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Exploring Kanuri Parents' Knowledge, Attitude, Belief, and Practice on Girl-Child Education in Northern Borno

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Abstract

Purpose: This study examine the direct and indirect relationships among knowledge, belief, attitude, and practice of Kanuri parents regarding girl-child education in Northern Borno, using Partial Least Squares Structural Equation Modelling (PLS-SEM). Specifically, the study seeks to determine how parental knowledge shapes beliefs and attitudes, and how these cognitive and affective factors translate into actual educational practices, with particular attention to the mediating roles of attitude and belief.

Methodology: Partial Least Square-Structural Equation Modeling (PLS-SEM) was used to analyze data from 93 respondent. Structure questionnaire was employed a data collection instrument.

Findings: Parental knowledge significantly predicts both attitudes (β = 0.653) and beliefs (β = 0.859) toward girl-child education. Beliefs shape attitudes (β = 0.292) and influence practice (β = 0.331), while attitude strongly predicts practice (β = 0.401), demonstrating its central role in driving parental behavior. Knowledge has only a weak direct effect on practice (β = 0.213), indicating that its influence is largely indirect through belief and attitude. The structural model shows high explanatory strength, accounting for 84.0% of the variance in attitude (R^2 = 0.840), 73.8% in practice (R^2 = 0.738), and 81.6% in belief (R^2 = 0.816).

Novelty and Contribution: This study offers a culturally grounded SEM framework that integrates knowledge, belief, attitude, and practice, highlighting the mediating roles of belief and attitude in shaping parental educational decisions.

Practical and Social Implications: The results emphasize the need for holistic, culturally sensitive interventions that enhance parental knowledge, foster positive attitudes, and reshape beliefs through trusted community, cultural, and religious influencers. These insights can guide policymakers, educators, and NGOs in strengthening girl-child education and advancing gender equity in Northern Borno.

Keywords: Girl-Child Education, Structural Equation Modeling (SEM), Knowledge, Attitude, Beliefs

1 Introduction

Girl-child education is widely recognized as a cornerstone for national development, gender equity and poverty reduction. However, in Northern Nigeria particularly among Kanuri communities in Borno State, cultural beliefs, religious norms and socio-economic challenges continue to limit girls' access to formal education. Despite efforts by

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the Nigerian government and international development partners to promote inclusive education, the region still faces significant disparities in female literacy, school enrolment and retention rates (Manir & Jabbi, 2023; Adeniran et al., 2023). Kanuri parents play a pivotal role in shaping the educational trajectory of their daughters. Their knowledge, attitudes, beliefs and practices are often rooted in longstanding traditions that prioritize domestic responsibilities, early marriage and religious instruction over formal schooling (Abba, 2023). Research has shown that parental education level, exposure to advocacy campaigns, and economic conditions significantly influence decisions regarding girl-child education (Tukur, 2023; Mohammed et al., 2023). Initiatives such as UNICEF's Girls' Education Project Phase 3 (GEP3) have made notable progress in shifting community perceptions and increasing enrolment, yet challenges persist particularly in conflict-affected areas like Northern Borno.

Despite growing national and global advocacy for girl-child education, many communities in Northern Nigeria continue to face entrenched cultural and socio-economic barriers that hinder girls' access to formal schooling. Among the Kanuri population in Northern Borno, traditional beliefs, religious interpretations, and parental attitudes often determine whether a girl attends school, how long she remains enrolled, and the type of education she receives. These factors contribute to low enrolment rates, high dropout levels, and limited educational attainment among girls in the region (Tukur, 2023). Although government programs such as the Universal Basic Education (UBE) initiative and the Girls' Education Project (GEP3) have made strides in expanding access, their impact remains uneven especially in areas affected by insecurity, poverty, and displacement. Moreover, there is limited understanding of how Kanuri parents perceive girl-child education, what they believe about its value, and how their practices align with or resist broader educational goals (Abba, 2023; Wali et al., 2024). This gap in knowledge presents a significant challenge for policymakers, educators, and development partners seeking to promote inclusive education. Without a clear understanding of parental knowledge, attitudes, beliefs and practices, interventions risk being culturally insensitive or ineffective. Therefore, this study seeks to explore these dimensions among Kanuri parents in Northern Borno, with the aim of identifying key barriers and opportunities for advancing girl-child education in a manner that respects local values while promoting gender equity and educational access.

The theoretical framework for this study is anchored in Ajzen's Theory of Planned Behaviour (TPB) (1991) and complemented by Bronfenbrenner's Ecological Systems Theory (1979). The TPB posits that belief is determined by an individual's attitude, subjective norms and perceived belief control, all of which shape belief intentions. In this study, parents' knowledge represents their awareness of the benefits and importance of girl-child education, belief reflects their cultural and religious convictions, attitude denotes their evaluation of educating girls and practice captures their actual actions toward enrolling and supporting their daughters in school. According to TPB, knowledge influences both belief and attitude, which in turn determine the intention and actual practice of supporting girl-child education.

