



More Skilled, More Cautious: Expertise and Decision Thresholds in Fingerprint Examination.

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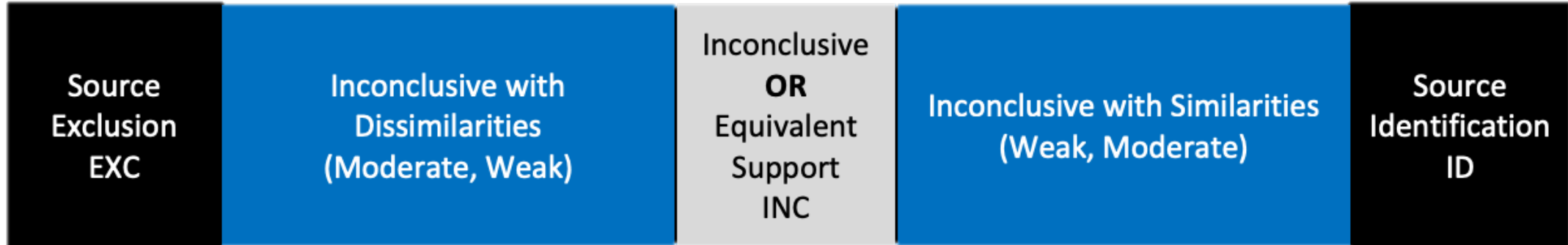
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The views expressed in this presentation are our own and based on our training, analyses, and experiences. Any opinions expressed are not reflective of any past or current employer

Fingerprint identification



Fingerprint identification

- Even when using standardized verbal scales, examiners can differ in how they interpret and apply these categories, leading to variability in decisions across individuals when evaluating the same fingerprint evidence (Ulery, 2012)
- Work by Luby (2023) demonstrated that examiners do not use conclusion categories in a uniform manner, and show variability in the frequency of inconclusive, exclusion, and identification decisions across identical comparisons.

Expertise

- Expertise has been defined as the possession of domain-specific knowledge that is acquired through experience or training and that leads to superior, reproducible performance in domain-related tasks (Feltovich, 2006).
- Thompson, Tangen and McCarthy (2013) revealed that qualified, court-practicing fingerprint experts exhibited exceedingly high accuracy, significantly outperforming novices.
- Thompson and Tangen (2014) found that experts were more conservative when analyzing genuine crime scene prints compared to simulated prints used in prior studies.

Stress in the Workplace

- Forensic examiner experience stress for a variety of reasons, including the high workload and the lack of clear guidance on identification thresholds (Busey et al., 2022).
- Examiners are often exposed to graphic and disturbing crime scene evidence, which can take a toll on their mental health (Busey et al., 2022).
- The pressure to make accurate identifications is high, as mistakes can have serious consequences.

The Need for Closure (NFC)

- The original NFC scale was developed and published in 1994 by Webster and Kruglanski. An updated version of the NFC scale, was published in 2007 by Roets and Van Hiel.
- Questions include:
 - “I don’t like situations that are uncertain”
 - “I feel uncomfortable when I don't understand the reason why an event occurred in my life”
 - “I feel irritated when one person disagrees with what everyone else in a group believes.”

The Need for Closure (con't)

- NFC is the desire for certainty and finality, and it can have a significant impact on how people make decisions.
- People with high NFC are more likely to make judgments about ambiguous stimuli, even when they are instructed to avoid doing so (Ask, 2005).
- People with high NFC are more likely to accept premature closure on complex problems, even when they had access to additional information (Ask, 2005; Kruglanski, 1996).
- NFC has also been shown to predict higher stress levels (White, 2022)

General Self-Efficacy (GSE)

- A personality trait that reflects a person's belief in their ability to cope with challenges and succeed in difficult situations (Schwarzer, 1995).
- People with high GSE tend to experience lower levels of stress in response to stressful events (Perrewé, 2022; Yao, 2018; Meyer, 2022; Cai, 2020).
- Questions include:
 - “If I am in trouble, I can usually think of a solution”
 - “I am confident that I could deal efficiently with unexpected events.”
 - “I can solve most problems if I invest the necessary effort.”

Why Do Fingerprint Examiners Reach Different Conclusions?



Research Question:

Investigate individual differences among examiners to measure relation between these factors and the examiners' thresholds.

Both of these are “Mated”



