

The role of achievement goal orientations in the relationships between high school students' anxiety, self-efficacy, and perceived use of revision strategies in argumentative writing

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Abstract: This study examined the relationships between writing anxiety, writing self-efficacy, and perceived use of revision strategies in high school students with different achievement goals as they learned argumentative writing in English Language Arts classrooms. Three achievement goal orientation profiles emerged from a sample of 307 American high school students on the basis of their mastery, performance-approach, and performance-avoidance goal orientations: Low on All, Average on All, and High on All. These three profiles of students significantly differed with respect to their writing anxiety and their perceived use of revision strategies. Writing self-efficacy mediated the effect of writing anxiety on the perceived use of revision strategies for students in the Average on All profile only. The findings suggest that students are diverse in their motivational and affective experiences with respect to argumentative writing, and caution against using a one-size-fits-all approach for teaching argumentative writing to students.

Keywords: goal orientation, writing anxiety, argumentative writing, writing self-efficacy



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The ability to generate written arguments is critical to students' academic success and college preparation (Graham & Perin, 2007; Preiss et al., 2013), and is a core literacy competency for students to engage in civic, democratic discourse in society. However, the poor quality of argumentative writing in high school students has been a serious concern over the last decade (Goldstein, 2017; Kiuahara et al., 2009). Recent national assessment of high school writing published by the National Center for Education Statistics (NCES, 2012) has noted that only 27% students are "proficient" (e.g., coherent organization) and 3% students show "advanced" skills (e.g., use evidence to support claims) in writing. Although the issue of how to teach high school students to construct high-quality written arguments is gaining prominence in educational research (Newell et al., 2015; Ferretti & Graham, 2019), the majority of studies in this field center on issues related to learning and instruction. Much remains to be understood regarding the psychological factors associated with learning to write argumentatively (Asterhan & Schwarz, 2016). Understanding these psychological factors is an important step toward designing more learner-centered approaches to teaching and learning argumentative writing.

The overarching goal of this study was to examine individual differences in the psychological mechanisms associated with high school students' perceived use of revision strategies during (modifying texts that were just written) and after (modifying a complete draft) argumentative writing. As in any other form of writing, revision in argumentative writing is a form of self-regulation (Harris et al., 2011; Zimmerman & Risemberg, 1997) by which writers coordinate diverse viewpoints (Midgette, et al., 2008; Nussbaum, 2008, 2011) and improve clarity in writing (Chanquoy, 2009; Ferretti & Lewis, 2013). Although revision has been positively associated with the quality of adolescents' argumentative writing (e.g., coherence in argument structure, Butler & Britt, 2011; Limpo et al., 2014), evidence suggests that adolescents seldom engage in revision or only revise texts at the surface level (e.g., Sanders-Reio et al., 2014). To understand the psychological mechanisms underlying revision, this study examined the association between perceived use of revision strategies and writing self-efficacy (i.e., the confidence in one's ability to succeed in writing; Pajares & Johnson, 1996).

The socio-cognitive model of writing represents a reciprocal relationship between self-efficacy and self-regulation strategies in writing (Zimmerman & Risemberg, 1997). Although the pathway from self-regulation to self-efficacy has been widely studied (e.g., MacArthur et al., 2015), the pathway from self-efficacy to students' use of self-regulation strategies is less understood, particularly in the domain of writing research. By studying the latter pathway, we could examine whether self-efficacy can act as a protective mechanism against negative psychological experiences associated with argumentative writing (Cassidy, 2015). We specifically centered on the role of writing anxiety as the negative relationship

between writing anxiety and students' writing performance has been well-documented in the field (Sanders-Reio et al., 2014; Stewart et al., 2015).

The current study further extends the literature by examining whether the interactions between writing anxiety, writing self-efficacy, and perceived use of revision strategies in argumentative writing, may be related to students' goal orientations (see Figure 1). The underlying assumption is that motives (i.e., goal orientations) governing student engagement in academic writing can vary across students (Pajares et al., 2000) and are differentially related to the perceived use of self-regulation strategies involved in writing (Kaplan et al., 2009). The achievement goal theory of motivation, as detailed in the later section, provides a context to explore this key individual difference (Elliot & Church, 1997).

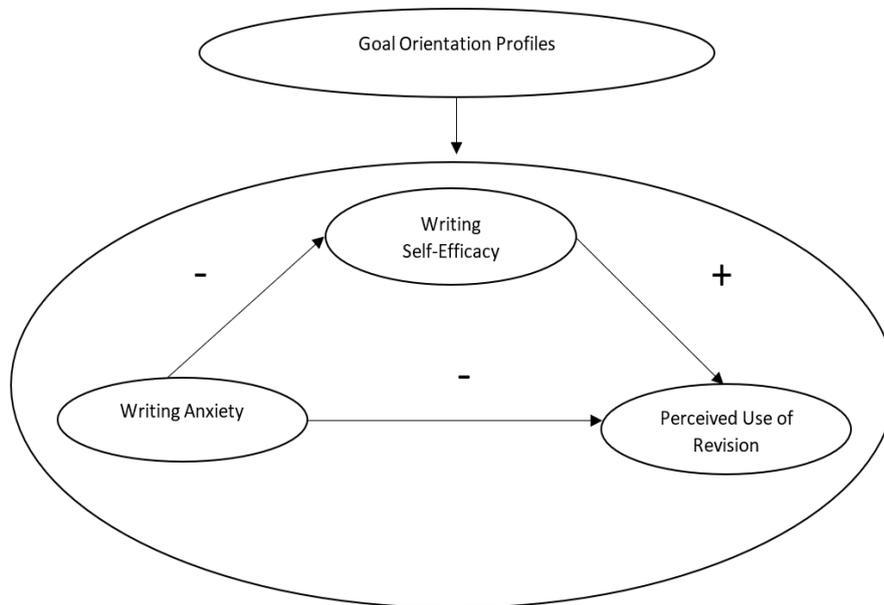


Figure 1. Hypothesized Model.

1. Theoretical Framework

1.1 Socio-Cognitive Perspective of Revision

The role of revision in improving the quality of student essays makes it a particularly significant self-regulation strategy in learning to write. For example, Midgette and Haria (2016) found that when fifth and eighth grade students engaged in revision of

writing within the context of argumentative writing instruction, they wrote structurally sound and topically relevant content in their essays. Song and Ferretti (2013) showed that undergraduate students who revised their argumentative essays with a critical approach (e.g., asking questions about the validity of essay content) wrote essays that were more effective in considering multiple perspectives than those who did not. Butler and Britt (2011) found that undergraduate students who received argumentation-specific instruction as well as directions on how to engage in an overall editing of written arguments produced essays that conveyed stronger arguments and better structure.

