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Beyond Fixed Roles: Overlapping Cyberbullying Perpetration, Victimization, and Witnessing in Primary School Pupils

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Abstract

Cyberbullying research commonly distinguishes perpetration, victimization, and witnessing, yet these roles may not be mutually exclusive. Using baseline data collected before a digital learning intervention, this study examined whether the three roles were empirically distinct or overlapping among 353 primary-school pupils. Twenty cyberbullying items were organized into perpetration (P), victimization (V), and witnessing/ exposure (W) domains. The analyses combined descriptive and correlational evidence, comparisons of alternative structural models, individual-level configurations of involvement, threshold sensitivity analyses, and known-groups comparisons. All three domains were strongly and positively associated, with the strongest correlation between perpetration and victimization. Ordinal confirmatory factor analyses showed inadequate robust global fit for both the one-factor and correlated three-factors models; therefore, neither a common latent continuum nor three distinct latent factors was established. Under the primary behavioral criterion, 170 pupils (48.2%) were involved in at least one domain. Of these, 62.4% were involved in at least two domains, whereas 37.6% were involved in only one. Multi-domain involvement remained clearly evident under more stringent classification rules. Pupils reporting previous experiences of being bullied or cyberbullied scored higher on both victimization and perpetration, providing further known-groups evidence of overlap. Overall, the findings suggest that perpetration, victimization and witnessing retain role-specific meaning but do not form cleanly separated categories of pupils. They provide only descriptive evidence of overlapping role experiences while leaving the latent measurement structure unresolved. Assessment and school-based prevention should therefore consider pupils' involvement across multiple domains rather than relying solely on single-role classifications, as pupils may occupy several roles simultaneously.

Introduction

Children's peer relationships increasingly extend across messaging applications, online games, social media, and other networked spaces, allowing peer aggression to move beyond the physical boundaries of school. Although cyberbullying research has concentrated largely on adolescents, primary-school pupils are becoming increasingly active online while still developing digital judgement and social-emotional competencies. Reviews indicate that cyberbullying prevention and assessment research remains comparatively limited in primary education and requires developmentally sensitive approaches rather than simple transfer from older age groups (Chicote-Beato et al., 2024, 2025; Zulkafli et al., 2026).

A central issue is how cyberbullying involvement is conceptualized. Research commonly distinguishes perpetration, victimization, and bystanding or witnessing, yet these labels can imply greater separation than children's experiences warrant. Perpetration and victimization frequently co-occur, and role membership in bullying need not be stable or exclusive (Lee & Chun, 2021; Li & Peng, 2022; Strohmeier et al., 2024). From a relational and social-ecological perspective, these positions are embedded in peer interactions rather than isolated attributes of individual children. The present study uses this perspective only as a conceptual lens for role overlap; it does not test a social-ecological model because family-, school-, and community-level predictors are not included.

Witnessing extends this problem beyond the familiar perpetrator–victim dyad. Cyber bystanders may remain passive, reinforce aggression, or support the target, and recent work treats bystanding as a differentiated process rather than a single behavior (Polanco-Levicán & Salvo-Garrido, 2021; Steinvik et al., 2024; Barton et al., 2025). Involvement in other roles can also coexist with bystander responses (Quintero-Jurado et al., 2025). The empirical question is therefore not whether perpetration, victimization, and witnessing should be collapsed, but whether they operate as cleanly bounded forms of involvement or as distinguishable perspectives within a shared cyberbullying space.

This distinction matters for both measurement and intervention. Imposing mutually exclusive roles before examining overlap can conceal pupils who occupy multiple positions, whereas reducing all items to one score can erase meaningful differences between enacting, receiving, and observing harmful behavior. Recent Korean evidence classified all eight possible perpetration–victimization–witnessing combinations and demonstrated that single and overlapping patterns coexist (Yoon & Moon, 2026). That study establishes the relevance of multi-role configurations, but it does not remove the need to ask whether the three domains are empirically separable before such configurations are interpreted, whether conclusions depend on the chosen behavioral threshold, or whether the same pattern is evident among younger pupils.

