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The Relationship Between Mindful Awareness and Cognitive Performance among U.S. Military Service Members and Veterans

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U.S. ARMY RDECOM Mindfulness ARL

- Awareness of one's physical, cognitive, and emotional states, as well as the environment and events experienced in the present moment
- With practice, individuals learn to recognize their response patterns and respond deliberately, rather than "mindlessly reacting"



Paying attention, in a particular way, to the present moment, non-judgmentally
 J Kabat-Zinn

Assists with self-reported:
 Stress
 Anxiety
 Depression
 Pain

MEDITATION

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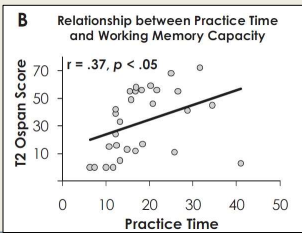
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U.S. ARMY RDECOM Mindfulness & Cognition ARL

Does mindfulness training enhance cognitive abilities?

- Jha et al. (2010) examined the effect of 8-week MMFT program on active duty U.S. military personnel's self-reported affect and working memory span.
- Participants who maintained regular practice of mindfulness techniques had higher working memory span task scores relative to those who did not practice regularly (dose response).



Source: Jha et al., 2010, p. 58

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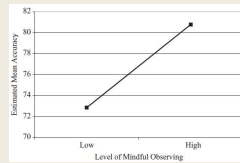
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U.S. ARMY RDECOM Dispositional Mindfulness ARL

Is cognitive performance associated with trait mindfulness?

- Chambers et al (2007): self-reported mindful attention was associated with increased backward digit span and word count performance. Short-term memory
- Anicha et al. (2012):
 - Self-reported observing was positively associated with increased perceptual accuracy & temporal order
 - Self-reported non-reactivity was positively associated with cognitive control flexibility.

Source: Anicha et al. (2012, p.265)




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U.S. ARMY RDECOM Purpose ARL

To Investigate the Relationship between Mindfulness and Cognition in a Sample Of U.S. Military Active Duty and Veteran Personnel




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- Participants**
 - U.S. military service members and veterans (N = 236)
- Surveys**
 - Demographics
 - Mindful Attention Awareness Scale (MAAS)
 - 15-items, overall score
 - Five Facets Mindfulness Questionnaire (FFMQ)
 - 39-items, 5 subscale scores: Observe, Describe, Action, Non-discriminate, & Non-reaction
- Automated Neuropsychological Assessment Metric (ANAM)**
 - Running Memory Continuous Performance Task (CPT).
 - Standard Continuous Performance Task (SCP)



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Slide 3

VR1 Was the practice time per day? or per week? How many were in the n for each group?

Valerie Rice, 9/26/2017

VR [2]1 are there other studies?

Valerie Rice, 9/26/2017

SPJCMA45 Practice was measured as minutes per day. There were 31 people in the MT group and 17 in the control group.

Schroeder, Paul J CTR MEDCOM AMEDDCS , 10/3/2017

Slide 5

VR [6]1 Paul---never put in photos that squish and distort the humans in them. It looks bad/sloppy

Valerie Rice, 9/26/2017

SPJCMA30 Ok. The photos did not appear distorted in my display, but the new photos look much better.

Schroeder, Paul J CTR MEDCOM AMEDDCS , 10/3/2017

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Demographics

Demographic	#	%
Gender		
Male	126	52.5
Female	110	45.8
Race		
African-American	60	25.0
Native American	4	1.7
Caucasian	126	52.5
Hispanic	41	17.1
Asian	4	1.7
Other	1	.4
Education		
High school/GED	16	6.7
Some college/AA	78	32.5
Bachelors	58	24.2
Masters/Ph.D.	70	29.2
Other professional degree	14	5.8

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Demographics

	#	%
Marital status		
Married	133	55.4
Divorced	51	21.3
Widowed	3	1.3
Single/separated	41	17.1
Partnered with sig. other	8	3.3
Military status		
Active duty	80	33.3
Veteran	156	65.0
Deployed	141	58.8
Years since deployment	10.93 years	11.61


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- Age was significantly correlated with the MAAS and FFMQ acting with awareness subscale scores.
- Education was correlated with the MAAS and FFMQ acting with awareness.
- Time in service (average 15.15 ± 8.56) was correlated with the MAAS and all FFMQ scores, except for FFMQ observe.
- When controlling for age using partial correlation, time-in-service was correlated with all mindfulness measures, except for FFMQ observe ($p < .05$). When controlling for time-in-service, age was no longer significantly associated with any measure of mindfulness ($p > .05$).



