

# THE HITCHHIKER'S GUIDE TO MENTAL CONTRASTING: EXPLORING THE INTERSECTION OF MINDFULNESS & MENTAL TIME TRAVEL

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## Abstract:

The adaptivity of mindfulness as a personality trait and the beneficial impact of mindfulness interventions on mental health are both substantiated by research. However, the phenomenon of mindfulness as a quality of consciousness remains ambiguous. This is especially true in regards to its relationship with time. Mindfulness emphasizes intentionality; has been proposed to represent healthy time perspectivity; and is correlated with goal conceptualization, pursuit, and achievement. As a preliminary measure in closing this research disparity by probing mindfulness and future-oriented cognition, the goal conceptualization strategy mental contrasting emerged as an intuitive addition to the body of research. This strategy professes three tenets: goal inception, obstacle generation, and solution cultivation. As present-minded action is accentuated, mindfulness is anticipated to be compatible with this model. The Mindful Attention Awareness Scale (MAAS) assessed subjects (n=94) instructed with Think Aloud protocol during which they vocalized organically-emerging thoughts for ten-minute recorded intervals. A qualitative scoring analysis was then applied so as to discern the proportion of the goal conceptualization strategy mental contrasting within raw test subject transcripts.

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Linear regression models demonstrated a positive correlation ( $p < 0.001$ ) between trait mindfulness and the utilization of the full three tenets of mental contrasting which emphasizes overcoming obstacles in anticipation of goals. Fantasizing, a fixation on goals without emphasizing obstacles, possessed an inverse relationship with trait mindfulness ( $p$ -value: 0.012), while failing to generate solutions to goal obstacles was also negatively correlated with trait mindfulness ( $p < 0.001$ ). Mindfulness as an intervention may be calibrated to encompass such adaptive temporal implementation.

## The Adaptivity of Mindfulness and Time Perspective Orientation

Though empirically embraced and clinically purported as intervention (Keng, 2011), secular mindfulness has been critiqued for its disproportionate emphasis on the present while neglecting its application to alternate tenses (Dreyfus, 2011). Given the extensive bedrock of literature pertaining to the adaptive sensorial correlates of trait mindfulness such as enhanced visual perception (Kharlas, 2016), superior motor acuity (Tarrasch-Lilach, 2017), interoception capabilities (Gibson, 2012), and both superior attentional awareness and low sensory sensitivity (Hebert, 2016), it is logical to anticipate that mindfulness may correspond with an adaptive relationship with sense of time. Corroborating this assertion is the proposition that mindfulness exists as a healthy time perspective (Zimbardo, 2014). Existing time perspectivity research suggests mindfulness is correlated with contemplating future ramifications of one's current actions. (Seema et al., 2014). Mindfulness and present-mindedness additionally correspond with self-directedness (Smalley, 2009), goal generation (Sobol-Kwapinska, 2009), pursuit (Brown, 2007) and subsequent achievement (Sobol-Kwapinska, 2009). Trait mindfulness is additionally associated with authenticity of goals characterized by their self-concordant properties which align with the identity of the goal-setter (Sheldon et al., 1999). Such goal authenticity is adaptive in that it emphasizes internal locus of control and is furthermore correlated with goal attainment (Koestner, 2002). Trait mindfulness also predicts goal internalization over the duration of their pursuit (Smyth, 2020). The bulk of research therefore suggests a positive relationship between goal quality and mindfulness. As such, we deemed it logical to examine intentional goal-related cognition's relationship with trait mindfulness.

Effective goals are additionally characterized by concreteness and by the proximal, more immediately attainable nature of subgoals (Cochran, 1996). In this context, this may be interpreted as a connection between future aspiration and the present-moment actions necessary in acquiring said aspiration. The goal conceptualization strategy mental contrasting (Oettingen, 2012) emphasizes actionable, present-oriented solutions designed to circumvent obstacles which threaten the achievement of a goal. This three-tenet framework was found to positively correspond with the achievement of goals (Kappes, 2021). Mental contrasting itself is characterized by first richly envisioning a desired future. This is followed by considering obstacles which impede the achievement of this reality. Mental contrasting then ultimately reconciles these obstacles by compiling contingency plans and exploring avenues by which the obstacles may be overcome so that the future in question may become reality. This method synthesized the present and future by combining the intentionality associated with mindfulness (Rothaupt & Morgan, 2007) with future-oriented ambition applied to actionable intention within the present tense. This structure is reminiscent of mindfulness' moment-minded nature. It would therefore be logical to expect a positive correlation between trait mindfulness and mental contrasting.

