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Graduate Socialization in the Responsible Conduct of Research: A National Survey on the Research Ethics Training Experiences of Psychology Doctoral Students

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Little is known about the mechanisms by which psychology graduate programs transmit responsible conduct of research (RCR) values. A national sample of 968 current students and recent graduates of mission-diverse doctoral psychology programs completed a Web-based survey on their research ethics challenges, perceptions of RCR mentoring and department climate, whether they were prepared to conduct research responsibly, and whether they believed psychology as a discipline promotes scientific integrity. Research experience, mentor RCR instruction and modeling, and department RCR policies predicted student RCR preparedness. Mentor RCR instruction, department RCR policies, and faculty modeling of RCR behaviors predicted confidence in the RCR integrity of the discipline. Implications for training are discussed.

Keywords: ethics, research, responsible conduct of research, mentoring, department, climate, graduate education, psychology

Graduate programs are the primary training ground for socializing each new generation of psychologists in the values and ethical practices guiding the responsible conduct of research (RCR). Through departmental policies, mentoring, and student involvement in research, graduate education in psychology creates the climate in which research integrity flourishes or flounders (Fisher, Wertz, & Goodman, 2009). Psychology has over 5 decades of history promoting the responsible conduct of research through the American Psychological Association's (APA's) Ethical Principles and Code of Conduct (APA, 2002; Canter, Bennett, Jones, & Nagy, 1994; Fisher, 2009; Hobbs, 1948; Sales & Folkman, 2000; Smith, 1976) and ethics scholarship influencing moral debate within the field and throughout the social sciences (e.g., Baumrind, 1964; McGaha & Korn, 1995; Melton, Koocher, & Saks, 1983; Milgram, 1963). Although ethics complaints against psychological scientists are infrequent (APA, Ethics Committee, 2004, 2005, 2006, 2007, 2008), like other disciplines, psychology has not escaped highly publicized cases of scientific misconduct (Ernhart, Scarr, & Geneson, 1993; Needleman, 1993; Salter, 1998; Sprague, 1993). Violations of research ethics regulations and professional standards, whether born of lack of awareness or understanding of RCR requirements or of malicious intent, undermine the overall integrity of the research enterprise (Eisen & Berry, 2002; Steneck, 2001). In recent years, increased public aware-

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ness of the effect of basic science and clinical trials on public health policy and health services along with some highly publicized cases involving charges of scientific misconduct (Commission on Research Integrity, 1995; Eisen & Berry, 2002; NAS, 2002) have led the Department of Health and Human Services to increase requirements for RCR training of investigators conducting federally funded research (Public Health Service, 2000, 2001) and prompted the Office of Research Integrity to provide guidelines on specific RCR core instructional areas. The current APA Ethics Code (APA, 2002) includes ethical standards corresponding to each of these RCR core areas, including data management, human participant and animal subject protections, publication practices and responsible authorship, peer review, and conflicts of interest. As vital as the commitment to research ethics continues to be within the field of psychology, however, little is known about how graduate programs transmit this commitment to students.

ETHICS COURSES AND RESEARCH EXPERIENCES

Graduate psychology programs differ in mission, curricula, and the degree to which students are encouraged to consider research as a career goal and these differences may influence the extent of student socialization in the responsible conduct of research. For example, to satisfy APA program accreditation requirements, students in clinical, counseling, and school psychology programs uniformly receive some type of formal ethics education, whereas ethical topics are often informally included within specific courses or through research apprenticeships in psychology programs devoted exclusively to research. Of interest, Brown and Kalichman (1998) found that attending courses on research ethics and case discussions increased student's sense of RCR preparedness but did not significantly alter perceptions of their own standards.

Different research designs and participant populations may also influence the extent and type of student exposure to research ethics challenges. At present, however, we know little about the type of research and ethics-in-science challenges associated with graduate student research and how these might relate to students' RCR self-efficacy and attitudes toward the integrity of the field. For example, students working with economically disadvantaged populations may gain more experience in deciding on fair, noncoercive incentives for research particpants, whereas those conducting deception studies will need to sharply focus on debriefing procedures. Students conducting research involving children or adults with impaired cognitive capacities may need to have more frequent discussions about developing and implementing appropriate informed consent procedures, whereas those conducting intervention and prevention research with high-risk populations may face more frequent challenges regarding confidentiality and disclosure. Students involved in commercially sponsored research programs are more likely to need information on ethical guidelines on conflicts of interest.

DEPARTMENT RESEARCH ETHICS CLIMATE

Empirical studies of students in counseling psychology programs have consistently demonstrated that departments that communicate support for research are more likely to have graduate students with positive attitudes toward research and research self-efficacy (Gelso, Mallinckrodt, & Judge, 1996; Kahn, 2001; Kahn & Scott, 1997). Similar findings are beginning to emerge in studies of

RCR departmental climate in psychology and other science programs (Anderson, Louis, & Earle, 1994; Fisher, Fried, Goodman, & Kubo-Germano, 2009; NAS, 2002). RCR department climate can affect student attitudes explicitly and implicitly. Explicit aspects of the RCR department climate include formal policies on research misconduct, efforts to make department and other relevant codes of scientific conduct known to students, the ease with which students can seek assistance in working with Institutional Review Boards (IRBs), and departmental support in resolving ethical conflicts among students and faculty. Implicit department RCR characteristics include prevailing department norms and the relative weight in career advancement given research ethics versus research productivity, adherence to or casual disregard for standards of research conduct, and the modeling of concern for the rights and welfare of research participants.

MENTORING THE RESPONSIBLE CONDUCT OF RESEARCH

The Council of Graduate Schools (1991) adopted a definition of mentors as people with career experience willing to share their knowledge and provide feedback on protégé performance, give emotional and moral encouragement, provide career opportunities, and model what an academic should be. In psychology, mentors have been described as available and invested, altruistic, ethical, and intentional role models who provide knowledge and advice to support the mentee's pursuit of becoming a full member of the profession (Clark, Harden, & Johnson, 2000; Gilbert, 1985; Kitchener, 1992; Wilson & Johnson, 2001). Mentors can socialize students in the responsible conduct of research explicitly through direct instruction and implicitly through modeling and student observation of behaviors (Fisher et al., 2009; Johnson & Nelson, 1999; Swazey & Anderson, 1996). Explicit RCR mentoring includes direct instruction and guidance in becoming familiar with and adhering to research relevant federal regulations and APA Ethics Code standards and procedures that best protect the rights and welfare of research participants. Implicit RCR mentoring socializes students through observation of mentors' behaviors indicating a valuing or devaluing of the aspirational principles and ethical standards of scientific psychology. Stern and Elliot (1997) argued that modeling of responsible conduct in research, if effective, only teaches students what to do but not why they are doing it. Thus both explicit and implicit mentoring is important if students are to understand both the "why's" and "how's" of RCR (Eisen & Berry, 2002).

