



Exploratory and Confirmatory Factor Analysis in Psychological Research

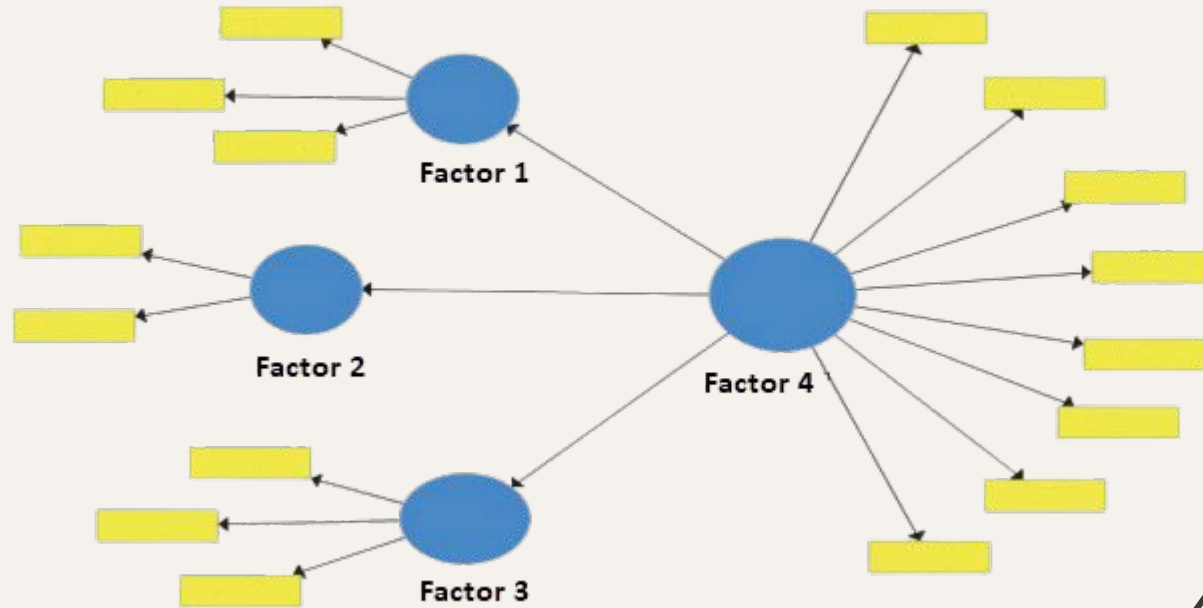
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PSY 504

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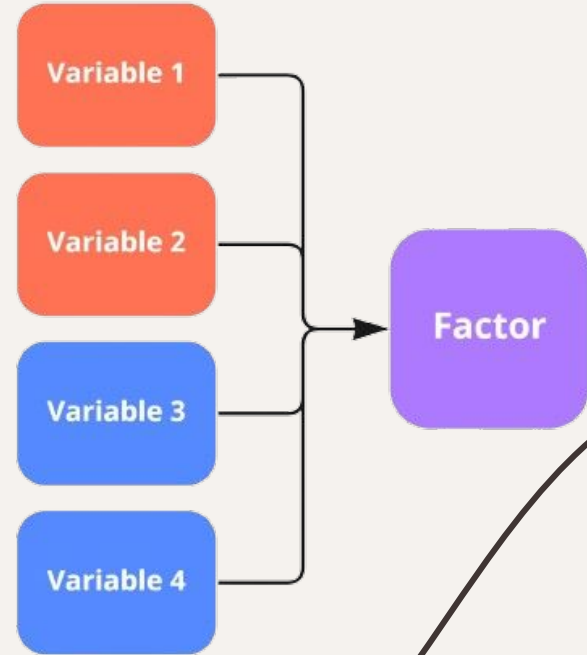


Introduction to Factor Analysis



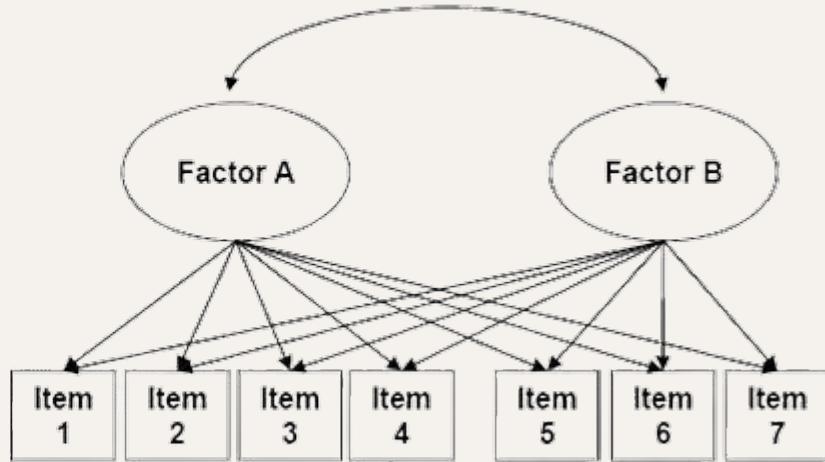
What is Factor Analysis?