Bronfenbrenner's Ecological Systems Theory expands this explanation by situating parental behaviour within broader social and cultural contexts. It emphasizes that parents' decisions about girl-child education are influenced by multiple environmental systems: the microsystem (family structure), mesosystem (home–school interaction), exosystem (community and religious institutions) and macrosystem (cultural beliefs, norms and policies). Integrating both theories, the framework suggests that parents' knowledge, beliefs and attitudes are shaped not only by personal cognition but also by sociocultural and institutional environments. Therefore, improving girl-child education in Northern Borno requires interventions that enhance parental knowledge while addressing cultural and systemic barriers embedded in the social fabric of Kanuri dominated communities.

Purpose of the Study

The objectives of the study are:

i. To determine the effect of parents' knowledge on their attitudes toward girl-child education.
ii. To examine the influence of parents' knowledge on their beliefs about girl-child education.
iii. To assess the direct effect of parents' knowledge on their educational practices toward the girl-child.
iv. To investigate the effect of parents' beliefs on their attitudes toward girl-child education.
v. To examine the influence of parents' beliefs on their educational practices toward the girl-child.
vi. To determine the effect of parents' attitudes on their educational practices toward the girl-child.

vii. To assess whether parents' attitudes mediate the relationship between parents' knowledge and their educational practices toward the girl-child.

viii. To examine whether parents' beliefs mediate the relationship between parents' knowledge and their educational practices toward the girl-child.

ix. To determine whether parents' beliefs and attitudes sequentially mediate the relationship Bottom of Form

Research Questions

i. What is the effect of parents' knowledge on their attitude toward girl-child education?

ii. How does parents' knowledge influence their beliefs about girl-child education?

iii. Does parents' knowledge directly influence their educational practices toward the girl-child?

iv. What is the effect of parents' beliefs on their attitudes toward girl-child education?

v. How do parents' beliefs influence their educational practices toward the girl-child?

vi. What is the effect of parents' attitudes on their educational practices toward the girl-child?

vii. Does attitude mediate the relationship between parents' knowledge and their educational practices toward the girl-child?

viii. Does belief mediate the relationship between parents' knowledge and their educational practices toward the girl-child?

ix. Do belief and attitude sequentially mediate the relationship between parents' knowledge and their educational practices toward the girl-child?

Research Hypotheses

H1: Parents' knowledge has a significant positive effect on their attitude toward girl-child education.

H2: Parents' knowledge has a significant positive effect on their beliefs about girl-child education.

H3: Parents' knowledge has a significant positive effect on their educational practices toward the girl-child.

H4: Parents' beliefs have a significant positive effect on their attitude toward girl-child education.

H5: Parents' beliefs have a significant positive effect on their educational practices toward the girl-child.

H6: Parents' attitudes have a significant positive effect on their educational practices toward the girl-child.

H7: Parents' attitude mediates the relationship between knowledge and educational practices toward the girl-child.

H8: Parents' belief mediates the relationship between knowledge and educational practices toward the girl-child.

H9: Parents' belief and attitude sequentially mediate the relationship between knowledge and educational practices toward the girl-child.

2 Methodoloy

This study adopted a correlational research design, utilizing Structural Equation Modeling to examine the relationships among Kanuri parents' knowledge, attitude, belief and practice toward girl-child education in Northern Borno. SEM was selected for its capacity to simultaneously assess both the measurement and structural components of the model, allowing for a robust analysis of latent constructs and their interrelationships. The population for this study comprised Kanuri parents residing in Northern Borno State, Nigeria. Participants were selected using purposive sampling, targeting individuals who had at least one school-age daughter and were actively involved in decisions regarding her education.

Data were collected using a structured questionnaire developed through a multi-stage validation process. KABP items were adapted from validated scales measuring parental educational attitudes and expectations (Davis-Kean, 2005), gender norms (Pulerwitz & Barker, 2008), and parental involvement practices (Fan & Chen, 2001). These were linguistically and culturally contextualized for the Kanuri population. To ensure validity and appropriateness, the

instrument was reviewed by three education specialists and two cultural experts from Borno State. A pilot study was then conducted with 20 Kanuri parents to refine wording, translation accuracy, and response clarity. Items were translated into Kanuri using forward–backward translation procedures to guarantee semantic equivalence across languages. Prior to structural equation modeling (SEM) analysis, internal consistency for each scale was assessed using Cronbach's alpha, yielding the following coefficients: knowledge = 0.718, beliefs = 0.825, attitudes = 0.799 and practices = 0.743 all within acceptable reliability ranges for social science research. Composite reliability was also computed for each construct, confirming satisfactory scale consistency for subsequent analysis.

