RESEARCH ARTICLE

Writing and Reading Self-efficacy in Graduate Students: Implications for Psychological Well-being

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Abstract

In an effort to identify critical antecedents of mental health challenges in graduate education, recent research has examined graduate students' self-efficacy beliefs as a motivational antecedent of their productivity, persistence, and well-being. Whereas graduate students' self-efficacy concerning their scholarly writing activities has received increasing research attention in regards to psychological health, the well-being implications of graduate students' self-efficacy for academic reading remains underexplored. The present study assessed both writing and reading self-efficacy in an international sample of graduate students (N = 851) in relation to critical well-being indicators including exhaustion, engagement, quitting intentions, program satisfaction, and imposter syndrome. Hierarchical linear regressions revealed writing self-efficacy to be a strong predictor across well-being outcomes, with a significant two-way interaction highlighting the combined benefits of writing and reading self-efficacy for imposter syndrome in graduate students. The present findings are novel in highlighting the well-being implications of both writing and reading self-efficacy for graduate students and support the expansion of graduate education programs aimed at promoting writing competencies to also address reading-related issues.

Keywords

Self-efficacy, writing, reading, well-being, graduate students

Introduction

Despite the increasing number of graduate students internationally (1.1% worldwide between 2005 and 2015; Council of Graduate Schools, 2016), there is limited research on graduate students' psychological well-being and motivation, with most research in higher education focusing on undergraduates (Brus, 2006). However, studies have consistently found high rates of psychological maladjustment in graduate students (Hyun *et al.,* 2006; University of California, Berkeley, 2014) and persistently high levels of negative emotions, such a guilt and anxiety (Hughes, 2011). With overall doctoral attrition rates around 50% over the past 50 years (Caruth, 2015), empirical studies have increasingly examined mental health in graduate education with respect to both positive outcomes (e.g., engagement; Litalien and Guay, 2015) and negative outcomes, such as burnout (Galdino *et al.*, 2016) and imposter syndrome (Fraenza, 2016). However, few studies to date have examined the relationship between psychological health in graduate students and the types of academic challenges specific to graduate students, namely the cognitively-demanding tasks of scholarly writing and reading. To address this research gap, the present study examined graduate students' motivational beliefs concerning their academic writing and reading activities (self-efficacy) in relation to psychological well-being outcomes, including program satisfaction, quitting intentions, engagement, exhaustion, and imposter syndrome.

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Academic Writing and Reading in Graduate Education

As outlined in a scoping review of critical contributors to achievement and well-being in doctoral students (Sverdlik *et al.*, 2018), graduate students often experience extreme stress due to the unfamiliar, complex, and demanding nature of advanced scholarly activities. Findings specifically suggest that lack of structure in graduate education is particularly daunting since it requires students to be self-motivated, especially in the later stages of doctoral programs that demand increased independence and knowledge creation (Gardner, 2009; Sverdlik and Hall, 2019). Similarly, Lovitts (2008) found that the transition to independent research in graduate education, after the completion of requisite coursework, to be especially difficult due to its requirements for demanding cognitive strategies, such as creativity and ingenuity, to successfully complete research tasks (Filipovic and Jovanovic, 2016). Graduate students are thus faced with many competing roles and responsibilities (Levecque *et al.,* 2017), with qualitative studies persistently underscoring the salience of writing and reading experiences of graduate students as a central contributor to their academic identity and emotional experiences (Cotterall, 2013; McAlpine and Amundsen, 2012).

Although much of the existing research on writing and reading challenges in graduate education has explored the difficulties faced by non-native English speakers (e.g., Phakiti and Li, 2011), there is growing research on the pressures of academic writing for graduate students at large. Not only do graduate students in research-based programs feel pressure to complete their research in a timely manner (Kamler, 2008), they are additionally pressured to publish their scholarly writing (McGrail *et al.*, 2006). Accordingly, graduate students must not only navigate a complex network of literature databases, read and summarize complex material, and write sophisticated research reports, they must also perform these tasks according to the standards set by their professional research community (Kwan, 2009). These demands thus require students to continually improve their advanced reading and writing abilities for research purposes, with the persistent development of these high-level academic competencies often posing significant motivational and emotional challenges.

Graduate Writing Challenges

For many graduate students, academic writing can be particularly daunting due to the undefined nature of the task, especially when related to research production. Moreover, existing research consistently shows the negative psychological impact of writing challenges in graduate education to be further exacerbated by insufficient support from supervisors and institutions (e.g., lack of scholarly socialization, academic writing training; Aitchison *et al.,* 2012; Odena and Burgess, 2017). Conversely, findings also show quality pedagogy in graduate education to have long-lasting benefits for students' career development in promoting life-long learning and self-regulatory competencies (White, 2007). However, despite growing interest in improving pedagogical offerings specific to academic writing for graduate students at large, there currently exists a lack of knowledge of optimal design and implementation (Brooks-Gillies *et al.,* 2015). Additionally, many of such programs encourage prescriptive solutions to improve writing self-regulation, but often do not address emotional issues that arise throughout the writing process (Brooks-Gillies *et al.*, 2015).

