

Metrics, Assessment, and Evaluation in Mentorship

Paul R. Hernandez, Ph.D.

Assistant Professor of Educational Psychology

West Virginia University

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Participatory Workshop on Metrics, Models, and Identities in STEMM Mentoring
Relationships: What Works and Why?

National Academy of Sciences
Irvine, CA 92617

Charge

- Provide landscape review of metrics, assessments, and methods used to research mentoring relationships in postsecondary educational STEMM (Science, Technology, Engineering, Mathematics, and Medical) contexts;
- Address measures from mentee, mentor, institutional, and program evaluation perspectives;
- Identify potential new or emerging metrics and identify significant gaps.

Mentoring

- A developmental relationship between a more experienced person (mentor) and a less experienced person (mentee), where the mentor provides support, guidance, and/or encouragement with the aim of enhancing the mentee's personal and professional development (Eby, et al., 2013; Jacobi, 1991; Kram, 1985).
- Process-Oriented Model of Mentoring
(Inputs → Relationship Processes → Outputs)(Eby, et al., 2013).

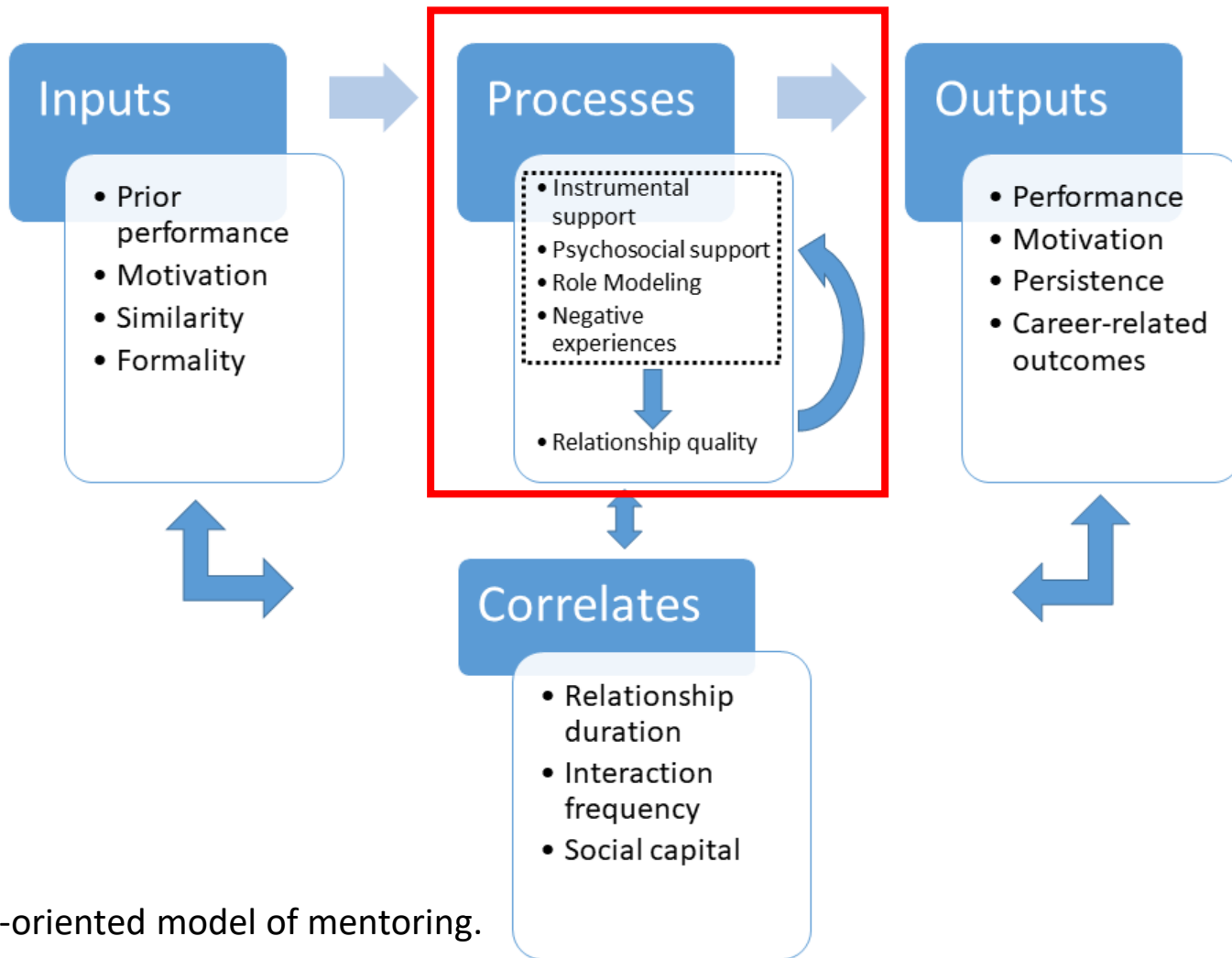


Figure 1. Process-oriented model of mentoring.

Landscape Review Methods

Study inclusion criteria:

1. Empirical (i.e., gathered data);
2. Postsecondary educational context (i.e., undergraduate student, graduate student, or postdoctoral mentees);
3. STEMM context (i.e., all or majority of mentees were from a STEMM discipline);
4. Measured mentoring relationship processes from mentee, mentor, and/or institutional/program evaluation perspective;
5. Sufficient information for replication (i.e., sample, procedures, and measures details provided in the research article);
6. Provided one-or-more sources of *measurement validation evidence* (AERA et al., 2014).
