New Measures of RCR Mentoring, RCR Department Climate and Graduate Student RCR Preparedness in Psychological Science

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Goals of Project

- Develop and validate measures to assess RCR student socialization and internalization in graduate education for psychological science.

- Administer measures to a large national sample of graduate students in psychology to compare RCR socialization and internalization across a wider range of diverse student, faculty, and departmental characteristics.

Study Rationale

- Need for the development of adequate measures to evaluate educational factors that promote integrity in research (NAS, 1997)
- Research suggests that mentoring and departmental climate are important RCR educational influences.
- There have been several multidisciplinary approaches to RCR training (Swazey & Anderson, 1996). However, measures are needed to empirically evaluate RCR socialization in the social sciences.

RCR Constructs in Need of Measures

RCR Socialization

- RCR Mentoring
  - RCR knowledge transmission
  - RCR positive modeling
- RCR Departmental Climate
  - RCR expectations and resources
  - RCR practices

RCR Internalization

- Student RCR preparedness
- Student attitudes toward the research integrity of the discipline.
- Student RCR competence

Overview

- Phase I: Item Development and Construct Validation
- Phase II: Scale Refinement

Step I: Initial Development of RCR Measures

- 3 distinct scales were developed:
  - RCR mentoring
  - RCR Department climate
  - RCR Graduate student preparedness

- Items were constructed from theoretical and empirical literature include RCR mentoring, departmental and competence from other disciplines and scales designed to evaluate transmission of research competencies in psychology.
- Items and format were refined through evaluation by ethics expert panel and student critique of content and format

Step 2: Validation of RCR Measures

- Newly constructed scales administered to a national sample of doctoral graduate students
- Construct relevant standardized measures were administered for validation.
- Psychometric analyses:
  - Item Analysis
  - Reliability (inter-item)
  - Construct Validity (with standardized measures)
  - Predictive Validity (Multiple Regression)
  - Factor Analysis: To identify subscales

Step 3: Revision of RCR Measures (Phase II)

- Revisions made to original items based on the results of psychometric analyses during Phase I
- Construct 2 additional outcome measures
- Administer revised survey to a second national sample of doctoral graduate students
  - Dropped standardized measures because construct validated
- Analyze and confirm psychometric properties of measures.

Phase I

Scale Development and Construct Validity

Mentoring the Responsible Conduct of Research (MRCR)

- Designed to evaluate mentor's RCR knowledge transmission, modeling, and social support.
- Format adapted from research by Swazey & Anderson (1996), Clark et al. (2000) and Hollingsworth & Fassinger (2002).
- 26 items on a 6-point Likert-type scale
  - **1=Strongly Disagree; 6=Strongly Agree**
- Example Items: "My Mentor…
  - **"Taught me strategies for avoiding plagiarism in my writing"**
  - **"Handled data ownership fairly"**
  - **"Encouraged me to consider ethical issues relevant to my research**

Who is a Mentor?
Scale Instructions to Students

- *"Research Mentor" refers to the faculty member who has/had the primary responsibility for supervising your master's, doctoral or other graduate level independent psychology research.*

- *IF YOU HAVE HAD MORE THAN ONE RESEARCH MENTOR, FOR THIS QUESTION AND FOR ALL THE QUESTIONS THAT FOLLOW, SELECT THE MENTOR YOU BELIEVE HAD THE GREATEST INFLUENCE (POSITIVE OR NEGATIVE) ON YOUR DEVELOPMENT AS A RESEARCHER.*

MRCR Validity Assessment

Advisory Working Alliance Index (AWAI; Schlosser & Gelso, 2001)

- Assesses graduate students' perceptions of working alliance with advisor
- Three dimensions:
  - Rapport
  - Apprenticeship
  - Identification-Individuation
- Examples:
  - "I got the feeling that my mentor did not like me very much"
  - "I do not want to be like my mentor"
  - "My mentor did not encourage my input into our discussions"

RCR Department Climate Index (RCR-DC)

