

## EFFECT OF DECISION RELATED FACTORS ON THE LOGICAL INFERENCES OF DEPRESSIVE EARLY ADULTS WITH AND WITHOUT BRAIN DAMAGES

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### Abstract

The present study aims to examine the effect of effect of decision related factors (including decision framing, decision situations, and decision time and decision structure) on the logical inferences of depressive adults with and without brain damages. The study is based on experimental vignette methodology (EVM). Sample of the study consisted of early adults with clinically significant depressive symptoms (N = 100), specifically under treatment, with age range of 19 to 23 years. Adults were divided into two groups adults with brain damages (n = 50, 50%) and adults without brain damages (n = 50, 50%). Data were collected from different health institutions of Sargodha city. Already diagnosed depressive adults were selected from hospitals. Stroop test was applied for their neurological screening and experimental vignettes were developed for measuring decisions on decision related factors. The findings of Chi-Square Test revealed significant differences in the patterns of mediate and immediate inferences of early adults with and without brain damages. Findings can help in understanding the decision patterns of early adults specifically with reference to their brain functioning.

**Keywords:** Decision Framing, Decision Situations, Decision Time, Decision Structure, Brain Damages, Logical Inferences

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## INTRODUCTION

Decision making is a system that picks a favored choice or a course of activities and it chooses different options that are based on given criterion or techniques like mediate inference or immediate inference (Wang & Ruhe, 2007). Decision making is one of the principal subjective procedures of early adults that are generally utilized in deciding sane, heuristic, and instinctive choices in complex logical circumstances, just as in practically every technique of day-by-day life. Since decision making is an essential mental procedure affected by many factors in general and four factors in particular including decision framing, decision situations, decision time and decision structure, it happens like clockwork in the reasoning courses of human personality deliberately or intuitively. The easiest meaning of the choice expresses that it is an intentional and non-arbitrary decision (Wang & Parkan, 2015). Brain damage is an injury that causes the destruction or deterioration of brain cells. All traumatic brain injuries are head injuries. But head injury is not necessarily brain injury. There are two types of brain injury: traumatic brain injury and acquired brain injury. Both disrupt the brain's normal functioning. Traumatic Brain Injury (TBI) is caused by an external force, such as a blow to the head that causes the brain to move inside the skull or damages the skull. This in turn damages the brain. Acquired Brain Injury (ABI) occurs at the cellular level. It is most often associated with pressure on the brain. This could come from a tumor. Or it could result from neurological illness, as in the case of a stroke. Both traumatic brain injury and acquired brain injury occur after birth. And neither is degenerative. Sometimes, the two terms are used interchangeably. There is a kind of brain damage that results from genetics or birth trauma. It's called congenital brain damage. It is not included, though, within the standard definition of brain damage or traumatic brain injury. Some brain injuries cause focal -- or localized -- brain damage, such as the damage caused when a bullet enters the brain. In other words, the damage is confined to a small area. Closed head injuries frequently cause diffuse brain damage, which means damage to several areas of the brain. For example, both sides of the brain are damaged and the nerves are stretched throughout the brain. This is called diffuse axonal injury or DAI. There are two types of inferences; Mediate and Immediate Inference. Immediate Inference means passing directly from a single premise to a conclusion i.e., choosing single option. Mediate Inference means deriving a conclusion from two or more logically interrelated premises. Involving an advance in knowledge, it is reasoning that involves the intermediacy of a middle term or second proposition which warrants the drawing of a new truth (Sundholm, 2012).

According to Wang and Patel (2004), decision making is that process in which an individual chooses a favored option or a course of actions from a set of alternatives on the basis of given criteria or strategies. Decision making is one of the superlative cognitive functions (Frederick, 2005). Psychological problems in general and depression in particular have more damaging impact on brain functioning (Patel & Wisner, 2011). Logical inference is a solution when the decisional system implements the human process of reasoning, here artificial intelligence comes with a rationalist approach, and this does not mean that the human approach is irrational (Russell & Norvig, 2016). Depression causes bio-chemical changes in brain which leads towards cognitive impairment or brain damages—which impairs reasoning ability to draw logical inferences in daily life decisional scenarios which are influenced by multiple factors including decision framing, decision situations, decision time and decision structure (Basserman, 2016). More spherically Riley and Blunden (2004) have explained that individuals with brain damages are unable to consider the multiple perspectives (mediate inference) in decisions and they usually restrict their choices to a single aspect (immediate inference). Keeping in view the above literature, the study intended to examine the inferences of adults with and without brain damages.

