THERAPEUTIC BENEFITS OF NATURE IMAGES ON HEALTH: Effects of Nature Images on Pain in a Simulated Hospital Patient Room

Ellen Vincent

A C K N O W L E D G E M E N T S

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INTRODUCTION Ph.D. Committee

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Sam Ingram, Graphics Communications

Portia Botchway, Nursing

Ellen Vincent

P R E S E N T A T I O N O U T L I N E

Introduction - Related Literature

Theory Guiding the Research

Phase I: Selection of Nature Images

Phase II: Experiment

- Pilot study
- Controlled study

Phase III: Presence and Influence

Limitations

Contributions

Next Steps

INTRODUCTION

OBJECTIVE

Measure the therapeutic benefits of nature images for healthcare settings using objective and subjective data

I N T R O D U C T I O N

P U R P O S E

(Phase I) Establish a methodology to select images

(Phase II) Study how images impact physiological and psychological indicators

Getty images

RELATED LITERATURE

AREAS	FIELDS
Stress and Pain	Medicine, Psychology, Nursing
Therapeutic Environments, Therapeutic Landscapes, Healthcare Settings	Environmental Psychology, Landscape Architecture, Architecture, Environmental Design
Evolutional Theory, Landscape Preference	Geography, Cultural Geography, Biology, Landscape Architecture, History
Virtual Environments, Therapeutic Art	Environmental Psychology, Computer Science, Art, Photography, Graphics Communications

RELATED LITERATURE

The Historical Healing Power of Nature

Time	People	Use	Source
300s BCE	Asclepius	Healing temples near pure water or mineral springs, pure air, and woods	http://dodd.cmcvellore.ac.in/hom/05%20-%20Temples%20Cult.html
5th century	Buddha	Obtained enlightenment sitting under a tree	Palmer 2001
13th century	Rumi	Poetry uses nature metaphors	Barks 1997
16th century	Monks	Protected healing plants in cloistered monastery gardens	Peplow 1988, p. 26; Vincent 2008

INTRODUCTION

The Historical Healing Power of Nature

Time	People	Use	Source
19th century	British insane asylums	Located in rural areas	Gesler and Kearns 2002, p. 122
Mid 20th century	Transcendentalists Emerson, Thoreau, etc	Nature essential for health	Thoreau 1947, Bode, ed., p. 33
Mid 20th century	Olmsted	Parks were "tranquilizing and restorative"	Beveridge 1997, p. 86
21st century	Modern spas	Near water and mountains; use natural materials for interior architecture	

Photo: http://www.groveparkinn.com/Leisure/TheSpa/Massage_1/

RELATED LITERATURE

Stress, anxiety, & pain hinder well-being (healing) in the healthcare setting (Selye 1976; Johnston & Wallace 1990; Kiecolt-Glaser & Marucha 1995; Kiecolt-Glaser et al. 1998; Frederickson & Levenson 1998)

Nature views can reduce stress, anxiety, & pain (Moore 1981; West; Ulrich 1984; West 1985; Verderber 1986; Frumkin, 2001, 2008)

Architecture affects medical outcomes (Horsburgh 1995; Verderber 1987, 2000; Frampton et al. 2003)

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RELATED LITERATURE

Virtual views may serve hospitals whose design prohibits a view

Nature art on the wall reduced anxiety or stress among patients
(Heerwagen 1990; Ulrich et al. 1993)

Nature videos reduced stress
(Ulrich & Simons 1986; Frederickson & Levenson 1998; Parsons et al. 1998; Laumann et al. 2003; Ulrich et al. 1991, 2003; Sponselee et al. 2004; de Kort et al. 2006

Nature videos reduced pain levels
(Miller et al. 1992; Tse et al. 2002)

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RELATED LITERATURE

Photographs are suitable surrogates for the real experience in research (Zube, Pitt, & Anderson 1975; Kaplan & Kaplan 1989; Stamps 1990, 2007, 2008; Shang & Bishop 2000; Laumann, Garling, & Stormark 2001; de Kort & IJsselsteijn 2006)

Photographs need to be reproducible (Stamps 2004; Singleton and Straits 2005)

Realism may be preferred by vulnerable people

experiential realism (Sponselee et al. 2004; deKort & IJsselsteijn 2006) visual realism (Ulrich & Gilpin 2003)

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RELATED LITERATURE

Restorative environments with high degrees of presence, a feeling of being there in the image, may be more therapeutic (de Kort et al. 2006; IJsselsteijn 2004)

Experiential realism = presence (Sponselee et al. 2004)

Non-interactive media environments may create convincing sense of presence in the physical realm (IJsselsteijn 2004)

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RELATED LITERATURE

Difficulty measuring presence (IJsselsteijn 2004)

People may not understand the term (IJsselsteijn 2004)

Some aspects of emotional experience are not available to subjective awareness
(Lopez & Snyder 2004; Gordon 2004)

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RELATED LITERATURE

Problems with therapeutic environments (nature and health) research:

Multiple variables **(**Ruso, Renninger, & Atzwanger, 2003; Dijkstra et al., 2006)

Poor replication of images (Stamps, 2004)

Unclear category titles and descriptions (Stamps, 2004)

Investigator preference substituted for sample population (Stamps, 2004)

Interdisciplinary research is weak in theory **(**RMNO 2004; IJsselsteijn 2004; Dilani 2005 **)**

Getty images

RELATED LITERATURE

Evolutionary theory for landscape preference has a distinguished following (Appleton 1975, 1996, Kaplan and Kaplan 1989, Ulrich 1991, 2008; Heerwagen & Orians 1993; Kellert & Wilson 1993; Frumkin 2001, 2008;

Appleton's prospect refuge theory has been used in literature, design (Wenner 1993; Tetlow, 1996; Hudson 1993; Segal 2003) **and research for 30 years** (Yeates, 1997; Ramanujam 2006; Juras 1997; Herzog & Kutzli 2002; Makhzoumi & Zako 2007)

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THEORY

Appleton's Prospect Refuge Theory & Evolutionary Theory

30-year history of research use and has informed recent research (Kaplan, Ulrich, Cooper Marcus, Hartig, Kellert, IJsselsteijn, Stamps)

Reproducible category definitions

Utilizes real and symbolic landscape views

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THEORY

Prospect refuge theory of landscape preference

"To see without being seen."

Jay Appleton, 1996

Present day landscape preferences stem from our hereditary hunter-gatherer roles in the African savannah.

Human's selection of habitats had serious life and death consequences.

Appleton developed a descriptive functional classification for landscapes.

Categories include "prospect"; "refuge"; and "hazard".

Getty image

PROSPECT REFUGE THEORY

OPERATIONAL DEFINITION

PROSPECT

An environmental condition, situation, object, or arrangement that presents real or symbolic access to a view.

PROSPECT REFUGE THEORY

PROSPECT: SAMPLE IMAGES

Getty Image

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PROSPECT REFUGE THEORY

OPERATIONAL DEFINITION

REFUGE

An environmental condition, situation, object, or arrangement that presents real or symbolic situations for hiding or sheltering.

Refuges provide protection from hazards.

Hides provide concealment from animate hazards.

Shelters provide concealment from inanimate hazards.

PROSPECT REFUGE THEORY

REFUGE:SAMPLE IMAGES

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Getty Image

PROSPECT REFUGE THEORY

OPERATIONAL DEFINITION

HAZARD

Incidents or conditions that present real or symbolic threats to life and well-being.