These questions are particularly relevant in primary education, where the evidence base remains smaller and developmental interpretation matters. Malaysian work has established the educational relevance of bullying and cyberbullying prevention among younger learners and has developed CBS-based approaches to cyberbullying knowledge and participation (Saibon et al., 2017; Mohamad et al., 2021; Saibon et al., 2025; Zulkafli et al., 2026). What remains unresolved is a more basic behavioral question: when the same primary-school pupils are assessed across perpetration, victimization, and witnessing, how clearly separated are those forms of involvement?

The measurement literature distinguishes cyberaggression, cybervictimization and cyberoperation while cautioning against treating their operational labels as evidence of psychometric separation (Garaigordobil, 2017; Del Rey et al., 2015). Research on the overlap between perpetration and victimization likewise suggests that role experiences need not be mutually exclusive (Cho, 2017). These findings motivate separate examinations of item-level structure and pupil-level co-occurrence, rather than assuming that a high correlation alone demonstrates a single latent continuum. For younger pupils, a systematic review of primary-education prevention programs highlights the importance of age-appropriate interpretation and support (Chicote-Beato et al., 2024).

The present study addresses that question using cyberbullying-experience data from 353 Malaysian primary-school pupils. Its contribution is not the claim that multi-role involvement exists. Rather, it test's role overlap across complementary levels of evidence: domain associations and structural separation, pupil-level configurations, robustness across behavioral thresholds, and known-groups convergence. This convergence-based design asks whether the same substantive conclusion survives different

analytic lenses instead of allowing a single factor model or classification cut-point to determine the interpretation.

Four research questions guided the study: (RQ1) To what extent do cyberbullying perpetration, victimization, and witnessing form empirically distinct versus overlapping dimensions of involvement among primary-school pupils? (RQ2) Does the observed structure indicate a dominant shared involvement signal rather than a clean discrete-role representation? (RQ3) At the individual level, how frequently do single-domain and multi-domain configurations occur, and are these patterns robust across defensible behavioral thresholds? (RQ4) Do independently reported experiences of witnessing bullying/cyberbullying and being bullied/cyberbullied show theoretically coherent differences across the three involvement domains? Together, these questions evaluate a cautious alternative to fixed role classification: role-specific meaning may coexist with substantial empirical overlap.

Methods

Design and analytic sample

This study employed a secondary cross-sectional analysis of baseline (pre-intervention) data from the Cegah Buli Siber (CBS) research programmed. The 20 cyberbullying-experience items were completed before pupils received the CBS digital learning intervention, as confirmed by the parent-study researcher. The present study did not evaluate intervention effectiveness or pre–post change. The analytic dataset comprised 353 pupils in Year 4 (n = 107, 30.3%), Year 5 (n = 117, 33.1%), and Year 6 (n = 129, 36.5%); 182 were boys (51.6%) and 171 were girls (48.4%). The recorded ethnic categories were Malay (n = 348, 98.6%) and Indian (n = 5, 1.4%). All 353 pupils attended primary schools in Kedah, Malaysia, and all had complete B1–B20 responses. The parent research selected eligible school settings with reference to fieldwork feasibility and technological access; pupils were selected randomly within the participating school setting(s), as confirmed by the study team. This pupil-selection procedure should not be conflated with random selection of all schools in Kedah or with a state-wide probability sample. The parent thesis also reports a separate intervention sample of 150 pupils, which is not the present analytic sample. Accordingly, this analysis characterizes associations and patterns within the 353 pupils and does not estimate population prevalence. Data were collected by the original researcher through face-to-face administration of paper-based questionnaires in Kedah primary schools; the researcher explained questionnaire items to participating pupils to support comprehension.

