DECEMBER 2022

Assessing General Mental Pressure in Virtual Walking Scenarios Using Human Factors Approach - a Pilot Study

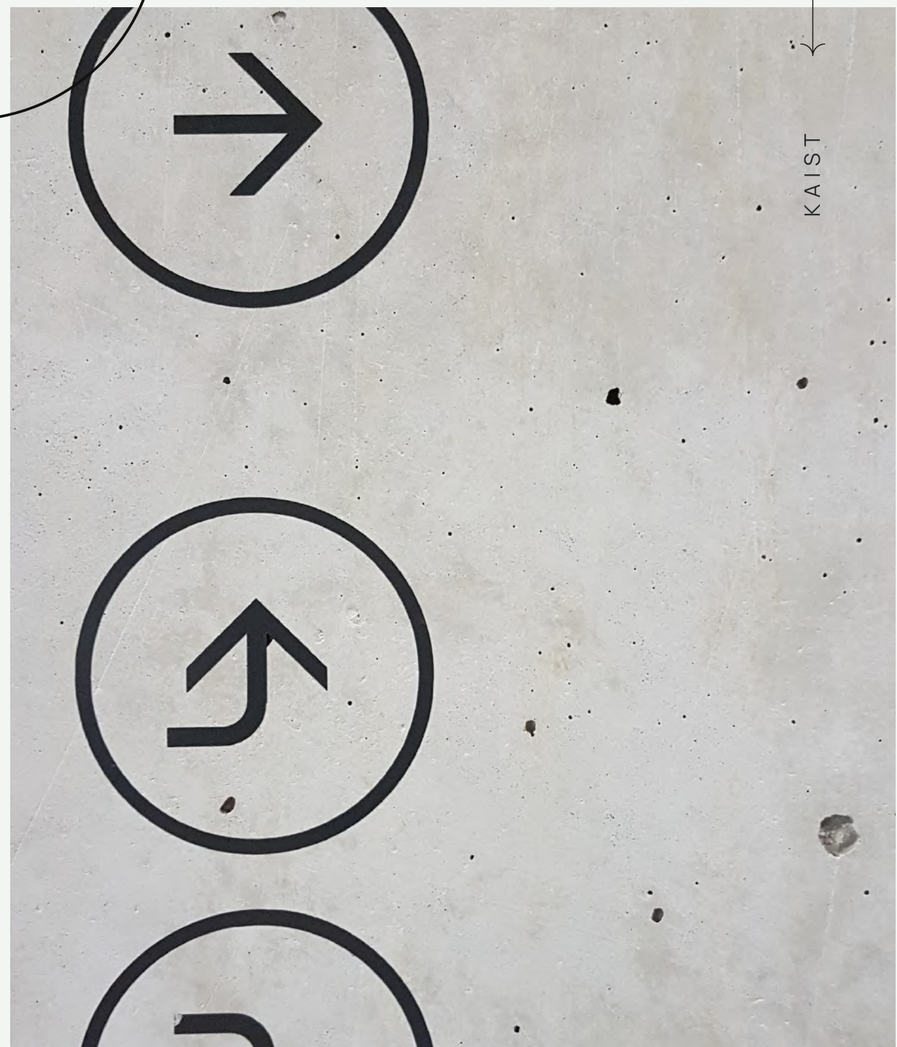
Xintong Wu

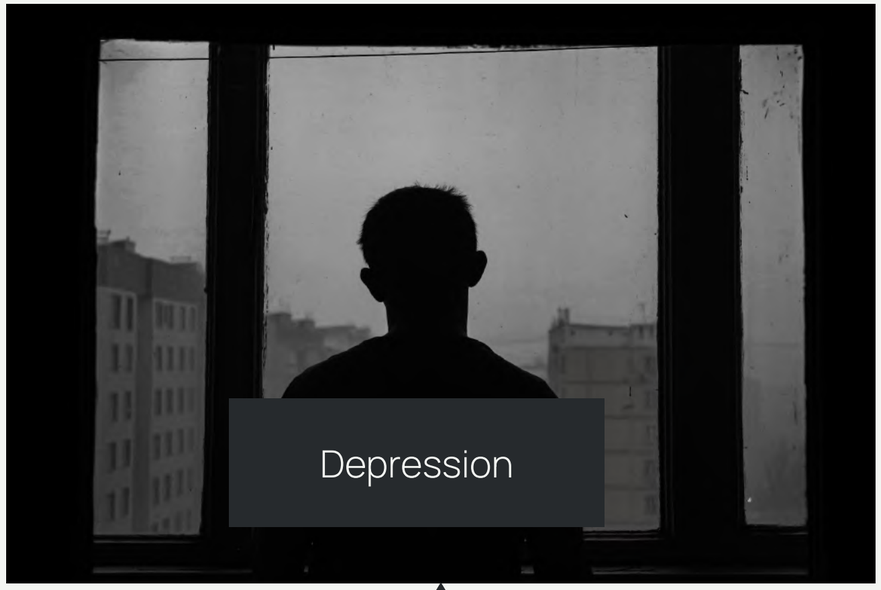
Aylar Akbari

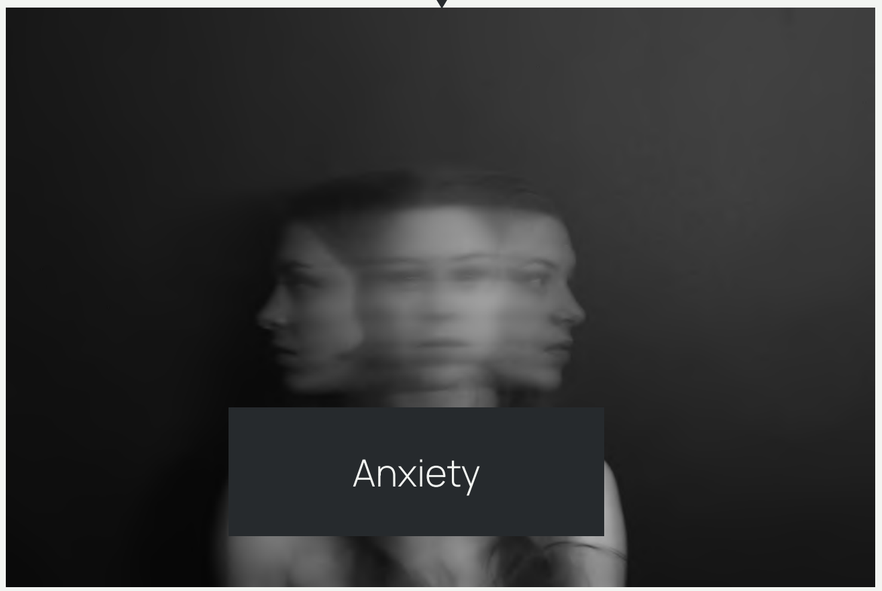
Content —

01

Recap on Project —







Final Project

Literature

Mental health is reported to. be related with physical activity in myriads of studies.

01 Relationship of Exercise and mental Health

02 Virtual Reality Exposure Therapy (VRET)

03 VR Walking Scenario

GCT565

KAIST

Pitch

Literature

Mental health is reported to. be related with physical activity in myriads of studies.

