

The Impact of Item Format on Test Security

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Item Preknowledge

- Definition: a source reveals item information to future examinees
- The items for which information has been leaked are **compromised**, while the remaining items are **secure**.
- Noticeable differences in compromised item performance are expected.

Multiple-Choice (MC)

- When a MC item is presented, every option is displayed, and the item is able to be harvested in its entirety.
- Examinees can use the process of elimination (i.e., testwiseness) when answering the item.

Discrete-Option Multiple-Choice (DOMC)

- Presents one option at a time to which an examinee must respond “Yes” or “No”
- Options are randomly presented until the item has been scored or all options have been exhausted.
- Items are scored as Correct if the examinee endorses the correct option, or as Incorrect if the examinee endorses an incorrect option or refutes the correct one.
- To deter examinees from deducing which option was correct, Foster and Miller (2009) recommend a 0.5 probability of presenting one additional, unscored option after an item has been scored.

DOMC Example

Is this a prime number?

6

- Yes

- No

DOMC Example

Is this a prime number?

9

- Yes

- No

DOMC Example

Is this a prime number?

7

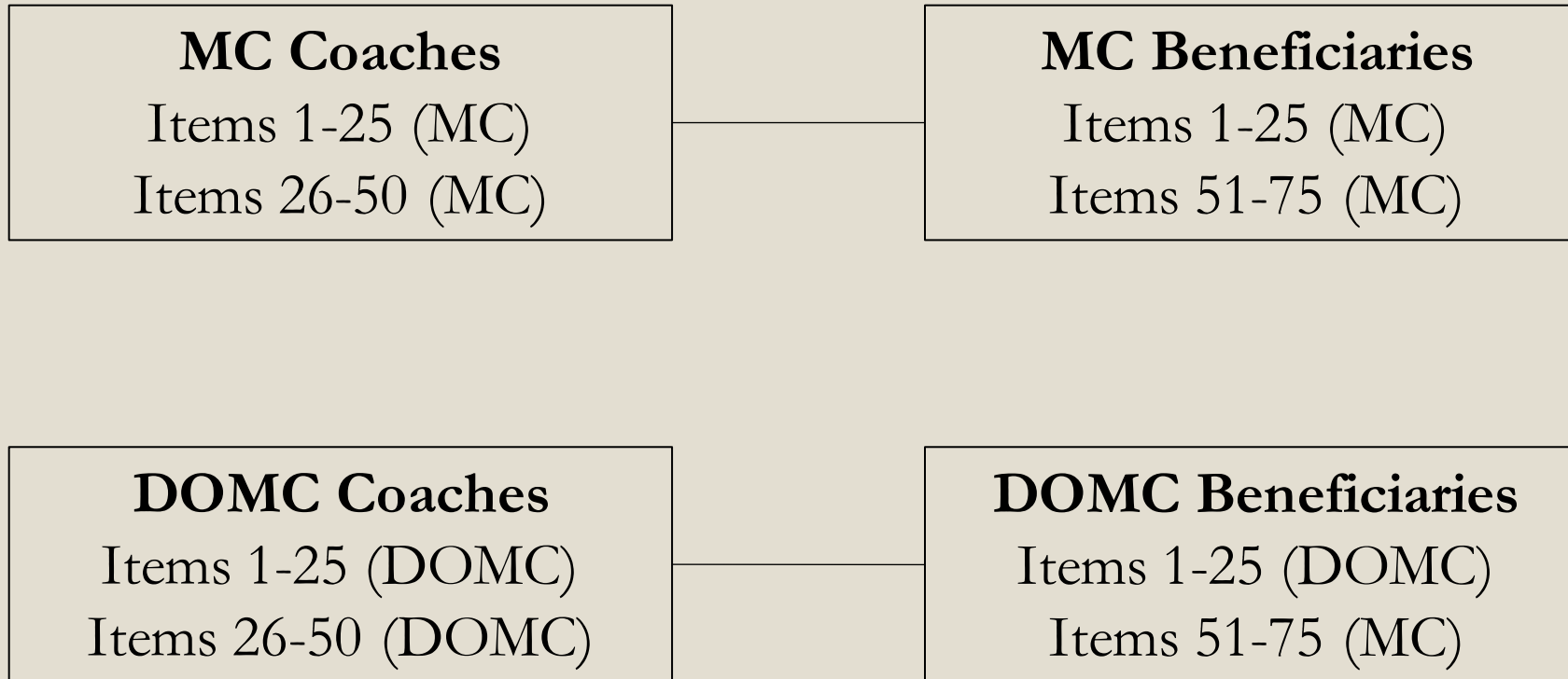
- Yes

- No

Design

- Purpose: compare the effects of MC and DOMC formats on item preknowledge
- 75 items, each consisting of a stem with 5 options
- Participants were randomly assigned to be a **Coach** or a **Beneficiary**. Each group received a unique set of instructions.
- Once the Coach had completed their test, they were paired with a Beneficiary, whom they met with for one hour to discuss the test and the items they had seen.

