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Do More of What Makes you Happy
The Relationship Between Effort Enjoyment Beliefs, Effort Seeking and Boredom

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Theoretical Background

Imagine you are confronted with a series of challenging tasks: completing a complex project under tight deadlines, mastering a new skill, learning a foreign language, navigating the academic curriculum, or even solving a challenging crossword puzzle. Does this sound stressful to you? Or rather like a challenge you would enjoy tackling?

The capacity to sustain focus and motivation can directly impact success and productivity (Csíkszentmihályi, 1990; Steel, 2007). Challenges posed by fatigue, boredom, exhaustion, or distractions can often hinder us in performing at our best. One aspect of our ability to overcome these challenges is the enjoyment we derive from engaging in effortful activities. Understanding how the enjoyment of effortful engagement and other factors, such as boredom, influence our longing for exerting effort, holds great practical significance in various domains. In educational settings, for example, identifying strategies to enhance students' enjoyment of learning could lead to more effective teaching methods and improved academic outcomes (see Cleary & Zimmerman, 2004). On the other hand, addressing issues that aggravate effort enjoyment could help smooth obstacles in goal attainment (Riddell et al., 2024). In the workplace, addressing issues related to boredom and low motivation could help boost employee engagement and thus overall organizational performance (Osabiya, 2015).

This thesis therefore explores the mechanisms of how effort enjoyment beliefs affect effort seeking and whether this relationship is further influenced by boredom. The final goal in this context is to contribute to an improved understanding of how we can better help individuals succeed in today’s ever more demanding environment.

Effort

Effort is defined as an individual's endeavor to intensify an activity to achieve a desired goal and can be mental and/or physical in nature (Eisenberger, 1992). The perceived level of effort depends on how hard, difficult, or exhausting a task feels (Kahneman, 1973). Kahneman also postulated that we consciously choose the goals we want to pursue and then engage in goal-directed activities to achieve them, allocating the appropriate amount of effort accordingly. The effectiveness of the subsequent task performance is also contingent upon various resources, such as capacity or attention, which vary based on the task’s demands while engaging in it. Examples for tasks that are perceived as effortful can be a student’s calculus homework, working on a career-enhancing paper, practicing skills that enhance the individual’s status, going to the gym,

eating healthy foods (Kurzban, 2016), or writing this thesis. Overall, it seems that effort is an omnipresent facet of our daily lives. A facet that is annoying, something we would rather like to avoid—at least you might think so.

In the context of this thesis, I focus on the cognitive aspects of effort and rely on the definition of *mental effort* by the American Psychological Association (2018). They define mental effort as a construct embedded in the cognitive resources that people engage during a specific task. This definition allows the perspective that effort must not necessarily be viewed as a negatively connotated construct. Together with Kahneman's assumptions, it is consistent with the general hypothesis that the effort invested in a task is mainly determined by the intrinsic demands of the task, and that voluntary control over effort is limited. We can choose when to start/stop a task, but not how much effort we exert (Kahneman, 1973). That mainly depends on the demands and nature of the task itself. If we allocate more or less effort than demanded by the task, this will lead to a deterioration of performance and to not achieving the desired goal.

Moreover, effort has traditionally been considered a limited mental resource that requires a conscious and careful allocation (Radner & Rothschild, 1975). We would thus often need to deliberately choose where to invest our effort in order to ensure that we are able to complete the tasks required for daily functioning and goal attainment. The explanations why we experience effort often rely on hypotheses where effort exertion consumes limited resources and is thus not indefinite. Shenhav et al. (2017) for example, postulate limitations in the information processing capacity when dealing with mental effort. Kool and Botvinick (2014) likewise postulate that we strive for an equilibrium referring to a joint utility function. Kool and Botvinick (2018) also state that decision-making processes incur mental costs, that is, effort.

In the realm of human behavior, the concept of effort has scientifically long been associated with unpleasantness and aversiveness. Cognitive effort is perceived as cumbersome and researchers have long assumed that individuals would generally prefer less effortful over more effortful tasks, as already postulated by Hull in as early as 1943 (Hull's law). Exerting (self-)control to refrain from doing something is just like exerting effort, and perceived as aversive (Kurzban, 2016) and costly (Westbrook et al., 2013).

However, this view of effort as inherently negative is not the full picture. More recent research (Clay et al., 2023; 2022; Inzlicht et al., 2018) has been gathering evidence that not all effort exertion is perceived as aversive. In fact, it can even be enjoyable. This enjoyment of

effort challenges the traditional perspective, suggesting that under certain conditions, the exertion of effort can be associated with positive emotions.

Emotions generally serve as significant motivators of human behavior, and perhaps are even the most crucial one (Schmidt-Atzert et al., 2014). They play a fundamental role in human motivation, driving individuals to engage in or disengage from various activities (Franklin & Ramamurthy, 2006). Positive emotions, such as enjoyment and fun, serve as powerful motivators, driving individuals to pursue goals and experience personal growth. Although effort is not typically known to spark joy, and is generally perceived as a negative, aversive state (Kurzban, 2016), we exert effort nonetheless. Obviously, we all have certain obligations to fulfill, which leads to the question whether external factors are the only reason why we would overcome our reluctance to put work into accomplishing a specific objective.