01

Relationship of Exercise and mental Health

oss-sectional and longitudinal associations of
tdoor walking with overall mental health in later
e

ng-Ti Chen [1], Clare Stevinson [2], Chih-Hsiang Yang [3], Wen-Jun Sun [4], Li-Jung Chen [5], Wen Ku [6]

Walking on sunshine: scoping review of the evidence for walking and mental health

Paul Kelly [1], Chloë Williamson [1], Ailsa G Niven [1], Ruth Hunter [2], Nanette Mutrie [1], Justin Richards [3]

Affiliations + expand

PMID: 29858467 DOI: 10.1136/bjsports-2017-098827

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Are Long-Distance Walks Therapeutic? A Systematic Scoping Review of the Conceptualization of Long-Distance Walking and Its Relation to Mental Health

Martin Mau [1 2 3], Anders Aaby [1 4], Søren Harnow Klausen [5], Kirsten Kaya Roessler [1]

Affiliations + expand

PMID: 34360035 PMCID: PMC8345809 DOI: 10.3390/ijerph18157741

Free PMC article

Abstract

Long-distance walking is an ancient activity practiced across cultures for many reasons, including the improvement of one's health. It has even been suggested that long-distance walking may be considered a form of psychotherapy. This scoping review examined the relationship between long-distance walking and mental health among adults. Publication trends and definitions were also examined, and the reason why long-distance walking may have therapeutic effects was discussed. Systematic searches in three online databases were performed using a selection of long-distance walking terms. Both quantitative and qualitative studies were included if they examined associations between long-distance walking and mental health in an adult population. Mental health was conceptualized in broad terms, including descriptions of mental states as well as more specific

Walking Psychotherapy As a Health Promotion Strategy to Improve Mental and Physical Health for Patients and Therapists: Clinical Open-Label Feasibility Trial

The Canadian Journal of Psychiatry / La Revue Canadienne de Psychiatrie
2022, Vol. 67(2) 153-155

DOI: 10.1177/0706743721039194
TheCJP.ca | LaRCP.ca
SAGE

Nicole Koziel, MD, FRCPC[1], Simone Vigod, MD, MSc, FRCPC[1],

Mental health and quality of life benefits of a pedometer-based walking intervention delivered in a primary care setting

Tomas Vetrovsky[1,*], Jozef Cupka[2], Martin Dudek[3], Blanka Kuthanova[4], Klaudia Vetrovska[5], Vaclav Capek[6], and Vaclav Bunc[1]

[1]Faculty of Physical Education and Sport, Charles University, Prague, Czech Republic; [2]Mediciman s.r.o., Prague, Czech Republic; [3]Laureus s.r.o., Dobrichovice, Czech Republic; [4]Praktici Praha 6, s.r.o., Prague, Czech Republic; [5]Humilitas s.r.o., Beroun, Czech Republic; and [6]Second Faculty of Medicine, Charles University, Prague, Czech Republic

Background: Physical activity level is positively associated with mental health and health-related quality of life. Primary care providers are ideally situated to offer physical activity interventions, and pedometers are commonly used as motivational tools to increase walking. However, several recent trials of pedometer-based interventions in primary care settings neither improved patients' quality of life nor reduced anxiety or depression, but these interventions only had relatively modest effects on physical activity levels. **Objective**: Our aim was to assess whether a pedometer-based walking intervention delivered in a primary care setting affects anxiety, depression, and health-related quality of life. **Methods**: A quasi-experimental, pre-post, single group study was conducted in 23 physically inactive patients from four general practices who participated in a pedometer-based intervention. The patients were administered the Hospital Anxiety and Depression Scale (HADS) and MOS 36-Item Short-Form Health Survey (SF-36) questionnaires before and after the 3-month intervention. **Results**: Following the intervention, the patients increased their walking volume by 1,676 steps per day ($p < .001$). Both the anxiety (−1.4, $p = .011$) and depression (−2.4, $p = .001$) subscales of HADS decreased, while the physical functioning (+6, $p = .023$), social functioning (+9, $p = .035$), mental health (+12, $p = .001$), vitality (+12, $p = .003$), and general health (+7, $p = .013$) subscales of SF-36 increased. **Conclusions**: Providing physically inactive patients with a pedometer and encouraging them to walk more in a primary care setting was associated with lower anxiety and depression scores, and improved health-related quality of life.

RESEARCH Open Access

"Walking alongside:" collaborative practices in mental health and substance use care

Ottar Ness*, Marit Borg, Randi Semb and Bengt Karlsson

Abstract

Background: Although the importance of collaboration is well established as a principle in research and in theory, p, has
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Walking side-by-side: Recovery Colleges revolutionising mental health care

Joanne Sommer, Katherine Gill and Jane Stein-Parbury

Joanne Sommer is a Rehabilitation Clinical Coordinator at the South Eastern Sydney Local Health District, Sydney, Australia. Katherine Gill is based at South Eastern Sydney Recovery College, Sydney, Australia. Jane Stein-Parbury is based at the University of Technology Sydney, Sydney, Australia.

Abstract

Purpose – *The Recovery College model is an innovative approach to providing education to consumers, carers and mental health staff, with the potential to facilitate both personal recovery gains and organisational transformation towards recovery-focused service provision. The purpose of this paper is to explore the experiences of students who attended the South Eastern Sydney Recovery College (SESRC).*

Design/methodology/approach – *An exploratory, descriptive qualitative design was employed with data collected through seven focus group interviews with consumers and mental health staff who had participated in courses run by the SESRC. Thematic analysis of the data was conducted using both deductive and inductive processes in order to interpret the data.*

Findings – *All participants were positive about their involvement in the RC. Four themes emerged from the thematic analysis: connection with others, hope for the future, the importance of the lived experience, and changing attitudes and systems.*

Originality/value – *The outcomes of this study indicate that the SESRC is achieving its aims in relation to both personal recovery gains, and the potential to impact on service transformation. It highlights the centrality of co-production as a fundamental aspect of the Recovery College model. This paper contributes to the emerging evidence base for this model and provides evidence that this model is applicable to the Australian context.*

Keywords *Recovery, Co-production, Peer education, Self-determination, Service transformation*

Paper type *Research paper*

Literature

Efficacy of VRET for several mental health problems has been reported.

02 Virtual Reality Exposure Therapy (VRET)

ELSEVIER

Treatment of acrophobia in virtual reality: The role of immersion and presence

Merel Krijn [a], Paul M.G Emmelkamp [a], Roeline Biemond [a], Claudius de Wilde de Ligny [a], Martijn J Schuemie [b], Charles A.P.G van der Mast [b]

A virtual reality exposure therapy (VRET) scenario for the reduction of fear of falling and balance rehabilitation training of elder adults with hip fracture history

Orestis Giotakos, Katerina Tsirgogianni, and Ioannis Tarnanas

Abstract— It is known that elderly who fall can suffer serious injuries. The American Geriatrics Society Panel on Falls Prevention has included in its specific recommendations for single intervention exercises including a component of balance training. Studies have shown that training programs proposed as a promising platform for the development of such retraining applications.

I. Introduction

Iterative Participatory Design for VRET Domain Transfer: From Combat Exposure to Military Sexual Trauma

Abstract

This case study describes the expansion of the BRAVE-MIND virtual reality exposure therapy (VRET) system from the domain of combat-related posttraumatic stress disorder (PTSD) to the domain of PTSD due to Military Sexual Trauma (MST). As VRET continues to demonstrate efficacy in treating PTSD across multiple trauma types and anxiety disorders, adapting existing systems and content to new domains while simultaneously maintaining clinical integrity is becoming a high priority. To develop BRAVEMIND-MST we engaged in an iterative participatory design process with psychologists, engineers, and artists. This first-person account of our collaborative development process focuses on three key areas (1) VR Environment, (2) User-Avatar State,

Open Access Full Text Article — CASE SERIES

Virtual Reality Exposure Therapy (VRET) for Anxiety Due to Fear of COVID-19 Infection: A Case Series

This article was published in the following Dove Press journal: *Neuropsychiatric Disease and Treatment*

> Front Psychol. 2021 Jul 15;12:671871. doi: 10.3389/fpsyg.2021.671871. eCollection 2021.