The socio-cognitive perspective with its emphasis on self-efficacy provides a theoretical framework for understanding psychological mechanisms underlying revision in argumentative writing (Bandura, 1986; Zimmerman & Risemberg, 1997). Zimmerman and Risemberg proposed that writing involves three types of self-regulation strategies: covert (e.g., detecting editorial changes to be made in the essay draft), behavioral (e.g., recording daily progress), and environmental self-regulation strategies (e.g., choosing a favorable setting to write). According to the Zimmerman and Risemberg model, these self-regulation strategies form a cyclic feedback loop with self-efficacy because practicing the use of these self-regulation strategies can enhance students' confidence in the ability to write, which in turn can motivate them to continue using self-regulation strategies.

The pathway from self-regulation to self-efficacy has been well-documented in the domain of writing (see Bruning & Kauffman, 2016). MacArthur et al. (2015) found that undergraduate students who were using self-regulation strategies, including revision, in their writing over the period of an academic semester reported higher writing self-efficacy at the end of the semester compared to students who were not using these strategies. Zumbrunn (2010) found that elementary students participating in a self-regulated strategy development intervention (SRSD; Graham & Harris, 2005; Harris & Graham, 1996) experienced increase in writing self-efficacy over time. Comparatively, the reversed pathway from self-efficacy to self-regulation strategy use is relatively unexplored in academic writing contexts. One exception is Zimmerman and Kitsantas's (2002) study showing undergraduate students who watched social models engage in revision had higher self-efficacy than those who did not, which led them to revise their own written work. Other studies that at best indirectly support the pathway from self-efficacy to use of self-regulation strategies fall outside the purview of writing research (e.g., Lee et al., 2014). Understanding the pathway from self-efficacy to use of self-regulation strategies is important because it serves as the basis for understanding the mediating role of self-efficacy between writing anxiety and revision.

Writing anxiety is a hindrance in the process of writing for many students (Pajares et al., 2007). Bandura (1997) defined anxiety as a form of physiological arousal. Writing anxiety has been shown to negatively predict both writing self-

efficacy and perceived use of revision strategies. Students who are highly anxious about writing tend to feel less efficacious (Martinez et al., 2011) and report using self-regulation strategies less often in writing (Stewart et al., 2015) than students with low anxiety. Furthermore, Woodrow (2011) found that writing self-efficacy mediates the relationship between writing anxiety and writing performance. Although the outcome measure of Woodrow's study focused on writing performance rather than self-regulation, it stands to reason that writing self-efficacy mediates the relationship between writing anxiety and use of self-regulation strategies in argumentative writing. This indirect link is expected to exist based on the consistent findings showing a positive correlation between self-regulation and writing performance (Santangelo et al., 2016). The current study sought to investigate the mediating role of writing self-efficacy.

1.2 Profiles of Achievement Goal Orientations

Achievement goal orientations are the reasons why a student engages in a particular academic activity. From a socio-cognitive perspective, achievement goal orientations are important personal factors that are correlated with engagement in self-regulation strategies in the domain of writing (Zimmerman & Risemberg, 1997). The current study adopted the trichotomous achievement goal theory proposed by Elliot and Church (1997) who delineated three types of achievement goal orientations that characterize students in learning environments – mastery, performance-approach, and performance-avoidance. Although later researchers have made a distinction between approach and avoidance within the mastery orientation (Elliot et al., 2011), the occurrence of mastery-avoidance in learning environments is uncommon and the existing measures of mastery-avoidance still need refinement (Ciani & Sheldon, 2010; Hulleman et al., 2010).

Different achievement goal orientations have been shown to have a distinct influence on use of self-regulation strategies in writing. Kaplan et al. (2009) found that mastery goal-oriented high school students were more likely to report engaging in self-regulation strategies (including revision) in writing whereas students with performance-approach or performance-avoidance goal orientations were less likely to report using self-regulation strategies in writing. Differences are also observed with respect to writing anxiety and writing self-efficacy based on students' goal orientations. In the context of writing, mastery goal orientation is adaptive in promoting low writing anxiety and high writing self-efficacy, performance-approach goal orientation is positively associated with writing self-efficacy, and performance-avoidance goal orientation is positively related to writing anxiety and negatively related to writing self-efficacy (Pajares et al., 2000). These findings make it imperative to incorporate achievement goal orientations into the socio-cognitive framework of perceived use of revision strategies in argumentative writing.

It has been acknowledged in the achievement goal theory literature that the same student can adopt a combination of goal orientations. Pintrich's (2000) seminal study showed that eighth and ninth grade students with high mastery as well as performance-approach goal orientations seemed to fare just as well as students with high mastery and low performance-approach goal orientations with respect to affective experiences, self-efficacy, and self-regulation, in learning environments. Since then, there has been a shift from a variable-centered approach to a person-centered approach to understand how individual differences in the overall configuration of multiple goal orientations are related to students' affective and motivational processes (Conley, 2012; Tuominen-Soini, et al. 2008, 2012).

However, findings of the number of goal orientation profiles have been mixed due to differences in the approach to identifying these profiles. For example, Conley (2012) found seven profiles in middle school students based on using the trichotomous goal theory in conjunction with the expectancy-value theory of motivation. Tuominen and colleagues (2011, 2012) identified four profiles in high school students based on five goal orientations in their studies: mastery-intrinsic, mastery-extrinsic, performance-approach, performance-avoidance, and work avoidance. Even researchers using the trichotomous achievement goal theory have found inconsistency in the number of profiles. For example, Luo et al., (2011) found the following four profiles in high school math classrooms: diffuse (moderate mastery, performance-approach, and performance-avoidance), moderate mastery (moderate mastery, low performance-approach and low performance-avoidance), success oriented (moderate mastery, high performance-approach, and high performance-avoidance), and approach (high mastery, high performance-approach, and low performance-avoidance). In a longitudinal study tracking students from third to seventh grade, Schwinger and Wild (2012) found three profiles: high multiple goals (high mastery, high performance-approach, high performance-avoidance), moderate multiple goals (moderately high mastery, moderately high performance-approach, moderately high performance-avoidance), and primarily mastery oriented (moderately high mastery, low performance-approach, low performance-avoidance). Some of these studies further suggest that goal orientation profiles are stable in most high school students (Tuominen-Soini et al., 2011).