It is important to consider that merely fantasizing about a longed-for alternative timeline does not constitute mental contrasting or effective goal conceptualization. Mental contrasting was developed as a means of circumventing such indulgent cognition (Oettingen et al., 2010). Remaining entrenched in fantasizing boasts a host of undesirable correlates such as poor problem-solving capability, life dissatisfaction and low rates of behavioral transformation (Oettingen, 2013). It was therefore anticipated that such dissatisfied individuals who engaged in high rates of fantasizing would possess lower trait mindfulness, which we postulate will manifest in adaptive proclivities in regard to time perspectivity and goal generation. This adaptivity would specifically manifest as structured orientation towards future-oriented cognition in the form of mental contrasting.

Other individuals are distinct in that they succeed in progressing within the tenets of mental contrasting from fantasizing to generating obstacles which impede the procurement of their desired future. However, in response to such barriers, while some advanced to the third and final tenet of cultivating solutions, others ruminated on the obstacles without such progression. Such subjects' transcripts were characterized by discouragement, anxiety, and complacency. These non-adaptive problem-solving orientations are in direct contrast to the adaptive orientations mindful individuals displayed in the literature regarding goal conceptualization (Sobol-Kwapinska, 2009). It was therefore hypothesized that these individuals would emerge possessing low levels of trait mindfulness within the analysis.

In terms of individuals who did not engage within goal-directed cognition, mental contrasted or otherwise, a noteworthy relationship with mindfulness was not anticipated. This is because we are interested in probing ways in which mindful individuals engage with goal orientation only when they deem it necessary to do so. We are not probing goal emphasis itself, and subjects were not instructed to engage within goal-oriented cognition within this task.

Attention-Deficit/Hyperactivity Disorder (ADHD) is inversely correlated with trait mindfulness (Smalley, 2009). As we expect mindfulness to possess a positive relationship with a utilization of the full three tenets of mental contrasting, it was therefore logical to expect an inverse relationship between ADHD and this goal conceptualization strategy. As for fantasizing and the failure to generate solutions to emerging obstacles, a positive relationship between these and ADHD were deemed rational hypotheses. People with ADHD are unlikely to endorse performance-approach goal orientation (Barron, 2006). Having ADHD is also linked with a chronic sense of underachievement, feeling one should be farther along in life than one is, and a history of not living up to potential in school or work (Firmin, 2007), which further bolsters this assertion.

Finally, depression corresponds with the subjective perception of a slow passage of time (Zimbardo, 2008) and a fixation on past-oriented cognition (Hawkins, 1988). As past-orientation and goal conceptualization are mutually exclusive, it was anticipated that cognition colored by depression would inversely correlate with mental contrasting. In terms of fantasizing, due to the negative life outcomes associated with this future-oriented stance, a positive correlation between these two traits was hypothesized. As for the relationship between depression and a failure to expound upon obstacles with solutions, a positive correlation was expected due to emphasis on futility. A relationship of note was not expected between depression and cognition devoid of mental-contrasting.

## Methods

Subjects ( $n = 78$ , 45 women, 30 men, 1 non-binary, 2 declined to report; range = 18-28 years) recruited from the University of Arizona's undergraduate student body were assessed utilizing a battery of questionnaires including the Mindful Attention Awareness Scale (MAAS), a metric designed to measure an individual's attunement to the present moment across everyday experience (Park, 2013).

The seven-item Generalized Anxiety Disorder self-report screening tool (GAD-7) was used to probe levels of anxiety within the subjects' previous two weeks of overall mental health (Williams, 2014). Levels of Attention Deficit / Hyperactive Disorder were measured with the Adult ADHD Self-Report Scale (ASRS-v1.1), a six-item instrument which assesses both inattention and hyperactivity (Hesse, 2012). The Patient Health Questionnaire (PHQ-9) (Kroenke & Spitzer, 2002) assessed for depression severity. Subjects were then instructed to voice aloud all organically-emerging cognition unrelated to any task, a "linguistic fingerprinting" procedure known as Think Aloud (Duncker, 1945; Pennebaker, 1999). During this protocol, subjects were given the instruction to freely vocalize emergent thoughts with the sole prompt of "Now think" on their computer screen guiding them. Such thought content could include depiction of mental imagery, narration of external stimuli, and attunement to bodily sensation. Self-censorship was discouraged. A preliminary one-minute Think Aloud sample was collected in the presence of a researcher in order to ascertain the subjects' ability to vocalize cognition in tandem with the established experimental parameters. After participants demonstrated an ability to engage in Think Aloud, a subsequent ten-minute sample was recorded with the subject in isolation from third parties. The 16 participants who did not comply with the Think Aloud protocol were excluded from the final analysis.

