside evolution?: Physiological responses to small**
5 **fires and multimedia**
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10 Running title: Fireside relaxation and television addiction
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27 Lay Summary

28 It seems to be taken for granted that hearth and campfires are relaxing, but is it the flickering
29 light, crackling sounds, or something else that has this effect? We test this question and suggest
30 the hypnotic effects of such fires are related to fascination with television and other multimedia.
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33 Contents

34 248-word abstract
35 3585-word main text
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58 1 Fireside relaxation and television addiction
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Abstract

Objectives: Fire has a well-documented role in human evolution, but impacts on cognition and mental health are underexplored. Hearth and campfires seem to have a hypnotic quality that may facilitate a relaxation response. Relaxation response is the parasympathetic restoration of calm after stress response and is a key physiologic element of hypnosis, meditation, and other altered states of consciousness. This hypnotic effect likely derives from the multisensory nature of fire. We suggest that the form features of small fires, specifically the flickering light and crackling sounds, heighten this hypnotic effect and that fascination with television and other multimedia is a related phenomenon because of these shared features.

Methodology: We used a randomized crossover experimental design to compare pre-posttest blood pressure change ($N = 54$) and skin conductance ($N = 27$) relative to four conditions: an audiovisual clip, digital fire with sound, fire sounds only, and a control. We tested for relaxation response via blood pressure using repeated measures ANOVA and via skin conductance using linear regression, including condition, absorption and other covariates.

Results: There were pre-posttest decreases in blood pressure across all conditions but significant condition-by-absorption interaction effects ($p = 0.004$ within-subjects and $p = 0.05$ between-subjects) associated with fire with sound and multimedia conditions relative to other conditions. Similarly, absorption but not condition was significantly and negatively associated with skin conductance.

Conclusions: The relaxation effect of small fires occurs through multisensory immersion, and the human preoccupation with multimedia may be a by-product of cognitive evolution at fireside.

Keywords: fire, relaxation response, television addiction, cyber-dependence, blood pressure, skin conductance

Introduction

Fire use is one of the most significant tools to have influenced human evolution, an influence that may persist through an inherited predilection for similar flickering light and sudden sound phenomena such as television. In previous research, we found that small fires, such as hearth and campfires, produce a relaxation response, even when the fire is a digital moving image [1]. Indeed, Euroamericans at least are so fascinated by fires that numerous consumer products are sold which simulate fires for the home to provide ambient effects without the energy-inefficiency of fireplaces. For instance, Yule log fires are a cultural fixture on cable networks or used for background effects during winter holiday celebrations (Fig 1). This contrast suggests that fires are similar in many ways to other flickering light and sound phenomena and that the human cross-cultural interest in television and multimedia may derive from human evolution around small evening hearth and campfires. Alternatively, fires may be fascinating because of developmental socialization—people grow up having hearth fires for winter holidays and campfires when camping and seek to recreate these prosocial environments in different ways [2].

FIGURE 1 HERE

By conservative estimates, hominid control of fire dates back at least 700,000 years [3], though one million year-old wood ash and bone found at Wonderwerk Cave in South Africa associated with stone tools and faunal remains almost certainly suggests hominid fire gathering and maintenance began earlier [4]. Despite evidence for the antiquity of habitual hominid use of fire, there is little indication of abilities to kindle or start fire until approximately 40,000 years ago [5]. Even if this estimate is overly conservative, as many suspect, there was likely a considerable period of time during which hominids were obliged to maintain existing fires