Cyberbullying involvement measure

Cyberbullying involvement was assessed using behaviorally worded items covering three role perspectives. Seven items assessed perpetration (B1-B7), including posting insulting material, sending threatening or humiliating messages, disclosing private information, sharing inappropriate images or video, online exclusion, identity misuse, and spreading embarrassing stories or rumors. Seven parallel items assessed victimization (B8-B14) from the recipient perspective. The available third domain contained six items (B15-B20) describing exposure to or observation of comparable cyberbullying

behaviors involving others. Although the source instrument labelled this domain as bystanding, the present study uses witnessing/exposure at first definition and witnessing thereafter because the retained items primarily capture observation or exposure rather than behavioral responses such as defending, reinforcing, or reporting.

The response format was frequency-based rather than attitudinal: 1 = very often, 2 = often, 3 = sometimes, 4 = rarely, and 5 = never. For analysis, all B items were reversed using 6 - raw score so that higher values consistently indicated greater reported involvement (1 = lowest/non-occurrence; 5 = highest frequency). Domain scores were calculated as item means rather than sums because the available domains differed in length (seven perpetration items, seven victimization items, and six witnessing items).

Background and experience indicators

Two questionnaire items were used only as external known-groups indicators. A3 asked whether the pupil had seen bullying or cyberbullying occur, and A4 asked whether the pupil had personally experienced bullying or cyberbullying. For both items, the questionnaire presented Yes before No; the analytic coding was therefore reconstructed as 1 = Yes and 2 = No. Values outside the binary 1–2 range were treated as data-entry anomalies and excluded only from the relevant known-groups comparison. These broad items cyberbullying and were not treated as independent criterion measures of the three cyberbullying domains.

Data screening and descriptive analysis

The analysis began with an item-level audit of wording, response anchors, scoring direction, missingness, and response distributions. All 353 cases were complete for B1-B20. For each domain, the mean, standard deviation, median, interquartile range, skewness, floor and ceiling concentration, and Cronbach's alpha were examined. Pearson correlations were used to quantify observed linear associations among perpetration, victimization, and witnessing scores; Spearman correlations were examined as a rank-based sensitivity check because the domain distributions were positively skewed and showed floor concentration.

Confirmatory Factor Analysis

Ordinal confirmatory factor analysis (CFA) was conducted using the weighted least squares mean and variance adjusted (WLSMV) estimator in R (lavanan) to examine the underlying structure of the 20 cyberbullying items. Two competing models were examined: a one-factor model comprising all 20 items and a correlated three-factor model representing perpetration (B1–B7), victimization (B8–B14), and witnessing (B15–B20). Model fit was evaluated using robust comparative fit index (CFI), Tucker–Lewis's index (TLI), root mean square error of approximation (RMSEA), and standardized root mean square

residual (SRMR). The CFA was treated as a supporting analysis to assess the proposed measurement structure rather than as definitive evidence of construct validity.

Individual-level role overlap

To translate domain-level overlap into pupil-level patterns, each pupil was classified into one of eight mutually exclusive configurations: no active domain, perpetration only, victimization only, witnessing only, perpetration + victimization, perpetration + witnessing, victimization + witnessing, or all three domains. The primary behavioral rule defined a domain as active when at least one item in that domain reached an analytic score of 4 or 5, corresponding to an original response of Kerap or Sangat kerap (often/very often). This threshold was selected because the primary rule relied only on the clearly defined Kerap and Sangat kerap response categories; category 3 was explained as sometimes during administration.

Threshold sensitivity analyses repeated the classification at analytic scores of ≥ 2, ≥3, ≥ 4, and ≥ 5. The ≥ 5 rule represented the strictest test, requiring at least one Sangat kerap response. A second sensitivity analysis required repeated indicators within a domain, including a stringent rule of at least two items at score ≥ 4. These classifications were used to evaluate the stability of role co-occurrence and were not interpreted as epidemiological prevalence estimates because the audited instrument did not establish a verified behavioral reference period.