PROSPECT REFUGE THEORY

HAZARD:SAMPLE IMAGES

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Getty Image

PROSPECT REFUGE THEORY

OPERATIONAL DEFINITION

MIXED PROSPECT + REFUGE

An equal balance of each (50%) is shown in image.

PROSPECT REFUGE THEORY

MIXED PROSPECT+REFUGE: SAMPLE IMAGES

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PHASE I: NATURE IMAGE SELECTION

	RESEARCH QUESTION
1)	Which photographic image best represents Appleton's categories of prospect, refuge, hazard, and mixed prospect + refuge?

PHASE I: NATURE IMAGE SELECTION

METHODS: IMAGE SELECTION CRITERIA

- Horizontal orientation
- Color
- Limited reference to animals, structures, equipment
- Dominant nature over built features
- No distinguishable people
- No national, international landmark places
- Limited number of variables
- Clear category operational definitions (Appleton's words)
- Use royalty free Getty Images and own images (for replication)

Photos by Ellen Vincent

PHASE I: NATURE IMAGE SELECTION

METHODS: SEQUENTIAL MODEL

	A Investigator select	B Focus groups	C Sorting task	D Content validity
Who	Investigator	55 experts & students	100 students	Subject experts
	informal	informal	controlled	informal
What	Identify images based on theory	Identify preferred category images	Identify preferred category images	Compare findings with category definitions and characteristics
Where	Computer	Classroom	Classroom	Conference room
How	Subjective selection based on Appleton's definitions	Sorting task using "most" to "least" scale	Sorting task using "most" to "least" scale	Content validity rating "most" to "least" scale
Results	300 to 72 images	72 to 20 images (5 per category)	20 to 4 images (1 per category)	20 to 4 images (1 per category) for use in experiment

PHASE 1(C): NATURE IMAGE SELECTION

METHODS: CATEGORY SORTING TASK

Research question #1	Which images best represent Appleton's categories of prospect refuge theory?	
Who	Students (100)	
Materials	20 images Consent form Pre-sort surveys Taped audio instructions Instruction sheet Image category operational definition chart Score sheet	
What	Complete consent form & surveys Listen to taped instructions; review category definitions Sort photos into four categories; Rank from "most to least"; Record selection on score sheet	
Data analysis	Frequency table for each photo to establish "most fit"	
Results	The highest rated photograph for each category retained for next stage; 4 images total (1 per category)	

PHASE I(C): NATURE IMAGE SELECTION

PROSPECT





REFUGE





HAZARD





MIXED P+R





PHASE I: NATURE IMAGE SELECTION

RESULTS: CATEGORY IMAGES

Prospect

Refuge

Hazard

Mixed Prospect + Refuge

PHASE II: EXPERIMENT

	RESEARCH QUESTION
1)	Which nature image categories are most therapeutic as evidenced by reduced pain and positive mood?

PHASE II: EXPERIMENT

	Hypotheses
1)	Nature views are variable in their impact on specific psychological and physiological health status indicators.
2)	Prospect and refuge nature scenes are more therapeutic than hazard nature scenes.

PHASE II: EXPERIMENT

RESEARCH DESIGN VARIABLES:

Independent variables	Nature images
Dependent variables	Psychological + physiological responses

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PHASE II: EXPERIMENT

INDEPENDENT VARIABLES

Type of view (Appleton, 1975,1996)

→ *responses*

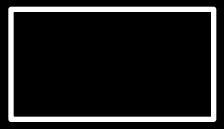
Examples

(1) *Prospect View [clear view]:* distant or close views; multiple vantage or viewing points.

(2) *Refuge View [safety]*: shelters or hides.

(3) *Hazard View [alarming]:* danger; exposure; no place to hide; impediments to movement.

(4) *Prospect/Refuge Mixed [view & safety]*: equal amounts of both prospect and refuge.



(5) *No Image [control]:* The LCD digital screen will be blank.

DEPENDENT VARIABLES

Health status & perceived well-being: Psychological and physiological

Perceived well-being – therapeutic aspects developed by Cooper Marcus (1995, 1999).

Health Status – Physiological measures: continuous vital signs- blood pressure + heart rate.

Health Status – Psychological measures:

- Short Form McGill Pain Questionnaire
- Profile of Mood States (POMS)
- Visual analogue scale for presence
- Visual analogue scale for influence
- Hope Scale
- Success with Life Scale

PHASE II: EXPERIMENT

RESEARCH DESIGN OPERATIONAL DEFINITION:

THERAPEUTIC ASPECT*	INSTRUMENT
Relief from physical symptoms	Short-Form McGill Pain Questionnaire
Stress reduction	Blood pressures: systolic and diastolic Heart rate
Improvement in overall sense of well-being, hopefulness	Profile of Mood States Hope Scale Success with Life Scale

** Cooper Marcus and Barnes 1999*

PHASE II: EXPERIMENT DESIGN

METHODS: SEQUENTIAL MODEL

	A **Pilot group**	**B** **Experiment group**
Who	32 students	109 students
	controlled-yet seeking debriefing feedback and advice	controlled
What	Test effect of nature image on perceived pain and mood	Test effect of nature image on perceived pain and mood
Where	Simulated in-patient hospital room	Simulated in-patient hospital room
How	Psychological & physiological health data correlations with nature images	Psychological & physiological health data correlations with nature images
Results	Process refined due to feedback	Preliminary data towards most therapeutic image(s) category

PHASE II: PILOT EXPERIMENT

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PHASE II: PILOT EXPERIMENT

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PHASE II: PILOT EXPERIMENT

RESULTS

	A Pilot group comments/actions	B Changes for controlled group
	Form fatigue: too many surveys	Administered 4 surveys once instead of twice
	After 60 minutes blood pressure starts rising	Reduced treatment from 90 minutes to 60 minutes
	Language on one survey “odd”; “strange”; “old fashioned”	Removed Zuckerman Thrill Seeking Scale
	Turn monitor away, “I will try to read it”	Altered position of vital sign monitor so participant can’t watch it
	“If you don’t stay in the room during the cold pressor people won’t keep their hand in the ice water”	Investigator stayed in room during 2 minute pain stressor, out of view of participant

PHASE II: CONTROLLED EXPERIMENT

INSTRUMENTS : PSYCHOLOGICAL

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PHASE II: CONTROLLED EXPERIMENT

PSYCH		
Instrument	Short Form McGill Pain Questionnaire	Profile of Mood States (POMS)
Items	15 items 3 scales: sensory (throbbing, shooting), affective (punishing-cruel) and total	65 items 6 subscales
Description	Check a number from 0 “none” to 3 “severe”	Circle a number from 0 “not at all” to 4 “extremely”

PHASE II: CONTROLLED EXPERIMENT

INSTRUMENTS : PHYSIOLOGICAL

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PHASE II: CONTROLLED EXPERIMENT

Name	Description
1. Systolic blood pressure	Systolic pressure is the maximum arterial pressure of the heart. Measurements were taken using an arm cuff and a continuous vital sign tracker and are in millimeters of mercury (mmHg). 15 readings were used for comparison.
2. Diastolic blood pressure	The relaxed state of the heart beat. Measured in millimeters of mercury (mmHg).
3. Heart rate	Heart rate is measured in beats per minute (BPM).
4. Mean Arterial Pressure (MAP)	Describes a notational average blood pressure in an individual. Defined as an average arterial pressure taken during a single cardiac cycle.