The study aimed to examine the effect of decision framing (framed as opportunity or framed as challenge), decision framing (certainty, risk and uncertainty), decision time (limited time provided, more time provided) on logical inferences of early adults and decision structure

(structured and unstructured) on logical inferences of early adults. More specifically, the study examined the differences in logical inferences based on specific decision related factors among adults with and without brain damages. The study anticipated that adults are likely to make immediate inferences on decisions framed as opportunity instead of decisions framed as challenge and likely to make mediate inferences on decisions framed as challenge instead of decisions framed as opportunity. Adults are likely to make immediate inferences on decisions under certainty instead of decisions under risk and uncertainty and likely to make mediate inferences on decisions under uncertainty instead of decisions under risk and certainty. Adults are likely to make immediate inferences on decisions with less time availability instead of decisions with more time availability and likely to make mediate inferences on decisions with more time availability instead of decisions with less time availability. Adults are likely to make immediate inferences on structured decisions instead of unstructured decisions and likely to make mediate inferences on unstructured decisions instead of structured decisions. More specifically it was anticipated that there will be significant differences in the logical inferences of early depressive adults with and without braining damages on all four types of decision related factors.

## **METHOD**

The present study aims to examine the effect of effect of decision related factors (including decision framing, decision situations, decision time and decision structure) on the logical inferences of depressive adults with and without brain damages. Study is based on Experimental Vignette Methodology (EVM) in which real like hypothetical situations are given to the participants to make decisions.

## **PARTICIPANTS**

Sample of the study consisted of early adults with clinically significant depressive symptoms ( $N = 100$ ), specifically under treatment, with age range of 19 to 23 years. Adults were divided into two groups including adults with brain damages ( $n = 50$ , 50%) and adults without brain damages ( $n = 50$ , 50%). Data were collected from different health institutions of Sargodha city. Stroop Neuropsychological Screening Test helped to identify the adults with and without brain damages (Trenerry et al., 1989). Brain damages involve problems in cognitive processing, brain dysfunctions and cognition impairment.

## **ASSESSMENT MEASURES**

Stroop Neuropsychological Screening Test was developed by Trenerry, et al. (1989). The Stroop Test was designed to differentiate between individuals with brain damage and individuals without brain damage. For the age of 18-79 years. It assesses the speed of reading names of colours. It is also a measure of executive function, requiring the subject to inhibit an over learned response in favour of an unusual one (Mitrushina et al., 1999). The brain damages were measured with cutoff scores to discriminate normative ( $= > 99$ ) and brain damaged subjects ( $< 99$ ).

The study is based on experimental vignette methodology (EVM). Experimental Vignettes on Decision Related Factors were developed for four decision related factors including decision framing, decision situations, and decision time and decision structure. Based on literature three vignettes were developed for each decision factor and then evaluated by SMEs and finally selected each for each factor. Experimental Vignettes are “systematic combination of characteristics which are short and cautiously constructed description of individual, object, or situations (Atzmuller, & Steiner, 2010). Research indicates that to assess the independent variables like intentions, attitudes and behaviours, experimental vignette methodology (EVM) which consists of “participants are offered with carefully constructed and realistic scenarios” (Aguinis & Bradley, 2014). Subjects were asked to visualize or imagine themselves in some situations and they have to tell what they will do in those hypothetical situations.

## **PROCEDURE OF STUDY USING EVM**

Initially, the first step involved the development of a list of mental health facilities and hospitals which were visited for data collection. It was followed by identification of early adults with clinically significant depression, and more specifically under treatment. The selected participants were provided instructions on the research objectives, nature of their participation and importance of their contribution in the research. Further identification of adults with and without brain damages was carried out using Stroop Neurological Screening Test. After the identification and selection of sample experimental vignettes on decision framing, decision situations, decision time and decision structure were administered. The participants were asked to make inferences on a response sheet devised for the measurement of immediate and mediate inferences of early adults on all decision factors. Thus, measurement of immediate and mediate inferences of early adults on all decision factors was carried out. Finally, the participants were appreciated for their invaluable contribution.