X-Axis – All Comparisons you’ve ever seen

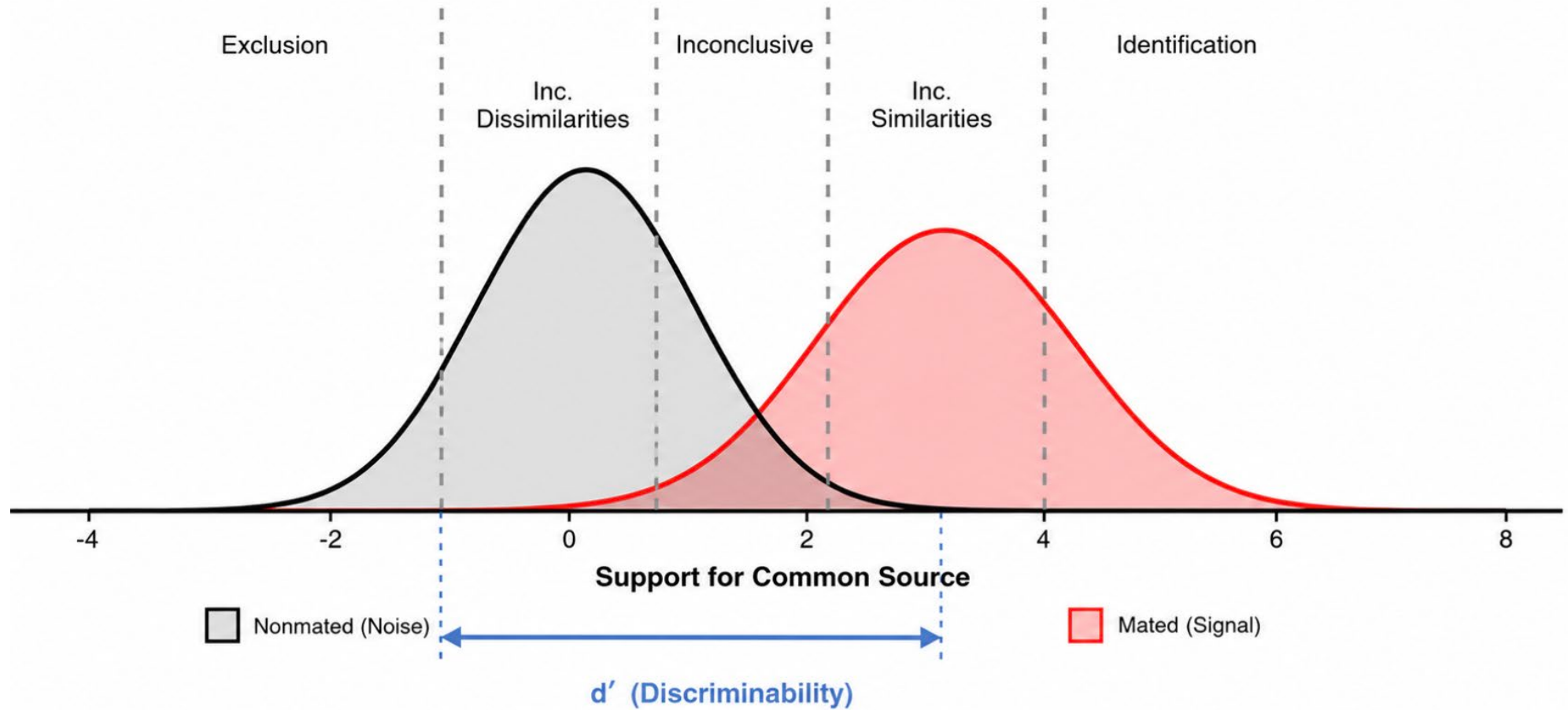


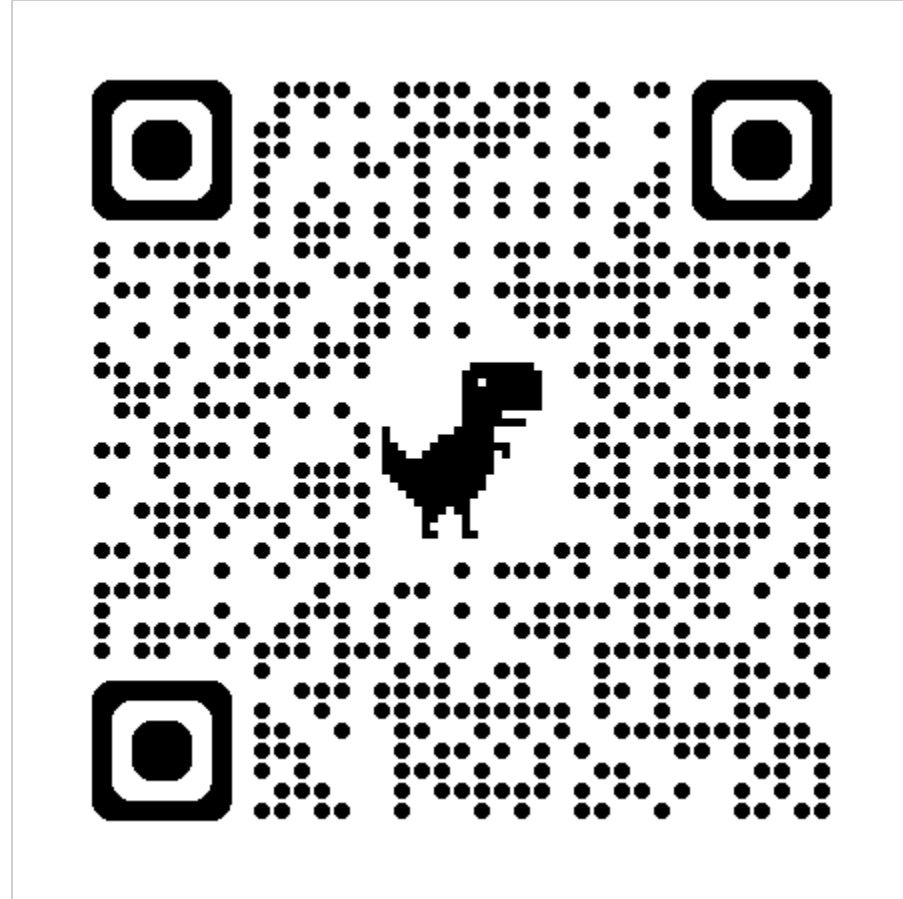
“The NOT Same” – Lots
of information

“The Same” – Lots of
information

Data analysis

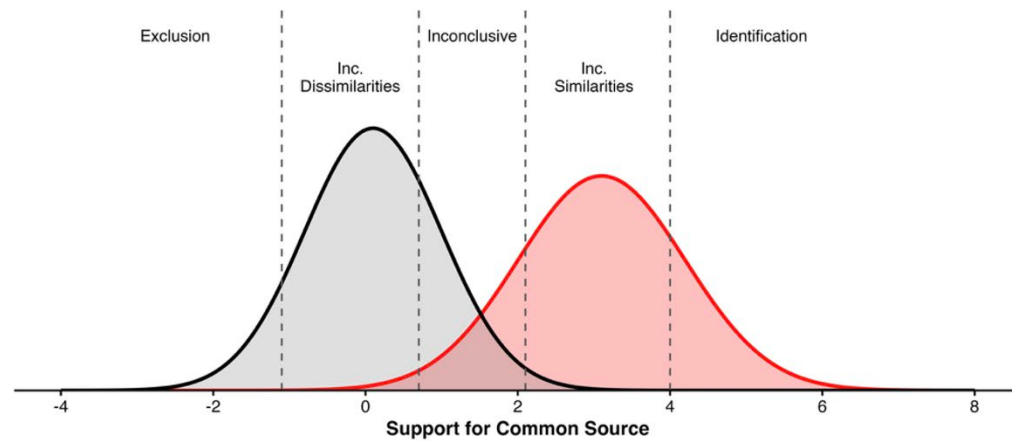
A Baseline (Reference Examiner)