PHASE II: CONTROLLED EXPERIMENT

RESEARCH DESIGN PAIN STRESSOR

COLD PRESSOR (INDEPENDENT VARIABLE)

Used in experimental psychology research
Used in cardiovascular research
(McClelland & McCubbin, 2008).

Immerse hand in cooler of ice water (0 C = 32 F) for up to 120 seconds.

If pain is intolerable remove hand early and say “done”.

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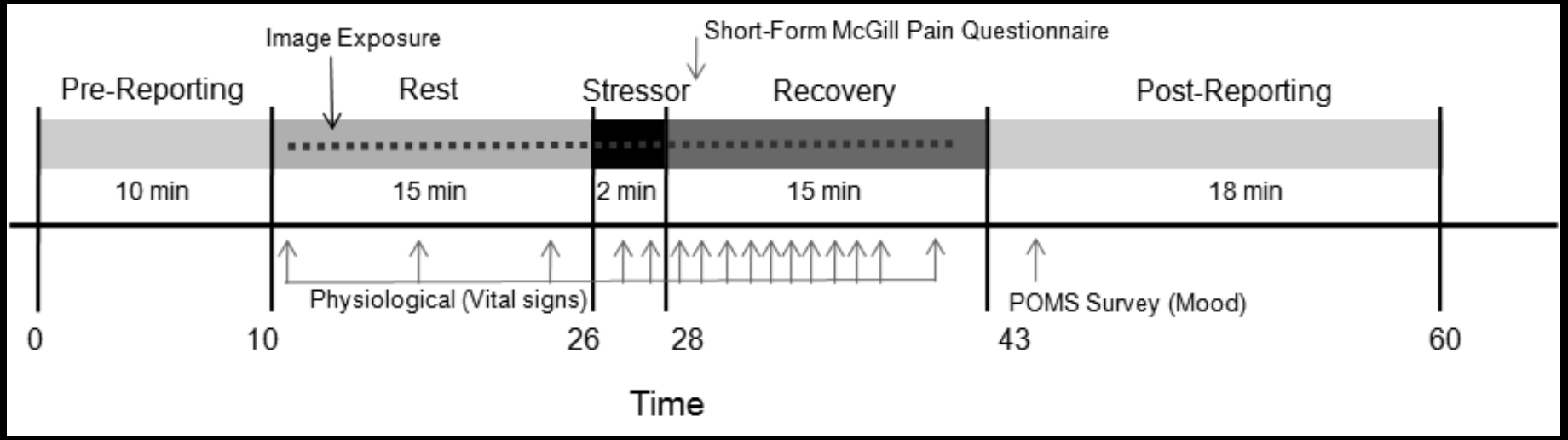
PHASE II: CONTROLLED EXPERIMENT

SCHEDULE OF EVENTS



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PHASE II: CONTROLLED EXPERIMENT

RESULTS : PSYCHOLOGICAL

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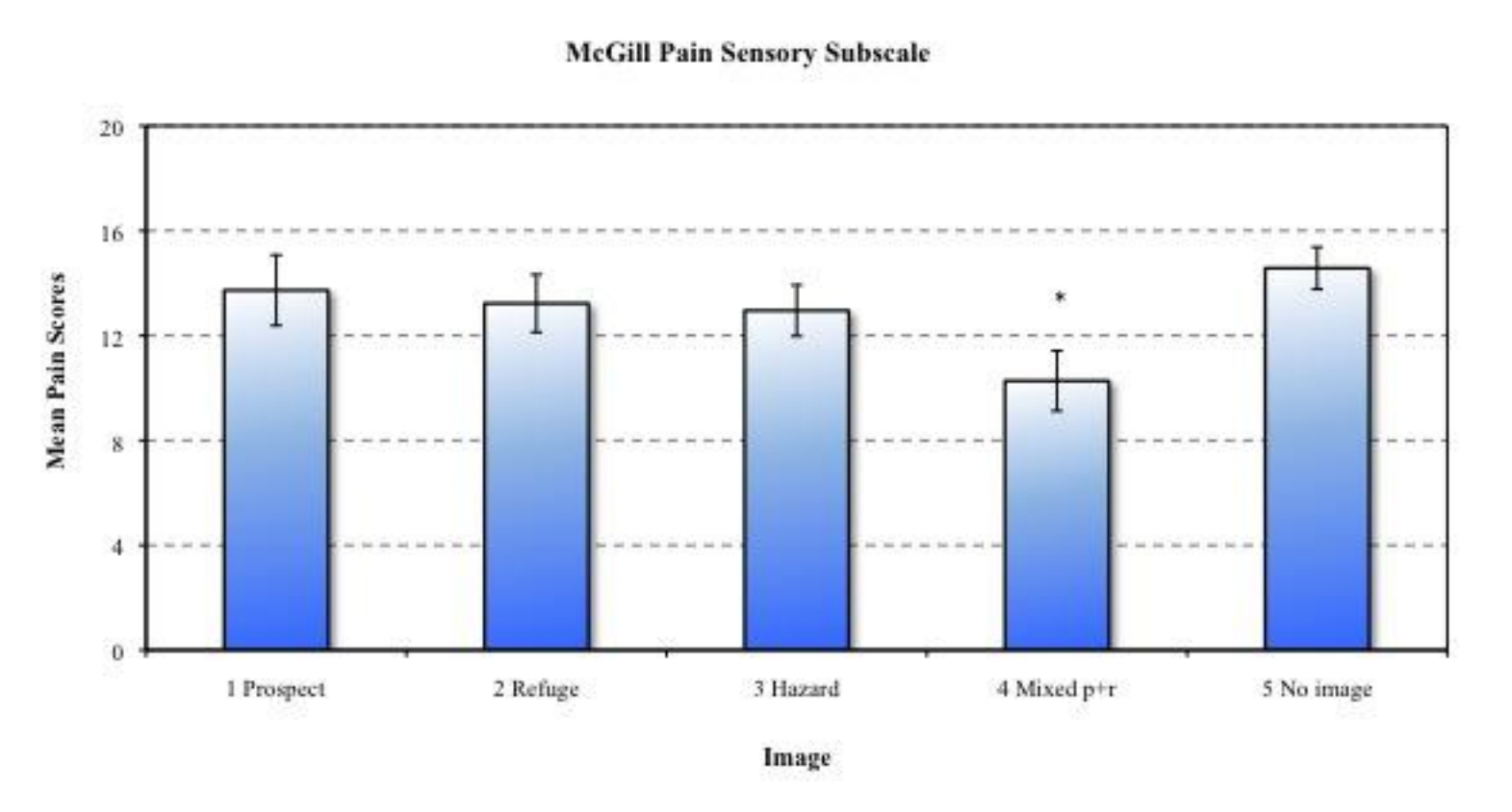
PHASE II: CONTROLLED EXPERIMENT