RCR PREPAREDNESS AND CONFIDENCE IN THE RCR INTEGRITY OF THE FIELD

Recent empirical work on the qualities of graduate education that influence student interest in and their sense of competence to conduct independent research (Gelso, 1993; Hollingsworth & Fassinger, 2002) provide a blueprint for examining their socialization into the responsible conduct of psychological research. For example, research self-efficacy, defined as students' beliefs about their ability to carry out and complete research relevant tasks (Bishop & Bieschke, 1998) has been found to be associated with the number of years and the positive nature of student research experiences, curriculum emphasis on research design, program support for faculty and student research, and the quality of faculty mentoring (Betz, 1997; Bieschke, Bishop, & Garcia, 1996; Gelso et al., 1996; Hill, 1997; Kahn, 2001; Kahn & Scott, 1997; Love, Bahner, Jones, &

Nilsson, 2007). We might expect similar relationships among RCR preparedness and research experience, RCR departmental climate and RCR mentoring. The few studies on RCR preparedness across disciplines suggest that research ethics training lags behind students' valuing of these skills (Brown & Kalichman, 1998; Meyers, Reid, & Quina, 1998). It is similarly intuitive that the RCR values explicitly communicated to students through formal departmental policies and direct mentor instruction as well as those implicitly communicated through faculty and mentor behaviors would promote expectations that all members of the discipline are obligated to act in similar ways (Eisen & Berry, 2002; Fisher, 2009; NAS, 2002)

GENDER AND ETHNICITY

Little is known about the influence of gender and ethnicity on students' graduate research ethics experiences, impressions of RCR mentoring and department climate, their sense of RCR self-efficacy, or confidence in the research integrity of the discipline. For example, although women now make up the majority of psychology graduate students, most faculty members, particularly senior faculty, are men (Cohen & Gutek, 1991; Cronan-Hillix, Gensheimer, Cronan-Hillix, & Davidson, 1986; Pion et al, 1996). Similarly, although the number of ethnic minority students in psychology has increased (Pion, 1996) the numbers are still very small (APA, 2008; Atkinson, Casas, & Neville, 1994). Some have reported that women and minority students typically have less access to mentoring and that good mentoring may help them gain advantages more frequently afforded to members of majority groups (Bogat & Redner, 1985; Cohen & Gutek, 1991; Gilbert & Rossman, 1992; Wilson & Johnson, 2001). Others have reported that women in academic settings are just as frequently mentored and just as satisfied with their mentorship as their male colleagues (Clark et al., 2000; Fried et al., 1996), that ethnic minority students report greater satisfaction with their mentors than White counterparts (Mintz, Bartels, & Rideout, 1995), and that male and female mentors do not differ in providing for their protégés' career and psychosocial needs (Clark et al., 2000; Hollingsworth & Fassinger, 2002; Nelson & Holloway, 1990).

THE CURRENT STUDY

The goal of the current study is to provide a national snapshot of how research experiences, mentoring, and departmental climate contributes to psychology graduate students' sense of RCR self-efficacy and their confidence in the integrity of the discipline of psychology. Five research questions guided our work:

1. What types of research designs and research populations characterize graduate psychology students research experiences and how is this related to their familiarity with research ethics practices and ethical challenges?
2. How do current and recent graduate students in psychology perceive the qualities of their RCR departmental climate and RCR mentored experiences?
3. To what extent do students believe their graduate experiences have prepared them for independently implementing RCR practices in their own research and how is this re-

lated to their research experiences, course instruction, RCR departmental climate and RCR mentoring.

4. To what extent do students have confidence in the RCR integrity of the discipline of psychology and how is that related to course instruction, RCR departmental climate and RCR mentoring?
5. Does student and faculty gender and ethnicity or program mission affect the perceived quality of RCR training, RCR preparedness and confidence in field integrity?

GENERAL METHOD

Participants

Participants (*M* age = 28, range = 18–64) represented a national sample of 968 (20% response rate; 71% female, 80% non-Hispanic White) current students or recent graduates (2002–2006) of geographically and mission-diverse doctoral programs in psychology in the United States.[1] The overrepresentation of females and non-Hispanic White students parallel those reported in the field (Hoffer et al., 2006). Detailed data on student and program characteristics are presented in Tables 1 and 2 in the Results section.

Procedures

Participants were recruited through announcements in APA and the Association for Psychological Science newsletters and e-mail blasts to approximately 4,800 students whose e-mail addresses were listed in association directories. To obtain a representative sample of ethnic-minority students we oversampled from APA Division 45, Society for the Psychological Study of Ethnic Minority Issues, and contacted graduate psychology programs at schools identified as Historically Black Colleges and Universities. Because nationally a greater proportion of psychology students are in scientist/practitioner or practitioner programs, efforts were also made to oversample students in basic and applied research programs through outreach to department chairs and program directors resulting in approximately equal numbers of respondents from basic/applied research (48%) and scientist practitioner (46%) programs. Similar efforts to recruit students in industrial-organizational and psychometrics programs were not as successful (see Table 2).

The announcements directed students to a Web site describing the study. To be included, respondents had to have conducted or engaged in conducting graduate faculty mentored research involving human participants. To protect anonymity, the Web site was constructed with a firewall made up of an integrated collection of security measures that prevented anyone (including the investigators) from identifying participants' Internet Protocol addresses. The study was approved by the university IRB. Students viewed the informed consent information on the home page of the Web site prior to beginning the survey, and students could withdraw at any time prior to submit-

[1]Four percent (39 students) indicated they had participated in a previous study conducted by the authors (for instrument refinement and validation purposes) using versions of these instruments. There were no significant differences on any of the RCR measures between those who participated in a previous phase and those who did not.

ting the completed survey. Students received an electronic $30 Barnes & Noble gift certificate for completing the survey.