Virtual Reality Exposure Therapy for Fear of Heights: Clinicians' Attitudes Become More Positive After Trying VRET

Elise Rimer [1], Lars Vågsholm Husby [1], Stian Solem [1]

Affiliations + expand

PMID: 34335386 PMCID: PMC8319686 DOI: 10.3389/fpsyg.2021.671871

Free PMC article

Abstract

Background: Virtual reality exposure therapy (VRET) has the potential to solve logistic challenges when treating specific phobias. However, VRET has yet to see a large-scale implementation in clinical settings despite positive findings in treatment trials. This may partly be due to attitudes and lack of experience among clinicians, but also because of expensive and stationary VR solutions.

Objective: This study tested whether modern, wireless, commercially available VR equipment with controller-free hand tracking could induce and reduce discomfort using scenarios designed for fear of heights. Also, the study tested if clinicians' attitudes toward using VR in therapy changed after trying it themselves.

Method: Attitudes to using VR in therapy and discomfort ratings were assessed for 74 clinicians

Evolution of VRET to Assist in the Treatment of Phobias: a systematic review

Julie S. Pereira, Instituto Federal do Sudeste de Minas Gerais, Rio Pomba, MG, Brazil, juliespereira7@gmail.com
Leonardo M. Faêda, Universidade Federal de Viçosa, Viçosa, MG, Brazil, leonardo.faeda@gmail.com
Alessandra M. Coelho, Instituto Federal do Sudeste de Minas Gerais, Rio Pomba, MG, Brazil, alessandra.coelho@ifsudestemg.edu.br

Virtual Reality Exposure Therapy for Fear of Heights: Clinicians' Attitudes Become More Positive After Trying VRET

Elise Rimer [1], Lars Vågsholm Husby [1], Stian Solem [1]

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Method: Attitudes to using VR in therapy and discomfort ratings were assessed for 74 clinicians

Literature

VR walking scenarios have been studied and shown to be effective in reducing mental health problems.

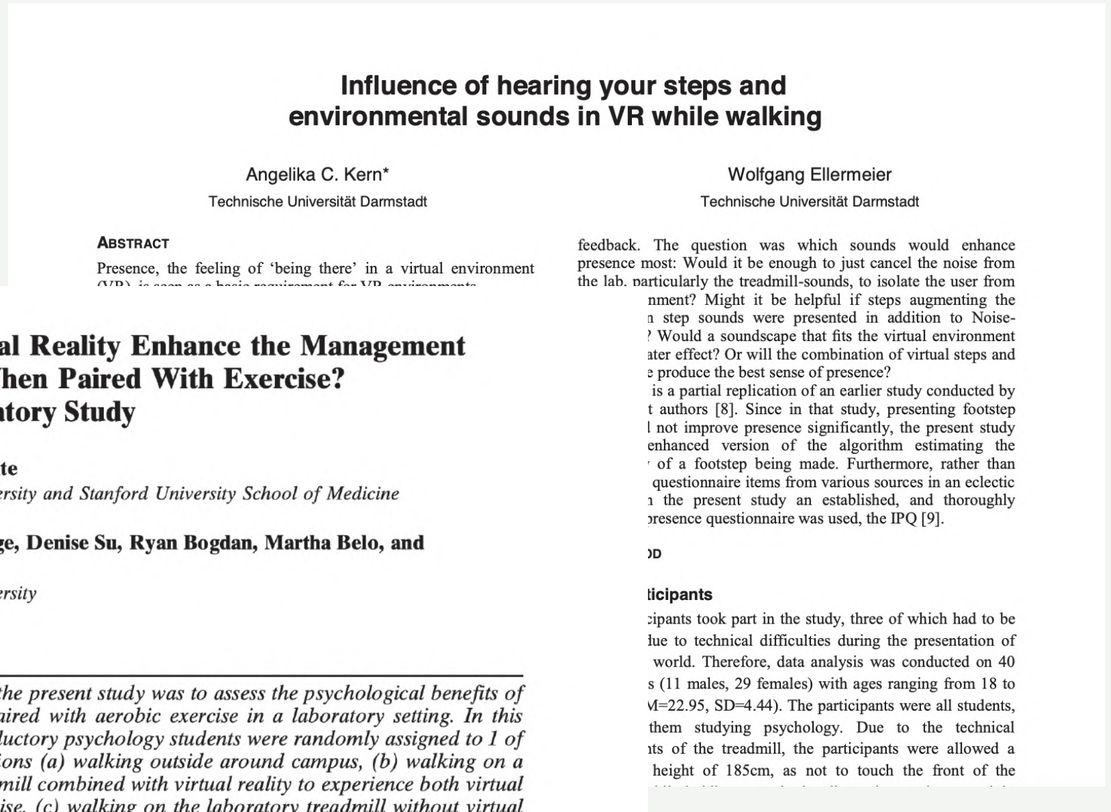
Weather, light, and traffic can all affect the exercise experience. Those reporting cost, weather, and personal barriers to physical activity are less likely to exercise, thus increasing their sedentary behavior (Salmon, Owen, Crawford, Bauman, & Sallis, 2003).

frontiers | Frontiers in Psychology Sections All journals All articles

Can Simulated Nature Support Mental Health? Comparing Short, Single-Doses of 360-Degree Nature Videos in Virtual Reality With the Outdoors

Matthew H. E. M. Browning[1*], Katherine J. Mimnaugh[1,2,4], Carena J. van Riper[2], Heidemarie K. Laurent[3] and Steven M. LaValle[4]

03 VR Walking Scenario



Influence of hearing your steps and environmental sounds in VR while walking

Angelika C. Kern*
Technische Universität Darmstadt

Wolfgang Ellermeier
Technische Universität Darmstadt

ABSTRACT

Presence, the feeling of 'being there' in a virtual environment

feedback. The question was which sounds would enhance presence most: Would it be enough to just cancel the noise from the lab, particularly the treadmill-sounds, to isolate the user from

nment? Might it be helpful if steps augmenting the
n step sounds were presented in addition to Noise-
? Would a soundscape that fits the virtual environment
ater effect? Or will the combination of virtual steps and
e produce the best sense of presence?
is a partial replication of an earlier study conducted by
t authors [8]. Since in that study, presenting footstep
l not improve presence significantly, the present study
enhanced version of the algorithm estimating the
of a footstep being made. Furthermore, rather than
questionnaire items from various sources in an eclectic
n the present study an established, and thoroughly
resence questionnaire was used, the IPQ [9].

OD

ticipants

cipants took part in the study, three of which had to be
lue to technical difficulties during the presentation of
world. Therefore, data analysis was conducted on 40
s (11 males, 29 females) with ages ranging from 18 to
M=22.95, SD=4.44). The participants were all students,
them studying psychology. Due to the technical
nts of the treadmill, the participants were allowed a
height of 185cm, as not to touch the front of the

Does Virtual Reality Enhance the Management of Stress When Paired With Exercise? An Exploratory Study

Thomas G. Plante
Santa Clara University and Stanford University School of Medicine

Arianna Aldridge, Denise Su, Ryan Bogdan, Martha Belo, and Kamran Kahn
Santa Clara University

The purpose of the present study was to assess the psychological benefits of virtual reality paired with aerobic exercise in a laboratory setting. In this study, 154 introductory psychology students were randomly assigned to 1 of 4 20-min conditions (a) walking outside around campus, (b) walking on a laboratory treadmill combined with virtual reality to experience both virtual and actual exercise, (c) walking on the laboratory treadmill without virtual

Research Gaps —

01 Lack of combination of multidimensional subjective and objective human factors approach for the assessment of mental pressure.

