

Building Mental Resilience in the Health Club Environment

Karlie Intlekofer, PhD

Karlie.Intlekofer@Matrixfitness.com

Global Research Scientist

Rick Muhr

rickmbmw@gmail.com

Matrix Brand Ambassador



#IHRSA2023

STRESS

- Perception that events are beyond your control
- Aversive for a reason
- Prevalence of stress-related mental health issues





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STRESS

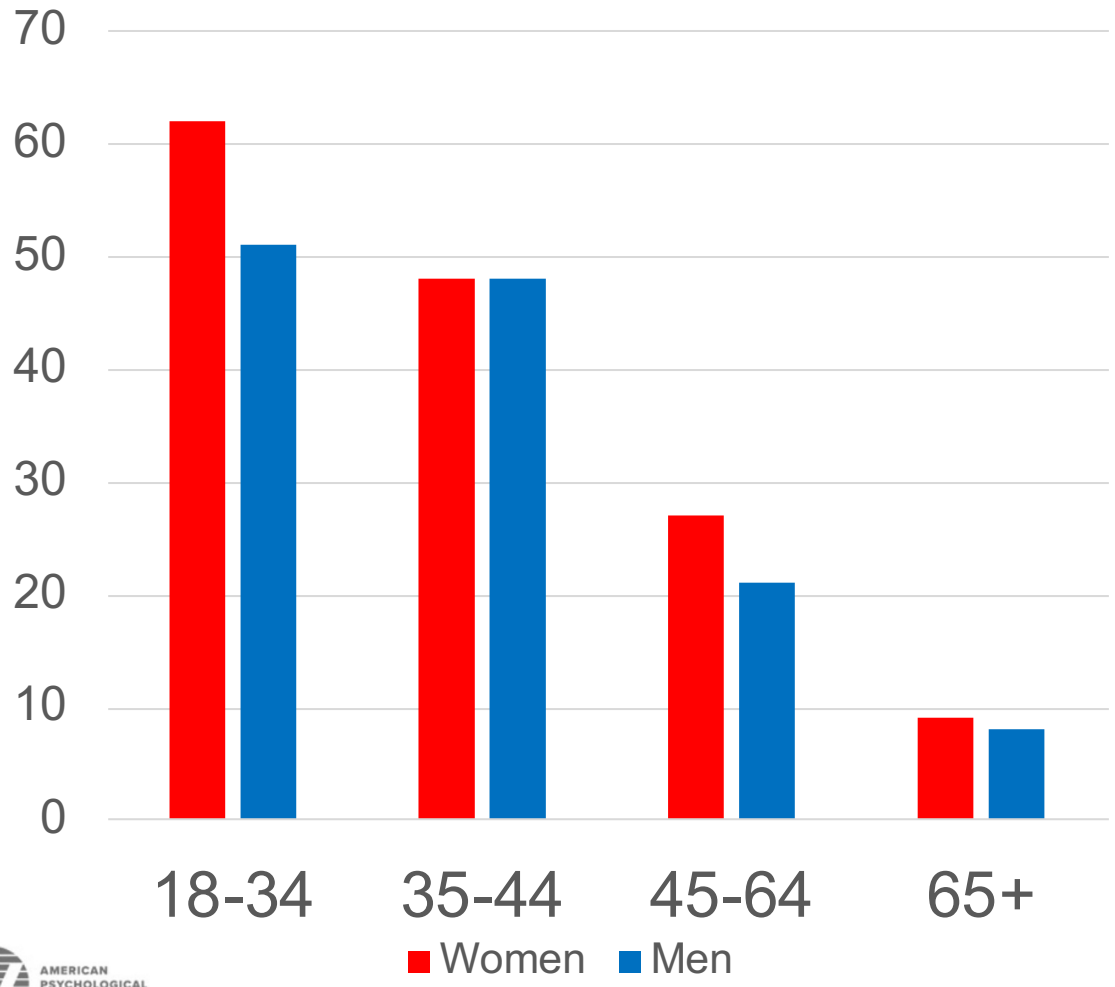
- Prevalence of stress-related mental health issues



STRESS



% of **women** & **men**: “most days, I am completely overwhelmed by stress”