The Effort Paradox

The paradox of (not) enjoying, but still exerting effort poses intriguing questions about the nature of motivation and the underlying factors that influence our engagement in challenging tasks. It has already been investigated that there are interindividual differences in the preferences and enjoyment of engaging in cognitive tasks (Cacioppo et al., 1984). Even beyond individual preferences, Clay et al. (2023) just recently postulated the existence of innate intrinsic enjoyment of exerting effort, namely *effort enjoyment beliefs*.

Exerting effort is also able to spark a sense of value: the more difficult something is to create, the worthier it will be perceived (Kruger et al., 2004). The so-called IKEA effect (Norton et al., 2012) supports this theory: self-assembled furniture can create a greater sense of value when compared to non-self-assembled furniture, regardless of their actual worth.

Inzlicht et al. (2018) call this the effort paradox: effort is perceived as aversive. However, the authors observe that the act of exerting effort or displaying resistance to temptations can emphasize the value of certain activities and elicit positive emotions, which in turn can motivate behavior.

Yet, how can we cultivate a more positive valuation of effort? To answer this question, we will first have to examine what actually drives us, what motivates human beings to participate in activities and have fun.

Effort Enjoyment Beliefs

The experience of flow—characterized by complete immersion and focused concentration in an activity—is a potent motivator as it enhances the desire to engage in a given task (Csíkszentmihályi, 1990). Moreover, intrinsic motivation serves as a powerful motivator (Gagné & Deci, 2005). When individuals are intrinsically motivated, they are driven by genuine internal interest, personal enjoyment, and a sense of full self-determination, that is, control over the activity, irrespective of external incentives. The inherent satisfaction experienced during intrinsic motivation further reinforces the willingness to participate in the activity concerned (Gagné & Deci, 2005).

Clay et al. (2023) investigated the tendency of people to perceive effort as enjoyable. They explored the main drivers and developed a questionnaire to assess the level of effort enjoyment beliefs, which will also be used in this study. While effort enjoyment beliefs are a more recent concept, similar constructs have existed in the field of cognitive psychology. It is crucial to understand the difference between these related constructs, namely the need for cognition (NFC; Cacioppo et al., 1984) and achievement motivation (Atkinson, 1957).

NFC reflects an individual's general inclination to seek out and derive pleasure from engaging in cognitive activities (Cacioppo et al., 1984). However, it is important to note that the NFC scale, developed and shortened by Cacioppo et al. (1984), is a self-assessment questionnaire that focuses on the likelihood of preferring complex cognitive tasks over simpler ones. It does not adequately capture people's actual subjective tendency to find cognitive tasks, that is, effort, enjoyable. Items such as “I would prefer simple to complex problems” ask about the preference for an effortful task rather than the experience of it. This is what Clay et al. (2023) focused on with their research.

Achievement motivation (Atkinson, 1957) focuses on the individual’s desire for positive outcomes, that their task achievement is successful. The probability of engaging in an activity thus increases when the individual anticipates that their efforts are likely to lead to success. The focus is on the results.

Effort enjoyment beliefs on the other hand focus on the process and personal experience, not the actual outcome. Positive results can be a side effect but are not subject to the definition of the construct of effort enjoyment beliefs. Clay et al. (2023) developed the effort enjoyment

beliefs scale to explore individual differences in the tendency to perceive the value and enjoyment of effort relating to cognitive effort exertion indicators.

One would assume that those individuals who have a tendency to derive enjoyment from effortful activities would be more likely to exert cognitive effort. The question is whether this behavior remains stable across contexts or is influenced by certain factors. For example, what if the individuals in question were in a bad mood? As explained above, emotions are powerful motivators for behavior and negative emotions are not exempt from this. A well-known, well-researched emotion that falls into this category is boredom, which has become an increasingly common topic of study in the scientific literature (e.g. Westgate & Wilson, 2018; Daniels et al., 2015, van Tilburg & Igou, 2017)

Boredom

It has been shown that boredom is perceived as an unpleasant, aversive state (e.g. Smith & Ellsworth, 1985). In fact, people do quite unexpected things to escape the feeling. Even filling out squares and circles can alleviate the sensation of feeling bored (Andrade, 2010). Boredom can serve as a compelling reason for individuals to seek alternative behavior or cognitive activities, that is, prompting them to exert effort.

Conventional theories of boredom depict it as an aversive, elusive emotional condition (Smith & Ellsworth, 1985), as a dissatisfying, purpose lacking, disengaging state (Fahlman et al., 2013), as generally overall unpleasant and negative (e.g. Nett et al., 2010). The American Psychology Association likewise defines boredom as “a state of weariness or ennui resulting from a lack of engagement with stimuli in the environment” (American Psychological Association, 2018). When being bored, time is not passing fast enough, there is no sensation of meaning to what we are doing and we are not able to engage in a desired activity (e.g. Troutwine & O’Neal, 1981; Smith & Ellsworth, 1985; Nett et al., 2010). To gain a deeper understanding of its origins, we will explore the factors that contribute to its emergence.