Measures

Demographic questionnaire. The survey began with demographic questions on student, department, and mentor characteristics (see Tables 1 and 2). In all parts of the survey, research mentor was defined as "the faculty member who has/had the primary responsibility for supervising your master's, doctoral, or other graduate-level independent psychology research" and, in the event a student has had multiple mentors throughout graduate school, students were instructed to select the mentor with "the greatest influence (positive or negative) on your development as a researcher." The first part of the survey also asked specific questions regarding student overall satisfaction with RCR mentoring and department climate, whether students had taken an ethics course, the number of years they had worked with their mentor, publication record and questions about the research design, population, and ethical procedures and challenges associated with students' mentored research (see Tables 2 and 3).

The Responsible Conduct of Research–Department Climate (RCR–DC) scales (Fisher et al., 2009). The RCR–DC consists of two subscales, both measured on a 6-point Likert-type scale from 1 (*extremely false*) to 6 (*extremely true*) that have been found to have good interitem reliability and construct validity as assessed by significant correlations with the Research Training Environment Scale–Revised, Short Form (Kahn & Miller, 2000). The RCR Department Climate–Policy subscale (RCR–DC–PY) begins with the stem, "In my graduate psychology program … ." Students respond to 15 items measuring explicit RCR departmental policies such as, "There is a clear policy for handling research ethics complaints," "Adherence to research ethics is carefully monitored," and "Concern for the welfare of research participants is stressed in courses." The RCR Department Climate–Practices subscale (RCR–DC–PR) consists of nine items tapping implicit RCR climate through perceived departmental acceptance of student and faculty research misconduct, including, "Graduate research assistants are confused about their roles and responsibilities," "Research productivity that violates ethical standards is rewarded," and "Research funds are misused." Interrater reliability for both subscales in the present sample was $\alpha = .91$ and $\alpha = .84$, respectively. Both the RCR–DC–PY and RCR–DC–PR were significantly correlated with student overall satisfaction with their department ($r = .39$ and $-.33$, respectively, $p < .001$) and with overall satisfaction with the RCR department climate ($r = .54$ and $-.37$, respectively, $p < .001$).

Mentoring the Responsible Conduct of Research (MRCR) scales (Fisher et al., 2009). The MRCR instrument consists of two subscales found to have good interitem reliability and construct validity (significant correlations with the Advisory Working Alliance Index–Student Version; Schlosser & Gelso, 2001). The MRCR–Instruction subscale (MRCR–I) begins with the stem, "My research mentor gave me helpful training about …" and using a 6-point Likert-type scale from 1 (*extremely unhelpful*) to 6 (*extremely helpful*) measures the extent to which mentors provided explicit instruction and practical guidance in 19 RCR areas including informed consent, confidentiality protections, appropriate storage and collection data, and fair and noncoercive payment incentives. The MRCR–Modeling subscale (MRCR–M) consists of ten 6-point Likert type items from 1 (*extremely false*) to 6 (*extremely true*) assessing the mentor's implicit modeling of

RCR behaviors and supervisory style including, "conducted his/her own research ethically," "was available to discuss questions about research ethics," and "discussed authorship of publications that might emerge from my research." Interrater reliability for both subscales in the present sample was $\alpha = .95$ and $\alpha = .93$, respectively. Both the MRCR–I and MRCR–M were significantly correlated with student overall satisfaction with RCR mentoring ($r = .62$ and .66, respectively, $p < .001$).

The Responsible Conduct of Research–Student Preparedness (RCR-P; Fisher et al., 2009). The RCR–P measures the degree to which current and recently graduated students from psychology doctoral programs feel they are prepared to implement ethical procedures in their research activities and has good interitem reliability and construct validity (significant correlations with the Self-Efficacy in Research Measure; Kahn & Scott, 1997). This 23-item, 6-point Likert-type scale from 1 (*extremely false*) to 6 (*extremely true*) begins with the stem, "At this point in my research career, I feel my graduate training has prepared me to …" and includes items such as, "Assign appropriate authorship credit for publications," "Know when it is ethically appropriate to disclose a research participant's confidential information," and "Identify financial or personal conflicts of interests that could bias my research." Reliability for the RCR–P in the current study was $\alpha = .95$.

The Responsible Conduct of Research–Field Integrity Scale (RCR–I) (Fisher et al, 2009). The RCR–I measures the degree to which students' graduate training has influenced their views of RCR practices in the discipline of psychology. This 12-item measure scored on a 6-point Likert-type scale from 1 (*extremely dissatisfied*) to 6 (*extremely satisfied*) begins with the stem "Based on my psychology graduate training, I believe …" and includes statements such as, "Research that was conducted unethically is not accepted for publication in psychology journals," "Psychology graduate students receive adequate training in research ethics," "The public can trust psychologists not to fabricate data," and "Conducting research ethically is the norm in psychology." Reliability for the RCR–P in the current study was $\alpha = .89$.

Confirmatory factor analysis. In their development of the RCR scales, Fisher et al. (2009) conducted exploratory factor analyses on the responses of two independent samples of current and recent graduate students from doctoral programs in psychology comparable in gender, ethnicity, and program mission to the current sample. To verify the factor structure reported by the authors, a confirmatory factor analysis was conducted on the responses of the current sample to the four RCR scales using AMOS 7.0 (Arbuckle, 2006). As recommended by Hu and Bentler (1999), several indices were used to assess model fit: The comparative fit index (CFI), the global fit index (GFI), root mean square error of approximation (RMSEA), and the root mean square residual (RMSR) were also calculated. In general, all measures indicated adequate to good model fit. For the MRCR scales, the GFI and CFI ranged from .82 to .88 and the RMSR and RMSEA were approximately .08. The Department Climate scales exhibited similar model fit, with the GFI and CFI ranging from .83 to .88, the RMSR equaling .07, and the RMSEA at .08. The RCR–P also exhibited adequate to good model fit, with GFI and CFI ranging from .85 to .88, RMSR equaling .05, and the RMSEA value at .08. Finally, the RCR-I Scale also had acceptable to good index values (GFI = .91, CFI = .90, RMSR = .04, RMSEA = .10).