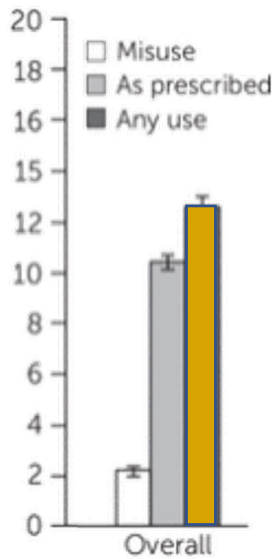
Regular exercise can *reinstate* the feel-good brain chemicals that are depleted by chronic stress and pain



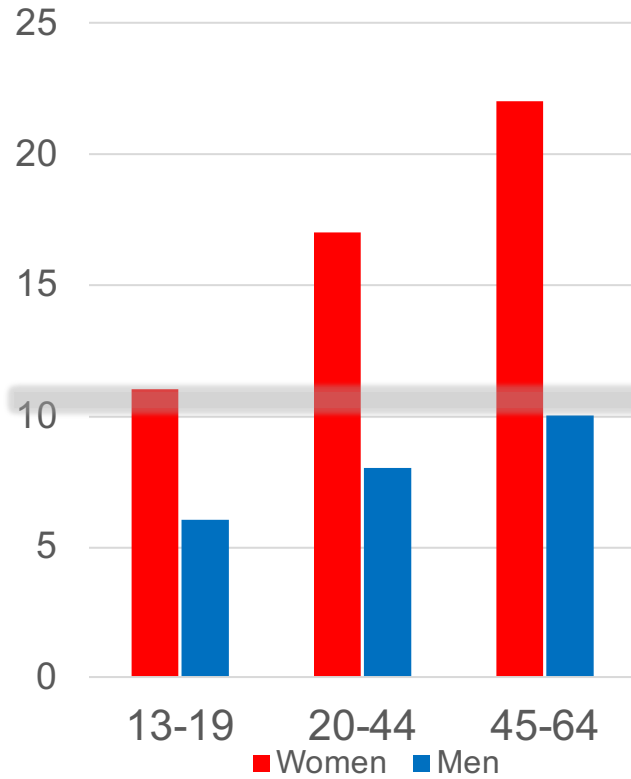
STRESS

Anxiety and depression are common

13% use *Benzos* **11%** use *Antidepressants*



NSDUH



EVERNORTH.



STRESS

- Our response to stress and pain can either reduce or amplify it
- How we think about our situation impacts our recovery timeline

Avoid & Withdraw: Delay, deny, distract

Catastrophize: Amplifies and prolongs pain & stress; helpless + repetitive negative thoughts, see self as victim

Take Action: Empowered individuals accept reality and take steps to secure what they need; will adjust routine to change course, focus on today vs past/future



STRESS

Top athletic performance is developed by **cycles of stress and recovery**, a willingness to adjust routines, ability to focus on what we can control



STRESS

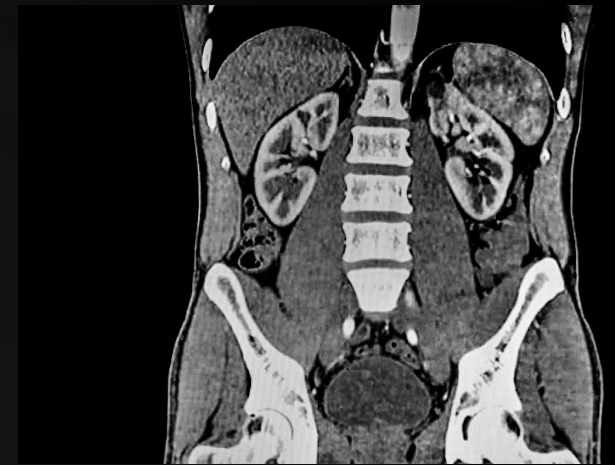
Mental Resilience is developed by **cycles of stress and recovery**, a willingness to adjust routines, ability to focus on what we can control





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STRESS & PAIN

- Lowers our goal-drive, makes us seek the comfort of old habits

Follow through
Resist impulses
Focus
Get it done!
Let's move!



