

Original Papers*Polish Psychological Bulletin*

2021, vol. 52(2) 188–196

DOI 10.24425/ppb.2021.137262

Adnan Adil*
Asmara Kanwal*
Ghulam Yasin**
Sadaf Ameer*

Ego Depletion Sensitivity as the Mediator Between Avoidance Temperaments and Subjective Vitality

Abstract: The present study examined the mediating role of ego depletion sensitivity between temperaments and subjective vitality. The sample of the present research consisted of 210 undergraduate students of the University of Sargodha. Temperament, ego depletion sensitivity, and subjective vitality were operationalized through Approach-Avoidance Temperament Questionnaire (Elliot & Thrash, 2010), Depletion Sensitivity Scale (Salmon et al., 2014), and Subjective Vitality Scale (Ryan & Frederick, 1997), respectively. Correlation analysis depicted that ego depletion sensitivity was positively correlated with avoidance temperament and negatively correlated with subjective vitality. Furthermore, ego depletion sensitivity mediated between avoidance temperament and subjective vitality. Implications of the study along with its limitations and suggestions were discussed.

Keywords: *Ego depletion sensitivity, temperament, subjective vitality.*

The construct of ego depletion is being studied in various fields and it has received significant attention in psychology. Coined by Baumeister and colleagues (Baumeister et al., 2000), ego depletion refers to the temporary reduction in the energy available to self's capacity or willingness to engage in a certain activity. When the energy for mental activity has been lowered, self-control is typically weakened and it would be considered as a state of ego depletion. Due to prolonged physical exertion and extended mental activity, a person may have weakened the capacity of self-regulation which leads toward the ego depleted state.

Ego depletion has been conceptualized by three different models. The self-control strength model of ego depletion suggests that self-control is considered an effortful conscious and intensive process to override and change a person's automatic attentional focus to fulfill the long-term goal (Baumeister et al., 2007; Muraven & Baumeister, 2000; Muraven, 2011). Muraven and Baumeister (2000) suggested that self-regulatory failure is caused by limited resources. They argued that when an individual applies self-control in one task, the application of self-control causes performance decrements in the subsequent task, which are unrelated but require self-control. Baumeister et al. (2007) stated that the strength model also

predicts that the performance of the experimental group will be impaired on the second task as compared to that of the control group. The participants of the experimental group possess limited resources, which get diminished just after doing the first task, and at the second task, it may worsen. To renew self-control resources, it is necessary to take rest and recuperation (Baumeister & Heatherton, 1996; Muraven & Baumeister, 2000).

The second model of ego depletion is rooted in the construct of self-regulation. Self-regulation is a method to pursue and chase all of the long term and short-term goals. Self-regulation integrates both conscious and unconscious processes to restrain the impulses to gain long-term goals and follow rules (Muraven, 2011). The self-regulation model of ego depletion proposes three assumptions. The first assumption states that thoughts about self-regulation depend upon mental resources, which is domain-general (Muraven & Baumeister, 2000). The second assumption states that this mental resource (self-regulation) is limited (Baumeister et al., 1998). It can be explained in such a way that performance can be affected if the demands of resources are higher than their availability (Just et al., 2003). The final assumption for this model demonstrates that resource of self-regulation involves a strength, which is limited so it can also be described as a muscle; if the

* Department of Psychology, University of Sargodha

** Department of Sociology and Criminology, University of Sargodha

analogy of muscle is seen, continuous usage of a muscle can become a cause of fatigue and its capacity gets reduced (Muraven et al., 1998).

Some of the studies show that regulatory resources are limited as they are comparable to energy (Baumeister & Heatherton, 1996; Muraven & Baumeister, 2000). It stated that regulation resources can be depleted by certain regulation activities which include control of behaviors, emotions, and thoughts that are required for intellectual performance, decision-making skills, and self-representation (Vohs et al., 2006).

The third model of ego depletion is termed as the process model and it explains particular cognitive, affective, and motivational mechanics of self-control and its depletion (Inzlicht & Schmeichel, 2012). Shifts in different constructs like motivation, attention, and emotion may result in depleted self-control. Inzlicht and Schmeichel stated that initial exertions of will power lead the individual towards gratification. Due to shifts of motivation and attention, it can reduce levels of self-control at time 2 than it was at time 1. This model suggested the finest explanation of lower levels of self-control at Time 2. It is proposed that poorer self-control is caused due to reduced motivation for exerting control and reduced attention to cues for signaling a requirement for control. The process model explained it into two processes: the first process is about the shift in motivation in which exertion of control makes individuals less motivated and hinders them to further engage in the control process and individuals become motivated to perform the activities which are enjoyable, interesting, and rewarding. The second process was explained as shifts in attention. People show less attention to those cognitive and affective signals, which depict any discrepancy or conflict between the ideal and present states, and perceive the cues, which are associated with reward and gratification.