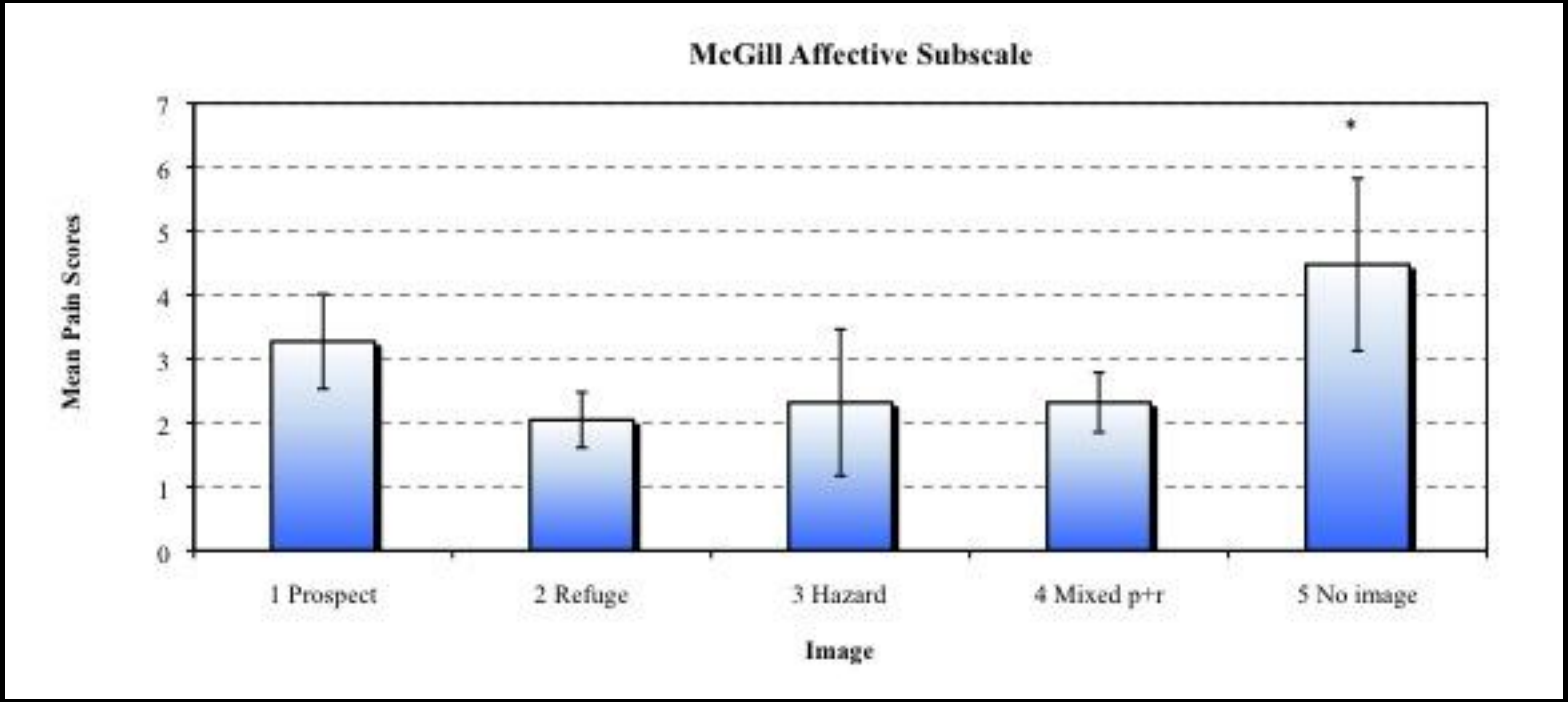
RESULTS: MCGILL SENSORY PAIN SUBSCALE (e.g. throbbing, shooting)



*Statistically significant $\alpha = 0.1$, F Value = 2.22, df = 4, 104 , $P = 0.0715$
Mixed prospect refuge image shows lowest pain levels

PHASE II: CONTROLLED EXPERIMENT

RESULTS: MCGILL AFFECTIVE PAIN SUBSCALE (e.g. sickening, punishing-cruel)

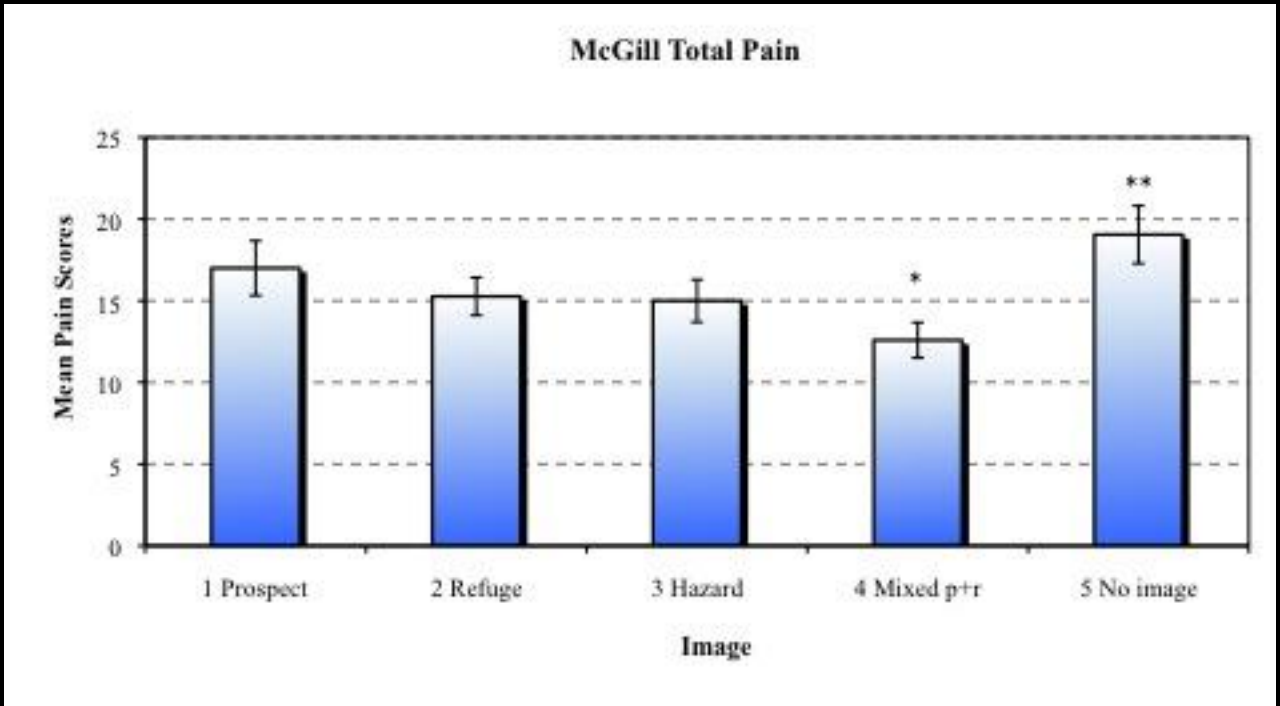


*Statistically significant $\alpha = 0.1$, F Value = 2.98, df = 4, 104. $P = 0.0226$

No Image treatment shows highest pain but prospect is not statistically different from any other treatment .