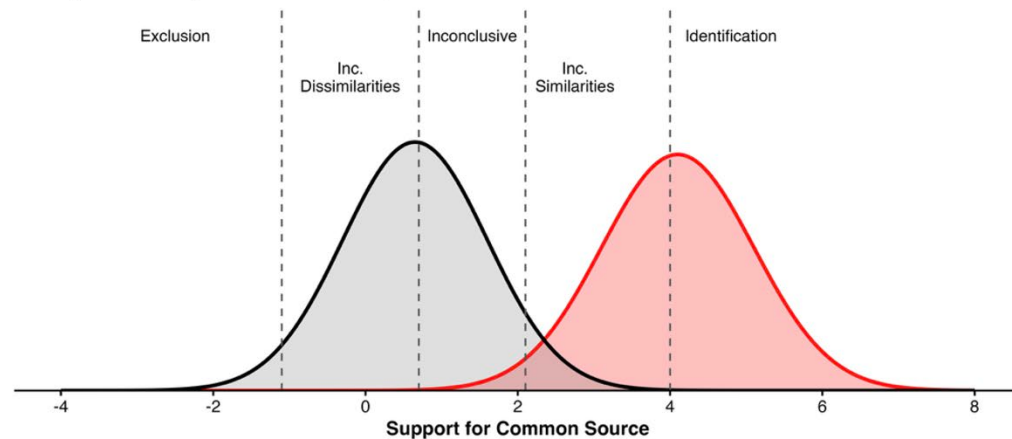


Signal Detection Theory

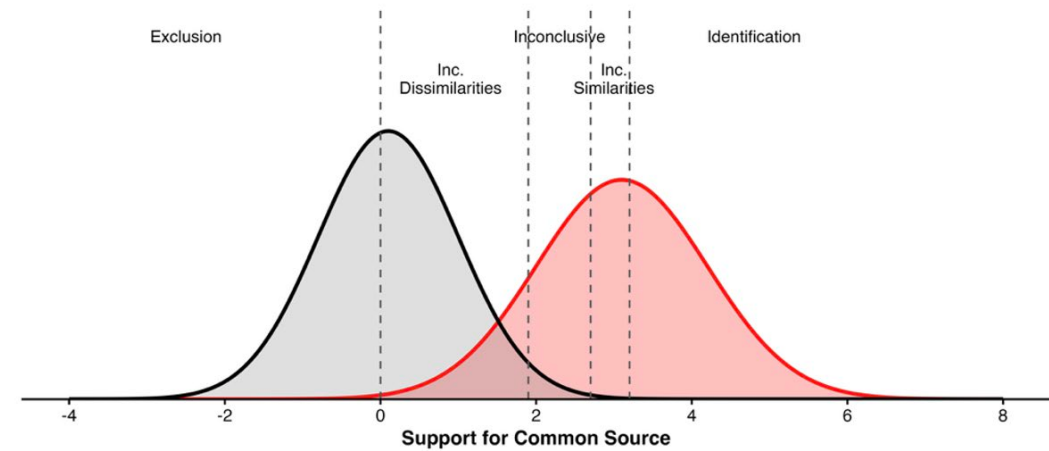
A Baseline (Reference Examiner)



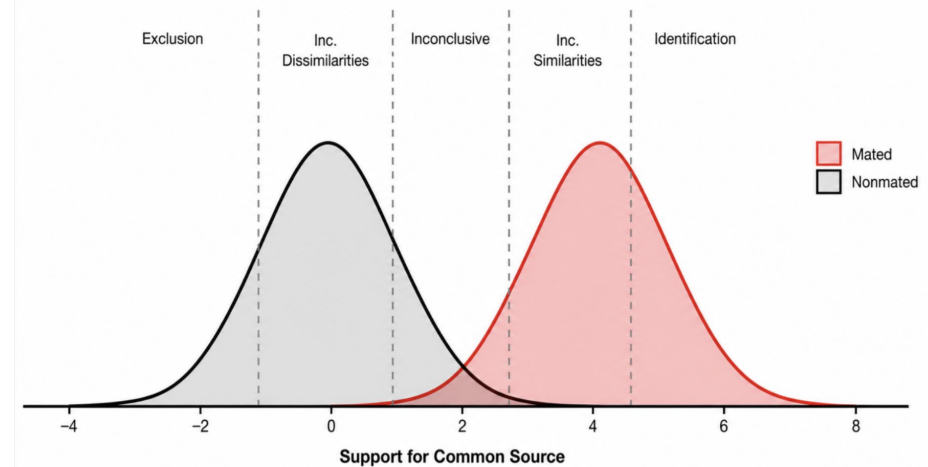
B Expert with Higher Discriminability



C Expert with Less Conservative Thresholds



D Expert with Higher Discriminability and More Conservative Thresholds



Method: *Latent Print Black Box 2 Study*

- 156 latent print examiners were given a random selection of 100 latent-exemplar image pairs from a pool of 300 possible pairs with a ratio of 80:20 non-mated: mated. Non-mates were selected from NGI (a Large AFIS Database)
- Examiners used the following 7-level categorical conclusion scale:
 - Exclusion–Non-Borderline (Excl-NB)
 - Exclusion– Borderline (Excl-B)
 - Inconclusive–Dissimilar (Inc-Dis)
 - Inconclusive no similarities/dissimilarities indicated (Inc-No)
 - Inconclusive–Similar (Inc-Sim)
 - Identification–Borderline (ID-B)
 - Identification– Non-Borderline (ID-NB)

Method: *Kibbey et al*

- 104 participants completed a series of 60 fingerprint comparisons.
- Each examiner used a 5-level categorical conclusion scale, with two brief follow-up questions after each comparison.
 - Exclusion
 - Inconclusive–Dissimilar
 - Inconclusive
 - Inconclusive–Similar
 - Identification– Non-Borderline
- The image pairs were evenly divided between mated and non-mated trials (50 mated:50 non-mated) and selected to be broadly representative of the range of complexity encountered in casework.
- Automated Fingerprint Identification System exemplars were **not** used to generate the non-mated trials; they were selected from same-subject fingers.