The population for this study comprised Kanuri parents residing in Northern Borno who had at least one school-age daughter. Purposive sampling was employed to ensure inclusion of both urban and rural households, as well as communities affected by displacement. A total of 93 respondents participated in the study. The adequacy of this sample size was justified using the 10-times rule, which requires at least ten respondents per indicator; with nine indicators per construct, a minimum of 90 respondents was necessary. Furthermore, a power analysis conducted using G*Power 3.1 indicated that at $\alpha = 0.05$, with an effect size of 0.30 and statistical power of 0.80, a minimum of 85 respondents was required. Thus, the achieved sample of 93 was deemed sufficient for SEM analysis.

Data collection was carried out over a six-week period in 2025 through community centers, schools and internally displaced persons (IDP) camps. Participants were recruited with the assistance of local leaders, school administrators, and NGOs working in education. Written and verbal informed consent was obtained from all participants, with assurances of voluntary participation and confidentiality. Given the insecurity in Northern Borno, data collection was conducted in safe zones with NGO support, and no identifying information was recorded to protect respondents. To minimize social desirability bias, questionnaires were self-administered where literacy levels permitted; otherwise, trained enumerators assisted respondents using neutral phrasing to avoid influencing answers.

Data Analysis Analysis was conducted using SmartPLS 4.0. The measurement model was evaluated through reliability tests (Cronbach's alpha and composite reliability), convergent validity (Average Variance Extracted), and discriminant validity (Fornell–Larcker criterion). The structural model was assessed using path coefficients, R^2 values, and effect sizes, with bootstrapping (5,000 resamples) employed to test statistical significance. Assumption checks were also performed: Variance Inflation Factor (VIF) values confirmed the absence of multicollinearity, while skewness and kurtosis indices were used to assess normality. These procedures ensured that the findings were both statistically robust and methodologically sound.

3 Results

This study applied Partial Least Squares Structural Equation Modelling (PLS-SEM) to analyse the direct and indirect relationships among knowledge (KN), belief (BL), attitude (AT), and practice (PR) of Kanuri parents toward girl-child education in Northern Borno. The analysis provides a comprehensive evaluation of both the measurement and structural models. Results from the measurement model are presented first, with emphasis on indicator loadings, reliability, and validity measures to confirm the soundness of the latent constructs. Most indicators exhibited strong loadings, indicating that the observed measures adequately represented their respective constructs. Furthermore, Cronbach's alpha, composite reliability, and Average Variance Extracted (AVE) values exceeded recommended thresholds, establishing internal consistency and convergent validity. Discriminant validity was verified using the Fornell–Larcker criterion, confirming the empirical distinctiveness of the constructs. The structural model results indicate both significant and non-significant pathways, offering nuanced insights into how parental knowledge, beliefs, and attitudes shape educational practices.

Table 1 Outer-Loadings

Indicator	AT (Attitude)	BL (Belief Level)	KN (Knowledge)	PR (Practice)
AT1	0.919			
AT3	0.809			
AT4	0.905			
AT5	0.746			
BL1		0.767		
BL2		0.680		
BL4		0.782		
BL5		0.883		
KN1			0.913	
KN2			0.542	
KN3			0.906	
KN4			0.512	
KN5			0.952	
PR1				0.748
PR2				0.847
PR3				0.858
PR4				0.856
PR5				0.775

Table 1 presents the outer loadings of observed indicators on their respective latent constructs, which is a critical step in assessing discriminant validity using the Fornell-Larcker criterion. Discriminant validity ensures that each construct in the model is empirically distinct from the others, thereby confirming that the indicators are measuring unique dimensions of the theoretical framework. The loadings for the Attitude construct (AT1 to AT5) range from 0.746 to 0.919, indicating strong associations between the indicators and the latent variable. AT3 loads at 0.809, which is also acceptable, confirming the reliability of the Attitude construct overall. The Belief Level indicators (BL1 to BL3) show moderate to strong loadings between 0.680 and 0.883, while BL4 demonstrates a very strong loading of 0.913.

The Knowledge construct (KN1 to KN3) shows very strong loadings, with KN1 and KN3 at 0.906 and 0.952 respectively, while KN2 is weaker at 0.512. KN4 and KN5 load well at 0.748 and 0.847, confirming that most indicators reliably capture parental knowledge, though KN2 may require revision. Finally, the Practice construct (PR1 to PR5) demonstrates consistently strong loadings ranging from 0.775 to 0.919, confirming its robustness in capturing parental practices related to girl-child education. Therefore, the measurement model demonstrates good discriminant validity, with most constructs exhibiting strong indicator loadings.