3 Fireside relaxation and television addiction

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3 through cooperation [6]. Some suggest the requirements of such cooperation may have provided
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5 selective pressure toward the development of language and extended memory, considered
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7 cornerstones of the apparent rapid appearance of widespread cultural practices during the Upper
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9 Paleolithic [7, 8; but see Cornélio, et al. 2016]. Recent evidence indicates that Neanderthals may
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11 have been able to control and ultimately start fires as well [10]. This shared behavior further
12
13 reinforces the importance and antiquity of fire use as an evolutionary influence on many aspects
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15 of human evolution and development.
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19 The control and production of fire played multiple roles in the evolutionary history of
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21 humans [2]. For example, the use of fire to cook allowed humans to increase their caloric intake
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23 in a decreased amount of time [11]. Control of fire increased the amount of day that could be
24
25 used, and nighttime interactions allowed for the extension and transmission of cultural
26
27 information [12, 13]. For instance, Wiessner [13] finds that 81% of conversations at night around
28
29 fires consist of storytelling, compared to the discussions of economics, complaints, and
30
31 criticisms that predominate during the day. There is greater openness among interlocutors during
32
33 nighttime discussions relative to daytime conversations [12]. Furthermore, days are spent
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35 preparing for ceremonies and rituals that invariably take place at night around fires [13, 14].
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40 The use and production of fire is a learned behavior that has been passed down through
41
42 generations [2]. Nevertheless, cultural success through use of fire may have occurred through
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44 dual inheritance of genes and culture [15]. Successfully harnessing fire could have produced
45
46 appreciable benefits for fitness among certain hominid groups over others. For instance, fire use
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48 may have been accidental and incidental but provided a strong advantage for groups using fire
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50 over those that were not. However, as global temperatures dropped with the onset of the Ice Age,
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52 a relative advantage may have turned into a necessity for those populations. Hominids with the
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55 56 57 58 4 Fireside relaxation and television addiction 59

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3 capacity to cooperate and maintain fire would have had an advantage over those without similar
4 abilities or fire access [16]. Baldwinian selection pressure suggests that a culturally learned
5 behavior or trait, characteristically arising from atypical environmental demands, influences the
6 evolution of a species through natural selection by creating an inherited trait that descendants
7 may or may not find useful in their own environment [7, 17].
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15 Fire may have also aided human ancestors in the development of prosocial behavior and
16 group cohesion by facilitating relaxation [16, 18, 19]. Some scholars suggest that human
17 language evolved from that synergy [7]. Focusing attention on campfires could have helped
18 ancestral humans to increase their working memory and capacity for extended attention [7]. Fire
19 relaxes people in a way that puts them at ease while also providing stimulation. There is
20 evidence that the multisensory influences of fire decreases blood pressure and increases hypnotic
21 absorption and social gregariousness [1]. Fire-induced relaxation may open individuals up to
22 interaction and conversation [13].
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33 The form features of fire resemble those of television and may help explain why both are
34 so compelling for humans. Media researchers find the cuts, edits, zooms, pans, and sudden
35 noises of television activate the orienting response, which continually compels human attention
36 [20]. Heart rates decrease 4-6 seconds after an orienting stimuli in media and, because of the
37 composition of commercials and other media formats, this orienting followed by decreases is
38 continual, like a switch being repeatedly toggled on and off [21]. Furthermore, the number of
39 changes from one camera angle to another in the same scene is associated with improved
40 memory, interpreted as a means of focusing attention [22]. Similarly, the internet and video
41 games afford a comparably compelling multimedia interface for human predilections in ways
42 that mirror fire. In addition to the audiovisual form features that fire and television seem to share,
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5 Fireside relaxation and television addiction

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3 the internet and video games engage people through interactivity [23]. Starting and maintaining
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5 fires provides similar interactivity that research suggests people enjoy [12].
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8 We used an experimental research design to assess the form features of fire and
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10 multimedia on relaxation response. Relaxation response is the parasympathetic restoration of
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12 calm after stress response and associated with an array of altered states of consciousness,
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14 including hypnotic absorption [24, 25]. We predicted that a relaxation response would occur in
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16 conditions that maximized the multisensory immersive dynamic of a naturalistic small hearth or
17
18 campfire at night and in multimedia conditions relative to those that disaggregated the sensory
19
20 features of fire.
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23 **Methodology**

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26 A trained team of researchers recruited participants from a university community to test
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28 the hypotheses that (1) relaxation response to fire is due to multisensory stimulation and (2)
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30 watching a neutral audiovisual has a similar relaxation effect due to form features shared
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32 between multimedia and fire. A randomized crossover approach was used to test participants in
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34 four conditions (fire with sound, sound alone, television, and control) for 15 minutes each based
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36 on protocol used in previous research [1].
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39 *Participants*