Threats impair frontal lobe in favor of quick fixes for emotional relief

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Chronic stress may facilitate the recruitment of habit- and addiction-related neurocircuits through neuronal restructuring of the striatum

S.B. Taylor^{a,c,1}, J.M. Anglin^a, P.R. Paode^a, A.G. Riggert^a, M.F. Olive^{a,b}, and C.D. Conrad^{a,b,1}

^aDepartment of Psychology, Arizona State University, Tempe, AZ USA
^bInterdisciplinary Graduate Program in Neuroscience, Arizona State University, Tempe, AZ USA

Abstract

Chronic stress is an established risk factor in the development of addiction. Addiction is characterized by a progressive transition from casual drug use to habitual and compulsive drug use. The ability of chronic stress to facilitate the transition to addiction may be mediated by increased engagement of the neurocircuits underlying habitual behavior and addiction. In the present study, striatal morphology was evaluated after two weeks of chronic variable stress in male Sprague-Dawley rats. Dendritic complexity of medium spiny neurons was visualized and quantified with Golgi staining in the dorsolateral and dorsomedial striatum, as well as in the nucleus accumbens core and shell. In separate cohorts, the effects of chronic stress on habitual behavior and the acute locomotor response to methamphetamine were also assessed. Chronic stress resulted in increased dendritic complexity in the dorsolateral striatum and nucleus

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Beyond pain: modeling decision-making deficits in chronic pain

Leonardo Emanuel Hess^{1,2*}, Ariel Haimovici^{3,4}, Miguel Angel Muñoz^{2,5} and Pedro Montoya²

¹ Training and Research for Argentine Medical Association (ICAM), Faculty of Medical Sciences, National University of Rosario (UNR), Rosario, Santa Fe, Argentina
² Research Institute on Health Sciences (IINCS), University of Buenos Aires (UBA), Palma, Spain
³ Departamento de Física, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Física, Buenos Aires, Argentina
⁴ Consejo Nacional de Investigaciones Científicas y Tecnológicas (CONICET), Buenos Aires, Argentina
⁵ Departamento de Personalidad, Evaluación y Tratamiento Psicológico, University of Granada, Granada, Spain

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Nils Birbaumer, University of Tübingen, Germany
***Correspondence:** Leonardo Emanuel Hess, Training and Research for Argentine Medical Association (ICAM), Faculty of Medical Sciences, National University of Rosario (UNR), Av. Santa Fe 3100, 2000 Rosario, Santa Fe, Argentina.
e-mail: leonardohess@gmail.com

Risky decision-making seems to be markedly disrupted in patients with chronic pain, probably due to the high cost that impose pain and negative mood on executive control functions. Patients' behavioral performance on decision-making tasks such as the Iowa Gambling Task (IGT) is characterized by selecting cards more frequently from disadvantageous than from advantageous decks, and by switching often between competing responses in comparison with healthy controls (HCs). In the present study, we developed a simple heuristic model to simulate individuals' choice behavior by varying the level of decision randomness and the importance given to gains and losses. The findings revealed that the model was able to differentiate the behavioral performance of patients with chronic pain and HCs at the group, as well as at the individual level. The best fit of the model in patients with chronic pain was yielded when decisions were not based on previous choices and when gains were considered more relevant than losses. By contrast, the best account of the available data in HCs was obtained when decisions were based on previous experiences and losses loomed larger than gains. In conclusion, our model seems to provide useful information to measure each individual participant extensively, and to deal with the data on a participant-by-participant basis.

Keywords: chronic pain, decision-making, modeling, cognition, emotion

STRESS & PAIN

Follow through
Resist impulses
Focus
Get it done!
Let's move!



Exercise helps us change our mind

Stress-induced changes in human decision-making are reversible

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© 2012 Maudsley Hospital NHS Trust. All rights reserved 2156-2181/12
www.nature.com/tp

JM Soares^{1,2,3,4}, A Sampao^{1,2,3}, LM Ferreira^{1,2,3}, NC Santos^{1,2,3}, F Marques^{1,2,3}, JA Palma^{1,2,3}, JJ Cerqueira^{1,2,3} and N Sousa^{1,2,3}

Appropriate decision-making relies on the ability to shift between different behavioral strategies according to the context in which decisions are made. A cohort of subjects exposed to prolonged stress, and respective gender- and age-matched controls, performed an instrumental behavioral task to assess their decision-making strategies. The stressed cohort was reevaluated after a 4-week stress-free period. The behavioral analysis was complemented by a functional magnetic resonance imaging (fMRI) study to detect the patterns of activation in corticostriatal networks ruling goal-directed and habitual actions. Using structural MRI, the volumes of the main cortical and subcortical regions implicated in instrumental behavior were determined. Here we show that chronic stress biases decision-making strategies in humans toward habits, as choices of stressed subjects become insensitive to changes in outcome value. Using functional imaging techniques, we demonstrate that prolonged exposure to stress in humans causes an imbalanced activation of the networks that govern decision processes, shifting activation from the associative to the sensorimotor circuits. These functional changes are paralleled by atrophy of the medial prefrontal cortex and the caudate, and by an increase in the volume of the putamen. Importantly, a longitudinal assessment of the stressed individuals showed that both the structural and functional changes triggered by stress are reversible and that decisions become again goal-directed.