- Factor Analysis simplifies datasets by identifying underlying factors from observed variables, revealing latent structures.
- Helps interpret complex data by grouping correlated variables into fewer, meaningful factors.

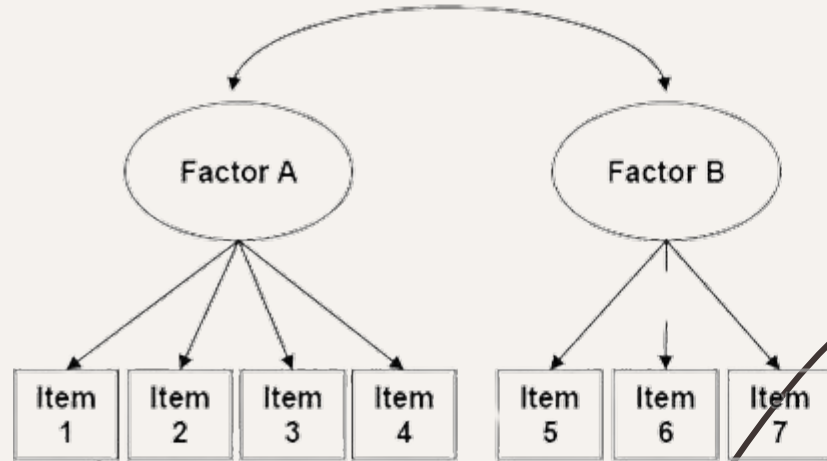


Types of Factor Analysis

Exploratory Factor Analysis



Confirmatory Factor Analysis

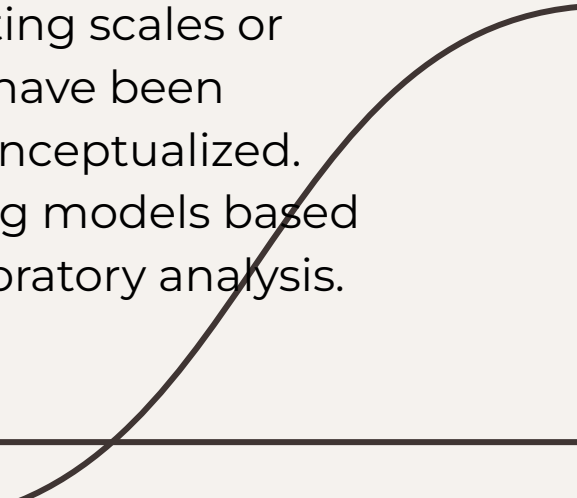


When to use CFA vs. EFA?