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42 Participants were recruited through classroom solicitation at the University of Alabama.
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44 No incentives were provided by researchers, but some professors rewarded students with extra
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46 credit. Interested students were sent a link to complete the online survey portion and, upon
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48 completion, were scheduled for the lab portion. One hundred fifty-three students started the
49
50 online surveys. Thirty-nine women (72%) and 15 men (28%) completed both portions
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52 completely and were included in analysis (age 18-40, mean \pm SD = 20.5 \pm 3.98). This
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58 6 Fireside relaxation and television addiction

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3 completion rate (35%) suggests some motivational bias. There were no significant demographic
4 differences between those who began surveys and those who completed all study protocols. The
5 majority self-reported as White (87%), single (67%), undergraduate freshmen or sophomore
6 (65%) with relatively high grade point averages (mean \pm SD = 3.51 \pm 0.59 out of possible 4.0).
7
8 All participants provided informed consent.
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10 11 12 13 14 15 *Procedures*

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17 Interested students were emailed a link to complete an anonymous survey, and those who
18 completed the survey were scheduled for the experimental portion of the study. Upon arrival at
19 the lab, participants completed another brief survey that queried caffeine and medication
20 consumption and emotional state for that day. Participants sat in a comfortable, padded desk
21 chair with armrests in front of a 19" computer monitor and wore noise-cancelling headphones.
22 The ~10 ft² room was darkened and maintained at an average temperature of 72°F (min-max =
23 67-76°). An automated blood pressure cuff was placed on the upper right arm of the participant.
24 Each participant was tested individually using a randomized crossover design across the
25 following four 15-minute conditions:
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- 37 (1) a small DVD hearth or campfire with sound (*Ambient Fire*, Jumby Bay Studios, 2006),
- 38 (2) the sound of the same fire with video turned off,
- 39 (3) a screenshot of the same fire turned upside down (see Lynn [2014] for examples), and
- 40 (4) an audiovisual clip from one of three videos (*Anthropologists at Work: Careers Making a*
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Difference, American Anthropological Association, 1993; *Faces of Culture*, Coast
Community College District, 1983; or *Discovering Alabama: Moundville Native*
American Festival, University of Alabama, 1999).

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3 Blood pressure was measured immediately before (pretest) and after (posttest) each condition.
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5 Skin conductance was measured among a subsample of 27 participants by placing electrodes on
6
7 the palmar side of the first and third digit of the right hand between the 2nd and 3rd knuckles of
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9 the with wire leads oriented distally. Upon completing the experimental portion, participants
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11 were asked which condition they found most and least relaxing.
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15 All protocols were approved by the University of Alabama Institutional Review Board.
16