To the best of our knowledge, the role of goal orientation profiles in the context of writing remains largely unexplored. The wide range of possible goal orientation profiles raises the possibility that this individual difference could be situation-specific (Kaplan & Maehr, 2002). The study sought to address the correlates of adopting different combinations of achievement goal orientations as high school students learn about argumentative writing.

2. Research Questions

We addressed four specific research questions:

1. What are the different goal orientation profiles among the high school students receiving argumentative writing instruction in English Language Arts (ELA) classrooms? We anticipated finding either three or four goal orientation profiles based on existing person-centric research using the trichotomous goal theory framework (Luo et al., 2011; Schwinger & Wild, 2012). The open-ended nature of this hypothesis stems from the variation in the number of profiles observed across studies in different academic contexts.
2. Do students with distinct goal orientation profiles differ significantly in writing anxiety, writing self-efficacy, and perceived use of revision strategies in argumentative writing? We expected the emergent goal orientation profiles to differ with respect to writing anxiety, writing self-efficacy, and perceived use of revision strategies in argumentative writing. An adaptive profile was expected to show low writing anxiety, high writing self-efficacy, and high perceived use of revision strategies. A maladaptive profile was expected to show high writing anxiety, low writing self-efficacy, and low perceived use of revision strategies. The presence of high performance-avoidance goal orientation in any profile was expected to be maladaptive (Pajares et al., 2000). A combination of high mastery and high performance-approach goal orientations in any profile was expected to have mixed outcomes, whereas a profile governed by high mastery goal orientation was expected to be adaptive (Pintrich, 2000). If high performance-approach and performance-avoidance goal orientations co-occurred in a profile, it was expected to be related to high writing anxiety and show mixed patterns of relationships with writing self-efficacy and perceived use of revision strategies (Elliot & Church, 1997; Luo et al., 2011). Low levels of mastery, performance-approach, and performance-avoidance goal orientations was expected to be associated with low writing anxiety and low perceived use of revision strategies, but moderate/high writing self-efficacy (Tuominen-Soini et al., 2008).
3. Does writing self-efficacy mediate the relationship between writing anxiety and perceived use of revision strategies in argumentative writing? We expected writing anxiety to have a direct and indirect relationship with perceived use of revision strategies in argumentative writing (Martinez et al., 2011; Stewart et al., 2015). We proposed an indirect pathway from writing anxiety to perceived use of revision strategies via writing self-efficacy (Woodrow, 2011).
4. Does the mediating effect of writing self-efficacy vary across students with different goal orientation profiles? To address this question, we conducted a prerequisite analysis to confirm that all of the measures for the constructs in the

mediation model were interpreted in an identical way across students with different goal orientation profiles. Under this measurement assumption, we expected the mediation effect to be distinct across goal orientation profiles (Pajares et al., 2000).

3. Method

3.1 Participants

Participants were 307 US high school students ($M_{\text{age}} = 16.38$ years, $SD_{\text{age}} = 0.76$) from 14 English Language Arts (ELA) classrooms located across 10 schools in midwestern United States. Each classroom was instructed by a different teacher. The gender composition of the sample was 40.70% boys. The race and ethnicity of the sample were as follows: 65.50% White, 8.50% Black, 3.90% Hispanic, 0.30% American Indian/Alaska Native, 6.20% Asian, 8.50% students reported other or mixed race, and 7.20% students did not report their race/ethnicity. About 47.90% students were on the general academic track and 52.10% students were in Advanced Placement classes.

3.2 Procedure

The data came from a larger research project that aimed to develop an effective instructional approach for argumentative writing in high school ELA classrooms. All teachers participated in a two-week summer workshop to learn mastery-focused practices and principles of teaching argument as a form of inquiry and learning (Newell et al., 2019). Based on these mastery-focused principles, the teachers developed lesson plans for argumentative writing with a marked emphasis on personal skill development as opposed to social comparison. Although the research team reviewed and discussed the initial drafts of these lesson plans, the teachers ultimately initiated and enacted the mastery-focused teaching principles into their instructional practices as they saw fit. At the beginning of the fall semester, students filled out questionnaires that assessed their writing anxiety and writing self-efficacy. Toward the end of the fall semester, students reported their use of revision strategies in argumentative writing and achievement goal orientations in their ELA class.

3.3 Measures

For each of the measure presented below, students were instructed to indicate how true the statements were for them as they learned argumentative writing in ELA classrooms. Students responded to each statement on a 5-point Likert scale ranging from 1 (not at all true) to 5 (always true). Reliability (Cronbach's α) and confirmatory factory analysis (CFA) for each measure are reported based on the current sample.

Achievement Goal Orientation

The Achievement Goal Orientation scale was adapted from a widely validated and replicated scale developed by Midgley et al. (1998). The scale consisted of three subscales: mastery goal orientation (four items; e.g., “I am eager to master the skills taught in this class”; $\alpha=.83$), performance-approach goal orientation (five items; e.g., “It is important to me that other students in my class think that I am good at my class work”; $\alpha=.89$), and performance-avoidance goal orientation (four items; e.g., “It is important to me that I don’t look stupid in class”; $\alpha=.81$). CFA indicated satisfactory fit, $\chi^2(62) = 232.53$, $p < .001$; CFI = .93; RMSEA = .10; SRMR = .07.

Writing Anxiety

A measure of writing anxiety was created in keeping with the operationalization of the construct within the socio-cognitive theory as a physiological state (Bandura, 1986, 1997). The writing anxiety scale consisted of four items (e.g., “I tremble or perspire when I write under time pressure”; $\alpha = .77$). The error correlation between two items was included in CFA: “I usually feel my whole body rigid and tense when I write” and “I feel my hands going cold when I have to write.” This decision was made because the wording for both of these items focused exclusively on the physiological aspect of anxiety, whereas the other items focused on physical discomfort when writing under time constraint. The wording of the items may have impacted the responses of the participants to these two items by affecting the way in which the items were understood; further, the need for incorporating this correlation was corroborated by a large modification index value of 18.46, a large standardized expected change value of .42, and a standardized residual greater than 2 (see Brown, 2015). Prior to the modification, the model fit was not ideal, $\chi^2(2) = 17.22$, $p < .001$; CFI = .95; RMSEA = .12; SRMR = .04. After the modification, CFA indicated an excellent model fit, $\chi^2(1) = .005$, $p = ns$; CFI = 1.00; RMSEA = .00; SRMR = .001.