An experimental testing room in the Psychology Building at the University of Arizona was used for all Think Aloud procedures. Participants were instructed to put phones away for the duration of the study so as to remove competing stimuli and reinforce the lack of task-orientation of the cognition. Upon completion of Think Aloud, participants then used a gradient scale to indicate how similar the vocalized thoughts were as compared to ones experienced in their day-to-day life.

The Think Aloud audio files were then transcribed and delineated into distinct thoughts per rigorous protocol for the sake of expedient coding and subsequent analysis. In accordance with this methodology, three raters delineated the transcripts into strong and associational transitions between thoughts. The interrater reliability in terms of average thought length and thought quantity demonstrated consistency (Cronbach alpha = .97, CI95=[.95; .99] and Cronbach alpha = .86, CI95=[.81; .91] respectively) with a 95% confidence interval in all contexts with the exclusion of temporal and perceptual orientation.

A qualitative codebook analysis (Fig. 1) was developed to assess the proportion of thoughts containing the goal conceptualization strategy mental contrasting within the raw Think Aloud transcripts.

This protocol was developed to mirror the structure of mental-contrasting (Oettingen, 2013) with emphasis on momentum of thought within goal conceptualization in conjunction with goal actionability. The paradigm was refined to emphasize present-moment actionability of goals within distinct thoughts. After transcripts were delineated into distinct thoughts per strong and associational transitions, a numeric value corresponding to a tenet of mental-contrasting was then ascribed to each thought in its entirety. This analysis allowed for assessing both proportion of distinct thoughts and for the proportion of thoughts as defined by respective word count. Linear regression analyses were then performed in conjunction with data gleaned from this protocol and the results from the battery of questionnaires associated with respective participants.

Linear regression models revealed a positive correlation (Fig. 9.  $p < 0.001$ ,  $r = 0.509$ ) between trait mindfulness and the utilization of the full spectrum of mental contrasting within the transcripts. Fantasizing possessed an inverse relationship with trait mindfulness (Fig. 7.  $p$ -value: 0.012,  $r = -0.289$ ). Failing to generate solutions to goal obstacles was also inversely correlated with trait mindfulness (Fig. 8.  $p < 0.001$ ,  $r = -0.467$ ). No significant relationship was found between mindfulness and non-engagement with mental contrasting tenets. All these correlations were true in terms of mindfulness and its relationship to the numbers of thoughts indicated by the protocol, the ratio of thoughts containing the mental contrasting tenets as compared with the total number of thoughts, and in terms of content ratio indicated by word count. Depression as measured by the (PHQ)-9 possessed statistically insignificant inverse relationships with both the full spectrum of mental contrasting and with cognition entirely unrelated to goals. Slight positive relationships emerged between depression and both fantasizing and the failure to generate solutions to obstacles.

0	<p>-<b>No</b> mention of a goal or future one wishes to experience by means of their own action.</p> <p>-<b>No</b> assertion of intentionality to engage in goal-related behavior.</p>
1	<p>+ A goal the subject would like to achieve. (e.g. “I need to start tanning more”) without mentioning potential obstacles or steps to implement towards reaching that goal.</p> <p>+ The goal may be desirable due to its pleasant qualities, positively valenced in nature. (e.g., “I want to go to the beach”)</p> <p>+ The goal may be desirable due to its contrast with a less preferred outcome (avoidant). (e.g., “I never want to forget my towel at the beach again”)</p> <p>This does <b>not</b> apply to:</p> <ul style="list-style-type: none"> <li>• A future-oriented thought in which an individual describes a future which is outside their control. (i.e. the weather or the actions of another independent entity)</li> </ul> <p>Or</p> <ul style="list-style-type: none"> <li>• A statement of fact pertaining to a future event which will occur whether the individual acts or not (e.g., “The football game is this Saturday”; “My parents are visiting this weekend”)</li> </ul>
2	<p>+ A thought which expresses one or more obstacles which must be overcome in order to either achieve a specified preferred future or to avoid the nonpreferred future. (“I want to go to the beach, but I don’t have any more vacation days for a trip”)</p> <p>+ These obstacles may entail barriers, anxieties, limits, negative emotional states or personality traits of the self, or any third party described which obstructs attainment of the goal in question.</p> <p>+ It is common for MC2 thoughts to end in tentative statements such as:  “But it’s whatever”, “But I’m just not going to worry about it”, “But yeah...”, “So...”  “I don’t know”, “Guess I just have to get over it”, “Nothing we can really do about it”  ... As if the subject is trailing off before completing the entirety of their thought.</p> <p>*Please note that if a solution is mentioned tentatively, contradicted, or immediately negated by the generation of additional incompatible solutions, this is still to be labeled MC2. This is because the focal point of the thought is on obstacles and not in overcoming.</p>
3	<p>+ Specific solution(s) which may be employed in overcoming an obstacle(s) so that the specified future may be experienced. The cognitive momentum culminates in a solution which the speaker endorses without contradiction. (“I want to go to the beach, but I don’t have any more vacation days for a trip. If I plan something over Labor Day weekend, that should work”)</p> <p>+ Within MC3 thoughts, obstacles may be implicit. If an individual is depicting actions they intend to engage in so as to pursue a goal, the obstacles are unspoken but evidently present in the speaker’s mind. If no obstacle exists, there is no need to plan.</p>