RESULTS

General Student, Program, and Mentor Characteristics

Student characteristics. As illustrated in Table 1, the majority of students were female, non-Hispanic White, between the ages of 18 and 29 (M = 28 years, SD = 5.34, range = 18–64) working toward a Ph.D. degree, and currently conducting their master's or doctoral research. More than half of all participants (59%) indicated that they had been enrolled in their doctoral program for 3 years or more. Overall, students in this sample were highly experienced and interested in research. Most reported they had experience as a graduate research assistant, had collaborated with their mentor on at least one publication, and presented at least one paper at a professional meeting, and 42% and 34% indicated research was their primary or secondary career goal, respectively. As expected, the number of years in graduate school was positively correlated with number of coauthored publications (r = .34, $p < .001$) and presentations (r = .29, $p < .001$). Although we recognize the serious conceptual limitations of grouping individuals from different self-identified ethnocultural groups together (Trimble & Fisher, 2006), the sample sizes of each individual ethnocultural group of both students and faculty were too small for statistical comparisons. We therefore collapsed the different ethnocultural categories into an "ethnic minority" student or faculty category to highlight potential differences in RCR research relevant experiences when warranted and to reflect the fact that within graduate programs in psychology non-Hispanic White students and faculty remain a majority (Hoffer et al., 2006).

Program characteristics. As illustrated in Table 2, the highest concentration of students was enrolled in Clinical followed by Social, Developmental, Cognitive, and Counseling programs. Programs were situated throughout the four major regions of the United States and within urban, suburban, and rural locations. The majority of students attended graduate programs that admitted 10 or fewer students a year, had 20 or fewer faculty, and departments that offered four or more graduate programs.

The sample was equally split between students enrolled in programs whose training mission was described as scientist-practitioner and basic/applied research with fewer than 7% describing their program training missions as practitioner, industrial-organizational, or psychometrics. Given these percentages, subsequent analyses specifically focused on program mission included only comparisons between basic/applied research and scientist-practitioner programs. Slightly more men (29%) than women (21%) were enrolled in basic/applied research programs and more female (79%) than male (71%) students in scientist-practitioner programs, $\chi^2(1, N = 908) = 7.54$, $p < .005$. Significantly more students in basic/applied research (61%) compared to scientist-practitioner programs (29%) indicated research was their primary career goal, $\chi^2(3, N = 901) = 235.90$, $p < .001$. There were no significant differences between students from scientist-practitioner and basic-applied research programs in the status of their master's or doctoral research, number of publications or presentations, selecting research as a secondary career goal (36% and 35%, respectively), or whether they had worked as a graduate research assistant.

Sixty percent of students reported that their programs had a required course that included research ethics. Significantly more scientist-practitioner programs (78%) required a course involving research ethics than basic/applied research (41%) programs, $\chi^2(2, N = 908) = 128.60$, $p < .001$, and not surprisingly, students in scientist-practitioner (82%) were more likely than students in basic/applied research (50%) programs to have completed such a course, $\chi^2(1, N = 908) = 100.50$, $p < .001$.

TABLE 1
Student Characteristics

Student Characteristics	*No. of Respondents*	*% of All Respondents*
Gender		
Female	717	74
Male	251	26
Age*		
18–29	712	74
30–39	212	22
40–49	29	3
50–59	9	1
60+	1	< 1
Ethnicity		
American Indian/Alaska Native	1	< 1
African American/Black	34	4
East Asian	48	5
Hispanic/Latino	47	5
Native Hawaiian/Pacific Islander	2	< 1
Non-Hispanic White	776	80
Southeast Asian	14	1
Biracial	29	3
Degree program		
Ph.D.	912	94
Psy.D.	54	6
Ed.D.	2	< 1
Student status		
Not yet begun master's	16	1
MA in process	319	33
Ph.D. in process	471	49
Ph.D. completed	162	17
Graduate research assistant	827	85
Primary & secondary career goal		
Research	412	42
Teaching	241	25
Professional practice	279	29
Industrial/Organizational	37	4
Student Publications		
None	248	26
One	202	21
Two	190	20
Three	104	10
Four or more	224	23
Student presentations		
None	95	10
One	91	10
Two	97	10
Three	102	10
Four or more	583	60
Completed a course involving research ethics	653	68
Basic or applied research	230	50
Scientist-practitioner	368	81
Practitioner	43	96
Psychometrics	2	67
Industrial/Organizational	10	83

Note. $N = 968$.

TABLE 2
Department and Mentor Characteristics

Characteristics	*No. of Respondents*	*% of All Respondents*
Department characteristics		
Completed a class that included research ethics	576	60
Program		
Clinical psychology	340	35
Social	197	21
Developmental	97	10
Cognitive psychology	78	8
Counseling psychology	46	5
School related	36	4
Consulting/IO	30	3
Experimental–physiological	28	3
Neuropsychology	20	2
Community psychology	18	2
Legal psychology	11	1
Health	10	1
Human factors	6	1
Evaluation	4	< 1
Other	47	5
Geographic region		
West (Pacific & Mountain states)	224	23
Midwest (Midwest/Central states)	279	29
Northeast	178	18
South	287	30
No. of faculty in graduate program		
≤ 20	736	76
> 20	232	24
No. of students in graduate program		
1–10	699	72
11–20	167	17
21 or more	102	11
No. of grad programs		
1–3 programs	446	46
4–6 programs	450	47
More than 7	72	7
Training mission		
Basic or applied research	458	48
Scientist–practitioner	450	46
Practitioner	45	5
Psychometrics	3	< 1
I/O	12	1
Required course involving research ethics	581	60
Basic or applied research	187	41
Scientist-practitioner	350	78
Practitioner	36	80
Psychometrics	0	0
I/O	8	67
Mentor characteristics		

(continued)

TABLE 2 (*Continued*)

Characteristics	*No. of Respondents*	*% of All Respondents*
Gender		
Female	428	44
Male	540	56
Ethnicity		
American Indian/Alaska Native	2	<1
Black	22	2
East Asian/Southeast Asian	27	3
South Asian	8	1
Hispanic/Latino	31	3
Native Hawaiian/Pacific Islander	6	1
Non-Hispanic White	843	87
Biracial	13	1
Other/Unknown	16	2
Years working with mentor		
1–2 years	338	35
3–4 years	372	38
4 or more years	258	27

Note. I/O = Industrial/Organizational.