17 ***Materials***

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19 Participants completed surveys including demographic questions and measures of
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21 hypnotic absorption, state-trait anxiety, sociality, and previous fire and screen exposure.
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23 Demographic questions queried age, gender (female, male, other), ethnicity (White, African-
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25 American, Hispanic, American Indian/Native American, Prefer Not to Answer), occupation,
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27 education level, major, current grade point average, relationship status (single, in a relationship,
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29 married, separated/divorced/widowed), hours physically active per week (none, 1-2, 3-4, 5+),
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31 worry about getting sick (no, sometimes, yes), religious denomination, weekly religious
32
33 attendance, prayer frequency (never, during formal ceremonies, when in need, daily), and social
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35 status [26].
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40 We measured predisposition for hypnotic absorption using the modified Tellegen
41
42 Absorption Scale (MODTAS) [27]. The MODTAS is a 34-item questionnaire that uses a 4-point
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44 Likert scale (0 = almost never, 3 = almost always) and positively correlates with hypnotizability.
45
46 Cronbach's alpha for this study was 0.89, indicating high reliability. We controlled for state and
47
48 trait anxiety using the State-Trait Anxiety scale [28] because anxiety could make relaxing more
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50 difficult for some participants. This 40-item scale measures the degree to which a person is
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52 currently (e.g. "I feel indecisive") or always (e.g. "I am indecisive") anxious (Cronbach alpha =
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58 8 Fireside relaxation and television addiction
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3 0.96). We measured prosociality using 43 items from the Myer-Briggs Personality Inventory and
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5 Altruistic Personality Scale [29, 30] following our previous fireside relaxation study [1]
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7 (Cronbach alpha = 0.86). Since previous fireside relaxation research indicated a significant
8
9 influence of a prosocial disposition [1], we drilled down on sociality by asking about social
10
11 support, the number of hours each week spent socializing, how many regular friends participants
12
13 socialize with each week, and the quality of participant social life. We also controlled for
14
15 previous multimedia and fire exposure by using the Fire Fascination Scale (FFS) [12] and asking
16
17 about the role of TV, computers, fireplaces, camping, and smartphones in leisure time. The FFS
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19 is reliable 10-item scale (Cronbach's alpha = 0.75) that measures the degree to which people are
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21 attracted to small fires (e.g. "Sitting close to a small fire makes me happy").
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26 To assess relaxation effects of experimental conditions, systolic and diastolic blood
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28 pressure were measured in millimeters of mercury (mmHG) before and after each condition
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30 using an Omron HEM-711 automatic blood pressure monitor (Omron Healthcare, Inc.,
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32 Bannockburn, IL), which is equivalent to mercury sphygmomanometer in reliability [31].
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34 Furthermore, we measured skin conductance during conditions for a subsample of participants
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36 using eSense Skin Response sensors (Mindfield Biosystems Ltd., Gronau, Germany), which
37
38 reliably detect subtle changes in stress in experimental conditions [32]. These sensors send a low
39
40 voltage of electricity between electrodes and measure the impedance to the current. Conductance
41
42 increases with moisture, such as that produced by sweating during physiological arousal [33].
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44 Skin conductance was sampled 10 times per second in μ Siemens, and measurements were
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46 averaged for each condition. Based on our hypotheses, we predicted pre-posttest decreases in
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48 blood pressure and lower skin conductance for the fire with sound and multimedia conditions
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50 relative to the sound only or control conditions.
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Analysis

Following Simmons et al. [34], we calculated descriptive statistics only for those measures used in analysis. We compared pre-posttest blood pressures measures using paired samples *t*-tests; tested all variables for normalcy, homoscedacity and multicollinearity; and standardized non-normally distributed variables. To test study hypotheses, we developed a repeated measures general linear model (GLM) for pre-posttest change in systolic and diastolic blood pressure. We used experimental condition and hypnotic absorption (MODTAS) as between-subjects factors and used a best-fit approach to select model covariates by examining *p*-values and effect sizes. We tested the impact of the two small fire types and three media clips on systolic and diastolic change using one-way analysis of variance and found no significant differences between fires or among clips so did not include these variables in full models. We regressed experimental condition on mean skin conductance and included significant predictors as covariates in the model. We used SPSS Version 25 (IBM Corp., Armonk, NY) for all analysis and considered statistics significant if $p < 0.05$.

Results

Most participants in the study self-reported as being low social status (63%), with 32% reporting as middle and 6% as high status. We queried number of caffeinated beverages and tobacco and licit and illicit drug use because of potential influences on anxiety or ability to relax. Very few respondents reported having more than one caffeinated beverage ($n = 9$), though 15 chose not to answer. Most participants reported no OTC or prescribed medication (63%), while 17% were taking stimulant or anti-depressant medication. Only five participants (9%) were tobacco users, and no participants reported using illicit drugs.

10 Fireside relaxation and television addiction

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3 When asked about the number of people available to provide social support during times
4 of need, 95% of respondents reported having at least two people they could count on; 78%
5 reported having at least three close friends. Seventy-six percent of respondents reported being
6 satisfied or very satisfied with their social lives. Forty-three percent of the participants reported
7 that they socialize every day, whereas 35% reported socializing no more than once or twice a
8 week. Participants were evenly split between those whose families were TV-centric (48%) and
9 those who weren't (52%), as was use of family fireplace (50% each). When asked about leisure
10 hours per day spent watching television, computer screens, or cell phones screens, the majority
11 of participants indicated spending 1-2 hours each day on each of the three types of screens. Mean
12 \pm SD for trait anxiety (41.1 ± 10.12) was significantly higher than state anxiety (37.4 ± 9.57 , $p =$
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TABLE 1 HERE

We compared pre-posttest change in systolic and diastolic blood pressure using paired samples t -tests (Table 1). Only the change in the control condition for systolic blood pressure was statistically significant, though fire with sound and multimedia condition changes for systolic approached significance.