The Emergence of Boredom

There are different theories concerning the emergence of boredom and these theories can be categorized into environmental, attentional, and functional theories.

Environmental theories of boredom define the lack of sufficient external stimulation and other external limitations as factors for the emergence of boredom. As early as 1981, Troutwine and O’Neal postulated that subjecting test participants to a monotonous recording, while

excluding other external stimuli, elicits boredom. More than 30 years later, in 2014, Markey et al. still induce boredom through a monotonous task, that is, letting test subjects repeatedly turn equal pegs in rows.

Attentional theories explain the emergence of boredom by the inability to direct the attention to a desired, satisfying activity and successfully maintaining it. Eastwood et al. (2012) hypothesized that this aversive state of mind occurs when we cannot engage in a desired activity, are aware of the inability of engagement and attribute this inability to the activity itself. Hence, in order to successfully direct attention to the desired activity and also maintain it, available cognitive resources and cognitive demands must match. Both states - having too many as well as too little mental resources available for mastering the desired task - will increase the likelihood of feeling bored (Westgate & Wilson, 2018; Eastwood et al., 2012 ; Smith & Ellsworth, 1985).

Lastly, functional theories of boredom focus on the underlying purpose of the desired activity. These theories postulate that boredom operates as a mechanism for altering current behavior as the activity in question no longer serves as a useful or meaningful objective (Bench & Lench, 2013; Barbalet, 1999).

Overall, low arousal and general passiveness have been identified as being commonly linked with boredom (Smith & Ellsworth, 1985). Simple, repetitive tasks represent no challenge nor are they mentally exigent or require much attention. In alignment with these findings, van Tilburg and Igou (2017) also hypothesize that boredom is connected with the perception of low challenge and low arousal.

All aforementioned theories deal with different aspects of boredom, but they are lacking a connecting element, a comprehensive perspective. That is why this paper will focus on an integrated model proposed by Westgate and Wilson in 2018: the *Meaning and Attentional Components (MAC) model* that comprises more facets of boredom, offering a more holistic approach to this emotion.

Meaning and Attentional Components Model of Boredom

Westgate and Wilson (2018) define boredom as an emotional signal when goal attainment is in jeopardy. This occurs when individuals feel that there is an obstacle in achieving their desired objective. According to the authors, factors contributing to this inability can be broken down into two distinct yet interrelated components: an attentional component and a meaning component.

The attentional component relates to the feeling of not being able to cognitively engage in goal-oriented activities. This could manifest when individuals feel either overstimulated, which leads to a sensation of being overwhelmed, or when they feel understimulated, which leads to a feeling of disengagement.

Conversely, the meaning component relates to people's willingness to engage in an activity. If the activity does not align with their personal goal, it will lead to meaningless boredom. This type of boredom occurs irrespective of the attentional capacity; it is rooted in the activity's failure to resonate with subjective importance or meaning.

The MAC model further predicts that deficits in either attentional or meaning components will, independently of each other, produce boredom. In order to effectively overcome boredom, both the attentional and meaning component must be met. This means, enjoyment or interest can only be achieved when the activity is goal-congruent (i.e. meaningful to the person) and when attentional demand and resources match; that is low demand and low resources and high demand and high resources, respectively (Westgate & Wilson, 2018).

Coping Strategies—How can we Overcome Boredom?

Boredom has motivational consequences that can lead to behavioral changes (e.g. Schmidt-Atzert et al., 2014; Posner et al., 2005). While certain outcomes can be positive, such as heightened creativity (e.g. Schubert, 1978; Haager et al., 2018; Witowska et al., 2020), empirical studies predominantly emphasize the adverse impacts on attention, engagement, and cognitive performance (e.g. Haager et al., 2018; Pekrun et al., 2010; Westgate & Steidle, 2020; Wojtowicz et al., 2019) as well as negative correlations with amusement (Mahony et al., 2001). Consequently, the tendency to avoid boredom is a potent behavioral motivator for individuals to actively seek an activity with the intention of circumventing its potential negative effects (Westgate & Wilson, 2018). The types of activities vary vastly: they include watching pornography (Bőthe et al., 2021), daydreaming, doodling, going on social media (Sharp et al., 2017), or even making "stupid noises" (Andrade, 2010). The perceived unpleasantness of experiencing boredom is so substantial that individuals may find any alternative activity more appealing than enduring it: even resorting to self-administered electric shocks seems better than remaining in a state of boredom (Wilson et al., 2014).

Hamilton et al. (1984) define boredom coping as the reflection of a current activity or the shift of attention that leads to a behavioral change away from boredom toward active

engagement and interest. Nett et al. (2010) suggest two dimensions of coping mechanisms when dealing with state boredom: approach versus avoidance orientation and cognitive versus behavioral orientation. The authors cluster reasons for boredom into affective, cognitive, physiological, expressive, and motivational components. They describe cognitive and behavioral coping strategies to overcome boredom (see Table 1 for details).