- Assessed presence and availability of RCR courses and materials, and positive and negative RCR faculty modeling.
- Adapted from questions developed by the Arcadia Institute to evaluate the research ethics environment of different disciplinary college programs (Swazey, Anderson, & Louis, 1993; Wright & Klomparens, 1998).
- 18 items on a 6-point Likert-type scale
  - 1=Strongly Disagree; 6=Strongly Agree
- Examples: "In my program…
  - **Faculty members carefully monitor students' work for plagiarism**
  - **Fraduate students are confused about their work roles and responsibilities within the department**
  - **Faculty members do not exploit graduate students**

RCR-DC Validity Assessment

The Research Training Environment Scale–Revised–Short Form (RTES-R-S; Kahn & Miller, 2000)

- Evaluates instructional and interpersonal dimensions of the research training environment
- Good psychometric properties
- Utilized across a geographically diverse range of graduate programs
- Examples:
  - Many of our faculty do not seem to be very interested in doing research
  - There is a sense around here that being on a research team can be fun, as well as intellectually stimulating

RCR Perceived Preparedness Scale (RCR-P)

- Taps the degree to which students feel their graduate training program prepared them to conduct responsible psychological research.
- Adapted from a questionnaire assessing graduate students' knowledge of RCR options available to them (Brown & Kalichman, 1998)
- 23 items on a 6-point Likert-type scale
  - 1=Strongly Disagree; 6=Strongly Agree
- Examples: "At this point in my research career, I feel my graduate training has prepared me to…"
  - **Maintain research records in a manner consistent with APA ethical standards**
  - **Appropriately debrief research participants**

RCR-P Validity Assessment

The Self-Efficacy in Research Measure
(SERM; Kahn & Scott, 1997)

- Self-evaluation of students' confidence in research design, writing, practical and quantitative skills
- Strong psychometric properties
- Examples:
  - Keeping records during a research project
  - Designing an experiment using traditional methods
  - Writing the introduction and literature review for a dissertation

Phase I: Participants

- 201 psychology graduate students enrolled in 13 geographically diverse psychology training programs.
- Students were mentored in the conduct of basic or applied research with human participants at the masters or doctoral level.
- Reflected the gender and ethnic distribution of the field
  - mostly female (71%) and non-Hispanic White (81.1%)

Phase I: Methods

- Participant Recruitment:
  - E-mail announcements, posters and flyers
  - Word-of-mouth
- Survey administration:
  - Online Survey
  - Firewalls to prevent identification of participants' Internet Protocol addresses
- Study approved by the Fordham University IRB

Phase I: Procedure

- Procedures:
  - Logged on to 'researchmentor.org'
  - Completed on-line survey:
    - Basic demographic information
    - Six measures (158 items)
  - Submitted survey
  - Retrieved $30 Barnes & Noble online gift certificate

Phase I: Results Overview

- Overall, all three RCR measures demonstrated:
  - High inter-item reliability
  - Good construct validity
  - Good predictive validity

Phase I: Results

- Item Analysis--Items were kept if they yielded acceptable:
  - Item Discriminability
  - Item Consistency
  - Item Difficulty
- Cronbach alphas for full scales with items that were maintained:
  - MRCR α=.90
  - RCR-DC α=.83
  - RCR-P α=.94

Results: Construct Validity

Correlations between newly constructed instruments and existing research scales:

- MRCR and AWAIS =.73 *
- RCR-DC and RTES-S-R =.65 *
- RCR-P and SERM =.63 *

* $p \leq .001$

Results: Multiple Regression

Do new RCR scales predict RCR Preparedness & Research Efficacy?

- RCR Preparedness:
  - Adjusted R Square = .53 for predictor scales MRCR, RCR-DC and RTES-S-R, and date of doctoral degree
- Research Efficacy:
  - Adjusted R Square = .30% for predictor scales MRCR, RTES-S-R and year of doctoral degree

Results: MRCR Factor Analysis

1. RCR Knowledge Subscale

   Mentor guidance on specific human subject protection procedures (8 items; α =.81)

2. Responsible Scientific Conduct Subscale

   Mentor guidance on RCR activities not tied to subject protections (e.g. appropriate data storage, avoidance of plagiarism)

   (10 items α =.84)

3. RCR Misconduct Subscale

   Instances when the mentor encouraged, permitted or modeled scientific misconduct (8 items; α =.79)