Writing Self-Efficacy

A domain specific self-efficacy scale to assess writing self-efficacy was adapted from the Writing Self-Efficacy Scale (Shell et al, 1989) and Writing Efficacy Scale (Kaplan et al., 2009). The scale consisted of six items (e.g., “While writing an argumentative essay, I can find evidence to support my arguments”; $\alpha = .77$). The error correlation for the following two items was included in CFA: “While writing an argumentative essay, I can consider multiple perspectives about the issue” and “While writing an argumentative essay, I can identify possible counterarguments to my arguments.” These two items are semantically associated with considering opposing sides of the issue. The need for correlating the two error terms was confirmed by a large modification index value of 23.70, a large standardized expected change of .33, and

a standardized residual greater than 2 (see Brown, 2015). Prior to the modification, the model fit was not ideal, $\chi^2(9) = 42.56$, $p < .001$; CFI = .95; RMSEA = .11; SRMR = .04. After the modification, CFA indicated a good model fit, $\chi^2(8) = 19.41$, $p = .01$; CFI = .98; RMSEA = .07; SRMR = .03.

Students' Perception of the Use of Revision Strategies

The perceived use of revision strategies scale consisted of six items (e.g., "After finishing an essay, I edit it to make it brief and to the point"; $\alpha = .78$) and was adapted from Learning Strategies and Self-Regulation in Writing Scale (Kaplan et al., 2009). The error correlation between the following two items was included in CFA: "After finishing an essay, I re-read to see whether everything is OK" and "After finishing writing an essay, I go back to fix what is not OK." Both the items revolve around checking and fixing writing after an essay is completed; the thematic overlap across the items due to the wording can substantively justify correlating their error terms. The need for error correlation was also justified based on a large modification value of 42.03, a large standardized expected value of .78, and a standardized residual greater than 2 (see Brown, 2015). The model fit prior to modification was not ideal, $\chi^2(9) = 47.58$, $p < .001$; CFI = .92, RMSEA = .12; SRMR = .05. After the modification, CFA indicated a very good fit, $\chi^2(8) = 11.97$, $p = ns$; CFI = .99; RMSEA = .04; SRMR = .02.

3.4 Data Analyses

Using the Mplus Version 6 statistical software package (Muthén & Muthén, 2010), a latent profile analysis was conducted to identify goal orientation profiles (research question 1). The differences in mean factors scores of writing anxiety, writing self-efficacy, and perceived use of revision strategies across the identified profiles were tested using Multivariate Analysis of Variance (MANOVA), followed by post-hoc group comparisons (research question 2). We used a Structural Equation Modeling approach (SEM; Kline, 2010) to test the mediation model for the full sample, controlling for the clustered nature of the data (i.e., students nested in classrooms; research question 3). The measurement invariance of writing anxiety, writing self-efficacy, and perceived use of revision strategies scales was tested (pre-requisite analysis for research question 4; Milfont & Fischer, 2010). Multigroup SEM was used to observe differences in the mediation effect across the latent profiles, controlling for clustering effects (Lau & Cheung, 2012; research question 4).

The percentage of missing values for each of the variables included in the study was less than 10%. Prior to data analyses, IBM Statistics SPSS 21 was used to impute missing values. Multiple imputations were conducted using the Fully Conditional Specification Method and Predictive Mean Matching Model.

4. Results

4.1 Research Question 1: Profiles of Achievement Goals

Means, standard deviations, and pairwise correlations for all variables using raw scores are presented in Table 1. To detect profiles of achievement goal orientations, an exploratory latent profile analysis was conducted (Finch & Bronk, 2011; Hoijtink, 2010). First, we tested a three-profile solution and found the entropy value was .80, indicating the existence of latent profiles in our sample (Muthén, 2018). Next, we tested a four-profile model which was a statistically better model than the three-profile model based on a comparison of the fit indices. To select the final solution of profiles, we compared the models based on the following model fit criteria: Lo-Mendell-Rubin (LMR) test, Akaike Information Criterion (AIC; Akaike, 1987), Bayesian Information Criterion (BIC; Schwarz, 1978), Sample-size Adjusted Bayesian Information Criterion (SABIC; Sclove, 1987), and entropy values. For LMR tests, the less statistically significant models are preferred. For AIC, BIC and SABIC values, lower values are preferred. For entropy values, higher values are preferred. Table 2 includes the values of the model fit indices for the three- and four-profile models.

Table 1. Correlations and Means: Goal Orientations, Anxiety, Self-Efficacy, and Revision

Variables	1	2	3	4	5	M	SD
1. Mastery	-					16.46	2.91
2. Performance-approach	.25**	-				14.22	5.28
3. Performance-avoidance	.33**	.83**	-			12.80	4.14
4. Anxiety	.12	.21**	.17**	-		9.03	3.61
5. Self-efficacy	.14*	.06	.03	-.15**	-	22.83	3.82
6. Revision	.54**	.16**	.20**	.09	.34**	23.15	3.90

Note. * $p < .05$. ** $p < .01$.

Table 2. Model Fit Indices for Latent Profile Analysis

Classes	LMRT	AIC	BIC	SABIC	Entropy
3	105.33 ($p = .03$)	4841.28	4893.46	4849.05	.80
4	56.71 ($p = .02$)	4790.10	4857.18	4800.09	.81

Additionally, the profiles are expected to be conceptually and statistically distinct on the indicator variables (e.g., Meece & Holt, 1993). In our sample, the four-profile model was difficult to interpret because MANOVA results indicated that the latent profiles were not statistically different from each other on the indicator variables unlike the three-profile model. Therefore, we decided to retain the three-profile

model because it was parsimonious, showed a good fit, and more interpretable than the four-profile model (Nylund-Gibson & Choi, 2018).

The students in Profile 1 had significantly lower mean scores on all three types of goal orientations compared to the students in Profile 2 and Profile 3. Students in Profile 3 scored significantly higher on all three goal orientations than students in Profile 1 and Profile 2. We labeled Profile 1 as “Low on All”, Profile 2 as “Average on All”, and Profile 3 as “High on All” based on the comparisons of mean factor scores in each type of goal orientation (see Figure 2).