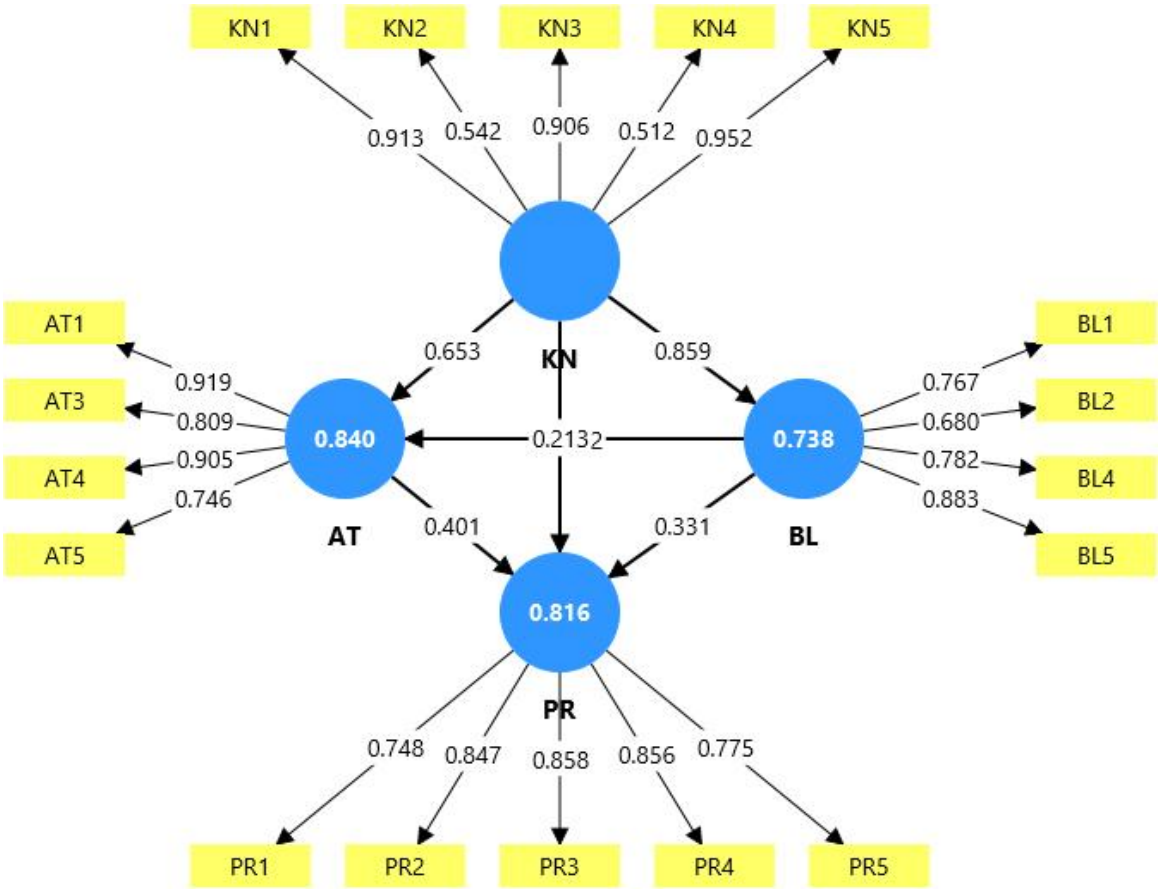

Figure 1 Path Diagram

The SEM presented in the path diagram illustrates the directional relationships among four key latent constructs: Knowledge (KN), Attitude (AT), Practice (PR), and Belief Level (BL). These constructs represent the cognitive, affective, and behavioral dimensions of Kanuri parents' engagement with girl-child education in Northern Borno. The model is supported by strong path coefficients and high R^2 values, indicating robust explanatory power.

Knowledge exerts a significant influence on both Attitude and Belief Level, with path coefficients of 0.653 and 0.859 respectively. This suggests that parents who are well-informed about the benefits and importance of educating girls are more likely to develop positive attitudes and exhibit supportive beliefs. Attitude, in turn, predicts Practice with a path coefficient of 0.401, and Belief Level with 0.292, indicating that favorable perceptions and emotional dispositions toward girl-child education contribute to both behavioral intention and actual support. Belief Level also influences Practice directly, with a coefficient of 0.331, reinforcing the idea that belief orientation plays a critical role in shaping parental actions.