Across various qualitative studies, students describe their supervisor's feedback and support throughout the writing process as essential to their degree completion and academic success (Gearity and Mertz, 2012; Odena and Burgess, 2017) particularly with respect to collaborative writing for developing writing skills (i.e., argumentation, justification; Florence and Yore, 2004). However, findings from Aitchison *et al.* (2012) suggest that whereas supervisors typically view writing as a means to an end for knowledge dissemination, doctoral students largely viewed writing as a highly emotional process critical to developing their academic identity. Doctoral students in particular reported that their supervisors are unlikely to provide extensive writing support, with this lack of support contributing to feelings of frustration, hurt, and confusion. Research by Merga (2015) further suggests that as dissertation formats have become less traditional over time (e.g., manuscript style), supervisors are increasingly unable to provide adequate support leading to self-doubt in graduate supervisees attempting to meet the rigorous writing standards of academic journals.

In another interview study, Cotterall (2011) found individual thesis supervisors, as opposed to formalized academic programing, to be responsible for writing education across graduate programs at an Australian university, thus resulting in inconsistent, highly individualized, and

unregulated training experiences. The interviews further revealed that students experienced a great deal of emotions in relationship to their writing (i.e., anxiety, insecurity, shame) and a general lack of confidence in their academic writing abilities. Similarly, autoethnographic findings from Gearity and Mertz (2012) suggest that although writing diaries may help graduate students improve their writing experiences, the writing process may also be impaired by an unsupportive supervisory relationship that can further exacerbate students' emotional issues and productivity.

Graduate Reading Challenges

Not unlike the limited empirical literature on the psychological experiences of graduate students in regards to writing, there exists remarkably little research on the lived experiences of graduate students in regards to reading for research purposes. Moreover, existing studies further tend to overlook reading processes by conceptualizing it only as a basic precursor serving to facilitate eventual writing (McAlpine and Amundsen, 2012) or as an impediment to academic writing progress and performance (e.g., Busl *et al.,* 2015; see also "interest-based studying", Senko *et al.,* 2013). Contrary to this notion, the limited research on reading in graduate education suggests that reading presents unique challenges, both conceptually and emotionally, that should be studied separately from writing processes.

As the complexity, density, and breadth of academic literature that graduate students are expected to read is typically much greater than in undergraduate education, reading processes in graduate education must become more strategic and efficient (Mikitish, 2017; Wohl and Fine, 2017). However, Green and Macauley (2007) found that students tend to develop their own idiosyncratic reading strategies, such as personalized systems for keeping track of readings or contrasting reference lists to determine salient readings, rather than soliciting external advice. Despite having individualized strategies, students generally tended to engage in a similar sequence of collecting references, re-reading sources, and preparing summary notes later used to inform thesis writing. In an interview study with 16 Chinese doctoral students, Kwan (2008) also found that participants continually seek out readings throughout the research process, not only before writing, to address gaps in argumentation and better situate their findings in the larger literature. Similarly, Hughes and Bridges-Rhoads (2013) found that doctoral students also use reading as a way of re-thinking their research topics or learning more deeply about their research fields, such as reviewing key texts from prominent scholars. Across these studies, students frequently reported a need to revisit their references throughout the writing process to clarify or reaffirm their initial understanding of the content.

A study by Wohl and Fine (2017) further assessed the reading practices and perceptions of graduate students through semi-structured interviews, with participants describing various useful techniques for sorting through large literatures (e.g., purpose targeting, selective attention, recall facilitation). Nevertheless, graduate students in this study also frequently reported feelings of guilt and shame with respect to their reading habits (i.e., "skimming" content), a finding also observed by Green and Macauley (2007) who found that graduate students reported the process of reading as highly emotional at times due to its potential impact on their thesis outcomes and academic identity. Research by Kwan (2009) further highlighted the importance of social support for graduate reading activities, showing reading recommendations from thesis supervisors and peers (e.g., key texts, prominent authors) to be particularly beneficial for learning gains and developing research interests. Students in this study also tended to view conducting a strategic literature review as a source of pride; it is a way to demonstrate their research abilities to their colleagues, advisor, and academic community. These findings were echoed by Johnson (2015) who found scholarly peer groups, such as a Doctoral Writing Conversation (DWC) group, to help compensate for lack of supervisor support with respect to both writing and reading activities through weekly meetings with peers to discuss their research. Participants in these support groups reported greater enthusiasm for engaging with their respective literatures and being more strategic in their reading (e.g., problem-solving inconsistent findings), with similarly encouraging findings observed from programs that pair doctoral students with librarians to implement more effective literature searches and reading strategies (i.e., effective skimming, note-taking; Harris, 2011).