02 Previous research on mental pressure is based on specific scenarios and causes, and there is a lack of research on general mental pressure.

Research Hypotheses —

01

Virtual walks would reduce the mental pressure and enhance the psychological well-being of subjects.

02

The improvement level of mental pressure would be affected by the subjects' familiarity with the virtual walking scenarios.

03

The improvement level of the mental pressure would be affected by subjects' involvement in the virtual walking scenarios.

Research Objectives —

01

To study which objective physiological indicators can reflect the change of mental pressure in real-time.

02

To evaluate the levels of mental pressure from several aspects through multiple feasible physiological assessment methods.

03

To explore the best combination of VR factors to minimize the mental pressure.

Measurments —

Psychological Measurments

01 AD-ACL

What and why?

- The AD-ACL (Thayer, 1960, 1978, 1986) is a brief and frequently used self-report checklist designed to measure momentary mood states including, energy, calmness, tension, and tiredness.
- Thayer (1978, 1986) reported that the AD-ACL has adequate reliability and has been validated in a number of psychopsysiological and biopsychological investigations involving exercise.

02 Subjective Units of Distress Scale (SUDS)

What and why?

- The Subjective Units of Distress Scale (SUDS; Wolpe, 1969) is defined as the self-rated current anxiety between 0 (a state of absolute calmness) and 100 (the worst anxiety ever experienced). The SUDS can be used to measure feelings and other internal experiences, such as anxiety, anger, agitation, stress or other painful feelings.
- The SUDS measure showed convergent validity with state anxiety(Kim, Bae, & Park, 2008) (APA PsycTests Database Record © 2019 APA, all rights reserved)

Measurments —

Physiological Measurments

01 Heart Rate

Heart rate variability as a measure of mental stress in surgery: a systematic review

Anne-Fleur The [1], Iris Reijmerink [1], Maarten van der Laan [1], Fokie Cnossen [2]

Affiliations + expand

PMID: 32215713 PMCID: PMC7452878 DOI: 10.1007/s00420-020-01525-6

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Abstract

Purpose: Th
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Methods: A
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Results: 24
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took place.

Conclusion
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Pilot Study of a Brief Hypnotic Induction: Effects on Blood Pressure, Heart Rate, and Subjective Distress in Patients Diagnosed with Hypertension

Arif Setyo Upoyo [1], Endang Triyanto [2], Agis Taufik [1]

Affiliations + expand

PMID: 34875965 DOI: 10.1080/00207144.2022.2004544

Abstract

The feasibility of hypnotherapy interventions f
in hypertensive patients was investigated in a
the effect of audio hypnotherapy on blood pre
hypertension patients. The study randomized
care. The intervention group received hypnoth
the control group took a rest for about 15 minu
with digital tensimeter and stress levels with th
used Kruskal Wallis Test. The results showed a
control groups with p value < .001 for decreasi
decreasing in stress levels. This pilot study su
feasible and of benefit in a clinical population
needed.

Mental health, stress, and resilience correlates of heart rate variability among military reservists, guardsmen, and first responders

Laurel L Hourani [1], I
Greg Lewis [4], Paul I
Marion Lane [3], Belir

Affiliations + expar

PMID: 31722190 D

Happiness at Your Fingertips: Assessing Mental Health with Smartphone Photoplethysmogram–Based Heart Rate Variability Analysis

Ivan Liu [1], Shiguang Ni [2], Kaiping Peng [1 3]

Affiliations + expand

PMID: 32101084 DOI: 10.1089/tmj.2019.0283

Abstract

Background: Heart rate variability (HRV) provides essential mental health information for clinical diagnosis, telemedicine, preventive medicine, and public health; however, the lack of a convenient detection method limits its potential. **Objective:** This study aims to investigate the feasibility and credibility of smartphone photoplethysmogram (PPG)-based HRV analysis for mental well-being and health assessment. **Methods:** Data were collected from 93 students and university employees

Heart Rate and Heart Rate Variability as Classification Features for Mental Fatigue Using Short-Term PPG Signals Via Smartphones Instead of ECG Recordings

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***Abstract*—The real-time detection and prediction of mental fatigue, mood and stress have received more and more attention the last few years. Mental fatigue can bring health hidden trouble to human body, make the women suffer from mammary gland cyst and uterine fibroid extremely easily, the men suffer from liver cyst and thyroid tumor. Photoplethysmography (PPG) technology is more suitable than Electrocardiography (ECG) for the real-time detection of human physiological signal via smartphones, smartwatches, and wearable sensors to prevent fatigue. Since PPG signal is vulnerable to interference, the polynomial fitting method and Savitzky-Golay (SG) filtering method were used to remove baseline wander and smooth waveform. Then, the adaptive peak-seeking algorithm was used to extract the R-peaks, and the heart rate (HR) were calculated based on R-R intervals (RRIs). The Welch spectrum estimation was used to obtain the spectrum diagram, and high-frequency component power (HF), low-frequency component power (LF) and the ratio of high-frequency component power and low-frequency component power (LF/HF)**

period of cognitive activity. What's more, a subjective uncomfortable feeling is caused by continuous physical or mental activity, which can cause people's physical and mental functions to decline, deeply affecting people's attention, perception, thinking, judgment, will, decision-making and movement [1]. In the actual production, life, work and study, fatigue will bring a lot of adverse effects.

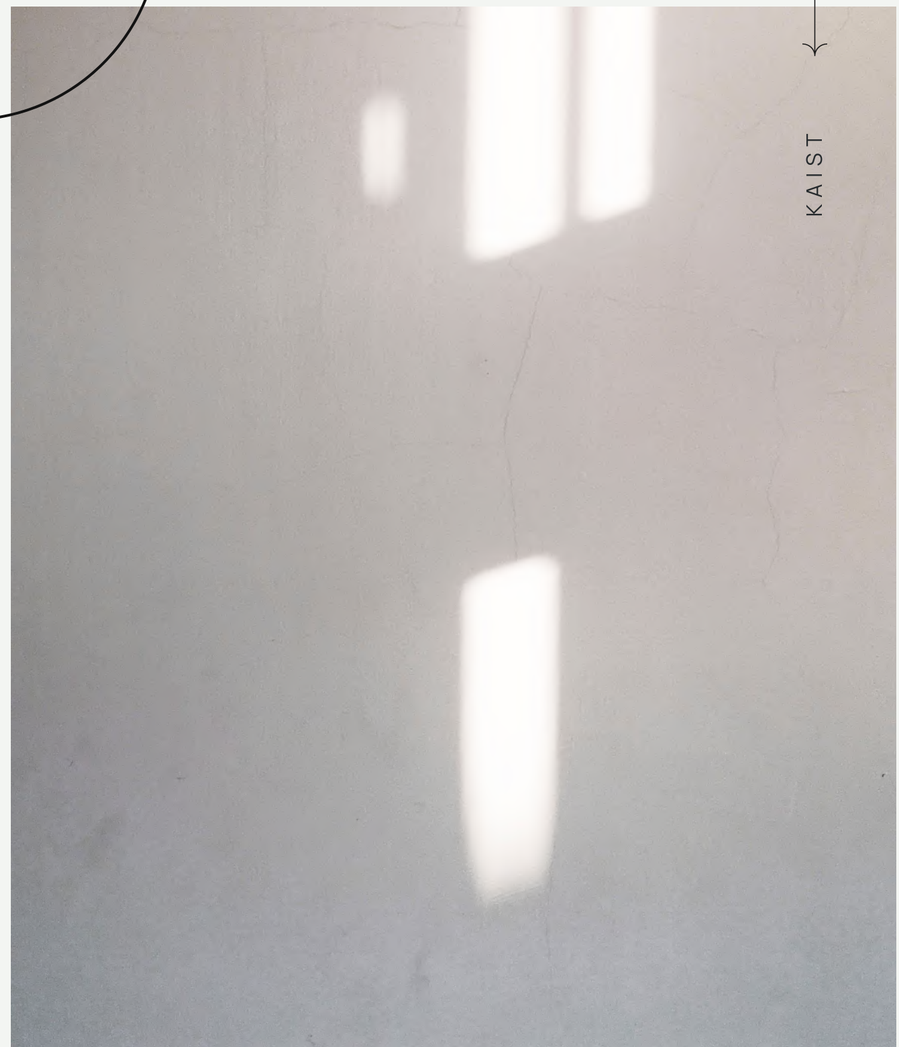
Mental fatigue can be evaluated via the state of the autonomic nervous of system (ANS), which is accompanied by changes of physiological signals and is also formed by sympathetic nervous system (SNS) and parasympathetic nervous system (PSNS) [2]. [3] and [4] show that physiological signal can more easily reflect the degree of fatigue over time and its features are associated with fatigue. For example, the relationship between fatigue and HRV is discussed in [5]. Furthermore, mental fatigue detection based on physiological signal has a plenty of advantages, such as the measurement is