Translational Psychiatry (2012) 2, e131; doi:10.1038/tp.2012.59; published online 3 July 2012

Introduction

The ability to mount an appropriate response to stress is vital for the survival of every living organism. However, when the homeostatic mechanisms to cope with stressful stimuli are disrupted, either because the individual has a particular vulnerability or because the response system is exhausted by a continuous activation, maladaptive responses take place and predispose to cognitive impairment and even to pathological conditions.^{1–3} Maladaptive stress affects cognitive behavior through sequential structural modulation of brain networks, mainly as a consequence of the release of corticosteroids.^{4,5} In fact, several studies have revealed stress-induced deficits in spatial reference- and working-memory and behavioral flexibility,^{6,7} these behavioral changes are attributed to epigenetic/methylation in both the hippocampus⁸ and the medial prefrontal cortex.⁹ Recently, we showed, in

that chronic stressed rats display an atrophy of the associative network (medial prefrontal cortex and dorsomedial striatum), in parallel with a hypertrophy of the dorsolateral (sensorimotor) striatum and the most lateral portions of the orbitofrontal cortex. In addition, the structural changes were associated with a bias in decision-making strategies, as behaviors in stressed rats rapidly shifted from goal-directed actions to habits.¹⁰

This automatization of recurring decision processes into stereotypic behaviors or habits caused by exposure to stress can be viewed as 'advantageous', as it increases behavioral efficiency by releasing cognitive resources for more demanding tasks.¹⁰ Typically, habitual responses do not require the evaluation of their consequences and can be elicited by particular situations or stimuli.^{11,12} However, to adapt to ever-changing life conditions, the ability to select the

Thalamic Atrophy Associated With Painful Osteoarthritis of the Hip Is Reversible After Arthroplasty

A Longitudinal Voxel-Based Morphometric Study

Stephen E. Gwilym, Nicola Filippini, Gwenaëlle Douaud, Andrew J. Carr, and Irene Tracey

Objective: Voxel-based morphometry (VBM) is a method of assessing brain gray matter volume that has previously been applied to various chronic pain conditions. From this previous work, it appears that chronic pain is associated with altered brain morphology. The present study was undertaken to assess these potential alterations in patients with painful hip osteoarthritis (OA).

Methods: We studied 16 patients with unilateral right-sided hip pain, before and 9 months after hip arthroplasty. This enabled comparison of gray matter volume in patients with chronic musculoskeletal pain versus healthy controls, as well as identification of any changes in volume following alleviation of pain (after surgery). Assessment involved self-completion questionnaires to assess pain, function, and psychosocial variables, and magnetic resonance imaging scanning of the brain for VBM analysis.

Results: Significant differences in brain gray matter volume between healthy controls and patients with painful hip arthritis were seen. Specifically, areas of the thalamus in patients with chronic OA pain exhibited preoperative changes were compared with the brain morphology of the patients 9 months after surgery, the areas of reduced thalamic gray matter volume were found to have "reversed" to levels seen in healthy controls.

Conclusion: Our findings confirm that gray matter volume changes reverse after hip arthroplasty and are associated with decreased pain and increased function. These findings have potential implications with regard to optimizing the timing of orthopedic interventions such as arthroplasty.

Patients with a wide range of chronic pain conditions have been studied using brain imaging techniques, in order to better understand the causes, mechanisms, and potential effects of experiencing pain on central nervous system structure, function, and neurochemistry (1). It is now well accepted that neuroplastic changes occur during and subsequent to the transition



STRESS & PAIN

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Resist impulses
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Let's move!



