

Defining and Measuring Psychological Financial Strain (not Debt)

Research Challenge and Background

Money and financial considerations are commonly described as a reason for why insiders engage in espionage (PERSEREC, 2009). For that reason, many Insider Risk Programs and Personnel Vetting Programs use an employee's financial debt to identify potential insider risk.



One challenge with using financial debt is there are too many cases of malicious insiders with little or no debt - and insider threat case data shows many insiders became spies to resolve very small amounts of debt (\$1,000). There are also many counterexamples of people with high debt not becoming insider threats (\$100,000).

By applying behavioral sciences theory and completing a detailed analysis of insider risk case data, MITRE's insider risk and behavioral psychology subject matter experts proposed that how an employee perceives their financial situation (i.e., *psychological financial strain*) is a more effective approach to identifying insider risk than knowing the amount of debt (i.e., *material financial strain*).

If Insider Risk Program Leaders want to use psychological financial strain as a Potential Risk Indicator (PRI) in their detection program, they will need a way to objectively and unobtrusively use the types of human, organizational, cyber, and physical sensors available to them. Prior to this research study, there were no approaches developed for measuring psychological financial strain for insider risk.

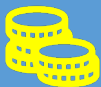
Research Study

MITRE's insider risk and behavioral psychologist practitioner-researchers designed and executed an applied behavioral research study with real employees in an actual industry organization to:

-  Identify, evaluate, and select the most promising characteristics of psychological financial strain specifically for detecting insider risk.
-  Develop and evaluate approaches for objectively and unobtrusively measuring the highest promise characteristics using sensors available to Insider Risk Programs.

What is Psychological Financial Strain?

The MITRE practitioner-researcher team conducted a review of over 700 psychology and economics research papers to identify 29 "characteristics" and 111 "sub-characteristics" of psychological financial strain. These were divided into material and psychological financial strain:

**Material Financial Strain**

Describes the actual financial resources people possess.

"What do I have?"

Example characteristics: Income, total debt, and debt to asset ratios.

**Psychological Financial Strain**

Describes how people perceive their financial circumstances.

"How do I feel about what I have?"

Example characteristics: Financial stress, satisfaction, anxiety, attitudes, coping, etc.

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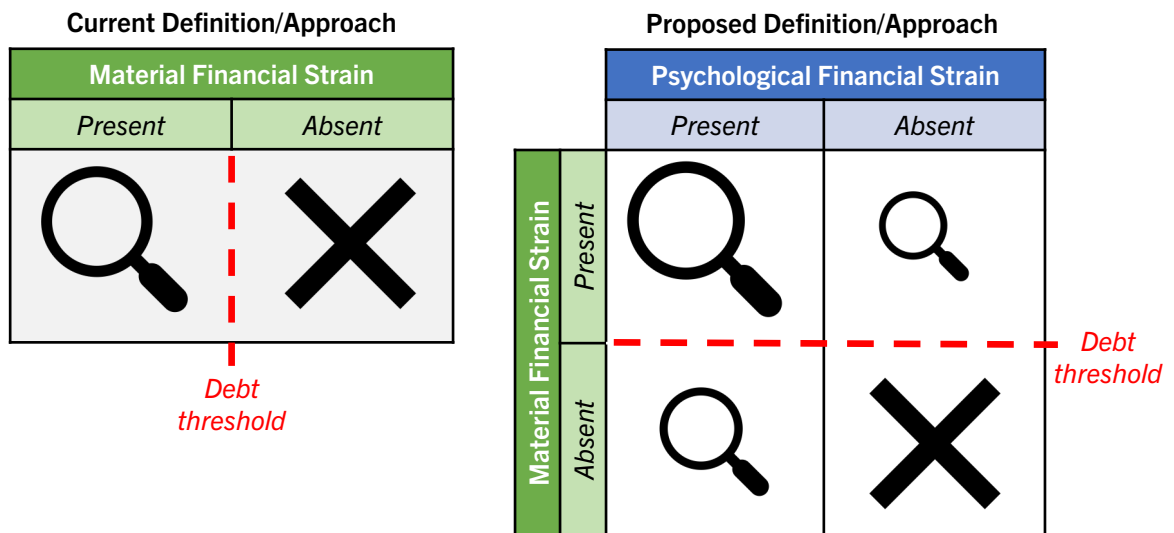
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Outcome: New Definition for 'Financial Considerations'

MITRE has redefined “financial considerations” as concerns about whether an individual is experiencing material financial strain and/or psychological financial strain. The new definition is a deliberate deviation from a significant body of research and practice that identifies financial considerations *only* as material financial strain.