Known-Groups Comparisons

Known-groups analyses examined whether pupils who reported broader bullying/cyberbullying experiences differed in the theoretically relevant cyberbullying domains. Because the domain scores were skewed, Mann-Whitney U tests were used to compare A3 Yes versus No and A4 Yes versus No groups on perpetration, victimization, and witnessing. Rank-biserial correlations were reported as effect-size estimates. As a behavioral cross-check, domain activation under the primary ≥ 4 rule was also compared across A3 and A4 groups using chi-square tests. These analyses were interpreted as convergent known-groups evidence rather than criterion validity.

Integrated decision logic

No single statistic was used to determine whether cyberbullying roles were discrete or overlapping. The interpretation was based on convergence across four forms of evidence: (1) observed domain associations and discriminant separation; (2) supporting structural model comparisons and robustness checks; (3) the frequency and stability of multi-domain configurations at the pupil level; and (4) known-groups convergence with broader reported bullying/cyberbullying experiences. Evidence for a shared involvement space was not taken to imply that perpetration, victimization, and witnessing were identical

constructs, and inadequate fit of a strict one-factor model was treated as evidence against a purely unidimensional interpretation.

Ethical and reporting considerations

The parent CBS research obtained research permission from the Malaysian Ministry of Education (Kementerian Pendidikan Malaysia, KPM) through the e-RAS application process, as confirmed by the study team. The parent thesis also describes coordination with the relevant education authorities, school administrators, teachers, and parents or guardians. The present article analyses de-identified baseline records collected under that parent research. KPM research permission is not presented as equivalent to approval by an institutional research ethics committee. No institutional ethics committee name, approval reference number, or specific child-assent procedure is claimed without documentary confirmation. All reported frequencies and behavioral classifications refer to the analytic sample rather than national prevalence.

IBM SPSS Statistics version 26 was used in the parent CBS study. For the present secondary analysis, descriptive summaries, Pearson HTMT estimates and Pearson-correlation parallel analysis were reproduced in Python (NumPy/pandas). Ordinal CFA was subsequently run in R/lavaan with WLSMV using the 353 pre-intervention observations. Table 2 reports the verified pre-intervention robust fit indices from the saved CFA output; post-intervention results were excluded from this cross-sectional manuscript.

Results

Data integrity and distributional characteristics

All 353 cases contained complete responses for B1–B20. Following the locked scoring protocol, item responses were reversed so that higher values represented greater cyberbullying involvement. Perpetration was represented by B1–B7, victimization by B8–B14, and witnessing by B15–B20; B21 was not available in the analytic dataset and was not imputed. The three domain scores were positively skewed, with the strongest floor concentration for perpetration and victimization. Witnessing showed the highest mean and the lowest floor concentration (Table 1). Internal consistency was acceptable across the three domains (α = .731–.764).

Table 1
Descriptive statistics, floor/ceiling concentration, and internal consistency of the cyberbullying domains

Domain	k	M	SD	Median	IQR	Skew	Floor %	α
Perpetration	7	1.47	0.60	1.29	1.00–1.57	1.94	29.5	.764
Victimisation	7	1.54	0.63	1.43	1.00–1.71	1.62	26.1	.756
Witnessing	6	1.87	0.81	1.50	1.33–2.33	1.20	12.7	.731

Note. N = 353. Higher scores indicate greater involvement. Ceiling concentration was 0% for all three domain composites. B21 was unavailable and was not imputed.

Observed overlap among perpetration, victimization, and witnessing

The domain scores were strongly and positively associated. Pearson correlations were .736 between perpetration and victimization, .640 between perpetration and witnessing, and .717 between victimization and witnessing. Rank-order associations were also substantial (Spearman ρ = .621, .599, and .670, respectively).

Structural evidence for overlapping rather than discrete roles

The WLSMV CFA results indicated inadequate robust global fit for both the general one-factor model (robust CFI = .830, TLI = .810, RMSEA = .115; SRMR = .067) and the correlated three-factor model (robust CFI = .833, TLI = .810, RMSEA = .116; SRMR = .067). The three-factor model did not show a substantively meaningful improvement in robust fit. These findings do not validate either a unitary continuum or three psychometrically distinct latent dimensions. No unadjusted chi-square subtraction is interpreted as a valid WLSMV difference test.