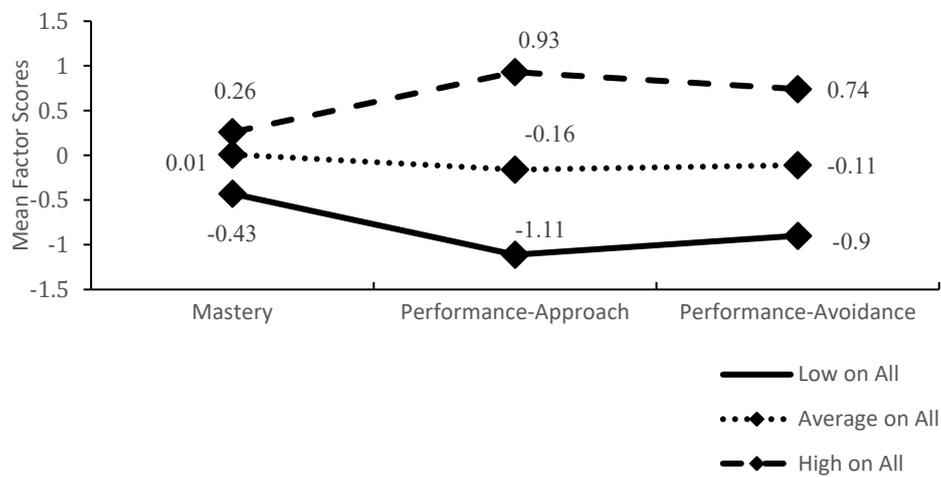


Figure 2. Latent Profiles.

Note. The mean of factor scores for each goal orientation profiles is 0 in the overall sample.

MANOVA and post-hoc comparisons showed that students in the three profiles differed significantly on each goal orientation (see Table 3). These comparisons confirm that the three-profile solution not only yielded a satisfactory model fit but also had the best interpretability (Muthén, 2004; Williams & Kibowski, 2016). About 21% ($n = 64$) of the high school students in our sample belonged to the Low on All profile, 47% ($n = 143$) to the Average on All profile, and 33% ($n = 100$) to the High on All profile.

Table 3. Comparing Mean Factor Scores of Goal Orientations, Anxiety, Self-Efficacy, and Revision Across Latent Profiles

Goal orientation	Low on all (a)	Average on all (b)	High on all (c)	F	η^2	Post hoc ^a
Mastery	-0.43	0.01	0.26	24.14	.14	a < b < c
Performance-approach	-1.11	-0.16	0.93	546.15	.78	a < b < c
Performance-avoidance	-0.90	-0.11	0.74	674.50	.82	a < b < c
Anxiety	-0.33	.002	0.21	10.28	.06	a < b, c
Self-efficacy	-0.04	-0.01	0.04	0.66	.004	$p = .52$
Revision	-0.19	0.01	0.11	7.87	.05	a < b, c

Note. ^aAll post hoc comparisons were significant at $p < .05$.

4.2 Research Question 2: Profile Differences in Writing Anxiety, Writing Self-Efficacy, and Perceived Use of Revision Strategies

Table 3 presents the mean factor scores of goal orientations, writing anxiety, writing self-efficacy, and perceived use of revision strategies for each profile. The mean writing anxiety factor scores were significantly different across the three profiles ($F = 10.28$, $p < .001$, $\eta^2 = .06$). Post hoc analyses showed students with the High on All profile and Average on All profile reported significantly higher writing anxiety than students with the Low on All profile. The mean scores for perceived use of revision strategies in writing were significantly different across the three groups ($F = 7.87$, $p < .001$, $\eta^2 = .05$). Post hoc analyses showed students with the High on All and the Average on All profile reported significantly higher perceived use of revision strategies compared to students with the Low on All profile. There was no difference in writing self-efficacy between the three different goal orientation profiles.

Table 4 reports the correlations between factor scores of writing anxiety, writing self-efficacy, and perceived use of revision strategies, for each latent profile. The correlation between writing self-efficacy and perceived use of revision strategies was positive and significant for students in all three profiles. The correlation between writing anxiety and writing self-efficacy was negative and significant only in the Average on All profile.

Table 4. Correlations of Factor Scores among Anxiety, Self-Efficacy, and Revision across Profiles

Low	1	2	3
1.Anxiety	-		
2.Self-efficacy	-.17	-	
3.Revision	.15	.61**	-
Average	1	2	3
1.Anxiety	-	-	-
2.Self-efficacy	-.28**	-	-
3.Revision	.16	.44**	-
High	1	2	3
1.Anxiety	-	-	-
2.Self-Efficacy	-.19	-	-
3.Revision	.16	.55**	-

Note. ** $p < .01$.

4.3 Research Question 3: Socio-Cognitive Model of Revision

Fitting the mediation model (see Figure 1) to the whole data set showed an adequate fit, $\chi^2(98) = 165.72$, $p < .001$; CFI = .95; RMSEA = .05; SRMR = .06. The direct path (c') from writing anxiety to the perceived use of revision strategies in writing was significant ($c' = .14$, $SE = .05$, $p = .006$). The indirect effect (product of path 'a' and path 'b') was significant ($B = ab = -.06$, $SE = .03$, $p = .03$; see Figure 3). The mediation analysis was conducted by controlling for cluster effects. Note, although the correlation between writing anxiety and perceived use of revision strategies was not significant as shown in Table 1, we tested the mediation model following Hayes's (2013) recommendation that "mediation analysis as practiced in 21st century no longer imposes evidence of simple association between X and Y as a precondition" (p. 88).

4.4 Research Question 4: Testing for Stability of Measures Across Profiles

We conducted a test of measurement invariance for writing anxiety, writing self-efficacy, and perceived use of revision strategies (Table 5). This involved testing for configural invariance (model 1) and metric invariance (model 2). A configural invariance model tested whether students in each profile understood the constructs in the same way. A metric invariance model tested whether students in different profiles responded to the items on each measure in the same way. The chi-square difference tests for each of the constructs were non-significant,

indicating that all the measures satisfied the weak measurement invariance criterion for multi-group analysis (Milfont & Fischer, 2010).