Material financial strain is insufficient alone in identifying insider risk because the presence of debt or money difficulties does not necessitate psychological financial strain. Instead, identifying insider risk on the basis of financial considerations should involve *both* material and psychological financial strain.

An employee with both high psychological and high material financial strain is considered highest risk. Employees with only high psychological financial strain are also higher risk, more-so than those with only high material financial strain. Employees with neither psychological nor material financial strain are lowest risk as it pertains to financial considerations. These differences are shown in the diagram below, where the size of the magnifying glass indicates an employee's proposed risk.



Outcome: Prioritized Psychological Financial Strain Characteristics for Insider Risk

MITRE's practitioner-researchers systematically prioritized all the characteristics and hypothesized observables to select the most promising for practically measuring psychological financial strain for insider threat detection. The prioritization was based on:

- **Theoretical sense** (is it likely indicative of psychological financial strain generally?)
- **Applicability for insider risk** (is it likely concerning and/or indicative of potential insider risk?)
- **Generalizability** (is it likely observable in the broad population?)
- **Feasibility** (can it be appropriately and easily collected?)
- **Observability** (how much intervention is required to collect data?)

Based on those criteria, eight psychological financial strain characteristics were most promising, and a subset of associated Hypothesized observables for those characteristics were selected for validation.

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Outcome: Validated Psychological Financial Strain Characteristics for Insider Risk

MITRE's practitioner-researchers ran an applied behavioral study to validate eight psychological financial strain characteristics. The team recruited 323 employees from a medium size Washington D.C.-based organization with a workforce commonly vetted for employment or security clearance, and within scope of an Insider Risk Program.

Each employee completed a 92-item academic self-report measure of 8 psychological financial strain characteristics. Employees selected a Family Member, Close Friend, and Manager to complete the same 92-item measure about them. Employees also provided the MITRE team with consent to access their corporate web browsing activity.

Psychological Financial Strain for Insider Risk Factors and Sub-factors

Finance-related perceptions, attitudes, and emotions

1. *Perceived difficulties meeting needs and obligations*
2. *Perceived frequency of inability to meet needs*
3. *Worry and stress about financial situation*
4. *Expectation of inability to meet future needs*
5. *Financial-contingent worth and self-esteem*
6. *Prioritizes money*

Unwillingness to improve financial situation

- Unwillingness to improve financial situation by...*
7. *Modifying lifestyle (e.g., ordering food less often)*
 8. *Modifying debt (e.g., loan consolidation)*

In the validation study, MITRE identified that self-report could be reduced down to 29-items.

Based on the interviews:

- **Family members** had most success assessing employee's psychological financial strain for three of eight factors.
- **Managers** were successful assessing one factor.
- **Close friends** were unable to successfully assess any of the eight factors.
- Combining the scores of family members and managers helped to successfully assess an additional factor, resulting in the successful assessment of five factors (*italicized* in the diagram above) – at least two more factors than when interviewing only a single group.

There were no statistically significant relationships between the psychological financial strain factors and finance-related web browsing activity.

Summary of Findings and Recommendations

- Five measures of psychological financial strain showed promise for detecting insider risk.
- Measuring psychological financial strain without talking to an employee is possible. Interviews with others could be a useful method of assessing an individual for psychological financial strain.
 - Interviewing family members gives a better return-on-investment in understanding an individual's psychological financial strain than only talking to close friends or managers (vetting).
 - If possible, interview family members, close friends, and managers in order to unlock additional factors and improve the assessment of psychological financial strain factors.
- There is no evidence to justify proactive usage of web browsing activity to detect psychological financial strain.
- Pilot and validate the psychological financial strain measures in real Insider Risk Programs.
- Examine why there are differences between family members, managers, and close friends.
- Validate additional high promise psychological financial strain characteristics for insider risk.