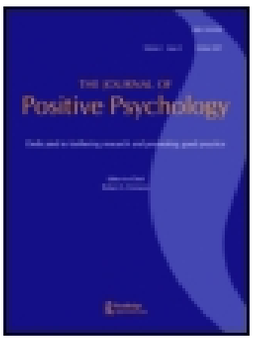

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You can do it! An experimental evaluation of an encouragement intervention for female students

Y. Joel Wong[a], Nelson O. O. Zounlome[a], Nancy Goodrich Mitts[a] and Emily Murphy[b]

[a]Counseling & Educational Psychology Department, Indiana University Bloomington, Bloomington, Indiana, USA; [b]Department of Educational, School, and Counseling Psychology, University of Kentucky, Lexington, Kentucky, USA

ABSTRACT

Although encouragement is a prevalent means of social support in everyday life, the empirical study of encouragement interventions has been sparse. Therefore, in this study, the authors evaluated an encouragement letter writing intervention. Participants were 140 (70 pairs of) doctoral advisors and their female advisees in Ph.D. psychology programs. Participants were randomly assigned to an experimental condition (advisors wrote and emailed a letter of encouragement to their advisees concerning their research potential) or a control condition (advisors wrote but did not send their letter of encouragement). About one month later, advisees in the experimental condition reported a greater increase in the advisor-advisee rapport (η_p^2 = .12), interest in conducting research (η_p^2 = .06), and interest in being a professor at a research-intensive university (η_p^2 = .06) than those in the control condition. The advisor-advisee rapport, but not advisees' relation-inferred self-efficacy, mediated the positive effects of the encouragement letter.

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Encouragement; positive psychology interventions; advising; women

Many researchers and scientists have cited the role of individuals whose encouragement positively and profoundly changed the trajectory of their professional lives. Consider the case of Gillian (pseudonym), an associate research scientist at an Ivy League university (Esping, 2018). She credited her professional mentor, a professor, for encouraging her to pursue a Ph.D. and for supporting her research throughout her graduate studies. Gillian noted that her mentor had high academic standards, but also communicated faith in Gillian's academic abilities. Gillian's research interest was 'solidified' when her mentor told 'her something [she] wrote was good enough to be published' (Esping, 2007, p. 152). Gillian disclosed that 'I'd [have been] lost without her', and what mattered most to Gillian was, 'She believes in me.' (Esping, 2007, p. 153).

Although Gillian's story is not uncommon in academia and, more broadly, in everyday life, the benefits of receiving encouragement has received limited attention in the positive psychology literature. Indeed, most positive psychological interventions that have been studied empirically have been self-help interventions (Bolier et al., 2013; Sin & Lyubomirsky, 2009).

In contrast, encouragement is a distinctively interpersonal activity that involves at least two individuals – an encourager and a recipient. More specifically, encouragement has been defined as 'the expression of affirmation through language or other symbolic representations to instill courage, perseverance, confidence, inspiration, or hope in a person … ' (Wong, 2015, p. 182). A key feature of this definition is that encouragement involves a form of social or interpersonal communication – that is, a person who has positive thoughts about someone cannot be said to have encouraged the other person if these thoughts are not expressed to the latter in language or other forms of symbolic representation (e.g., hand gestures).

Encouragement might be a particularly useful means of social support in academia and school settings, especially for students and researchers who are struggling academically or who are not fully aware of their scholarly potential. Indeed, recent research has shown that the experience of encouragement in academic settings has been positively associated with increased academic self-efficacy, job search self-efficacy, campus connectedness, and hope (Alcott, 2017; Lin & Flores, 2013; Won, Lee, & Bong, 2017; Wong, Cheng, McDermott, Deng, & McCullough, 2019). There is also some limited research on the efficacy of encouragement interventions in academic settings. Two studies found that encouragement messages that conveyed teachers' high expectations coupled with the assurance that students could meet these expectations had a positive impact on college and middle school students' academic motivation and

CONTACT Y. Joel Wong joelwong@indiana.edu

the quality of essays students wrote, especially among African American students (Cohen, Steele, & Ross, 1999; Yeager et al., 2014).

Nonetheless, research on encouragement remains in its infancy. In this study, we address several gaps in the literature on encouragement interventions. First, if a core feature of encouragement is an interpersonal communication of an affirmative message, it is important for researchers to disentangle the effects of positive expectations about another person from an encourager's *communication* of these positive expectations to the recipient. This distinction is relevant because a perceiver who has positive expectations about a target can elicit positive behaviors in the target consistent with these expectations even without explicitly communicating them to the target (Snyder & Klein, 2005). Therefore, research is needed to rule out the possibility that the communication of the encouragement message is unnecessary for benefits to accrue to the recipient. That is, we need to exclude the possibility that writing an encouragement message merely triggers positive expectations in the encourager who then interacts with the recipient in ways that elicit positive outcomes in the recipient.