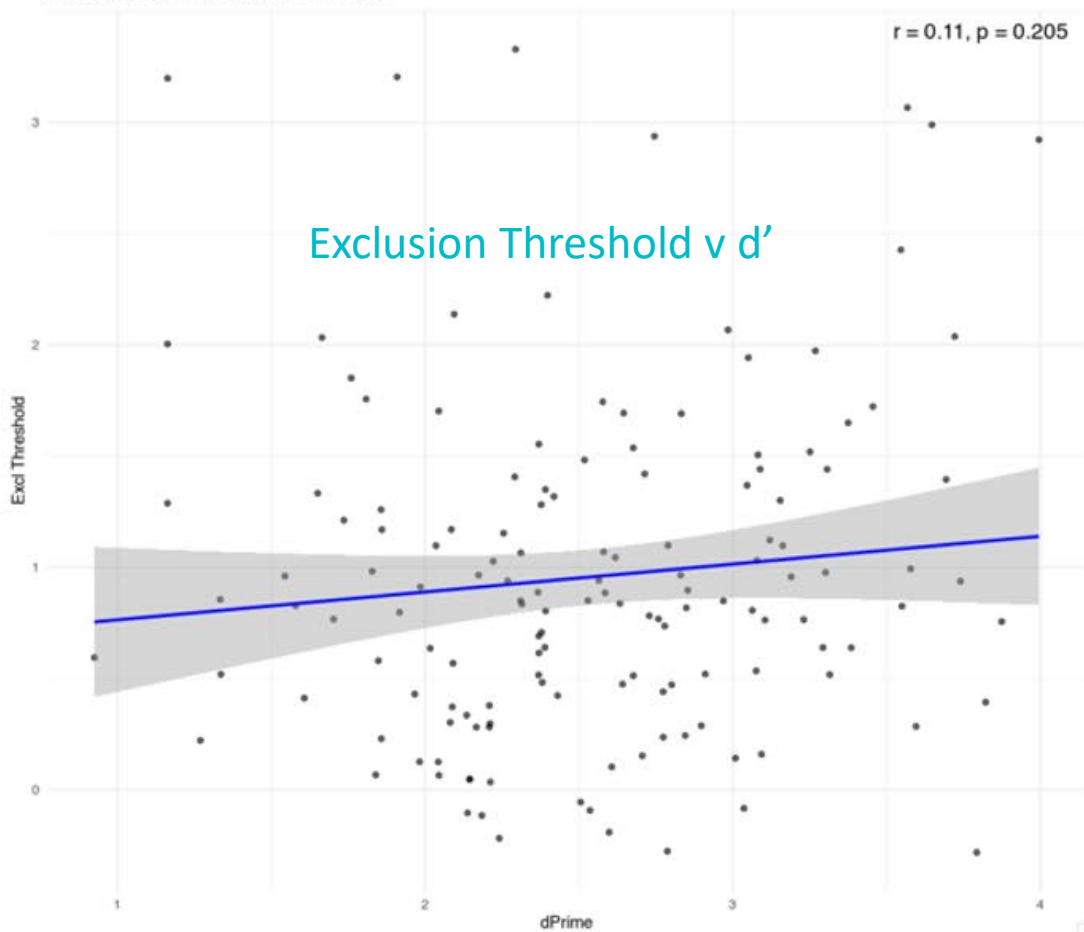
**Result: Latent
Print Black Box 2
Study.**

Thresholds vs d' – Hicklin 2026 Study

Correlation: d' Prime vs Excl Threshold

$r = 0.11, p = 0.205$

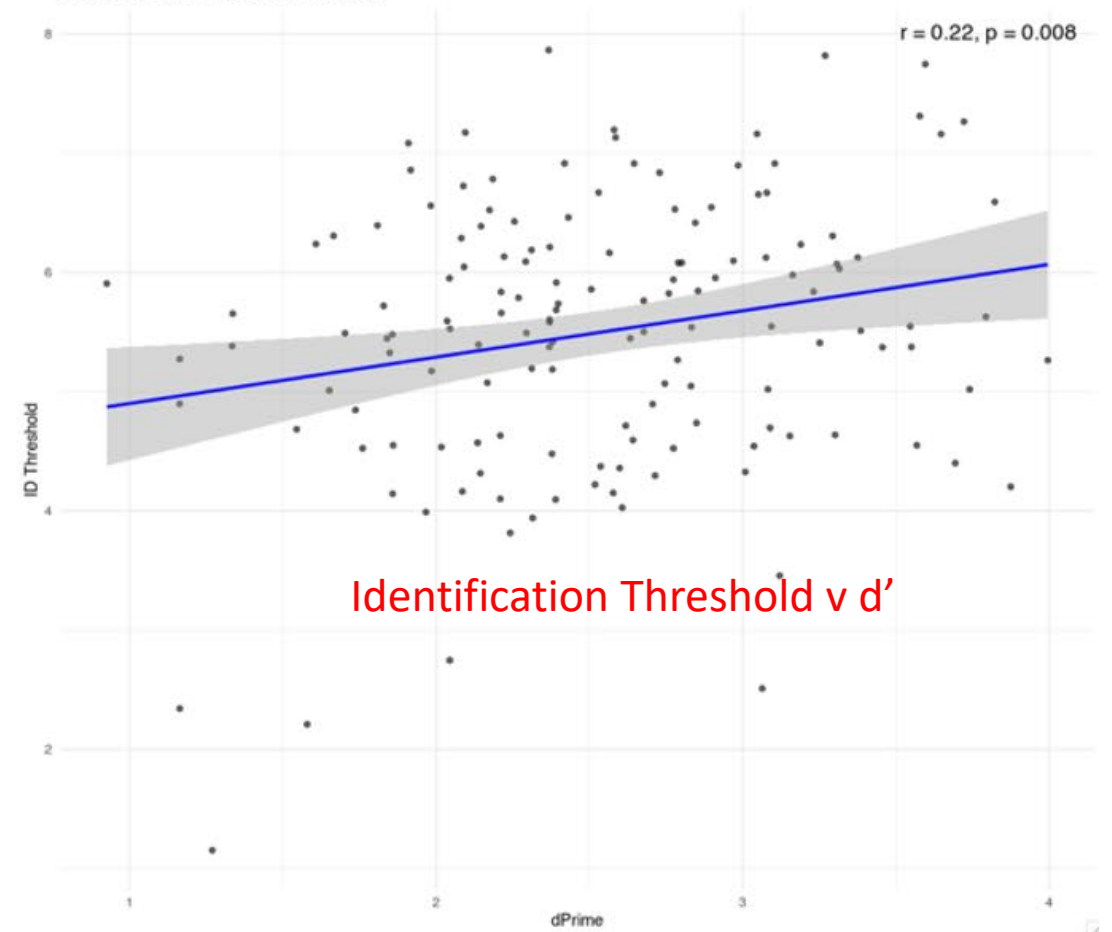
Exclusion Threshold v d'