Mentor characteristics. As illustrated in Table 2, 56% of mentors were reported to be male and 87% non-Hispanic White. Female students (48%) were more likely than male students (33%) to have a female mentor, $\chi^2(1, N = 968) = 14.72$, $p < .001$. Students self-identified as ethnic minority (27%) were more likely than non-Hispanic White students (8%) to be mentored by ethnic-minority faculty, $\chi^2(1, N = 968) = 48.60$, $p < .001$. Preliminary analyses on RCR scale scores yielded no significant effects of student-mentor pairings by ethnicity or gender. The mean number of years working with their mentor was 3.44 years ($SD = 1.76$). Of those students working on their dissertation, 48% reported their dissertation mentor also mentored their master's or other graduate-level research.

Student-Mentored Research

Methodologies and populations. As illustrated in Table 3, the majority of students were working on mentored research that entailed nonintervention designs (89%), with non-Hispanic White (72%), middle-class (75%) populations who did not have identified mental or physical disorders (72%). Students self-identified as ethnic-minority (49%) were more likely than non-Hispanic White students (24%) to conduct research with populations consisting of 50% or more ethnic minority participants, $\chi^2(1, N = 968) = 38.15$, $p < .001$; similarly, ethnic minority faculty (49%) were more likely than nonminority faculty (26%) to be mentoring student research involving at least 50% ethnic minority participants, $\chi^2(1, N = 968) = 23.93$, $p < .001$.

Significantly more intervention research was reported by students in scientist-practitioner (15%) compared to basic/applied research (6%) programs, $\chi^2(1, N = 968) = 20.95$, $p < .001$, and for research involving populations with physical or mental disorders (24% vs. 7%), $\chi^2(1, N = 908) = 55.63$, $p < .001$. No differences were found for research designs by participant ethnicity or economic status. However, when research included 50% or more ethnic minority participants the samples were six times more likely to be economically disadvantaged than samples with nonminority participants, $\chi^2(1, N = 968) = 266.6$,

$p < .001$. Ethnic minority research populations were also more likely to have identified mental or physical disorders (36% vs. 26% of studies involving health disorders), $\chi^2(1, N = 944) = 10.73$, $p < .001$.

RCR Procedures and Challenges

RCR procedures. As illustrated in Table 3, almost all students reported submitting their research for IRB review. Less than one third of student research involved obtaining guardian permis-

TABLE 3
Student Research Interest and Nature of Mentored Research

	No. of Respondents	*% of All Respondents*
Research design		
Intervention	109	11
Non-intervention/Correlational	399	41
Non-intervention/Experimental	402	42
Other	58	6
Participants: minority		
25 or less	675	72
50 or more	269	28
Participants: Economically disadvantaged		
25 or less	721	75
50 or more	247	25
Participants' health status		
Healthy/No identified disorder	700	72
At risk for or diagnosed with physical or mental health disorder	171	18
Balanced health and at risk or diagnosed	97	10
Chance of harm to participant if confidential Information disclosed		
Not likely	691	71
Somewhat likely	212	22
Very likely	65	7
Greater than minimal risk to participants	34	4
Applied for a Certificate of Confidentiality	175	18
Obtained guardian permission	279	29
Ethical challenges[a]		
Participant recruitment	334	5
Informed consent	253	26
Confidentiality	251	26
Participant compensation	170	18
Debriefing	153	16
Adverse participant reactions	140	15
Dissemination	88	9
Participant risk	83	9
Risk to family or community	20	2
Other	158	16

[a] $M = 1.70$, mode = 1.00.

sion. Guardian permission was more likely to be obtained for intervention (39%) compared to nonintervention (28%) studies, $\chi^2(1, N = 968) = 5.64$, $p < .02$. The majority of students offered participants some type of compensation, with percentages higher for nonintervention (79%) than intervention (62%) research, $\chi^2(1, N = 15.50) = 15.50$, $p < .001$. Eighteen percent of students applied for a Public Health Service Certificate of Confidentiality, although 36% checked "I don't know" for this question. Approximately one in five students were conducting research that included deception, the majority in nonintervention (22%) compared with intervention (7%) studies, $\chi^2(1, N = 968) = 12.99$, $p < .001$. Half of all deception studies were conducted by students in social psychology programs.

RCR challenges. Almost all students described their research as minimal risk. We asked students to indicate how many of nine specific ethical procedures they encountered during their research. All but one reported at least one ethical challenge. The total number of ethical challenges a student reported was not significantly related to the status of their research or whether a student had completed a course that included research ethics. The most common challenges were participant recruitment, confidentiality, and informed consent. With respect to confidentiality concerns, one third believed that it was somewhat (23%) or very likely (7%) that participants might be harmed if confidential research information was disclosed. The greater the harm from disclosures, the more likely students were to report that they had obtained a Certificate of Confidentiality, $\chi^2(2, N = 968) = 31.46$, $p < .001$, or found confidentiality or informed consent to be an ethical challenge for their research, $\chi^2(4, N = 968) = 27.25$, $p < .001$; $\chi^2(2) = 6.28$, $p < .05$, respectively. About one in four students indicated informed consent presented a challenge during their research especially for students who needed to obtain guardian consent, $\chi^2(1, N = 968) = 20.57$, $p < .001$, or whose population was economically disadvantaged, $\chi^2(1, N = 968) = 12.95$, $p < .001$.

RCR Department Climate

RCR departmental policy. The mean score on the RCR–DC–PY was 4.83 ($SD = .80$, range = 1–6, with 4 as *somewhat true* and 5 as *mostly true*) indicating that in general participants felt their department had adequate RCR policies. Fourteen percent had subscale scores below 4, suggesting a need for improvement in RCR departmental policies. Perusal of individual items suggests that departments were most likely to have policies conveying that all students and faculty must comply with the APA Ethics Code (98%) and least likely to have written policies on how to avoid research related conflicts of interest (75%). Although students in scientist-practitioner ($M = 4.90$) and basic/applied research programs ($M = 4.74$) differed somewhat on ratings for RCR departmental policies, $F(1, 906) = 9.27$, $p = .002$, the partial eta-square did not exceed .01, indicating program mission accounted for less than 1% of the overall (effect + error) variance.

