Gender Influences on Motivation and Learning Achievement among Tamil-Medium Senior Secondary Students in the Colombo Education Zone

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ABSTRACT

This descriptive survey study aimed to study the influence of gender in motivation and learning achievement among senior secondary students. 360 students from Grades 10 and 11 were selected by stratified random sampling from Tamil Medium schools in Colombo educational zone with equal number of male and female participants. 24 class teachers, 72 parents, and 12 principals were also included in this study. Validated adapted Academic Motivation Scale was used to assess the motivation and average examination marks from recent common examination were used to assess the learning achievement. Female students showed higher learning achievement than male students ($p < 0.001$). No statistically significant difference was noted in intrinsic motivation, overall extrinsic motivation, identified extrinsic motivation and introjected extrinsic motivation between boys and girls ($p>0.05$). However external regulation extrinsic motivation was significantly higher in females than males ($p=0.023$). Female students showed statistically significant higher levels of extrinsic motivation than intrinsic motivation ($p = 0.009$). No significant difference between intrinsic motivation and extrinsic motivation among male students ($p = 0.457$). Motivation of students was identified as a strong predictor of learning achievement in regression analysis ($p < 0.001$). Gender influence on the relationship between motivation and learning achievement was confirmed by moderation analysis using the PROCESS macro with HC3 robust standard errors ($p < 0.01$). Simple slope analysis showed that moderator effect of gender on relationship between motivation and learning achievement is stronger for females than males ($p< 0.001$). This study revealed the gender influence in motivation and its effect on learning achievement. Gender sensitive educational practices would help students improve their motivation and learning achievement. Strategies should also focus on improving intrinsic motivation and internalization among female students.

Keywords: intrinsic motivation, extrinsic motivation, learning achievement, gender differences, senior secondary students

INTRODUCTION

Motivation to learn is known to affect learning achievement of students. Higher levels of motivation are often associated with better learning achievement (Athirathan, 2025; Deci & Ryan, 2020). However, motivation differs among students. Some students are motivated to enjoy learning. Some students study mainly because of exams, marks, or pressure from teachers and parents. Sri Lankan education curriculum mainly assesses students by way of examinations. Students in Sri Lankan education system naturally have an environment for extrinsic motivation. Self-Determination Theory helps to explain these differences. It describes two types of motivation such as intrinsic motivation and extrinsic motivation. Intrinsic motivation comes from own interest and enjoyment in learning. Extrinsic motivation comes from outside reasons such as rewards, marks, or fear of failure. However, self-determination theory argues that extrinsic rewards, sanctions and sanctions generally lead to lower quality of motivation and achievement (Deci & Ryan, 2020).

This study uses both self-determination theory and social cognitive theory. Self-determination theory pays special attention to intrinsic motivation and internalization. Students who are intrinsically motivated are more likely to achieve better academic results than students who are mainly motivated through extrinsic motivation. Several studies conducted on SDT support this argument (Deci & Ryan, 2000, 2020). SDT argues that learning improves when students' basic psychological needs are supported. These needs include autonomy, competence,

and relatedness. Autonomy is the state of control over own's actions. Competency is the sense that one can succeed. Relatedness is feeling of connection or belonging. When these basic needs are satisfied, internal factors would contribute to motivation. However external regulation such as rewards, fear of punishment or failure could make the students mainly dependent on external factors rather than recognizing the values of the learning. It can affect persistent learning and long-term learning outcome. SDT describes autonomous components in the extrinsic motivation which occurs through the process of internalization. Integrated regulation has most autonomous component that a person realizes the value of the particular activity and is motivated to involve although the motivation originated from the external factors. Sense of control over motivation improves from introjection to identification to integration. However externally regulated extrinsic motivation is driven by external factors (Deci & Ryan, 2000, 2020).