Second, previous research (Brownlow, Janas, Blake, Rebadow, & Mello, 2011; Cohen et al., 1999; Yeager et al., 2014) have used brief standardized messages that all participants in the experimental condition received, e.g., 'I have very high expectations and I know that you can reach them.' In contrast, encouragement in naturalistic settings tends to be tailored to the recipients' specific needs. Indeed, effective encouragement messages in real-world settings are likely to be highly individualized and may take into account the recipients' fears, wishes, past successes, and the nature of the encourager-recipient relationship (Wong, 2015).

Third, we extend the research on encouragement interventions to an understudied population in the literature on positive psychology interventions – female psychology Ph.D. students, a subject we address in the next section of this paper.

Women in research careers and academia

Women in research careers and academia face considerable challenges. Past work has found that women experience discrimination in several research-related areas such as hiring (Steinpreis, Anders, & Ritzke, 1999), journal reviewing/publications (Budden et al., 2008), grant/fellowship funding (Wenneras & Wold, 1997), and tenure and promotion (Winkler, 2000). In addition, women in the male-dominated atmosphere of research and academia often face sexist microaggressions and are seen as less capable than their male counterparts during graduate school and into their careers (Ong, Wright, Espinosa, & Orfield, 2011; Savigny, 2014). Experiencing these obstacles in their graduate program can discourage women from pursuing or persisting in research-related careers such as academia. This may be particularly salient in the field of psychology. Even though women enroll in psychology doctoral programs and are hired as assistant faculty at higher rates compared to their male peers (74% vs. 26% and 62% vs. 38%, respectively), female Ph.D. psychologists are underrepresented as associate professors, full professors, and institutional leaders (American Psychological Association [APA], 2018; Fowler et al., 2018). The unsupportive academic environment women face, coupled with the gender bias that exists throughout the research process (grant funding through publication) may cause some women to lose interest in research and academia over time. For graduate students, these negative environments can result in female doctoral students leaving their program within the first few years, particularly in research-intensive programs (APA, 2016; Bostwick & Weinberg, 2018) Therefore, strategies are needed to help combat these outcomes and close the gender gap.

Given previous research showing that women in STEM careers perceive that the confidence significant others expressed in their abilities was the most important factor influencing their career choices (Zeldin & Pajares, 2000), we speculate that women might benefit more from encouragement in academic settings than their male counterparts. Therefore, one strategy for increasing female psychology doctoral students' interest in research careers is to provide them with encouragement in their first few years of graduate school. In particular, female doctoral students' academic advisors might be one of the most appropriate individuals to provide encouragement. The advisee-advisor relationship is one of the main elements of doctoral students' experiences and can profoundly shape the trajectory of doctoral students' professional development (Gelso & Lent, 2000). Students who have access to effective research mentorship from their advisors are more likely to become involved in research activities than were those who were not exposed to such mentoring (Love, Bahner, Jones, & Nilsson, 2007). Because many students work with a specific advisor, the quality of this relationship is often vital to advisees' success in their program and as researchers (Kahn & Schlosser, 2010; Schlosser & Gelso, 2001, 2005; Schlosser & Kahn, 2007).

In this regard, a related question is the psychological mechanisms through which advisors' encouragement enhances female doctoral students' interest in research careers. Curiously, previous studies on encouragement activities have not tested mediators of the effects of

such activities (e.g., Brownlow et al., 2011; Cohen et al., 1999; Yeager et al., 2014). The identification of psychological mechanisms through mediation analyses might shed light on why encouragement works and how to harness it more effectively. In this study, we tested two potential constructs that might explain the benefits of advisors' encouragement for female doctoral students – the advisor-advisee rapport and advisees' relation-inferred self-efficacy.

Advisor-advisee rapport

One of the main components of the advisee-advisor relationship is rapport, i.e., the extent to which advisees and advisors get along interpersonally. For advisees, a key aspect of rapport is support and encouragement received from their advisor (Schlosser & Gelso, 2001). In the context of a doctoral advisee-advisor relationship, receiving encouragement from one's advisor may boost the advisor-advisee rapport, which can then increase the advisee's interest in research. Receiving words of encouragement from one's advisor could induce greater connection to and affection for the advisor. Indeed, past work has found that doctoral students who were satisfied with their advisor-advisee relationship characterized it as similar to a mentor-protégé relationship in which they felt encouraged and respected by their advisors (Schlosser, Knox, Moskovitz, & Hill, 2003). Also, advisees perceived encouragement as one of the key means through which their advisors support them (Love et al., 2007). In turn, a strong advisor-advisee relationship has been found to be positively associated with doctoral students' interest in research (Schlosser & Gelso, 2001). When the advisor-advisee rapport is strong, advisees might be more likely to perceive their advisors as positive research role models, which could strengthen their interest in pursuing research careers (Schlosser, Lyons, Talleyrand, Kim, & Johnson, 2011). Having a strong relationship with one's advisor may also increase the advisor's credibility to provide valuable feedback in the advisee's eyes – a factor that may ultimately strengthen advisees' interest in research.