Correlation: d' Prime vs ID Threshold

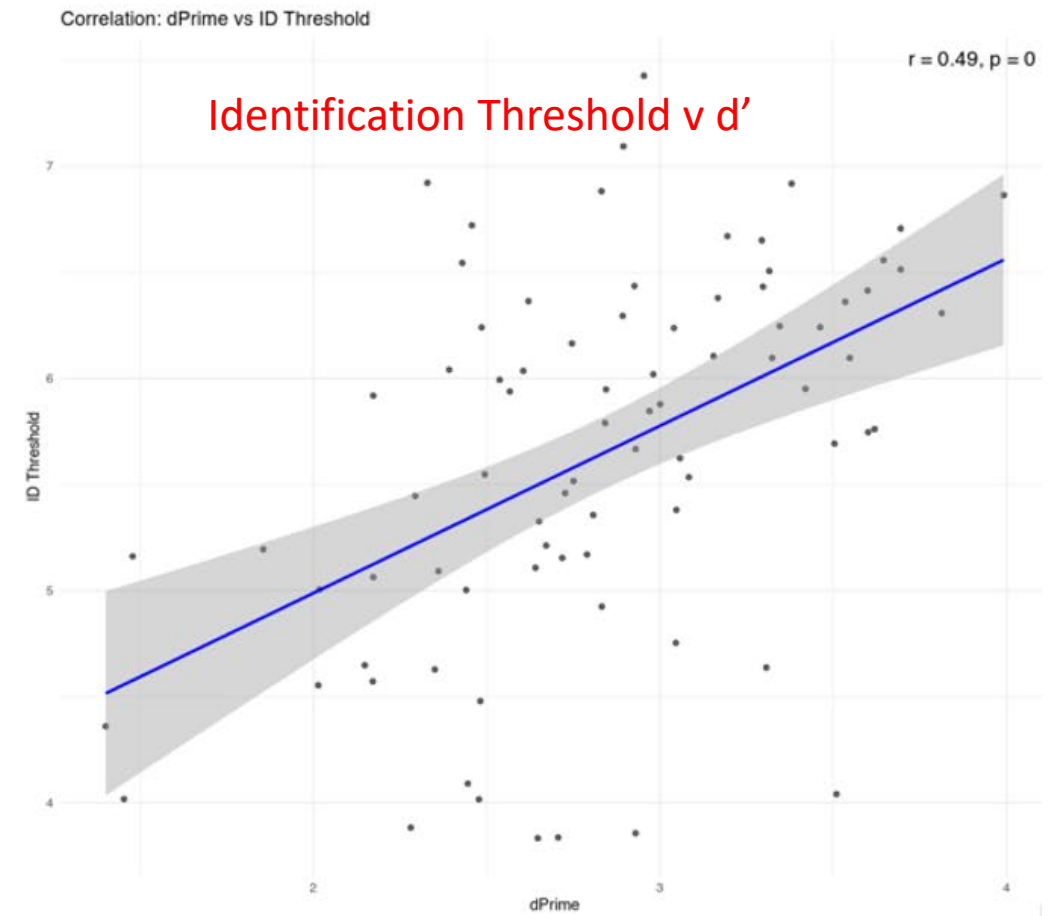
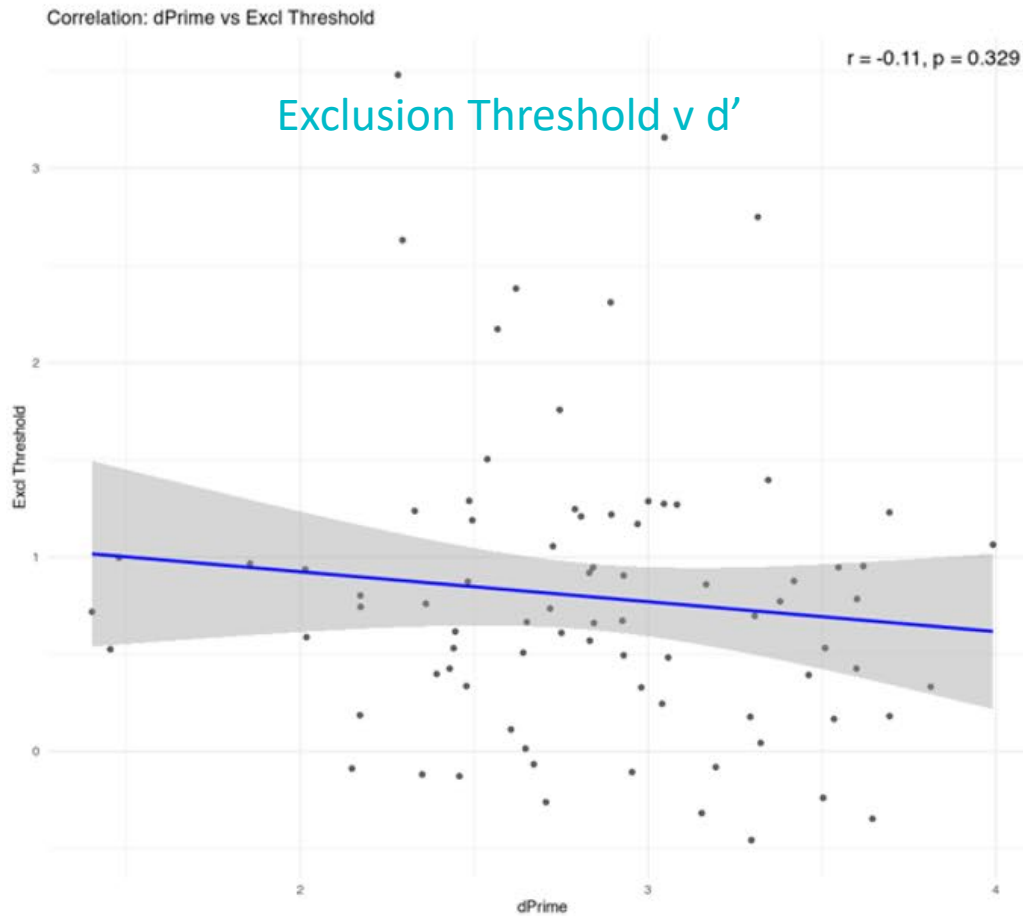
$r = 0.22, p = 0.008$

Identification Threshold v d'