Social cognitive theory is used to explain the possible gender difference in motivation. Social Cognitive Theory explains how human functioning is shaped through triadic reciprocal determinism. Personal factors such as beliefs and motivation, behavior, and environmental influences cross react with each other. motivation is more likely influenced by self-efficacy beliefs, outcome expectations, observational learning, and social reinforcement. Social Cognitive Theory explains the role of observational learning and social modeling in constructing gender associated behaviors. Students are exposed to gendered expectations through parents, teachers, peers, and media representations since childhood. These expectations may influence how boys and girls perceive motivation, learning achievement. effort, and compliance with school rules. Social cognitive theory states that gender difference would be there in self-efficacy belief and outcome expectations. It could explain difference in gender perspectives on motivation and learning achievement (Bandura, 1989).

Several studies have confirmed that intrinsic motivation is positively associated with academic achievement (Deci & Ryan, 2020; Howard *et al.*, 2021). Highly motivated students are more likely involve in the learning with higher academic achievement (Howard *et al.*, 2021; Muhammad *et al.,* 2021; OECD, 2020). Howard *et al* (2021) found out that external regulation was not associated with adaptive outcomes. However, rest of the subtypes such as introjected, identification and integration showed positive association with adaptive outcomes. This study complements the argument of SDT. However, it is to be noted that positive effects depend on the degree to which external regulations are internalized and aligned with students' personal goals (Deci *et al.*, 1999).

A study done in Italy by Zaccone and Pedrini (2019) revealed that gender moderates the relationship between motivation and learning effectiveness. It raises the possibility of significant moderator role of gender in relationship between motivation and learning achievement. Howard *et al.* (2021) observed a trend of moderating effect of gender on relationship between self reported learning achievement and intrinsic motivation in their meta analysis, which further supports the moderator effect of gender.

Sri Lanka is known for its free education and used to record high literacy rates. Gender difference is noted in several levels of education in Sri Lanka. Female literacy rate is slightly higher than male literacy (UIS, 2025; World Bank, 2025a). Female students complete the secondary education more than male students and female students are enrolled for higher education (University level) than male students in Sri Lanka (World Bank, 2025b, 2025c, 2025d). Learning achievement also showed gender difference in literature. Athirathan (2025) and Himaz *et al.* (2021) found out that girls showed better academic performance in different cohorts in Sri Lanka.

Several studies conducted locally and internationally revealed that motivation differed among genders (Adamma et al., 2018; Athirathan, 2025a; Ghaonta, 2017). Adamma et al (2018) studied effect of gender on motivation and academic achievement in primary pupils in Nigeria. They found out that intrinsic motivation was predominant in females while extrinsic motivation is predominant in males. Athirathan (2025) found out that both intrinsic and extrinsic motivation were higher in females of higher secondary level than males in a sample of 200 students.

There is also limited research that specifically examines gender as a moderator variable in the relationship between motivation and learning achievement both globally and locally. No published studies available on moderator effect of gender in Sri Lanka. Literature is limited in Sri Lanka on studies which compare motivation types within gender and in between gender. Literature on published local studies focusing on self-determination theory is also limited. These gaps need to be addressed.

Therefore, this study was designed to study motivation among samples of senior secondary students with focus on gender influence on relationship between motivation and learning achievement. Tamil-medium senior secondary students in the Colombo Education Zone were selected for this research as this group has not received

much attention in earlier research on motivation. Outcome of this research can be used to rectify the gaps in improving motivation in educational system in Sri Lanka.

METHODOLOGY

This study is a descriptive survey study. Grade 10 and 11 students in Tamil-medium schools of the Colombo Education Zone were selected as study population. 360 students (180 boys, 180 girls) were selected from 12 schools in stratified random sampling method including students from both national and provincial schools. 24 class teachers, 72 parents, and 12 principals were also included in this study.

Students' motivation was measured using a validated adapted version of the Academic Motivation Scale (AMS) which was developed by Vallerand *et al.* (1992). AMS assesses intrinsic and extrinsic motivation through multiple subscales. Wordings were adapted according to Sri Lakan cultural context while preserving the original content. Scales, subscales and response format were preserved. A pilot study was conducted with the adapted AMS scale which showed satisfactory reliability (Cronbach's $\alpha = 0.832$).

