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Development and validation of the perceived expressed emotion scale for adolescents (pees-gap)

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Abstract

Background Current assessments of expressed emotions among the psychiatric population face significant limitations in reliability and validity, particularly for non-clinical adolescent populations. Existing scales are designed for clinical settings and lack applicability to broader contexts. This study addresses these gaps by developing and validating the Perceived Expressed Emotion Scale for the General Adolescent Population (PEES-GAP). Tailored specifically for adolescents outside clinical environments, PEES-GAP enhances utility and effectiveness, offering a robust, reliable, and valid tool to assess emotional dynamics in diverse settings, representing a significant advancement in expressed emotion research.

Methods The study adopted a descriptive cross-sectional survey design, using accidental sampling techniques to recruit participants. One thousand seven hundred forty-one students were selected from six secondary schools and three universities from three southwestern Nigeria states to complete the questionnaires. Instruments for data collection included the Perceived Expressed Emotion Scale (PEES-GAP), Index of Family Relation (IFR), and Drug Abuse Screening Test (DAST). Ethical clearance for this study was sought and obtained from the University of Lagos Ethical Review Committee.

Results The study showed that PEES-GAP's internal consistency was 0.800, while validity analyses proved that the Index of family Relation (IFR) and Drug Abuse Screening Test (DAST) converged and diverged, respectively, with the three subdomains of expressed emotion as measured by PEES-GAP.

Conclusion This study confirms the 20-item PEES-GAP as a reliable, valid tool for assessing expressed emotion in adolescents across clinical and non-clinical settings. Ensuring comparability and broad application offers a uniform measure, promotes holistic understanding, and enhances resource efficiency. Hence, it comprehensively addresses mental health issues from the client's perspective.

Keywords Perceived expressed emotion, Adolescent, Non-psychiatric population

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Background

Adolescence is the developmental stage that occurs between childhood and maturity. It is a period for healthy identity exploration, the acquisition of independence, and significant changes in the body and brain, frequently occurring at various rates. These quick shifts can also be difficult or stressful for teenagers, resulting in upheaval, emotional outbursts, and disagreements with parents and other adults [1–4]. It is a period laden with wrong choices, some of which have long and short-term consequences for the adolescents' lives and families [3, 5]. Such consequences include early sexual exposure [6], unplanned pregnancy [7], substance use [8], school dropout [9], and predisposition to mental health challenges [10]. These consequences make the adolescent period the most crucial source and target of expressed emotion from parents, caregivers, and significant others.

Expressed emotion is a measure of family environment based on how a psychiatric patient's relatives spontaneously talk about the patient. It precisely measures three to five aspects of the family environment: the most important are critical comments, hostility, and emotional over-involvement [11, 12]. Expressed emotion has gained widespread acceptance as a crucial indicator of the home environment, and it has proven to be a very accurate psychosocial predictor of psychiatric relapse for several decades of research [11–14]. It measures how much a patient's immediate family members criticise (critical comment), become hostile toward (Hostility), or become overly emotionally invested (Over Involvement) in the patient, as demonstrated during a one-on-one interaction with the patient at home or clinical interview in the hospital [11, 14, 15]. The concept of "toxic family stress" provides one framework for understanding how high Expressed Emotion environments interact with individual biological vulnerabilities to promote illness onset and recurrence.

Recent events and literature have revealed that families are experiencing expressed emotion due to specific issues and challenges with children within the adolescent age bracket. This development requires an assessment instrument for these adolescents to objectively measure expressed emotion from their perspective, which is currently unavailable due to a lack of focus and consideration of these non-clinical adolescent populations [16–19]. This novel scale aims to fill the gaps left by existing measures by providing a culturally sensitive tool that accurately reflects the emotional dynamics of adolescents in various contexts, thus representing a significant advancement in the field of expressed emotion research. PEES-GAP differs from and improves upon other adolescent-focused expressed emotion scales, particularly in its psychometric properties. It is designed to be culturally sensitive, ensuring relevance across diverse backgrounds, and includes both positive and negative emotional interactions, such as warmth and support, in addition to criticism and hostility. PEES-GAP has high internal consistency and test-retest reliability and has undergone extensive validation processes to ensure its accuracy in measuring expressed emotion from adolescents' perspectives. It is also user-friendly, inclusive, and suitable for clinical and non-clinical adolescent populations.

Several methods have been used to measure expressed emotion, including the Five-Minute Speech Sample (FMSS) of a patient relative by Magana et al. [20], the Camberwell Family Interview (CFI) by Vaughn & Leff [21], and the Structured Interview for the Assessment of Expressed Emotion (SIAEE) by Muela-Martinez et al. [22]. The FMSS is a one-on-one clinical interview with the parent, caregiver, or family of the patient in question, which is considered the typical approach to measuring expressed emotion subjectively. However, this approach denies the patients who receive negative emotions the chance to express their opinions about the interaction style or pattern between them and their parents or caregivers. The CFI was designed, validated, and used in evaluating the construct EE. However, concerns have been raised about its reliability due to the one-sided nature of eliciting and collecting information only from parents or caregivers while ignoring the evaluated patient.

Also, the CFI is exclusively designed for mental health patients' parents or caregivers; therefore, it cannot be used for people in the general population. Additionally, Expressed Emotion Scales designed to measure Expressed Emotion from the patient's perspective were mainly intended for use among psychiatric patients and not for people in the general population. These scales are highly costly in terms of time duration, professional competence, and training; they also take much time for testing and data interpretation in terms of the nature of the assessment instrument [21]. Remarkably, measuring expressed emotion (EE) among adolescents from a global perspective has inherent limitations, including the lack of culturally sensitive tools and the over-reliance on Western-developed scales [22]. Most widely used EE measurement scales, such as the Five-Minute Speech Sample (FMSS) and the Camberwell Family Interview (CFI), were developed in Western contexts and may not fully capture the nuances of family dynamics in non-Western cultures [23]. Additionally, these scales often focus on negative aspects of EE, such as criticism and hostility, while neglecting positive elements like warmth and support, which can also significantly impact adolescent mental health [23]. Thus, more adolescent-centric assessment tools are needed to consider this age group's unique developmental and social challenges [24]. Current instruments often fail to account for adolescents' reluctance to express emotions and the influence of peer relationships

on their emotional well-being [24]. Addressing these limitations requires developing more inclusive and comprehensive measurement tools that can be applied across diverse cultural and age-specific contexts [22]. Consequently, it is expedient and essential to develop a scale to measure expressed emotion in the general population from the client's perspective for both clinical and non-clinical populations - Perceived Expressed Emotion Scale for General Adolescent Population (PEES-GAP).