 - Extracted validation evidence based on Content, Internal Structure, and Relationships

Landscape Review Methods:

Assessments of Mentoring Relationship Processes

- Literature search process informed by prior reviews and updated search for mentoring assessments using the Web of Science database.
- Identified 34 assessments of mentoring relationships used in post-secondary educational STEMM contexts:
 - 22 (65%) from mentee's perspective (Appendix 1);
 - 3 (9%) from mentor's perspective (Appendix 2);
 - 9 (26%) from institutional/program evaluation perspective (Appendix 3).

Results

Example Appendix 1 - Mentee Perspective

Scale Name [#items] & (Original Ref.)	Subscales	Evidence from STEMM context	Methodology and Validation Evidence in STEMM context
Mentor Role Instrument [MRI, 33] (Ragins & McFarlin, 1990)	<ul style="list-style-type: none">• Career roles (sponsor, coach, protector, challenger, and promoter);• Psychosocial roles (friend, social associate, parent, role model, counselor, and acceptor).	<u>Dilmore et al., (2010)</u> 141 clinical and translational science trainees at an academic medical center.	<u>Dilmore et al., (2010)</u> Content: Original scale develop items to assess career and psychosocial mentor functions described by Kram (1985). No wording changes from the original. Relationship quality and relationship effectiveness captured with a single-item each. Complete list of relevant mentoring survey items provided. Internal Structure: Confirmatory factor analysis used to test subscales within Career and Psychosocial roles (i.e., 2 nd -order model); evidence of adequate data-model fit. Internal consistency reliability reported at >.70. Relationship with other mentoring relationship variables: Moderate-to-strong correlations between career support, psychosocial support, relationship quality, and relationship effectiveness.

