Gender Differences in Mathematics Anxiety across Different Ethnic Communities in Nepal

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Abstract

Mathematics anxiety represents a significant psychological obstacle in educational contexts, particularly across diverse cultural sceneries. To investigate these gender disparities, this study examined mathematics anxiety across five ethnic/cultural groups in Nepal, applying a cross-sectional quantitative design to analyze the data from 625 participants (358 males, 267 females) representing five ethnic categories: Brahmins and Chhetris, Newar, Mongolians, Scheduled Caste, and Others. Independent samples t-tests and effect size calculations exhibited a statistically significant overall gender difference in mathematics anxiety ($t = -3.4437$, $p < .001$, $d = 0.28$), with females consistently reporting higher anxiety levels in four out of five ethnic groups. The Brahmins and Chhetris group demonstrated the most notable gender disparity ($t = -4.4339$, $p < .001$, $d = 0.53$). The findings highlight the complex interplay of gender and cultural factors in mathematical psychological experiences, suggesting the need for targeted educational interventions and culturally sensitive support strategies that address gender-based mathematical anxiety across those diverse ethnic contexts.

Keywords: Cultural psychology, educational performance, ethnic diversity, gender disparities, mathematics anxiety

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Introduction

Mathematics anxiety is a significant psychological obstacle that can obstruct mathematical learning and performance, perchance leading to permanent educational and career consequences. Although research on mathematics anxiety is increasing, there remains a significant gap in understanding how this issue appears among various ethnic and cultural groups, especially in multifaceted sociocultural environments like Nepal. The present research aims to explore variations in mathematics anxiety associated with gender among various ethnic groups, examining the multifaceted relationships among gender, culture, and psychological experiences in mathematics.

Mathematics anxiety represents a critical psychological phenomenon that can impact mathematical learning and performance significantly (Dowker et al., 2016; Soumen & Susanta, 2018), yet its manifestation across diverse cultural contexts remains incompletely understood. This study aims to address this gap by examining gender-based mathematics anxiety across multiple ethnic groups in Nepal, a context characterized by rich cultural diversity and complex social dynamics (Pradhan, 2017). The research is particularly significant because it moves beyond simplistic, uniform approaches to understanding mathematical psychological experiences, instead exploring how gender and cultural identity intersect to shape anxiety patterns.

The theoretical foundations of this research are based on Bourdieu's influential notion of cultural capital and Honneth's theory of recognition, offering a solid framework for comprehending the intricate dynamics of mathematics anxiety across gender and cultural settings. Bourdieu (1986) defined cultural capital as the social assets that are not monetary but facilitate social mobility, comprising educational qualifications, knowledge, and skills passed down through family and institutional channels. In educational environments, cultural capital is evident through the accumulated academic benefits or hindrances that are profoundly ingrained in social frameworks and spread current social inequalities. In addition, recognition theory, formulated by Honneth (2006), precisely examined the formal conditions necessary for human actualization. Recognition theory emphasizes the diverse identities and experiences of students within the education structure. It highlights the importance of recognizing and supporting historically marginalized communities, promoting a feeling of belonging and self-esteem. Embracing a culturally responsive teaching approach is one of the methods to apply recognition theory in education. This includes students' cultural values and practices, experiences, and viewpoints within the educational curriculum. By

doing this, teachers foster a learning atmosphere that honors and appreciates the diverse identities of their students.

Recognition theory further supports inclusive practices that confront stereotypes and advance social justice. For example, schools can arrange programs and activities that honor different cultures, foster understanding, and inspire dialogue among students from varied backgrounds. This theoretical synthesis provides a comprehensive perspective for exploring how gender and cultural background intersect to influence mathematical self-image, anxiety, and academic experiences, highlighting the subtle yet significant ways social structures affect individual psychological reactions to educational challenges.

