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RESEARCH ARTICLE OPEN ACCESS

Psychometric validation of the positive aspects of caregiving (PAC) scale among informal caregivers of persons with mental disorders in Nigeria

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Abstract
Objectives: Informal caregiving for individuals with mental disorders is often challenging, yet it can also be a source of personal growth and fulfilment. Despite increasing global attention on the positive aspects of caregiving, there is limited evidence from low- and middle-income countries, including Nigeria. The study aimed to determine the psychometric properties of the 9-item Positive Aspects of Caregiving (PAC) scale among informal caregivers of persons with mental disorders in Nigeria.
Methods: A cross-sectional study involving 215 informal caregivers. Participants completed the PAC scale, Positive Aspects of Caregiving Questionnaire (PACQ), and Zarit Burden Interview (ZBI-12). Internal consistency was measured using Cronbach's alpha. Convergent and divergent validity were assessed through Spearman's correlation of the PAC scale with PACQ and ZBI-12, respectively. Confirmatory factor analysis (CFA) was conducted using SPSS AMOS version 26.
Results: The PAC scale showed good internal consistency (Cronbach's $\alpha = 0.829$). The Self-Affirmation and Outlook on Life subscales had Cronbach's α of 0.720 and 0.918, respectively. PAC scale correlated positively with PACQ ($\rho = 0.773$, $p < 0.001$) and negatively with ZBI-12 ($\rho = -0.790$, $p < 0.001$), indicating good convergent and divergent validity, respectively. CFA supported a two-factor structure with excellent model fit indices (CFI = 0.989, RMSEA = 0.054).
Conclusion: The PAC scale is thus a reliable and valid tool for assessing positive caregiving experiences among Nigerian caregivers. Its use could inform culturally relevant interventions that enhance caregiver resilience and support in similar low-resource settings.

Keywords: Psychometric validation, Positive aspects of caregiving, Informal caregivers, Mental disorders

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Plain English Summary
This study examined how well the Positive Aspects of Caregiving (PAC) Scale suits the purpose of assessing positive experiences among informal caregivers of people with mental disorders in Nigeria. Caregiving is often linked with stress and burden, but it can also bring benefits such as personal growth, stronger relationships, and a sense of purpose. While the PAC Scale has been widely used elsewhere, it has not been validated in Nigeria.
Involved in the study were 215 caregivers at the Federal Neuropsychiatric Hospital, Yaba, Lagos, using the PAC Scale, other measures of positive caregiving, and a burden scale. Statistical analysis showed that the PAC Scale was reliable (overall Cronbach's alpha = 0.83), with two clear dimensions: "Self-affirmation" and "Outlook on life." Scores on the PAC Scale strongly correlated with another positive caregiving measure and were negatively related to caregiver burden, confirming that it measures a different but related concept. Confirmatory factor analysis showed an excellent model fit, supporting the two-factor structure in this cultural setting.
The findings show that the PAC Scale is a valid, reliable tool for Nigerian caregivers and can help identify strengths and resilience in caregiving. Using it in mental health care could lead to more balanced, strength-based interventions for caregivers.