Ego depletion and mental fatigue appear to be overlapping constructs. Giboin and Wolff (2019) notice that the concept of ego depletion has evolved in psychology whereas the concept of mental fatigue has been developed in exercise physiology. According to the strength model, the capacity to exert mental effort hinges on a depletable global self-control resource (Hagger et al., 2010). The state of depleted self-control resources is called ego depletion and supposedly leads to impaired performance in subsequent self-control demanding tasks because all self-control processes draw on the same limited resource, which implies that applying self-control in one task (e.g., regulating an emotional response) will affect performance in completely unrelated self-control demanding physical task. In exercise physiology, these performance decrements are primarily explained by mental fatigue which is thought to occur after prolonged exertion of mental effort (Marcora et al., 2009). More specifically, according to the psychobiological model of endurance performance (Marcora & Staiano, 2010), perception of effort is the 'cardinal exercise stopper' (Staiano et al., 2018). Both ego depletion and mental fatigue aim at explaining the apparent reduction in performance after

prior mental exertion. The only difference that Giboin and Wolff (2019) identify suggest that tasks that are aimed to induce ego depletion are substantially shorter than those aimed at causing mental fatigue. Mental fatigue is only thought to reliably occur if the mental exertion was at least 30 minutes long (Van Cutsem et al., 2017) whereas a linear association between duration of the depleting task and the size of the ego-depletion effect is expected (Hagger et al., 2010) but the strength model does not specify a lower limit for the duration mental effort needs to be exerted for an ego depletion effect to occur.

The studies that have explored the phenomenon of ego depletion are not conclusive. For instance, Schmeichel et al. (2003) demonstrated that ego depletion did take place and led people to think less intelligently. Rottenstreich et al. (2007) provided empirical evidence that depletion impaired the performance on the tasks which require executive control for following the rules to convert information from what was given into something else. Nevertheless, some studies on ego depletion suggest that the phenomenon of ego depletion does not take place. For example, studies by Xu et al., (2014); Lurquin et al. (2016) failed to provide any evidence in support of ego depletion. Specifically, Lurquin et al. (2016) found that participants of the control condition did not perform well than participants of the depletion condition on the subsequent self-control task. Furthermore, Xu et al. (2014) found that the task used for depletion did not affect self-control on subsequent tasks. In their review article, Fries et al. (2019) observed that the reality of ego depletion is subject to great debate. Their analysis suggests that critical evidence is unlikely to convince proponents that ego depletion does not exist. Likewise, the supporting evidence is unlikely to convince skeptics that ego depletion does exist. They concluded that better empiricism and better theory are needed to move the field forward and find more conclusive answers to the question of whether, when, and why ego depletion does (not) exist.

EGO DEPLETION SENSITIVITY

Ego depletion sensitivity could be conceived as a dispositional variable that might explain the individual differences in people's degree of ego depletion. Thus, owing to high levels of ego depletion sensitivity, some of us may deplete our self-control resources more quickly than others and each of us has a different level of ego depletion (Salmon et al., 2014). Some people hold a high level of self-regulatory energy and they are capable to control this energy in a better way which helps them to protect themselves from the effects of ego depletion (Baumeister et al., 2006).

If the concept is defined in terms of muscle metaphor, it can be said that some people hold more endurance intensity of the muscle than others. The concept of depletion sensitivity has two implications. The first implication states that muscle power is necessary to exert self-control at a specific moment, so it is supposed that this power involves an unchanging situational level of trait

self-control (Baumeister & Alquist, 2009). If the trait self-control level is insufficient, a person is unable to use self-control at a specific moment. Trait self-control works on the extent of the self-control the first time but depletion sensitivity works on differences in the degree to which people exert self-control repeatedly over time. It means that people having an equal level of trait self-control still differ in self-control depletion. It is proposed that depletion sensitivity relates to muscle endurance and trait self-control relates to the overall power of muscle. The second implication is that the one who is more sensitive to depletion of resources has less ability for having self-control on the second subsequent task as compared to the less sensitive person (Salmon et al., 2014).

Since ego depletion sensitivity is relatively a new construct, therefore empirical literature on ego depletion sensitivity is quite scarce. In their pioneering research on ego depletion sensitivity, Salmon et al. (2014) found that people who showed more sensitivity toward ego depletion had experienced more ego depletion in contrast to the persons who were less sensitive to depletion. Thus, they provided a piece of evidence for the construct validity of ego depletion sensitivity by demonstrating that sensitivity to ego depletion could validly predict the subsequent level of actual ego depletion. They also showed that people with a higher level of depletion sensitivity were more prone to buy unhealthy snacks.

Extending the work of Salmon et al. (2014), one could reason that if ego depletion sensitivity could predict the subsequent ego depletion, it should also be a dispositional predictor of the established outcomes of ego depletion including reduced subjective vitality (Ryan & Deci, 2008), impaired task persistence, and task performance (Hagger et al., 2010; Baumeister et al., 2007); however to the best of our knowledge, no previous researches have explored ego depletion sensitivity as a dispositional factor in relation to the aforementioned outcomes of ego depletion. The current study bridges this void in the existing literature as it intended to explore the evidence for the nomological validity of ego depletion sensitivity by examining its relationships with the established outcomes of ego depletion.

TEMPERAMENTS

Temperament involves individual differences in affect, activity, attention, and self-regulation (Rothbart & Bates, 2006). Kagan and Snidman (2004) defined temperament as a reflection of features that are inherited biologically. Temperament is considered as individual differences, which are reflected in emotional, motor, and attentional activities and their regulation (Thomas & Chess, 1977). Since temperaments are largely conceived as biologically determined and are central to one's attentional and self-regulatory capacities, therefore, they should have a strong bearing on one's sensitivity to ego depletion.

Approach temperament is described as neurobiological sensitivity to stimuli which is positive e.g., reward; and

avoidance temperament is described as neurophysiological sensitivity toward negative or unwanted stimuli and a behavioral tendency away from them, for instance punishment (Elliot & Thrash, 2010). Approach temperament tends to motivate the characteristics of extraversion, positive emotionality, and behavioral activation system whereas avoidance temperament tends to form the characteristics of neuroticism, negative emotionality, and behavioral inhibition system (Bipp & Kleingeld, 2013).