Therefore, this study aimed to develop and validate a scale to measure expressed emotion in the general population from the clients' perspective for both clinical and non-clinical populations - The Perceived Expressed Emotion Scale for General Adolescent Population (PEES-GAP). Based on the forging and the review of relevant literature, we proposed one research hypothesis:

1. The Perceived Expressed Emotion Scale for the General Adolescent Population (PEES-GAP) will be a valid and reliable measure of Expressed emotion in the general adolescent population.

Methods
Instrument development
The expressed emotion scale for general adolescent population (PEES-GAP) development was in line with the Procedure outlined in classical test theory, i.e., the definition of the concept, design of the scale, review of items, pilot study, field test, selection of the final items, and evaluation of the validity and reliability.

Definition of the concept
In line with the reviewed literature, perceived expressed emotion is conceptualised as a subjective feeling and an objective assessment of expressed emotion from the patient's perspective. While 'Expressed emotion' is a term used in mental health to denote the intensity of expressing a range of emotions within the family context. Levels of expressed emotion may be high or low. This emotion may be considered 'negative' (for example, hostility, anger) or 'positive' (for example, caring concern- Over Involvement).

Design of the scale
A three-phase approach was adopted to develop the perceived expressed emotion scale– General Adolescent Population (PEES-GAP). The first phase in the development of the PEES-GAP was a literature search, the second phase was the key informant interview, and the third phase was consultation with the key experts. The next phase is obtaining the psychometric properties of the PEES-GAP to ascertain the reliability and validity of the instrument. Samples of Nigerian adolescents with conditions that trigger expressing emotion, such as unwanted

pregnancy and other adolescents from the general population, were used to establish the psychometric property. The development and testing process of the PEES-GAP followed the classical test theory procedure. The ethical approval for the study was obtained from the Department of Psychology ethics committee, University of Lagos.

A literature search was undertaken to identify existing expressed emotion scales used in the psychiatry population. Some of the identified scales are parent/caregiver administered, such as the Camberwell Family Interview (CFI) developed by Vaughn & Leff [21], while a few others, such as the Level of Expressed Emotion Scale (LEE) by Cole & Kazarian [26] were patient administered. All identified scales were evaluated and found to have face and content validity. Similarly, most individual items in the scale were found to be relevant to the construct being measured either directly in the case of LEE or indirectly in the case of CFI. The key informant interview also confirmed the literature's pattern and content.

The participants for the key informant interview were 12 patients (4 from the psychiatry clinic, four from remand homes, and four pregnant females from the antenatal clinic who were less than 18 years old); their ages ranged from 13 to 19 years. The primary interview question was to "explain, describe, and illustrate the three most common responses you elicit from your parent or caregiver. This interview was conducted with the consent of the key informants or their parents or legal guardians. Each participant's interview duration ranged between 15 and 25 minutes; the interviews were recorded for easy transcription and future reference. The interview was transcribed, and a line-by-line content analysis was carried out on the interview data. It was confirmed by four key experts in clinical and abnormal behaviour with many years of experience in qualitative research. Finally, the reliability and validity of the data gathered on the developed expressed emotion scale through 1,741 participants drawn from the general population aged 13–19.

Review of items
The transcription of the recorded interviews enabled a line-by-line content analysis of the interview data; a total of 28 candidate items and three themes were generated. Four key informants were invited to review the items generated. Their review yielded fewer candidate items from 28 to 22 with three themes. This was followed by the review of the four key experts in clinical and abnormal psychology with decades of experience in qualitative research. Although their review was done independently when their review came back, the four yielded similar results and further reduced the number of items on the scale from 22 to 20. Like the key informant report, the three themes were maintained. The key experts clarified item clarity by modifying and rewording a few items.

Reducing candidate items from 28 to 20 was made possible by merging similar candidate items and rewording the items where necessary for clarity and better understanding. This was done to ensure that each candidate item accurately represents the content and skills the scale aims to measure and that it aligns with the theoretical constructs or concepts being measured to yield consistent results across different administrations and conditions.

Pilot study

The 20-item scale was pilot-tested among 120 adolescents from three public secondary schools and a public University in Ogun State, Nigeria, to evaluate the level of clarity and participant understanding of individual items on the scale. The review of the result of the pilot study revealed that each candidate item is robust, straightforward, and easy to understand enough to merit being on the scale.

Field study

The field study was carried out among 1,741 adolescents aged 13–19 years in 9 public schools (6 Secondary and 3 Universities) in three states in Nigeria on the 20 items for content validity. After data collection, factor analysis was done, which is this step's primary goal. Although Spector [27] and Nunally [28] recommend a sample size of 100–200 or ten times the number of items, we decided to go higher to allow for a robust database for our study. This is reflected in the number of participants and the spread of the location.

It is important to note that the minimum age of admission to university in Nigeria is 16 years, which explains the inclusion of university students as participants in the study.

Study location

The researchers selected three out of the six states in southwestern Nigeria, namely Lagos, Ogun, and Oyo States, as study locations. Three public schools (2 secondary and 1 university) were selected in each state, bringing the total number of schools chosen across the three states to 9 (6 secondary schools and 3 Universities). The study adopted accidental sampling based on the availability of participants to make the samples easily accessible and more representative of the states in the South West region of Nigeria. All the states have a representative sample of both male and female adolescents.