Pearson-correlation parallel analysis (2,000 simulated independent normal datasets; fixed random seed 20261012) indicated a dominant first dimension. The observed first eigenvalue was 6.847, whereas the second was 1.400. Only the first observed eigenvalue exceeded its simulated 95th-percentile benchmark in the reproducibility analysis. Simulation reference values depend on the stated algorithm and random seed and should not be interchanged with values from a different run.

Table 2
Ordinal WLSMV confirmatory factor analysis: robust fit of one-factor and correlated P/V/W models (pre-intervention)

Model	χ^2	df	χ^2/df	CFI	TLI	RMSEA	SRMR
General one-factor	415.38	170	2.44	.830	.810	.115	.067
Correlated P/V/W	410.04	167	2.46	.833	.810	.116	.067

Note. Pre-intervention N = 353; 20 ordinal items; robust WLSMV estimates from R/lavaan. The chi-square values are scaled test statistics; CFI, TLI and RMSEA are robust indices; SRMR is reported separately. The models converged, but neither demonstrated adequate robust fit. P = perpetration; V = victimizations; W = witnessing.

Robustness of the overlap interpretation

After rank transformation, the three-factor model remained only marginally better than the one-factor model (CFI = .716 vs. .714; RMSEA = .104 for both; SRMR = .085 vs. .086). In the threshold-aware ordinal sensitivity analysis, all 20 indicators showed positive associations with the common component (approximately .447–.713; mean ≈ .571). Average within-domain associations were .301 for perpetration, .308 for victimizations, and .289 for witnessing; cross-domain averages were .304 for perpetration–victimizations, .260 for perpetration–witnessing, and .293 for victimizations–witnessing.

Individual-level co-occurrence across cyberbullying domains

Under the primary behavioural rule, a domain was active when at least one item reached an analytic score of ≥ 4 (original response: often or very often). Of the 353 pupils, 183 (51.8%) had no active domain and 170 (48.2%) had at least one active domain. Among the 170 pupils with at least one active domain, 64 (37.6%) showed a single-domain configuration and 106 (62.4%) showed a two- or three-domain configuration. Forty-eight pupils (13.6% of the full sample; 28.2% of those with at least one active domain) met the criterion in all three domains (Table 3).

The configuration pattern was examined across alternative thresholds (Table 3). In the exploratory ≥ 3 sensitivity classification (including the middle response category), 222 pupils had at least one active domain and 152 (68.5%) of them showed multi-domain involvement. At the primary ≥ 4 threshold, the corresponding proportion was 62.4%. At the strictest threshold (≥ 5; original response: very often), 104 pupils had at least one active domain and 54 (51.9%) showed multi-domain involvement. Under the repeated-indicator sensitivity rule requiring at least two items at score ≥ 4 within an active domain, 103 pupils had at least one active domain and 45 (43.7%) showed multi-domain involvement.

Table 3
Individual-level P/V/W configurations across behavioral thresholds

Rule	None	P	V	W	P + V	P + W	V + W	P + V+W
≥ 2	28 (7.9)	5 (1.4)	9 (2.5)	28 (7.9)	3 (0.8)	31 (8.8)	39 (11.0)	210 (59.5)
≥ 3	131 (37.1)	14 (4.0)	16 (4.5)	40 (11.3)	5 (1.4)	26 (7.4)	38 (10.8)	83 (23.5)
≥ 4	183 (51.8)	7 (2.0)	13 (3.7)	44 (12.5)	8 (2.3)	24 (6.8)	26 (7.4)	48 (13.6)
≥ 5	249 (70.5)	5 (1.4)	7 (2.0)	38 (10.8)	2 (0.6)	11 (3.1)	20 (5.7)	21 (5.9)

Note. Values are n (% of N = 353). Thresholds refer to the reversed analytic scale, where higher values indicate greater involvement. The ≥ 4 rule was designated the primary behavioral rule. P = perpetration; V = victimizations; W = witnessing

Known-groups convergence with reported bullying experiences

For A4, pupils reporting that they had been bullied or cyberbullied had higher victimizations scores than those reporting no such experience (M = 1.651 vs. 1.473), $p < .001$, $r_{rb} = .240$. Perpetration was also higher in the A4 Yes group (M = 1.539 vs. 1.429), $p = .00487$, $r_{rb} = .175$. Witnessing scores did not differ significantly (M = 1.941 vs. 1.833), $p = .385$, $r_{rb} = .055$ (Table 4).