The theorizing of Gray (1970) is noteworthy in this literature in that he has posited the existence of individual differences in two conceptual nervous systems: one labeled the behavioral activation system (BAS), which is posited to facilitate behavior and produce positive affect, and the other labeled the behavioral inhibition system (BIS), which is posited to inhibit behavior and produce negative affect. According to Elliot and Thrash (2002), extraversion, positive emotionality, and BAS constructs all share the same basic core—a general neurobiological sensitivity to positive/desirable (i.e., reward) stimuli (present or imagined) that is accompanied by perceptual vigilance for, affective reactivity to, and a behavioral predisposition toward such stimuli. Likewise, neuroticism, negative emotionality, and BIS all share the same basic core—a general neurobiological sensitivity to negative/undesirable (i.e., punishment) stimuli (present or imagined) that is accompanied by perceptual vigilance for, affective reactivity to, and a behavioral predisposition away from such stimuli. Elliot and Thrash (2002) label these core constructs approach temperament and avoidance temperament, respectively, to highlight the fact that they represent basic forms of approach and avoidance motivation that are presumed to possess the primary characteristics of temperament. Conceptualizing these core constructs as temperaments is in direct accord with the contemporary conceptualization of the individual dispositional constructs as biologically based temperaments.

Some earlier studies supported that the selection of daily approach and avoidance goals is affected by individual differences in approach and avoidance temperaments (Elliot & Thrash, 2002). Most of the studies on self-control are grounded on the self-control strength model and it has examined the control of approach-motivated behaviors (Vohs & Heatherton, 2000). It is considered that a high level of self-control leads towards approach motivated behavior (Harmon et al., 2008). Baumeister (2002) suggested that ego depletion has a negative influence on self-regulation so it can be concluded that self-control and ego depletion are inversely linked to the approach motivated behavior and temperament.

According to Eisenberg et al. (2010), ego resiliency in children is positively related to approach temperament or BAS, because inflexible, excessively controlled behavior is not conducive to approaching new resources, people, and spontaneous social interactions. Thus, it is likely that individuals with approach temperament would be more sensitive to the acquisition of new resources owing to which their sensitivity to ego depletion should be low. In contrast, the BIS or avoidance temperament may be

associated with more anticipatory attention in infancy, and the fear associated with such inhibition has been linked to higher levels of effortful inhibitory control (Aksan & Kochanska 2004). This inhibitory control may lead to a more rapid depletion of ego resources making people more sensitive to ego depletion.

People with avoidance temperaments are more prone to depletion of their resources (Koch et al., 2009). Approach temperament was positively connected with approach goals, which searched and acquired positive consequences and goal attainment. Thus, people with approach temperament should have higher task persistence as compared to the people with avoidant temperament. Avoidance temperament was related to the acquisition of avoidance goals and purpose was the avoidance of negative outcomes (Elliot et al., 2011). Koch et al. (2008) verified in a study that on an initial cognitive task, people with avoidance condition performed better but later on showed greater indications of resource depletion. Thus, people with avoidance temperament may be more sensitive to ego depletion.

Schmeichel et al. (2010) reported that approach motivation is heightened by depletion, so individuals focus less on reward irrelevant stimulus than reward relevant stimulus. Ego depletion theory suggests that regulatory resources are strengthened when people experience positive social interactions and receive social rewards (Bono et al., 2013). Therefore, people with approach temperament who are primarily motivated to maximize positive rewards should have lower levels of ego depletion sensitivity. These lines of reasoning suggest that approach temperament should be negatively whereas avoidance temperament should be positively related to sensitivity to ego depletion. Therefore, the current study hypothesized:

H1: Approach temperament will be negatively and avoidance temperament will be positively related to ego depletion sensitivity.

SUBJECTIVE VITALITY

Subjective vitality is a sense of feeling alive, being full of energy, and feeling vital (Ryan & Frederick, 1997). Vital people are observed to cope well with stress, are more active and productive, and have better mental health (Penninx et al., 2000). It was further experienced that high levels of subjective vitality create adequate energy to fulfill the tasks, and improves the mood so that all of the tasks are performed in a better way. Ryan and Frederick (1997) conceptualized that positive affect increases subjective vitality; on the contrary, fatigue, and illness hamper the activation which leads to the loss of energy resulting in diminished levels of subjective vitality.

Ryan and Deci (2008) suggest that autonomously regulated (self-regulation) behaviors are less inclined to deplete than self-controlled behaviors. However, behaviors, which demand self-control, could reduce levels of energy and reduce performance and persistence at subsequent tasks. Ryan and Deci further asserted that ego depletion does not occur if the self is regulated in

autonomous or volitional forms. Furthermore, as vitality is concerned with energy, not with activation; it is argued that anyone satisfied with the basic need of self can sustain or increase vitality and self-regulatory capacities. When one feels as vital, one can more quickly replenish the strength (Muravan et al., 2006). Lower levels of vitality can lead to a lower amount of self-control (Tice et al., 2007) resulting in higher levels of ego depletion. In consonance with the aforementioned literature, the current study hypothesized that:

H2: Ego depletion sensitivity will be negatively related to subjective vitality.