Graduate Student Self-efficacy: A Motivational Perspective

Although research on writing and reading within graduate education is increasing, there remains a notable lack of empirical research in the area of graduate students' motivational experiences throughout their programs, especially in the areas of writing and reading. According to Bandura (1977), self-efficacy is one of the most influential factors underlying motivation and persistence in achievement settings and is defined as a person's belief that they are competent to execute certain behaviors to produce specific outcomes. Research increasingly shows self-efficacy and perceived competence to be a critical component of both graduate students' academic success (Virtanen *et al.,* 2016) and mental health (Feizi *et al.*, 2018). For example, Litalien and Guay (2015) found perceptions of academic competence to better predict persistence in doctoral students than external supports (i.e., from advisors, faculty), with Kearns *et al.* (2008) similarly showing graduate students with low academic self-efficacy to engage in more self-handicapping behaviors and demonstrate greater program attrition.

Empirical studies on self-efficacy in graduate students have to date focused specifically on self-efficacy for conducting research due to research activities being a vital component of graduate education. For example, higher research self-efficacy in doctoral students has been found to predict greater research productivity (e.g., empirical publications; Kuo *et al.,* 2017) and technological proficiency (e.g., academic computing; Odaci, 2013), as well as higher levels of research engagement (e.g., interactions with colleagues) and shorter time to completion (Hwang *et al.*, 2015). Moreover, findings from Lambie et al. (2014) showed graduate students who participated regularly in specific research activities, such as research writing and publishing, to reported higher research self-efficacy that, in turn, predicted greater research interest and knowledge. These findings thus highlight the importance of evaluating self-efficacy in terms of specific graduate research activities, particularly with respect to writing and reading for research purposes.

Writing Self-efficacy in Graduate Students

Following from initial findings by Lavelle and Bushrow (2007) that showed low writing self-efficacy in graduate students to be associated with greater self-doubt and writing blocking behaviors (e.g., procrastination), Matoti and Shumba (2011) further indicated that postgraduate students report overall low writing self-efficacy levels, as well as difficulties in academic writing due to external factors (e.g., studying part-time). Wisker (2015) similarly showed graduate students to report limited confidence in their ability to express themselves using the academic language of their discipline and to frequently experience writing blocks related to over-simplifying or over-complicating relevant theories. Findings from Holmes et al. (2018) also suggest that graduate students experience predominantly negative dispositions towards academic writing, including lack of confidence, time, and skills to produce quality writing, and graduate students unfailingly report a need for more guidance and support for improving their writing abilities. Moreover, existing studies consistently show lower self-efficacy for academic writing to correspond with higher anxiety levels in graduate students (e.g., Cotterall, 2011; Huerta *et al.*, 2017; Lavelle and Bushrow, 2007).

Writing support programs. Despite ongoing debates as to the optimal structure of writing support services, there is evidence that writing self-efficacy can be strengthened through scholarly writing support groups and institutional programs. Results from Palmer and Major (2008) showed graduate students who participated in an innovative writing development program (reciprocal peer review) to report higher levels of knowledge about scholarly writing, as well as greater interest in submitting a manuscript for publication and reading professional journals. Similarly, Johnson (2015) found a Doctoral Writing Conversation (DWC) group to effectively address the writing needs of doctoral students through weekly meetings, a semi-structured writing schedule, and reviewing each other's work in a systematic and meaningful manner. Gardner et al. (2018) further examined the effects of an institutional writing intervention for graduate students in STEM disciplines, with follow-up interviews showing increases in writing self-efficacy attributed to verbal encouragement from the writing specialist and peer feedback. Similarly, a "Writing Process" intervention predicted greater confidence in writing skills in graduate students (Busl et al., 2015), and a weekly graduate writing course outlining detailed strategies for writing research proposals improved participants' writing-related self-efficacy, emotions, self-regulation, and supervisory relationships over the course of three semesters (Miedijensky and Lichtinger, 2016).

Reading Self-efficacy in Graduate Students

To date, there exists notably few studies examining reading processes and perceptions in graduate students, especially with respect to their perceptions of competence or self-efficacy. One notable exception is a qualitative study by Tercanlioglu (2004) that found native English speakers to report higher levels of reading self-efficacy than non-native speakers, as well as more frequent use of metacognitive reading strategies. In contrast, non-native speakers expressed more anxiety towards writing and utilized reading strategies that relied more on external support (i.e., online references, asking a colleague). However, there was no significant difference between native and non-native English-speaking graduate students in their reading comprehension scores, suggesting that differences in reading self-efficacy are not likely to be due to reading aptitude.