**ETHICAL CONSIDERATIONS**

Ethical guidelines suggested by American Psychological Association were followed in the present study. Firstly, the participants were informed that the information collected will be kept confidential and will solely be used for drawing empirical evidences. Their information will never be cross communicated to any other person in order to manage potential risks for social stigmatization for mental illness. Secondly, the research participation was on voluntary basis without any tangible incentive and the participants were not forced to take part in the research. Even the anonymity of the participants was ensured by not asking them for providing their personal details or identifying information like name. Thirdly, participants were informed and then their consent was obtained in writing. Thus, they were requested to put their signatures beneath informed consent "the researcher has provided sufficient information about the research and I am willingly participating in it". Fourthly, the participants were given the right regarding withdrawal of their information during the any stage of the research.

**RESULTS**

The study aimed to examine the effect of four prominent decision related factors on the logical inferences of young adults. Chi-Square Test was applied for hypothesis testing.

**TABLE 1: FREQUENCY AND PERCENTAGE OF YOUNG ADULTS**

Demographics	n	%	Demographics	n	%
Brain damages			Family system		
With brain damages	50	50%	Nuclear	46	46%
Without brain damages	50	50%	Extended	54	54%
Gender			Residence		
Men	50	50%	Rural	47	47%
Women	50	50%	Urban	53	53%

Table 1 shows equal number of adults with and without brain damaged participated in the research. Men and women were also equal in frequency whereas slightly higher number of adults from extended families and urban residents participated.



TABLE 2: FREQUENCIES AND CHI-SQUARE RESULTS FOR BRAIN DAMAGES AND DECISION FACTORS

		Overall sample				Adults with brain damages				Adults without brain damages			
		Immediate inferences		Mediate inferences		Immediate inferences		Mediate inferences		Immediate inferences		Mediate inferences	
Source		<i>n</i>	<i>n</i>	$\chi^2$	$\phi$	<i>n</i>	<i>n</i>	$\chi^2$	$\phi$	<i>n</i>	<i>n</i>	$\chi^2$	$\phi$
Decision time	More available time	40	10	27.21**	.52	20	5	15.71**	.56	20	5	11.69**	.48
	Less available time	14	36			6	19			8	17		
Decision structure	Unstructured	40	10	33.65**	.58	20	5	11.68**	.48	20	5	22.27**	.68
	Structured	11	39			8	17			3	22		
Decision framing	Negatively framed	38	12	38.83**	.62	20	5	20.51**	.64	18	7	18.47**	.61
	Positively framed	7	43			4	21			3	22		
Decision situations	Certainty	41	9	49.18**	.70	20	5	23.27**	.68	21	4	25.96**	.72
	Uncertainty	6	44			3	22			3	22		

\*\*\**p* < .001.

## DISCUSSION

The present study aims to examine the effect of effect of decision related factors (including decision framing, decision situations, decision time and decision structure) on the logical inferences of depressive adults with and without brain damages. The study is based on Experimental Vignette Methodology (EVM). Experimental vignettes were developed for four decision related factors and participants were asked to visualize themselves in some decision situations related to specific decision related factors (decision framing, decision situations, decision time and decision structure) and they have to opt the option what they will do in those hypothetical situations (Aguinis & Bradley, 2014).

Decision making is multifaceted phenomenon impacted by a wide range of factors. A prime factor impacting decisions is the availability of time which directly impacts the course of actions in decisions. In the ample time availability, usually adults prefer mediate inference because moderate inference requires ample amount of time to consider multiple factors in decisions. However, in the decisions involving time pressures to make choices in a limited time period usually restrict decision makers to consider only one option which is readily available or permits fast decision which any deliberation to consider numerous alternatives. This the decision makers opt for immediate inference. Although all decisions are time bound, but still the type of decisions can be bifurcated along less and more time availability decisions. Thus, the hypotheses pertaining immediate inferences in the case of low time availability and mediate inferences in case of more time availability were supported in study. Time pressure has long been an issue of interest for the decision researchers and the research is evident that spontaneous decisions lead to negative consequences. Thus, it is important to understand from the findings of the present study that low quality immediate decisions are made in low time availability scenarios. Therefore, procrastination should be avoided and decisions should be made by investing due time required to make high quality decisions.