TABLE 2 HERE

We tested the hypothesis that the relaxation response effect of small fires is due to the multisensory aspects of fire by disaggregating the sensory components and comparing pre-posttest change in systolic and diastolic blood pressure using repeated measures ANOVA. Systolic and diastolic pre- and posttest blood pressure were within-subjects factors; condition and hypnotic absorption were between-subjects factors; and age, gender, fire fascination,

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3 television exposure, number of friends, social time, social satisfaction, state and trait anxiety, and
4
5 trial sequence were covariates (Table 2). Age, trial sequence, fire fascination, television
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7 exposure, state anxiety, social satisfaction, social time, number of friends, and absorption were
8
9 significant predictors of pre-posttest change in systolic blood pressure. Only condition-by-
10
11 absorption was a significant predictor of pre-posttest change in diastolic blood pressure, and the
12
13 effect size for this interaction was large.
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17 To explore the impact of each condition, we graphed the repeated measures GLM models
18
19 for systolic and diastolic blood pressure, which included model covariates. As Fig 2 illustrates,
20
21 there was a slightly larger decrease in blood pressure for the fire with sound and multimedia
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23 conditions relative to control and sounds-alone conditions, a difference more apparent in the
24
25 diastolic pre-posttest changes (Fig 2b).
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29 FIGURE 2 HERE

30
31 When asked which conditions they found most and least relaxing, 16 (30%) indicated
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33 they preferred the fire with sound, four (7%) preferred the sound only, and one (2%) preferred
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35 the control condition. No one preferred the multimedia condition, though 33 (61%) did not
36
37 respond to this item. Only five participants responded to the query about the least relaxing
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39 condition; among those, three (6%) found the control least relaxing and two (4%) indicated the
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41 multimedia condition.
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45 TABLE 3 HERE

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47 Finally, we examined skin conductance among a subsample using a best-fit linear
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49 regression model (Table 3). We started with significant predictors from the blood pressure
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51 models and retained the experimental condition variable and significant predictors. The final
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53 model was significant ($F_{5,83} = 7.284, p < 0.001, \text{adjusted } r^2 = 0.26$) and included condition, age,
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59 12 Fireside relaxation and television addiction

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3 trial sequence, absorption, and state anxiety. Valence of predictors affirms the importance of
4 absorption in relaxation response, as higher predispositions for absorption and lower state
5 anxiety predict lower arousal. Experimental condition was not a significant predictor, which is
6 consistent with the relative similarity of pre-posttest decrease in blood pressure observed for all
7 conditions apparent in Table 1.
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14 **Discussion**

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17 We tested the hypotheses that hearth and campfires are relaxing because of their
18 multisensory qualities rather than any one sensory element and that the human tendency toward
19 finding multimedia engaging may be a by-product of cognitive evolution at fireside. We found
20 that all conditions in the current study resulted in decreases in blood pressure, but there was a
21 significant effect of condition-by-absorption on pre-posttest change in diastolic blood pressure
22 and in the between-subjects model. These findings support McClenon's [16, 18, 19] ritual
23 healing hypothesis, which suggests that hominid ancestors with stronger predispositions for
24 hypnotic absorption may have had an advantage in self-soothing and collective health outcomes
25 through fireside relaxation. Furthermore, the contrasts when covariates and condition-by-
26 absorption interaction effects were included in the GLM suggest more pronounced changes for
27 the fire with sound and multimedia conditions, especially in diastolic blood pressure (Fig 2).
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13 Fireside relaxation and television addiction

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3 The relaxation effect of the multimedia condition was not as strong as that of the fire-
4 with-sound condition, but it was a significant effect and supports our suggestion that the human
5 fascination with multimedia may be a by-product of fireside relaxation. The relationship suggests
6 that television addiction and cyber-dependence may be the result of evolutionary mismatch.
7 Evolutionary mismatch theory suggests that predispositions for essential but rare resources (e.g.
8 sugar or salt) are maladaptive in modern environments wherein these resources are cheap and
9 easy to access [36]. This ready access of previously rare but important resources precipitates
10 overindulgence, health problems, and addiction, as has been found true of alcohol, drugs, and
11 gambling, among other modern indulgences [37-41].