For A3, pupils reporting that they had witnessed bullying or cyberbullying had higher victimizations scores (M = 1.649 vs. 1.445), $p < .001$, $r_{rb} = .232$, and slightly higher perpetration scores (M = 1.505 vs. 1.445), $p = .0439$, $r_{rb} = .122$. Witnessing scores did not differ significantly (M = 1.908 vs. 1.837), $p = .367$, $r_{rb} = .055$ (Table 4).

Table 4
Known-groups differences in P/V/W scores by reported bullying/cyberbullying experiences

Grouping item	Domain	Yes n	Yes M	No n	No M	p / r_rb
A3: witnessed	P	167	1.505	184	1.445	.0439 / .122
	V	167	1.649	184	1.445	< .001 / .232
	W	167	1.908	184	1.837	.367 / .055
A4: been bullied	P	141	1.539	207	1.429	.00487 / .175
	V	141	1.651	207	1.473	< .001 / .240
	W	141	1.941	207	1.833	.385 / .055

Note. Mann–Whitney tests were used; r_rb = rank-biserial correlation. Invalid/non-binary A3/A4 codes were excluded from the relevant comparison. A3/A4 are broad known-groups indicators and are not treated as gold-standard criterion measures.

Taken together, the observed domain correlations, pupil-level configurations, and known-groups comparisons indicated substantial co-occurrence across the operationally defined perpetration, victimizations, and witnessing domains. However, neither CFA model demonstrated adequate robust global fit. The findings therefore support descriptive role overlap while leaving the underlying latent measurement structure unresolved. Known-groups comparisons showed the clearest differences in victimizations, smaller differences in perpetration, and no statistically significant differences in witnessing.

Discussion

The central finding is that pupils reported cyberbullying experiences frequently span more than one operational role domain. The result does not depend on a claim that the questionnaire establishes three discrete latent constructs: both prespecified WLSMV models showed inadequate robust fit. This distinction between observable co-occurrence and unresolved measurement structure is essential when interpreting the evidence. The present contribution is the triangulation of domain correlations, threshold-sensitive pupil-level configurations and modest known-groups comparisons in a primary-school sample.

Role differentiation within a shared involvement space

Role labels remain useful because enacting, receiving, and observing cyberbullying describe different positions and imply different support needs. They become problematic only when a label is treated as a mutually exclusive type of child. The especially strong perpetration–victimizations association is consistent with prior evidence that cyberbullying roles can co-occur (Lee & Chun, 2021; Li & Peng, 2022), while the inclusion of witnessing extends the question beyond the conventional bully–victim dyad. From a relational perspective, the relevant distinction is therefore between role-specific experiences and role-

exclusive identities: the former are supported by the item content, whereas the latter are not well supported by the present pattern of evidence.

The poor robust CFA fit should be interpreted alongside prior work showing that the psychometric performance of cyberbullying instruments depends on item content, language and population (Del Rey et al., 2015; Garaigordobil, 2017). It is therefore premature to claim that the present 20-item instrument establishes either a validated general cyberbullying factor or three distinct latent role factors. A future item-level revision and independent validation in younger Malaysian samples would be preferable to selecting a model solely because its fit is marginally less poor.