Cognitive coping strategies imply a change in the way of thinking about the situation so the perception changes (approach coping). The second cognitive coping alternative is avoidance: one would direct their thoughts to something completely different that has nothing to do with the current, boring situation. Opposed to these cognitive reappraisals, behavioral changes can occur. One can either do something to alter the current boring situation (approach coping) or do something else that has nothing to do with the current boring situation (avoidance coping).

Table 1

Boredom Coping Strategies (adapted from Nett et al., 2010)

Coping strategy	Approach coping	Avoidance coping
Cognitive	Change the point of view	Think of something else
Behavioral	Change the situation	Do something else

In situations where boredom stems from understimulation, people tend to cope by choosing a more challenging task that requires greater effort and, in turn, attribute a positive value to effort as it helps them escape a negative state of mind (Inzlicht et al., 2018).

If this were the case, how would boredom affect individuals when they are presented with a cognitive task, such as addition problems, and given the opportunity to freely choose between different levels of mathematical difficulty? Would the influence of boredom affect their behavior and cause them to choose a more difficult task? How would it affect people with a tendency toward high effort enjoyment beliefs? Would the effort still be enjoyable and serve as another reinforcing motivator to choose a more difficult task?

Current Study

The aim of the current study is to show that effort enjoyment beliefs lead to increased effort and that this effect is enhanced by boredom. Previous research suggests a strong relation between higher effort enjoyment beliefs and the selection of more difficult cognitive tasks (effort

seeking; Clay et al., 2023). Likewise, boredom stemming from understimulation can increase the likelihood of seeking out more challenging tasks to counterbalance the unpleasant state boredom condition (Vogel-Walcutt et al., 2012). In order to substantiate these ideas, we aimed to test that high levels of effort enjoyment beliefs in individuals lead people to choosing more difficult math tasks, that bored individuals tend to choose more difficult math tasks than non-bored participants, and that individuals with high scores in effort enjoyment beliefs are even more likely to choose a more difficult math task if they were also bored.

Accordingly, the following hypotheses are derived:

H1: Participants with a high score in effort enjoyment beliefs will score higher in effort seeking.

H2: Participants in the state boredom condition will score higher in effort seeking.

H3: State boredom will moderate and reinforce the effect: the high effort enjoyment beliefs and boredom condition group will show the highest scores in effort seeking.

The now following section provides a comprehensive account of the research approach employed to test the hypotheses, comprising information on the sample, study design, and statistical evaluation methods.

Methods

A moderation analysis using a multiple linear regression model was used to test the relation between effort enjoyment, effort seeking, and the hypothesized moderating influence of boredom. Participants' baseline characteristics were assessed and related to their difficulty level choice of mathematically challenging tasks.

Sample

Participants for this study were recruited through the Laboratory Administration for Behavioral Sciences (LABS) of the University of Vienna. Course credits were granted to psychology students which they needed to pass a mandatory course. Participants who were recruited outside of the LABS system were paid 8 € for the completion of the entire study. Participants were pre-excluded if they had not reached the age of majority or had not sufficient eyesight to follow the on-screen instructions. Additionally, fluency in German was a prerequisite for participation, as there were videos presented in German.

313 participants took part in the study. 23 participants had to be excluded from this initial sample due to missing data, leaving a final sample of n = 290 of which 54 participants were paid

and 236 were granted study credits. 219 (76%) reported to be female, 68 (23%) to be male, 2 (1%) diverse, and 1 (0%) preferred not to disclose their gender. The mean age was 22 years, ranging from 18 to 63 years of age. 229 (79%) participants held A-level qualifications, 2 (1%) had successfully completed a professional apprenticeship, and 59 (20%) obtained a university degree as their highest reported level of education.

Study Design

Firstly, participants completed an online questionnaire comprised of approximately 80 questions assessing information on their demographical data, boredom proneness, math self-concept, effort enjoyment beliefs, conscientiousness, dark triad, and emotion regulation (concepts not connected to this thesis are due to the fact that data was co-collected for other students' respective master theses and the research group of the university's department of motivational psychology).

The second and main part of the study was subsequently conducted in the university's research laboratory with multiple individual workstations, each equipped with a PC, privacy screen, and headphones. This setting was designed to prevent potential distractions that could have occurred if conducted online.

Boredom Manipulation. The participants were randomly divided into two groups: the experimental group in the boredom condition and the control group in the non-boredom condition. Both groups started watching one of two versions of a video. The control group viewed a more entertaining video of a successful TEDx Talk (TEDx Talks, 2013) about super communicators. Troutwine and O'Neal (1981) successfully induced boredom in a study where test subjects had to listen to a monotonous recording, thus this study used the same method with the intention to induce state boredom: The experimental group watched a boring video with the same content and text as the first video. This time it was read by a student who was not looking into the camera, did not show any visible gestures or emotions, had no alternating speech intonation and was speaking rather slowly in a consistent, monotonous voice. Participants were instructed to pay attention to the videos, as they were told that it is important for the success of the study. In addition, interposed on-screen content questions were added. These were intended to decrease the likelihood of implementing potentially successful coping strategies or getting distracted, especially in the boredom condition. The video aimed to induce boredom through

understimulation, with the anticipated effect of prompting viewers to want to compensate for the lack of stimulation by exerting effort (Inzlicht et al., 2018).