Exercise helps us change our mind

frontiers
in Aging Neuroscience

ORIGINAL RESEARCH
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8 weeks → better blood flow, self-control, focus

Aerobic Exercise Training Improves Cerebral Blood Flow and Executive Function: A Randomized, Controlled Cross-Over Trial in Sedentary Older Men

Jordi P. D. Kleinloger¹, Ronald P. Mensink¹, Dimo Ivanov¹, Jos J. Adami¹, Kamil Uludağ^{2,3} and Peter J. Joris^{1*}

¹ Department of Nutrition and Movement Sciences, MTRIM School of Nutrition and Translational Research in Metabolism, Maastricht University, Maastricht, Netherlands, ² Department of Cognitive Neuroscience, Faculty of Psychology and Neuroscience, Maastricht University, Maastricht, Netherlands, ³ Department of Biomedical Engineering, H. Carter, Sangjiunghwan University, Suwon, South Korea, ⁴ Techno Institute & Koerner Scientist in MRI Imaging, University Health Network, Toronto, ON, Canada

Background: Physical activity may attenuate age-related cognitive decline by improving cerebrovascular function. The aim of this study was therefore to investigate effects of aerobic exercise training on cerebral blood flow (CBF), which is a sensitive physiological marker of cerebrovascular function, in sedentary older men.

Methods: Seventeen apparently healthy men, aged 60–70 years and with a BMI

OPEN ACCESS

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Journal of Personalized Medicine

MDPI

Article

A Novel Intensity-Based Approach to Increasing Prefrontal Cerebral Oxygenation by Walking Exercise

Ya-Wen Hsiao^{1,2,†}, Hsin-Ya Tzeng^{1,2,†}, Chi-Ming Chu^{3,4,5,6,7,8}, Hsiang-Yun Lan^{1,3} and Hui-Hsun Chiang^{1,4*}

¹ School of Nursing, National Defense Medical Center, No 161, Sec. 6, Minquan E. Road, Neihu Dist., Taipei 11490, Taiwan; AAAAA190702@gmail.com (Y.-W.H.); a992036201@gmail.com (H.-Y.T.); shunyan1@gmail.com (H.-Y.L.)
² Department of Nursing, Tri-Service General Hospital, No 325, Sec. 2, Chengong Rd., Neihu Dist., Taipei 10490, Taiwan
³ Division of Biostatistics and Medical Informatics, Department of Epidemiology, School of Public Health, National Defense Medical Center, Taipei 114201, Taiwan; chuchiming@web.de
⁴ Graduate Institute of Life Sciences, National Defense Medical Center, Taipei 114201, Taiwan
⁵ Graduate Institute of Medical Sciences, National Defense Medical Center, Taipei 114201, Taiwan
⁶ Big Data Research Center, Fu Jen Catholic University, New Taipei City 242062, Taiwan
⁷ Department of Public Health, School of Public Health, China Medical University, Taichung 404328, Taiwan
⁸ Department of Public Health, Kaohsiung Medical University, Kaohsiung 807378, Taiwan
* Correspondence: huihsunchiang@mail.ndmctgh.edu.tw; Tel.: +886-2-87923100 (ext. 18761)
† These authors contributed equally to this work.

Abstract: Regional cerebral blood flow (rCBF) increases after moderately intense exercise and is significantly correlated with cognitive function. However, no intensity-based physiological indicator for enhancing rCBF during low- to moderate-intensity exercise has been proposed. The purpose of this study was to develop a physiological indicator housed in a wearable device to determine whether low-to-moderate intensity walking can increase rCBF. A cross-sectional study with four parallel arms was performed. Each of 114 participants was randomly assigned to either the moderate, low-to-moderate, low, or very low walking intensity groups. A novel dynamic cardiac force meter (CFM) was used to quantify walking intensity. Heart rate and hemodynamic parameters (HEC) were

check for updates

Citation: Hsiao, Y.-W., Tzeng, H.-Y., Chu, C.-M., Lan, H.-Y., Chiang, H.-H. A Novel Intensity-Based Approach to Increasing Prefrontal Cerebral