RCR departmental practices. The majority of students believed their departments did not encourage or condone the unethical conduct of research by students or faculty ($M = 1.88$, $SD = .89$, range = 1–6, where scores of 1–3 departmental acceptance of unethical conduct was extremely to somewhat false). One out of every 10 students had overall mean scores over 3, suggesting that acceptance of unethical behaviors was at least "somewhat true" in their department. Perusal of individual items suggests that the majority of students believe that research productivity that violates ethical standards will not be rewarded in their department (93%). Although most students believed their departments adequately supervised research assistants, 26% endorsed the statement describing research assistants as confused about their roles and responsibilities.

Multivariate analyses yielded significant differences for RCR–DC–PR scores (where higher scores indicated poorer practices) for basic/applied versus science-practitioner mission ($M = 1.95$ vs. 1.80), $F(1, 906) = 7.0$, $p < .01$; male versus female students ($M = 1.97$ vs. 1.84), $F(1, 966) = 4.04$, $p < .05$; and ethnic minority versus non-Hispanic White ($M = 2.03$ vs. 1.84), $F(1, 966) = 9.56$, $p < .05$. However, for all these analyses the partial eta-square did not exceed .01, indicating these variables accounted for less than 1% of the overall (effect + error) variance.

Correlations. Given the large number of demographic variables and large sample size, we used a conservative estimate of significance $p < .002$. As indicated in Table 4, students who had completed an ethics course were significantly more likely to report departmental RCR policies and less likely to report department support for unethical supervisory or research behaviors. Not surprisingly, students who reported more unacceptable departmental student and faculty practices were more likely to have encountered more ethical challenges in their mentored research. Unexpectedly, the more time the student reported being enrolled in the doctoral program and the more years spent with their mentor, the lower they rated overall RCR departmental faculty practices.

RCR Mentoring

RCR mentoring instruction. In general, participants were positive about the training their mentor provided in the responsible conduct of research. The mean score on the MRCR–I was 4.60 ($SD = .93$, range = 1–6), with a score of 4 indicating mentors were somewhat helpful and 5 as mostly helpful in providing direct instruction about RCR practices. About one in five (21%) had mean scores below 4, indicating that their mentors were extremely to somewhat unhelpful. A perusal of responses to individual items suggests that mentors were most likely to provide specific guidance on prohibitions against data fabrication (89%) and least likely to provide specific direction on how to avoid personal or financial conflicts of interest that might bias data collection.

TABLE 4
Correlations

	RCR–P	*RCR–I*	*RCR–DC–PY*	*RCR–DC–PR*	*MRCR–I*	*MRCR–M*
RCR–P	1	.60**	.68**	–.41**	.63**	.57**
RCR–I			.66**	–.49**	.45**	.42**
RCR–DC–PY				–.53**	.52**	.48**
RCR-DC Practices					–.31**	–.33**
MRCR—I						.72**
No. of publications	.19**	.02	–.05	.01	.13**	.13**
Completed ethics course	.11**	.11**	.19**	–.10**	.14**	.08*
Status of research	.09**	–.03	–.10**	.008	.01	–.004
Years with mentor	.12**	.01	–.09**	–.01	.052	.002
Ethics challenges	–.06*	–.05	–.04	.09**	–.003	–.03

Note. RCR = responsible conduct of research; RCR–P = RCR–Student Preparedness scale; RCR–I = RCR–Field Integrity scale; RCR–DC–PY = RCR Department Climate–Policy subscale; RCR–DC–PR = RCR Department Climate–Practices subscale; MRCR–I = MRCR–Instruction subscale; MRCR–M = MRCR–Modeling subscale.

*$p = .05$. **$p = .01$.

RCR mentor modeling. The MRCR–M yielded a mean of 5.04 (*SD* = .88, range = 1–6) with a score of 5 indicating that statements describing their mentors as acting responsibly in their own research and in student supervision was mostly true. About one in eight had mean scores below 4, indicating that overall they did not view their mentors' behaviors as ethically responsible. Perusal of individual items suggests that mentors were most likely to be perceived by students as conducting the mentor's own research ethically (96%) and least likely to initiate supervisory discussions with the student about research ethics (67%). Although the MRCR–I means for students in scientist-practitioner (4.68, *SD* = .88) and basic-applied research (4.51, *SD* = 1.00) programs were significantly different, $F(1, 908) = 6.38$, $p < .02$, the partial eta-square did not exceed .01, indicating program mission accounted for less than 1% of the overall (effect + error) variance.

Correlations. As illustrated in Table 4, the number of publications co-authored with the mentor was significantly correlated with both the MRCR–I and MRCR–M. Moreover, students who had completed a course involving RCR ethics, who rated RCR departmental policies positively, and whose departments were not perceived as approving research misconduct were significantly more likely to rate mentors more highly on RCR instruction and modeling. RCR mentor ratings were not related to student gender, ethnicity or the number of years the student had worked with his or her mentor.

Student RCR Preparedness

In general, participants felt well prepared to conduct ethically responsible research (RCR–P: *M* = 5.10, *SD* = .67, where 5 = *mostly true*); only 6% felt they were at least somewhat unprepared to conduct research in an ethical manner. Perusal of individual item means suggests that on average students feel most prepared to avoid behaviors representing research misconduct (e.g. plagiarism, inaccurate reporting of results) and least prepared to know when it is appropriate to share data with other scientists and how to accurately report expenditures to institutions and funding agencies.

As illustrated in Table 4, RCR–P was significantly correlated with the RCR mentoring and departmental climate scores and was significantly higher in students who had more publications, were further advanced in their doctoral studies, had completed a course that included research ethics, and had more years with their mentor. There were no significant effects of number of ethical challenges, student gender, ethnicity, career goals, or program mission.

Hierarchical multiple regression was conducted to test the relative contribution of variables significantly correlated with RCR–P in the following order: status of student research and number of publications (Block 1); number of ethical challenges, years working with mentor, and completion of an ethics course (Block 2); and MRCR–I, MRCR–M, RCR–DC–PY and RCR–DC–PR (Block 3). As illustrated in Table 5, a significant model emerged with adjusted R^2 accounting for 4%, 5%, and 61% of variance for Blocks 1, 2, and 3, respectively. Beta values in Block 3 (the full model) indicated that along with number of publications and number of years working with their mentor, both RCR mentoring instruction and mentor modeling, and RCR department policies, but not RCR departmental practices independently contributed to the variance in students' RCR preparedness.