After that, the participants were prompted to answer additional questionnaire items that measured their level of boredom, among other things.

Meaning. Following the questions, a different screen popped up with a picture of the master students. The text informed the participants that the official part of the study was over, but they were asked to voluntarily take part in an additional part designed only for our master theses, not related to the original study. They could also leave and still being granted their credits or money, respectively. As they decided to continue, the next part introduced the math effort task (MET). The setting intended to induce meaning by deceiving participants so that they felt like they were doing us a favor and reduce external motivation through the credits or money, respectively. The variable was calculated based on the mean of two questionnaire items ("Hatten Sie beim Anschauen der Videos den Eindruck, etwas Sinnloses zu tun?" and "Hatten Sie beim Anschauen der Videos den Wunsch, etwas Bedeutungsvolleres zu tun?").

Effort Seeking. The MET measured the level of effort seeking by examining the tendency to choose a more cognitively exigent task over an easier one. This was done by letting participants solve mental arithmetic problems using the MET with 100 addition problems (Engle-Friedman et al., 2003). It was also used successfully by Clay et al. (2022) studying the value of cognitive effort. Participants had a trial run to understand the MET and were then prompted to recurrently choose from five difficulty levels, ranging from 1 (least difficult) to 5 (most difficult; Engle-Friedman et al., 2003). The effort seeking variable was defined as the average difficulty level chosen by the participants.

Effort Enjoyment Beliefs. Effort enjoyment beliefs were measured in the preliminary online survey using Clay et al.'s (2023) questionnaire. Their scale comprises eight items on a 5-point Likert scale, half of which pertain to effort exertion (e.g. "Es macht Spaß, sich anzustrengen") and the other half to the evaluation of easy tasks (e.g. "Leichte Aufgaben sind langweilig").

Boredom Proneness and Math Self-Concept. In order to obtain reliable results confounding variables had to be controlled for. Consequently, variables that were assessed comprised the general proneness to get bored, that is, trait boredom, and the individuals' math self-concept to control for the influence of the participants' subjective beliefs in their

mathematical skills. Trait boredom was assessed using the Boredom Proneness Scale-Short Form (BPS-SR) by Struk et al. (2017) consisting of eight items on a 7-point scale. Items were translated into German, for example, ”Es braucht mehr Anreize, um mich in Schwung zu bringen als die meisten Menschen”. Benson’s scale of seven 5-point Likert items (Benson, 1989) was used to measure the math self-concept, for example, “Ich habe das Gefühl, dass ich von Natur aus gut in Mathe bin”.

Statistical Evaluation Methods

A linear regression model was used to statistically explore the hypotheses. The model examined the effects of state boredom, effort enjoyment beliefs, and their interaction on effort seeking. It controlled for the confounding variables math self-concept and trait boredom. All analyses were performed using R (version 4.3.2, R Core Team, 2023).

Results

Prior to analyzing the effects, it is important to determine if the experimental design manipulation was successful and to perform additional preliminary analyses.

Preliminary Analysis

The first important question is to confirm that the participants were properly randomized across the boredom and non-boredom group. 152 participants were in the boredom and 138 in the non-boredom control group. Welch’s Two-Sample t-tests were conducted to compare group differences in effort enjoyment beliefs, math self-concept, gender, and age. The results indicated that the randomization was successful, as no significant differences were found between groups. Moreover, no significant differences were found between paid and non-paid participants, meaning the type of remuneration did not impact the results. There was a significant difference in the expression of the meaning variable between the two groups, $t(285) = 7.15$, $p < .001$, with the control group attributing more meaning to the task than the boredom group. Finally, the t-test analysis for the levels of boredom in both groups did not yield significant results indicating that the experimental boredom manipulation was unsuccessful, that is, that the differences in perceived boredom did not differ significantly between the two groups (for detailed results, refer to Table A1 in the annex).

Main Analysis

Initially, I conducted a multiple linear regression analysis without including an interaction term. The model significantly predicted the MET level, that is, effort seeking (adj. R^2

= .066, $F(4, 285) = 6.065$, $p < .001$). As depicted in Table 2, effort enjoyment beliefs and math self-concept showed a significant effect, boredom and trait boredom (measured by the boredom proneness scale) did not.

Table 2

Linear Regression Model: Effects on Effort Seeking

Effect	Estimate	*SE*	95% CI		*p*
			LL	*UL*	
Fixed effects					
Intercept	.035	.079	-.121	.191	.661
Group[a]	-.070	.115	-.297	.156	.542
Effort enjoyment beliefs[b]	.222	.059	.107	.337	<.001***
Math self-concept[b]	.126	.059	.009	.242	.035*
Trait boredom[b]	-0.050	0.058	-.165	.065	.396

Note. $N = 290$, CI = confidence interval; *LL* = lower limit; *UL* = upper limit; Signif. codes: 0 '***' 0.001 '**' 0.01 '*'

[a] boredom group and control group, [b] factor scores were used for calculation

Subsequently, a moderation analysis was conducted by augmenting the model with the addition of the interaction term between boredom and effort enjoyment beliefs. The model still significantly predicted the MET level, that is, effort seeking (adj. $R^2 = .062$, $F(5, 284) = 4.835$, $p < .001$). This analysis tested whether boredom moderates and reinforces the effect effort enjoyment beliefs have on effort seeking, while controlling for boredom proneness and math self-concept. Since boredom did not become significant in the first model, the interaction term did not reach significance either in the subsequent moderator analysis. The detailed results are depicted in Table 3.