From structural overlap to pupil-level co-occurrence

The pupil-level configurations translate that structural conclusion into a form with direct substantive meaning. Under the primary behavioral rule, multi-domain involvement was more common than single-domain involvement among pupils meeting at least one domain criterion, and multi-domain patterns remained evident as the criterion became more stringent. The importance of this result lies less in any single percentage than in its robustness to alternative classification rules. The overlap conclusion was therefore not dependent on one permissive cut-point.

This also clarifies the study's novelty relative to emerging multi-role research. Yoon and Moon (2026) demonstrated all eight possible perpetration–victimizations–witnessing combinations in Korean youth. The present study does not claim priority for multi-role classification. Instead, it asks a prior measurement question—how separable are P/V/W?, and then examines whether the resulting overlap is reproduced at the pupil level, survives threshold changes, and receives external support from broader experience indicators. The contribution is thus convergence across levels of analysis in a primary-school sample rather than the existence of an eight-category typology itself.

The place of witnessing in the involvement system

Witnessing was descriptively the highest-scoring domain and the most common single-domain configuration under the primary behavioral rule. Its interpretation, however, requires precision. The retained items capture exposure to or observation of cyberbullying involving others, not whether pupils defended, reinforced, ignored, or reported what they observed. This distinction is consistent with literature showing that bystander responses are heterogeneous (Polanco-Levicán & Salvo-Garrido, 2021; Steinvik et al., 2024; Barton et al., 2025). Accordingly, the observed overlap with perpetration and victimizations indicates interconnected exposure and involvement, not equivalence among bystander behaviors.

Cyber observation is conceptually distinguishable from the subsequent response of a bystander. The Cyberbullying Test explicitly separates observation from perpetration and victimizations (Garaigordobil, 2017), whereas research on bystander behavior examines actions such as defending, reinforcing or remaining passive (Polanco-Levicán & Salvo-Garrido, 2021; Barton et al., 2025). The present witnessing

items do not identify which of those actions' pupils took. Therefore, neither the witnessing means nor its correlations should be interpreted as evidence of defending behavior.

External convergence and the limits of role inference

The known-groups findings provide a deliberately modest external check. Pupils reporting previous bullying or cyberbullying experience showed the clearest difference in the theoretically corresponding victimizations domain, alongside a smaller difference in perpetration. This pattern is compatible with cross-role co-occurrence, but it cannot establish that victimizations lead to perpetration. The data are cross-sectional, and A3/A4 cyberbullying without a verified reference period. The absence of a significant difference in the witnessing composite further cautions against treating the broad A3 item as a criterion measure of cyber-witnessing. These comparisons therefore support convergence, not criterion validity or temporal role transition.

Implications for measurement, classification, and prevention

The measurement implication is to avoid both forced categorization and indiscriminate aggregation. Researchers can retain domain-specific P/V/W scores while explicitly reporting their shared variance and co-occurrence. This is especially important when role categories are later used as predictors, outcomes, or intervention strata, because apparent groups can partly reflect scoring and threshold decisions. The present results also show why person-centered solutions should demonstrate qualitative role differentiation rather than simply partitioning a severity continuum.

For schools, the actionable implication is that single-role identification should trigger multidomain assessment. Detecting victimizations should prompt assessment of perpetration and witnessing as well; the same logic applies when a pupil first comes to attention through perpetration or witnessing. This does not imply uniform intervention. Support should remain need-specific: protection and psychosocial support for victimizations, accountability and behavior change for harmful conduct, and skills for safe and constructive responding among witnesses. The shift is from label-first intervention to pattern-informed assessment and response.

This pattern-informed approach is compatible with prevention literature that treats cyberbullying as a relational and ecological process rather than an isolated act. Peer responses can reinforce, ignore, challenge, or report online aggression, while whole-school prevention recognizes the influence of peer norms and social context (Polanco-Levicán & Salvo-Garrido, 2021; Strohmeier et al., 2024). In primary education, where prevention evidence remains less developed than in secondary settings, the present findings add a classification principle to that agenda: early identification should examine the child's pattern of involvement across the cyberbullying system rather than assume that one observed role exhausts the child's experience (Chicote-Beato et al., 2024).