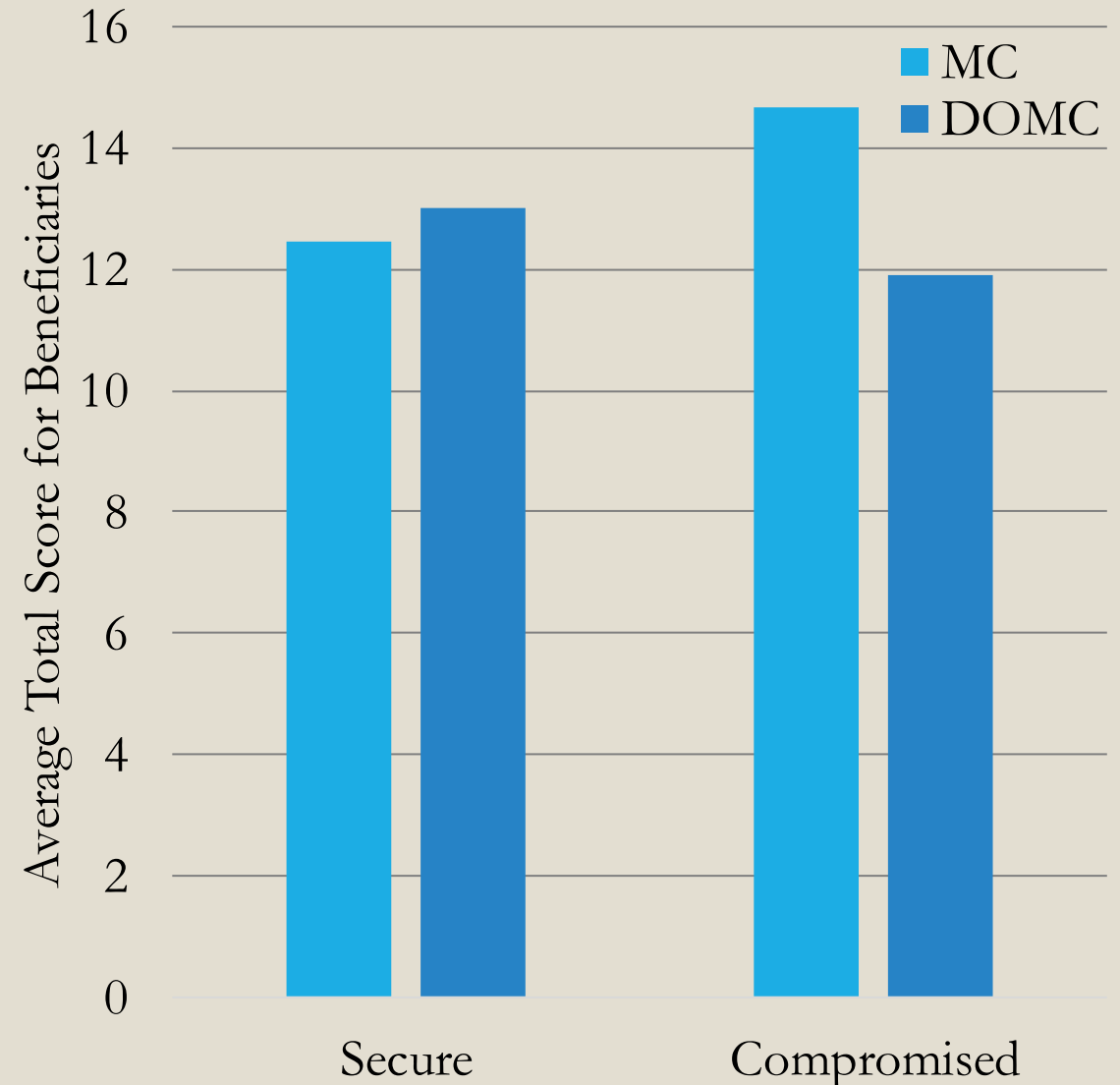
Design



Results

MC vs. DOMC Groups

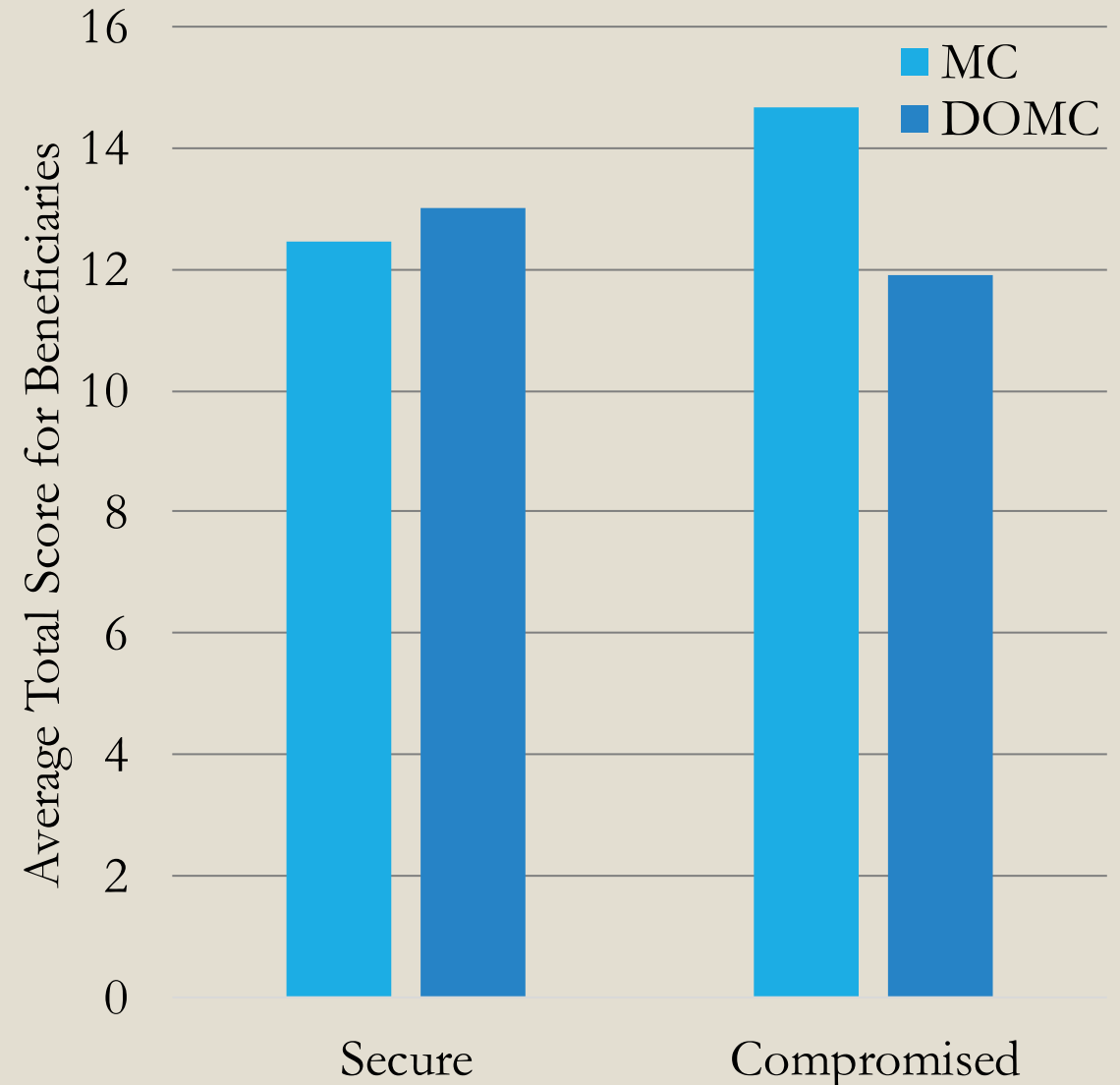
- **25 secure items:** There was no significant difference between MC and DOMC Beneficiaries' scores.
- **25 compromised items:** After mean equating, MC Beneficiaries ($\mu = 14.69$) scored significantly higher than DOMC Beneficiaries ($\mu = 11.91$, $p < 0.01$).