Weekly course assignments. Despite the limited overall focus on reading self-efficacy in graduate education, related qualitative research has assessed the utility of innovative course assignments aimed at improving graduate students' reading strategies and attitudes. For example, Wiles *et al.* (2016) explored how the implementation of weekly summaries and critiques of assigned articles, that were later used to facilitate class discussions, helped graduate students to read more extensively and critically in a qualitative methods course. Findings over a three-year period showed students to report feeling more critically engaged with the literature through these assignments, as well as more confident in their ability to read (and write) in a more scholarly manner. Recent work by Beaupoil-Hourdel et al. (2017) evaluated a similar project aimed at helping graduate students in the humanities become better readers of academic articles by promoting the use of specific narrative devices. Findings from this "Research and Storytelling" program over four semesters showed graduate students to read more (i.e., about 5,280 words per week) and read better (i.e., use reading devices, synthesise articles, keep concise records, reflexive practices) as a result of the reading program, with the analysis of journal entries further showing notable increases in self-confidence for engaging in scholarly discourse.

The Present Study

As outlined in the preceding review, emerging research suggests that both writing and reading processes play a critical role in graduate student development and warrant greater research on how these processes both independently, and in combination, correspond with persistence and well-being in graduate education. While it is clear that writing and reading are highly interwoven processes in graduate studies, they are rarely given equal attention, with reading self-efficacy often overlooked in favour of writing or research self-efficacy concerns. To address this research gap, the present study investigated how writing and reading self-efficacy both independently and interactively impact persistence and psychological adjustment in graduate students. As previous research has been largely qualitative in nature, or situated within a specific writing course or writing program, the present study obtained larger-scale quantitative data through the recruitment of a diverse, international sample of graduate students. Thus, this study aimed to contribute to the burgeoning research literature on graduate students' psychological well-being in examining the relationship between their self-efficacy for critical writing and reading processes and key indicators of psychological health and persistence as outlined in the hypotheses below.

Study Hypotheses

Hypothesis 1: Writing self-efficacy. Graduate students with high levels of writing self-efficacy should report better levels of persistence and well-being. This hypothesis is based on previous research that shows academic writing to be a highly emotional component of graduate education, especially in research-based programs (Cotterall, 2011), with self-doubt commonly reported in relation to graduate students' experiences with scholarly writing (Lavelle and Bushrow, 2007). This hypothesis is also derived from findings showing general academic self-efficacy in the context of graduate education to be positively linked to various indicators of persistence (i.e., lower quitting intentions; Litalien and Guay, 2015) and engagement (i.e., involvement with departmental activities; Lambie and Vaccaro, 2011), as well as negatively linked to various adverse well-being outcomes (e.g., stress; Virtanen et al., 2016; self-handicapping; Schwinger and Stiensmeier-Pelster, 2011).

Hypothesis 2: Reading self-efficacy. Higher levels of reading self-efficacy should show positive relations with persistence and well-being in graduate students. This hypothesis is

consistent with limited research showing reading poses a significant threat to academic identity development (McAlpine and Amundsen, 2012) and elicits strong negative emotional reactions in graduate students (Green and Macauley, 2007), thus additionally suggesting that reading be examined as a distinct academic task, rather than as a simple precursor to writing activities.

Hypothesis 3: Interaction effects. Writing and reading self-efficacy should interact to explain additional variance in the persistence and well-being outcomes assessed beyond their respective main effects. Specifically, it was hypothesized that students with high levels of both writing and reading self-efficacy would report higher program satisfaction and engagement, as well as lower levels of quitting intentions, exhaustion, and imposter syndrome than students with lower levels on one or both forms of self-efficacy. This hypothesis follows from recent research suggesting that writing and reading tasks in graduate education are intricately interwoven despite their independent roles (Hutchinson and Tracey, 2015; Kwan, 2009; Wiles *et al.*, 2016), with both processes playing critical interdependent roles in the academic identity development of graduate students (McAlpine *et al.*, 2009).

Method

Participants and Procedure

Graduate student (*N* = 851) participants were enrolled primarily full-time (85.5%) in either master's programs (21.6%), doctoral programs (62.2%), or combined master's-doctoral programs (10.3%). Participants were primarily Caucasian (82.6%), female (78.1%), and native English speakers (77.1%) with an average age of 31.14 years (SD = 7.25). The sample included participants from 45 countries and 41 disciplines, with most participants enrolled in graduate programs in the U.S. (48.7%), Canada (18%), and the U.K. (8.4%). The sample most strongly represented the disciplines of psychology (16.5%), biology (9.7%), and education (9.4%). Participants were recruited via social media (e.g., Twitter, Facebook) to complete an online questionnaire with an entry to five cash prize draws of $50 as study compensation. The self-report questionnaire consisted of demographic items and measures of writing and reading self-efficacy, as well as well-being variables including both program-specific measures of engagement and satisfaction and global measures of exhaustion, quitting intentions, imposter syndrome (descriptive statistics for the self-report study measures are provided in Table 1).