Relation-inferred self-efficacy

In addition to the advisor-advisee rapport, a second mechanism through which encouragement may increase female advisees' interest in research careers is advisees' relation-inferred self-efficacy. Although there is a robust body of research linking students' research self-efficacy to their interest in research (e.g., Kahn & Scott, 1997; Lambie & Vaccaro, 2011), a relatively less well-known construct – relation-inferred self-efficacy (RISE) – may be particularly relevant to advisor-advisee relationships. RISE is defined as an individual's beliefs about how an observer perceives their ability to perform certain actions successfully (Lent & Lopez, 2002). Thus, if advisees believe their advisors are confident in their research ability (high RISE), they may, in turn, be more interested in research. For example, Morrison and Lent (2014) found that graduate students' RISE was positively correlated with their research interest. According to Lent and Lopez (2002), RISE is particularly applicable to growth-promoting interpersonal relationships, such as the one between a faculty advisor and their student advisee. Lent and Lopez (2002) also postulated that RISE is especially important in contexts requiring the development of new academic or occupational skills and has stronger effects when one has few direct mastery experiences, such as a graduate student learning how to conduct research. To boost a student's RISE, faculty research mentors could provide encouragement to advisees regarding their research abilities. Indeed, research has shown that people cite verbal persuasion (persuading someone that they are capable) as one of the primary sources of their RISE (Jackson, Knapp, & Beauchamp, 2008; Saville et al., 2014). In sum, it is clear that advisors can have a powerful impact on their advisees' interest in research, and advisors who encourage their advisees might facilitate their advisees' interest in research by bolstering RISE.

Current study and research hypotheses

Against this backdrop, we tested whether an encouragement intervention in which doctoral advisors wrote a letter of encouragement to their female advisees in Ph.D. psychology programs enhanced their advisees' interest in research careers. We focused on two career-related outcomes – advisees' interest in conducting research as a part of their post-Ph.D. career and their interest in being a professor at a research-intensive university. We examined both outcomes because a student may be interested in research, but not in being a professor; conversely, one could aspire to be a professor at a research-intensive university because this role encompasses more diverse responsibilities beyond merely conducting research (e.g., research mentoring of doctoral students). We used a letter as the means of communicating encouragement because, unlike oral expressions of encouragement, a letter provides advisees the opportunity to review and reread their advisors' words of encouragement, which could deepen the impact of their advisors' encouragement.

Our goal was to test the conceptual model described in Figure 1. First, we hypothesized that a month later, advisees who were assigned to receive a letter of encouragement from their advisors would report an

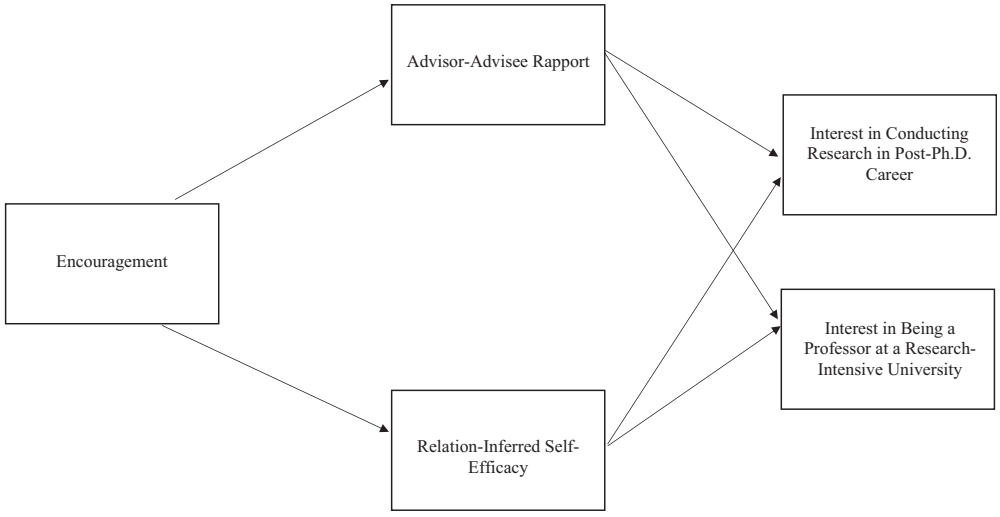

Figure 1. Conceptual model depicting the mechanisms through which encouragement letter writing impacts female doctoral advisees' interest in research careers.