Result:
Kibbey et al

Thresholds vs d' - Kibbey et al Study



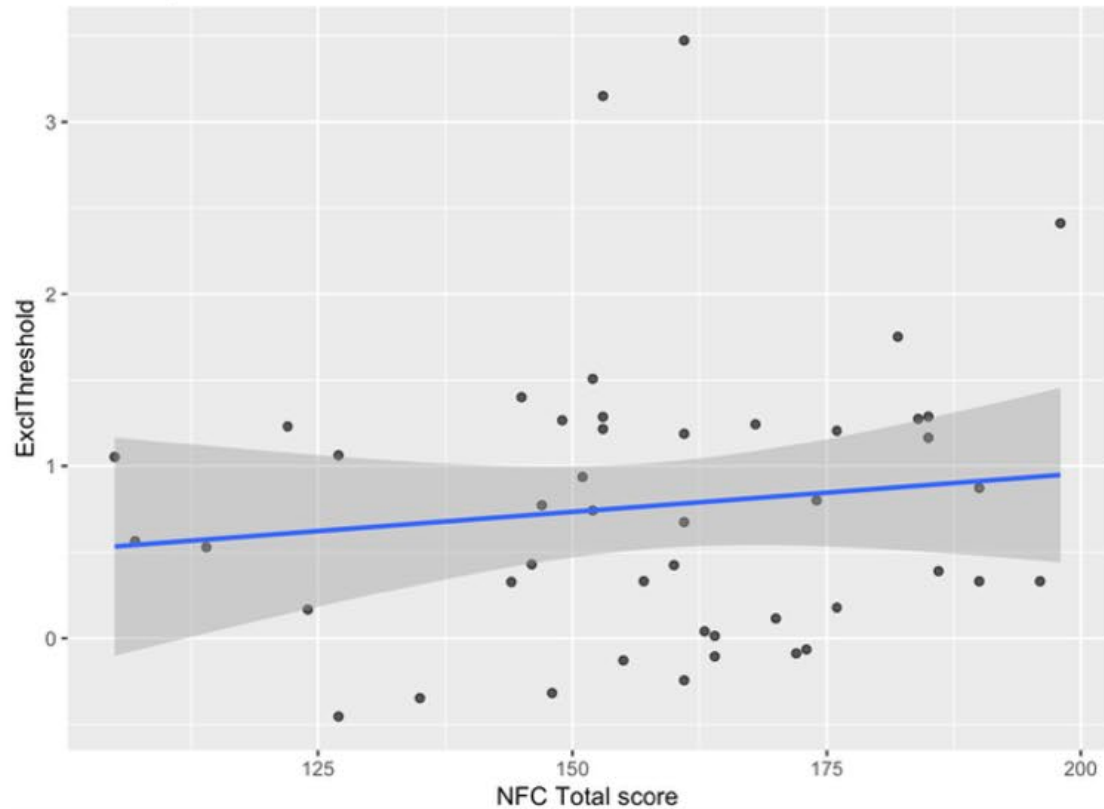
Method: *Personality data*

- Need For Closure Scale
- General Self Efficacy Scale
- Trier Inventory for Chronic Stress Scale : Work Overload; Social Overload; Pressure to Perform; Work Discontent; Excessive Demands at Work; Lack of Social Recognition; Social Tensions; Social Isolation; Chronic Worrying.