Learning achievement was evaluated by average marks obtained in the most recent school term examinations conducted by the Department of Education of Colombo Education Zone. As all students sat the same examination papers, the average marks were a standard comparable measure of learning achievement among the selected schools and students. This strengthens the validity of measures of learning achievement. This method is also used to reduce the variability associated with assessments conducted by individual teachers and schools.

Quantitative data analysis was done using SPSS. Tests of normality revealed that motivation scores did not follow normal distribution. Therefore, nonparametric statistical tests were used in analysis. Gender differences in motivation and learning achievement were analyzed using the Mann–Whitney U test. Wilcoxon signed-rank test was used to compare the intrinsic and extrinsic motivation within same gender. Multiple regression analysis was done to assess the predictive value of intrinsic and extrinsic motivation as residuals followed normal distribution. Hayes's PROCESS macro for SPSS was used for moderation analyses to examine the moderator effect of gender on relationship of motivation on learning achievement. Qualitative data collected from school principals. The qualitative findings were used to complement and support the quantitative results.

Null hypotheses

H_o1: There is no significant difference in learning achievement between male and female students.

H_o2: There is no significant difference in intrinsic motivation between male and female students.

H_o3: There is no significant difference in extrinsic motivation between male and female students.

H_o4: Gender does not moderate the relationship between motivation and learning achievement.

RESULTS

Gender differences in learning achievement

Table 1: Gender differences in learning achievement

Variable	Boys (n=180) Median (IQR)	Girls (n=180) Median (IQR)	Mean Rank (Boys)	Mean Rank (Girls)	U	Z	p (2tailed)
Learning Achievement	50.00 (31.11)	55.56 (30.42)	161.34	199.66	12751.50	−3.493	< 0.001

(Source: Students' Questionnaire, 2025)

Table 1 presents the findings of Mann –Whitney U test performed to study the gender differences in learning achievement among Tamil-medium senior secondary students. Female students showed higher learning achievement than male students with statistically significant difference ($p < 0.001$). Therefore, the null

hypothesis (H_01) was rejected as there is significant difference in learning achievement between male and female students. These findings suggest that gender has an influence on learning achievement.

Gender differences in motivation dimensions

Table 2: Gender differences in motivation dimensions

Variable	Boys (n=180) Median (IQR)	Girls (n=180) Median (IQR)	Mean Rank (Boys)	Mean Rank (Girls)	U	Z	p (2-tailed)
IM to Know	6.00 (5.00)	6.00 (4.13)	171.40	189.60	14562.50	−1.670	0.095
IM to Accomplish	6.00 (5.19)	6.00 (4.00)	181.26	179.74	16064.00	−0.139	0.890
IM to Stimulation	5.75 (5.38)	6.00 (4.44)	178.34	182.66	15811.50	−0.397	0.691
Intrinsic Motivation	5.92 (5.00)	6.08 (4.21)	177.98	183.03	15745.50	−0.461	0.645
EM Introjected	6.00 (5.50)	6.25 (4.81)	172.03	188.97	14676.00	−1.563	0.118
EM Identified	5.75 (5.00)	6.00 (3.50)	172.70	188.30	14796.00	−1.432	0.152
EM External Regulation	6.00 (5.25)	6.50 (4.25)	168.23	192.77	13992.00	−2.274	0.023*
Extrinsic Motivation	6.00 (5.17)	6.25 (3.85)	170.74	190.26	14443.50	−1.782	0.075
Overall Motivation	6.00 (4.96)	6.15 (4.03)	175.57	185.43	15313.00	−0.899	0.369

Note. * $p < 0.05$

(Source: Academic Motivation Scale, 2025)

Table 2 shows the gender differences in motivation dimensions. It shows median value of motivation, intrinsic motivation, extrinsic motivation and subscales of both intrinsic and extrinsic motivation for male and female students. It also presents the findings of the Mann–Whitney U test conducted to compare the motivation among both genders. No statistically significant gender difference was noted in all intrinsic motivation subscales, including Intrinsic Motivation to Know, Intrinsic Motivation towards Accomplishment, Intrinsic Motivation to Stimulation, and overall Intrinsic Motivation ($p > 0.05$). the null hypothesis (H_02) stated that there is no significant difference in intrinsic motivation between male and female students. And it was not rejected in these tests.