**Figure 1: Mental Contrasting Coding Protocol**

# Results

Linear regression models revealed a positive correlation ( $p < 0.001$ ) between trait mindfulness and the utilization of the full spectrum of mental-contrasting within the transcripts. Fantasizing possessed an inverse relationship with trait mindfulness ( $p$ -value: 0.012). Failing to generate solutions to goal obstacles was also inversely correlated with trait mindfulness ( $p < 0.001$ ). No significant relationship was found between mindfulness and non-engagement with mental-contrasting tenets. All these correlations were true in terms of mindfulness and its relationship to the numbers of thoughts indicated by the protocol, the ratio of thoughts containing the mental contrasting tenets as compared with the total number of thoughts, and in terms of content ratio indicated by word count. Depression as measured by the (PHQ)-9 possessed statistically insignificant inverse relationships with both the full spectrum of mental-contrasting and with cognition entirely unrelated to goals. Slight positive relationships emerged between depression and both fantasizing and the failure to generate solutions to obstacles.

		MAAS (n = 75)		MAAS (- SS with no goals, n = 70)	
		r	p	r	p
Thought number	MC0	-0.006	0.957	-0.006	0.959
	MC1	-0.289	0.012	-0.309	0.009
	MC2	-0.467	<.001	-0.483	<.001
	MC3	0.509	<.001	0.523	<.001
Thought ratio	MC0	0.091	0.44	0.105	0.386
	MC1	-0.281	0.015	-0.305	0.01
	MC2	-0.486	<.001	-0.501	<.001
	MC3	0.484	<.001	0.495	<.001
Content ratio	MC0	0.212	0.085	0.242	0.058
	MC1	-0.345	0.004	-0.365	0.004
	MC2	-0.547	<.001	-0.563	<.001
	MC3	0.519	<.001	0.535	<.001

**Figure 2: Mindfulness & Mental Contrasting Levels**

		PHQ9 (n = 75)		PHQ9 (- SS with no goals, n = 70)	
		r	p	r	p
Thought number	MC0	-0.129	0.27	-0.117	0.333
	MC1	0.078	0.506	0.136	0.261
	MC2	0.179	0.125	0.218	0.07
	MC3	-0.337	0.003	-0.317	0.008
Thought ratio	MC0	-0.041	0.728	-0.12	0.321
	MC1	0.124	0.291	0.193	0.11
	MC2	.124 (.308)	.065 (.008)	.250 (.346)	.037 (.004)
	MC3	-0.212	0.068	-0.19	0.116
Content ratio	MC0	-0.046	0.711	-0.148	0.251
	MC1	0.154	0.215	0.219	0.088
	MC2	0.204	0.099	0.243	0.057
	MC3	-0.261	0.033	-0.236	0.064