Sample population

This study employed a multistage sampling approach encompassing random, purposive, cluster, and accidental sampling techniques to select the sample population. Initially, the purposive sampling method selected the South-West geopolitical zone from Nigeria's six geopolitical zones (North-West, North-East, North-Central, South-East, South-South, and South-West). The South-West geopolitical zone comprises six states: Lagos, Ogun, Oyo, Ondo, Osun, and Ekiti. Out of these, three states (Lagos, Ogun, and Oyo) were randomly selected for the study. These three selected states included a total of seventy-one (71) Local Government Areas (LGAs), with Lagos comprising 18 LGAs, Ogun 20 LGAs, and Oyo 32 LGAs. Each LGA was treated as a cluster. From these 71 clusters, nine LGAs were randomly selected, with each LGA producing one school based on the predefined inclusion criteria. Each selected secondary school encompasses six levels (JSS 1, JSS 2, JSS 3, SS 1, SS 2, and SS 3). Three levels (JSS 3, SS 2, and SS 3) were randomly chosen for participation. All students who completed and returned the parental consent forms were included in the study, and a convenience sampling method was applied. This final stage of convenience sampling allowed for the practical selection of participants within the nine selected schools, including the three universities. The inclusion criteria for this study required that participating schools be mixed-gender institutions, one from each local government area (LGA), with school authorities consenting to participate in the study. Six secondary schools that met these criteria were selected. Federal Universities in the three states were also chosen to represent their respective LGAs. While nonprobabilistic sampling methods, such as convenience or accidental sampling, are often employed in clinical studies, surveys, and social research due to their cost-effectiveness and ethical considerations, they present challenges in terms of generalizability, limiting statistical inference to larger populations. To mitigate these issues, we incorporated diverse subgroups and demographics, as suggested by previous studies, to reduce selection bias. The multistage sampling approach enhances the study's representativeness by systematically including diverse subgroups within the population, minimising selection bias, and ensuring a more accurate and reliable sample. Despite initial consent from five secondary schools, one school declined, necessitating its replacement with another that fulfilled the inclusion criteria, including obtaining school approval.

Participants

The study population is 1,741 participants. Females were 897(51.5%), while males were 844 (48.5%). Specifically, the participants' ages range between 13 and 19 years old, with an age range of 6, a mean of 14.92, and a standard deviation of 1.27. Participants aged 13 to 15 numbered 1289(74%), while those aged 16 to 19 numbered 452(26%). Based on religion, about 1044(60%) participants were Christians, 688(39.5%) participants were Muslim while 9(0.5%) participants were from traditionalist. Furthermore, about 1438(82.6%) participants were

from the Yoruba ethnic group, 184(10.6%) were from the Igbo ethnic group, and 119(6.8%) participants were Hausa by ethnicity.

Research design

The research design for the study was a descriptive cross-sectional survey. Due to the significant number of participants required for the research and to satisfy the requirement that a specific sample can be picked from a vast population at a particular time, this design was chosen.

Instruments

The questionnaires contain four sections. Section one contains sociodemographic items such as gender, age, educational level, and ethnic group of the participants. The Perceived Expressed Emotion Scale - General Adolescent Population (PEES-GAP) assesses the participants' self-evaluation of expressed emotion. PEES-GAP is a 20-item scale in which respondents described their degree of agreement on a 5-point Likert scale ranging from 1, "Rarely or none of the time," to 5, "Most or all of the time." After summing the scores across items, the total obtainable score is 100, while the least obtainable scores are 20.

Another instrument used in the study was Hudson's Index of Family Relations (IFR) [32]. The IFR was already adapted and validated for use in Nigeria and was used to test for the convergent validity of the newly developed scale. IFR is a 25-item instrument that measures the family's interpersonal relationship problems. The inventory is designed to measure the extent, severity, or magnitude of problems that family members have in their relationships with one another on a 5-point Likert scale ranging from 1 "Rarely or none of the time" to 5 "Most or all of the time." Hudson [32] provided the psychometric properties for American samples, while Anumba [33] provided the psychometric properties for Nigeria samples with a reliability coefficient of 0.95 and divergent validity coefficient of 0.006.

The drug Abuse Screening Test (DAST-20), developed by Skinner [34], was used to test divergent validity. The Drug Abuse Screening Test (DAST-20) was designed as a unidirectional self-report instrument for general population screening, clinical case finding, and treatment evaluating research and has been used severally in Nigeria. It may be given in either a self-report or a structured interview format. A yes or no response is requested for each of the 20 questions. DAST-20 has been reported to be highly valid, with reliability scores ranging between 0.70 and 0.90 (Skinner, 2001; Yudko et al., 2007). Ajonye et al. [35] provided the psychometric properties for Nigeria samples with a reliability and validity coefficient of 0.74,

while Osamika et al. [36] documented a Cronbach alpha of 0.90 for the Nigerian sample.

Procedure

The data for the study were collected in January and February 2020 before the Covid-19 lockdown in Nigeria. We obtained ethical approval from the ethics committee of the Department of Psychology, University of Lagos, before the commencement of the project. Twelve research assistants were recruited and trained on how to approach the participants and how to retrieve the questionnaires. To obtain parental consent from the secondary school students, the six secondary schools that met the inclusion criteria were given a parental consent form to be distributed to their students within the selected age group for onward transmission to parents to obtain parental consent to participate in the study and those who returned the filled parental consent forms were met in their respective classrooms and auditoriums, which had already been arranged by the school authorities and were waiting to meet the research team. The university students were met in their classrooms, relaxation centres, and libraries. The research team explained the purpose of the research to the study students, and participants who signified interest were issued a consent form to give their consent before being issued a questionnaire to fill out for the study.

Similarly, after securing ethical approval, the hospital management introduced the research team to the consultants in psychiatry and gynaecology clinics for the underage hospital-based participants. The treating team selected stable, eligible participants and informed them and their parents about the research and the research team. Underage participants were selected and handed over to the research team with their parents or legal guardians, and selected treating team members were present during interactions. Inform consent was obtained from parents, sometimes in indigenous languages, ensuring understanding among non-English speakers. Thus, informed consent was obtained per the relevant guidelines and regulations of the Declaration of Helsinki (2013).