Background
Caring for individuals with mental disorders is a complex experience for informal caregivers, often marked by emotional, psychological, financial, and social burdens (1, 2). This is especially because the majority of them take on this role without adequate support or resources in place, and without being paid for their services (3). However, there is growing recognition in global mental health that understanding both the burdens and benefits of caregiving provides a more holistic view, which is essential for designing interventions that sustain caregiver resilience and well-being (4, 5).
Emerging evidence reveals that caregiving can result in positive experiences such as personal growth, a sense of purpose, and strengthened family relationships (6, 7, 8, 9). Yuan et al., in a qualitative study that evaluated the benefits of caregiving on the informal caregivers of persons with dementia, reported that caregiving enhances caregivers' consciousness of the significance of their own well-being, resilience in handling challenges, as well as improving the relationship they have with the care recipients, significant others and other caregivers (10). Similarly, Cohen et al found that caregivers' report of positive caregiving experience reduces the likelihood of experiencing burden, distress or depression by the caregivers (11). These positive aspects are essential to understanding the full caregiving experience and enhancing caregiver support strategies (4, 12).
In Nigeria, where mental health services are limited, and families play a central role in caregiving[13], there is a pressing need to understand caregivers' experiences holistically. While burden and stress have been extensively studied (13, 14, 15, 16, 17, 18, 19, 20), the potential positive experiences of caregiving remain under-researched and underutilised in intervention design.
To measure the positive caregiving experience, the Positive Aspects of Caregiving (PAC) scale has been developed and applied in several settings (21, 22, 23, 24). It was originally developed by Tarlow et al. in 2004 and measures caregivers' perceptions of personal growth and satisfaction derived from caregiving (24). Studies across diverse populations, such as dementia and cancer caregivers, have found the PAC scale to be a valid and reliable measure (22, 23, 24). However, studies on caregivers of persons with mental illness are generally fewer, and most have been conducted in high-income countries (22, 23, 24). Psychometric properties of the PAC scale, including its reliability (Cronbach's alpha typically >0.80), construct validity, and factor structure, have shown general consistency (22, 23, 24). Yet, cultural, socio-economic, and health system differences may influence how caregivers interpret and respond to scale items. For instance, the Japanese version of the scale identified a 2- factor structure (´living an enriched life´ and ´self-usefulness´) (23) which differs from the 2-factor structure (´self-affirmation´ and ´outlook on life´) of the original model developed by Tarlow et al (24).
However, there is a lack of psychometric validation of this instrument within the Nigerian context, especially among caregivers of persons with mental disorders. This gap affects the capacity to adequately assess and incorporate positive caregiving experiences into mental health services and interventions in Nigeria. Thus, validating the scale within the Nigerian context is critical to ensure it accurately measures the positive caregiving experiences among this population. It will provide a culturally relevant and psychometrically sound tool for assessing positive

caregiving experiences, contribute to the limited body of knowledge on positive caregiving experiences in low- and middle-income countries and inform clinical practice and policy aimed at supporting caregivers of individuals with mental illness.

This study aimed to assess the psychometric properties of the Positive Aspects of Caregiving (PAC) scale among informal caregivers of persons with mental disorders attending the adult outpatient clinics of Federal Neuropsychiatric Hospital in Yaba, Lagos State, Nigeria. Objectives were to: determine the reliability of the PAC scale in the study population, determine the construct validity of the PAC scale through discriminant validity and confirmatory factor analysis.

Materials and Methods

Study Design

A cross-sectional quantitative study.

Setting

The study was conducted at the Adult Outpatient Clinics of the Federal Neuropsychiatric Hospital located in Yaba, Lagos, Nigeria. The hospital runs 4 adult outpatient clinics in a week, where patients with diverse mental health conditions are attended to. Patients often present at the clinic with their primary caregivers, who form an important collaborator in the management of the patients.

Study population and sampling strategy

Participants were primary informal caregivers of patients diagnosed with mental disorders who were receiving care at the adult outpatient clinics of the Federal Neuropsychiatric Hospital, Yaba. Included in the study were adults (≥18 years) who lived with the patient, provided at least 4 hours of caregiving per day, for a minimum of 6 months and gave informed consent. In cases where more than one person met these criteria, they (caregivers) were asked to identify the primary caregiver. Caregivers who could not read or comprehend the English language were excluded from the study.

Based on the recommendation of a minimum of 200 participants for factor analysis, and consideration of 10% non-response rate, 220 participants were recruited into the study. There were, however, 5 non-responders. Hence, 215 participants participated in the study.

Participants were recruited using a simple random sampling technique. On each clinic day, the list of hospital numbers of patients booked for consultation formed the sampling frame from which 3 were selected using computer-generated random numbers. Caregivers of the patients with the selected numbers were approached and assessed for eligibility to be recruited for the study. The selected hospital numbers were recorded to prevent reselection in subsequent clinic days.

Data collection

The following instruments were used for data collection:

Sociodemographic Questionnaire

This was developed to assess caregivers´ sociodemographic characteristics, including age, sex, relationship to patient, marital status and highest level of education of participants.

Positive Aspects of Caregiving (PAC) Scale

It is a self-administered 9-item scale assessing perceived rewards and personal growth experienced by caregivers (24). Each item is rated on a 5-point Likert scale (1 = totally disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = totally agree) (24). The 9 items were organised into 2 components by factor analysis: Self-affirmation and Outlook on life. Self-affirmation comprises items 1-6 on the scale, while Outlook on life comprises items 7-9[24]. The Cronbach´s alpha for the entire scale was 0.89, while for the components were 0.86 for Self-affirmation and 0.80 for Outlook on life (24).