FACTOR ANALYSIS RCR-DC

- RCR-DC Department Expectations and Resources 9 Items $\alpha = .76$

- RCR-DC Faculty & Student RCR Practices 7 Items $\alpha = .70$

Phase II

- Psychometric Evaluation of Subscales
- Construction of 2 new Student Internalization Measures

Phase II: Participants

- 241 psychology graduate and postgraduate students enrolled in 14 geographically diverse psychology training programs
- Students were mentored in the conduct of basic or applied research with human participants at the masters or doctoral level.
- Reflected the gender and ethnic distribution of the field
  - mostly female (77%) and non-Hispanic White (83%)
- Recruitment and methods were similar to Phase 1.

RCR-M

- RCR Mentoring Subscales

RCR-M Knowledge Transmission

Measures extent of research mentor's RCR direct instructions and practical guidance (22 items)

- 6-point Likert-type Scale
  - 1=Extremely Unhelpful; 6 = Extremely Helpful
- "My research mentor gave me helpful training about…:
  - …appropriate informed consent procedures"
  - …avoiding plagiarism in my writing"
  - …preparing an IRB application"
  - …how to protect participant confidentiality"

RCR-M Positive Modeling

Measured extent of research mentor's RCR modeling and supervisory style (22 items)

- 6 point Likert-type Scale
  - 1=Extremely False; 6 = Extremely True
- "My research mentor…:
  - …conducted his/her own research ethically"
  - …monitored the ethical implementation of my informed consent procedures"
  - …initiated ethics discussions"
  - …discussed authorship of publications that might emerge from my research

RCR Departmental Climate Subscales

RCR-DC

RCR-DC Expectation and Resources

Assesses RCR content in departmental courses, course requirements, resources, and procedures. core areas of RCR that students would receive explicit instruction on from their mentor (15 items)

- 6 point Likert-type scale
  - 1=Extremely False; 6 = Extremely True
- "In my graduate psychology department…."
  - … concern for the welfare of research participants is stressed in research courses"
  - … a major consideration is whether a research design protects participants' autonomy"
  - …there is a high level of support for making ethically sound decisions"
  - …students are made aware of specific rules prohibiting research misconduct"

RCR-DC Practices

Assesses RCR positive and negative departmental student and faculty practices (10 items)

- 6 point Likert-type scale
  - 1=Extremely False; 6 = Extremely True
- "In my graduate psychology department…
  - …faculty and students engage in ethically questionable research practices"
  - …research funds are misused"
  - …graduate research assistants are confused about their roles &

Student RCR Preparedness Scale

Assesses degree to which students feel their graduate training program has prepared them to conduct responsible research. (23 items)

- 6 point Likert-type scale
  - 1=Extremely False; 6 = Extremely True
- "At this point in my research career I feel by graduate training has prepared me to…
  - …assign appropriate authorship credit for publications"
  - …know when it is ethically appropriate to disclose a research participant's confidential information"

New RCR Internalization Scales

- Attitudes toward RCR integrity of discipline of psychology
- Familiarity with American Psychological Association Research Related Ethics Code Standards

RCR Expectations:
Student Attitudes toward the Research Integrity of the Discipline

Assesses influence of graduate training on student expectations for the responsible conduct of research in the field of psychology (12 items)

- 6 point Likert-type scale
  - 1=Extremely False; 6 = Extremely True
- "Based on my psychology graduate research training, I believe…
  - …there are adequate safeguards to ensure psychologists engage in ethical research practices"
  - …conducting research ethically is valued in the field of psychology"

Student APA Ethics Code Competence Scale

Measures familiarity with specific APA Ethical Standards related to research (23 items)

- True-False Items
- Examples:
  - Studies judged to present no more than minimal risk are exempt from IRB review.
  - The APA Ethics Code permits researchers to disclose confidential information to protect individuals who are not research participants
  - Deception in research is permissible if any emotional distress that is severe can be remediated during debriefing

Phase II Results

Item analyses, factor analyses and inter-item reliabilities confirmed the psychometric validity of 7 scales:

Scale	# Items	α
RCR Mentoring		
➢ RCR Knowledge Transmission	22	.95
➢ RCR Positive Mentoring	22	.93
RCR Departmental Climate		
➢ RCR Expectations and Resources	15	.91
➢ RCR Practices	13	.86
RCR Internalization		
➢ Student RCR preparedness	23	.95
➢ Student RCR Expectations	12	.89
➢ Student Ethics Code competence	23	.95

Correlations of RCR-Socialization Scales with RCR Internalization Scales

	MRCR-Knowledge Transmission	MRCR-Positive Modeling	RCR-DC Expectations & Resources	RCR-DC Faculty & Student Practices
RCR-Preparedness	.55	.54	.64	-.47
RCR-Attitudes toward Discipline	.36	.37	.65	-.56

All correlations significant at $p < .001$

Ethics Code Knowledge Scale

- No correlation with subscales
- APA Ethics Code not memorized by mentors, and thus students are not required to memorize ethical standards.
- The salience of different APA Ethics Code research standards differ depending on
  - Research Population
  - Research Methods
  - Research Setting

Do RCR-M and RCR-DC Scales Predict Student Preparedness?

Multiple Regression

- Adjusted R Square = .98 $p < .001$
- Significant Beta Scores

✓ RCR-DC Expectations & Resources *B = .638* ($p < .001$)

✓ MRCR-Knowledge Transmission *B* = .258 ($p = .001$)

✓ RCR-DC Faculty & Student Practices *B* = .042 ($p = .036$)

Do RCR-M and RCR-DC Scales Predict Student Attitudes Toward the RCR Integrity of Psychological Science?

Multiple Regression

- Adjusted R Square = .99 $p < .001$

- Significant Beta Scores
  - ✓ RCR-DC Expectations & Resources *B = .781* ($p < .001$)
  - ✓ RCR-DC Faculty & Student Practices *B* = .084 ($p < .001$)

Discussion

- Validation of New RCR Instruments for Psychological Science
- Next Steps

RCR Student Internalization Scales

- Student RCR Preparedness RCR-P

  Measures the degree to which students feel their graduate training program has prepared them to conduct responsible research.

- Student RCR attitudes RCR-A

  Measures the influence of graduate training on students' views on the responsible conduct of research ethics in the field of psychology.

Both scales have excellent inter-item reliability and construct validity

Mentoring the Responsible Conduct of Research [MRCR]

- MRCR Knowledge Transmission
  Measures extent of research mentor's RCR direct instructions and practical guidance

- MRCR Positive Modeling
  Measures extent of research mentor's RCR modeling and supervisory style

Both scales have high inter-item reliabilities and significantly associated with student RCR preparedness and attitudes toward discipline

MRCR-Knowledge Transmission yields significant Beta weights when RCR Departmental Climate Scales are included in predicting RCR preparedness

Future questions: Does departmental climate mediate or moderate RCR mentoring influences on students' attitudes toward the RCR integrity of the discipline of psychology?

RCR Department Climate Scales

- RCR-DC Expectations & Resources

  Assesses RCR content in departmental courses, course requirements, resources, and procedures. core areas of RCR that students would receive explicit instruction on from their mentor

- RCR-DC Practices

  Assesses RCR positive and negative departmental student and faculty practices

Both scales have high inter-item reliabilities and are significantly associated with student RCR preparedness and attitudes toward discipline

Both scales yield significant Beta weights when RCR Mentoring scales are included in predicting RCR preparedness and RCR attitudes

Future Directions

- Validate a test of RCR Competence based more on socialization of RCR values and decision-making than on familiarity with specific standards in the APA Ethics Code

Adaptation of Social Science Research Ethics Decision-making from:

"Validation of ethical decision-making measures:
Evidence for a new set of measures"

Authors: Michael D. Mumford, Lynn D. Devenport, Ryan P. Brown, Shane Connelly, Stephen T. Murphy, Jason H. Hill, and Alison L. Antes

Final Phase

- Apply validated scales to a large national sample of graduate students to evaluate the multi-level effects of RCR mentoring, RCR graduate program ethical climate, and student characteristics on RCR preparedness, attitudes toward the RCR integrity of the discipline, and RCR ethics decision-making.

For Copies of Scales Contact

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