Table 3

Moderator Analysis: Effects on Effort Seeking

Effect	Estimate	*SE*	95% CI		*p*
	β		*LL*	*UL*	

Fixed effects					
Intercept	.035	.080	-0.122	0.191	.661
Group[a]	-.070	.115	-0.297	0.157	.543
Effort enjoyment beliefs[b]	.223	.085	0.056	0.390	.009**
Math self-concept[b]	.126	.059	0.009	0.242	.035*
Trait boredom[b]	-.050	.059	-0.165	0.066	.397
Interaction term group[b] : trait boredom[b]	-.003	.115	-0.230	0.225	.982

Note. N = 290, CI = confidence interval; *LL* = lower limit; *UL* = upper limit; Signif. codes: 0 '***' 0.001 '**' 0.01 '*'

[a] boredom group and control group, [b] factor scores were used for calculation

An analysis of variance (ANOVA) was conducted to compare the fit of the two models. The change in the model's explanatory power was very small and thus not statistically significant ($\Delta R^2 < .001$, $F(1, 284) < 0.001$, $p = .981$). Therefore, the interaction and moderation effect have not become significant either and cannot be interpreted.

With these results in mind, we can now assess how well the hypotheses align with the empirical data:

H1 can be confirmed: Effort enjoyment beliefs have a significant positive effect on effort seeking.

H2 is rejected: The boredom group condition does not have a significant effect on effort seeking.

H3 is rejected: The interaction term is not significant, and boredom does not significantly moderate the relationship of effort enjoyment beliefs and effort seeking.

The model controls for trait boredom and math self-concept. The latter shows a significant correlation in the model.

Exploratory Analysis

Beyond the theoretical hypotheses, noteworthy results were identified through further exploratory data analysis.

Upon examination of the correlations between the variables, it was noticeable that there is a significant negative correlation between effort enjoyment beliefs and boredom proneness,

$r(288) = -.212$, $p < .001$. In addition, math self-concept and effort enjoyment beliefs were found to be mildly correlated, $r(288) = .134$, $p = .023$.

The hypotheses of this thesis did not look at the actual results of the MET, the MET score, which was considered in the original paper by Engle-Friedman et al. (2003). The variable is a weighted mean value taking the difficulty level and whether the answer was correct or not into account. The MET score was subjected to the exploratory analyses and used as the dependent variable in the linear regression model replacing the previously used MET level. The regression model, using the same remaining independent variables as before, did in this case not become significant, adj. $R^2 = .015$, $F(4, 285) = 2.086$, $p = .083$. It therefore did not provide sufficient explanation for the variation in the MET score. The only significant predictor for the MET score in this model was the control variable math self-concept ($\beta = .137$, $p = .025$, CI 95% [0.02, 0.26]). This indicates that higher levels of math self-concept were associated with higher MET scores. All other variables did not show any significant effects.

Discussion

The primary aim of this thesis was to investigate the relationship between effort enjoyment beliefs, effort seeking, and boredom. The study has demonstrated that individuals who experience greater levels of effort enjoyment beliefs are more likely to also show a higher degree of effort seeking (H1). This relationship was anticipated. Boredom was expected to have a noticeable impact on effort seeking (H2). However, the results showed otherwise. The influence of state boredom levels on effort seeking did not reach statistical significance, which is contrary to previous findings in diverse research contexts where the effect could be confirmed. Consequently, the hypothesized moderating effect of boredom (H3) could not be substantiated either. We will now examine possible reasons for this outcome.

Possible Explanations

The most evident explanation for the fact that we cannot observe significant differences in the experimental and control group in effort seeking based on their respective levels of boredom is that the boredom manipulation did not work. The mean boredom score hardly differed between the groups. On a 5-point Likert scale, it was 2.985 for the boredom group and 2.936 for the control group right after watching the respective videos. The mean for both groups slightly decreased after completing the MET, but the difference was not statistically significant, neither between nor within the groups. The results do not mean that boredom has no influence on

effort seeking. Nevertheless, the observed differences were not sufficiently large to detect potential effects. Further research should investigate whether there are significant effects when the boredom manipulation is effective and when a broader range of boredom levels is considered. At a minimum, two statistically significant distinct groups should be included in the study: one comprising individuals who report feeling bored and one with individuals who do not.