No statistically significant gender difference was observed in introjected regulation, identified regulation, overall extrinsic motivation, and overall motivation did not differ significantly between boys and girls ($p > 0.05$). However, girls showed statistically significant higher levels of external regulation than boys ($p = 0.023$). Null hypothesis (H_03) stated that there is no significant difference in extrinsic motivation between male and female students. As most extrinsic motivation subscales and over all extrinsic motivation did not show significant gender differences, null hypothesis (H_03) was not rejected. These findings suggest that boys and girls showed comparable intrinsic and extrinsic motivation, although girls are more likely to be influenced by the externally regulated extrinsic motivation than boys.

Within-gender comparison of intrinsic and extrinsic motivation among boys and girls

Table 3: Within-gender comparison of intrinsic and extrinsic motivation among boys and girls

Gender	N	Negative Ranks (EM < IM)	Positive Ranks (EM > IM)	Ties	Zvalue	pvalue	Interpretation
Boys	180	84 (IM higher)	65 (EM higher)	31	–0.744	0.457	No significant difference; IM ≈ EM
Girls	180	73 (IM higher)	88 (EM higher)	19	–2.601	0.009	EM significantly higher than IM

(Source: Students' Questionnaire, 2025)

Table 3 presents the findings of Wilcoxon Signed Rank Test which was done to compare intrinsic motivation (IM) and extrinsic motivation (EM) within each gender group. No statistically significant difference was noted between intrinsic and extrinsic motivation levels among boys ($p = 0.457$). It indicates that intrinsic motivation and extrinsic motivation levels are comparable among boys. However, statistically significant difference was noted between intrinsic and extrinsic motivation among girls ($p = 0.009$). Positive ranks also suggest that extrinsic motivation was significantly higher than intrinsic motivation among girls. These findings reveal that influence of motivation type differs within gender.

Gender as the moderator of relationship between motivation and learning achievement

Moderation analysis was done to check if the gender moderates the relationship between motivation and learning achievement. Assumptions for the regression analysis were satisfied. Residuals were normally distributed. HC3 standard errors, bootstrapping and other robust methods were used to ensure that the results are reliable and not affected by outliers, multicollinearity, or unequal error variance. Table 4 presents the findings of moderation analysis.

Table 4: Moderation analysis of the relationship between motivation and learning achievement by gender

Predictor	B	SE B (HC3)	95% CI for B	t	p
Motivation	6.74	0.30	[6.14, 7.34]	22.20	< 0.001
Gender	4.47	1.34	[1.84, 7.10]	3.34	< 0.001
Motivation X Gender	1.59	0.61	[0.39, 2.78]	2.61	< 0.01

Note. Model fit: $R^2 = 0.593$, Adj. $R^2 = 0.590$

Interaction: $\Delta R^2 = 0.0078$, $F(HC3)(1,356) = 6.83$, $p = 0.009$

As shown in Table 4, motivation is a strong predictor of learning achievement with interaction coefficient value of 6.74 ($p < 0.001$). Gender also independently predicted the learning achievement with interaction coefficient value of 4.47 ($p < 0.001$). Interaction between motivation and gender was statistically significant with interaction coefficient value of 1.59 ($p<0.01$). It indicates that gender moderates the effect of motivation on learning achievement.