increase in (a) interest in conducting research, (b) interest in being a professor at a research-intensive university, (c) the advisor-advisee rapport, and (d) RISE, compared to advisees in the control condition a month later. To disentangle the effects of advisors' positive expectations about their advisees from the communication of encouragement, advisors in the control group wrote but did not send their advisees encouragement letters. Hence, in both conditions, advisors were primed with positive thoughts about their advisees, but the experimental condition included the communication of encouragement to advisees. Second, we hypothesized that an increase in advisor-advisee rapport and advisees' relation-inferred self-efficacy would mediate the positive effects of the encouragement letter.

Method

Procedures and participants

Participants were pairs of doctoral advisors and advisees in psychology Ph.D. programs in the United States recruited from psychology professional listservs, psychology departments in U.S. universities, and emails to U.S.-based psychology professors. The study was approved by the Institutional Review Board at the first author's university. The project was advertised as a study on female doctoral students' research experiences. The criteria for participation were as follows: (a) all participants had to be at least 18 years, (b) both advisors and advisees had to consent to participate in the study and only one of the advisor's advisees could participate, (c) the advisor had to be a professor or a researcher supervising the advisee's research, (d) the advisee identified as female, (e) the advisee was in her first, second, or third year in a Ph.D. program in psychology or a closely related discipline (we excluded students in their fourth year and beyond because students' interest in research might be less amenable to change in their later years in the program), (f) the advisor's and advisee's research is primarily quantitative in nature (because two of our measures include items that refer to quantitative research skills), and (g) on average, the advisor met with the advisee at least once a month. A summary of participants' demographic information is provided in Table 1. Seventy-one pairs of participants responded to the survey, although one pair of advisors/advisees was not eligible because the advisee was a fourth-year student. The final sample consisted of 140 participants or 70 pairs of advisors and advisees.

All contact between the researchers and advisors and advisees occurred via email and all research activities were completed via online surveys using the Qualtrics software. Both advisors and advisees clicked on a radio button in their respective online survey to signify consent. Advisors who were interested in participating in the study provided the names of up to three advisees who met the criteria for this study. We then randomly selected and emailed one of the advisees to invite her to participate in the study. Advisees were not told they would receive a letter of encouragement from their advisors. They were encouraged to be honest in their responses to the surveys in the study and told that their responses would not be shared with their advisors. Advisees who agreed to participate completed a survey at Time 1 (T1). Advisors and advisees were randomly assigned to one of two letter-writing conditions. In the experimental

Table 1. Demographic information about advisors and advisees.

	Advisors	Advisees
Age (mean)	44.39 (*SD* = 9.38)	26.91 (*SD* = 4.41)
Gender		
Female	54%	100%
Male	46%	-
Race		
African American/Black	3%	10%
Asian/Asian American	9%	10%
Latinx/Hispanic American	6%	7%
Native American/American Indian	1%	1%
White/European American	77%	66%
Other	4%	6%
Advisees' academic discipline		
Cognitive Psychology		6%
Counseling Psychology		43%
Clinical Psychology		16%
Developmental Psychology		7%
Educational Psychology		7%
Health Psychology		6%
Personality and Social Psychology		3%
School Psychology		3%
Other		10%
Advisees' year in the program		
First year		30%
Second year		36%
Third year		34%
Advisors' rank		
Assistant Professor	31%	
Associate Professor	30%	
Full Professor	39%	

Note: Because percentages were rounded to the nearest whole numbers, they do not necessarily add up to 100%.

condition, the advisor was instructed to type a letter of encouragement to the advisee who had agreed to participate in the study regarding her research potential and then to email the letter to the advisee immediately. Advisors were encouraged to write at least 250 words in their letter. In the control condition, advisors were given the same instructions but were told not to send their letter to their advisees. To minimize impact on the effort and quality of the letters, the instructions on whether to send the letter to advisees were given only *after* advisors had completed their letters. In both conditions, advisors were given 18 practical tips on how to write an effective encouragement letter to their advisees with examples of what to write (available upon request from the first author). These recommendations were based on prior conceptualizations of effective encouragement (Wong, 2015). Examples include expressing confidence in the advisee's research potential, making a positive prediction of their future as a researcher, and providing specific examples to explain the advisor's confidence in the advisee. Advisors wrote an average of 286.18 words (*SD* = 89.81); the number of words did not differ significantly across conditions, $p > .05$. To illustrate, the following is an excerpt from an encouragement letter written by an advisor in the experimental condition:

> I know … you're anxious about being able to do research. But I want you to know I have total confidence in you and know that you will learn about the process – you have great ideas and such good analytical skills that I know you will be able to do this! … I have watched you ask terrific questions in our team meeting, and in class, and I love how you ask the question – then get a bit scared that it makes sense. And it does! You'll be a great researcher because you think critically …

Within a few days of the advisors sending their letters, the researchers, through email, checked with and confirmed with advisees in the experimental condition that they received and read the letters. In the email, advisees were also asked to complete a very brief survey to rate the genuineness of the letters they received (see Measures section below).

About a month after advisors wrote their letters (Time 2, i.e., T2), advisees completed a second survey consisting mostly of the same measures at T1. After completing the measures at T2, advisees in the experimental condition were asked how often they had read the letter their advisors wrote since receiving it. The vast majority (74%) reported they had read the letter more than once, while the rest indicated they had read it once. At the end of this survey, advisors and advisees were debriefed on the purpose of the study and compensated with a $20 Amazon gift card ($40 per dyad). Advisors in the control condition were encouraged to send the encouragement letter they had written a month earlier to their advisees.

Measures

Advisor-advisee rapport

The Advisory Working Alliance Inventory-Student Version (AWAI-S, Schlosser & Gelso, 2001) measures the working alliance between graduate student advisees and advisors from the advisee's perspective. The scale is scored on a 5-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). The AWAI-S has three subscales: Apprenticeship, Identification-Individuation, and Rapport, although, in this study, we only used the 11-item Rapport subscale because it is the subscale that best captures the quality of the advisor-advisee relationship. Specifically, the Rapport subscale measures the extent to which the advisee and advisor get along interpersonally. An example item is 'My advisor welcomes my input into our discussions.' The Rapport subscale has been found to be significantly positively correlated with advisee's research self-efficacy, (Schlosser & Gelso, 2001). In the present study, α = .90 (T1) and .91 (T2). Responses were averaged to create composite scores

at T1 and T2 with higher values indicating greater rapport.

RISE

The 11-item Relation-Inferred Research Self-Efficacy Scale (RISE; Morrison & Lent, 2014) is an altered form of the Self-Efficacy in Research Measure short from (SERM–S; Phillips & Russell, 1994) used to measure advisees' perceptions of their advisors' beliefs about their research efficacy. Advisees were asked to indicate how much confidence they believed their advisors had in their (advisees') research abilities on a 9-point Likert scale ranging from 1 (*no confidence*) to 9 (*total confidence*). An example item is 'I believe my advisor thinks I have a good ability to use advanced statistical methods.' Morrison and Lent (2014) found that RISE was significantly and positively correlated with the advisor-advisee working alliance, research productivity, and a general measure of self-efficacy. In the current study, responses were averaged to create composite scores at T1 (α = .93) and T2 (α = .96), with higher values indicating higher RISE.

Interest in conducting research

The 16-item Interest in Research Questionnaire (IRQ; Bishop & Bieschke, 1994, 1998) was used to capture advisees' interest in conducting research as a part of their professional (post-Ph.D.) career on a 5-point Likert scale, ranging from 1 (*very uninterested*) to 5 (*very interested*). Example items include 'Leading a research team.' and 'Taking a statistics course.' To account for the different academic disciplines of our sample, the item 'Conducting research at site of counseling practice.' was modified to 'Conducting research at diverse sites.' The IRQ has been found to be positively correlated with research productivity, the advisor-advisee working alliance, and a general measure of self-efficacy (Morrison & Lent, 2014). In the present study, responses were averaged to create composite scores at T1 (α = .91) and T2 (α = .92), with higher values indicating higher research interest.

Interest in being a professor

We developed an item to measure advisees' interest in being a professor at a research-intensive university: 'How interested are you in becoming a professor in a research-intensive university in the future?' The scores ranged from 0 (*no interest*) to 9 (*extremely interested*). No prior validity evidence is available for this measure, since we developed it for the current study.

Perceived genuineness

After receiving letters from their advisors, advisees responded to the following one-item measure about their advisors' letter: 'To what extent do you think this letter was genuinely motivated by your advisor's desire to encourage you?' The scores ranged from 0 (*not at all*) to 9 (*to a great extent*). The mean score was 7.5 (*SD* = 1.46).