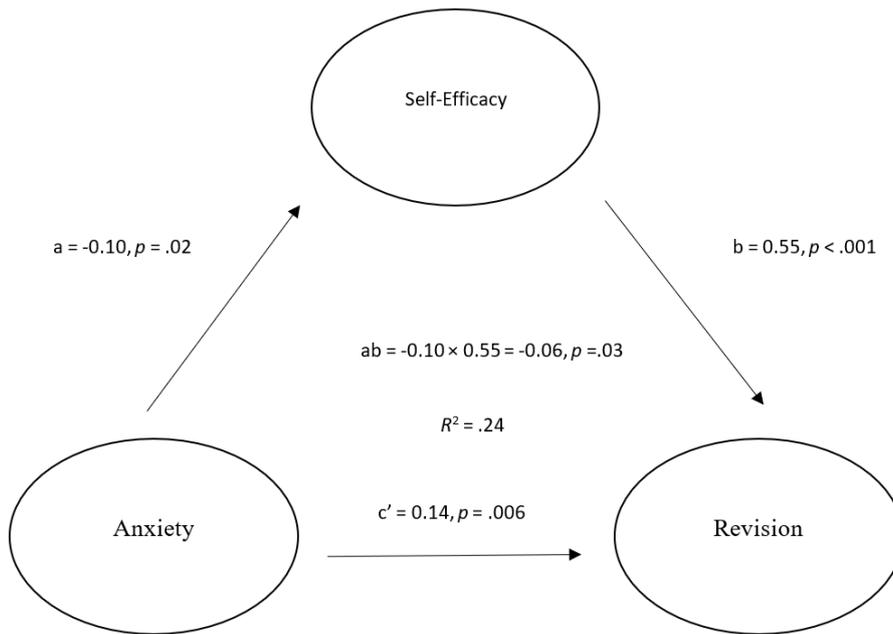


Figure 3. Socio-Cognitive Model of Revision for all Students.

Table 5. Measurement Invariance Testing across the Three Latent Profiles

Variable	χ^2	CFI	TLI	RMSEA	SRMR	$\Delta\chi^2$
Writing anxiety						
Configural invariance	11.29 ₍₉₎ , $p = .26$	.99	.98	.05	.04	-
Metric invariance	15.47 ₍₁₅₎ , $p = .42$	.99	.99	.02	.05	3.70 ₍₆₎ , $p = .72$
Self-efficacy						
Configural invariance	36.61 ₍₃₄₎ , $p = .35$	.99	.99	.03	.04	-
Metric invariance	44.06 ₍₄₄₎ , $p = .47$	1.00	1.00	.004	.06	6.94 ₍₁₀₎ , $p = .73$
Revision						
Configural invariance	34.07 ₍₃₄₎ , $p = .46$	1.00	1.00	.01	.04	-
Metric invariance	40.25 ₍₄₄₎ , $p = .63$	1.00	1.00	.00	.05	5.09 ₍₁₀₎ , $p = .88$

4.5 Research Question 4: Socio-Cognitive Model of Revision by Achievement Goal Profiles

A multigroup mediation analysis indicated an acceptable model fit, $\chi^2_{(394)} = 530.47$, $p < .001$; CFI = .91; RMSEA = 0.06; SRMR = 0.09. The results showed that the indirect effect (ab) of writing self-efficacy on the relationship between writing anxiety and perceived use of revision strategies was significant for students with the Average on All profile ($B = ab = -0.09$, $SE = 0.03$, $p = .008$) (Figure 4.3). This indirect effect (ab) of writing self-efficacy was not statistically significant for students with the Low on All profile ($B = ab = -0.05$, $SE = 0.06$, $p = .39$; Figure 3.1) or the High on All profile ($B = ab = -0.04$, $SE = 0.05$, $p = .40$; Figure 4.2). The multi-group mediation analysis was conducted after controlling for cluster effects.

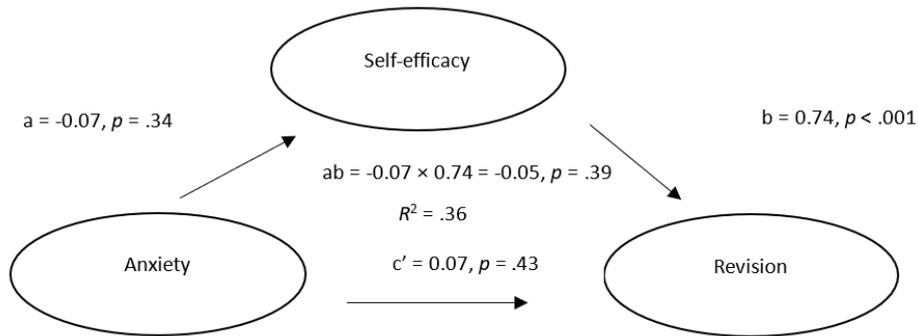


Figure 4.1. Mediation Model 'Low on All.'

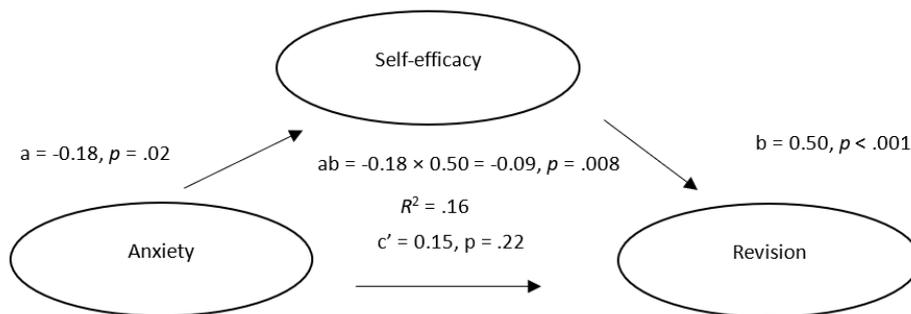


Figure 4.2. Mediation Model 'Average on All.'

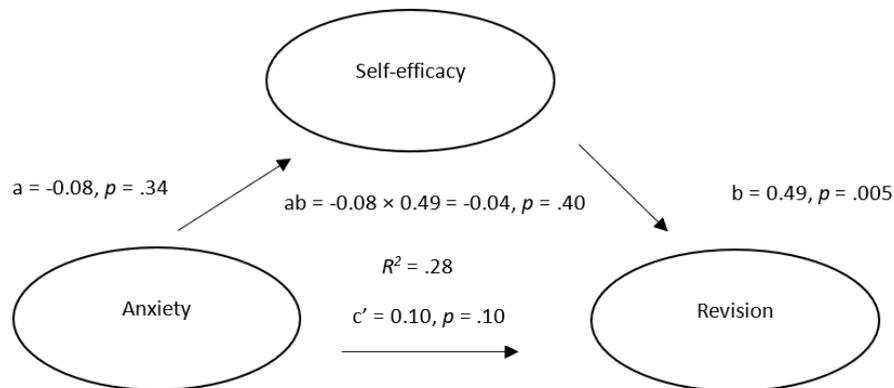


Figure 4.3. Mediation Model 'High on All.'

