Imagine that you are 24-year-old and suffering from severe depressive episodes, and your doctor prescribed Prozac to improve your mood. However, the doctor cautioned you that the use of Prozac is associated with a 30-50% chance of developing sexual problems (e.g., impotence). Now, being in adolescence, would you take that medicine regularly? Is it worth it? To make an informed decision, one needs to know what does 30-50% chance of developing sexual problems mean! Instances such as these are commonplace in today's society, and since the publication of the first test measuring numeracy, extensive scholarship has revealed that numeracy is strongly linked with superior decision making. However, surveys conducted in multiple developed countries revealed that about one-third of respondents do not have the basic numeric skills to perform simple and everyday activities. Low numeracy is often linked with more disadvantageous outcomes in the financial, health, digital, and civic domains. Research on the psychological processes underlying numeracy sheds light on sources of difficulty for most reasoners.

Among many competing theories, Fuzzy Trace Theory (FTT) can potentially make the most diverse and robust predictions regarding the difference in performance between individuals with high and low numeracy. FTT argues that all individuals simultaneously encode verbatim representations of numbers alongside the categorical and ordinal gist of those same numerical inputs. Yet, individuals usually rely on their less salient and more readily available gist representation to make decisions. FTT claims that highly numerate individuals, compared to less numerate individuals, can make superior decisions by extracting more accurate meaning (i.e., categorical or ordinal gist) from numbers due to their better understanding of qualitative patterns and relations between numbers. Empirical evidence from process tracing studies also supports this claim. Results indicate that highly numerate individuals, compared to less numerate individuals, spend significantly more time, sample more information, and switch less frequently between alternatives to create an affect-rich and accurate mental representation of the decision problems. Despite these theoretical predictions, a dearth of research has attempted to empirically test them as potential determinants for better decision making among less numerate individuals.

The current study aims to fill this gap. I postulate that motivating or mandating less numerate individuals to increase deliberation will not only coax them to make a more accurate gist representation but also may allow them to utilize verbatim representation to make better decisions. I will investigate this research problem in one simulation study and six fully-incentivized pre-registered empirical studies grouped into three tasks. Task 1 & 2 can be divided into two separate studies, respectively: one with financial problems and another with medical decision problems. The necessary deliberation period required to observe the effect of enhanced deliberation on choice performance will be estimated from the simulation study for the financial problems. However, the deliberation period for the medical decision problems will be estimated from the pilot study. The metacognitive intervention in Task 1 follows the principle of nudge (i.e., changing the choice architecture) to constrain the decision maker to deliberate on each choice problem. Whereas, in Task 2, the metacognitive intervention was created by following the "boosting" principle (i.e., steering preference by increasing competence while preserving their freedom of choice) to motivate the decision maker to deliberate on each choice problem. In Task 3, unlike Task 1 & 2, I will combine the novel metacognitive interventions with already proven risk communication tools (i.e., graphical presentation of numeric information) to evaluate the effect of enhanced deliberation on choice performance between two contrasting interventions (i.e., nudging and boosting techniques).

I hypothesized that deliberation would be positively correlated with the increment in choice performance across all three tasks. I posit that boosting intervention, due to the increment in overall competency, will be more effective than the nudge intervention. Lastly, when numerical information is presented graphically, deliberation will significantly enhance the performance of less numerate individuals leading to no meaningful differences in performance between the high and low numeracy groups. Taken together, the current project will provide an opportunity to test the effect of enhanced deliberation on choice performance. Furthermore, it will enable me to compare and contrast the two dominant philosophical approaches toward intervention (i.e., nudging and boosting). Besides the theoretical implication of the current project, it also provides a potential framework that allows less numerate individuals to make better and more informed decisions. Lastly, the current study potentially can have a big impact on policy development for the less numerically skilled section of the population.