

# Self-selected leisure promotes ambulatory blood pressure dipping: A within-person randomized field experiment

<sup>1</sup>Lydia Chechowitz, BA, <sup>1</sup>Marcellus M. Merritt, Ph.D., <sup>2</sup>Matthew J. Zawadzki, Ph.D., <sup>1</sup>Michelle R. Di Paolo, Ph.D.

1. Psychology Department, University of Wisconsin Milwaukee
2. Psychological Sciences, University of California, Merced

## OBJECTIVES

- The present study determined whether there is more blood pressure (BP) dipping during a day that participants complete a Self-Selected Leisure Activity (SSLA), versus no SSLA.

## INTRODUCTION

### Ambulatory Blood Pressure

#### Background

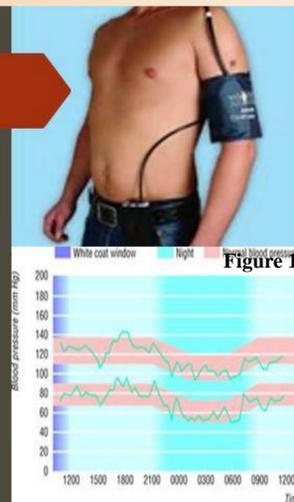
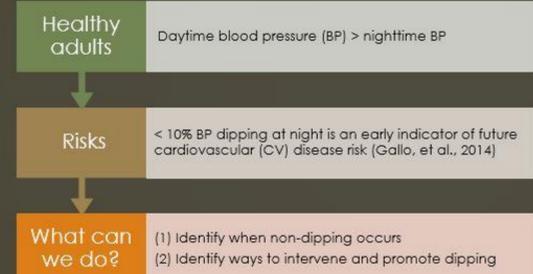
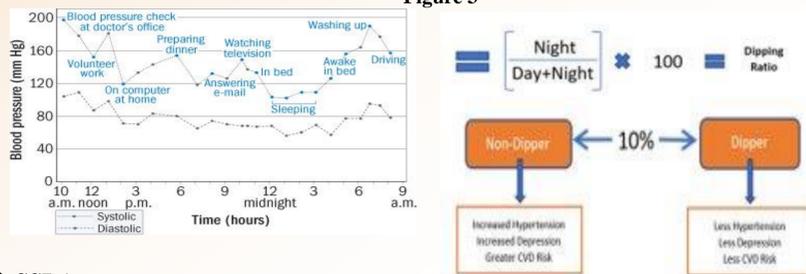


Figure 2

- Among healthy adults, BP typically decreases when one goes to sleep at night, this is otherwise known as dipping (refer to Figures 1-3 for hypothetical cases).
- When this dipping does not occur, it is an early indicator of one being at risk for cardiovascular disease and early mortality (see Figure 3 for dipping computation).

Figure 3



### SSLAs

- SSLAs are self-selected leisure activities, or non-work related activities that one does with the intent of relaxation and/or mental escape (1, 2)
- These activities are linked with better sleep quality and less depressive episodes (3-5). Overall, those who engage in these activities tend to have lower daily BP (2).
- Psychological stress may be one reason why people do not dip as much, and we want to think about non-traditional ways to promote dipping that reduce stress.
- Traditional interventions such as mindfulness meditation have good short-term efficacy, yet they have dubious sustainability. So, to get optimal adherence researchers may use more non-traditional methods such as SSLAs.
- Though, it is unclear if SSLAs affect BP levels, and there is reason to speculate that dipping may be more significant on days these activities are completed.
- Consequently, this study proposes an initial test of leisure's health effects on BP dipping among young adults using a within-person field experiment.

- Hypothesis:** On a day that one performs an SSLA, they will show more nighttime dipping than on a day where the SSLA is not completed.

## METHOD

### Sample

- 362 college students were recruited through extra credit opportunities and completed a short online Qualtrics screening.
- 144 people total were eligible with 86 of these persons opting not to participate in the lab. The remaining 42 were enrolled in the study.
- Exclusions included 4 participants who showed BP readings in the hypertensive range or a reported history of cardiovascular disease.
- The final sample was 38 adults, aged 18 to 31 years, 78.9% female, 68.4% white, and with an average BMI of 26.54.

### Measures

- Online survey – Upon IRB waiver, participants filled out baseline psychological measures, an SSLA questionnaire, and basic demographic information.
- SSLA operational definition
  - A 10-minute semi-structured interview was conducted to assess a wide range of participants' SSLAs and choose one to be done in the field.
  - One was chosen based on frequency and duration in the last month, as well as the preference and ease of that activity.
  - Additionally, all activities must be deemed ethically feasible.
- Ambulatory blood pressure measurement
  - An Ambulo 2400 ABP (Mortara Instrument, Inc., Milwaukee, WI) was used to measure ambulatory systolic and diastolic BP (refer to Figure 1).
  - The monitor collected readings every 30 minutes during the day and hourly when asleep (refer to Figure 3). Average systolic and diastolic BP scores were run for day- and night-time hours.
  - To be included, each participant must have had at least 5 daytime and 3 nighttime readings over each recording session.