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24 It is not simply that fires and multimedia are relaxing that leads us to suggest a link with
25 problematical mismatch behavior but that they trigger a predisposition for hypnotic absorption.
26 Studies of online gaming addiction suggest a similar role for immersive or absorptive elements
27 [42]. This predisposition for absorption is not unique in humans, as studies of tonic immobility in
28 fowl and other animals indicate [43], but may have been exapted or amplified through
29 evolutionary processes in hominids through dual-inheritance of genetic mechanisms for
30 absorption and cultural control of small fires [11, 15, 16]. According to Lang and colleagues, the
31 loud noises and fast-moving objects produced by the form features of multimedia, such as
32 television, activate human appetitive systems that influence feelings, attention, memory, and
33 behavior. Interaction with such stimuli may be positively rewarded through dopamine
34 production, motivating additional interaction, and endorphin production, producing the quiescent
35 relaxation associated with toggling the startle reflex [44].

36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 *Limitations*

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3 Mean decreases in blood pressure from pre-posttest occurred in all four experimental
4 conditions so interpretations should be weighed cautiously. Furthermore, despite controlling for
5 cultural socialization around fires and media, the sample in the current study was a WEIRD
6 (White, Educated, Industrialized, Rich, and Democratic) population, which necessarily limits our
7 ability to generalize [45]. Cross-cultural research demonstrates that local conditions have large
8 impacts on individual biology and that physiological responses vary from country to country and
9 even region to region [46, 47]. Future research should test this model both in naturalistic
10 conditions and among non-WEIRD populations.
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21 **Conclusions**

22 We conducted a follow-up study of fireside relaxation response using an experimental
23 design in a non-naturalistic setting. Our study was limited in testing the hypothesis that
24 multisensory small fires influence relaxation response because we conducted the study during the
25 day in a lab using simulated fires. Nevertheless, we found a statistically significant interaction
26 between the experimental conditions and hypnotic absorption, which suggests a predisposition
27 for hypnotic absorption can amplify relaxation effects. Slight differences in blood pressure in
28 regression modeling suggests a stronger relaxation effect for multisensory fire and multimedia
29 conditions. These data support the hypotheses that fireside relaxation may have played an
30 important role in cognitive evolution by providing a context for prosocial self-soothing.
31 Furthermore, the features of fires that are hypnotically absorbing are similar to those of
32 multimedia, which may help explain why multimedia are universally compelling. Future
33 research should explore this evolutionary mismatch model in naturalistic settings.
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51 **Funding and Conflicts of Interest**

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Table 1 Paired *t*-test comparisons of pretest and posttest systolic and diastolic blood pressure (mean \pm SD) for each condition and skin conductance (mean \pm SD) for each condition

	Systolic			Diastolic			Skin conductance
	Pretest	Posttest	<i>p</i>	Pretest	Posttest	<i>p</i>	
Fire with sound	121.06 (15.1)	117.62 (11.7)	0.08	75.50 (7.9)	74.64 (7.9)	0.34	0.96 (0.5)
Sound only	118.65 (11.5)	117.92 (12.8)	0.57	76.18 (9.6)	74.63 (7.2)	0.19	0.97 (0.5)
Multimedia	120.21 (12.5)	116.89 (13.7)	0.07	75.00 (8.9)	74.71 (9.9)	0.80	1.04 (0.5)
Control	120.68 (16.2)	117.12 (12.6)	0.03	74.30 (9.2)	75.88 (10.4)	0.28	0.97 (0.5)

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Table 2 Two-way repeated-measures ANOVA with systolic and diastolic blood pressure as within-subjects factors and condition and absorption as between-subjects factors (N = 54)