Sometimes decisions are solely outcomes of time as time pressures force decision makers to take hasty decisions which later on prove wrong. On the other hand, sometimes ample amount of time facilitates decision makers to take very rational, reasonable and logical decisions, just because of no time pressures. Thus, decisions are sometimes a product of time. Contrary to routine life programmed decisions, one of the major features of crucial non programmed decisions is time pressure to whom decision makers have to comply. Thus, learning how to make right decisions in limited time is a key to success. These empirical insights can be used to learn that the actually available time must be invested in decisions and procrastination should be avoided, as delayed decisions usually lead to negative consequences.

Decisions are responses to the problem in hand. These problems are sometimes routine type to which we are familiar and habitual in taking such type of decisions, a classification known as programmed decisions. These decisions are about routine matters and we usually make immediate inferences as readily available solutions are available for such problems. Thus, structured decisions are easily taken with immediate inferences. A parallel classification of decisions is based on non-programmed decisions which are unstructured, novel and ambiguous with little and no information availed in hand to take a right decision. Therefore, these decisions require more rigorous consideration of multiple factors before taking a decision, at least more than one. Thus, in the case of unstructured problems, the mediate inferences are drawn by the decision makers. Thus, these empirical insights instill that the inference drawn is dependent upon the type of problem faced by decision maker adults. Adults switch from immediate to mediate inference as decisions turn from structured to unstructured (Finucane et al., 2005).

A stock-phrase "nothing good or bad thinking makes it so" is not just fiction but really applicable to real life scenarios. Not all two adults make the same decision for the same problem. This is all about framing, how adults see their problems, either as challenge or opportunity. In case if a problem is cognitively framed positively the decision maker will take a little time to

make the decision, thus resulting in immediate inferences. Contrary to this if a problem is framed negatively, it will yield a lot of stress on the decision maker and they will find it difficult to decide a course of action, therefore they will consider multiple factors and make mediate inferences. As a matter of fact, besides the reality of decision problems, how these problems are evaluated or taken determines the outcome decisions. Not always but on the first priority, the problems should be framed the way they are, instead of colouring the problems with perceptions. Thus, perception management plays a vital role in decision making of young adults. Framing of problems determine how decision information will be processed. This is how a task is taken as a learning venture, responsibility, challenge or burden, similar will be the response to hand it. Thus, if a decision is taken negatively, it will cause more Cognitive overload and would require more Cognitive efforts, contrasting to the decision activities taken positively (Chong & Druckman, 2007).

Every human behaviour is an outcome of the interplay of person and situation. Most of decisions of daily life are made in certainty except few which are taken into uncertainty. But it is worth noticing that important decisions involving greater stakes are made under the conditions of risk and uncertainty. Uncertainty is marked by higher level of ambiguity along with a greater probability of wrong decisions. Certain decisions are abrupt and can be taken with little or even no effort but uncertain decisions are taken by consuming lot of time and efforts. The decision makers usually collect relevant information to turn their uncertainty into certainty before making a decision as certainty is an ideal situation for decision making. Therefore, in the Certain decision situation decision makers make immediate inference whereas in the uncertain situations decision makers make mediate inference by considering multiple factors before making a decision.

## CONCLUSION

The study has investigated the role of four important decision related factors in the logical inferences of young adults. The findings obtained using EVM revealed that all these four decision factors including decision time, structure, framing and situations play important role in determining why people make immediate or mediate inferences. More specifically, logical inferences of the young adults are the outcomes of these decisions factors.

## LIMITATIONS

1. The study had focused on four decision factors with reference to their role in logical inferences which can be further extended to other factors like decision conflicts, decision dilemmas etc.
2. EVM although symbolizes the real-life decision factors still cannot guarantee its replication of the young adults' facing of the real decision scenarios.
3. The study can be replicated to other important groups like policy makers to see the heightened effect of these decision factors on their inferences.

## IMPLICATIONS

The study has marked applied significance in the field of cognitive psychology in general and decision sciences in particular. The study can facilitate in understanding how young adults' logical inferences change on the basis of understanding decision factors which they are facing while making decisions. The study also highlights which factors lead to immediate inferences and which lead to mediate inferences and why it is needed to make a decision in certain way.

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