Results

Preliminary analyses and analytic plan

Missing data (0.7% of data points) were minimal and were imputed using the Expectation Maximization algorithm. In a preliminary analysis, we examined differences in T1 outcomes as a function of the advisors' gender. A series of *t*-tests revealed no significant differences in AWAI-S, RISE, IRQ, and interest in being a professor among advisees with female vs. male advisors at T1, *p*s > .05.

Because our research questions focused on whether the magnitude of change in outcomes between T1 and T2 differed between groups rather than on absolute differences between groups at T2, we used repeated measures ANCOVA for our first set of hypotheses. To be consistent with our overarching conceptual model (see Figure 1), we included T1 RISE as a covariate when analyzing changes in AWAI-S Rapport across groups and T1 AWAI-S Rapport when examining changes in RISE across groups. For our analyses of the two research career outcomes (interest in being a professor and IRQ), we added T1 RISE and T1 AWAI-S Rapport as covariates. We used η_p^2 = .01, .06, and .14 as approximate indicators of small, medium, and large effect sizes, respectively (Richardson, 2011). An a priori power analysis based on G*Power 3.1.9.2 (Faul, Erdfelder, Lang, & Buchner, 2007) found that, assuming power = 0.80 and a *p* value of .05, sample sizes of *n* = 34 and *n* = 200 were sufficient to detect a small effect of η_p^2 = .01 (Cohen's *f* = .10) and a medium effect size of η_p^2 = .06 (Cohen's *f* = .25), respectively. Hence, our sample of *n* = 70 was sufficient to detect small but not medium effect sizes. For all analyses, Mauchly's sphericity test revealed no evidence that the assumption of sphericity was violated.

We used PROCESS, an SPSS computational tool that integrates bias-corrected bootstrapping within a regression-based framework (Hayes, 2013), to examine mediation effects in our conceptual model (Figure 1). Because PROCESS can only accommodate one outcome variable at a time, we conducted two mediation analyses, one with T2 interest in being a professor as the outcome (with T1 interest in being a professor as a covariate) and the other with T2 IRQ as the outcome (with T1 IRQ as a covariate). The mediators were T2 AWAI-S Rapport and T2 RISE, while T1 AWAI-S Rapport and T1 RISE were added as covariates.

To investigate mediation effects, we computed mean indirect effects using 10,000 bootstrap samples generated

by random sampling with replacement. A mediation effect is significant if 95% of the confidence intervals of the indirect effects exclude zero. According to Monte Carlo analyses performed by Fritz and MacKinnon (2007), a sample size of 71 was sufficient to detect a significant mediation effect using bias-corrected bootstrapping, assuming β = .39 for the paths from the predictor to the mediator and from the mediator to the outcome, controlling for the mediator, while a sample size of 34 was needed if β = .59 for both paths.

Main analyses

Regarding our first set of hypotheses, participants in the experimental group reported a significantly greater increase in (a) scores for interest in being a professor at a research-intensive university, (b) IRQ scores, and (c) AWAI-S Rapport scores, but (d) not an increase in RISE scores, as compared to control participants (see Table 2). Effect sizes, based on η_p^2, for significant effects were all at least in the medium range, although the largest effect size was for change in AWAI-S Rapport (η_p^2 = .12).

Regarding our second set of hypotheses, T2 AWAI-S Rapport, B = −.24, SE = .15, 95% CI = [−.61, −.02], but not T2 RISE, B = −.17, SE = .16, 95% CI = [−.64, .02], was a significant mediator in the model predicting interest in being a professor. Similarly, in the model with T2 IRQ as the outcome, T2 AWAI-S Rapport, B = −.06, SE = .04, 95% CI = [−.19, −.002], but not T2 RISE, B = −.01, SE = .02, 95% CI = [−.07, .02], was a significant mediator. We also re-analyzed the data using just one mediator and outcome at a time. The results were similar: for both research career outcomes, T2 AWAI-S Rapport, but not T2 RISE, was a significant mediator. Given these findings and, in the interest of parsimony, we focused on analyzing the single-mediator models (with only IRQ) to better understand the constituent paths in the significant mediating effects. Receiving the encouragement letter was significantly and positively associated with increased T2 AWAI-S Rapport, B = .24, SE = .08, β = .21, p = .005, which was in turn associated with advisees' increased interest in being a professor at T2, B = 1.92, SE = .48, β = .36, p < .001, after controlling for the covariates in the mediation model. Similarly, in the mediation model with T2 IRQ, receiving the encouragement letter was significantly and positively associated with increased T2 AWAI-S Rapport, B = .24, SE = .08, β = .21, p = .004, which was in turn related to increased T2 IRQ, B = .30, SE = .12, β = .27, p = .013, after controlling for the covariates. To summarize, the advisor-advisee rapport, but not RISE, mediated the effects of the encouragement letter on advisees' interest in research careers.