It is also possible that the experimental setting in the laboratory was a reason for the lack of significant group differences in the boredom manipulation. The environment may have contributed to a more neutral situation in which it was more difficult to evoke more pronounced emotions. Similarly, the content questions about the videos were meant to impair boredom coping strategies, but might have lowered the enjoyment, also creating more boredom for the control group. On the other hand they might have modelled a more interesting situation for the boredom group as they could not let their minds wander off as easily.

In contrast, effort enjoyment beliefs did not have to be induced; rather they were assessed as a trait via a questionnaire beforehand. We thus got more robust results and measured different effort enjoyment beliefs levels within the sample group. The regression model indicates that effort enjoyment beliefs have a significant impact on effort seeking. This suggests that individuals who generally enjoy cognitively effortful tasks are more likely to choose a more difficult MET problem to solve. So it seems that individuals tend to do more of what makes them happy which supports the main hypothesis (H1) of this thesis.

The second observable effect stems from the math self-concept. The higher the individual's perception of their mathematical skills is, the more likely they are to choose a more difficult MET item. It is presumably their higher perceived self-efficacy in the math context that supports this effect. It is also possible that the math self-concept measures something similar to effort enjoyment beliefs. The math self-concept items focus more on how easy or difficult math feels, but if you enjoy doing something, it also feels easier and more rewarding (Csíkszentmihályi, 1990). So potentially they are showing a similar effect. As the variables were found to be mildly but significantly correlated, I would recommend to investigate this connection further in future research.

In addition, the MET may not have been the most appropriate measurement instrument for assessing effort seeking. Several variables, such as motivational factors, attitudinal factors, and academic involvement, can contribute to mathematics engagement (Singh et al., 2002).

Thus, even though the math self-concept was controlled for, there may have been other distorting effects. Since task difficulty has been shown to reliably indicate individual effort exertion (Wright, 2008), the use of another performance-based but non-mathematical task, such as the N-back task (Conway et al., 2005), could be tested to see whether it yields similar results and confirms the findings of the MET.

Furthermore, this thesis did not consider the actual results of the MET, the MET score (Engle-Friedman et al., 2003). Whilst understanding that the MET level helps to predict behavior, it is also of interest to investigate if and how individuals who perform better on the MET score might differ from those who do not. In the present study, the MET score was only significantly predicted by the math self-concept. Accordingly, the regression model used did not provide an overall explanation for the variation in the MET score. Consequently, effort enjoyment beliefs do not seem to be predicting results, but rather observable behavior. Although effort enjoyment beliefs can help predict task selection, they appear to have limited predictive power in determining actual performance outcomes. This confirms the background of Clay et al.'s (2023) effort enjoyment beliefs scale, which focuses on measuring enjoyment rather than results, in contrast to, for example, achievement motivation. If the general interest in effort enjoyment beliefs refers to the question on how to improve certain results, for instance, at the university or in the workplace, it would be interesting to see whether the results were correlated to the enjoyment of the task if it was a task other than the MET, like the aforementioned N-back task.

Effort enjoyment beliefs are also significantly negatively correlated with boredom proneness. Individuals who derive enjoyment from effortful tasks may have a greater ability to sustain attention and focus on challenging activities, thereby reducing the likelihood of experiencing boredom. On the other hand, those prone to boredom may struggle to maintain engagement in such tasks, leading to lower levels of effort enjoyment beliefs. Individuals who tend to experience higher levels of effort enjoyment beliefs might also be prone to exert cognitive effort more often and thus experience less boredom. A longitudinal study investigating the stability of effort enjoyment beliefs as a character trait over time could be valuable in this context.

Lastly, the study inquired about the meaning component and there is indeed a significant group difference. The control group attributed more meaning to the MET than did the boredom

group. During data collection in the lab, some participants paused and asked for clarification when the screen with the personalized text and our picture appeared, indicating that at least some of them did not read the instructions properly. For future research using a shorter and more easily understandable on-screen prompt for participants could help eliminate this. It is further possible that participants felt like they had to complete the second part including the MET rather than voluntarily wanting to do it. This could contribute to explain why the levels of boredom did not change significantly: participants did not feel like they were doing something different, or that it personally meant anything to them. They just continued with the given task without actually feeling the freedom of opting to not completing it. The onsite research group members additionally asked nicely if they could please finish the study voluntarily in cases the participants did indicate that they wanted to leave early, which might have had an additional influence. Furthermore, meaning was calculated using only two items. The actual validity of the variable should thus be examined.

Last, but not least, the study sample consisted of a rather homogeneous group of mostly female psychology students with a mean age of 22, which may additionally limit the external validity of the findings.

Conclusion

In examining the relationship between effort enjoyment beliefs, effort seeking, and boredom, this study revealed significant findings despite encountering limitations.

Effort enjoyment beliefs emerged as a key predictor for effort seeking, highlighting individuals' preferences for engaging more in cognitive tasks they find enjoyable. Yet, at the same time, a direct connection between effort enjoyment beliefs and success, that is, measurable results, could not be confirmed. However, the study did show that the math self-concept could play an influential role in task selection, suggesting a potential interplay with effort enjoyment beliefs.