Data analysis

The data collated was entered into a Statistical Package of Social Science (SPSS). The data was analysed using both descriptive and inferential statistics. Pearson moment correlation was used to test the relationships among the variables, while factor loading was used to get the principal component method of extraction, and the sum of squares, mean, standard deviation, and variance was used for other variable analyses, especially for the norm.

Results

Result of the validation of perceived expressed emotion scale- general adolescent population (pees-gap)

The primary statistical analysis that precedes the validation of psychological instruments is the Item total analysis. This helps to determine which items are consistent or inconsistent with another and deemed to be discarded. Afterwards, consistent items are factored together to determine how many factors or constructs they measure. The initial item-total analysis of all 20 items is presented in Table 1 below:

From Table 1 above of the item statistical analysis, the overall internal consistency of the scale is 0.79, which is above the acceptable standard of 0.50. However, in the table, it was shown that item 16 slightly varies from others and has a low correlated item-total collation of 0.135, with the possibility of if deleted, the internal consistency of the overall inventory will increase to 0.80, this is insignificant as the difference is less than 0.01. Therefore, there was no need for the deletion of item 16. This is so because the scale scores mean if item 16 is deleted range from 44.96 to 46.57, while the scores of the scale variance if item 16 is deleted range from 142.66 to 153.82. More so, the scores of correlated item-total correlation range between 0.135 and 0.485, scores of squared multiple correlation range between 0.114 and 0.315, while Scale's Cronbach Alpha if item deleted range from 0.777

to 0.800. Descriptively, The EEI reported an average scale variance of 161.46 and 48.37 ± 12.70, with a minimum score of 20 and a maximum score of 86 among one thousand seven hundred and forty-one participants (1741).

Table 2 shows the Principal Component Method, which is used in extracting a number of factors that account for a large proportion of the variance of the total scale. The method uses the alpha coefficient loadings of each item when each is initially taken as a component to factor together components that account for Eigenvalues greater than 1. Based on initial Eigenvalues greater than 1, the result shows that about three factors were extracted from the whole PEES-GAP.

From Table 3 above, the result revealed that using the Principal Component Analysis, the 20-item PEES-GAP was conveniently loaded on three components (factors).

From the above Table 4, Hostility domain (r[1741] = 0.632; p <.01), Over Involvement (r[1741] = 0.523; p <.01), and Critical Comments (r[1741] = 0.678; p <.01) significantly have a positive relationship with Index of Family Relation. Interestingly, the overall Expressed Emotion Inventory (r[1741] = 0.718; p <.01) significantly has a positive association with the Index of Family Relations.

From the above Table 5, the Hostility domain (r[1741]= -257; p <.01), Over Involvement (r[1741] = − 0.018; p <.01), and Critical Comments (r[1741] = − 0.014;

Table 1 Showing the mean, standard deviation, variance, and Cronbach's alpha using Item-total statistics of the 20-item perceived expressed emotion scale -General adolescent population (PEES-GAP)

Items of the PEES	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
1. I often face a lot of criticism from my relatives	**46.57**	148.577	0.377	0.197	0.785
2. I often feel my effort is not being appreciated	46.16	150.094	0.344	0.193	0.786
3. I often feel overprotected by my relatives	45.57	150.595	0.236	0.119	0.793
4. I am often make to feel guilty of my action by my relatives	45.90	146.603	0.391	0.185	0.783
5. Often, my relatives make me to feel angry easily	45.92	146.569	0.394	0.222	0.783
6. Often, my family make me feel as if I don't know myself	46.17	**142.665**	**0.485**	**0.315**	**.777**
7. I often feel my relations seems not understand me	45.95	146.648	0.389	0.241	0.784
8. My relatives often panic when I'm restless	45.82	151.108	0.223	**0.114**	0.794
9. My relatives often make me to ask for help elsewhere	46.30	147.851	0.336	0.213	0.787
10. My relatives often make me feel I'm their problem	46.40	145.254	0.434	0.310	0.781
11. I am often being blamed for undesirable situations by my relatives	46.13	144.168	0.455	0.308	0.780
12. My activities are often being controlled by my relatives	45.71	148.143	0.317	0.176	0.788
13. I am often being told I am the cause of my problem	46.28	144.599	0.469	0.263	0.779
14. I often feel my relatives want to know everything I do	45.48	144.625	0.402	0.289	0.783
15. Often, my relatives get angry with me for no reason	46.30	146.166	0.401	0.263	0.783
16. I often get my relatives support whenever I need it	**44.96**	**153.820**	**0.135**	**0.262**	**0.800**
17. Whenever I make a mistake, my relatives do not show understanding	46.04	145.339	0.428	0.264	0.781
18. Often, I feel a lot is expected from me by my relatives	45.59	149.443	0.279	0.210	0.790
19. I am often being asked a lot of personal questions by my relatives	45.53	147.811	0.320	0.204	0.788
20. Often, my relatives make things worse for me when things are not going well	46.24	145.941	0.390	0.207	0.783

Table 2 Below shows the initial eigenvalues, number of extracted items, and the sum of squared loadings if rotated for EEI

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Var.	Cum. %	Total	% of Var.	Cum. %	Total	% of Var.	Cum. %
1	4.353	21.765	21.765	4.353	**21.765**	21.765	3.877	19.384	**19.384**
2	1.963	9.816	31.581	1.963	**9.816**	31.581	1.915	9.577	**28.961**
3	1.116	5.580	37.161	1.116	**5.580**	37.161	1.640	8.200	**37.161**
4	1.066	5.328	42.489						
5	0.988	4.942	47.431						
6	0.935	4.673	52.104						
7	0.907	4.535	56.639						
8	0.884	4.418	61.057						
9	0.863	4.316	65.372						
10	0.804	4.022	69.394						
11	0.783	3.917	73.311						
12	0.734	3.671	76.982						
13	0.672	3.361	80.343						
14	0.648	3.242	83.585						
15	0.628	3.140	86.725						
16	0.581	2.903	89.627						
17	0.573	2.865	92.493						
18	0.534	2.670	95.162						
19	0.497	2.486	97.649						
20	0.470	2.351	100.000						