MATRIX



MATRIX



MATRIX

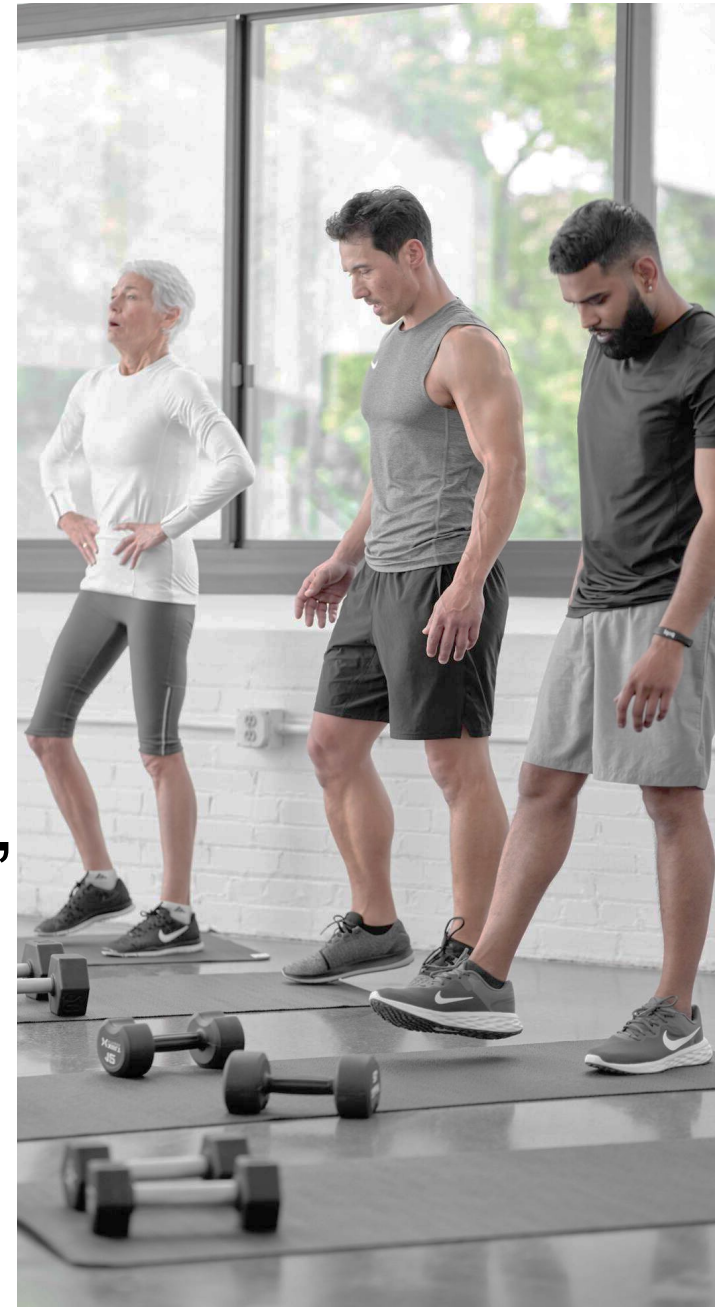
GYM ENVIRONMENT

- **Friendless in 1990: 3% vs 2021: 12%**
- Loneliness protective factor: The quality of daily interactions with others
- **Social bonds: In-person > voice only > text only**