Approach temperament is positively connected with approach goals, which involves the search and acquisition of the positive consequences and goal attainment. Contrarily, avoidance temperament is related to the acquisition of avoidance goals and leads to the avoidance of negative outcomes (Elliot et al., 2011). Consequently, avoidance temperament may lead to depletion in energy, induced negative affect, reduced subjective well-being, and lowered performance in the long run (Stahl et al., 2012). Therefore, the current study hypothesized:

H3: Approach temperament will be positively and avoidance temperament will be negatively correlated to subjective vitality.

Ego depletion and avoidance temperament influence each other positively (Koch et al., 2009). Therefore, people with avoidant temperament should be more sensitive to ego depletion, which in turn may lead to lowered levels of subjective vitality. Ego depletion is the depletion of mental resources; and the person who depletes his/her mental resources more quickly i.e., one with high sensitivity to ego depletion should report a reduced level of vitality. This stream of reasoning suggests that temperaments may predict ego depletion sensitivity, which, in turn, may influence subjective vitality, which justifies the mediating role of ego depletion sensitivity between temperaments and vitality. Therefore, we hypothesized:

H4: Ego depletion sensitivity will mediate between temperaments and subjective vitality.

METHOD

Sample

Sample of the present research comprised of ($N = 210$, Men = 32, Women = 178) students of various departments of the University of Sargodha. The students of 5th or higher semesters of BS programs and students of any semester of the master's program within the range of 18–23 years ($M = 21.4$, $SD = 0.99$) were purposively recruited in the present study. Demographic variables of gender, age, residence, qualification, CGPA, and semester were also included.

Instruments

Since all the participants were bilinguals and were fluent in English, the present study used the original English versions of the scales.

Approach Avoidance Temperament Questionnaire (ATQ). 12-item ATQ (Elliot & Thrash, 2010) was used to assess the approach and avoidance temperaments on a 7-point Likert scale (1 = strongly agree to 7 = strongly disagree). Item number 2, 4, 5, 8, 10, and 11 assessed approach temperaments, and item number 1, 3, 6, 7, 9, and 12 measured avoidance temperaments (Elliot & Thrash, 2010). A higher score on either of the temperament scales indicates a stronger inclination toward that temperament.

Depletion Sensitivity Scale. 11-item Depletion Sensitivity Scale (Salmon et al., 2014) was used to measure sensitivity to ego depletion on a 5-point rating scale ranging from strongly disagree (1) to strongly agree (5). Higher scores on this scale demonstrate higher levels of depletion sensitivity and low scores show lower levels of depletion sensitivity.

Subjective Vitality Scale (SVS). 14-item Subjective Vitality Scale ($\alpha = .84$; Ryan & Frederick, 1997) was used to measure the vitality and energy of self within a person on a 7-point response rating scale (1 = not at all true to 7 = very true). Higher scores on this scale demonstrate a higher level of subjective vitality and lower scores demonstrate a lower level of subjective vitality.

Procedure

Participants were approached in their classrooms and were briefed about the objectives of the study. Their informed consent was taken and they were ensured that their information would be kept confidential and they could leave at any stage of study if they did not feel comfortable. Participants' relevant demographic information were recorded on a demographic data sheet which

Reliability coefficients are satisfactory for all the scales. Values of skewness for all the scales are also within the acceptable range. Furthermore, the actual range of all scales approximated their potential range, which provides evidence for the absence of a restricted range of response.

Table 2 shows the correlation matrix among the focal constructs of the present study. Avoidance and approach temperaments have significant negative relationship with each other. Avoidance temperament has significant negative relationship with subjective vitality and significant positive relationship with depletion sensitivity. Approach temperament has significant positive relationship with subjective vitality and non significant relationship with depletion sensitivity.

The path analysis was undertaken in IBMSPSS Amos version 24. The maximum likelihood method was used and biased corrected 95% confidence intervals (CI) were generated across 2000 bootstrap samples. The analysis revealed that the proposed model of the present study fitted well to the data ($\chi^2 = .79$, $df = 6$, $p = .85$; CFI = 1.00; GFI = .99; RMSEA = .000, $p_{close} = .92$). The path model is schematically presented in Figure 1.

Temperaments explained a 23% variance in depletion sensitivity. Avoidance temperament positively predicted depletion sensitivity whereas approach temperament did not predict it. After controlling age, approach temperament positively whereas avoidance temperament and ego depletion sensitivity negatively predicted vitality and the model explained 20% variance in subjective vitality. The indirect effect of avoidance temperament on subjective vitality through ego depletion sensitivity was significant and it was found that the avoidance temperament might

Table 1. Descriptive and Psychometric Properties of the Scales of Present Study (N = 210)

Scales	Range					
	<i>M</i>	<i>SD</i>	<i>a</i>	Actual	Potential	<i>Sk^a</i>
Approach temperament	32.40	5.4	.70	13-42	06-42	-.25
Avoidance temperament	24.52	6.7	.71	08-42	06-42	-.17
Ego depletion sensitivity	34.66	6.4	.79	11-55	11-55	-.17
Subjective vitality	67.96	12.4	.84	30-95	14-98	-.23

^aStandard error of skewness = .17

included their age, gender, academic discipline, and family system. Participants were handed over the questionnaire booklets, which took 20 to 25 minutes to complete. In the end, participants were thanked for their participation in the study.

RESULTS

Table 1 represents psychometric properties and descriptive statistics of instruments used in the present study. It shows means, standard deviations, alpha reliability, range, and skewness of the scales of the study.