Figure 1: Conceptual moderation model (gender as moderator)

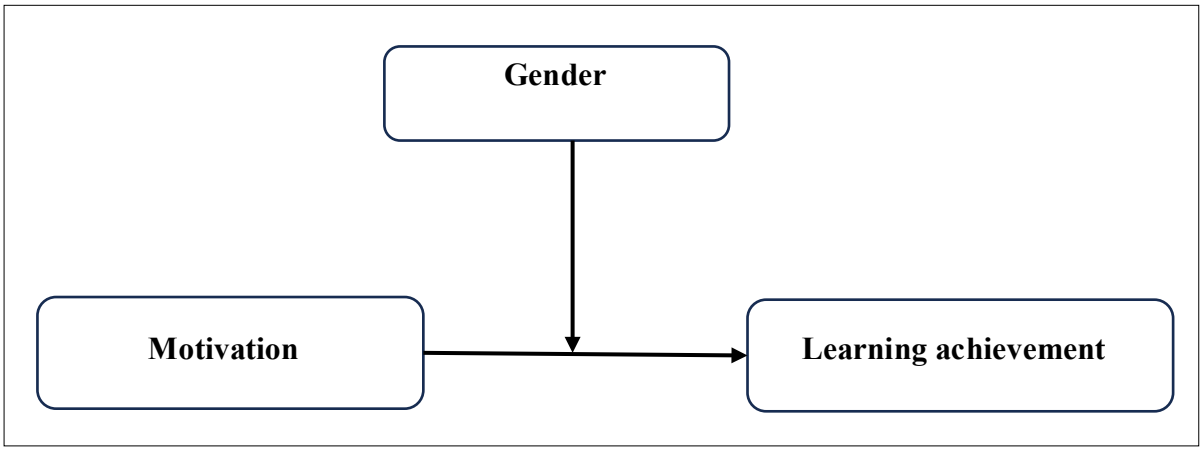
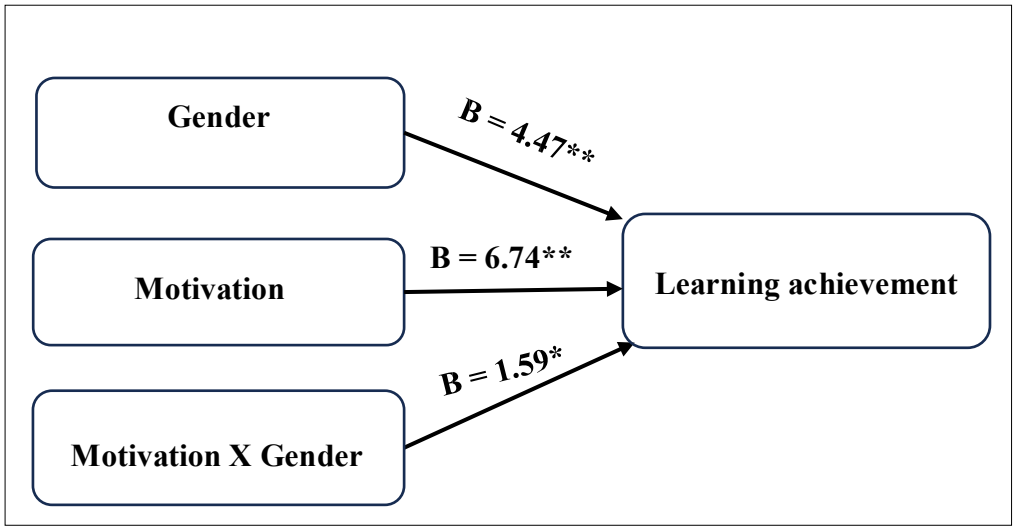


Figure 2: Statistical moderation model (gender as moderator)



Note. * p< 0.01, ** p< 0.001

Conceptual moderation model of this moderation analysis is shown in figure 1. It shows that motivation is expected to influence learning achievement directly. At the same time, gender is expected to moderate the effect of motivation on learning achievement. Statistical results of the moderation analysis are also presented as statistical moderation mode in Figure 2.

Table 5: Conditional effects of motivation on learning achievement by gender

Gender	B	SE B (HC3)	95% CI for B	p
Boys	5.95	0.41	[5.14, 6.75]	< 0.001
Girls	7.53	0.45	[6.65, 8.41]	< 0.001

Note. PROCESS centered values: −0.50 ≈ Boys; +0.50 ≈ Girls

Girls also showed steeper regression slopes than boys in simple slope analysis with regression coefficient value of 7.53 (p<0.001) as shown in table 5. Increases in motivation lead to greater gains in learning achievement among female students compared to male students. It indicates girls showed stronger motivation and learning achievement relationship than boys.