Posthoc analyses

Although not originally hypothesized, we also examined, using hierarchical multiple regression, the relationship between the perceived genuineness of advisors' letters and the outcomes in our study among advisees in the experimental condition (n = 34). Controlling for the relevant T1 outcomes, advisees' perception that the letters were genuinely motivated by their advisors' desire to encourage them was significantly and positively associated with T2 AWAI-S Rapport (p < .05), but not with T2 RISE and T2 IRQ (ps > .05), while the association between the perceived genuineness of the letters and T2 interest in being a professor approached significance (p = .051). Hence, advisees who perceived that the letters they received were genuinely motivated by their advisors' desire to encourage them reported increased advisor-advisee rapport and interest in being a professor. Detailed results on these analyses are available, upon request, from the first author.

Discussion

The goal of this study was to evaluate the impact of an encouragement letter intervention for female psychology Ph.D. students. We found that advisees who were assigned to receive a letter of encouragement from their advisors concerning their research potential reported increased (a) interest in being a professor at

Table 2. Comparison of experimental and control groups in change in interest in being a professor, interest in conducting research, relation-inferred self-efficacy, and advisor-advisee rapport across time.

	T1 *M(SD)*		T2 *M(SD)*			
Outcome	Experimental	Control	Experimental	Control	*F (df)*	η_p^2
Interest in being a professor	5.09 (3.16)	6.03 (3.33)	5.91 (3.03)	6.01 (3.15)	4.36* (1, 66)	.06
Interest in a conducting research	3.80 (0.72)	3.95 (0.57)	3.92 (0.64)	3.94 (0.63)	4.32* (1, 66)	.06
Relation-inferred self-efficacy	6.98 (1.52)	7.57 (1.10)	7.58 (1.54)	7.84 (1.33)	2.34 (1, 67)	.03
Advisor-advisee rapport	4.25 (0.63)	4.54 (0.45)	4.36 (0.53)	4.38 (0.62)	9.42** (1, 67)	.12

Note: Interest in being a professor = interest in being a professor at a research-intensive university; interest in conducting research = interest in conducting research as part of one's post-Ph.D. career; N for experimental group = 34; N for control group = 36; N total = 70; T = Time;
*p < .05, **p < .01

a research-intensive university, (b) interest in conducting research in their post-Ph.D. careers, and (c) advisor-advisee rapport, but (d) not an increase in RISE, as compared to control participants a month later. Moreover, the advisor-advisee rapport, but not RISE, mediated the positive benefits of the encouragement. That is, advisees who received letters of encouragement reported stronger advisor-advisee rapport, which was in turn positively associated with increased interest in being a professor and in conducting research.

Several strengths of our study should be noted. Unlike previous research that utilized brief standardized encouragement messages (e.g., Brownlow et al., 2011; Cohen et al., 1999; Yeager et al., 2014), our encouragement writing intervention has greater external validity because we allowed advisors to tailor their encouragement letters to address their advisees' individual situations and needs, a process which fits with how effective encouragement is likely administered in real-world academic settings. Indeed, one of our recommendations to advisors was that they provide in their letters specific examples to explain why they were confident of their advisees' research abilities. Additionally, by instructing advisors in the control group to write an encouragement letter but not send it to their advisees, we were able to rule out advisor's positive expectations or behavioral confirmation as the sole cause of the benefits that accrued to advisees (Snyder & Klein, 2005). That is, advisors' *communication* of encouragement to their advisees, and not just their positive beliefs about their advisees, appears to be a vital psychological ingredient in the encouragement intervention, which is consistent with Wong's (2015) definition of encouragement as an act of social communication. Furthermore, we were able to demonstrate that the effects of the encouragement letter did not merely have a temporary priming effect on advisees, but lasted at least a month. One advantage of a letter is that participants had the opportunity to reread their advisor's encouraging words, which may have the effect of prolonging the longevity of the encouragement intervention's salutary effects. Indeed, at T2, almost three-quarters of advisees in the experimental condition reported that they had read their advisors' letters more than once since receiving it.