PHASE II: CONTROLLED EXPERIMENT

RESULTS: MCGILL TOTAL PAIN



*Statistically significant $\alpha = 0.1$, F Value = 2.87, df = 4, 104, $P = 0.0265$

No image treatment is higher than mixed p + r

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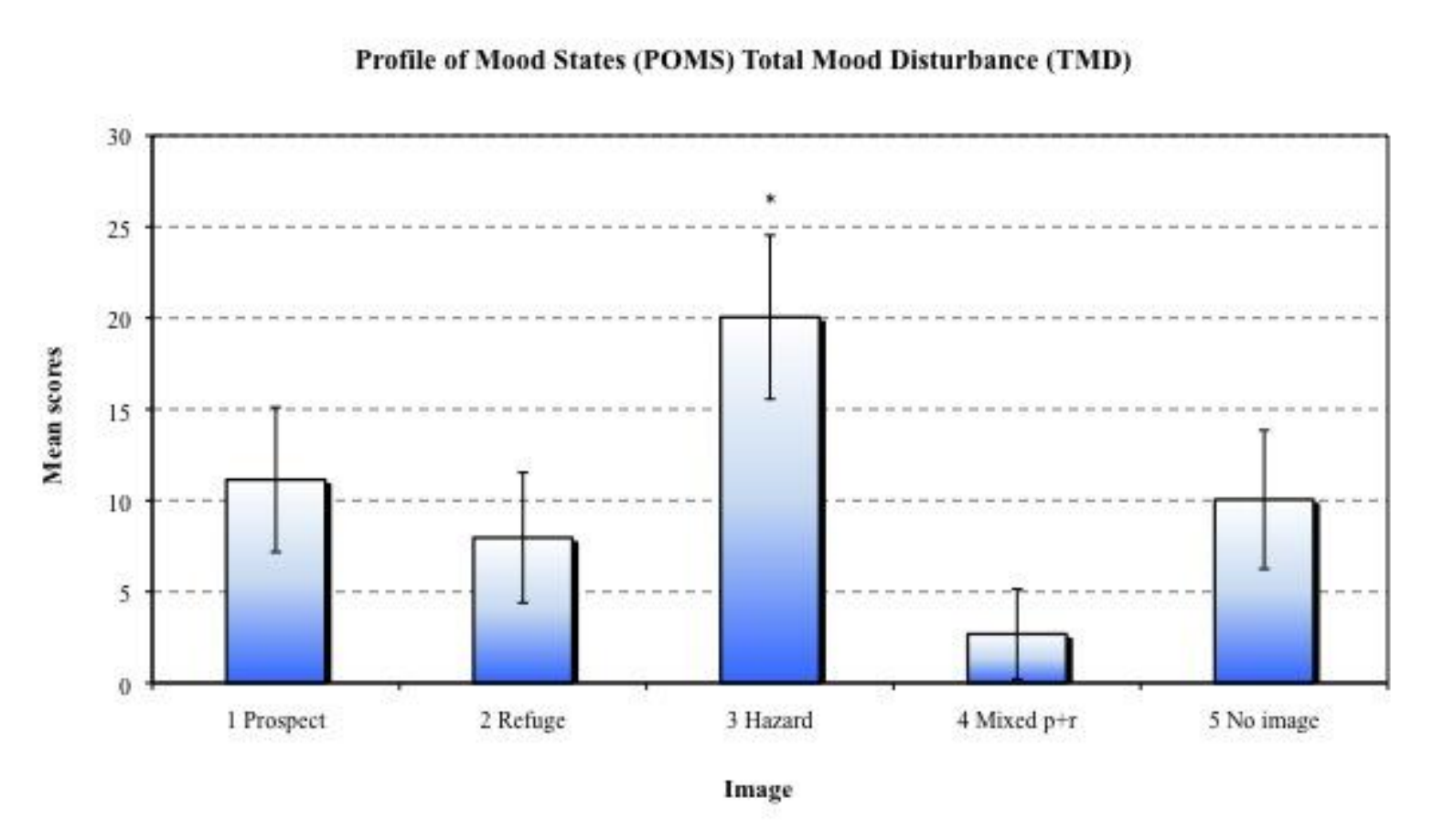
Mixed prospect + refuge

PHASE II: CONTROLLED EXPERIMENT

RESULTS: POMS TOTAL MOOD DISTURBANCE (TMD)



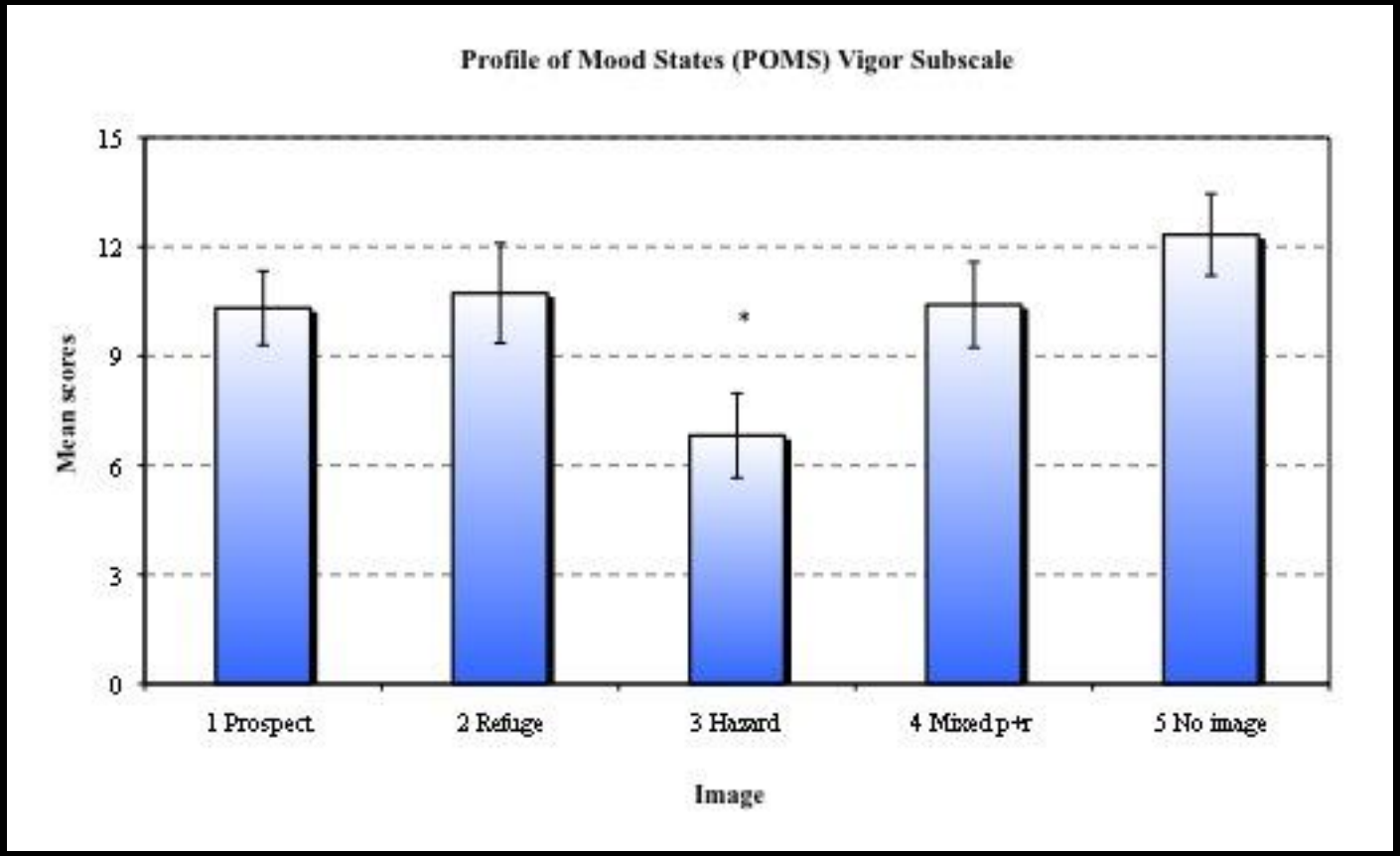
*Statistically significant $\alpha = 0.1$, F Value = 2.90, df = 4, 104, $P = 0.253$
Hazard image has highest total mood disturbance responses