### Procedure

- Participants visited a psychophysiology lab two times about a week apart. During the first visit, they gave informed consent then completed the SSLA interview and next, two seated resting BP measures were taken to validate non-hypertensive status.
- Both visits had participants fitted with a validated Ambulo 2400 monitor (Figure 1) to measure BP over the next 24 hours. A sample reading was taken to acquaint the participants with the protocol.
- Subjects were then told to go about their days as they normally would, including sleeping with the monitor on, but avoiding water-based activities, such as showering or swimming, and physically strenuous activities, such as weightlifting and aerobics.
- SSLA and control days were counterbalanced across participants (see Figure 4).
  - On their SSLA day, they were instructed to perform the activity at a time of their choice before going to bed.
  - On their control day, they were told to go about it normally, but to avoid engaging in any SSLA activity.

Figure 4



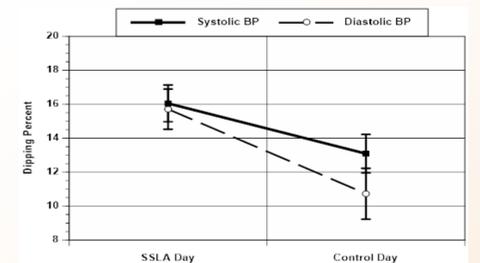
## RESULTS

- Watching TV and online programming were the most reported leisure activities, followed by listening to music and reading (see Table 1).
- Paired samples t-tests were run to compare BP dipping on an SSLA day to the control day.

Table 1. Description and prevalence of SSLAs performed by participants.

SSLA	Number of subjects	Percent of sample
Watch TV or Online Program	17	44.74
Listening to music	5	13.16
Reading	4	10.50
Play video games	3	7.89
Nap or sleep	3	7.89
Sing or play instrument	2	5.26
Yoga	1	2.63
Socialize	1	2.63
Other (i.e., to-do list, be alone)	1	2.63

Figure 5. Ambulatory blood pressure dipping (in percentage) on SSLA day versus control day.



Note. BP = Blood Pressure; SSLA = Self-Selected Leisure Activity. The error bars represent pooled standard errors for each mean.

- Two additional within-subject ANOVAs with systolic BP and diastolic BP as separate outcomes were run. A significant interaction was discovered for both systolic BP  $F(1, 37) = 5.488, p = .025, \eta^2 = .129$ , and diastolic BP,  $F(1, 37) = 11.99, p = .001, \eta^2 = .245$ . (see Figure 5)
- Systolic BP was higher during the day on SSLA versus control days ( $M = 124.31, SD = 11.68$  vs.  $M = 120.98, SD = 9.73$ ), but the opposite occurred at nighttime with systolic BP lower on SSLA versus control days ( $M = 104.20, SD = 12.71$  vs.  $M = 105.10, SD = 13.11$ ).
- The results were similar with diastolic BP higher during the daytime on SSLA days than on control days ( $M = 77.93, SD = 5.98$  vs.  $M = 74.28, SD = 5.62$ ), but, again this switched at nighttime with diastolic BP lower on SSLA days than control days ( $M = 65.48, SD = 7.05$  vs.  $M = 66.17, SD = 7.35$ ).

## DISCUSSION

- This study found that there was more BP dipping on a day where participants completed their SSLA than on a day they did not.
- Ambulatory BP levels were higher during the SSLA (versus the control) day but lower at night, thus resulting in greater levels of dipping on the SSLA day.
- Although speculative, this pattern of results suggest that participants may be more active and engaged in their tasks on SSLA days, which at the time may cause higher arousal and thus higher BP but then ease restoration effects of sleep at night.
- Additionally, participants may have been able to engage in more active coping in the face of stressors and other hassles during SSLA days by being able to choose and engage in a preferred activity and restricted from this coping on control days.
- Also, SSLAs might give participants a greater sense of daily control, which could allow the observed pattern in dipping, as coping and control under certain conditions have shown benefits to BP (7-9).

### Future Directions

- Investigate the effects that engaging in SSLAs have on reducing stress and improving mood.
- Test the impact of SSLAs on individuals with more solidified routines (e.g., family caregivers) and/or have early cardiovascular disease to generalize these results.
- Activities have different psychosocial features like absorption, vigor, positive effect, and challenge/difficulty, which in turn may also predict more depression and worse sleep (6).
- To allow for the creation of more tailored leisure interventions, future work should actively vary these leisure dimensions to examine if they differentially predict BP dipping.

## REFERENCES

- Iso-Ahola et al., 2004, Work and Leisure, Routledge
- Zawadzki, 2013, Absorption in self-selected activities is associated with lower ambulatory blood pressure but not for high trait ruminators, AM J Hypertens
- Merritt, 2017, Dimensions of self-selected leisure activities, trait coping and their relationships with sleep quality and depressive symptoms. Leis Stud
- Ouyang, 2015, Leisure, functional disability and depression among older Chinese living in residential care homes. Aging Ment Health
- Sonntag, 2008, 'Did you have a nice evening?' A day-level study on recovery experiences, sleep, and affect. J Appl Psychol
- Zawadzki, 2015, Real-time associations between engaging in leisure and daily health and well-being. Ann Behav Med
- Merritt, 2004, Low educational attainment, John Henryism, and cardiovascular reactivity to and recovery from personally relevant stress. Psychosom Med
- Roepke, 2011, Toward a more complete understanding of the effects of personal mastery on cardiometabolic health. Health Psychol
- Silvia, 2011, Trait self-focused attention, task difficulty, and effort-related cardiovascular reactivity. Int J Psychophysiol