5. Discussion

In this study, we tested a social-cognitive model of revision in writing and examined how the model varied by students' goal orientation profiles in the context of argumentative writing. Our study identified three latent profiles of achievement goal orientations in high school students' learning argumentative writing in ELA classrooms: Low on All goal orientations, Average on All goal orientations, and High on All goal orientations. Students with these three profiles varied in their writing anxiety and perceived use of revision strategies in argumentative essay writing, but not writing self-efficacy. Overall, writing self-efficacy mediated the relation between writing anxiety and the perceived use of revision strategies in argumentative writing, indicating that the negative relationship between writing anxiety and perceived use of revision strategies in argumentative essay writing may be explained by the mediation effect of writing self-efficacy. This mediation effect of writing self-efficacy was significant in the Average on All group. Overall, the findings suggest that even though students within a classroom received the same mastery-oriented argumentative writing instruction, their learning experience varied significantly due to differences in their goal orientations in the ELA classrooms.

5.1 Goal Orientation Profiles: Individual Differences in Motivation to Write

High school students in our study mostly belonged to the High on All and Average on All profiles of goal orientations, and a small group of students belonged to the Low on All profile (research question 1). The tendency for the majority of the students to pursue mastery and performance goal orientations simultaneously as opposed to a single type of goal orientation indicated that they were motivated to learn but were also concerned about how their performance in class was compared to their peers. The moderate to high adherence to mastery goal orientation may

have been due to the prevalence of instructional practices that were aimed to be mastery-focused; the ELA classroom teachers in our study had received training to support the learning of argumentative writing with a focus on students' skill development rather than testing performance. It is likely that these teachers had promoted a mastery-focused learning environment, as reflected by the students' moderate to high pursuit of mastery goal orientation. It is important to note that about half of our participants came from accelerated classrooms where student placement depended on demonstrated superiority of academic abilities in comparison to their peers. Advanced placement often introduces competition for grades or school-level goals for performance (Feld & Shusterman, 2015; Hammond, 2008; Park et al., 2014). This might explain why social comparison remained highly salient in the argumentative writing experience of these high school students even though the instruction was mastery focused.

We observed that performance-approach and performance-avoidance goal orientations showed a strong and positive correlation in our sample. Furthermore, the students who endorsed mastery goal orientation also endorsed both types of performance goal orientations. The majority of research on goal orientations indicates that the two performance orientations are positively correlated despite there being a conceptual difference among the two (Linnenbrink-Garcia et al., 2012). The magnitude of the correlation ranges from low to very high (Hulleman et al., 2010). In the domain of writing, Kaplan et al. (2009) found that performance-approach and performance-avoidance were highly correlated (above .80). High school students in particular often fail to see a distinction between the approach and avoidance components of performance goal orientations even when explicitly prompted to do so (Murayama & Elliot, 2009; Urda & Mestas, 2006).

The positive correlations between mastery goal orientation and performance goal orientations was inconsistent with the bulk of past research which indicates mastery goal orientation is positively related to performance-approach goal orientation but unrelated to performance-avoidance goal orientation (Hulleman et al., 2010). Yet, our findings are aligned with a handful of studies supporting the positive correlation between mastery goal orientation and performance-avoidance goal orientation (e.g., Kaplan et al., 2009). Hence, the mixed findings suggest that more research attention is needed to identify the developmental factors (e.g., importance of peers) and situational factors (e.g., competition) that may be pertinent to the complex relations among high school students' achievement goal orientations with respect to argumentative writing.

The results of our profile analysis echo the findings from Schwinger and Wild (2012). The patterns of relationships among goal orientations in our sample point to the importance of the "person x situation" interaction involved in the concurrent adoption of different types of goals (Kaplan & Maehr, 2002). Although the instructional approach in the ELA class was mastery focused, the inherently

competitive nature of high school academic environment (e.g., ability grouping) and the resultant salience of social comparison in adolescence may have contributed to the concomitant adoption of mastery, performance-approach, and performance-avoidance goal orientations (Bong et al., 2014).

There were differences across profiles with respect to writing anxiety and the perceived use of revision strategies, and no difference was found in writing self-efficacy (research question 2). Students with the High on All profile and students with the Average on All profile had a higher level of writing anxiety compared to students with the Low on All profile. It is likely that students who identified highly with both mastery and performance goal orientations experience higher stress as a by-product of a constant concern that stems from social comparison, which lies at the core of performance goals (Bong et al., 2014; Linnenbrink, 2005; Sideridis, 2005). In fact, even the presence of mastery goal orientation which is typically associated with low anxiety can fail to buffer against the anxiety stemming from social comparison underlying performance goal orientations (Daniels et al., 2008; Luo et al., 2011). This is corroborated in our sample through the observed positive correlation of writing anxiety with both performance-approach and performance-avoidance goal orientations. Tuominen-Soini et al. (2011) showed that low levels of adherence to mastery and performance goal orientations is associated with less stress. Therefore, it can be argued that students in the Low on All profile were less concerned about self-improvement and their relative class standing resulting in a low level of writing anxiety.

Revision strategies are utilized with the objective of improving the quality of writing. In the absence of concern about skill development and social comparison, it is unlikely students will be motivated to use these strategies. In fact, the Low on All students in our sample reported using revision strategies significantly less than the High on All and the Average on All students. The significantly higher perceived use of revision strategies in the High on All and Average on All groups implies there is a self-regulatory advantage in pursuing mastery and performance goal orientations simultaneously (Wormington & Linnenbrink-Garcia, 2017). However, when the differences in writing anxiety and perceived use of revision strategies are considered together, it would seem that High on All students are the most distressed despite the high perceived use of revision strategies. This pitfall of adopting performance-avoidance and performance-approach goal orientations together stems from the positive relationship between them (Linnenbrink-Garcia et al., 2012). Performance-approach goals and performance-avoidance goals are both driven by a fear of failure, but when students are able to meet academic challenges satisfactorily the desire to succeed overrides the fear of failure (Darnon et al., 2007; Elliot & Church, 1997). On the contrary, in the event of a threat to competence fear of failure dominates their affective state. The High on All students seem most

vulnerable to the fear of failure given their strong identification with the two types of performance goal orientations and high level of writing anxiety.

The lack of difference in writing self-efficacy across the profiles was surprising. The ELA teachers participated in a summer workshop to learn about mastery-oriented instruction for argumentative writing. This summer workshop might have influenced our participating teachers' initial instructional styles, which might have affected their students' writing self-efficacy at the beginning of the semester, even though minimal instruction was implemented prior to the study. Exposure to this instructional approach may have precluded the manifestation of differences in writing self-efficacy across profiles. Another possibility is that since a large portion of the sample were recruited from Advanced Placement classrooms, these students with different profiles may have similar writing self-efficacy across profiles based on their successful academic experiences in the past (Bandura, 1997).