<i>Factor</i>	Within-subjects				Between-subjects	
	Systolic		Diastolic		<i>p</i>	Partial eta ²
	<i>p</i>	Partial eta ²	<i>p</i>	Partial eta ²		
	<i>0.75</i>	<i>0.003</i>	<i>0.24</i>	<i>0.04</i>		
Age	< 0.001	0.41	0.24	0.04	0.01	0.21
Gender	< 0.001	0.54	0.28	0.04	0.003	0.23
Trial sequence	0.01	0.19	0.80	0.002	< 0.001	0.48
Fire fascination	< 0.001	0.41	0.79	0.002	0.01	0.20
TV exposure	< 0.001	0.34	0.81	0.002	0.001	0.30
State anxiety	< 0.001	0.48	0.97	< 0.001	0.97	< .001
Trait anxiety	0.87	0.001	0.96	< 0.001	0.73	0.004
Social satisfaction	< 0.001	0.37	0.39	0.02	< 0.001	0.31
Social time	< 0.001	0.38	0.61	0.01	< 0.001	0.32
Number of friends	< 0.001	0.441	0.61	0.01	< 0.001	0.41
Experimental condition	0.42	0.08	0.18	0.13	0.74	0.04
Hypnotic absorption	< 0.001	0.86	0.63	0.43	< 0.001	0.93
Condition-x-absorption	0.20	0.74	0.004	0.85	0.05	0.80
<i>Intercept</i>					<i>0.002</i>	<i>0.25</i>

Table 3 Linear regression on mean skin conductance for subsample (N = 27)

	β	p
(Constant)		< 0.001
Age	-0.46	< 0.001
Experimental condition	-0.01	0.95
Trial sequence	-0.40	0.001
Absorption	-0.63	< 0.001
State anxiety	0.33	0.002

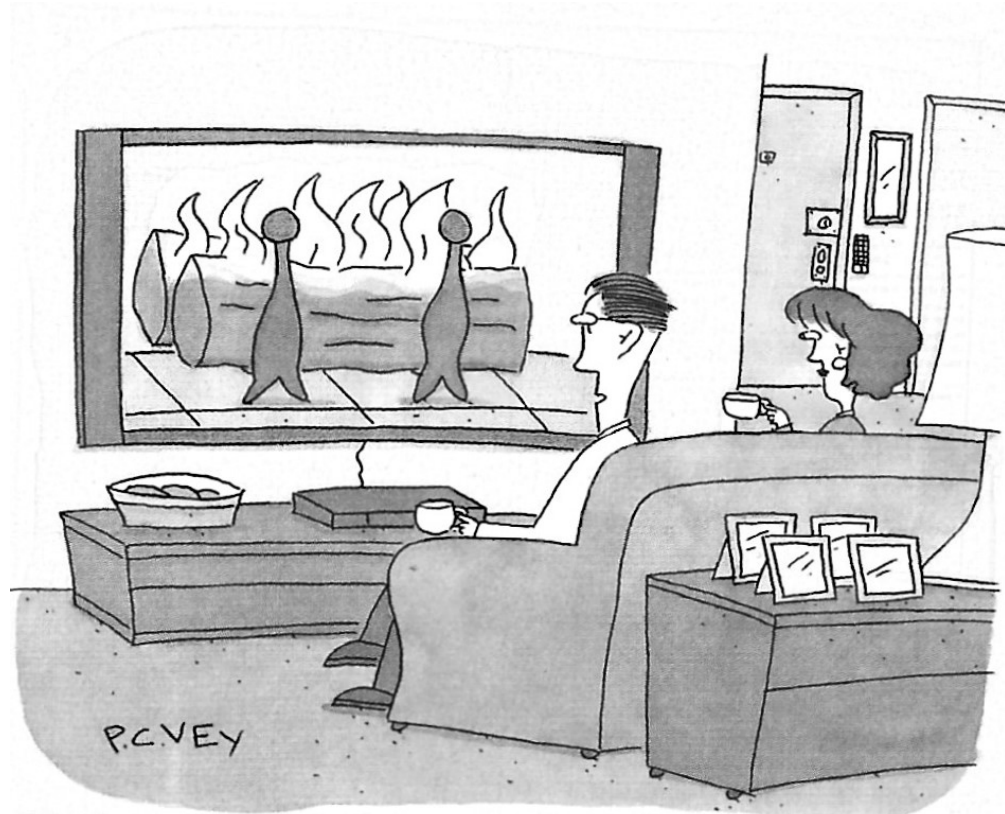
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FIGURES

Fig 1 A cartoon that invokes the irony of replacing a Yule log in the fireplace with a television version (Credit: P.C. Vey, *The New Yorker*)

Fig 2 Estimated marginal means of pre- and posttest systolic (Fig 2a) and diastolic (Fig 2b) blood pressure by condition, including model covariates age (20.6), gender (1.27), trial sequence (9.3), TV exposure (1.9), state anxiety (37.5), trait anxiety (41.3), social satisfaction (4.0), social time (3.1), and number of close friends (3.1).