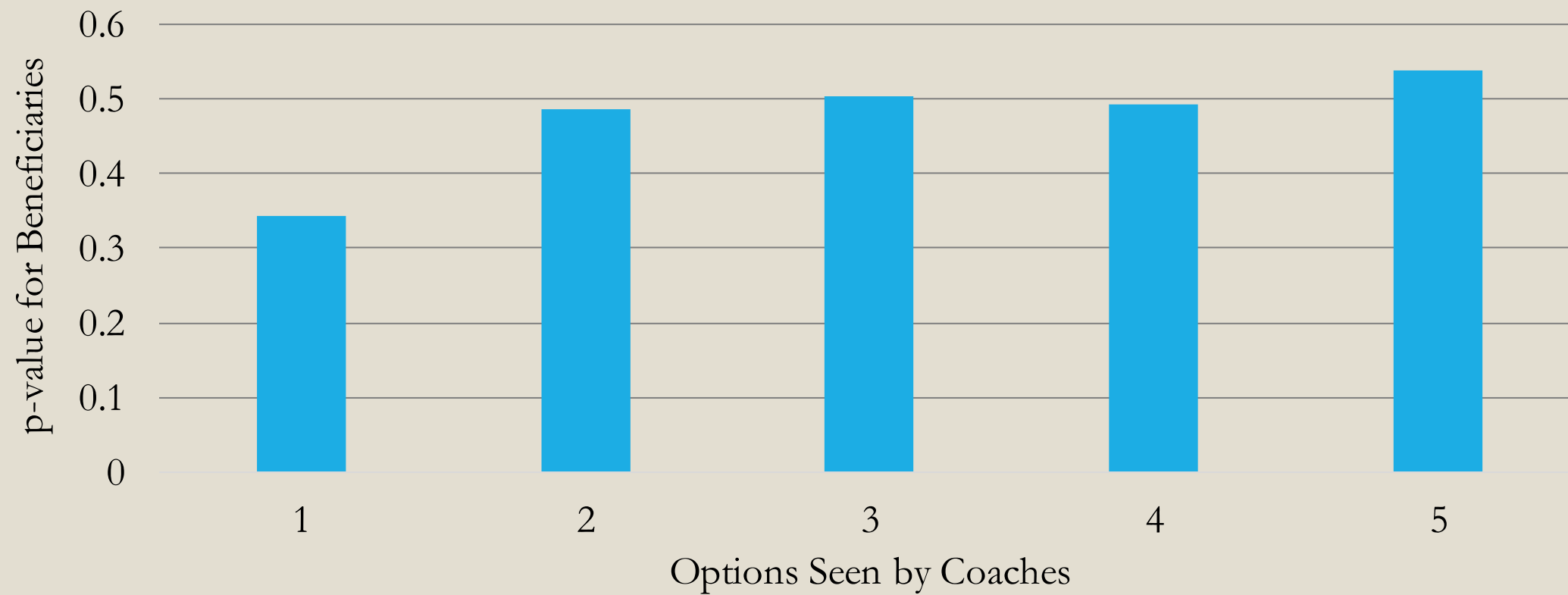
Results

Secure vs. Compromised Items

- **MC Beneficiaries:** Participants scored significantly higher on compromised items ($\mu = 14.44$) than on secure items ($\mu = 12.44, p < 0.01$).
- **DOMC Beneficiaries:** There was no significant difference between secure and compromised item scores.



Additional Results



Discussion

- The difference between MC and DOMC Beneficiaries on compromised item scores may reflect the additional challenges faced by DOMC Coaches as they attempted to pass on item preknowledge.
- The similarity between secure and compromised item scores for DOMC Beneficiaries encourages the use of DOMC items from a test security standpoint.
- The more options a Coach sees, the better chance their Beneficiary has at answering the item correctly.

Future Research

- A beneficiary group that experiences both MC and DOMC secure items, and MC and DOMC compromised items to draw stronger item format comparisons
- Setting different probabilities for showing the additional alternative
- Scoring the additional alternative

References

- Foster, D. (2016). *The Discrete Option Multiple Choice Test Item: An Important Evolution in Test and Item Design*. Retrieved from <https://caveon.com/2016/08/19/the-discrete-option-multiple-choice-test-item/>.
- Foster, D., & Miller, H. L. (2009). A new format for multiple-choice testing: Discrete-Option Multiple-Choice. Results from early studies. *Psychology Science Quarterly*, 51(4), 355–369.