**Figure 3: Depression & Mental Contrasting Levels**

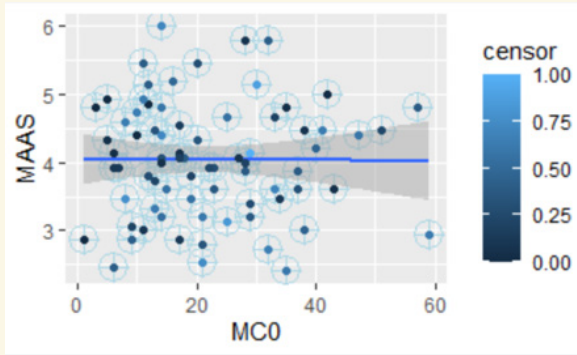
		ADHD (n = 75)		ADHD (- SS with no goals, n = 70)	
		r	p	r	p
Thought number	MC0	0.082	0.485	0.094	0.438
	MC1	0.14	0.229	0.217	0.071
	MC2	0.252	0.029	0.303	0.011
	MC3	-0.464	<.001	-0.442	<.001
Thought ratio	MC0	0.075	0.523	-0.01	0.933
	MC1	0.091	0.439	0.172	0.154
	MC2	0.281	0.015	0.326	0.006
	MC3	-0.402	<.001	-0.386	0.001
Content ratio	MC0	-0.062	0.621	-0.193	0.132
	MC1	0.265	0.03	0.355	0.005
	MC2	0.345	0.004	0.402	0.001
	MC3	-0.469	<.001	-0.447	<.001

**Figure 4: ADHD & Mental Contrasting Levels**

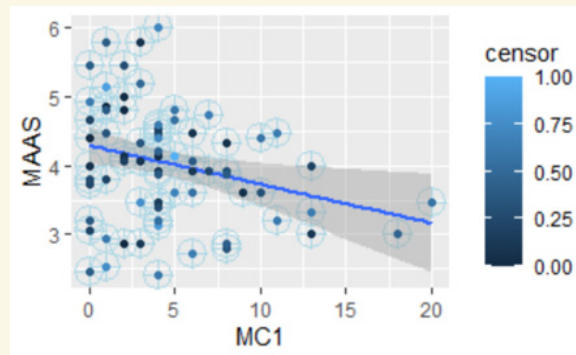
		GAD (n = 75)		GAD (- SS with no goals, n = 70)	
		r	p	r	p
Thought number	MC0	-0.003	0.976	0.016	0.389
	MC1	0.129	0.27	0.213	0.076
	MC2	0.255	0.027	0.315	0.008
	MC3	-0.317	0.006	-0.292	0.011
Thought ratio	MC0	-0.013	0.913	-0.117	0.334
	MC1	0.137	0.242	0.232	0.053
	MC2	0.209 (.292)	.072 (.012)	.260 (0.426)	.030 (<.001)
	MC3	-.264 (-.361)	.022 (.002)	-.239 (-.341)	.046 (.004)
Content ratio	MC0	-0.055	0.658	-0.194	0.131
	MC1	0.191	0.122	0.283	0.026
	MC2	.224 (.308)	.069 (.012)	.282 (.372)	.027 (.003)
	MC3	-0.302	0.013	-0.275	0.031

**Figure 5: Anxiety & Mental Contrasting Levels**

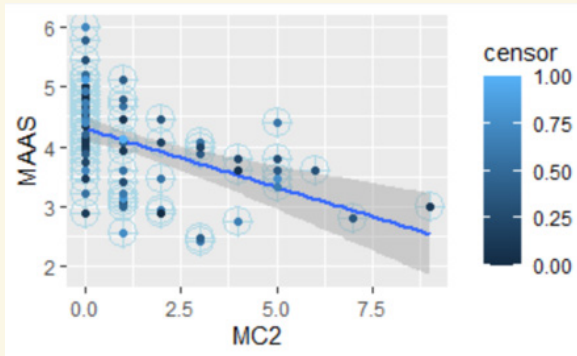




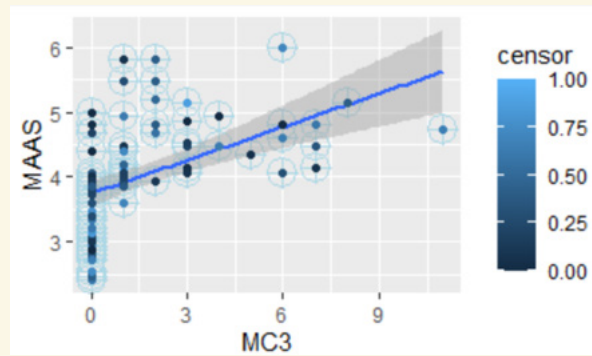
**Figure 6: Trait Mindfulness & No Mental Contrasting**