Table 2. Pearson Correlations among Variables of Present Study (N = 210)

Variables	1	2	3	4
1. Approach Temperament	-	-.24*	.07	.15*
2. Avoidance Temperament	-	-	.47**	-.29**
3. Depletion Sensitivity	-	-	-	-.37**
4. Subjective Vitality	-	-	-	-

Note. * $p < .05$, ** $p < .01$

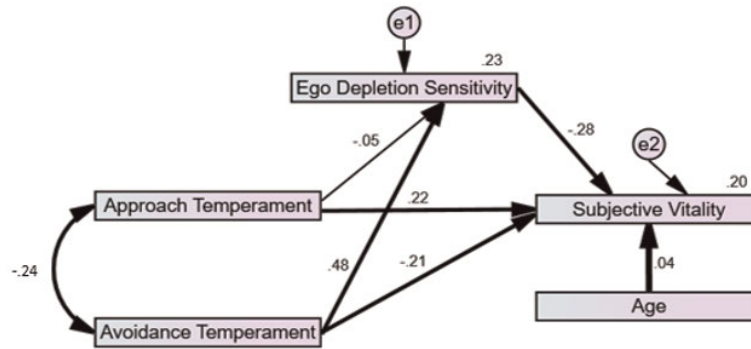


Figure 1. Path Diagram of the Proposed Model of the Present Study

Note. The significant paths are shown by bold arrows whereas the regular arrow shows no-significant path

lead to greater sensitivity to ego depletion which in turn might reduce subjective vitality. The indirect effect of approach temperament on subjective vitality through ego depletion sensitivity was not computed since approach temperament did not predict ego depletion sensitivity. The standardized path coefficients of the direct and indirect effects along with 95% CI are presented in Table 3.

Owing to the cross-sectional design of the present study, the direction of causality of the indirect effect cannot be warranted. Accordingly, it is quite plausible that depletion sensitivity may influence avoidance temperament leading to subjective vitality. Therefore, we examined the two indirect paths (i) avoidance temperament → depletion sensitivity → subjective vitality and (ii) depletion sensitivity → avoidance temperament → subjective vitality. The standardized path coefficient of the first path was $-.14$ ($p = .001$) whereas the same for the second path was $-.03$ ($p = .052$), which established the evidence that depletion sensitivity mediated between avoidance temperament and subjective vitality.

The model was tested across men and women for its invariance across gender. The freely estimated model ($\chi^2 = 8.9$, $df = 6$, $p = .11$) was compared with the fully constrained model where all paths were constrained to be equal across the gender ($\chi^2 = 18.4$, $df = 12$, $p = .32$). The findings revealed that the model was invariant across

gender ($\Delta\chi^2 = 9.5$, $\Delta df = 6$, $p = .15$). This indicated that gender did not moderate any path of the model of the present study.

DISCUSSION

The process model of ego depletion may offer the best explanation of the findings of the present study. Since temperaments establish the core of one's characteristic motivational orientation throughout one's life, therefore, we may conclude that in consonance with the process model (Inzlicht & Schmeichel, 2012), shifts in different constructs like motivation, attention, and emotion may result in depleted self-control. Accordingly, an individual with avoidance temperament is more likely to be dispositionally high on depletion sensitivity because an avoidant person is only motivated just to avoid the failure and s/he may not proactively exert her/his energies persistently to achieve the best.

The first hypothesis of the study stated that avoidance temperament would have a positive whereas approach temperament will have a negative influence on ego depletion sensitivity. This hypothesis has been partially supported as the path analysis indicated that only avoidance temperament had a positive direct effect on depletion sensitivity whereas approach temperament had

Table 3. Standardized Path Coefficients of Direct and Indirect Effects of the Proposed Model of the Present Study

Paths	β	p	95% CI	
			LL	UL
Approach temperament → ego depletion sensitivity	-.05	.55	-.19	.10
Avoidance temperament → ego depletion sensitivity	.48	.001	.35	.60
Ego depletion sensitivity → subjective vitality	-.28	.001	-.41	-.13
Approach temperament → subjective vitality	.22	.003	.08	.34
Avoidance temperament → subjective vitality	-.21	.01	-.35	-.05
Avoidance temperament → ego depletion sensitivity → subjective vitality	-.14	.001	-.22	-.06
Age → subjective vitality	.04	.54	-.08	.15

no direct effect on depletion sensitivity (see Table 3). The positive direct effect of avoidance temperament on depletion sensitivity is in line with the findings of Koch et al. (2009), which established that people with avoidance temperament were more prone to depletion sensitivity and deplete their resources more quickly. As previous studies of Vohs and Heatherton (2000) had shown that people engage in undesirable behaviors due to failure in regulation of shifts of approach and avoidance, so it can be inferred that people with avoidant temperament cannot regulate themselves successfully and therefore may deplete sooner.

The non significant direct effect of approach temperament on depletion sensitivity can be understood in terms of Pakistani cultural context. Literature suggests that Pakistani youth is not highly motivated, and cultural demands are unpleasantly influencing the goals of youth and approach to achievements of life (Rauf, 2016); so, these results are not surprising. This line of reasoning can be supported through valence from the effort hypothesis (Morsella et al., 2010), which suggests that challenging targets motivate individuals yet individuals try to strive for them while investing minimum efforts for the sake of conserving their ego reservoirs. In situations involving ego depletion, since the subsequent task becomes more difficult owing to ego depletion in the first task, the individual is likely to adopt avoidance motivation instead of the approach motivation. Therefore, approach temperament may not relate with ego depletion sensitivity whereas avoidance temperament does positively correlate with sensitivity to ego depletion.