Table 1. Descriptive Statistics of Study Measures

Scale	*n*	*M*	*SD*	Items	Range	α
Writing self-efficacy	796	4.98	1.06	12	1-5	0.92
Reading self-efficacy	826	5.55	0.76	12	1-5	0.88
Engagement	728	3.83	1.12	17	0-6	0.92
Satisfaction	742	4.34	1.68	5	1-7	0.94
Quitting intentions	744	1.53	0.73	4	1-5	0.67
Emotional exhaustion	740	3.55	1.37	7	0-6	0.92
Imposter syndrome	737	3.74	0.80	10	1-5	0.87

Self-report Measures

Writing and reading self-efficacy. Two existing seven-point Likert scales (1 = strongly agree, 7 = strongly disagree) previously developed for undergraduates by Prat-Sala and Redford (2010) were adapted for the present graduate student sample. Consistent with the original measures, each scale preamble explicitly reminded participants to differentiate between writing and reading activities (e.g., reading self-efficacy scale: "Think about the most recent time you were reading for a task related to your current phase in your academic program (i.e., coursework, comprehensive/qualifying exams, thesis/dissertation)"). Scale items for each self-efficacy measure developed for this study are provided in Appendix A.

The Self-efficacy in Writing (SEW) scale included 12 items that asked participants to rate their confidence in completing various academic writing tasks. Items were adapted to our graduate student sample by replacing the word "essay" with "academic paper," such as "How

well can you plan for the required tasks involved in writing an academic paper?" The SEW scale was found to have notably high internal reliability (α = .92) consistent with previously reported metrics for the original measure used with undergraduates (αs = .89-.92; Prat-Sala and Redford, 2010, 2012).

The 12-item Self-efficacy in Reading (SER) scale asked participants to rate their confidence in completing reading tasks related to higher education. The scale was adapted for graduate students by replacing the word "essay" with "academic paper" (i.e., "How well can you search effectively for relevant background reading when writing an academic paper?") and by reducing item wordings to facilitate item comprehension. For example, the item "Whilst reading an article, how well can you identify other relevant references which you consider may be of further interest to read?" was adapted to "While reading an article, how well can you identify other relevant references?" The SER scale showed high internal reliability (α = .88) similar to the original measure developed for use with undergraduates (αs = .87–.90; Prat-Sala and Redford, 2010, 2012).

Program variables. An adapted version of the 17-item, seven-point work engagement scale developed by Schaufeli *et al.* (2006; 0 = never to 6 = every day) was used to measure students' perceived engagement in their academic programs (replacing "work" with "studies"; sample item: "I find my studies full of meaning and purpose"). The five-item, seven-point Satisfaction with Life scale (Diener *et al.,* 1985; 1 = strongly disagree to 7 = strongly agree) was adapted to measure participants' satisfaction with their graduate program (replacing "life" with "program"; sample item: "The conditions of my program are excellent"). A four-item, 5-point scale adapted from Hackett *et al.* (2001; 1 = very unlikely to 5 = certain),) was used to measure participants' intentions to quit their graduate studies (sample item: "I think about quitting my graduate program").

Psychological well-being. The seven-item, seven-point emotional exhaustion subscale of the Maslach Burnout Inventory (MBI; Maslach and Jackson, 1986; 0 = never to 6 = every day) was adapted for the present study (changing "work" to "studies"; sample item: "I feel emotionally drained from my studies"). A 10-item, five-point, brief version of the scale developed by Clance (1985; 1 = not at all true to 5 = very true) was used to assess imposter syndrome, with scale items including statements describing feeling like a fraud despite previous achievements (sample item: "At times, I feel my success has been due to some kind of luck").

Results

Preliminary Analyses

Initial differences. Independent-samples t-tests and correlational analyses were conducted to examine potential initial differences on the study measures as a function of key demographic variables (i.e., gender, age, English language). There was a significant gender effect on exhaustion [$t(761)$ = -2.14, p = .044, with females reporting higher levels (M = 3.58, SD = 1.36) than males (M = 3.32, SD = 1.40). Similarly, females reported higher levels of imposter syndrome (M = 3.77, SD = 0.79) than males (M = 3.62, SD = 0.79; $t(757)$ = -2.155, p = .032). Native and non-native English speakers also differed on writing self-efficacy [$t(814)$ = 4.323, p < .001], with non-native speakers reporting lower levels of writing self-efficacy (M = 4.68, SD = 1.02) than native speakers (M = 5.06, SD = 1.06). Likewise, non-native English speakers reported significantly lower levels of reading self-efficacy (M = 5.40, SD = .76) than native speakers (M = 5.59, SD = .76; $t(776)$ = 2.58, p < .001). Zero-order correlations further showed participants' age to be positively correlated with writing self-efficacy ($r(787)$ = .11, p < .01) and quitting intentions ($r(786)$ = .08, p < .05), as well as negatively correlated with exhaustion ($r(782)$ = -.08, p < .05) and imposter syndrome ($r(782)$ = -.17, p < .01).