Getty Image

Hazard

PHASE II: CONTROLLED EXPERIMENT

RESULTS: PROFILE OF MOOD STATES (POMS) VIGOR SUBSCALE



*Statistically significant $\alpha = 0.1$, F Value = 2.93, df = 4, 104, $P = 0.0244$

Hazard image shows lowest positive mood responses

PHASE II: CONTROLLED EXPERIMENT

RESULTS: PHYSIOLOGICAL

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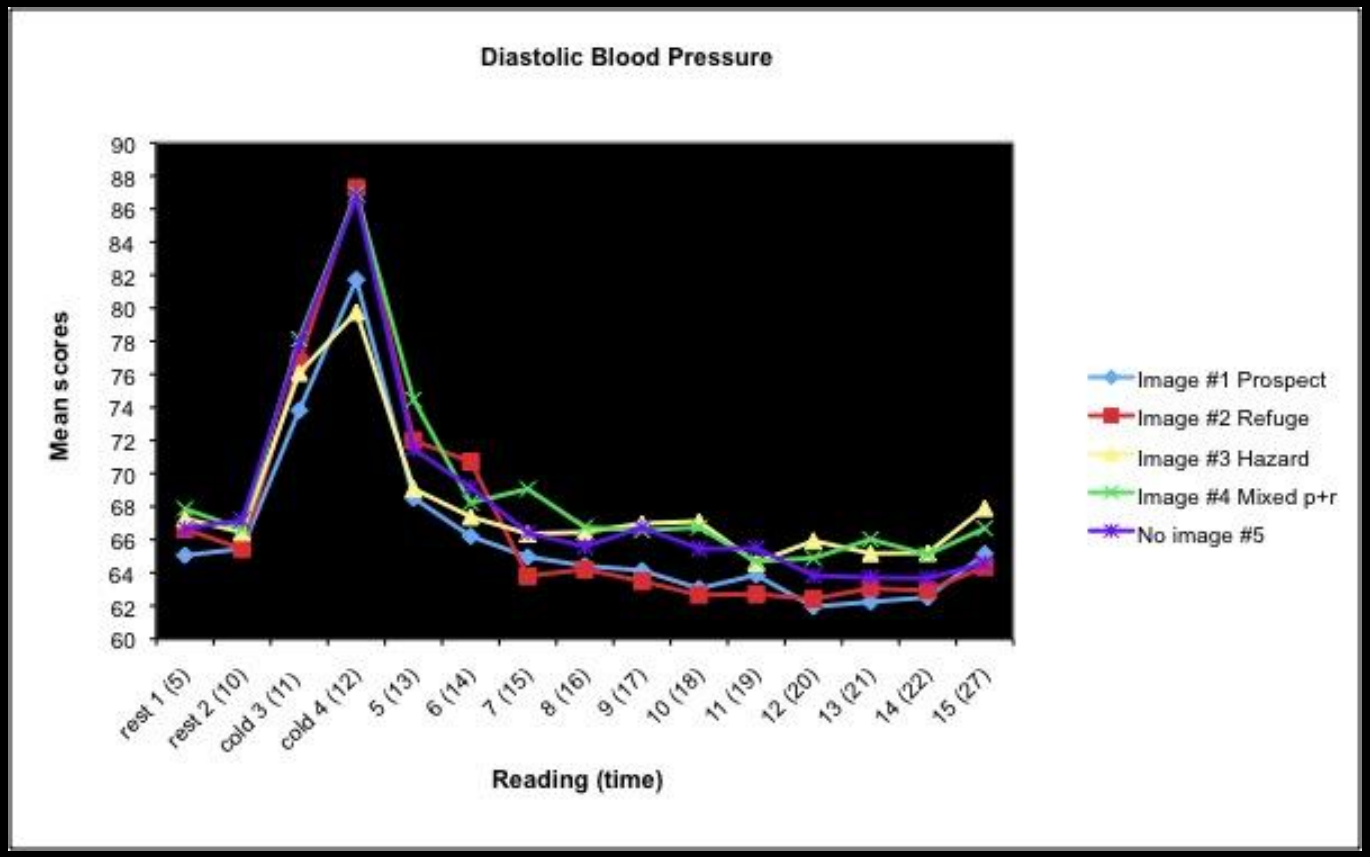
PHASE II: CONTROLLED EXPERIMENT

RESULTS : Diastolic Blood Pressure



*Statistically significant $\alpha = 0.1$ for changes in readings over time

Hazard image is lowest during pain stressor then rises during recovery

PHASE II: CONTROLLED EXPERIMENT

RESULTS: DIASTOLIC BLOOD PRESSURE

Statistics of interaction between reading and image group

Effect	Numerator DF	Denominator DF	F Value	Probability F
Image	4	104	0.57	0.6884
Reading	14	1245	118.88	<.0001**
Image *Reading	56	1245	1.33	0.0561**

**Statistically significant $\alpha = 0.1$, to assess trends for changes over time

Hazard image is lowest during pain stressor then rises during recovery

PHASE II: CONTROLLED EXPERIMENT

RESULTS: EFFECTIVE STRESSOR

Measurement	Difference	Pr > [t]
Systolic	13.7628*	< .0001
Diastolic	14.0398*	<.0001
Heart rate BPM	7.6703*	<.0001
Mean arterial pressure (MAP)	15.6177*	<.0001

*Statistically significant $\alpha = 0.1$
Stressor was very effective

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PHASE II: CONTROLLED EXPERIMENT

	RESEARCH QUESTION& RESULTS
1)	Which nature image categories are most therapeutic as evidenced by reduced pain and positive mood?
Result	Mixed prospect + refuge showed significantly lower sensory pain responses. Hazard received lowest diastolic blood pressure and highest influence responses.
Discussion	No one image clearly was “most” therapeutic. Hazard was not therapeutic due to low level mood responses.

PHASE II: CONTROLLED EXPERIMENT

	FUTURE RESEARCH QUESTION
Question	Why was hazard successful at distracting people from pain?
Discussion	Assess color effect by including sunrise and sunset image rich in yellow and orange in image selection choices. Yellow symbolizes prospect.
Discussion	Imagery effect of heat (fire) and cold (ice water) confounding variable (Turk 2002, Syrjala and Abrams (2002) . Will not be issue in hospital.

PHASE II: CONTROLLED EXPERIMENT

	RESEARCH HYPOTHESES & RESULTS
1)	Nature views are variable in their impact on specific psychological and physiological health status indicators.
Results	Perceived pain levels did vary. “No image” treatment had higher affective pain levels than all but prospect viewers. Sensory pain was lowest for mixed prospect and refuge.

PHASE II: CONTROLLED EXPERIMENT

	RESEARCH HYPOTHESES & RESULTS
2)	Prospect and refuge nature scenes are more therapeutic than hazard nature scenes.
Results	Yes-regarding mood. Mixed prospect + refuge shows potential for reducing sensory pain level perceptions.

PHASE II: PRESENCE & INFLUENCE

	RESEARCH QUESTIONS
1)	Is there a difference in the level of presence between the selected images?
2)	Is there a difference in the level of influence between the selected images?
3)	Is there a correlation between levels of presence and levels of influence?

PHASE III: PRESENCE & INFLUENCE

HYPOTHESIS

Higher degrees of presence and/or influence in the still photograph make it more effective at holding the viewer's attention, which may then distract the viewer from pain.