Extraction Method: Principal Component Analysis. Determinant = 0.034

Table 3 Showing factor loadings of items on the scale using the principal component method of extraction

	Components			OverA	Communality
Items for Expressed Emotions Inventory	1	2	3		
Factor 1 (Hostility)					
2. I often feel my effort is not being appreciated	**0.478**	0.166	−0.123		**0.271**
5. Often, my relatives make me to feel angry easily	**0.520**	−0.139	0.404		**0.453**
10. My relatives often make me feel I'm their problem	**0.635**	0.060	−0.037	.58	**0.408**
15. Often, my relatives get angry with me for no reason	**0.557**	0.206	−0.172		**0.382**
17. Whenever I make a mistake, my relatives do not show understanding	**0.561**	0.141	0.007		**0.335**
18. Often, I feel a lot is expected from me by my relatives	**0.732**	0.076	0.119		**0.555**
Factor 2 (Critical Comments)					
1. I often face a lot of criticism from my relatives	0.098	**0.483**	0.080		**0.250**
4. I am often make to feel guilty of my action by my relatives	0.286	**0.422**	0.028		**0.216**
7. I often feel my relations seems not understand me	0.048	**0.548**	0.025		**0.303**
9. My relatives often make me to ask for help elsewhere	−0.028	**0.522**	0.041	.59	**0.275**
11. I am often being blamed for undesirable situations by my relatives	0.383	**0.525**	−0.175		**0.453**
13. I am often being told I am the cause of my problem	0.220	**0.500**	0.191		**0.335**
20. Often, my relatives make things worse for me when things are not going well	−0.045	**0.549**	0.187		**0.338**
Factor 3(Over Involvement)					
3. I often feel overprotected by my relatives	0.090	0.049	**0.453**		**0.216**
6. Often, my family make me to feel as if I don't know myself	0.138	0.008	**0.659**		**0.453**
8. My relatives often panic when I'm restless	0.014	0.123	**0.516**		**0.281**
12. My activities are often being controlled by my relatives	0.133	−0.028	**0.655**	0.66	**0.447**
14. I often feel my relatives want to know everything I do	0.144	0.477	**0.481**		**0.479**
16. I often get my relatives support whenever I need it	−0.189	0.350	**0.635**		**0.561**
19. I am often being asked a lot of personal questions by my relatives	0.079	0.335	**0.505**		**0.371**

Table 4 Showing the convergent validity between the extracted factors and a similar scale using pearson product moment correlations

Variables	1	2	3	4	5	$\overline{x}$	SD
1. Hostility	1					28.44	9.75
2. Over Involvement	0.297**	1				10.85	3.62
3. Critical Comments	0.182**	0.411**	1			9.08	3.30
4. Expressed Emotion Inventory	0.899**	0.619**	0.517**	1		48.37	12.71
5. Index of Family Relations	0.632**	0.523**	0.679**	0.718**	1	85.10	21.68

**. Correlation is significant at the 0.01 level (2-tailed). *N* = 1741

Table 5 Showing the divergent validity between the extracted factors and a different scale using pearson product moment correlations

Variables	1	2	3	4	5	$\overline{x}$	SD
1. Hostility	1					28.44	9.75
2. Over Involvement	0.297**	1				10.85	3.62
3. Critical Comments	0.182**	0.411**	1			9.08	3.30
4. Expressed Emotion Inventory	0.899**	0.619**	0.517**	1		48.37	12.71
5. Drug Use (DAST)	**− 0.257****	**− 0.018****	**− 0.014****	**− 0.215****	1	1.73	1.85

**. Correlation is significant at the 0.01 level (2-tailed). *N* = 1741

Table 6 Showing the Inter-correlation between the expressed emotion scale and its sub scales using pearson product moment correlations

Variables	1	2	3	4	$\overline{x}$	SD
1. Hostility	1				28.44	9.75
2. Over Involvement	0.297**	1			10.85	3.62
3. Critical Comments	0.182**	0.411**	1		9.08	3.30
3. Expressed Emotion Inventory	0.899**	0.619**	0.517**	1	48.37	12.71

**. Correlation is significant at the 0.01 level (2-tailed). *N* = 1741

Table 7 Showing the norms of the expressed emotion scale and its domains

Variables	Min.	Max.	Range	Mean	Std. Dev.	Variance	Skewness	Kurtosis
Hostility	13.00	62.00	49.00	28.44	9.75	95.02	0.35	-0.46
Over Involvement	4.00	20.00	16.00	10.85	3.62	13.08	0.13	-0.46
Critical Comments	3.00	15.00	12.00	9.08	3.30	10.89	-0.05	-0.82
Expressed Emotion Inventory	20.00	86.00	66.00	48.37	12.71	161.46	0.04	-0.34

N = 1741

$p < .01$) significantly have a negative relationship with drug use (DAST). Additionally, the overall PEES-GAP (r[1741] = − 0.215; $p < .01$) significantly has a negative association with drug use (DAST).

From Table 6 above, the results show that the hostility domain (r[1741] = 0.899; $p < .01$), over-involvement domain (r[1741] = 0.619; $p < .01$), and critical comments domain (r[1741] = 0.517; $p < .01$) significantly related with the overall score for Expressed emotion. The correlation values are slightly above the standard of 0.05 but not too extreme (0.99) to indicate possible multicollinearity. The outcome further denotes that each domain can significantly be measured independently.