Correlational analyses. As outlined in Table 2, zero-order correlational analysis showed a large positive correlation between writing and reading self-efficacy. As such, multicollinearity between writing and reading self-efficacy was examined with a tolerance of > .40 and VIF of < 2.50 as outlined by Meyers, Gamst, and Guarino (2017). In the current regression model, the tolerance ranged from .645 to .683 and the VIF ranged from 1.465 and 1.535, thus ruling out multicollinearity as a serious potential confound. The program-specific and global well-being measures were intercorrelated in the expected directions and were small to moderate in magnitude, thus suggesting limited redundancy between our outcome measures.

Main Analyses

As outlined in Table 3, hierarchical linear regressions were conducted to evaluate the main and interaction effects of reading and writing self-efficacy on the program-specific and global well-being dependent measures. Covariates were entered in Step 1 to control for participants' background characteristics and included age, gender, and English as a first language based on significant initial differences. The inclusion of these covariates is also consistent with existing research showing self-efficacy levels to be especially problematic for

Table 2. Zero-order correlations between study variables

	1	2	3	4	5	6
1. Writing self-efficacy	-					
2. Reading self-efficacy	.56**	-				
3. Engagement	.34**	.26**	-			
4. Satisfaction	.28**	.17**	.45**	-		
5. Quitting intentions	-.11**	-.26**	-.29**	-.44**	-	
6. Emotional exhaustion	-.14**	-.24**	-.32**	-.39**	.32**	-
7. Imposter syndrome	-.19**	-.32**	-.16**	-.19**	.41**	.15**

Note. $^*p < .05.$ $^{**}p < .01.$

graduate students who are younger (e.g., Ho, 2016), non-native English speakers (e.g., Sidman-Taveau and Karathanos-Aguilar, 2015; Tercanlioglu, 2004), or female (e.g., Huerta *et al.*, 2017). Writing and reading self-efficacy were subsequently entered as predictors in Step 2 to evaluate their main effects, with the interaction between writing and reading self-efficacy entered in Step 3. The main and interaction effects were mean-centered prior to the analysis.

Table 3. Hierarchical regression analyses of self-efficacy on well-being

	Engagement		Satisfaction		Quitting intentions		Emotional exhaustion		Imposter syndrome	
	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β	ΔR^2	β
Step 1	0.01		0.01		.02**		.02***		.04***	
Age		0.01		-0.03		-.09**		-.10**		-.19***
Gender		0.06		-0.04		0.07		.07*		0.07
English		0		-.07*		-0.03		.08*		-0.07
Step 2	.12***		.08***		.07***		.07***		.11***	
Writing self-efficacy		.28***		.27***		-.27***		-.26***		-.34***
Reading self-efficacy		.11**		0.01		0.02		0		0.01
Step 3	0		0		0		0		.01*	
Writing self-efficacy X reading self-efficacy		-0.01		-0.02		0.02		-0.03		-.08*
Total R^2	.13***		.08***		.08***		.09***		.16***	

Note. English = English as a first language. $^*p < .05.$ $^{**}p < .01.$ $^{***}p < .001.$

Results showed *writing self-efficacy* to be a strong predictor across all outcome measures. Specifically, higher writing self-efficacy levels predicted better levels of program engagement (*β* = .28, *p* < .001), satisfaction (*β* = .28, *p* < .001), and quitting intentions (*β* = .28, *p* < .001), as well as lower levels of both emotional exhaustion (*β* = .28, *p* < .001) and imposter syndrome (*β* = .28, *p* < .001). *Reading self-efficacy* was additionally found to predict higher levels of program engagement (*β* = .28, *p* = .012), but did not significantly predict any other dependent variables. A significant interaction effect was also observed between writing and reading self-efficacy on imposter syndrome (β = .28, *p* = .014). A simple slopes post-hoc contrast (Figure 1) showed the benefits of reading self-efficacy on imposter syndrome to be greatest for graduate students with higher levels of writing self-efficacy (*β* = -.12, *t*(745) = -2.026, *p* = .043, *CI* = [-.276, -.032]).
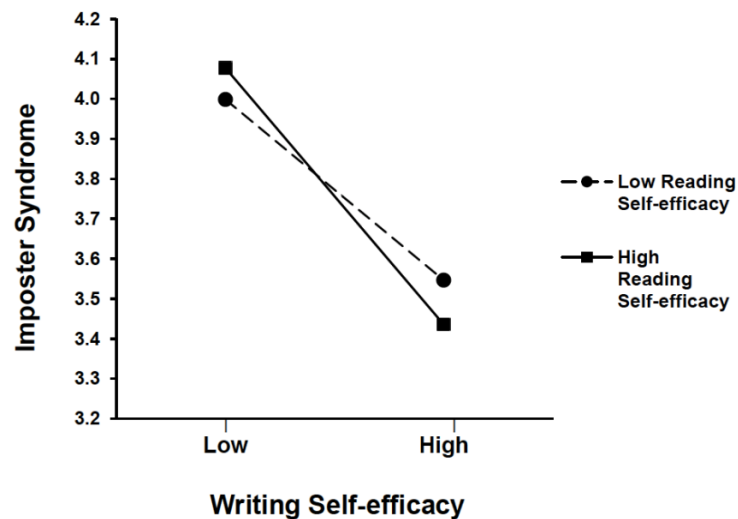
Figure 1. Interaction effect of writing and reading self-efficacy on imposter syndrome.