Evidence syntheses suggest that anti-bullying and cyberbullying programs can have beneficial average effects, although outcomes vary by programmed and context (Gaffney et al., 2019a, b). A review focused

on primary education likewise underscores the need for developmentally appropriate cyberbullying prevention (Chicote-Beato et al., 2024). These sources support the practical relevance of multidomain screening, but they do not establish that the CBS intervention was effective: the present analysis concerns baseline observations only.

Limitations and Directions for Future Research

Several limitations qualify the conclusions. First, the study uses one pre-intervention baseline measurement and is cross-sectional; no temporal ordering, role switching, or developmental progression can be inferred. Second, the B-item distributions were positively skewed, with substantial floor concentration and several sparse response categories, particularly for perpetration and victimizations.

The structural results should therefore be interpreted as supporting evidence rather than definitive scale validation. Both prespecified ordinal CFA models were estimated using WLSMV and demonstrated inadequate robust global fit; thus, neither a validated unidimensional continuum nor psychometrically distinct role factors can be claimed. Third, the available witnessing block contained six items because B21 was absent from the analytic dataset; it was not imputed. Fourth, the questionnaire did not provide a verified behavioral reference period in the current audit, so the classification percentages should not be interpreted as population prevalence.

Fifth, the A3/A4 known-groups indicators cyberbullying and were not independent validated criterion measures. Finally, the precise selection mechanism for these 353 baseline records was not fully reconstruct able from the parent thesis, and all pupils attended schools in Kedah, and the sample was predominantly Malay (98.6%); the findings may not transfer to other geographic or demographic settings. The findings should not be generalized automatically to older adolescents or to Malaysian schoolchildren nationally.

These limitations also identify productive directions for future research. Longitudinal studies should test whether the overlapping involvement space observed here reflects stable co-occurrence, movement between forms of involvement, or incident-specific role changes over time. Measurement work should retain the distinction between witnessing exposure and bystander response, allowing passive observation, reinforcing, defending, and other responses to be examined alongside perpetration and victimizations.

Replication using robust ordinal structural models and larger primary-school samples would help determine whether the weak empirical separation among P/V/W is characteristic of younger pupils or specific to the present instrument and context. Person-centered approaches may still be valuable, but future profile solutions should demonstrate qualitative role differentiation rather than merely partitioning a skewed severity continuum.

Conclusions

In this sample of primary-school pupils, cyberbullying perpetration, victimizations and witnessing frequently co-occurred within individuals, including under more stringent behavioral thresholds. Nevertheless, ordinal CFA did not adequately support either the one-factor or correlated three-factor representation. The principal contribution is therefore descriptive and methodological: role-specific questionnaire domains can be retained for practical assessment while their empirical co-occurrence and unresolved latent structure are reported transparently.

For practice, identifying one role should be the beginning of assessment rather than its endpoint: schools should examine involvement across perpetration, victimizations, and witnessing while matching support to the pupil's specific pattern of needs. For research, the findings argue for testing role overlap explicitly and reporting the consequences of classification rules. Because the evidence is cross-sectional and sample-specific, it cannot establish causal pathways or role transitions, but it provides a developmentally relevant basis for moving from fixed labels toward pattern-informed assessment and prevention in primary education.

Declarations

Author Contribution

Jamalsafri led the study, conceptualised the research, supervised the research process, and contributed to the development and critical revision of the manuscript. As the corresponding author, Jamalsafri also coordinated communication with the journal and managed the manuscript submission process. Syamsol Azhar contributed to the literature review, research methodology, data analysis, interpretation of findings, and preparation of the manuscript. Ahmad Zamri contributed to the theoretical framework, interpretation of the results, and critical review of the manuscript. Ramdzan Ali contributed to the validation of the research approach, review of the findings, and critical revision of the manuscript. All authors reviewed and approved the final version of the manuscript.

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Data Availability

The datasets generated and analyzed during the current study are not publicly available due to participant privacy and ethical restrictions, but are available from the corresponding author on reasonable request.

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