From Table 7, the participants had a minimum of 13 and a maximum of 62 scores with 28.44 ± 9.75 on the Hostility domain of PEES-GAP, while a minimum of

4 and maximum of 20 scores with 10.85 ± 3.62 on Over Involvement domain. Meanwhile, on the Critical Comments domain, the participants had a minimum of 3 and a maximum of 15 scores with 9.08 ± 3.30. Besides, on the overall Perceived Expressed Emotion Scale report, the participants scored a minimum of 20 and a maximum of 86 with 48.37 ± 12.71. Similarly, from the table, the variable's distribution is moderately skewed, While the kurtosis showed some normalcy as the distribution is platykurtic.

Figure 1 above shows that most items are highly loaded in the hostility domain. In this, The Cronbach Alpha of the six (6) items ranges between 0.47 and 0.73, which is above the standard Cronbach Alpha of 0.40.

Figure 2 above shows that most items are loaded in the critical comments domain. In this domain, The Cronbach
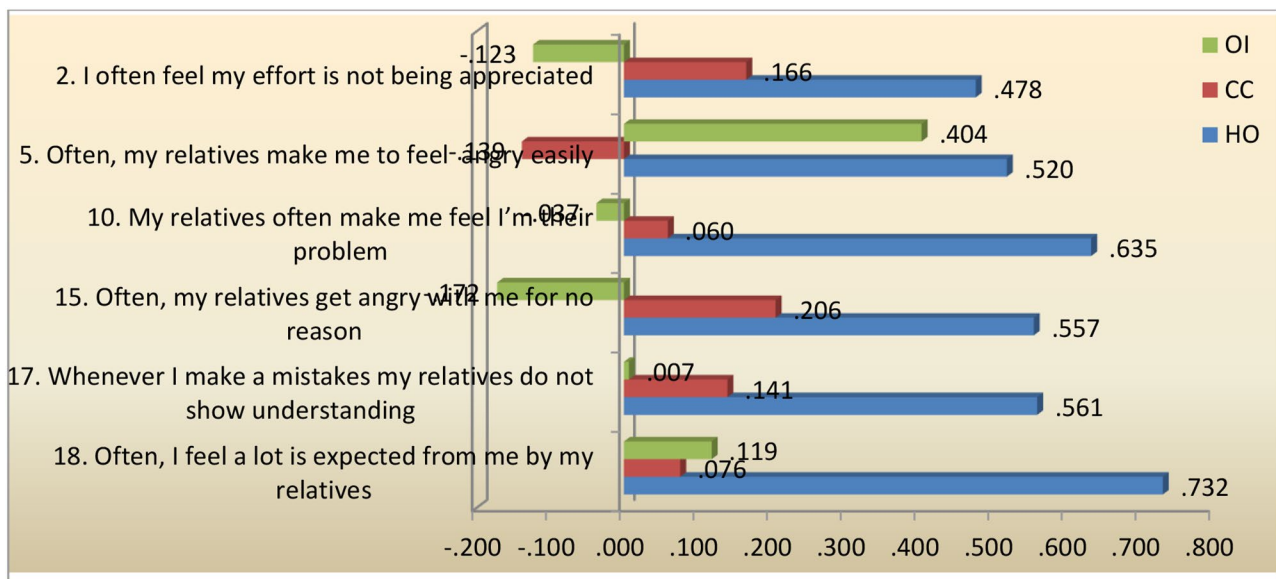
Fig. 1 Showing the graphical representation of Items mostly loaded in the Hostility domain
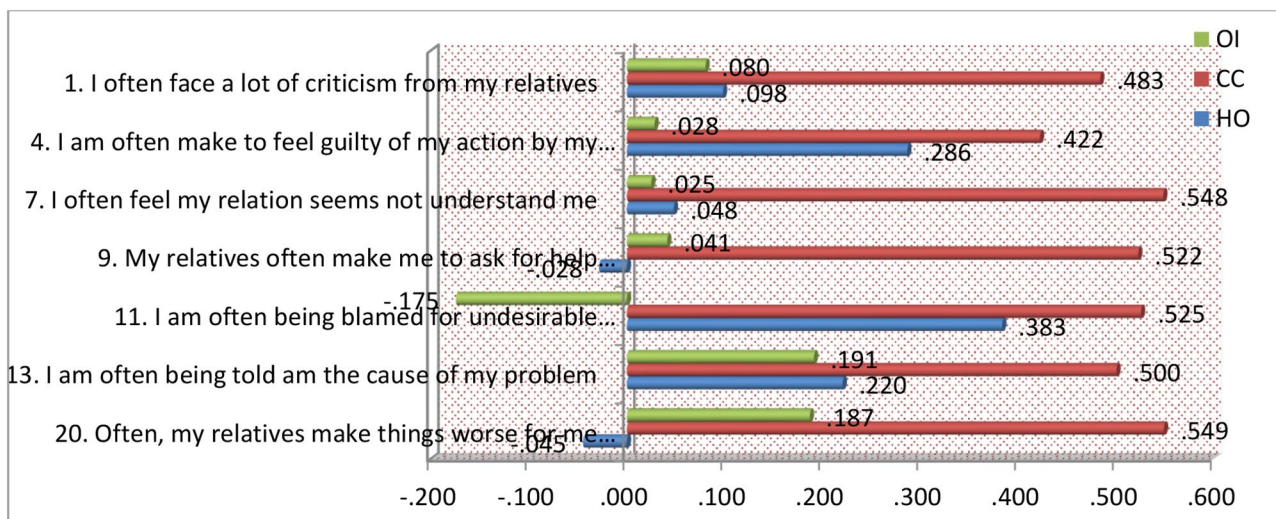
Fig. 2 Showing the graphical representation of Items mostly loaded in the Critical Comments domain

Alpha of the seven (7) items ranges between 0.42 and 0.54, which is above the standard Cronbach Alpha of 0.40.

Figure 3 above shows that most items are highly loaded in the over-involvement domain. In this domain, The Cronbach Alpha of the seven (7) items ranges between 0.48 and 0.65, which is above the standard Cronbach Alpha of 0.40.