Discussion

Hypothesis 1 and 2: Main Effects

The present study represents the first quantitative attempt to investigate the relationships between writing and reading self-efficacy, persistence, and well-being in graduate students. Overall, the results showed writing self-efficacy to be a stronger and consistent predictor of graduate students' well-being and persistence thus providing clear empirical support for our first study hypothesis. This finding is consistent with previous research showing graduate students' writing activities to be closely connected to their emotional well-being (e.g., Aitchison *et al.*, 2012; Castello *et al.*, 2013). Moreover, this pattern of results is consistent with social learning theory as outlined by Bandura (1977, 1994) in showing graduate students' self-efficacy to be closely related to with their somatic and emotional experiences specifically with respect to the writing process.

However, the study findings provided only limited support for Hypothesis 2 in showing only a single main effect for reading self-efficacy on program engagement in graduate students. Nevertheless, given the zero-order correlations showing reading self-efficacy to correspond with better levels on each of the outcomes assessed, these results suggest that reading self-efficacy may in fact function in the service of writing self-efficacy that, in turn, serves as a more powerful proximal predictor of well-being in graduate students (for arguments in support of this potential causal relationship, see Wisker, 2015; McAlpine and Amundsen, 2012; Kwan, 2008). Taken together, these findings suggest that while it is important to emphasize both writing and reading self-efficacy to promote more meaningful program engagement and commitment among graduate students, it is especially advantageous to promote writing self-efficacy to more substantially impact their program persistence and overall psychological well-being.

Hypothesis 3: Interaction Effects

In partial support of our third hypothesis that proposed significant multiplicative interaction effects of writing and reading self-efficacy on the program-specific adjustment and well-being outcomes, a significant interaction effect was observed on imposter syndrome in our graduate student sample. Whereas writing self-efficacy was generally beneficial for feeling less like a fraud in one's graduate program, this effect was significantly stronger when students also reported greater confidence in their reading abilities. Given that imposter syndrome pertains directly to perceptions of self-efficacy, with feelings of self-doubt corresponding directly with low self-confidence, it is perhaps not surprising that this competence-related outcome was more strongly predicted by the self-efficacy interaction effect than the other measures. Nevertheless, this finding expands upon previous research in showing not only writing but also reading self-efficacy to correspond with self-doubt in graduate students (cf. Lavelle and Bushrow, 2007), and it further highlights the potential importance of both writing and reading supports for fostering a greater sense of belonging in graduate education.

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Study Limitations and Future Directions

Concerning sample characteristics, given that the present sample was comprised largely of Caucasian females from North America who were native English-speaking students, future studies that reflect greater diversity is needed to generalize the study findings to other graduate student groups (e.g., ESL and ethnic minority graduate students). With respect to methodological issues, due to our adapted measures having not been previously assessed with graduate students, further study of how accurately these scales measure the types of reading and writing tasks required of graduate students is needed. For example, whereas previous case studies show graduate students to report a lack of confidence specifically concerning completing extensive literature reviews or navigating citation protocols to solidify their scholarly identity (e.g., Harris, 2011; Kwan, 2009), the present reading self-efficacy scale focused mainly on the efficiency and effectiveness of their reading strategies and comprehension. Thus, it is possible that the limited impact of reading self-efficacy on graduate student well-being in this study may have been due in part to the scale not including critical aspects of graduate reading experiences.