There have been reports of conflicting gender differences in mathematics anxiety among most researchers (Dowker et al., 2016), some researcher argued that there exists an effect of gender on mathematics anxiety and some researchers disagreed with this result. Girls often have more math anxiety than boys (Devine et al., 2012; Hopko et al., 2003), whereas Abadi (2004) reported an opposite result. By employing rigorous statistical methodologies, including t-tests and effect size calculations, the study provides nuanced insights into the variations of mathematics anxiety across the Brahmins, the Chhetris, the Newars, the Mongolians, and the Scheduled Caste groups. The findings have broader implications for educational policy and psychological interventions, potentially informing targeted strategies that address the specific psychological barriers faced by different demographic groups, since mathematics anxiety has often received less attention over the years (Foley et al., 2017). Moreover, the role of gender within and among cultures remain less explored globally (Morsanyi et al., 2016). In this background, this research contributes to the global understanding of mathematics anxiety by highlighting how cultural and gender factors interact to influence mathematical psychological experiences, offering a more comprehensive and contextually sensitive approach to understanding mathematical learning challenges. The potential outcomes of this study extend beyond academic research, promising to provide valuable insights for educators, psychologists, and policymakers interested in creating more inclusive and supportive mathematical learning environments.

By investigating these dimensions, the study aims to provide a comprehensive understanding of how mathematics anxiety manifests across different ethnic and gender groups in Nepal, posing valuable insights for educators, psychologists, and policymakers. The study aims to answer the following research questions:

i. What association is there between gender and mathematics anxiety?

ii. How do gender-based differences in mathematics anxiety vary across different ethnic and cultural groups in Nepal?

Methodology

This quantitative study employed a cross-sectional design to investigate gender differences in mathematics anxiety across five ethnic/cultural groups in Nepal. A total of 625 students (358 males, 267 females) of grade XI of Kathmandu Metropolitan City Nepal. The participants were selected by using a stratified random sampling technique, representing the Brahmins and Chhetris, the Newars, the Mongolians, the Scheduled Caste, and the "Others" categories.

Table 1

Sample of the Study

Ethnic/cultural Groups	No. of Male	No. of Female	Total
Brahmin & Chhetries	180	131	311
Newars	77	69	146
Mongolians	41	18	59
Scheduled Caste	8	11	19
Others	52	38	90
Total	358	267	625

The Revised Mathematics Anxiety Rating Scale (RMARS) of Plake and Parker (1982) was adopted to measure participants' psychological responses to mathematics. The research utilized independent samples t-tests to compare mathematics anxiety levels between males and females within every ethnic group, with a significance level set at $p < 0.05$. The scale has been found to have a high level of reliability globally as well as locally, that is, in the Nepalese classroom context (Paudel, 2023) which gave a sufficient base to adopt the scale in this study.

Statistical analysis involved calculating descriptive statistics, including mean scores and standard deviations, and determining effect sizes. Ethical considerations comprised getting informed consent, preserving participant privacy, and securing institutional approval. The research design accounted for potential limitations such as the cross-sectional nature of the study and the self-reported nature of mathematics anxiety measurement.

Results and Discussion

In accordance with the study's objectives, the findings derived from the research have been elaborated below.

Gender Differences in Mathematics Anxiety

The comprehensive analysis of gender disparities in Table 2 shows a significant difference between men and women ($t = -3.4437$, $p < .001$), with women ($M = 55.77$, $SD = 16.24$) and men ($M = 51.33$, $SD = 15.54$) by an average of 4.44 points. This indicates that female students are more anxious than male students in math. This finding is consistent with the finding obtained by previous researches (Devine et al., 2012; Hopko et al., 2003). Further, this general gender disparity shows a small to medium effect size ($d = 0.28$), indicating a significant yet moderate practical relevance.

Gender Differences in Mathematics Anxiety across Nepalese Cultural/ Ethnic Groups Gender difference in mathematics anxiety across different cultural/ethnic groups (*Brahmins and Chhetris*, *Newar*, *Mongolians*, *Scheduled Caste*, *and Others*) are presented in Table 2.