Attitudes Toward the RCR Integrity of the Field of Psychology

Overall, students believed members of the discipline of psychology conducted research responsibly (*M* = 4.92, *SD* = .64, with a score of 5 indicating positive statements about the field were

TABLE 5
Completed Ethics Course, Years with Mentor, Number of Publications, MRCR, and RCR–DC Subscales Regressed onto RCR–Preparedness Scores

Block		R^2	*F Change*	β	*t*
Block 1		.04	.88		
	Status of research			.02	.49
	No. of publications			.18	5.37***
Block 2		.05	6.42***		
	Status of research			–.05	–1.28
	Number of publications			.18	5.12***
	Total Challenges			–.07	–2.25*
	No. of years working with mentor			.09	2.09*
	Completed an ethics course			.12	3.70***
Block 3		.61	207.07***		
	Status of research			.04	1.51
	Number of publications			.12	5.34***
	Total challenges			–.04	–1.79
	No. of years working with mentor			.08	2.91**
	Completed an ethics course			–.03	–1.43
	MRCR Instruction			.26	8.57***
	MRCR Modeling			.12	4.00***
	RCR–DC–Policy			.49	17.94***
	RCR–DC–Practices			–.02	–1.01

Note. MRCR = Mentoring the Responsible Conduct of Research; RCR–DC = Responsible Conduct of Research–Department Climate.

*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$.

mostly true). Only 7% had mean scores indicating overall impressions that psychological science as a field was not conducted responsibly. Perusal of individual item means suggested students were most confident that psychology as a discipline valued and encouraged its members to conduct research ethically. They were less sure that psychology students received adequate training in research ethics or that the field had adequate safeguards to ensure psychologists engage in ethical research.

As illustrated in Table 4, completing a course that included research ethics was significantly correlated with RCR–I scores. These scores were not related to number of publications, research status, years with mentor, or number of ethics challenges. In addition, there were no significant differences in terms of participant ethnicity, graduate program mission, or specific program type for RCR–I scores. Female students ($M = 4.94$, $SD = .62$) gave slightly higher scores for the integrity of the discipline than male students (4.85), $F(1, 907) = 5.39$, $p = .002$; however, eta-square did not exceed .01, indicating gender accounted for less than 1% of the overall (effect + error) variance.

Hierarchical multiple regression was conducted to test the relative contribution of variables significantly correlated with RCR–I with completed an ethics course entered in Block 1 followed by MRCR–I, MRCR–M, RCR–DC–PY, and RCR–DC–PR entered in Block 2. As illustrated in Table 6, a significant model emerged with adjusted R^2 accounting for 1% and 47% of the variance for Blocks 1 and 2 respectively. Beta values in Block 2 (the full model), indicated that both RCR department policies and RCR departmental practices and RCR mentoring instruction, but not mentor modeling, independently contributed to the variance in students' RCR preparedness.

TABLE 6
Completed Ethics Course, MRCR, and RCR–DC Subscales Regressed onto RCR–Field Integrity Scores

Block		R^2	*F Change*	β	*t*
Block 1		.01	11.88**		
	Completed an ethics course			.11	3.45***
Block 2		.47	209.71**		
	Completed an ethics course			–.01	–.40
	MRCR–Instruction			.10	2.95**
	MRCR–Modeling			.12	1.41
	RCR–DC–Policy			.49	15.32***
	RCR–DC–Practices			–.02	–6.79***

Note. MRCR = Mentoring the Responsible Conduct of Research; RCR–DC = Responsible Conduct of Research–Department Climate.
*$p \leq .05$. **$p \leq .01$. ***$p \leq .001$.

DISCUSSION

The aim of this national survey was to contribute to a small but growing empirically based understanding of graduate student socialization in the responsible conduct of psychological research. We sought to accomplish this by focusing on five research questions, each of which is discussed next.

Research Design and RCR Challenges

On one hand, it is heartening to find that for this national sample, the large majority of psychology students are obtaining experience in submitting their research to IRBs. The majority of research conducted by students was characterized as minimal risk, and thus it is not surprising that ethical challenges were few. Students who listed informed consent as a challenge were more likely to work with populations that required guardian consent or were economically disadvantaged. The fact that students who are aware that these populations are more likely to challenge the efficacy of general cookbook ethical procedures and rules with regard to informed consent is also encouraging. The more likely students anticipated participants might be harmed by disclosures of experimentally obtained information, the more likely confidentiality was listed as a challenge and the more likely students were to have applied for a Certificate of Confidentiality. That one third of students indicated they did not know if they had applied for a Certificate of Confidentiality suggests that graduate training might place greater emphasis on explaining the array of procedures available to protect participant confidentiality.

On the other hand, it is disheartening to learn that the research exposure of a large national sample of students with experience and career interests in conducting psychological science is limited to nonintervention studies involving non-Hispanic White populations without identified mental or physical disorders. This should raise red flags for the profession of psychology as it pursues initiatives to expand adoption of training in evidence-based practice in clinical care (Luebbe, Radcliffe, Callands, Green, & Thorn, 2007). Without experience conducting intervention research involving populations with mental health disorders students, pursuing careers in psycho-

logical science will not have the training to independently conduct studies of treatment efficacy and effectiveness and practicing psychologists will be deprived of experiences that can assist them in critically evaluating the relevance of evidence-based practices to their everyday professional activities.