Our second hypothesis state that ego depletion sensitivity will have a negative influence on subjective vitality and it has been supported by the findings. Since individuals high on subjective vitality perceive themselves as more resourceful, therefore, they should be less sensitive to ego depletion. Furthermore, Muraven et al. (2006) found that a vital person could replenish one's strengths more quickly. Lower levels of vitality can lead to a lower amount of self-control (Tice et al., 2007).

The third hypothesis of the present study was also supported as avoidant temperament was found to be the negative predictor of vitality whereas the approach temperament turned out to be the positive predictor of the same. Approach temperament tends to motivate the characteristics of extraversion, positive emotionality, and behavioral activation system whereas avoidance temperament tends to form the characteristics of neuroticism, negative emotionality, and behavioral inhibition system (Bipp & Kleingeld, 2013), therefore, approach temperament demonstrated positive whereas avoidance temperament demonstrated negative associations with subjective vitality.

The fourth hypothesis of the present study stated that ego depletion sensitivity would mediate between temperaments and subjective vitality and our findings support this hypothesis. Avoidance temperament increases chances of ego depletion which is in line with the research of Koch et al., (2009), which may compromise one's degree of

subjective vitality. Individuals with avoidance temperament can have higher levels of ego depletion. Ego depletion is the depletion of mental resources, and the person who depletes his/her mental resources cannot remain vital and energetic. As discussed earlier, the direct effect of approach temperament on ego depletion sensitivity was non-significant, therefore, ego depletion sensitivity did not mediate between approach temperament and subjective vitality. Adopting an approach orientation may lead to more exertion of ego resources whereas adopting an avoidance approach may lead to conservation of ego resources. That's why people with avoidance temperament are more likely to have greater sensitivity to ego depletion, which in turn, may reduce their perceived subjective vitality.

LIMITATIONS, SUGGESTIONS, AND IMPLICATIONS OF THE PRESENT STUDY

Some of the important limitations of the present study are highlighted here. Firstly, there could have been issues of generalization since the sample of the present study was limited to students of the University of Sargodha and all of them were undergraduate students. Therefore, further research would be required on more diverse samples to generalize results across a broader population. Secondly, the present study used a cross-sectional research design through which causal interpretations of the linkages among variables are not warranted. Future research may employ a longitudinal design for better causal inferences. Finally, all constructs of the present study were measured through self-report instruments, which might have introduced common method bias in the findings.

Future research may use the multi-method approach to overcome issues of common method variance. Further researches should be undertaken to search for methods and techniques to replenish the mental resources and postpone ego depletion. It should search for the question of whether ego depletion is caused by disinterest or lack of attention. Moreover, recent research suggests some evidence of individual differences in volitional action that may moderate ego-depletion and invigoration, for instance, Gröpel et al. (2014) and Kazén and Kuhl (2020) found that people with action orientation were higher on ego invigoration whereas people with state orientation were higher on ego depletion. Therefore, future studies should investigate the convergent and discriminant validity of the Depletion Sensitivity Scale of Salmon et al. (2014) against Kuhl's Action Control Scale.

The present study produces rich material for theory and practice in the field of psychology. It can help better understand individual differences in ego depletion and how they can be harnessed for promoting self-regulation in society. The results of the present study can be implanted in educational and work settings to understand why some students and workers deplete their mental resources sooner and leave the effort due to higher sensitivity to ego depletion and avoidance temperament. This study may

serve as a guideline in work settings to understand that people of different temperaments may have different levels of ego depletion. Therefore, ego depletion sensitivity and its predictors can serve as relevant indicators of performance in challenging situations and could be assessed as relevant criteria of selection in challenging professions.

