Risk and its relationship to certain genetic markers in the brain

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(Phys.org) —Insurance research focuses heavily on risk, particularly on the choices people make and why. So when Lisa Posey, associate professor of business administration at the Penn State Smeal College of Business, wanted to investigate risk and its relationship to certain genetic markers in the brain, she came to the college's Laboratory for Economics, Management and Auctions (LEMA).

The LEMA lab, directed by Associate Professor of Business Economics Anthony Kwasnica, is a dedicated computer lab for experimental economics projects that provides a controlled environment to help researchers understand why people make certain decisions.

"In the real world, we don't always know why people do what they do," said Kwasnica. "The lab provides conditions for a controlled environment so we can better understand the decisions that are made."

Kwasnica, a co-author on Posey's recent paper, helped program the experiments she used in her study, "Heterogeneity in Decision-Making Under Risk: Dopamine, Genetics and Prospect Theory," which aimed to investigate the correlations in risk-taking activity with variations in the subjects' dopamine system—represented by the DAT1 gene variable.

"I worked with Tony to fine-tune the experiments, and then he helped do the programming for use in the lab," said Posey.

Through the LEMA lab, Posey, Kwasnica and co-author Charles Geier,

assistant professor of human development and family studies, were able to evaluate risk-taking behaviors among participants. Study participants were presented with two risky prospects, or gambles. The computer recorded the outcome of 45 sets of these gambles, and at the end, the subjects received final compensation related to the results of their choices.

After participants finished the computer portion of the experiment, they provided cheek swabs to combine the genetic aspect with the experimental results.

"What we found was that participants who had the DAT1 10 version of the gene—as opposed to the DAT1 9—tended to react less to gains and losses. They are not necessarily more risk-taking; they are less sensitive to changes in the size of the outcome," explained Posey. "Since people react differently to gains than to losses, context matters a lot."

According to Posey, the experiment would have been much more difficult to conduct without the resource of the LEMA lab.

The researchers plan to follow up on the study by performing functional magnetic resonance imaging (fMRI) of subjects while they make decisions to study the relationship between behavior, genetic background and brain activity during decision-making under risk.

"The lab gives us very quick access to subjects and allows us to organize the experimental sessions with minimal effort," said Posey. "Also, the system makes the resulting data so much easier to collect and analyze."

Posey specializes in economic modeling of insurance markets. She holds a doctorate and a master of arts from the Wharton School at the University of Pennsylvania and also recently received a master's degree in genetics with a focus on neuroscience.

Kwasnica's research expertise lies in microeconomic theory, game theory, and experimental economics. He teaches in the Penn State Smeal MBA Program and the Executive MBA Program, and holds a doctorate and a master of science from the California Institute of Technology.

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