Table 6: Bootstrap test of the motivation × gender interaction effect

Predictor	B	Boot SE	Boot LLCI	Boot ULCI
Motivation X Gender	1.59	0.49	0.62	2.53

Note. 5000 bootstrap samples; 95% CI

As shown in Table 6, bootstrapping analysis using 5000 samples confirmed the robustness of the moderation effect. These interaction effects were statistically reliable as confidence intervals for these interaction effects did not reach zero. 59% of the variance in learning achievement was explained by motivation, gender and interaction between motivation and gender. Interaction between motivation and gender contributed to the 0.78% incremental variance in achievement with statistical significance ($\Delta R^2 = 0.0078$, $p = 0.009$). It supports the fact that gender moderates the effect of motivation on learning achievement.

Overall results of this analysis revealed that motivation is an important predictor of learning achievement. However, its effect is stronger in girls than boys with statistically significant gender difference in the effect. This finding supports the study's conceptual model. Null hypothesis (H_o4) stated that gender does not moderate the relationship between motivation and learning achievement and it was rejected.

DISCUSSION

We examined gender differences in motivation and learning achievement among Tamil-medium senior secondary students in Colombo educational Zone. We also analyzed whether gender moderates the relationship between motivation and learning achievement. Female students demonstrated significantly higher learning achievement than male students in this study. It comparable to prior studies conducted in Sri Lanka (Athirathan, 2025; Himaz & Aturupane, 2021). These findings are complementary to the national evidence of higher literacy rate and higher participation in secondary level and higher education level among females in Sri Lanka (Himaz & Aturupane, 2021; UIS, 2025, World Bank, 2025a, 2025c, 2025d).

Intrinsic motivation is at comparable level between both boys and girls. It indicates that intrinsic motivation remains at largely same level among both girls and boys. Intrinsic motivation is improved when the basic psychological needs such as autonomy, competence and relatedness are met as per the SDT. No difference between the boys and girls could be explained by the similar need support received by both boys and girls in school environment.

Overall extrinsic motivation and most of the subscales of extrinsic motivation except external regulation showed no gender difference. Female students showed statistically significant higher levels of external regulation than male students. Female students were also found to have significantly higher levels of extrinsic motivation than intrinsic motivation. The results suggest external factors such as rewards, avoiding punishment, recognition, and parental expectations exert a strong influence in female students. These findings could be explained by the results of study conducted by Himaz & Aturupane (2021). Female students were found to have more sensitive to parental aspirations and teacher attitude (Himaz & Aturupane, 2021). This supports the possibility of females have more tendency for external regulation in Sri Lanka. Exam oriented education system of Sri Lanka could also be a contributor for this pattern.

However Male students did not show statistically significant difference between intrinsic motivation and extrinsic motivation. This finding is comparable to the finding of Himaz & Aturupane (2021) which stated that influence of parental aspirations and teacher attitudes were significantly lower for boys. Although the results contradict the findings of Adamma *et al.* (2018) which stated that intrinsic motivation was predominant in primary girls in Nigeria. That contradiction could be due to differences in age and country. We could also suggest that differences in education system, cultural and social factors could influence motivation types among countries. Examination oriented nature of Sri Lankan education system could also contribute to the predominance of extrinsic motivation in girls.

Self-determination theory argues that intrinsic motivation and internalization are most important for academic achievements. It also states that more autonomous motivation types should be encouraged to higher achievement. Deci & Ryan (2020) presented several studies that supported the argument that more autonomous motivation was associated with higher academic achievement in their article. Howard *et al.* (2017) also found that external regulation was unrelated to adaptive outcomes in their metanalysis. They also found out that more autonomous motivation types such as introjected regulation, identified regulation and intrinsic motivation were positively associated with better outcomes. Therefore, predominant extrinsic motivation in girls and higher levels of external regulation in girls than boys are concerned. However, it is to be noteworthy that girls outperform in learning achievement than boys in our study. Athirathan (2025) also found that girls showed higher extrinsic motivation than boys as well as higher academic achievement than boys. This could suggest there could be cultural variation in the effect of motivation types in learning achievement. It is noteworthy to consider the argument of Markus, Kitayama, and Heiman (1996) that autonomy is not important in traditionalist cultures. However, Deci and Ryan (2020) support the SDT by several studies done across cultures. Therefore, improving intrinsic motivation and more autonomous forms of extrinsic motivation could enhance the outcome further in girls.