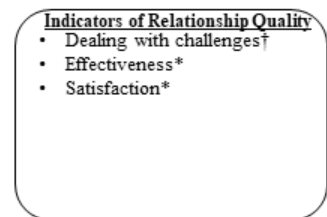
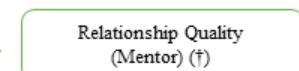
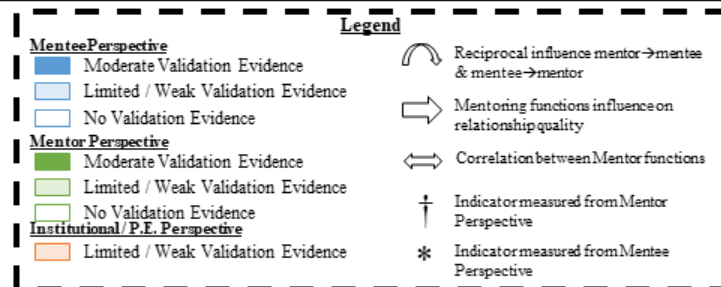
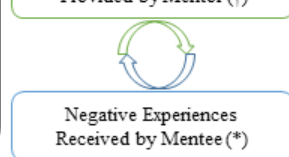
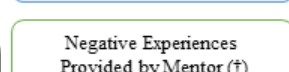
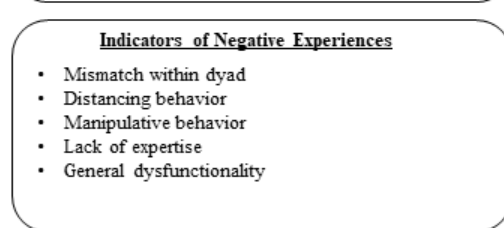
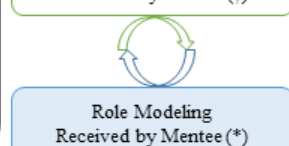
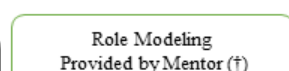
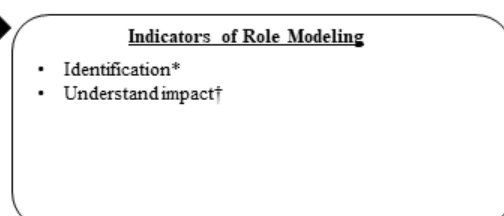
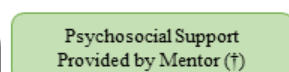
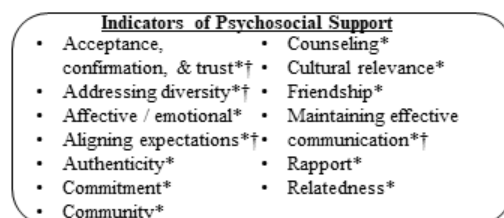
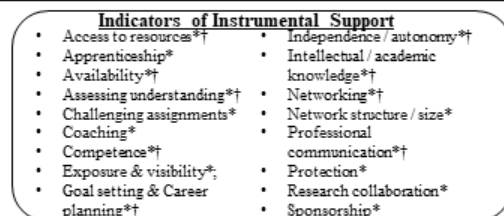
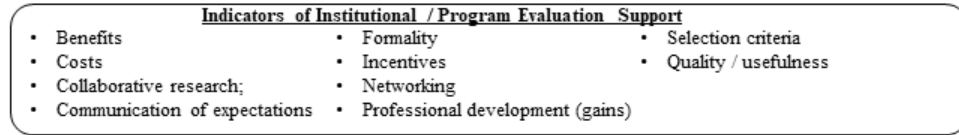


Figure 2. Synthesis of mentoring relationship processes validation evidence in postsecondary STEMM contexts.

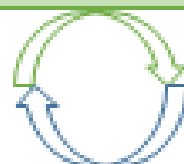
Indicators of Instrumental Support

- Access to resources*†
- Apprenticeship*
- Availability*†
- Assessing understanding*†
- Challenging assignments*
- Coaching*
- Competence*†
- Exposure & visibility*;
- Goal setting & Career planning*†
- Independence / autonomy*†
- Intellectual / academic knowledge*†
- Networking*†
- Network structure / size*
- Professional communication*†
- Protection*
- Research collaboration*
- Sponsorship*

Indicators of Psychosocial Support

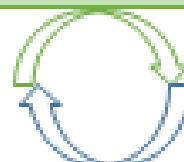
- Acceptance, confirmation, & trust*†
- Addressing diversity*†
- Affective / emotional*
- Aligning expectations*†
- Authenticity*
- Commitment*
- Community*
- Counseling*
- Cultural relevance*
- Friendship*
- Maintaining effective communication*†
- Rapport*
- Relatedness*

Instrumental Support
Provided by Mentor (†)



Instrumental Support
Received by Mentee (*)

Psychosocial Support
Provided by Mentor (†)



Psychosocial Support
Received by Mentee (*)

Take-way points

1. Relatively robust validation evidence for mentee perspective of instrumental support, psychosocial support, and relationship quality based on content, internal structure, and relations with other variables. Limited validation evidence for role modeling, negative experience, and reciprocal exchanges.
2. Limited validation evidence on mentoring relationship processes from mentor, institutional, and program evaluation perspectives.
3. Additional studies are needed to promote robust validation evidence across all aspects of mentoring relationship in postsecondary STEMM contexts. Gathering of evidence can be guided by validation standards (AERA, APA, & NCME, 2014).
4. A number of promising methods that can be used to better capture reciprocal exchanges in mentoring relationships (e.g., dyadic data analysis), as well as methods for measuring mentoring networks (e.g., social network analysis).