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Results

Means and standard deviations for two ANAM cognitive measures

Measure	Mean	SD	
CPT			
# correct	63.63	12.36	79.6
# incorrect	7.43	8.08	% correct
Throughput	75.53	23.10	
Mean RT (Msc)	639.80	94.39	
SCP			
# correct	199.13	4.50	99.08
# incorrect	1.33	4.78	% correct
Mean RT	449.40	105.08	

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Results

Pearson-Product Moment Correlations between scores on the ANAM CPT and Mindfulness Measures

Measure	MAAS		FFMQ			
	MAAS	Obs	Des	Act	NonJ	NonR
ANAM CPT						
# correct	-.02	.00	.15*	.10	.13	.08
# incorrect	.07	.00	-.06	-.02	-.01	.00
Throughput	.02	.00	.14*	.10	.14*	.07
Mean RT (Msec's)	-.14*	-.09	-.10	-.11	-.10	-.11

*= $p < .05$. Obs = Observe, Des = Describe, Act = Action, NonJ = Non-judgement, NonR = Non-react

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Results

Pearson-Product Moment Correlations between scores on the ANAM SCP and Mindfulness Measures

Measure	MAAS		FFMQ			
	MAAS	Obs	Des	Act	NonJ	NonR
ANAM SCP						
# correct	-.09	-.02	-.04	-.08	.01	-.02
# incorrect	.13	.03	.04	.08	-.03	.03
Mean RT (msec's)	-.18**	-.06	-.15*	-.15*	-.05	-.15*

*= $p < .05$, **= $p < .01$. Obs = Observe, Des = Describe, Act = Acting with Awareness, NonJ = Non-judgement, NonR = Non-react

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Slide 7

- VR [7]1** I would not have removed them if there were that many....unless you knew of a good reason/rationale to remove them.
Valerie Rice, 9/26/2017
- SPJCMA47** This is as we reported it in the paper.
Schroeder, Paul J CTR MEDCOM AMEDDCS , 10/3/2017
- VR [8]1** positive? older = more mindful ? can you explain what 'action' means? higher educated = more mindful?
Valerie Rice, 9/26/2017
- VR [10]1** also, if these are worth mentioning (you are going to explain the findings and you think it is really important for the readers/listeners to know and it'll be part of the discussion), then perhaps they deserve a slide?
Valerie Rice, 9/26/2017
- SPJCMA33** I'm not sure I understand your question. Age was positively correlated with mindfulnessness,so yes, increased age is associated with increased midnfulness. As explained in Slide 6, "action" means acting with awareness.
Schroeder, Paul J CTR MEDCOM AMEDDCS , 10/3/2017
- SPJCMA34** I assume that speakers are only allotted a limited amount of time for a presentation? Perhaps it would be more efficient to simply mention the ancilliary findings and focus on the main findings? What do you think?
Schroeder, Paul J CTR MEDCOM AMEDDCS , 10/3/2017
- VR [9]1** Unless these were significantly different between the two groups, I would not mention them....
Valerie Rice, 9/26/2017
- SPJCMA35** I'm not sure I know to which groups you are refering? There were no groups in this study.
Schroeder, Paul J CTR MEDCOM AMEDDCS , 10/3/2017

Slide 8

- VR [12]1** How can you have a % for the average number of yrs someone has been deployed? Are you saying that only 11.61% of those participating had this mean? or is this really a SD? If so, label it appropriately.
Valerie Rice, 9/26/2017
- SPJCMA37** 141 volunteers (58.8%) of the sample reported that they had deployed. The other 41.2% reported that they had not deployed.
Schroeder, Paul J CTR MEDCOM AMEDDCS , 10/3/2017
- VR [13]1** positive correlation? more time in service=higher mindfulness?...very interesting, should go into the end discussion or as one of the major points.
Valerie Rice, 9/26/2017
- VR [14]1** We have not seen this previoiusly when Baoxia did the stats....
Valerie Rice, 9/26/2017
- VR [16]1** What are the 'norms' and how do military compare with norms? Is this is our paper? I don't remember it being in our paper...
Valerie Rice, 9/26/2017
- SPJCMA38** I can look into that for you. I am not aware of any "norms" for the mindfulness measures.
Schroeder, Paul J CTR MEDCOM AMEDDCS , 10/3/2017
- VR [27]1** Valerie Rice, 9/26/2017

Slide 10

VR [15]1 how does this compare to norms?

Valerie Rice, 9/26/2017

VR [17]1 If the average percent correct was 99%, then this probably is not a good measure of anything....as our population topped out, thus relationships (correlations) are likely to be rather meaningless....

Valerie Rice, 9/26/2017

SPJCMA39 These data were reported in the paper. We probably should have discussed this prior to submitting the paper, but at this point I think it might seem odd to leave out a finding that we reported in the paper, dont you agree?

Schroeder, Paul J CTR MEDCOM AMEDDCS , 10/3/2017

RVJC(1 The point is...you will need to be able to address it if asked a question...and this might show tht the SCP is not as good of a measure....

Rice, Valerie J CIV (US), 10/3/2017

Slide 11

VR [18]1 Valerie Rice, 9/26/2017

VR [19]1 NOTE: Correlation coefficient values between 0 and 0.3 (0 and -0.3) indicate a weak positive (negative) linear relationship via a shaky linear rule.