An additional limitation is that the cross-sectional nature of study precludes causal inferences. For example, although Bandura's (1977) theory asserts that physical symptoms (i.e., exhaustion) could also serve as informational cues that predict subsequent self-efficacy beliefs, our data does not allow for directionality of relations between potentially reciprocal variables to be assessed. Accordingly, future research with longitudinal methods is encouraged to evaluate causal relations between self-efficacy and well-being (e.g., cross-lagged analyses), and between self-efficacy beliefs and demonstrable writing and reading abilities to determine the extent to which these beliefs serve an antecedents or consequences of observable competencies in graduate students. Longitudinal research is also required to evaluate the trajectories of self-efficacy beliefs over time to optimize timing of institutional or peer support initiatives. Moreover, as each of our main study measures was self-report in nature, it is possible that common response bias could have further contributed to inflated relations between the cross-sectional study variables. It is recommended that more objective measures of persistence (e.g., time to completion, supervisor ratings), productivity (e.g., number of manuscripts submitted for publication), reading and writing abilities (e.g., reviewer ratings), and well-being (e.g., medical records) be assessed in future research to provide more substantive insights on how self-efficacy beliefs impact these critical aspects of graduate student development.

Implications for Practice

Considering both the consistently beneficial effects of writing self-efficacy across well-being outcomes, and the significant added benefit of reading self-efficacy for both academic engagement (additive main effect) and imposter syndrome (multiplicative interaction effect), these findings underscore the importance of continued efforts to support both students' writing and reading abilities in graduate programs so as to facilitate not only quality research and program completion, but also promote their psychological well-being in this challenging academic setting. With respect to institutional efforts, our findings highlight the need for writing courses and skill-building workshops for graduate students, especially at the departmental level, to improve self-confidence, productivity, and emotional well-being (Castello *et al*., 2009; Kramer and Libhaber, 2016). Departmental writing retreats to promote self-reflection and goal-setting should also be beneficial for graduate student well-being, due largely to the emotional support provided (Dowse and van Rensburg, 2015; Papen and Thériault, 2018). Moreover, the present findings suggest that the inclusion of strategies for reading and literature navigation in departmental writing courses could help to promote reading self-efficacy, thus potentially achieving additional psychological benefits.

The present findings also support the development of student-centered writing support programs that have been found in previous research to not only increase writing self-efficacy (e.g., Johnson, 2015) but also improve the emotional experiences associated with graduate writing tasks (e.g., lower anxiety; Wynne *et al*., 2014; greater pride, enjoyment; Dwyer *et al*., 2012). Whether such group activities simply include weekly conversations about writing and reading projects (Johnson, 2015), or more structured and routinely scheduled peer feedback events (Palmer and Major, 2008), peer scholarly socialization activities have shown to promote a healthy academic identity (McAlpine *et al*., 2009) and should similarly benefit graduate student well-being. Given that the present study's finding indicate both writing and reading self-efficacy in graduate students to be important predictors of both program-specific

outcomes (engagement, satisfaction) as well as persistence (quitting intentions) and mental health (burnout, imposter syndrome), such writing programs and groups as implemented by universities, departments, or students themselves should serve an important role in promoting both research competencies and psychological well-being in graduate students.

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Appendix A

Self-efficacy in Writing (SEW) Scale Items

1. How well can you express your arguments clearly in academic papers?
2. How well can you link the paragraphs to make your academic paper coherent and make the text flow?
3. If you put in a lot of effort, how well can you write an academic paper that you are proud of?
4. How well can you provide relevant evidence to support your argument?
5. How well can you connect and summarize all of your main points in the conclusion?
6. How well can you write an effective introduction that informs the reader of your intentions for the academic paper?
7. How well can you demonstrate substantial subject knowledge in your academic paper?
8. How well can you plan for the required tasks involved in writing an academic paper?
9. How well can you put ideas together in such a way that they are clear to the reader?
10. How well can you critically evaluate ideas and arguments in an academic paper using evidence from relevant research?
11. How well can you plan and write academic papers when you know the criteria expected of you (by faculty, journals or review committees)?
12. How well can you adopt a variety of methods to enhance your academic writing? (e.g., noting everything down straight away or writing in separate blocks and then putting it together, etc.).

Self-efficacy in Reading (SER) Scale Items

1. How well can you identify all the key points while reading a journal article or academic book?
2. How well can you understand a journal article or academic book?
3. While reading an article, how well can you identify other relevant references?
4. After you read a text, how well can you answer questions or talk with another person about it?
5. How well can you understand the academic language and terminology in your discipline?
6. How well can you recall the most important points after reading a journal article or book chapter?
7. How well can you understand an academic statement or argumentation?
8. How well can you identify relevant background reading when searching the literature?
9. After reading, how well can you understand the notes or summaries that you made while you read?
10. If you cannot understand an academic text, how well can you understand it if you review additional resources related to the topic?
11. How well can you use a variety of methods to enable your understanding of a book chapter or journal article (e.g., highlighting, underlining, etc.)?
12. How well can you identify the most appropriate reference from a number of relevant articles and books?

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