Discussion

The present study was designed to develop and validate the Perceived Expressed Emotion Scale for the General Adolescent Population (PEES-GAP) by conducting an exploratory factor analysis. This approach aimed to meet

the rigorous conditions set by Nunnally [28] and Briggs & Cheek [37]. Additionally, the study evaluated the convergence validity by examining the correlation between the Index of Family Relationships (IFR) and the PEES-GAP and the divergent validity by investigating the relationship between the Drug Abuse Screening Test (DAST) and PEES-GAP in the general adolescent population. These methodological steps were critical to ensure the new scale's comprehensive validity and reliability.

The PEES-GAP was scientifically developed and statistically confirmed to be a valid and reliable instrument for assessing expressed emotion among adolescents. It demonstrated an internal consistency of 0.800 from 20 items, making it shorter and more time-efficient than other
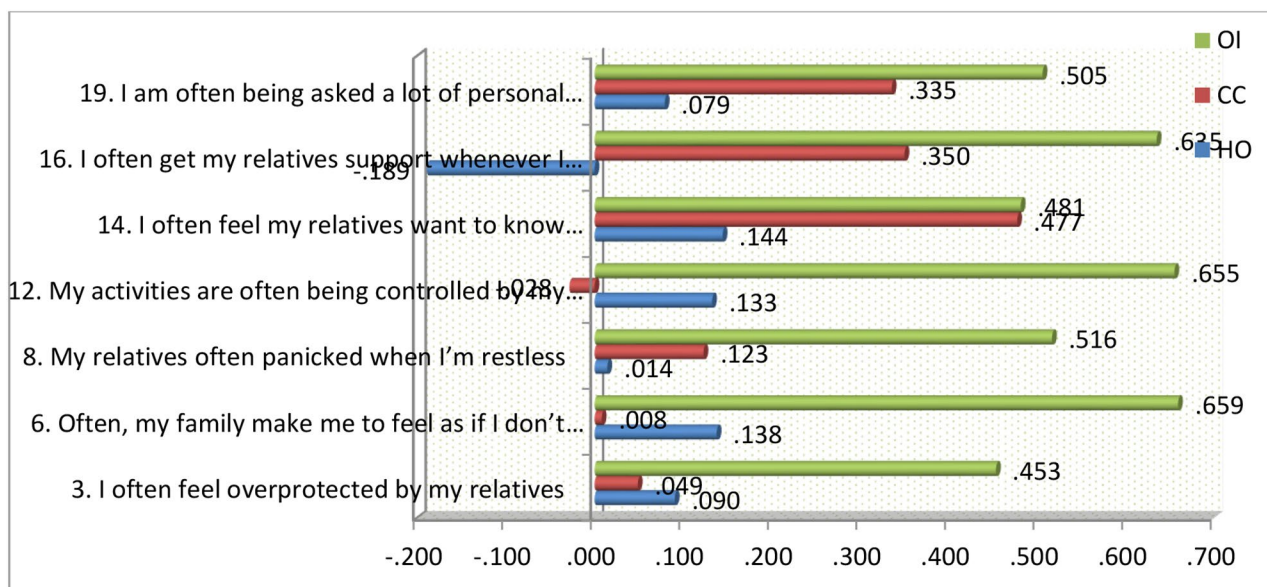
Fig. 3 Showing the graphical representation of Items mostly loaded in the Over Involvement domain

measures of expressed emotion [38], such as the Family Expressed Emotion Scale (FEES). Despite one item showing a low correlation in the item-total collation, it was retained due to its insignificant impact on the overall internal consistency, thereby ensuring that the scale remained comprehensive and robust.

The PEES-GAP consists of 20 items rated on a 5-point Likert scale, with three factors: Critical Comment, Hostility, and Over Involvement. The scale ranges from 0 (Rarely or none of the time) to 5 (Most or all the time), with scores from 20 to 100 indicating the level of expressed emotion. This structure aligns with the criteria set by Zwick and Velicer [39] for meaningful factor interpretation. The exploratory factor analysis revealed that three factors explained 37.16% of the total variance. This finding is significant as it fulfils the criterion for total variance in social science research, indicating that the new scale can adequately account for expressed emotion.

The need to evaluate the validity and reliability of a newly developed scale is a necessary condition that must be fulfilled in test development. Factor analysis is usually adopted to assess the construct validity of a new scale. The three factors comprising 20 items of PEES-GAP explained 37.16% of the total variance, accounting for more than one-third of the total scale. This substantial variance explanation is a testament to the scale's construct validity, aligning with previously developed scales [40], such as the Camberwell Family Interview (CFI) and the Five-Minute Speech Sample (FMSS).

The study assessed the scale's convergence validity and found a positive correlation between the IFR and all subdomains of expressed emotion measured by PEES-GAP. This supports Seong's [41] criteria for high validity, with

a score range of 0.6–0.8. The divergent validity was evaluated using the DAST, which showed an inverse relationship with all three subdomains of expressed emotion, confirming the scale's ability to differentiate between related but distinct constructs. These findings underscore the PEES-GAP's effectiveness in capturing the complex dynamics of expressed emotion within families.

In the context of broader research on adolescent emotional regulation, the development of PEES-GAP provides a valuable tool for understanding how family dynamics influence adolescent emotions. Studies have shown that family environments characterised by high expressed emotion can exacerbate emotional regulation difficulties in adolescents [42, 43]. By accurately assessing expressed emotion, interventions can be tailored to address specific family dynamics that may hinder emotional development, thereby enhancing adolescent mental health outcomes. This aligns with current research, emphasising the need for culturally and developmentally appropriate tools to assess and address expressed emotion in diverse adolescent populations [44, 45].

Additionally, cultural and developmental factors play a significant role in shaping expressed emotion among adolescents. Research has highlighted that adolescents from different cultural backgrounds may experience and express emotions differently due to varying cultural norms and values [46]. The PEES-GAP's culturally sensitive design ensures that it accurately reflects these diverse emotional dynamics, making it a valuable tool for researchers and practitioners working with adolescents from various cultural contexts.