The R^2 values further validate the strength of the model: Attitude is explained by Knowledge at 0.840, Practice by Attitude and Belief Level at 0.738, and Belief Level by Knowledge, Attitude, and Practice at 0.816. These values demonstrate that the model captures a substantial portion of the variance in parental behavior, making it a reliable framework for understanding and improving girl-child education outcomes in culturally sensitive contexts.

Table 2 Reliability and Convergent Validity of Constructs

Construct	Cronbach's Alpha	Composite reliability	Composite Reliability	AVE
Attitude	0.869	0.906	0.910	0.719
Belief	0.786	0.803	0.861	0.611
Knowledge	0.830	0.910	0.886	0.623
Practice	0.875	0.880	0.910	0.669

Table 2 presents the reliability and convergent validity statistics for the four latent constructs used in the structural equation model: Attitude, Belief, Knowledge and Practice. These metrics are essential for evaluating the internal consistency and measurement accuracy of the constructs. The indicators include Cronbach's Alpha, Composite Reliability and Average Variance Extracted, each serving a distinct purpose in validating the measurement model. The Cronbach's Alpha values range from 0.786 (Belief) to 0.875 (Practice), indicating strong internal consistency across constructs. The Composite Reliability scores are higher, ranging from 0.803 (Belief) to 0.910 (Attitude and Practice), suggesting that the constructs are reliably measured when considering the actual loadings of each indicator. This reinforces the strength of the measurement model beyond what Cronbach's Alpha alone might suggest.

The AVE values, which assess convergent validity, show that Attitude (0.719), Belief (0.611), Knowledge (0.623) and Practice (0.669) all exceed the recommended threshold of 0.50, indicating that more than half of the variance in their indicators is captured by the latent constructs. These results confirm that the constructs demonstrate adequate convergent validity. Therefore, the reliability and validity statistics support the adequacy of the measurement model, confirming that the constructs are sufficiently robust for further structural analysis. These results provide a foundation for interpreting the causal relationships among Kanuri parents' knowledge, beliefs, attitudes and practices toward girl-child education.

Table 3 Structural Model Path Coefficients

Path	Path Coefficients	Decision
AT->PR	0.401	Accept
BL->AT	0.292	Reject
BL->PR	0.331	Reject
KN->AT	0.653	Accept
KN->BL	0.859	Accept
KN->PR	0.213	Reject

Direct Effects

The structural model indicates that knowledge has a strong and significant positive effect on parents' attitude toward girl-child education (β = 0.653). This result demonstrates that increased awareness and understanding of the benefits of girl-child education substantially improve parental attitudes. The magnitude of this coefficient underscores the central role of knowledge in shaping attitudinal orientation within conservative socio-cultural settings.

Similarly, knowledge significantly influences parents' beliefs about girl-child education (β = 0.859), representing the strongest path in the model. This finding suggests that belief systems surrounding girl-child education among Kanuri parents are largely knowledge-driven, and that increased access to accurate information can effectively challenge misconceptions and culturally entrenched narratives that discourage female education.

However, the direct effect of knowledge on practice was positive but statistically insignificant (β = 0.213). This indicates that parental knowledge alone does not directly translate into supportive practices such as enrolment, retention, or encouragement of girls' schooling. The finding reveals a clear knowledge–practice gap, implying that contextual and structural constraints may inhibit behavioural execution despite cognitive awareness.

The results further show that belief does not significantly influence attitude (β = 0.292), suggesting that belief systems alone are insufficient to shape parental attitudes toward girl-child education. Likewise, the effect of belief on

practice was positive but statistically insignificant (β = 0.331), indicating that favourable beliefs do not necessarily result in supportive educational practices. These findings challenge the assumption that cultural or religious beliefs automatically determine educational behaviours in traditional communities.

In contrast, attitude was found to have a significant positive effect on practice (β = 0.401), making it the strongest significant predictor of parental practice in the model. This result highlights attitude as the critical behavioural catalyst through which parental dispositions are converted into tangible educational actions.

Table 4 Mediation Effect

Indirect Path	Indirect β	Mediation Outcome
KN → AT → PR	0.262	Significant – Full Mediation
KN → BL → PR	0.284	Not Supported
KN → BL → AT → PR	0.101	Not Supported

Indirect and Mediating Effects

Beyond the direct paths, mediation analysis reveals important indirect relationships. The indirect effect of knowledge on practice through attitude was computed by multiplying the path coefficients (KN → AT = 0.653; AT → PR = 0.401), yielding an indirect effect of β = 0.262. Notably, this indirect effect is stronger than the direct effect of knowledge on practice (β = 0.213), and the direct path was insignificant. This pattern provides evidence of full (indirect-only) mediation, indicating that knowledge influences parental practice only by first shaping attitudes toward girl-child education.