Finally, our study is, to our knowledge, the first to identify a significant mediator of the impact of encouragement. Notably, the effect size for the impact of encouragement on the advisor-advisee rapport was the strongest among the various outcomes analyzed (see Table 2), and rapport, but not RISE, was a significant mediator of the benefits of encouragement. Given the contrast between the advisor-advisee rapport and RISE, these findings suggest that the mechanism through which the benefits of encouragement is transmitted to advisees may be more relational and less cognitive in nature. These findings are also akin to research documenting the robust association between the therapeutic alliance and treatment outcomes in psychotherapy (Horvath, Del Re, Flückiger, & Symonds, 2011). Perhaps receiving letters of encouragement from advisors sets off a positive recursive process (Walton & Wilson, 2018), in which advisees feel cared for by their advisors and view them as role models (Schlosser et al., 2011), thereby intensifying advisees' motivation to engage with their advisors. These social interactions may enhance advisors' positive perceptions of advisees, leading advisors to give their advisees more research opportunities, which reinforces advisees' interest in research. Advisees' increased rapport with advisors may also accentuate their sense of belongingness to the university and research setting (Walton & Wilson, 2018), thereby amplifying their interest in a research career.

Limitations and future research directions

Despite these strengths, we acknowledge several limitations in our study that future research can address. First, we studied how the encouragement intervention influenced students' short-term (one month) interest in research careers but not their research productivity or their actual career choices. Future research could track the long-term impact of encouragement on doctoral students' research output and career choices (e.g., whether they apply for and are successful in obtaining research-oriented jobs).

Second, because of our small sample, we did not have sufficient statistical power to test moderators of the encouragement intervention. Such research is valuable because previous research suggests that African American students might benefit more from their teachers' encouragement than White students in academic settings (Yeager et al., 2014), possibly because of their experience of discrimination and a lack of access to positive role models (Wong, 2015). Future research could explore the types of advisors (e.g., female vs. male advisors and advisors who think highly of their advisees' research abilities versus those who do not) whose encouragement have the strongest impact as well as the types of students who benefit most from encouragement (e.g., students of color vs. White students, female vs. male students). Although we believe the encouragement letter writing intervention would also work for male doctoral students, we speculate that it would be more effective for female students than for male students because the former may experience greater challenges in academia (e.g., sexist

microaggressions; Savigny, 2014) and thus benefit more from encouragement.

Third, our sample focused on doctoral students and not on postdoctoral researchers who are no longer in an advising relationship. Our findings suggest that the advisor-advisee relationship might be a key mechanism through which the benefits of encouragement are transmitted. However, it is unclear if other researchers (e.g., assistant professors) who receive encouragement (e.g., from their department chairs) would receive similar benefits in the absence of the advisor-advisee relationship.

Fourth, by asking advisees whether they received their advisors' letters, advisees may have been alerted to the fact that the letters were relevant to their participation in the study. It is possible that this knowledge diminished the perceived sincerity of the letters if some advisees believed their advisors wrote the letters solely because of their participation in the study. This would have attenuated the positive effects of the intervention, whereas in a truly naturalistic setting (outside the research context), advisees would have fewer reasons to doubt the sincerity of their advisors who write them letters of encouragement.

Fifth, although both advisors and advisees participated in this study, all our outcomes pertained only to advisees. However, Wong (2015) theorized that encouragement yields benefits not only for others but also for the encourager, and recent research indicates that the character strength of encouragement is positively associated with favorable interpersonal and psychological outcomes for encouragers (Wong, Shea, Wang, & Cheng, 2019). Writing an encouragement message to others might help encouragers focus on the positive qualities of the recipients and also draw attention to encouragers' capacity to contribute to others. Therefore, future research could test whether writing an encouragement letter could yield psychosocial benefits for encouragers in a manner akin to the salutary effects of writing gratitude letters for letter writers (Wong et al., 2018). Sixth, a future study could examine what aspects of the content of encouragement letters best predict positive outcomes for recipients (e.g., use of positive emotion words; Wong et al., 2018). Such findings could help advisors in writing more effective encouragement letters.

Finally, although our study focused only on encouragement in a higher education setting, we believe that encouragement interventions in various forms (e.g., letters, oral expressions, and online forums) can be implemented and evaluated to improve interpersonal relationships, well-being, and performance in diverse settings, such as schools, psychotherapy, mentoring relationships, parenting, and workplace settings. To illustrate, some psychotherapists practice writing therapeutic letters to their clients (Rombach, 2003). Researchers could, therefore, test whether an encouragement letter written by psychotherapists to their clients in the first few sessions of therapy enhances the therapeutic relationship and client outcomes.

Conclusions

To summarize, we found, in this study, that female Ph. D. psychology students who were randomly assigned to receive a letter of encouragement from their advisors reported an increase in interest in research careers one month later relative to control participants, and these positive effects were mediated by the advisor-advisee rapport. We hope our study will stimulate new avenues of research on encouragement interventions to uncover when, for whom, and how encouragement engenders benefits for encouragers and recipients. More broadly, we call for research on positive psychology interventions that extends beyond self-help activities to those that harness the promise of interpersonal relationships and social support.

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