REFERENCES

- Aksan, N., & Kochanska, G. (2004). Links between systems of inhibition from infancy to preschool years. *Child Development, 75*, 1477–90.
- Baumeister, R. F. (2002). Ego depletion and self-control failure: An energy model and the self's executive function. *Self and Identity, 1*, 129–136. <https://doi.org/10.1080/152988602317319302>.
- Baumeister, R. F., & Alquist, J. L. (2009). Is there a downside to good self-control? *Self Identity, 8*, 115–130. <https://doi.org/10.1080/15298860802501474>.
- Baumeister, R. F., & Heatherton, T. F. (1996). Self-regulation failure: An overview. *Psychological Inquiry, 7*, 1-15.
- Baumeister, R. F., Bratslavsky, E., Muraven, M., & Tice, D. M. (1998). Ego-depletion: Is the active self a limited resource? *Journal of Personality and Social Psychology, 74*, 1252-1265.
- Baumeister, R. F., Muraven, M., & Tice, D. M. (2000). Ego Depletion: A resource model of volition, self-regulation, and controlled processing. *Social Cognition, 18* (2), 130-150.
- Baumeister, R. F., Vohs, K. D., & Tice, D. M. (2007). The strength model of self-control. *Current Directions in Psychological Science, 16*, 351–355. <https://doi.org/10.1111/j.1467-8721.2007.00534.x>.
- Bipp, T., & Ad Kleingeld (2013). *The construct and predictive validity of approach and avoidance temperament*. Houston, Texas.
- Bono, J. E., Glomb, T. M., Shen, W., Kim, E., & Koch, A. J. (2013). Building positive resources: Effects of positive events and positive reflection on work stress and health. *Academy of Management Journal, 56*(6), 1601-1627.
- Cooper, A., Gomez, R., & Buck, E. (2008). The relationships between the BIS and BAS, anger, and responses to anger. *Personality and Individual Differences, 44*(2), 403-413.
- DeWall, C. N., Baumeister, R. F., Gailliot, M. T., & Maner, J. K. (2008). Depletion makes the heart grow less helpful: Helping as a function of self-regulatory energy and genetic relatedness. *Personality and Social Psychology Bulletin, 34*, 1653-1662.
- Eisenberg, N., Spinrad, T. L., & Eggum, N. D. (2010). Emotion-related self-regulation and its relation to children's maladjustment. *Annual Review of Clinical Psychology, 27*(6), 495–525.
- Elliot, A. J., & Thrash, T. M. (2002). Approach-avoidance motivation in personality: Approach and avoidance temperaments and goals. *Journal of Personality and Social Psychology, 82*, 804–818.
- Elliot, A. J., & Thrash, T. M. (2010). Approach and avoidance temperament as basic dimensions of personality. *Journal of Personality, 78*(3), 865 - 906.
- Elliot, A. J., Murayama, K., & Pekrun, R. (2011). A 3x2 achievement goal model. *Journal of Educational Psychology, 103* (3), 632-648.
- Friese, M., Loschelder, D. D., Gieseler, K., Frankenbach, J. & Inzlicht, M. (2019). Is ego depletion real? An analysis of arguments. *Personality and Social Psychology Review, 23*(2), 107–131. <https://doi.org/10.1177/10888683187621183>
- Giboin, L. S., & Wolff, W. (2019). The effect of ego depletion or mental fatigue on subsequent physical endurance performance: A meta-analysis. *Performance Enhancement & Health, 7*(1-2), 100-150.
- Gomez, R., Cooper, A., & Gomez, A. (2000). Susceptibility to positive and negative mood states: Test of Eysenck's, Gray's, and Newman's theories. *Personality and Individual Differences 29* (2), 351-365
- Gray, J. A. (1970). The psychophysiological basis of introversion-extraversion. *Behaviour Research and Therapy, 8*(3), 249-266.
- Gröpel, P., Baumeister, R. F., & Beckmann, J. (2014). Action versus state orientation and self-control performance after depletion. *Personality and Social Psychology Bulletin, 40*(4), 476–487. <https://doi.org/10.1177/0146167213516636>
- Hagger, M. S., Wood, C., Stiff, C., & Chatzisarantis, N. L. D. (2010). Ego depletion and the strength model of self-control: A meta-analysis. *Psychological Bulletin, 136*(4), 495-525. <https://doi.org/10.1037/a0019486>; 10.1037/a0019486.
- Harmon-Jones, E., & Peterson, C. K. (2008). Effect of trait and state approach motivation on aggressive inclinations. *Journal of Research in Personality, 42*, 1381–1385.
- Inzlicht, M., & Schmeichel, B. J. (2012). What is ego depletion? Toward a mechanistic revision of the resource model of self-control. *Perspectives on Psychological Science, 7*(5), 450–463.
- Just, M. A., Carpenter, P. A., & Miyake, A. (2003). Neuro-indices of cognitive workload: Neuroimaging, pupillometric, and event-related potential studies of brain work. *Theoretical Issues in Ergonomics Science, 4*, 56-88. <https://doi.org/10.1080/14639220210159735>
- Kagan, J., & Snidman, N. (2004). *The long shadow of temperament*. London, England: The Belknap Press of Harvard University Press.
- Kazén, M., & Kuhl, J. (2020). Ego-depletion or invigoration in solving the tower of Hanoi? Action orientation helps overcome planning deficits. *Current Psychology*. Advance online publication. <https://doi.org/10.1007/s12144-020-00770-9>
- Koch, S., Holland, R. W., & van Knippenberg, A. (2008). Regulating cognitive control through approach-avoidance motor actions. *Cognition, 109*, 133–142. <https://doi.org/10.1016/j.cognition.2008.07.014>
- Koch, S., Holland, R.W., Hengstler, M., & van Knippenberg, A. (2009). Body locomotion as regulatory process: Stepping backward enhances cognitive control. *Psychological Science, 20*, 549–550. <https://doi.org/10.1111/j.1467-9280.2009.02342.x>.
- Lurquin J. H., Michaelson, L. E., Barker, J. E., Gustavson, D. E., von Bastian, C. C., & Carruth, N. P. (2016). No evidence of the ego-depletion effect across task characteristics and individual differences: A pre-registered study. *PLoS ONE, 11*(2), e0147770. <https://doi.org/10.1371/e0147770>
- Marcora, S. M., & Staiano, W. (2010). The limit to exercise tolerance in humans: Mind over muscle? *European Journal of Applied Physiology, 109*(4), 763-770. <https://doi.org/10.1007/s00421-010-1418-6>
- Marcora, S. M., Staiano, W., & Manning, V. (2009). Mental fatigue impairs physical performance in humans. *Journal of Applied Physiology, 106*(3), 857-864. <https://doi.org/10.1152/jappphysiol.91324.2008>
- Morsella, E., Feinberg, G. H., Cigarchi, S., Newton, J. W., & Williams, L. E. (2010). Sources of avoidance motivation: Valence effects from physical effort and mental rotation. *Motivation and Emotion, 35* (3), 296-305.
- Muravan, M., Shmuel, D., & Burkley, E. (2006). Conserving self-control strength. *Journal of Personality and Social Psychology, 91*, 524-537.
- Muraven, M. (2011). *Ego-depletion: Theory and evidence*. University at Albany. Oxford Handbook of Motivation.
- Muraven, M., & Baumeister, R. F. (2000). Self-regulation and depletion of limited resources: Does self-control resemble a muscle? *Psychological Bulletin, 126*, 247–259. <https://doi.org/10.1037/0033-2909.126.2.247>.
- Muraven, M., & Shmueli, D. & Burkley (2006). The self-control costs of fighting the temptation to drink. *Psychology of Addictive Behaviors, 20*, 154-160.
- Muraven, M., Tice, D., & Baumeister, R. (1998). Self-control as limited resource: Regulatory depletion patterns. *Journal of Personality and Social Psychology, 74*, 774-789.
- Penninx, B. W. J. H., Guralnik, J. M., Bandeen-Roche, K., Kasper, J. D., Simonsick, E. M., & Ferrucci, L. (2000). The protective effect of emotional vitality on adverse health outcomes in disabled older women. *Journal of American Geriatric Society, 48*, 1359–1366.
- Rauf, M. (2016). Achievement motivation and career decision making among youth. *Journal of Social Sciences, 2*, (2), 50-52.
- Rothbart, M. K., & Bates, J. E. (1998). *Temperament*. Handbook of child psychology (5thed.). New York: Wiley Press.
- Rottenstreich, Y., Sood, S., & Brenner, L. (2007). Feeling and thinking. *Journal of Consumer Research, 33*, 461–469.
- Ryan, R. M. & Deci, E. L. (2008). From Ego Depletion to Vitality: Theory and Findings Concerning the Facilitation of Energy Available to the Self. *Social and Personality Psychology, 702*–717. <https://doi.org/10.1111/j.1751-9004.2008.00098.x>.

- Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*, 68-78.
- Ryan, R. M., Frederick, C. (1997). On energy, personality, and health: subjective vitality as a dynamic reflection of well-being. *Journal of Personality*, *65*, 529-65.
- Salmon, S. J., Adriaanse, M. A., Fennis, B. M., De vet, E., & De Ridder. (2014). Depletion sensitivity predicts unhealthy snack purchases. *Appetite*, *96*, 25-37.
- Salmon, S. J., Adriaanse, M. A., Vet, E. D., Fennis, B. M., & Ridder, D. T. (2014). When the going gets tough, who keeps going? Depletion sensitivity moderates the ego-depletion effect. *Frontiers in Psychology*, *5*, 647. <https://doi.org/10.3389/fpsyg.2014.00647>.
- Schmeichel, B. J., Harmon-Jones, C., & Harmon-Jones, E. (2010). Exercising self-control increases approach motivation. *Journal of Personality and Social Psychology*, *99*, 162173.
- Schmeichel, J. S., Vohs, K. D., & Baumeister, R. F. (2003). Intellectual performance and ego depletion: Role of the self in logical reasoning and other information processing. *Journal of Personality and Social Psychology*, *85*, 33-46.
- Smits, D. J., & Boeck, P. D. (2006). From BIS/BAS to the big five. *European Journal of Personality*, *20* (4), 255-270.
- Ståhl, T., Van Laar, C., & Ellemers, N. (2012). The role of prevention focus under stereotype threat: Initial cognitive mobilization is followed by depletion. *Journal of Personality and Social Psychology*, *102*, 1239-1251.
- Staiano, W., Bosio, A., Morree, H. M. d., Rampinini, E., & Marcora, S. (2018). The cardinal exercise stopper: Muscle fatigue, muscle pain or perception of effort? In S. Marcora & M. Sarkar (Eds.), *Sport and the Brain: The science of preparing, enduring and winning, Part C: Progress in brain research*: Elsevier.
- Thomas, A., & Chess, S. (1977). *Temperament and development*. New York: Brunner/ Mazel.
- Tice, D. M., Baumeister, R. F., Shmueli, D., & Muraven, M. (2007). Restoring the self-positive affect helps improve self-regulation following ego depletion. *Journal of Experimental and Social Psychology*, *43*, 379-384.
- van Cutsem, J., de Pauw, K., Buyse, L., Marcora, S., Meeusen, R., & Roelands, B. (2017). Effects of Mental Fatigue on Endurance Performance in the Heat. *Medical Science and Sports Exercise*, *49* (8), 1677-1687. <https://doi.org/10.1249/MSS.0000000000001263>
- Vohs, K. D., & Heatherton, T. F. (2000). Self-regulatory failure: A resource-depletion approach. *Psychological Science*, *11*, 243-254.
- Vohs, K. D., Baumeister, R. F., & Tice, D. M. (2006). Self-regulation: Goals, consumption, and choices. In C. P. Haugtvedt, P. Herr, & F. Kardes (Eds.), *Handbook of consumer psychology*. Mahwah, NJ: Lawrence Erlbaum.
- Xu, X., Demos, K. E., Leahey, T. M., Hart, C. N., Trautvetter, J., Coward, P., Middleton, K. R., & Wing, R. R. (2014). Failure to replicate depletion of self-control. *PLoS ONE*, *9* (10): e109950. <https://doi.org/10.1371/journal.pone.0109950>
- Yovetich, N. A., & Rusbult, C. E. (1994). Accommodative behavior in close relationships: Exploring transformation of motivation. *Journal of Experimental Social Psychology*, *30*, 138-164.