978-1-6654-3182-8/20$31.00 ©2021 IEEE | DOI: 10.1109/ICCSN52437.2021.9463614

and Networks (ICCSN)

02

Experiment Design



Questionnaires

AD-ACL

Activation-Deactivation adjective check list

SUDS

Subjective Units of Distress Scale

AD-ACL

Dimension	Items
Energy	Active
	Lively
	Energetic
	Vigorous
	Full-of-pep
Wakefulness	Sleepy
	Drowsy
	Tired
	Wide-awake
	Wakeful
Tension	Tense
	Clutched-up
	Fearful
	Jittery
	Intense
Calmness	Calm
	At-rest
	Still
	quiet
	placid

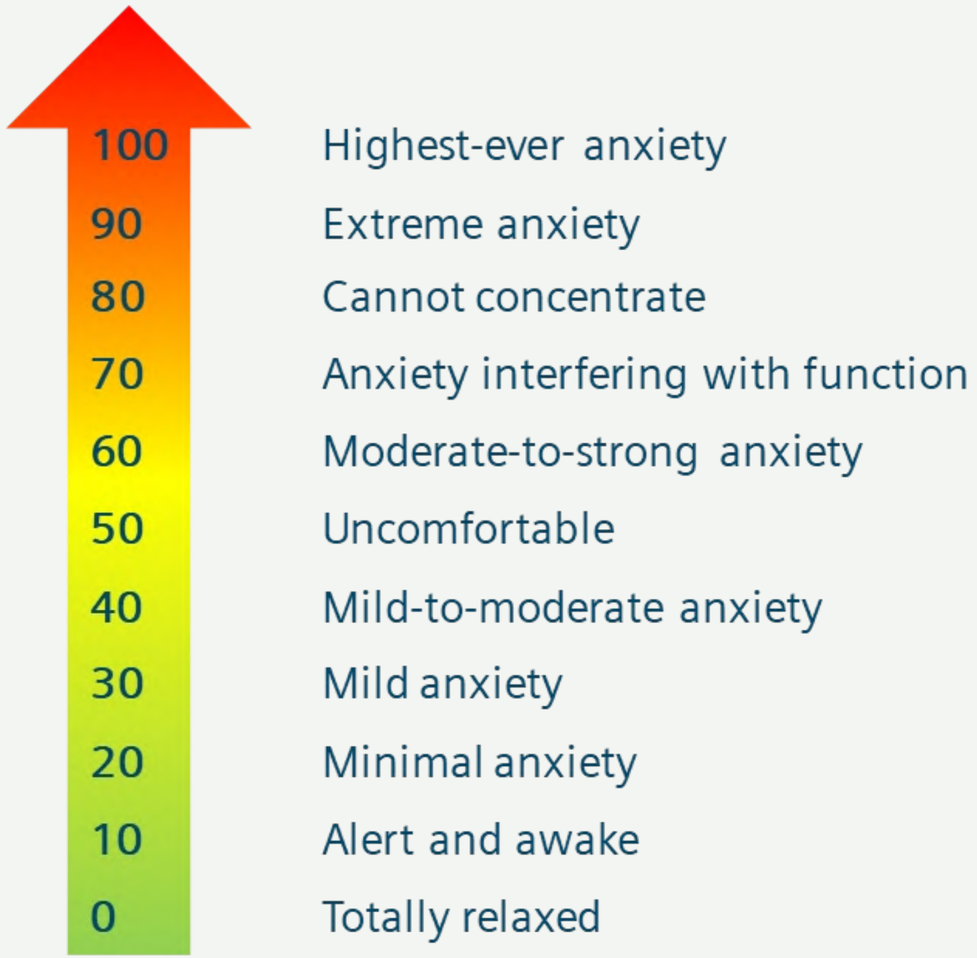
Questionnaires

AD-ACL

Activation-Deactivation adjective check list

SUDS

Subjective Units of Distress Scale



Panoramic Videos

KAIST VR:

recorded by Insta 360 X3

Countryside VR:

searched on Youtube

Almost the same resolution (5.7K)

Conditions

Two factors, three levels
Between-subject design

	KAIST VR Walk inside a familiar virtual campus env.	Countryside VR Walk inside an unfamiliar virt. suburb env.	Non-VR Without VR
Treadmill	K-T	C-T	N-T
Standstill	K-S	C-S	N-S