Furthermore, the PEES-GAP's reliability was tested using the Cronbach alpha coefficient, revealing high

internal consistency. This fulfils the criteria suggested by Burns and Grove [47], indicating the scale's ability to reflect nuanced differences in the levels of expressed emotion among adolescents. The high reliability of the PEES-GAP ensures that it can be a dependable tool in both clinical and research settings, providing consistent results across different populations and contexts.

The study's findings also highlight the importance of including diverse subgroups and demographics in research. This approach minimises selection bias and enhances the generalizability of the results, as suggested by Guo [30] and Baker et al. [31]. The comprehensive assessment of expressed emotion among adolescents in clinical and non-clinical settings provides insights crucial for developing effective mental health interventions. By incorporating a diverse sample, the study ensures that the PEES-GAP is relevant and applicable to various adolescent populations.

Linking these findings to the broader research on family dynamics, the PEES-GAP offers a robust measure for examining how expressed emotion within families impacts adolescent mental health. The scale's validation aligns with the broader objective of understanding the interplay between family environment and adolescent emotional regulation, which is critical for promoting mental health and well-being [48, 49]. This holistic understanding is essential for designing interventions that address the root causes of emotional dysregulation in adolescents.

The practical implications of this study are significant. Mental health professionals can use the PEES-GAP to identify high-risk adolescents who may benefit from targeted interventions. Additionally, the scale can inform family-based therapeutic approaches by highlighting specific areas of expressed emotion that need to be addressed. By integrating the PEES-GAP into routine clinical practice, healthcare providers can better support adolescents in navigating emotional regulation challenges.

Moreover, the PEES-GAP can serve as a valuable tool for designing and implementing intervention programmes. For instance, it can help identify specific emotional dynamics within families that may contribute to adolescent mental health issues. By targeting these dynamics through therapeutic interventions, mental health professionals can develop personalised treatment plans that address the unique needs of each adolescent. This personalised approach can enhance the effectiveness of interventions and lead to better mental health outcomes.

On a policy level, the PEES-GAP can inform the development of mental health policies and programmes aimed at supporting adolescents. Policymakers can use data collected through the PEES-GAP to identify prevalent emotional issues within families and develop strategies to address them. This can include the creation of community-based programmes that provide education and support to parents and caregivers on managing expressed emotions and fostering a positive family environment.

Additionally, the PEES-GAP can be used to evaluate the effectiveness of existing mental health programmes and policies. By assessing changes in expressed emotion before and after the implementation of intervention programmes, policymakers and practitioners can determine the impact of these programmes on adolescent mental health. This can lead to continuous improvement and refinement of policies and interventions, ensuring that they are effective and responsive to the needs of adolescents.

Besides, the PEES-GAP's cultural sensitivity and relevance make it suitable for use in diverse settings, allowing for a broader application of its findings. This can contribute to the development of culturally-informed interventions and policies that consider the unique emotional dynamics of different populations. By incorporating the PEES-GAP into public health initiatives, stakeholders can ensure that mental health support is accessible and effective for all adolescents, regardless of their cultural background.

Moreover, the PEES-GAP was meticulously adapted to ensure cultural relevance for Nigerian adolescents. This involved several key steps such as Expert Translations, Focus Group Discussions, Cognitive Interviews, and Piloting and Validation. The PEES-GAP's cultural adaptation process highlights the importance of involving the target population in the development of assessment tools. This approach ensures that the tool is not only culturally sensitive but also relevant to the specific context in which it will be used.

Regarding its applicability in diverse cultural settings, the PEES-GAP can serve as a model for developing similar scales in other cultural contexts. The process of expert translation, focus group discussions, cognitive interviews, and piloting can be replicated in other regions to ensure that the scale is culturally adapted and relevant. This approach can help bridge the gap between Western-developed scales and the unique cultural dynamics of different populations, ultimately leading to more accurate and meaningful assessments of expressed emotion among adolescents globally.

Limitation and recommendation

The study's limitation lies in PEES-GAP being a self-report scale and the homogeneity of its sample, predominantly drawn from a single cultural matrix, which may impede the instrument's broad applicability. Thus, future research should continue exploring the PEES-GAP's applicability across different cultural contexts.

Cross-cultural validation studies are essential to ensure the scale's global relevance and effectiveness. Additionally, longitudinal studies could provide deeper insights into how expressed emotion evolves over time and its long-term impact on adolescent mental health. Such research would further solidify the PEES-GAP's position as a critical tool in the field of adolescent mental health.

Conclusions

In conclusion, the PEES-GAP is a reliable and valid tool for assessing expressed emotion among adolescents. Its development and validation contribute to the broader research on adolescent emotional regulation and family dynamics, offering a comprehensive measure that enhances our understanding of these complex interactions. The scale's psychometric properties ensure its applicability in diverse settings, making it a valuable resource for researchers and clinicians.

Abbreviations
MFH   Morenikeji Fausiat Hamzat
BAA   Bushura Afolabi Aroyewun
GA   Gbenusola Akinwale

Author contributions
MFH, BAA, and GA, developed the concept of the study. MFH conducted literature searches, and BAA conducted the key informant interviews. BAA and GA completed data collection. GA analyzed all data. BAA drafted the manuscript. MFH, BAA, and GA provided feedback. All authors read and approved the final manuscript. NOTE MFH: Morenikeji Fausiat Hanzat BAA: Bushura Afolabi Aroyewun GA: Gbenusola Akinwale.

Data availability
The datasets generated during and analysed during the current study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate
In accordance with the relevant guidelines and regulations of the Declaration of Helsinki (2013), we sought and obtained ethical approval for the study from the Department of Psychology Ethics Committee, University of Lagos, in September 2020. Written informed consent was obtained from all participants, and if age < 18 years, their legal guardians.

Consent for publication
However, consent for publication is not applicable because our manuscript does not involve any identifiable data or images of participants that will require consent for publication.

Competing interests
The authors declare no competing interests.

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