5.2 Goal Orientation Profiles: Variation in the Role of Self-Efficacy

The social-cognitive model of writing proposing self-efficacy as a mediating factor in the relationship between writing anxiety and the perceived use of revision strategies while engaging in argumentative writing was validated. The mediation analysis based on the entire sample showed that writing self-efficacy mediates the relationship between writing anxiety and perceived use of revision strategies (research question 3). In preparation for the multi-group analysis, measurement invariance was tested for the following measures – writing anxiety, writing self-efficacy, and perceived use of revision strategies. The measures showed configural invariance and metric invariance across the three profiles. Multi-group mediation analysis indicated that the mediating role of writing self-efficacy varied across the three goal orientation profiles (research question 4). Writing self-efficacy was a significant mediator in the Average on All profile but did not exert a mediating influence in the Low on All or the High on All profiles.

The overall mediation model indicated that writing self-efficacy is the mechanism partially responsible for the negative association between writing anxiety and students' perceived use of revision strategies in argumentative writing. That is, writing anxiety depletes writing self-efficacy, a psychological resource that is beneficial for triggering use of self-regulation strategies in writing, leading to an overall negative link as suggested by the mediation analysis (Stewart et al., 2015). The results confirm the theoretical implication that writing anxiety is a source of writing self-efficacy, which is correlated with use of self-regulation strategies in writing (Bandura, 1997; Zimmerman & Risemberg, 1997). It should be noted that after controlling for the indirect influence of writing self-efficacy (Figure 3), writing anxiety showed a direct and positive influence on the perceived use of revision strategies in our sample. One possible explanation is that once the mediation mechanism is considered, the remaining association of anxiety with self-regulation

is positive because it is experienced by students as eustress (i.e., an optimal level arousal; Selye, 1976) and thus has an adaptive consequence for the learners.

In comparing goal orientation profiles, we found writing self-efficacy was a significant mediator for the Average on All students in particular. This suggests that in the Average on All group, writing self-efficacy has the potential to reduce the magnitude of the negative association of writing anxiety with the perceived use of revision strategies in argumentative writing. In the other two profiles, writing self-efficacy did not mediate the negative relationship of writing anxiety and perceived use of revision strategies in argumentative writing. This might be because the Average on All students are less stressed about their writing performance compared to their High on All peers, although the difference is not statistically significant. The Average on All and High on All students were not different in the perceived use of revision strategies, and both groups showed higher self-report of using revision strategies in argumentative writing compared to the Low on All group. Average on All students are not overtaken by the negative forces of writing anxiety (e.g., detrimental self-talk) associated with high levels of performance goal orientations (Daniels et al., 2008; Graham & Harris, 1997; Luo et al., 2011), nor are they psychologically detached from the learning outcomes in the argumentative writing context associated with low levels of mastery and performance goal orientations (Tuominen-Soini et al., 2008). Our results suggest that integrating achievement goal theory and the socio-cognitive perspective on writing can shed light on differences in the underlying socio-cognitive processes involved in the learning of argumentative writing (Kaplan et al., 2009).

6. Limitations

The study has several limitations. First, achievement goal orientation was the only motivation construct used to identify students' motivational differences. In the future, profile analysis can incorporate other motivational constructs (e.g., value, perfectionism) to yield a richer understanding of the individual differences in motivation to write (e.g., Conley, 2012; Hanchon, 2010). Second, the students in this study completed an argumentative essay task at the beginning and end of the academic year. However, we could not include a performance measure of revision of argumentative writing because the essay task was a one-draft writing process, and we did not record their process of writing. These reasons prevented us from examining students' revision process during and after writing using non-obtrusive methods such as keystroke logging. We were also unable to include the essays scores in our prediction model due to a significant amount (~40%) of missing values in student essays scores. However, our analysis showed that students' perceived use of revision strategies in writing was positively associated with students' argumentative writing scores averaged across two time points (fall and spring) during the academic year ($r = .12, p = .04$), providing some support for the predictive

validity of the self-report measure of perceived use of revision strategies in argumentative essay writing (Santangelo et al., 2016). Future research can further investigate the motivational influences on students' actual use of revision strategies and performance in argumentative essay writing. Third, writing anxiety, writing self-efficacy, and the perceived use of revision strategies in writing were measured at single time points, preventing us from considering changes in these constructs over time if any, as a result of being exposed to mastery focused argumentative writing instruction (Butler & Britt, 2011; Piniel & Csizér, 2015). Fourth, we demonstrated weak invariance (i.e., metric invariance) but not strict invariance (i.e., scalar invariance) for the variables in the mediation mechanism. Strict invariance is the gold standard for multi-group analysis. Therefore, our findings cannot completely eliminate the possibility that the measures of writing anxiety, writing self-efficacy, and perceived use of revision strategies were interpreted differently by students with different goal orientation profiles. Despite this limitation, our results provide a meaningful starting point for investigating how individual differences in motivation are related to affect, beliefs, and self-regulation in argumentative writing.

7. Implications

Integrating the achievement goal theory with the socio-cognitive perspective on writing provides a new way of acknowledging differences among learners in the context of argumentative writing. Although all the students in the study experienced the same instructional approach, each student's socio-cognitive processes differed in magnitude as did the inter-relationships among them based on their goal orientation profiles. This implies that well-intentioned instructional approaches may fail to impact students positively if they neglect individual differences in students' motivation to engage in argumentative writing.

The differences in socio-cognitive processes as a result of differences in goal pursuits suggest that high levels of joint endorsement of the two types of performance goals are detrimental for high school students learning argumentative writing. Performance goals are focused on social comparisons and potentially indicate internalization of expectations which are derived from others in the social environment. Future investigations should look into the influence of perfectionism on adolescents within argumentative writing contexts.

Overall, the socio-cognitive model of writing is validated with respect to the self-regulation strategy of revision. Writing self-efficacy shared a positive relationship with the perceived use of revision strategies in all students. However, writing anxiety was not related to writing self-efficacy for all students. This implies that promoting the use of revision strategies in students will require differential approaches based on recognition of distinct combinations of achievement goal orientations adopted by students.

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The data supporting the results of this study are not publicly available due to privacy and ethical restrictions. Request for data will need to be approved by the Institutional Review Board at The Ohio State University.

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