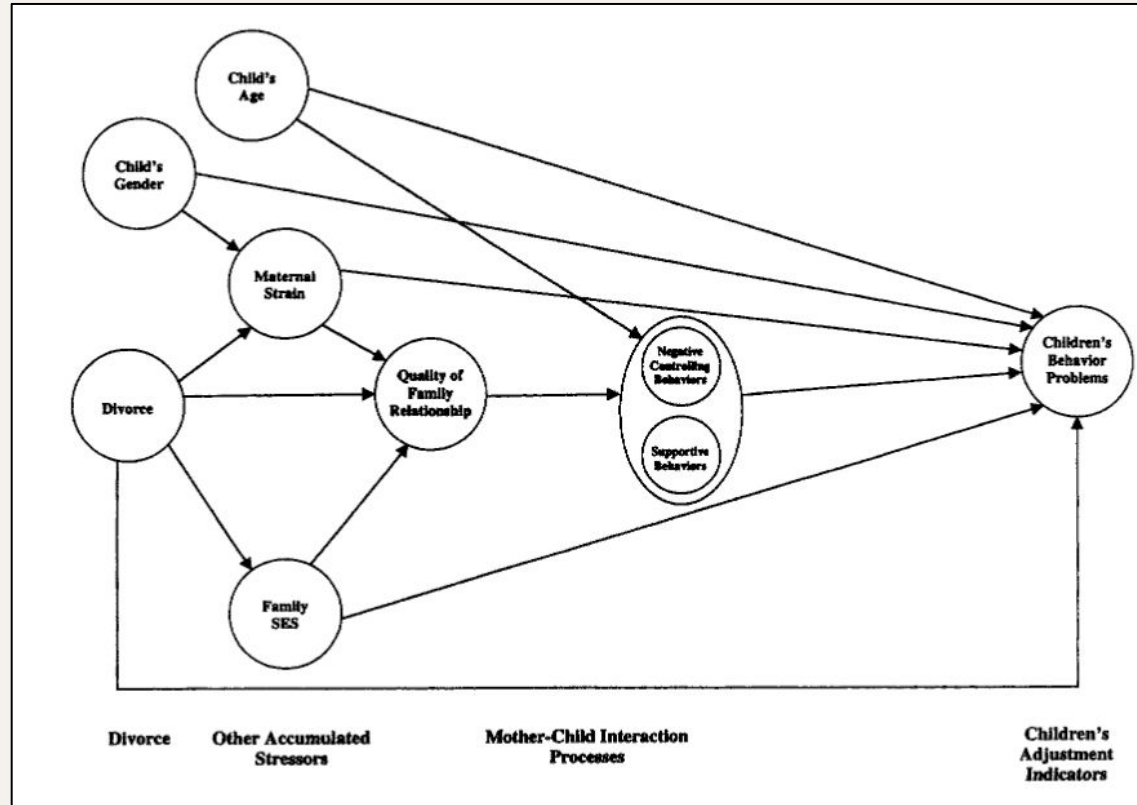
EFA

- When starting with broad, undefined research questions.
- When exploring large datasets to discover patterns, relationships, or groupings among variables.
- When previous research does not provide sufficient theories or predictions about the nature of the constructs.

CFA

- When your research is based on a strong theoretical foundation that predicts how variables should be grouped.
 - When validating scales or models that have been previously conceptualized.
 - When refining models based on prior exploratory analysis.
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Confirmatory Factor Analysis (CFA) Example



Steps to Conduct an EFA

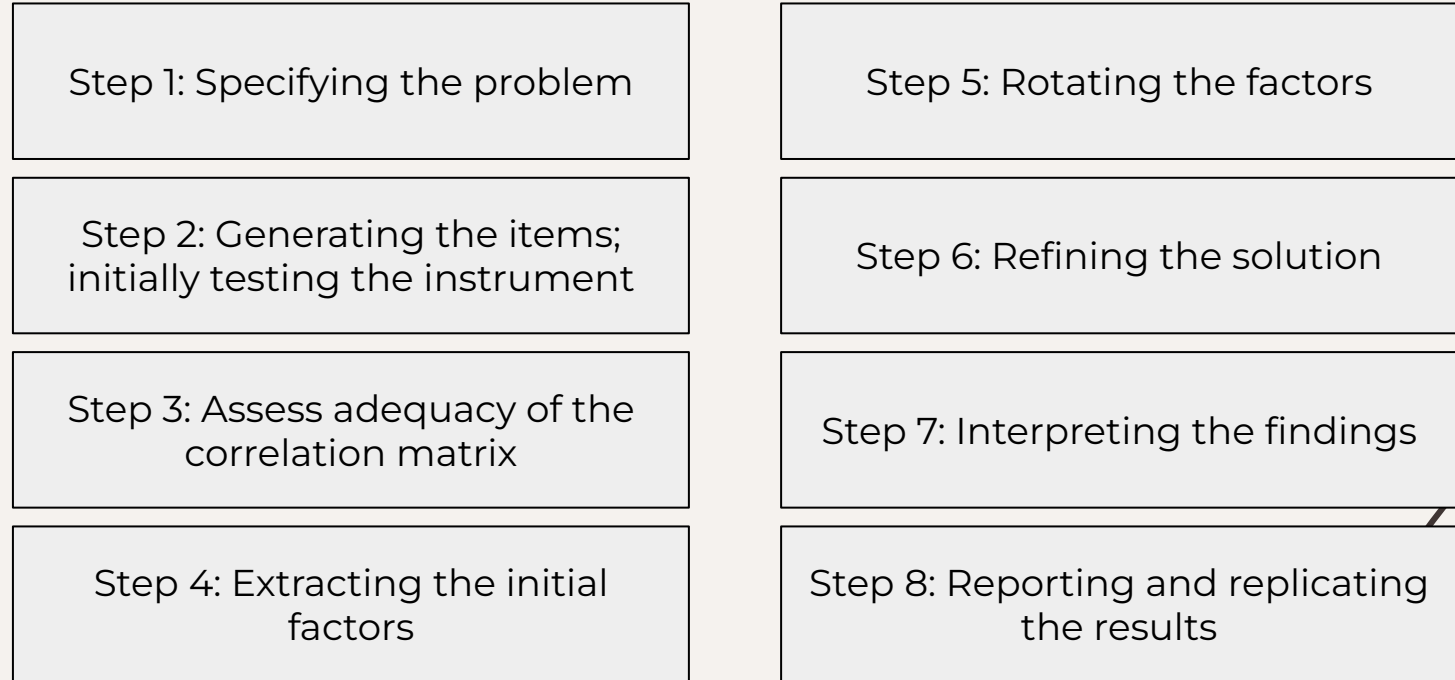


Figure 1.2, Pett, M. A., Lackey, N. R., & Sullivan, J. (2003)