PHASE III: INFLUENCE

***v.* "To affect or alter" (Merriam Webster, 1989, p. 382)).**

v. "Sway, affect, alter, change, induce, persuade" (Agnes & Laird, 2002, p. 328).

Influence question added because of pilot participant response. Influence of image on thoughts may be easier to comprehend than presence.

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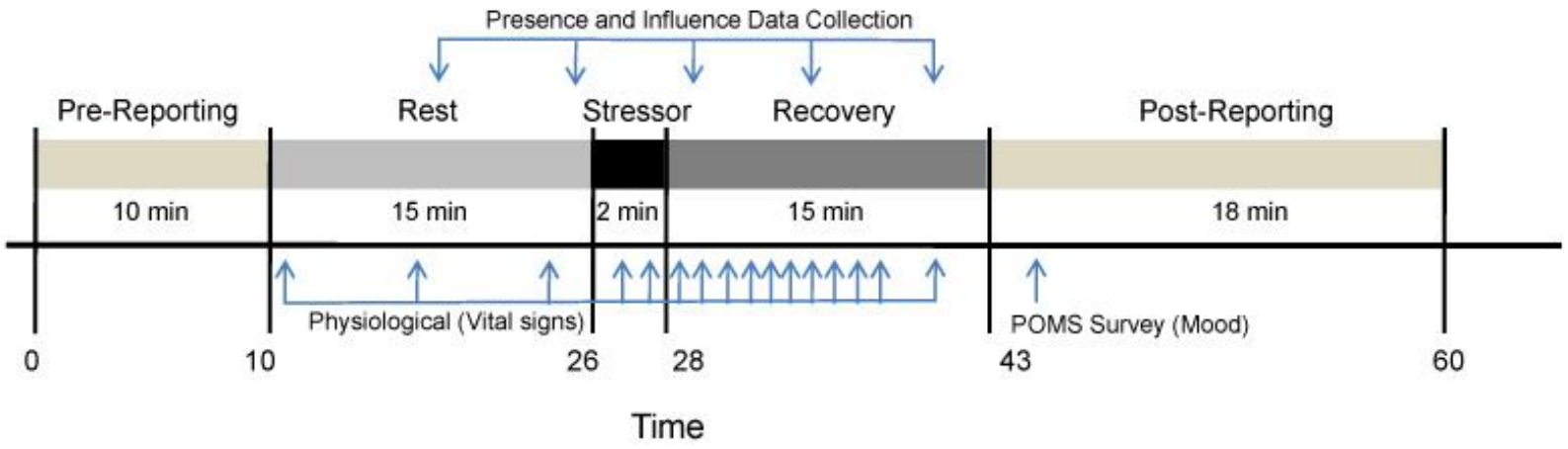
PHASE III: PRESENCE & INFLUENCE

Presence Instrument	Influence Instrument
Presence Visual Analogue Scale (VAS)	Influence Visual Analogue Scale (VAS)
How strong is your sense of presence, ‘bring there’, in the image right now?	How strong is the image at influencing your thoughts, either directly or indirectly right now?

Vertical slash responses were made on a 10-cm. line anchored by terms “extremely weak” and “extremely strong.”
Responses were measured with a ruler and assigned a number.

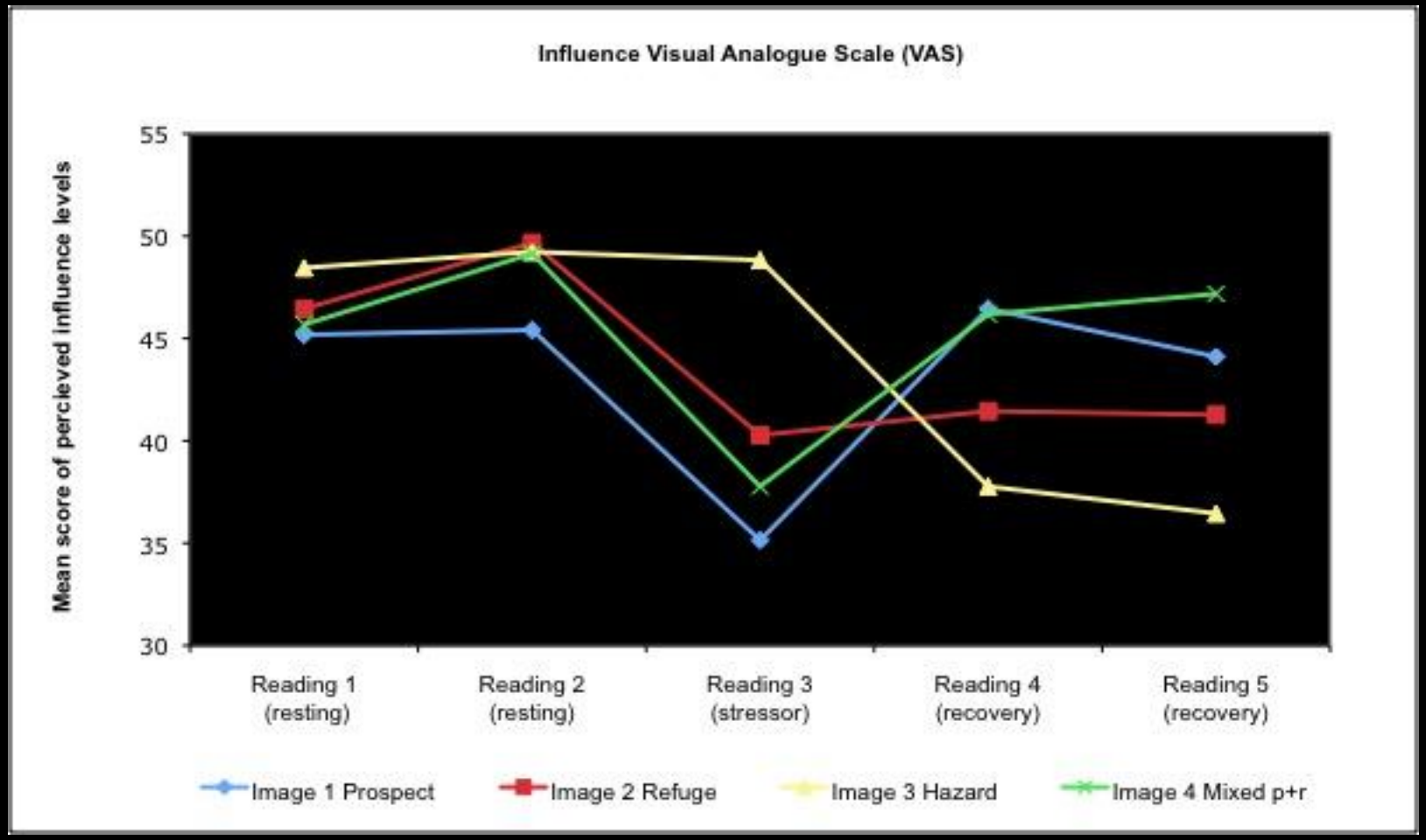
PHASE III: PRESENCE & INFLUENCE

EXPERIMENT SCHEDULE



PHASE III: INFLUENCE

RESULTS : INFLUENCE VISUAL ANALOGUE SCALE (VAS)



- Statistically significant $\alpha = 0.1$ Changes in readings over time

Hazard image shows most influence during pain and drops during recovery

PHASE III: PRESENCE & INFLUENCE

RESULTS: INFLUENCE VISUAL ANALOGUE SCALE (VAS)