In contrast, the indirect effect of knowledge on practice through belief (KN → BL → PR) produced a coefficient of β = 0.284, but this pathway was not statistically meaningful due to the insignificance of the BL → PR path. Similarly, the sequential mediation pathway KN → BL → AT → PR yielded a weak indirect effect of β = 0.101, which was also unsupported because the BL → AT path was insignificant. These results confirm that belief does not function as an effective mediating mechanism in translating knowledge into practice.

Table 5 R^2 Values of Endogenous Constructs

Construct	R^2 Value
Attitude (AT)	0.840
Practice (PR)	0.738
Belief (BL)	0.816

Table 5 presents the coefficient of determination (R^2) values for the endogenous constructs in the structural model: Attitude, Practice and Belief Level. The R^2 value for Attitude is 0.840, meaning that 84.0% of the variance in parental attitude toward girl-child education is explained by the exogenous constructs, primarily Knowledge and Belief. This high value reflects the strong influence of cognitive and cultural factors on how parents perceive and emotionally respond to the idea of educating girls. Similarly, Practice (PR) has an R^2 of 0.738, indicating that 73.8% of the variation in parental practices such as school enrollment, support, and follow-through is accounted for by Attitude and Belief Level. This suggests that favorable attitudes and belief orientation are key drivers of actual educational support.

The R^2 for Belief Level (BL) is 0.816, showing that Knowledge, Attitude and Practice collectively explain 81.6% of the variance in belief disposition. This construct reflects the overall readiness and commitment of parents to act in ways that support girl-child education. Taken together, these R^2 values demonstrate that the model has strong predictive capability and that the selected constructs are meaningful in explaining parental engagement. The results validate

the structural equation model and reinforce the importance of targeting knowledge, attitudes and practices in interventions aimed at improving girl-child education outcomes in Northern Borno.

4 Discussions

This study establishes a clear structural hierarchy in the determinants of parental support for girl-child education among the Kanuri of Northern Borno. The strong and significant direct effects of knowledge on belief (β = 0.859) and attitude (β = 0.653) are consistent with the cognitive–affective model of behavioural change, which posits that cognition precedes and shapes affective orientations. The exceptionally strong knowledge–belief relationship suggests that parental beliefs about girl-child education are largely knowledge-driven rather than fixed cultural dispositions. This finding supports Manir and Jabbi's (2023) argument that in Northern Nigerian communities, increased awareness of the tangible benefits of education—such as improved health outcomes, economic security, and social mobility—serves as a key catalyst for re-evaluating traditionally held views.

Empirical evidence from prior studies further reinforces this relationship. Hussain et al. (2016) found that parents with higher educational attainment exhibit more positive attitudes toward female education, underscoring the role of knowledge and exposure in shaping supportive views. Similarly, Rehman and Shafi (2021) reported that 76.7% of parents acknowledged that their own education contributed to more favourable attitudes toward female education, with educational exposure significantly associated with reduced traditional resistance. Sualihu et al. (2024) also observed that in Ghana, parents' educational histories strongly influence their beliefs about girls' ability to enrol, perform, and complete schooling. Extending these findings, the present study provides robust empirical confirmation that knowledge is not a peripheral factor but a foundational driver that reshapes both belief systems and attitudinal orientations toward girl-child education.

Despite this strong cognitive influence, knowledge did not exert a significant direct effect on parental practice (β = 0.213), revealing a pronounced knowledge–practice gap, a phenomenon widely documented in development and education research. Similar patterns were reported by Adeniran et al. (2023), who found that awareness-focused advocacy initiatives in Nigeria frequently produced substantial cognitive gains without corresponding improvements in girls' enrolment or retention. The present model helps to explain this disconnect by demonstrating that knowledge alone is insufficient to trigger behavioral enactment unless it is first translated into a favorable evaluative orientation, namely, attitude. Evidence from Kebbi State further supports this interpretation. Mairo (2017) observed that girls from educated households exhibited higher enrolment, retention, and classroom participation, suggesting that parental educational background—and the attitudinal dispositions that often accompany it—plays a decisive role in shaping girls' educational trajectories. Complementary qualitative evidence from India and Tanzania similarly reveals that even parents who profess to value education may withdraw girls from school due to concerns over safety, family honor, early marriage, or domestic labor demands, thereby reinforcing the persistence of the knowledge–practice gap (Srivastava et al., 2025; Maro & Omer, 2024).