Exploratory factor analysis: perceptions of pronoun sharing

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Call:
factanal(x = dat_fa, factors = 3, scores = "regression", rotation = "promax")
```

	Factor1	Factor2	Factor3
SS loadings	7.47	4.15	3.88
Proportion Var	0.23	0.13	0.12
Cumulative Var	0.23	0.36	0.48

Factor Correlations:

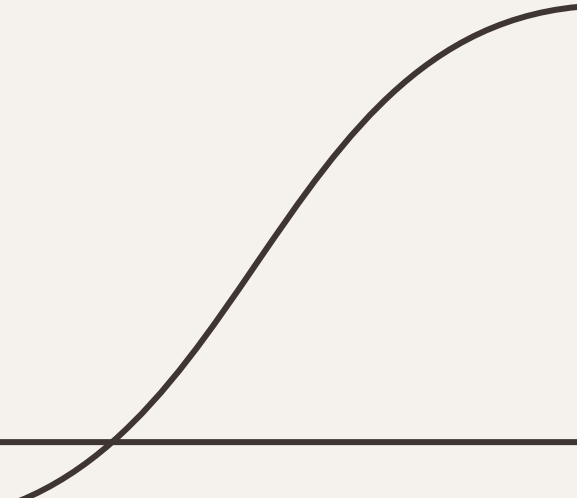
	Factor1	Factor2	Factor3
Factor1	1.00	0.23	0.11
Factor2	0.23	1.00	-0.30
Factor3	0.11	-0.30	1.00

Test of the hypothesis that 3 factors are sufficient.
The chi square statistic is 2667.46 on 403 degrees of freedom.
The p-value is 0

Item	Reputation signaling	Identity signaling	Norm support
MotiveStatus: Motive to gain status	0.87		
MotiveInfluencePower: Motive to have power to influence others	0.85		
MotivePower: Motive to gain power	0.84		
MotiveValence: Motive to make others like oneself	0.81		
MotiveReputation: Motive to enhance reputation	0.80		
MotiveAttention: Motive to attract attention	0.80		
MotiveSuperior: Motive to make superiors think highly of oneself	0.79		
MotivePeer: Motive to make peers think highly of oneself	0.76		
MotiveBenefit: Motive to benefit oneself	0.66		
MotiveMoral: Motive to look morally good	0.65		
MotiveSociality: Motive to make others want to interact with oneself	0.55		
MotiveCompetence: Motive to display competence at one's job	0.42		
MotiveLose: Motive to avoid social cost	0.42		
MotivePersonalID: Motive to signal personal identity		0.82	
MotiveSocialID: Motive to signal social identity		0.79	
MotiveGenderID: Motive to signal gender identity		0.79	
MotiveMisgender: Motive to avoid being misgendered		0.64	
MotiveShare: Motive to share how one wants to be addressed		0.62	
MotivePersonalImp: Motive to do something that is personally important		0.54	
MotivePersonalValue: Motive to reflect personal values		0.53	
MotivePersonal: Motive to make oneself feel safe and comfortable		0.43	
MotiveOther: Motive to benefit TGNC people			0.68
MotiveImportance: Motive driven by belief in importance of action			0.68
MotiveBelief: Motive driven by belief in the value of gender-inclusive workplace			0.65
MotiveSamePage: Motive driven by belief that colleagues are on the same page about gender inclusivity			0.60
MotiveInjNorm: Motive to follow an injunctive norm			0.56
MotiveCommunityValue: Motive to reflect workplace values			0.54
MotiveRight: Motive to do the right thing			0.51
MotiveDescNorm: Motive to follow a descriptive norm			0.46
MotiveInfluenceBehav: Motive to influence behavior			0.42
MotiveSignal: Motive to signal that the action is the right thing to do			0.41
MotiveConsistency: Motive to remain consistent with past words/actions			

Challenges and Limitations 🤔

- Assumptions of Linearity
- Sample Size Requirements
- Distribution of Data
- Rotation Subjectivity
- Uniqueness Problem
- Complexity in Interpretation



Sources

Pett, M. A., Lackey, N. R., & Sullivan, J. (2003). Chapter 1: An Overview of Factor Analysis. Making Sense of Factor Analysis: The Use of Factor Analysis for Instrument Development in Health Care Research (1st edition). SAGE Publications, Inc.

Watkins, M. W. (2018). Exploratory Factor Analysis: A Guide to Best Practice. Journal of Black Psychology, 44(3), 219–246. <https://doi.org/10.1177/0095798418771807>

Images

<https://statisticsbyjim.com/basics/factor-analysis/>

https://www.researchgate.net/figure/Conceptual-distinction-between-confirmatory-factor-analysis-left-and-exploratory-factor_fig5_47386956