**Figure 7: Trait Mindfulness & Fantasizing**



**Figure 8: Trait Mindfulness & Obstacle Generation**



**Figure 9: Trait Mindfulness & Mental Contrasting**

ADHD had an inverse relationship with mental-contrasting ( $p < 0.001$ ,  $r$ -value:  $-0.464$ ); whereas positive relationships emerged in relation to ADHD and the failure to expound upon obstacles by listing solutions ( $p$ -value:  $0.029$ ,  $r$ -value:  $0.303$ ). Specifically in terms of proportion of thought content, ADHD also possessed an inverse relationship with fantasizing ( $p$ -value:  $0.03$ ,  $r$ -value:  $0.265$ ). Depression as measured by the PHQ-9 indicated an inverse relationship with mental-contrasting ( $p$ -value:  $0.03$ ,  $r$ -value:  $-0.337$ ). Anxiety possessed an inverse relationship with mental contrasting ( $p$ -value:  $0.006$ ,  $r$ -value:  $-0.317$ ) and a positive relationship with obstacle fixation without generating solutions ( $p$ -value:  $0.027$ ,  $r$ -value:  $0.255$ ). When a lack of goals was controlled for, anxiety was additionally found to correspond with fantasizing ( $p$ -value:  $0.076$ ,  $r$ -value:  $0.213$ ).

# Discussion

These relationships provide a bedrock for future research pertaining to the correlates of mindfulness as it relates to time perspectivity and goal generation, refinement, pursuit, and ultimate achievement. Within this task, subjects abundant in trait mindfulness implemented the goal conceptualization strategy of mental contrasting in greater proportion as compared with their less mindful counterparts. These results suggest that not only are mindful individuals more preoccupied with the present as corroborated by the body of literature, but there is an emphasis on curating feasible present moment action in regards to its future ramifications and alignment with a goal. Within this study, both the failure to generate solutions to obstacles impeding goals and a fixation upon the future without accounting for prerequisite actions ushering in such goals were correlated with depression and ADHD.

A central limitation of this study pertains to the MAAS questionnaire being characterized by a focus on attentional awareness and not soliciting self-report pertaining to the unconditional acceptance component of trait mindfulness (Trousseau et al., 2010).

While we have probed the attentional awareness component of mindfulness distinct from self-acceptance, future research may be benefitted by emphasizing self-acceptance or even by isolating it in relation to goal conceptualization. For instance, the authentic nature of mindful goals (Sheldon, 1999) may be specifically attributed to this unconditional acceptance trait as opposed to mindfulness as a collective. Scaffolding upon this study's results, future endeavors may wish to assess how mindful individuals create goals in both spontaneous, unstructured contexts and in prompted ones. This would help us ascertain delineations or shared patterns mindful individuals may profess in goal generation. Study designs curated to assess adaptive relationships or strategies other than goal conceptualization employed by mindful individuals when relating to future-oriented cognition would be additionally desirable. Another intuitive addition to the body of research would be assessing the manner in which mindful individuals relate to the past. Though nonadaptive rumination is associated between the mentally unwell and past-oriented cognition (Raffaelli, 2021), little is known of adaptive means of relating to the past and how that relates to trait mindfulness specifically.

It may also be beneficial to pivot from trait mindfulness to mindfulness as a conscious state by probing the impact of mindfulness meditation or intervention upon goal strategies employed, their quality, and their successful execution.

In response to these findings within an implementation context, mindfulness as an intervention may be calibrated to encompass adaptive temporal leanings. This will aid clinically-guided goal pursuit and the training adaptive future-oriented cognition. Mental contrasting through a lens of mindfulness may serve as an adaptive alternative to anxiety-laden catastrophizing, and framing it as such within a therapeutic context may increase overall life satisfaction. This may be of particular benefit to individuals struggling with psychopathology, namely those afflicted with depression or ADHD, which were unveiled in our study as inversely associated with mental contrasting and with mindfulness itself. Within the experiment, such suffering individuals were inclined to ruminate upon obstacles without generating solutions, and intentionally crafting therapies to circumvent cognition could foster emotional fortitude.

Should we desire to gain a comprehensive view of mindfulness as a quality of consciousness, it is necessary to view it through a temporal prism. By isolating the influence this trait exerts upon time perception, we gain invaluable insight into individual differences and novel means of operating. This may beget healthy strategies for operating within our complex world and subsequent interventions designed to foster such healthy strategies. For those entrenched within maladaptive patterns, cognitively grafting themselves to such beneficial paradigms is a prerequisite measure to achieve mental health, catalyze resiliency and contribute to humanity.

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