Statistics of influence response for image and reading
Mixed model analysis of variance with a repeated measure design

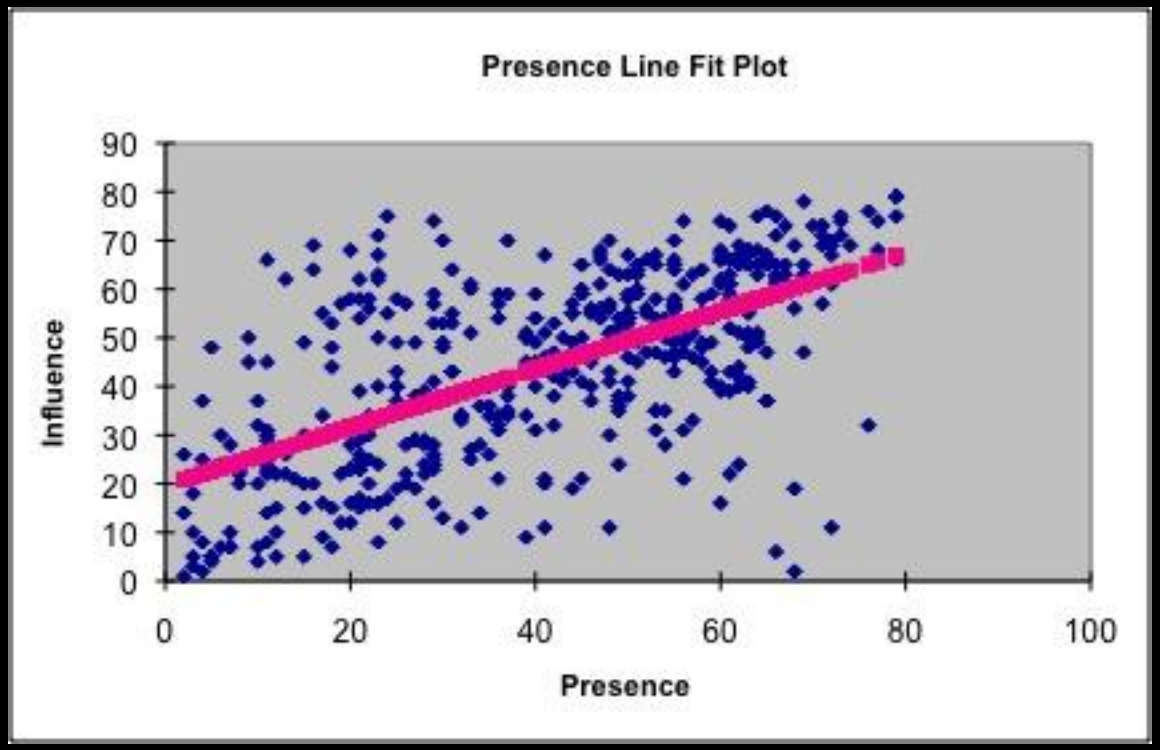
Effect	Numerator DF	Denominator DF	F Value	Probability F
Image	3	83.9	0.07	0.9745
Reading	4	332.0	4.29	0.0021**
Image *Reading	12	332.0	1.95	0.0277**

**Statistically significant $\alpha = 0.1$ to assess trends for changes over time.

Hazard image showed highest influence responses during pain and least during recovery

PHASE III: PRESENCE & INFLUENCE

RESULTS: CORRELATION



Statistically significant (α = 0.1) to assess trends
Moderate to strong correlation (r = .62, $P < 0.0001$)
Presence and influence rose and fell together a significant portion of the time.

PHASE III: PRESENCE & INFLUENCE

RESEARCH QUESTIONS & RESULTS

	PRESENCE
1)	Is there a difference in the level of presence between the selected images?
Result	No statistical difference found
Discussion	Levels may be equal due to rigorous image selection process Concept of presence may have been difficult to comprehend

PHASE III: PRESENCE & INFLUENCE

RESEARCH QUESTIONS & RESULTS

	INFLUENCE
2)	Is there a difference in the level of influence between the selected images?
Result	Yes. Influence was significantly higher for image group (3) ‘hazard’ over time. It was highest during the cold pressor and lowest during recovery.
Discussion	Forest fire may have high arousal and distraction potential. Use of imagery (heat and cold) to reduce pain may have been used by some participants (Turk 2002).

PHASE III: PRESENCE & INFLUENCE

RESEARCH QUESTIONS & RESULTS

	PRESENCE & INFLUENCE
3)	Is there a correlation between levels of presence and levels of influence?
Result	Yes. A moderate to strong correlation (*r* = *.62*) was found between perceived presence and influence in this study.
Discussion	It is not known at this time whether this correlation is coincidence or not. Additional studies are needed.

RESEARCH HYPOTHESIS

1	Higher degrees of presence and influence in the still photograph make it more effective at holding the viewer's attention, which may then distract the viewer from pain.
Result + Discussion	Yes, as evidenced by the hazard image. But hazard was not "therapeutic" due to a quick plummet in influence and high mood disturbance reports.

RESEARCH DESIGN LIMITATIONS

External generalization to other populations not possible with one study and small sample size.

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C O N T R I B U T I O N S

(1) Methodology for selecting images presented.

(2) Methodology for testing effects of nature images on health presented.

(3) Adding empirical research data to interdisciplinary field .

(4) Introduces nature into healthcare settings to reduce stress and pain.

(5) Evidence based outcomes for designers and hospital personnel responsible for selecting art work for the healthcare setting.

Informs future study with patient population in the hospital setting.

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CONTRIBUTIONS

DATE	CONFERENCE PRESENTATIONS
2008. 6	INTERDISCIPLINARY SOCIAL SCIENCES CONFERENCE, PRATO, ITALY
2008. 9	URBAN & COMMUNITY FORESTY COUNCIL ANNUAL CONFERENCE, GREENVILLE, SC
2009. 5	INTERNATIONAL HEALTHCARE CONFERENCE, ROTTERDAM,THE NETHERLANDS
2009. 5	EDRA 40, KANSAS CITY, MO
2009. 11	HEALTHCARE DESIGN CONFERENCE, ORLANDO, FL

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CONTRIBUTIONS

DATE	PAPERS
2009. 6	Vincent, E., Battisto, D., & Grimes, L. (2009b). The effects of presence and influence in nature images in a simulated hospital patient room. *Health Environments Research and Design Journal*; *Special Edition for 3TU Healthcare Design Conference, Rotterdam, The Netherlands*. In submission.
2009. 6	Vincent, E., Battisto, D., & Grimes, L., McCubbin, J. (2009). Effects of nature images on pain in a simulated hospital patient room. *Health Environments Research and Design (HERD) Journal.* In submission.
	Vincent, E.,& Battisto, D. (2009). 30+ Year Timeline for Key Events for Therapeutic Benefits of Nature. In preparation.
	Vincent, E., Battisto, D., & Grimes, L. (2009a). A methodology for selecting nature images for Appleton's prospect refuge theory. In preparation.
	Vincent, E, Battisto, D., & Nadenicek, D.(2009). History of Therapeutic Landscapes. In preparation.

Ellen Vincent

RESEARCH CONTINUUM

NEXT STEPS	PHASES	POPULATION	TIME
Replicate study in hospital	Phase I- Sorting task Phase II- Experiment	In-patient	2009
Replicate study in multiple hospitals	Phase I- Sorting task Phase II- Experiment	In-patient	2010-2011

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THANK YOU

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