Need for Closure Personality Data Kibbey et al

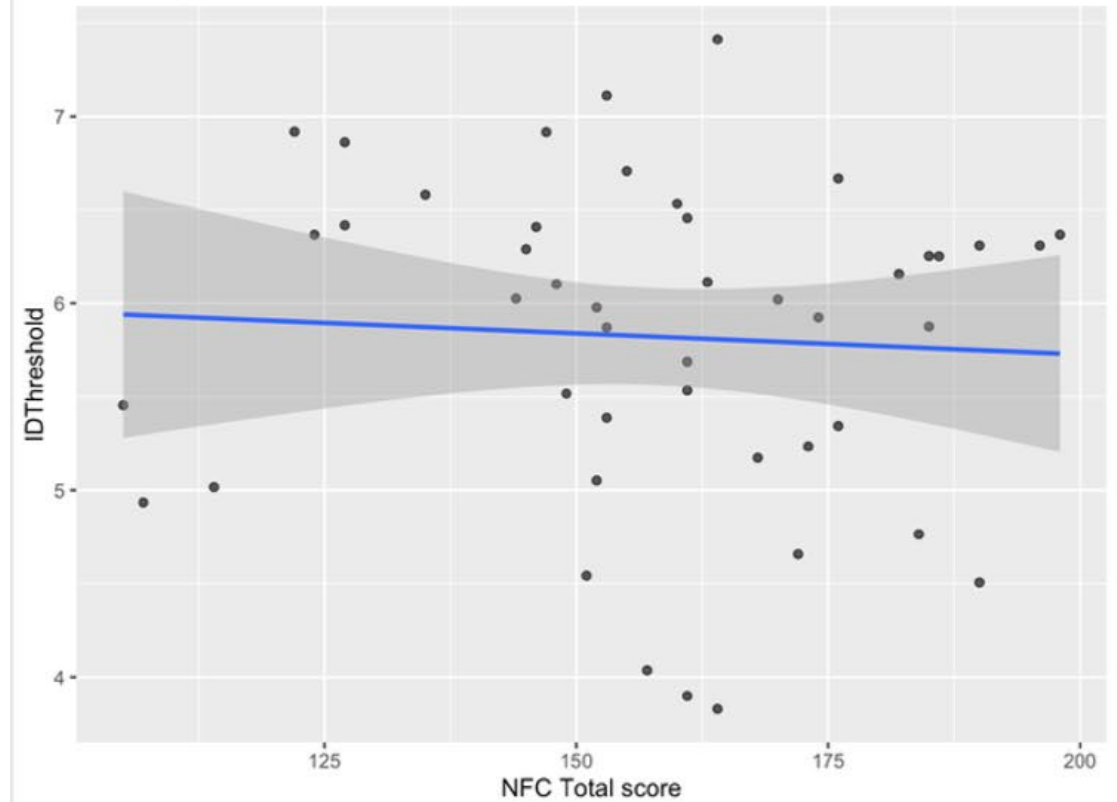
NFC Total score vs ExclThreshold

$r = 0.12$, $p = 0.419$, $n = 46$



NFC Total score vs IDThreshold

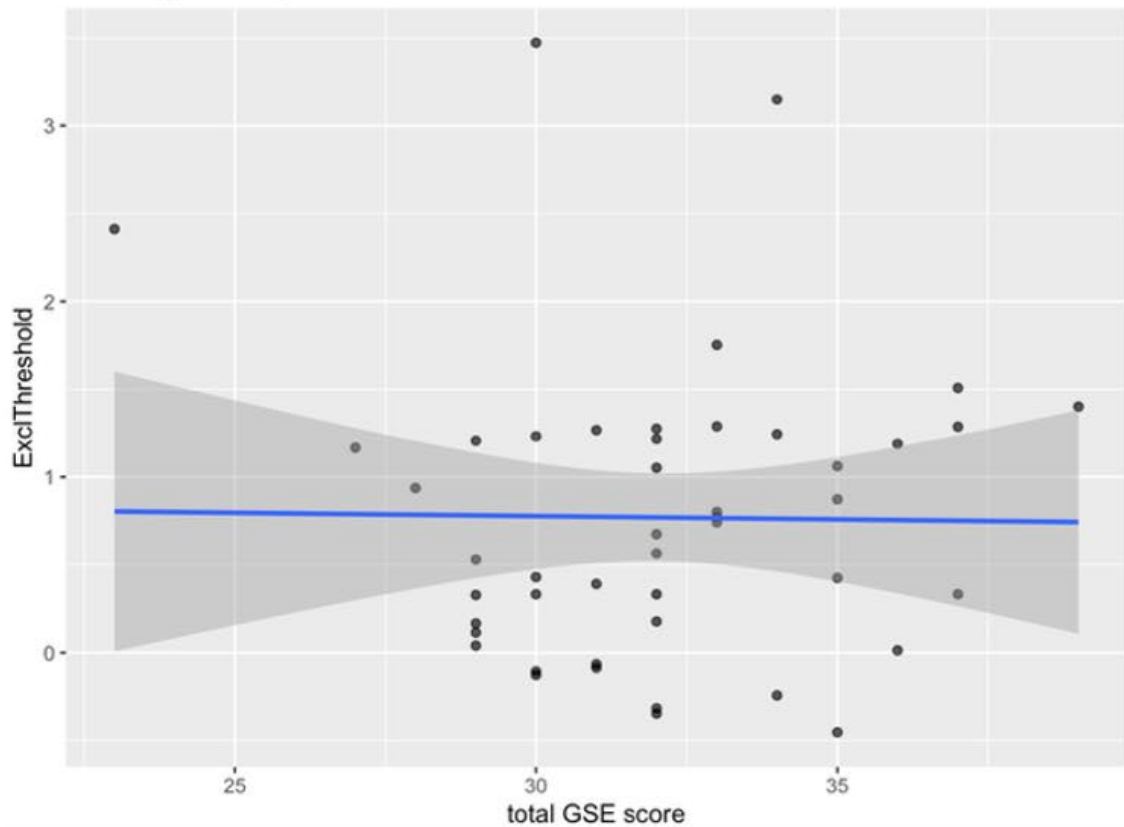
$r = -0.06$, $p = 0.695$, $n = 46$



General Self-Efficacy Personality Data Kibbey et al

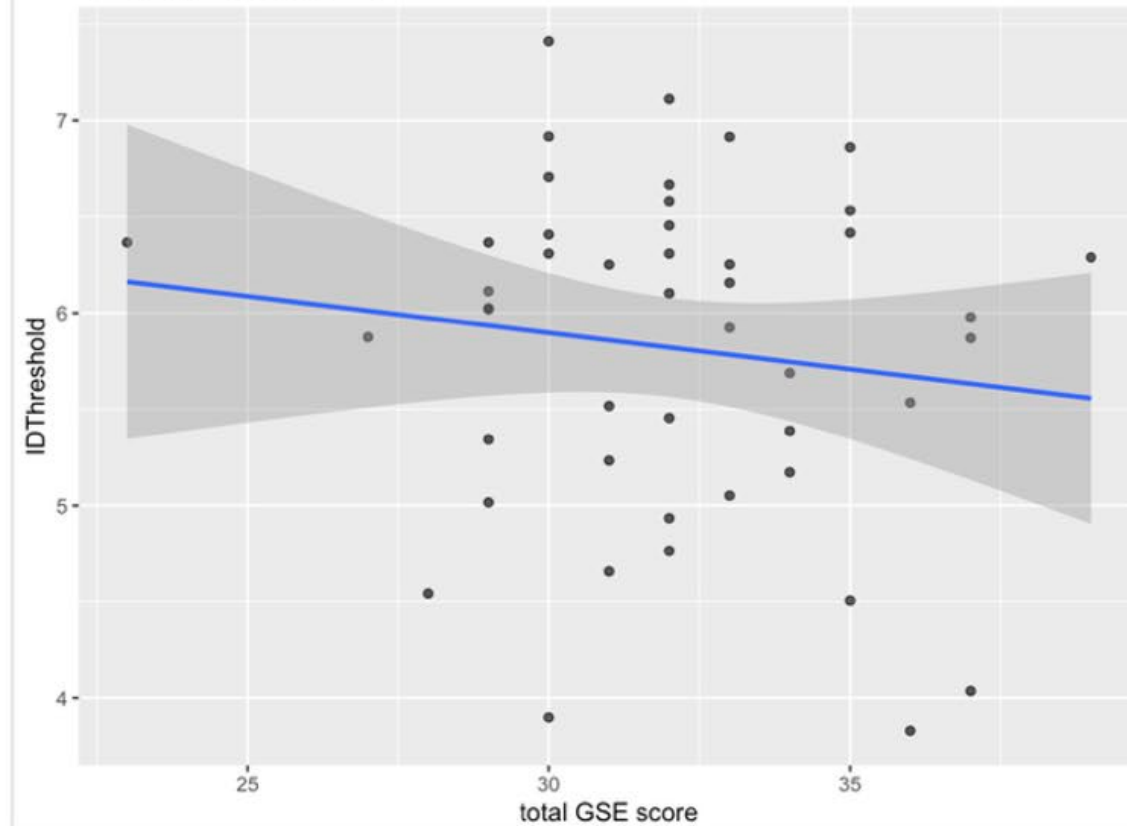
total GSE score vs ExclThreshold

$r = -0.01$, $p = 0.928$, $n = 46$



total GSE score vs IDThreshold

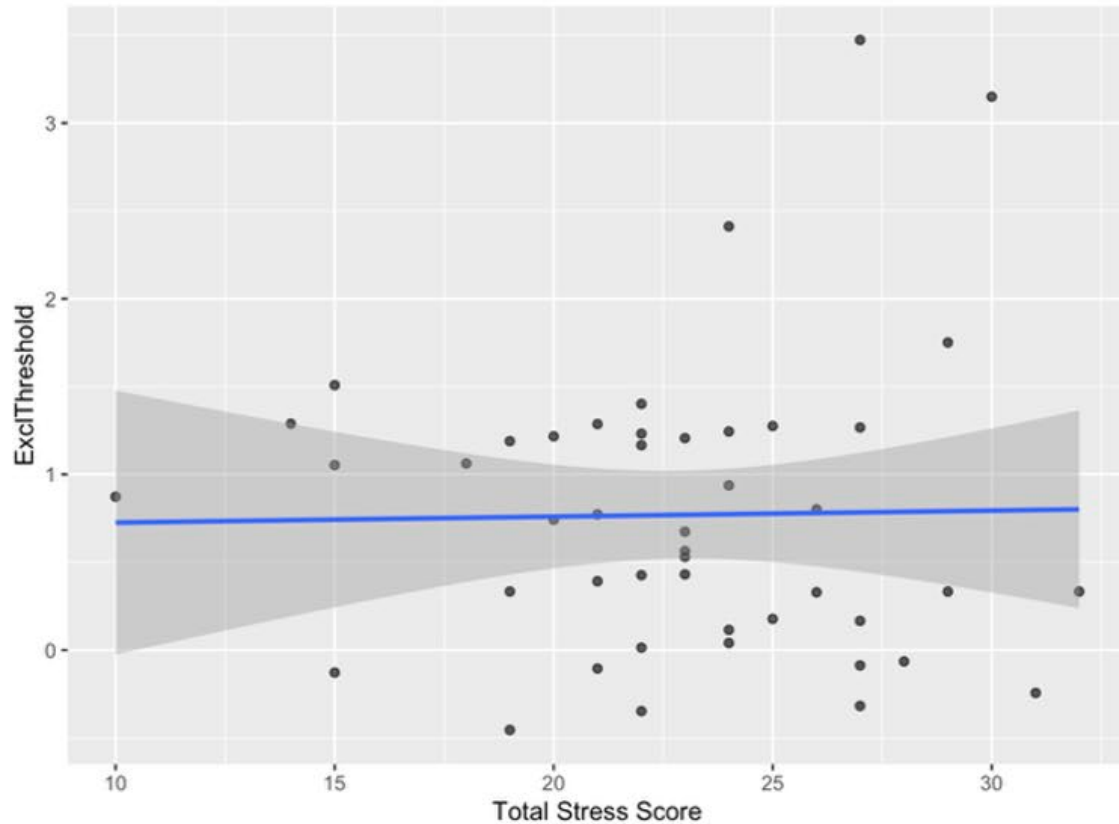
$r = -0.13$, $p = 0.379$, $n = 46$



Chronic Stress Data Kibbey et al

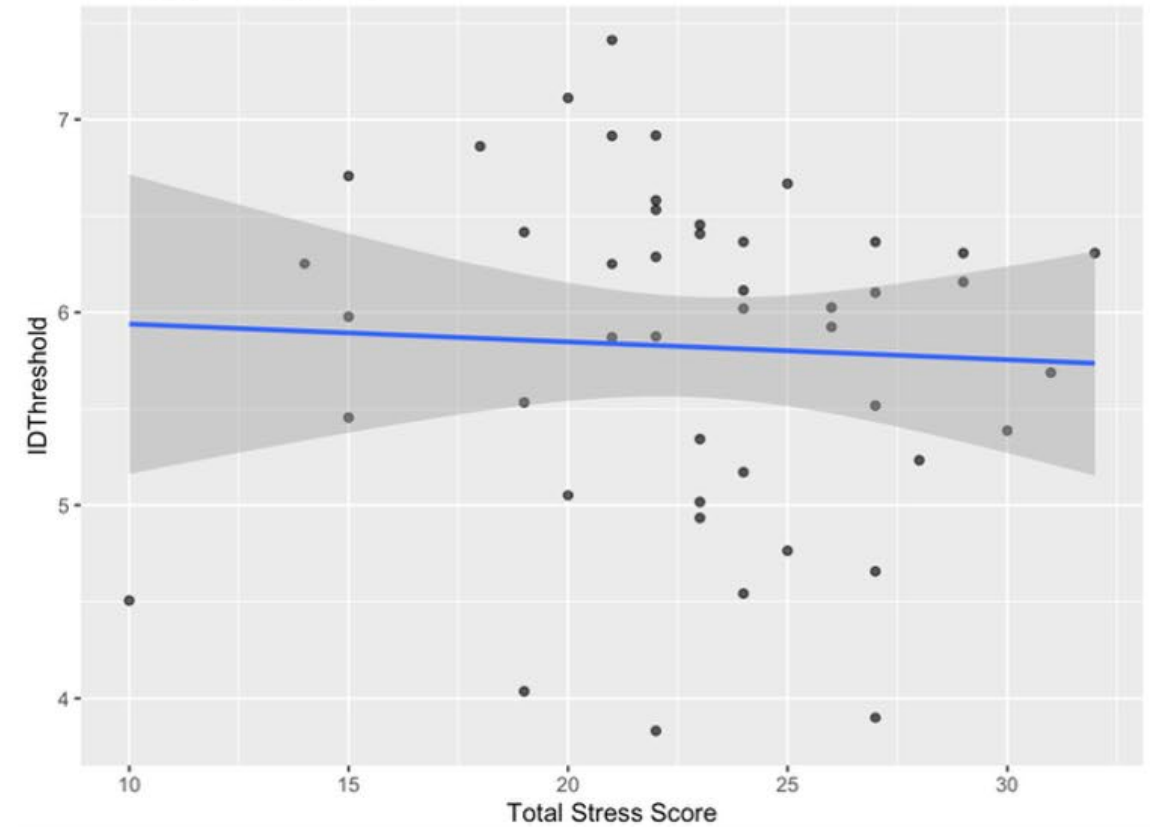
Total Stress Score vs ExclThreshold

$r = 0.02$, $p = 0.901$, $n = 46$



Total Stress Score vs IDThreshold

$r = -0.05$, $p = 0.745$, $n = 46$



Discussion

- Our findings are consistent with those reported by Ulery, Hicklin, Buscaglia and Roberts who showed that examiner accuracy on **mated comparisons** did not straightforwardly predict behavior on **nonmated comparisons**.
- Identification thresholds showed a **positive association with expertise**, particularly in the Kibbey et al dataset, where higher d' values were strongly associated with more risk-averse identification thresholds.

Discussion

- The absence of significant relations between personality traits, stress and decision thresholds in the present study should not be interpreted as evidence that such traits are irrelevant to forensic decision-making.
- Due to the anonymity of Hicklin 2026 participants, we are unable to link these personality and stress factors to their performance data.
- The non-mated stimuli used in the Kibbey et al. study were not selected from a large AFIS database, these samples may have limited the extent to which traits such as Need for Closure or stress susceptibility were engaged.

Conclusion

- The best examiners are also the most cautious.
- Where is the optimal location of the decision criterion?



Reference

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