The mediation analysis provides decisive evidence that attitude is the critical conduit through which knowledge influences parental practice. The indirect effect of knowledge on practice through attitude (β = 0.262) was statistically significant and substantially stronger than the non-significant direct path from knowledge to practice, thereby indicating full (indirect-only) mediation. This finding implies that knowledge becomes behaviorally consequential only after it reshapes how parents feel, evaluate, and emotionally orient themselves toward girl-child education. Such a mechanism closely aligns with Ajzen's (1991) Theory of Planned Behavior, which posits that attitudes—formed from underlying beliefs and information—constitute the most proximal psychological determinants of behavior. Within this framework, attitude functions as a behavioral catalyst that translates cognitive awareness into concrete practices, including school enrolment, retention, and active encouragement of girls' education.

This mediating role of attitude is consistent with the findings of Xueqi et al. (2021), who demonstrated that parental attitudes of preventability mediated the positive relationships between knowledge, attribution of responsibility, and supervision behaviors, as well as the provision of a safe home environment. Together, these findings reinforce the centrality of attitudinal transformation as the mechanism through which informational interventions achieve behavioral outcomes.

Contrary to common assumptions in the literature, belief did not exert a significant influence on either attitude (β = 0.292) or practice (β = 0.331). Consequently, neither the simple mediation pathway (KN → BL → PR) nor the

sequential mediation pathway (KN → BL → AT → PR) was supported. These results challenge deterministic narratives that frame cultural or religious beliefs as automatic drivers of educational behavior in conservative contexts (Tabe-Ojong & Nshakira-Rukundo, 2021). Instead, the findings suggest that although beliefs are strongly shaped by knowledge, they function primarily as background cognitive frames rather than direct behavioral triggers unless accompanied by a corresponding shift in attitude. This nuance refines earlier conclusions by Yusuf and Adamu (2021), indicating that in this context, attitudinal orientation—rather than belief endorsement—is the decisive mechanism translating knowledge into parental educational practice.

In contrast, attitude emerged as the strongest and only significant predictor of parental practice ($\beta = 0.401$), underscoring the primacy of attitudinal disposition over belief systems in shaping real-world educational decisions. While parents may cognitively endorse positive beliefs about girl-child education, such beliefs do not necessarily translate into action unless they are internalized as favorable attitudes capable of overcoming emotional reservations, social pressures, and perceived risks (Gordon, 2021). Empirical evidence from Pakistan similarly demonstrates that supportive parental attitudes are robust predictors of gender equity in education; however, persistent concerns regarding daughters' safety, family honor, and domestic responsibilities often impede actual educational support despite expressed approval (Hassan et al., 2025). This pattern aligns with Omede and Omede's (2018) concept of the "affective barrier," which posits that behavioral change in traditional contexts requires affective commitment beyond mere ideological acceptance.

Overall, the model exhibits strong explanatory power, with substantial variance accounted for in both attitude and practice, thereby validating the integrated application of the Theory of Planned Behavior and Ecological Systems Theory. The findings further resonate with Bronfenbrenner's (1979) mesosystem perspective, wherein parental cognition dynamically interacts with social and cultural contexts to shape educational behavior. Nonetheless, the unexplained variance in parental practice highlights the continued relevance of structural constraints—such as poverty, insecurity, and displacement—which remain pervasive in Northern Borno and significantly condition parental agency (UNICEF, 2022).

These results carry important policy and programmatic implications. They argue against isolated information campaigns that focus solely on raising awareness. Instead, they call for integrated interventions that prioritize attitude formation through community-based dialogue, participatory engagement, and value reframing, alongside knowledge dissemination. Programs should also recognize that changing beliefs alone is insufficient unless those beliefs are transformed into positive evaluative orientations toward girls' education. Monitoring and evaluation frameworks should therefore track intermediate psychological shifts—particularly attitude—as leading indicators of future behavioral change.

In summary, this study moves beyond identifying correlates of parental support to modeling the precise psychological pathways through which support for girl-child education is either activated or inhibited. It confirms that while knowledge is foundational, it is functionally inert unless it successfully passes through the attitudinal filter. For policymakers and practitioners in Northern Borno and similar socio-cultural contexts, the model provides a strategic roadmap: sustainable change requires prioritizing attitude transformation as the central lever linking awareness to action.

5 Conclusions

This study employed Structural Equation Modeling (SEM) to investigate the interrelationships among Kanuri parents' knowledge, attitude, belief, and practice regarding girl-child education in Northern Borno, Nigeria. The validated model revealed a clear and robust structural hierarchy. Parental knowledge emerged as the most powerful antecedent, exerting strong direct effects on both belief and attitude. However, the path to supportive practice was predominantly indirect, mediated by these attitudinal and belief-based constructs. Specifically, while the direct effect of knowledge on practice was weak, its influence was powerfully channeled through positive attitudes and supportive beliefs, which were significant direct predictors of practice. The model demonstrated high explanatory power, accounting for a substantial proportion of the variance in attitude (84.0%), belief (81.6%), and practice (73.8%), confirming its efficacy in mapping the psychological and social determinants of parental behavior in this context.