Valerie Rice, 9/26/2017

VR [20]1 make sure you can describe throughput

Valerie Rice, 9/26/2017

SPJCMA40 I've never heard that rule, but thank you for letting me know :)

Schroeder, Paul J CTR MEDCOM AMEDDCS , 10/3/2017

SPJCMA41 Ok. Also, please note that on Slide 6: "For both the CPT and SCP, key performance metrics were: number of correct responses, incorrect responses, and mean response time (RT). For the CPT, throughput scores (the number of correct responses per unit of the available response time) were analyzed. "

Schroeder, Paul J CTR MEDCOM AMEDDCS , 10/3/2017

RVJC(2 the point is that you are able to describe it 'on your feet' and explain why this measure was NOT used with SCP...

Rice, Valerie J CIV (US), 10/3/2017

Slide 12

VR [21]1 Be sure you can explain what each measure means

Valerie Rice, 9/26/2017

SPJCMA42 Ok. Also, they are all explained on Slide 6.

Schroeder, Paul J CTR MEDCOM AMEDDCS , 10/3/2017

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Conclusions

In this population:

- There was no correlation between age and mindfulness when controlling for time-in-service.
- Those with greater time-in-service demonstrate higher mindfulness; and the average mindfulness score for those with greater time-in-service was XXXXXX.
- Those with more education exhibit greater mindfulness.
 - Perhaps due to reflection & introspection processes during higher education

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Conclusions

In this population:

- For CPT
 - Higher FFMQ describe and non-judging scores were positively correlated with correct responses per unit of time

Being able to identify, but not judge one's internal experiences, may speed decision making, while judging one's experiences may slow decision making while an individual assesses and compares his responses and performance.

- Higher FFMQ describe was positively correlated with # correct (explained on final slide)

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Conclusions

In this population:

SCP:

- Higher FFMQ scores on describing, acting with awareness, and non-reactivity were negatively correlated with mean reaction time.

Acting with thought and deliberation, but without becoming entrenched in one's emotions and thoughts, appears to speed responses during tasks requiring continuous monitoring and response.

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Conclusions

CPT & SCP:

- Higher MAAS scores were negatively correlated with faster decision making speed on both cognitive tasks
- The MAAS measures the current state of mindfulness (Brown & Ryan, 2003)
- The FFMQ measures elements of mindfulness (Baer, et al., 2006)

Increased 'state' mindfulness appears to speed the rate at which information is processed.

Specific mindful factors (e.g., describing experiences, acting with awareness, non-judging, and non-reactivity) may reduce competing thoughts (and self-judgements) that can impede cognitive processing and responses.

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Questions?

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Extras

Facet of Mindfulness	Reported mindfulness
Observe	25
Describe	28
Action	25
Non-judgment	28
Non-react	22

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Slide 13

VR [22]1 What does this mean????

Valerie Rice, 9/26/2017

SPJCMA48 Please see Slide 8 or page 3 of the paper.

Schroeder, Paul J CTR MEDCOM AMEDDCS , 10/3/2017

RVJC(4 just making sure you can explain it

Rice, Valerie J CIV (US), 10/3/2017

VR [23]1 compare this with norms and place information here

Valerie Rice, 9/26/2017

SPJCMA49 I'm not sure to which "norms" you are refering? Norms for the MAAS? FFMQ?

Schroeder, Paul J CTR MEDCOM AMEDDCS , 10/3/2017

RVJC(3 the mean for community adults is 4.20 +/- .69 What was the range of mindfulness for those with greater time in service? was it higher or lower than this norm?

Rice, Valerie J CIV (US), 10/3/2017

RVJC(5 Replace these XXXX with the appropriate value

Rice, Valerie J CIV (US), 10/3/2017

Slide 17

VJR31 Based on these findings, is it worth teaching mindfulness to soldiers? It appears marginally so...that is...mindfulness and mood are correlated so increased mindfulness should = increased mood. While we saw this, especially in the clinically significant findings (all were better in IM group than control group....I believe that increasing vigor and happiness and decreasing anger, anxiety, depression, restlessness and fatigue makes it worth while. In addition, our other findings show improvements in PTSD symptoms, and weekly reports of stress and pain....

Rice, Valerie J CIV (US), 8/16/2017

Slide 18

VR [26]1 This does not seem to be showing me anything...if you are trying to show that higher mindfulness is correlated with higher observation etc., then a line diagram showing the correlations (with lines) would be better....but they are WEAK correlations so you might not see much.

Valerie Rice, 9/26/2017

SPJCMA43 This slide shows the average scores on the FFMQ subscales.

Schroeder, Paul J CTR MEDCOM AMEDDCS , 10/3/2017

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Slide 19

VR [25]1 No one wants to see references at a talk, they will be in the proceedings....at least that is my experience.
Valerie Rice, 9/26/2017

SPJCMA44 Agreed. However, in my expereince, it is possible that an audience member may request a reference that was mentioned during a talk. Better to have them and not need them, than to not have them and need them :)

Schroeder, Paul J CTR MEDCOM AMEDDCS , 10/3/2017