Protocol

18 subjects, 3 for each condition
In random order

Hardware:
HTC VIVE PRO EYE
Polar H10

03

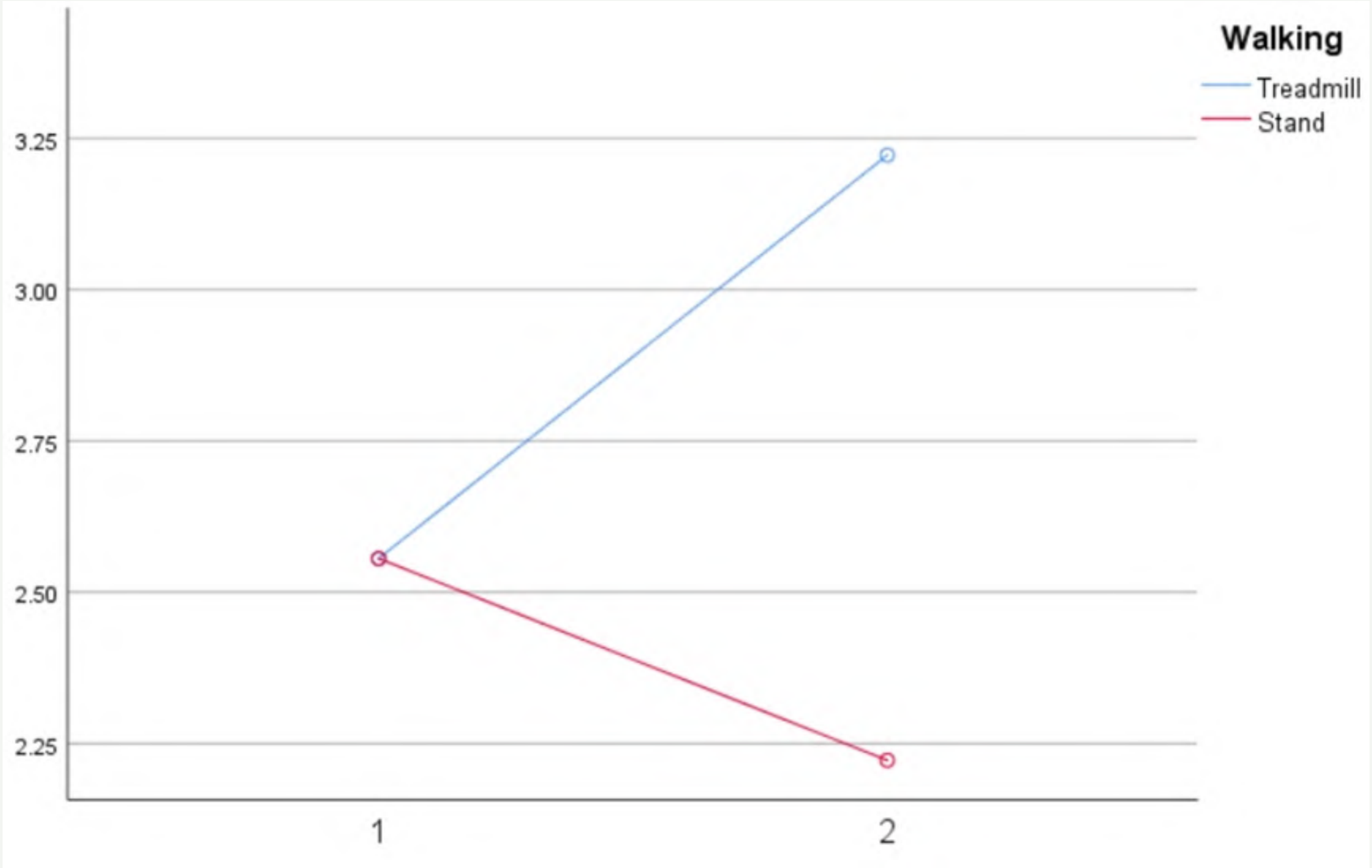
Results

AD-ACL

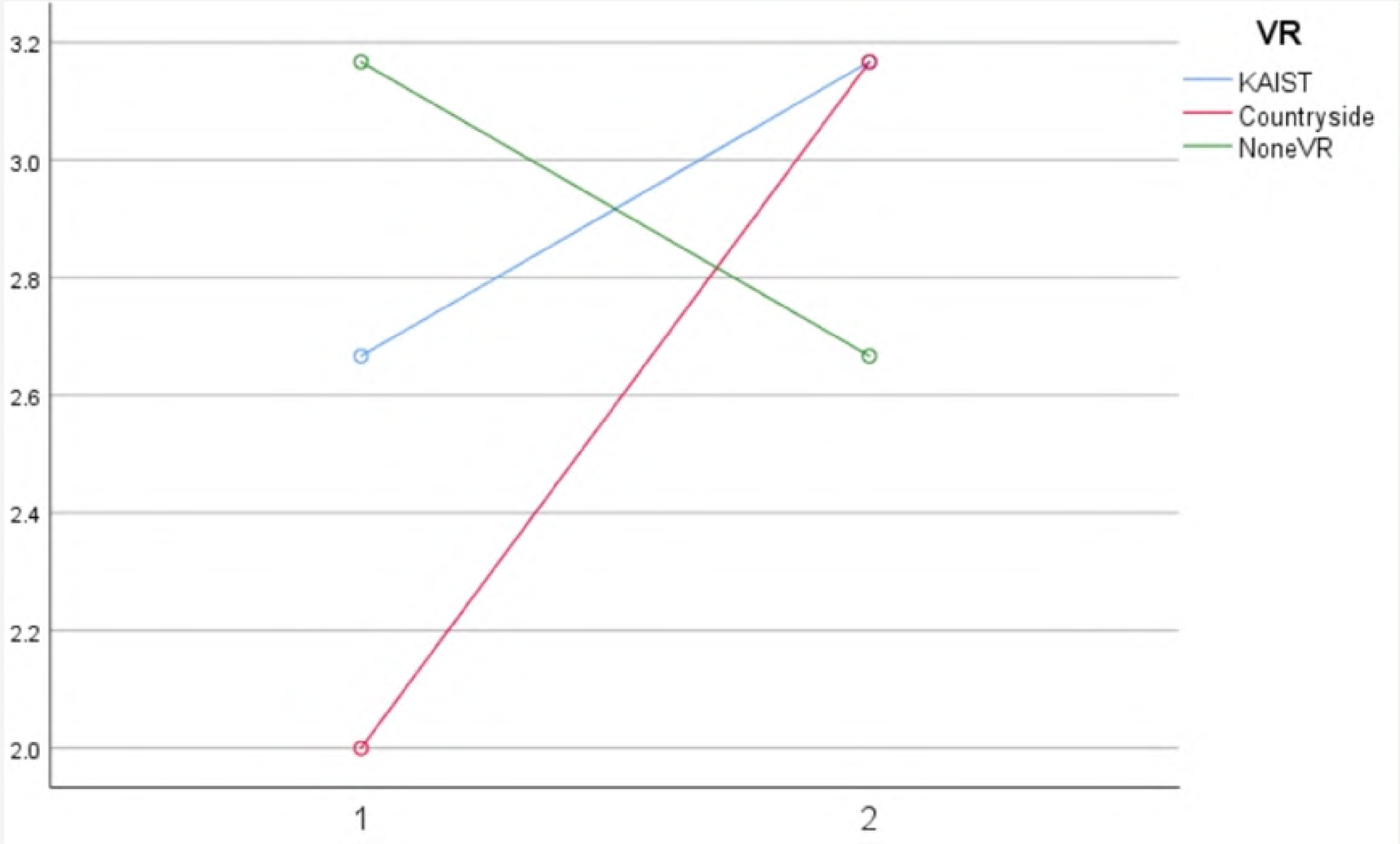
*: p < 0.05

	Pre		Post	
	Mean	SD	Mean	SD
Active	2.78	0.808	2.78	0.808
Lively	2.67	0.767	2.94	0.998
Energetic	2.61	0.979	2.72	0.895
Vigorous	2.67	0.907	2.78	0.943
Full-of-pep	2.56	0.784	2.44	0.984
Sleepy	1.94	0.998	1.72	0.752
Drowsy	2.06	0.998	1.78	0.878
Tired	2.22	1.060	1.83	0.786
Wide-awake	2.22	0.943	2.56	1.149
Wakeful*	2.56	0.922	2.72	1.074
Tense	1.94	0.802	1.61	0.608
Clutched-up	1.44	0.616	1.44	0.616
Fearful	1.33	0.594	1.33	0.594
Jittery	1.50	0.707	1.39	0.608
Intense	1.67	0.907	1.5	0.786
Calm	2.78	0.808	2.94	0.802
At-rest*	2.61	0.916	3	0.686
Still	2.72	0.958	2.72	0.826
Quiet	2.56	0.784	2.61	0.916
Placid*	2.44	0.856	2.83	0.707