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"You haven't enjoyed the Yule log till you've enjoyed it in high def."

Fig 1 A cartoon that invokes the irony of replacing a Yule log in the fireplace with a television version
(Credit: P.C. Vey, The New Yorker)

249x218mm (96 x 96 DPI)

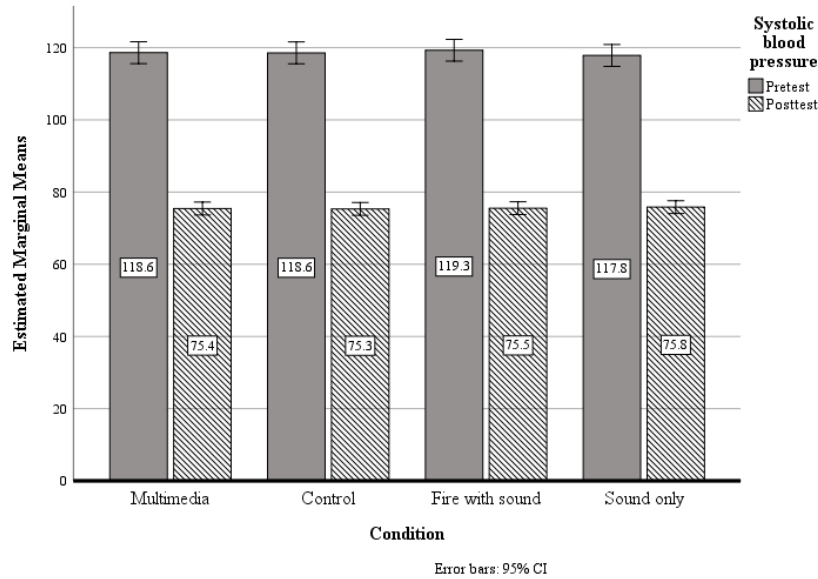


Fig 2 Estimated marginal means of pre- and posttest systolic (Fig 2a) and diastolic (Fig 2b) blood pressure by condition, including model covariates age (20.6), gender (1.27), trial sequence (9.3), TV exposure (1.9), state anxiety (37.5), trait anxiety (41.3), social satisfaction (4.0), social time (3.1), and number of close friends (3.1).

300x176mm (72 x 72 DPI)

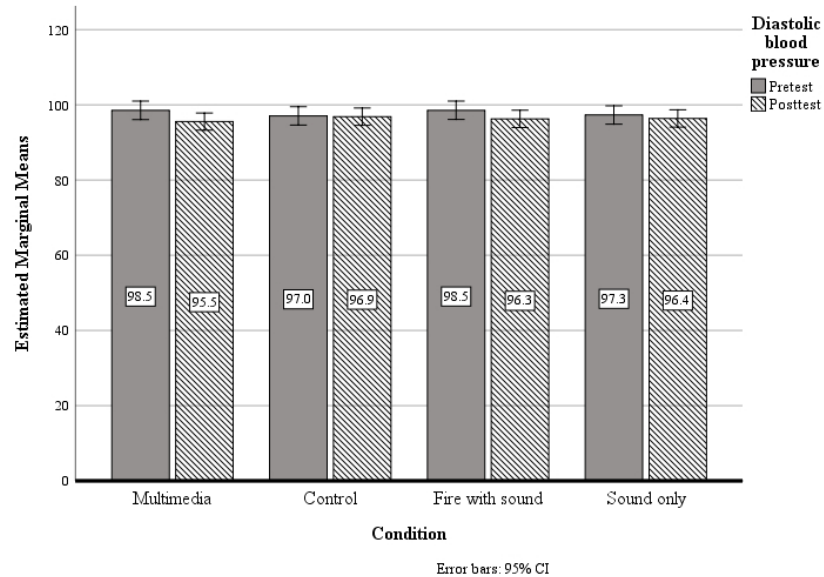


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300x176mm (72 x 72 DPI)