Although the discipline of psychology has increasingly called for multicultural competence in research, practice, and ethics training (Fisher, 2009; Lyon & Cotler, 2007; Magyar-Moe et al., 2005; Ponterotto, Casas, Suzuki, & Alexander, 2001; Rogers-Sirin, 2008; Sue & Sue, 2003; Trimble & Fisher, 2006), our data raise concerns that students who are most likely to pursue careers in psychological science or to incorporate research findings into their professional practice have little direct experience conducting research with ethnic minority populations. Moreover, those that conduct research involving ethnic minority groups are likely to study only those with mental disorders or who are economically disadvantaged, whereas those researching majority group members largely study healthy middle-class populations. Such restrictions on research training means that psychological science may fail to provide data on normative and non-normative mental health functioning across diverse populations needed to help practicing psychologists accurately identify mental health and mental disorders in these populations

RCR Departmental Climate and Mentoring

Overall, students positively rated psychology departments as providing explicit policies promoting the responsible conduct of research and creating an atmosphere that encouraged respect for and adherence to research ethics principles and practices. Students were similarly positive about the explicit RCR knowledge communicated to them through mentoring and the implicit endorsement of RCR values conveyed though mentor behaviors. Responses on measures of RCR departmental climate, mentoring, and preparedness converged to highlight how to recognize and avoid conflicts of interest in research as an area that needs increased attention in psychology graduate programs (Pachter, Fox, Zimbardo & Antonuccio, 2007). Of some concern is that one out of every 10 students had subscale scores suggesting that some departments are too lax in their support for and monitoring of student and faculty ethics related research endeavors. Of particular note, is that on the RCR-DC-Practices subscale, one in four students thought graduate research assistants were confused about their roles and responsibilities. This concern was echoed in the MRCR subscales, where one in five students felt their mentors were somewhat if not very unhelpful in providing explicit RCR guidance and one out of three students indicated their mentors did not provide adequate RCR supervision. Not surprisingly, responses to the item tapping students' evaluation of the success of the field in providing adequate RCR training (on the RCR Integrity scale) was among the lowest scores.

RCR Socialization Outcomes: RCR Preparedness and Integrity of the Field

In this study, perceived RCR preparedness and confidence in the RCR integrity of the field were considered outcomes of student RCR relevant research experiences, coursework, departmental climate, and mentoring, Scores on the RCR–P suggest that students in our sample had a heightened sense of RCR self-efficacy. This study cannot determine whether this reflects students' actual RCR competence, is a product of social desirability, or is inflated due to naïveté about the demands of RCR when research is conducted independently. However, the fact that RCR–P scores

were significantly associated with number of student publications, completing a course that included research ethics, and more years working with their mentor, suggests that this sense of self-efficacy, at least compared in relative terms, is realistic. Although all four RCR departmental and mentoring subscales were correlated with RCR–P, it is of interest to note when entered simultaneously in a multiple regression, the modeling of RCR by departmental faculty did not exert an independent effect on RCR preparedness.

A different pattern emerged in the relationship between students' confidence in the integrity of the field and implicit RCR mentoring and departmental climate scores. Perhaps not surprisingly given the fact that student respondents were highly interested and experienced in research, their scores reflected an overall confidence in the RCR integrity of psychological science. Of interest is the finding of the significant role that departmental support for faculty and student RCR practices played in students' confidence in the field. Thus, although students' confidence in their RCR self-efficacy is advanced when research mentors are perceived to act responsibly, the behaviors of departmental faculty are more compelling in strengthening or weakening student confidence in the RCR integrity of the field as a whole.

Program Mission and Student and Mentor Gender and Ethnicity

The final aim of this study was to shed light on how program mission and student and mentor gender and ethnicity might influence students' RCR relevant experiences and attitudes. With respect to program mission, students who responded to this survey (approximately 20% of those who were sent e-mails) were highly involved and interested in research, and except for primary career goals, students from basic/applied research and scientist-practitioner programs did not differ in experience as graduate research assistants, publications, and professional presentations or in perceptions of RCR department climate, mentoring, preparedness, or integrity of the field. Scientist-practitioners were more likely to be involved in intervention studies, but even in these programs the percentages were very small (15%). As expected, students in scientist-practitioner programs were more likely than those in basic/applied research to have taken a course involving research ethics and to have programs that required such a course. Thus, it would appear as if accreditation standards are contributing to program requirements that encourage ethics socialization not only for practice but for the responsible conduct of research.

As found in previous work (Fisher et al., 2009), neither gender nor ethnocultural identification influenced student evaluations of RCR relevant mentor and department characteristics, their sense of RCR self-efficacy or attitudes toward the RCR integrity of the field. Although faculty members were more like to be male and non-Hispanic White, our data suggest that, when feasible, it appears as if female students are more likely to seek out female mentors and ethnocultural minority students are more likely seek out minority faculty, although such pairings did not significantly influence students' RCR attitudes. However, it is of interest that students who self-identified or identified their mentor as a member of an ethnocultural group were significantly more likely to conduct research with populations consisting of 50% or more minorities.

Strengths, Limitations, and Future Directions

The Web-based data collection methods used in this study successfully drew a large sample of graduate psychology students from mission and geographically diverse programs. Although re-

spondents were more likely to be female and non-Hispanic White, the percentages reflect the status of the field (APA Center for Psychology Workforce Analysis and Research, 2008). Nonetheless, although the sample was large enough to be confident about gender influenced patterns of responding, it was not sufficient to fully explore whether student ethnocultural identification plays a role in how they perceive their socialization into the responsible conduct of psychological science. Students who chose to respond to the survey appeared to be more experienced and interested in research as a career goal than students nationwide. Particularly high percentages of students in scientist-practitioner programs indicated research was a primary or secondary career goal. Future studies are needed to explore whether student interest and experience in research is a product or predictor of positively perceived RCR departmental climate and mentoring experiences, and RCR socialization outcomes.

Despite these limitations the present study's results have implications for RCR training in graduate psychology programs. First, it appears from the responses of our national sample that students with relatively high interest in research are crying out for more direct supervision in how to responsibly conduct their own research and what is expected of them as research assistants. Second, as psychological science becomes increasingly attractive to corporate funders, graduate students, and perhaps departmental faculty as well, will need specific guidance in how to recognize and avoid research conflicts of interest (Fisher, 2009; Pachter, Fox, Zimbardo, & Antonuccio, 2007). Third, our findings empirically support what is perhaps intuitive about RCR principles, that is, research ethics values of the discipline of psychology are not transmitted to students simply by taking a course in ethics or having experience submitting IRB proposals but require explicit direction from mentors and clear departmental policies that provide students with the resources to feel prepared to independently conduct research responsibly. At the same time, our data suggest that having an ethically responsible mentor does not by itself instill confidence in the research integrity of the field. Rather students' observations of how overall departmental faculty and student behaviors reflect RCR values strongly influence the extent to which graduates of these departments believe the discipline of psychology to be a community with the common purpose of promoting responsible science and protecting the rights and welfare of research participants.

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