Thank you.

Questions?

Affinity Group Questions

- What mentoring relationship qualities (e.g., support experiences), are **not** adequately represented in assessments from mentee, mentor, or institutional/programmatic perspectives?
- What developmental aspects of the mentoring relationship are **not** adequately described and measured. For example, what aspects of support change (or are expected to change) as mentees transition from undergraduate, to graduate, to postdoc?
- What are the most typical/salient modes or opportunities for reciprocal feedback between mentors and mentees? And what types mentor-mentee reciprocal feedback (e.g., instrumental support received) are most important for the development of high quality mentoring relationships?
- What do negative mentoring experiences look like (that is, how do they manifest) in postsecondary STEMM contexts? How do negative experiences differ across mentee, mentor, and institutional perspectives?
- Which aspects of the mentoring relationship (i.e., which types of support experiences) are most important for **(a)** short-, medium, and long-term the career outcomes of mentees? or **(b)** scholarly outcomes (e.g., productivity) of both the mentors and mentees? And, which types of support experiences are most important for mentees at different developmental stages (e.g., 1st year undergraduate, 4th year undergraduate, postdoc, etc.)?

Additional Slides

Unified Validity Framework

(AERA et al., 2014; Messick, 1995)

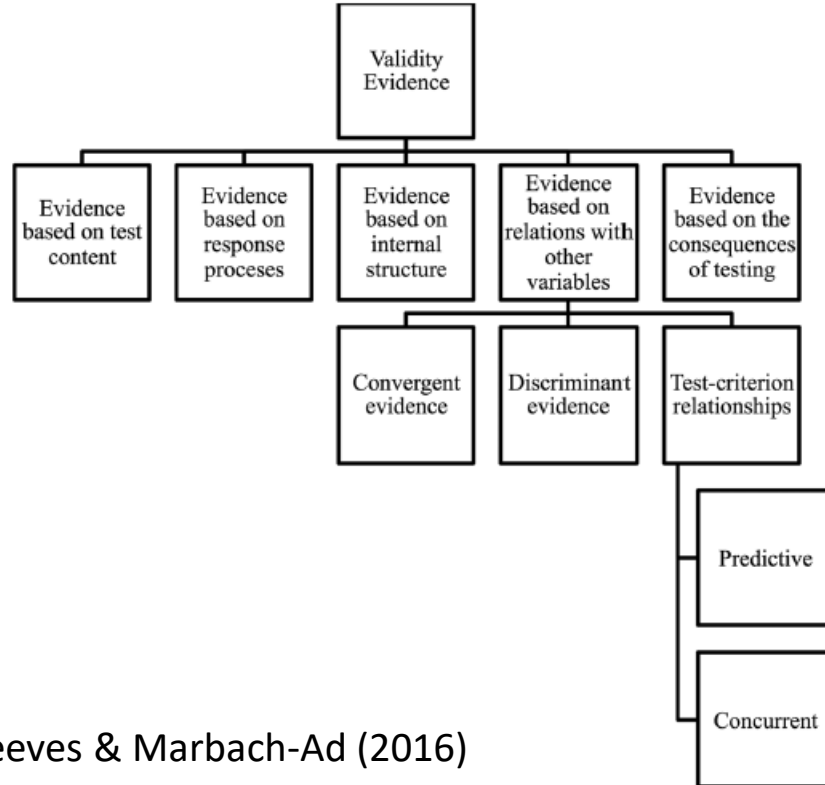


Figure 1. Categories of evidence used to argue for the validity of test score interpretations and uses (AERA, APA, and NCME, 2014).

Landscape Review Methods:

Sample

- Mentee Perspective ($n=22$)
 - 59% with undergraduates, 36% with graduate students, & 5% with postdocs;
 - 45% with mentees' from historically underrepresented groups.
- Mentor perspective ($n=3$)
 - 66.5% with university faculty and 33.5% with graduate student and postdocs.
- Institutional / Program Evaluation perspectives ($n=9$).
 - 37% with institutional staff members running programs and 63% with faculty mentors involved in programs.