Table 2

Gender Differences in Mathematics Anxiety across Different Cultural Groups

Ethnic/cultural		N	Mean	Std. Deviation	t	sig	Cohen's d
Brahmin and Chhetris	male	180	44.1944	11.58360	-4.4339	0.001	0.53
	female	131	51.3817	15.70226			
Newar	male	77	59.6753	9.79452	-1.1913	0.236	0.2
	female	69	61.9275	12.67503			
Mongolians	male	41	63.9512	25.63099	1.5347	0.134	0.2
	female	18	53.1111	24.69077			
Scheduled Caste	male	8	72.1250	12.67661	-1.0367	0.315	0.43
	female	11	78.7273	15.00727			
Others	male	52	50.5000	7.63506	-2.0169	0.05	0.45
	female	38	54.3158	9.66494			
Total	male	358	51.3268	15.54237	-3.4437	0.001	0.28
	female	267	55.7678	16.24456			

The study investigated gender disparities among the given five ethnic/ cultural groups in Nepal, uncovering notable differences in mathematics anxiety. Among the ethnic groups, the Brahmins and Chhetris exhibited the most notable gender disparity ($t = -4.4339$, $p < .001$) with the females achieving significantly higher anxiety than the males, indicating a medium effect size ($d = 0.53$). The "Others" category showed a notable gender disparity ($t = -2.0169$,

$p < .05$) that favored females. Nonetheless, the Newars, the Mongolians, and the Scheduled Caste groups exhibited no statistically significant differences based on gender, despite noticeable numerical variations in their mean scores. Interestingly, females have higher anxiety level than males in four of the five ethnic/cultural categories, with the Mongolians being the sole group in which the males attained a higher mean math anxiety, although this difference lacked statistical significance.

The study results reveal the complex ways cultural capital and perceived inequality appear in mathematics anxiety among various ethnic groups in Nepal. The evident gender differences, especially within the Brahmins and Chhetris highlight the unequal distribution of cultural capital (Bourdieu, 1986), resulting in unequal academic experiences that enhance psychological turmoil. The consistently elevated anxiety levels in females across the various ethnic groups indicate a continual reinforcement of educational disadvantages, as social and cultural factors internalize and sustain gender-related academic obstacles. When examined through the lens of the recognition theory, these disparities highlight the mental strain arising from perceived injustices in educational opportunities and expectations.

Moreover, the slight distinctions between ethnic groups demonstrate that mathematics anxiety is not a uniform experience but a nuanced interplay of cultural standards, social structures, and individual psychological responses. The moderate effect sizes noted, particularly in groups such as Brahmins and Chhetris, suggest that although gender plays a significant role in mathematical anxiety, its effect is influenced by cultural contexts. Significantly, the distinct pattern observed in the Mongolian group's male anxiety levels diverging from the overall trend highlights the necessity of intersectional approaches that transcend basic gender binary interpretations. This result highlights the necessities of spheres of recognition of Honneth's theory comprises private, legal as well as solidarity i.e. creating self-confidence, self-respect and self-esteem. These results contest general beliefs regarding mathematics anxiety and highlight the necessity for culturally aware, context-specific solutions that tackle the fundamental social factors perpetuating educational disparities.

Conclusion and Implications

The study reveals a complex landscape of mathematics anxiety across ethnic groups in Nepal, indicating significant gender disparities that diverge across cultural contexts. The females consistently suffered higher levels of mathematics anxiety in most of the ethnic groups in Nepal. The Brahmins and Chhetris group possess the most pronounced gender disparity, highlighting the

intricate interplay between gender, culture, and mathematical psychological experiences.

These results have significant implications for educational policy and psychological conducts. The persistent gender disparities highlight the necessity for exhaustive, culturally aware methods to tackle mathematics anxiety, such as specialized psychological support, gender-oriented curriculum design, and customized educational procedures. The study offers a vital perspective for comprehending the intricate connection between gender, culture, and learning in mathematics, highlighting the need for creating inclusive educational settings that identify and tackle the distinct psychological obstacles faced by various demographic groups.

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