The boredom manipulation did not produce significant group differences in their respective levels of effort seeking. This underscores the need for further exploration into the nuances of how individuals interact with tasks, including their level of involvement, participation, general engagement, and perceived meaning.

In conclusion, individuals are inclined to pursue activities they enjoy, yet the intricacies of this relationship require further investigation. Rather than a broad recommendation, this thesis

suggests a refined understanding of the interplay between effort enjoyment beliefs, effort seeking, and boredom. By exploring these dynamics in greater depth, researchers and practitioners can better assist individuals in maximizing their success, engagement, and satisfaction in various pursuits.

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List of Tables

Annex

Table A1

Welch Two Sample t-Tests Results

Parameter	Boredom group		Control group		*t*	*p*
	M	*SD*	*M*	*SD*		
Effort enjoyment beliefs[a]	-.084	0.94	.093	1.06	t(276) = -1.50	.135
Math self-concept[a]	.057	0.98	-.025	0.99	t(285) = 0.71	.481
Gender	1.29	0.52	1.22	0.42	t(284) = 1.17	.243
Age	22.28	5.71	22.43	5.04	t(288) = -0.23	.819
Remuneration type[b]	0.17	0.38	0.20	0.40	t(281) = -0.69	.490
Boredom (after video)	2.99	0.31	2.94	0.24	t(285) = 1.52	.129
Boredom (after MET)	2.73	0.32	2.78	0.29	t(295) = -1.46	.146
Meaning[c]	3.32	1.22	2.38	1.00	t(285) = 7.15	<.001***

Note. $N = 290$. Signif. codes: 0 '***' 0.001 '**' 0.01 '*'

[a] factor scores were used for calculation, [b] 0=paid 1=credits, [c] scale 1-5, high values equal low meaning

Abstract

Effort enjoyment beliefs, effort seeking, and boredom are fundamental constructs in psychology that influence individuals' engagement with cognitive tasks. The aim of the current study is to explore the relationships between the aforementioned constructs and demonstrate that the enjoyment of cognitive activities results in increased effort, and that this effect is enhanced by boredom. The sample size for this study was 290 participants. Effort enjoyment beliefs and boredom were measured using self-report scales, while effort seeking was assessed through the math effort task (MET). Results revealed a significant positive relation between effort enjoyment beliefs and effort seeking, indicating that individuals who derive enjoyment from cognitive tasks are more likely to select cognitively effortful tasks. Unexpectedly, the study did not find a significant relationship between boredom and effort seeking, indicating that boredom in this case did not have an influence on the choice of the task difficulty in the MET. Therefore, there was no significant moderating effect of boredom either, which was expected to reinforce the effect of effort enjoyment beliefs on effort seeking. The effect should be interpreted with caution, as the boredom manipulation was not successful and the experiment should be repeated with two groups exhibiting a significant difference in their levels of boredom.

Keywords: effort enjoyment beliefs, effort seeking, boredom, math effort task, MET

Abstract (German)

Überzeugungen über die Freude an Anstrengung (Effort Enjoyment Beliefs), Anstrengungsbereitschaft (Effort Seeking) und Langeweile sind grundlegende Konstrukte in der Psychologie, die das Engagement von Individuen bei kognitiven Aufgaben beeinflussen. Ziel der vorliegenden Studie ist es, die Beziehungen zwischen den genannten Konstrukten zu untersuchen und zu zeigen, dass die Freude an kognitiven Aktivitäten zu einer erhöhten Anstrengung führt und dass dieser Effekt durch Langeweile verstärkt wird. Die Stichprobengröße für diese Studie betrug 290 Teilnehmende. Effort Enjoyment Beliefs und Langeweile wurden mit Hilfe von Selbsteinschätzungsskalen gemessen, während Effort Seeking mit Hilfe einer mathematischen Anstrengungsaufgabe (MET) erfasst wurde. Die Ergebnisse zeigten einen signifikant positiven Zusammenhang zwischen Effort Enjoyment Beliefs und Effort Seeking, was darauf hindeutet, dass Personen, die Spaß an kognitiven Aufgaben haben, eher kognitiv anspruchsvolle Aufgaben wählen. Unerwarteterweise wurde in dieser Studie kein signifikanter Zusammenhang zwischen Langeweile und Effort Seeking gefunden, was darauf hindeutet, dass Langeweile in diesem Fall keinen Einfluss auf die Wahl der Aufgabenschwierigkeit in der MET hatte. Daher wurde auch kein signifikanter moderierenden Effekt von Langeweile nachgewiesen, von dem erwartet wurde, dass er die Wirkung von Effort Enjoyment Beliefs auf Effort Seeking verstärkt. Der Effekt sollte mit Vorsicht interpretiert werden, da die Langeweile-Manipulation nicht erfolgreich war. Das Experiment sollte mit zwei Gruppen wiederholt werden, die einen signifikanten Unterschied in ihrem Langeweile-Niveau aufweisen.

Schlüsselwörter: Überzeugungen über die Freude an Anstrengung, Effort Enjoyment Beliefs, Anstrengungsbereitschaft, Effort Seeking, Langeweile, mathematische Anstrengungsaufgabe, MET