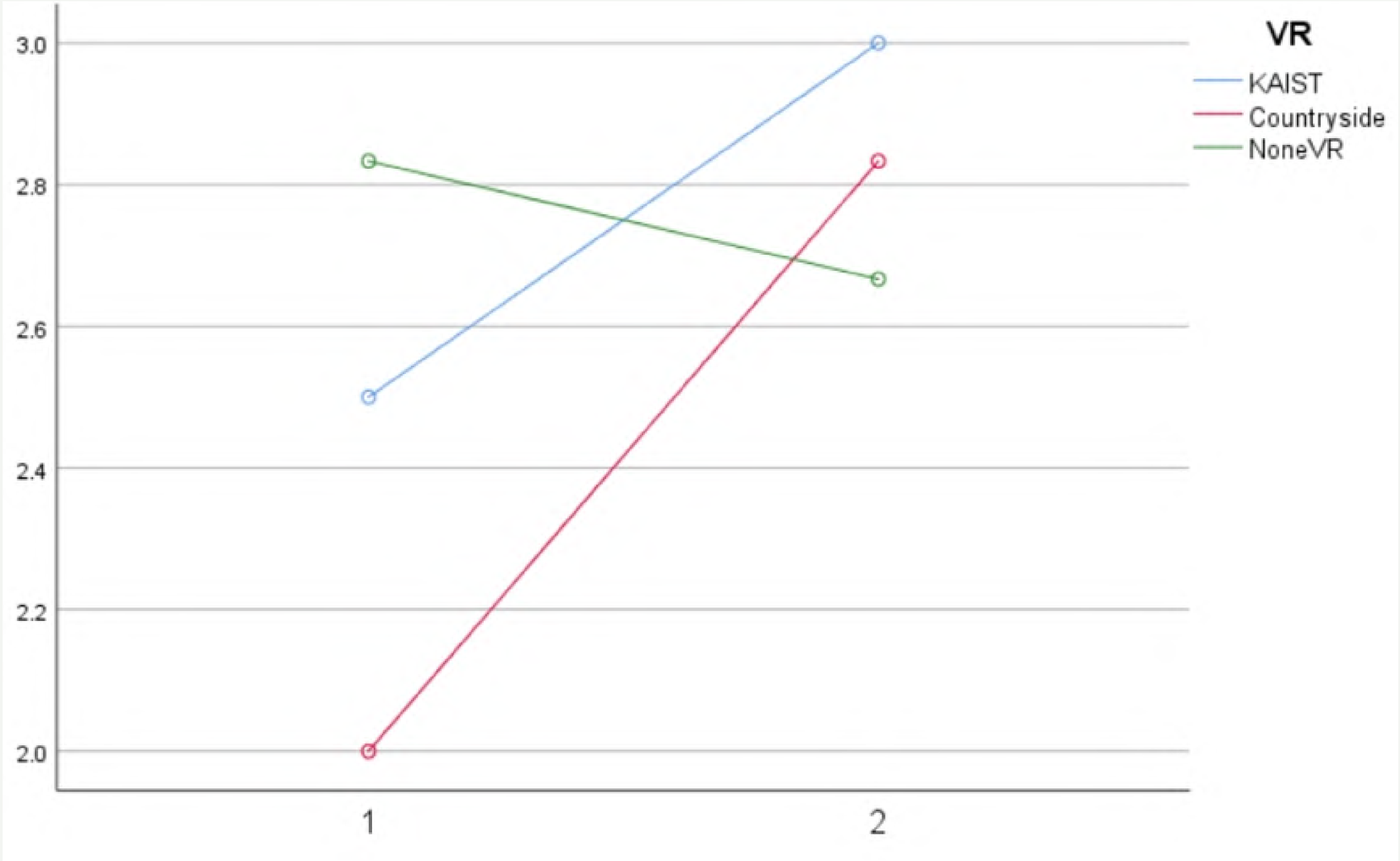
Wakeful



At-rest

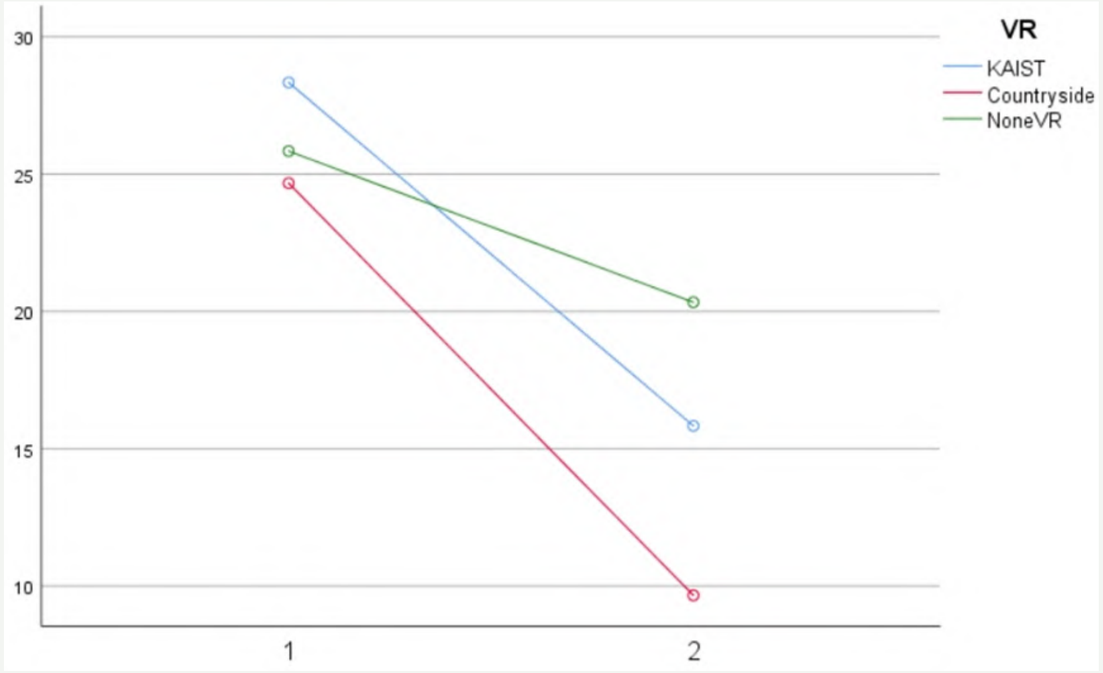


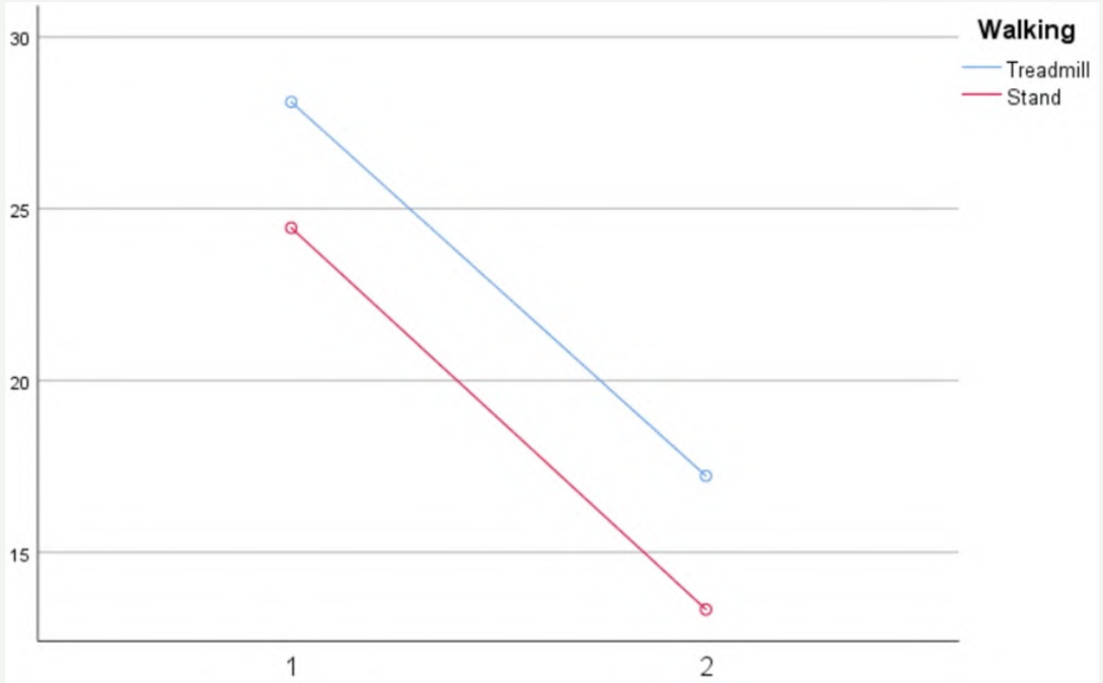
Placid



SUDS

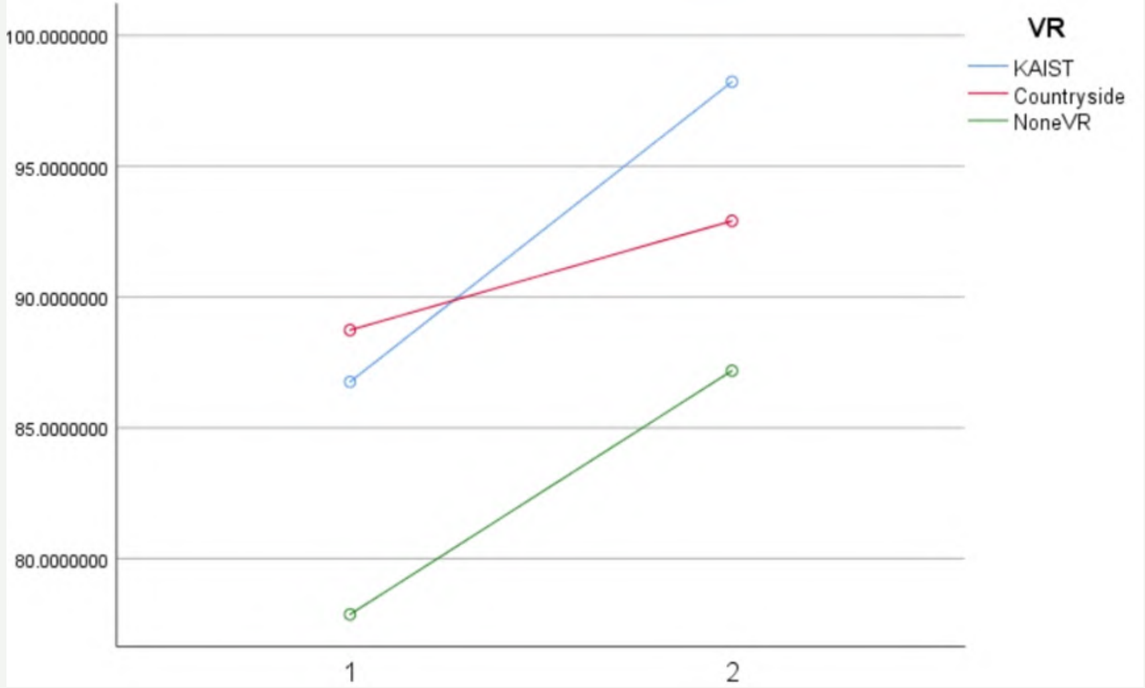
p=0.001

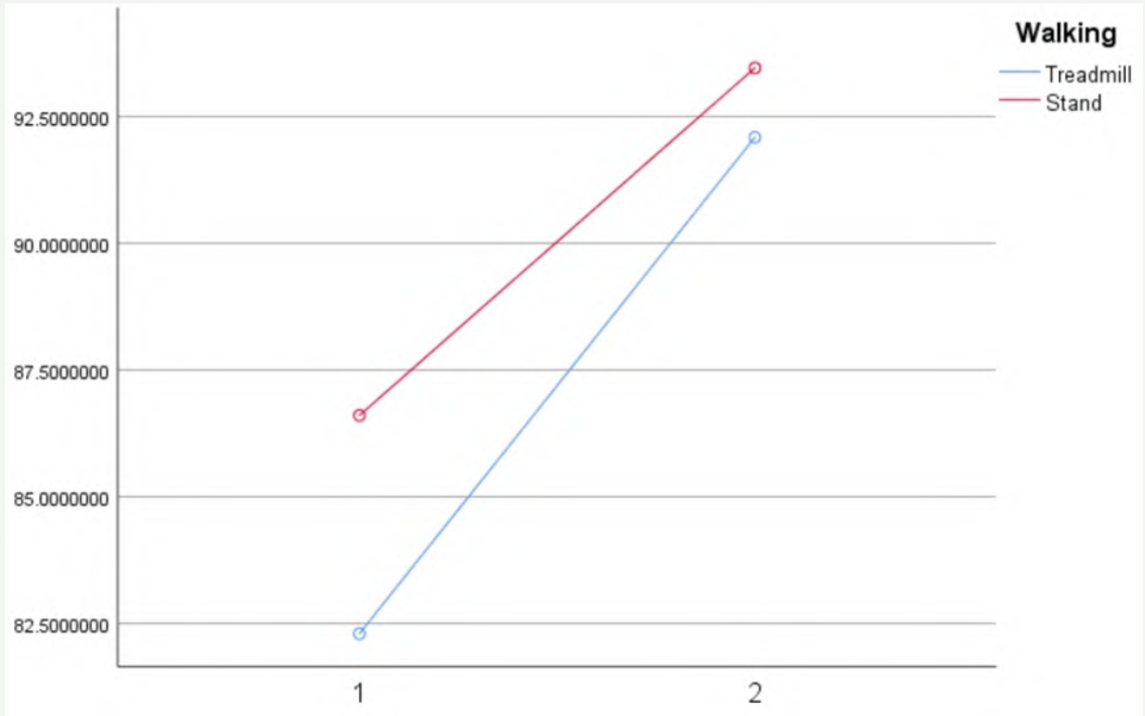




Heart rate

p=0.002





04

Discussion & Future work

Discussion

01 Virtual walking can reduce mental stress and increase psychological well-being by making participants feel **at-rest** and **placid**

02 Unfamiliar scenarios are more effective in reducing mental stress

03 The effect of involvement (walking or standing in VR) on the reduction of mental stress has not been found

Contribution

01

Novelty: combining subjective mental pressure evaluations with physiological data in VR-settings

02

Seeking to unravel the potential connections of subjectively sensed mental pressure and physiological factors to measure mental pressure

The outcome would serve as a stepping stone and guideline for future research in healthcare industry to design VR-based solutions for people with depression and anxiety disorder

03

Final Project

Future works

Duration and Sessions

longer walks(15-60) and also multiple sessions have been reported to be more effective

Walk along

Add Avatars or connect VRs of different people to walk together

More Control

Provide more interaction for user through self-paced treadmill and also user controlled VR scenario

04

Q&A —