Based on these key findings, several recommendations are proposed. First, interventions must evolve beyond standalone awareness campaigns. A synergistic, multi-component strategy is essential, one that

simultaneously enhances factual knowledge, cultivates positive attitudes through community engagement and role-modeling, and actively engages with cultural and religious belief systems via trusted intermediaries like traditional and religious leaders. Second, monitoring and evaluation frameworks for girl-child education programs should incorporate indicators for knowledge, attitude, and belief, using them as leading metrics to predict and understand changes in enrollment and retention practices.

This research is not without limitations. The cross-sectional design precludes definitive causal inferences, indicating that the proposed relationships, while strong, should be interpreted as predictive pathways rather than proven causality. The sample size, though adequate for the analysis performed, was moderate and drawn via purposive sampling from a specific cultural and geographic setting (Kanuri parents in Northern Borno), which may affect the generalizability of the findings to other ethnic groups or regions.

These limitations point directly to avenues for future research. Longitudinal studies are needed to trace the evolution of the knowledge-attitude-belief-practice chain over time and establish causality. Employing mixed-methods approaches would be highly beneficial; quantitative models like this one could be deepened with qualitative inquiries to explore the nuanced content of "beliefs" and the specific socio-economic barriers parents reference. Furthermore, testing this structural model in different socio-cultural and regional contexts within Nigeria and the broader Sahel would assess its transferability and identify context-specific moderators.

The practical implications of this study are significant for policymakers, NGOs, and community advocates. The model provides a strategic blueprint for intervention design, emphasizing that to change practice, one must first change the mindset. Investments should be directed toward integrated programs that respect the local cultural ecology while systematically addressing each layer of parental decision-making. By understanding that knowledge is the seed, but attitude and belief are the soil in which the seed must grow, stakeholders can develop more effective, respectful, and sustainable strategies to advance the critical goal of universal girl-child education in Northern Borno and beyond, ultimately contributing to gender equity, poverty reduction, and community resilience.

Theoretical and Practical Implications

The results extend the Knowledge–Attitude–Practice (KAP) framework by empirically demonstrating that attitude serves as the pivotal transmission mechanism between knowledge and behaviour. From a policy perspective, the findings suggest that interventions should move beyond information dissemination to focus on attitude transformation strategies, including community role modelling, parental engagement forums, and value-based advocacy. Additionally, addressing structural barriers such as poverty, insecurity, and access to schools is essential for converting positive attitudes into sustained educational practices.

Social and Practical Implications

This study shows that when parents understand the benefits of girls' education, they are more likely to change their attitudes and beliefs, which then influence their actions. This means that programs should not only give parents information but also work with communities to build positive attitudes and challenge cultural beliefs that limit girls' schooling. In practice, schools, NGOs, and government agencies can use these findings to design activities that involve parents, religious leaders, and community elders so that support for girls' education grows naturally within the community.

Implications for Management and Policy

For education managers and policymakers, the results suggest that success should not be measured only by the number of girls enrolled in school. Instead, they should also look at changes in parents' knowledge, attitudes, and beliefs as early signs of progress. Policies should encourage cooperation between schools, families, and community leaders to create an environment where girls are supported. Managers should also involve parents in planning and decision-making so that programs feel relevant and are more likely to last.

Implications for Theory

This study adds to existing theories by showing how knowledge, attitudes, and beliefs work together to shape parents' actions. It supports the idea that knowledge alone is not enough parents must also change how they feel and what they belief before they act. By combining ideas from behavior theory and ecological theory, the study shows that decisions about girls' education are influenced both by personal understanding and by community traditions. This helps researchers apply these theories in cultural settings where religion and tradition play a strong role.

Limitations and Future Research

The study has some limits. Because it was done at one point in time, it cannot prove cause and effect. The sample size was also small, with only 93 parents, so the results may not represent all Kanuri families. In addition, answers were self-reported, which may have been influenced by what parents thought was the "right" response. Future studies should include larger samples, use interviews or focus groups to add depth, and follow families over time to see how attitudes and practices change. Research in other communities across Nigeria and the Sahel would also help test whether the findings apply more widely.

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Data Availability Statement

Data will be made available on request. Interested readers may contact the corresponding author to access anonymized data, subject to ethical approval and confidentiality rules.

Conflict of Interest

The authors declare no conflicts of interest.

Declaration of Use of Generative AI

Generative tools were used only to help with language editing and formatting. All ideas, analysis and interpretations are based on the authors' own research data.

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