Gender moderated the positive relationship between motivation and learning achievement, with a stronger effect observed for girls. It indicates that increase in motivation results in more positive learning outcomes in girls than boys. This result is comparable to the study conducted by Zaccone & Pedrini in 2019. They revealed that gender moderates both intrinsic and extrinsic motivation. This finding further supports gender differences in the relationship between motivation and learning achievement. This moderator effect of the gender may be an advantage in academic achievement for females and possibly explain the gap with academic achievement by boys in Sri Lanka. Although overall intrinsic motivation and extrinsic motivation did not differ among gender, learning achievement was higher in girls than boys. That means even the overall motivation remains same for both girls and boys, learning achievement differs. This could be possibly explained by moderator effects of gender.

Overall findings indicate that observed gender gaps in academic performance are less likely to reflect differences in the overall amount of motivation and more likely to reflect how motivation is regulated and enacted. This can be explained by self-determination theory and social cognitive theory together.

These findings suggest gender sensitive strategies would be beneficial to improve motivation and learning achievement. Overall teaching and educational practices should focus on improving intrinsic motivation among students. Strategies should focus on improving more autonomous motivation in girls.

This study had several limitations. Self administered questionnaires were used to collect data, which might be affected by social desirability bias. This descriptive survey design was a cross sectional study which would limit to establish cause and effect relationship. Longitudinal studies would be recommended. Further Comparative studies on cultural variation in motivation types and its effect on learning achievement would be interesting to study. This study was conducted in Colombo Educational Zone Tamil medium schools. Most of the students live in urban areas. This study needs to be expanded to include rural areas, Sinhala and English medium students and other district students to generalize the findings to Sri Lankan populations. This study did not examine the effect of basic psychological needs such as autonomy, competence and relatedness explained in SDT. Further studies are warranted to incorporate these needs as well. This article is based on a larger study which collected and analyzed data on family income, school resources, school types, location of school and parental education. Detailed explanation of these factors is beyond the scope of this article. They will be reported in a separate article.

CONCLUSION

This study examined gender differences in motivation and learning achievement among Tamil-medium senior secondary students in Sri Lanka and explored the moderating role of gender in the motivation–achievement relationship. Learning achievement in between gender, Predominant motivational type within same gender and external regulation between females and males showed significant findings indicating the gender influence on motivation and learning achievement. Moderator effect of gender on relationship between motivation and learning achievement was also revealed in this study. Educational practices and strategies should incorporate these gender influences and gender sensitive strategies should be employed to improve motivation and learning

achievement. Female students showed significantly higher learning achievement which is consistent with female academic advantage reported in Sri Lankan educational literature. Females also showed stronger externally regulated motivation than male students. However, SDT argues about improving more autonomous motivation types. Strategies should focus on more internalization of extrinsic motivation and improving intrinsic motivation in females. Improving intrinsic motivation would benefit both males and females as explained by SDT. Females are more in advantage of moderator effect of gender than males on relationship between motivation and learning achievement. Male students should be supported additionally on improving the quality of motivation and learning achievement. Females showed higher learning achievement and higher external regulation than boys. Females also had extrinsic motivation as predominant motivation type. Although studies conducted on SDT support the fact that internalization and intrinsic motivation was associated with higher academic achievement, country specific cultural perspectives should be considered. Further studies in Sri Lanka are warranted incorporating large diverse samples and longitudinal study design across the country.

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Declarations

Conflicts of interest

Authors declare that they have no conflicts of interest to disclose.

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Data availability statement

Data used in this study is not publicly available due to ethical and confidentiality considerations.

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