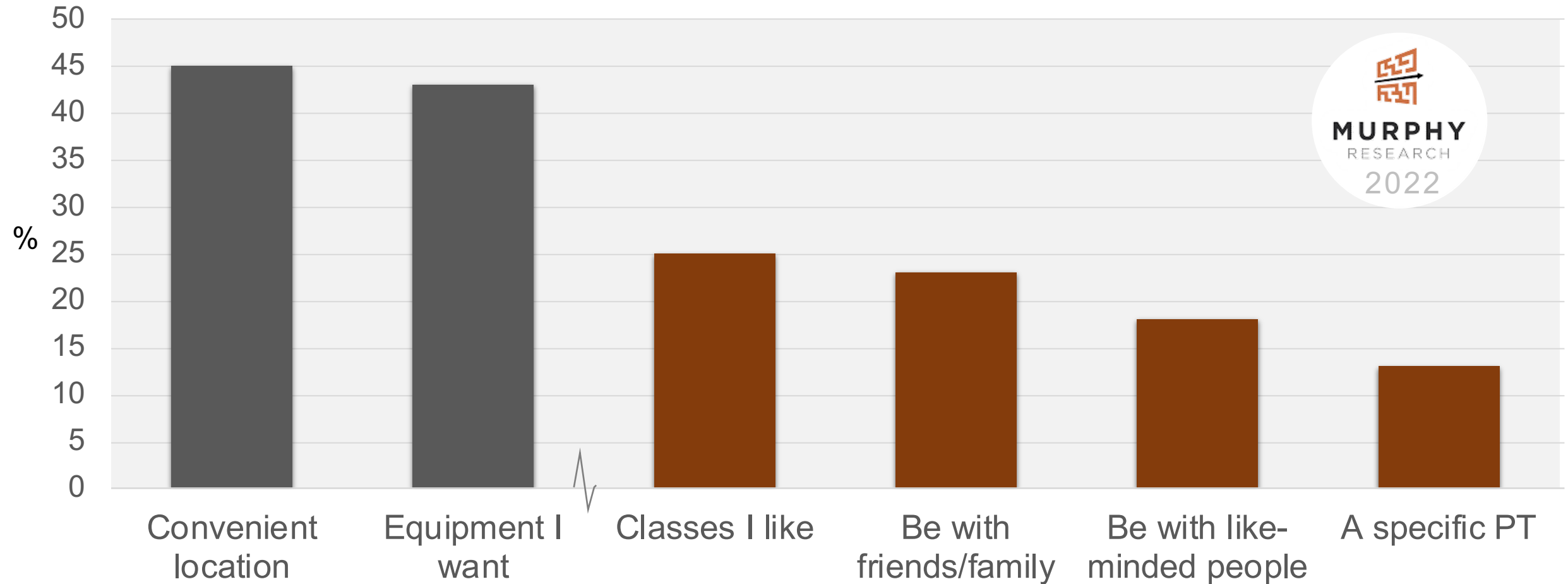
GYM ENVIRONMENT

- Sense of community
- **Inspiration, wisdom, appreciation**
- Group exercise *adherence* advantages
Best when classes attract similar ages or interests
- Support social interactions in overflow areas, discounts at nearby coffee shops / cafes



GYM ENVIRONMENT

- Consumer value equation: What brings them in?
- **A desire for *shared experiences* is a selection criterion**



GYM ENVIRONMENT

A man in a red t-shirt is running on a treadmill in a gym. The background shows other treadmills and gym equipment, with a bright, modern interior.

Autonomy: Individual choice

Most enjoyable class, equipment...

Why they choose to make gym visits a priority?

Competence: Gym visits help me because _____

What are they gaining as a result?

What skills are they developing?

Relatedness: We support each other here!

Favorite hobbies, foods, restaurants, music...

Celebrate members and make connecting a little easier

GYM ENVIRONMENT



Stress Management:

Short workouts *work!*

Low-intensity workouts *work!*

**Does your team know
how to advise for these?**

GYM ENVIRONMENT

Elevate a positive message

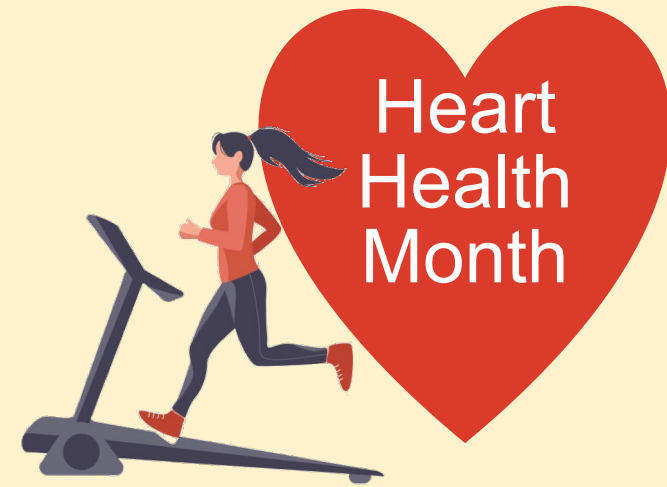
- Volunteer opportunities
- Train for a cause



GYM ENVIRONMENT

Elevate a positive message

- Health awareness by month
- Member spotlight



**Exceptional members of your community
don't give up...
give back to others...
overcome setbacks**



GYM ENVIRONMENT

Healthy stress coping skills

Improve physical and mental health

Fosters social connection, community

RESILIENCE





Building Mental Resilience in the Health Club Environment



Karlie Intlekofer, PhD

Karlie.Intlekofer@Matrixfitness.com
Global Research Scientist

Rick Muhr

rickmbmw@gmail.com
Matrix Brand Ambassador