Positive Aspects of Caregiving Questionnaire (PACQ)

It is a 10-item, self-administered questionnaire which assesses the positive experience of caregiving. Each item in the questionnaire is rated on a 5-point Likert scale ranging from 0 = Strongly disagree to 4 = Strongly agree (25). The total possible score ranges from 0 to 40, with a higher score indicating greater satisfaction with the caregiving role. It has 2 dimensions: patient and caregiver relationship, which comprises items 1-4, and caregiver´s psychological wellbeing that comprises items 5-10 (25). It has high internal consistency (Cronbach´s alpha = 0.785) and good convergent and divergent validity (25).

12- Item Zarit Burden Interview (ZBI-12)

The 12-item questionnaire is self-administered and contains elements that caregivers typically describe as being burdensome when providing care for people with psychiatric conditions (26). It inquires into the untoward mental, social, physical and financial effects of caregiving (26). It is rated on a 5-point Likert scale (0 - never, 1- rarely, 2- sometimes, 3 - quite frequently, 4 - nearly always) with a total score of 0-48. A higher score indicates

a greater burden of care. Its psychometric properties are good, with internal consistency measured by Cronbach's α = 0.88, and good construct validity against the full version (rho = 0.97)[26]. Its psychometric characteristics are comparable to those of the complete Zarit Burden Interview, while still having the benefit of a quicker administration time, which makes it suitable for assessing care burden, particularly in busy outpatient clinics where caregivers are less likely to respond to protracted questionnaires. It has been validated for use among informal caregivers in Nigeria with Cronbach α = 0.90, split-half correlation coefficient 0.84, and strong construct validity (17). It can be completed in less than 5 minutes.

Data analysis

Data was analysed using Statistical Product and Services Solution (SPSS) Statistics version 27 and Amos version 26. The SPSS Statistics version 27 was used for descriptive statistics, calculation of Cronbach´s alpha to determine internal consistency and Spearman´s rank-order correlation to determine discriminant validity of PAC scale against 12-item ZBI and GHQ 12. All continuous variables were subjected to the Shapiro-Wilk normality test, and none were all not normally distributed, as they had a p-value <0.05. The level of significance was set at 0.05.
Confirmatory factor analysis was done to evaluate construct validity using SPSS AMOS version 26.

Results

The most represented age group was 30-44 years (31.2%), and about three out of every five respondents (60.9%) were female. Almost all the respondents were either Christians or Muslims, with 72.1% being Christians and 26.0% being Muslims. Yoruba represented 61.6% of the participating sample, and Igbos made up 25.1%. In terms of the respondents' relationship to the patients, parents were the most represented, accounting for 31.6% of the respondents, children were 23.3%, and 0.9% of the respondents had no family relationship with the patient. All the respondents had at least a primary level of education, with only 0.9% not going beyond primary school education (Table 1).

Table 1: Sociodemographic characteristics of respondents

Variables		Frequency (n)	Percentage (%)
Age (years)	18-29	44	20.5
	30-44	67	31.2
	45-59	65	30.2
	≥60	39	18.1
Sex	Male	84	39.1
	Female	131	60.9
Religion	Christianity	155	72.1
	Islam	56	26.0
	Others	4	1.9
Ethnicity	Yoruba	132	61.4
	Igbo	54	25.1
	Hausa	3	1.4
	Others	26	12.1
Relationship with the patient	Parent	68	31.6
	Sibling	47	21.9
	Child	50	23.3
	Spouse	32	14.9
	Other family relationships	16	7.4
	No family relationship	2	0.9
Highest level of education	Primary	2	0.9
	Secondary	60	27.9
	Tertiary	153	71.2

Internal consistency

The internal consistency of the Positive Aspects of Caregiving Scale (PAC) was assessed using Cronbach's alpha. The overall 9-item PAC scale demonstrated good internal consistency, with a Cronbach's alpha of 0.829, indicating that the items were reliably measuring the construct of positive caregiving experience. For the Self-Affirmation subscale (PAC1–PAC6), internal consistency was acceptable, with a Cronbach's alpha of 0.720. The

Outlook on Life subscale (PAC7–PAC9) demonstrated excellent internal consistency, with a Cronbach's alpha of 0.918 (Table 2).

Table 2: Internal Consistency of the Positive Aspects of Caregiving (PAC) Scale and Subscales

Scale/ Subscale	Items	Cronbach´s alpha	p-value
PAC Total Scale	1-9	0.829	<0.001
Self-Affirmation Subscale	1-6	0.720	<0.001
Outlook on Life Subscale	7-9	0.918	<0.001

Bold p-value = statistical significance at the level of significance set at 0.05

Convergent validity

Spearman´s correlation test revealed a high positive correlation between the PAC scale and PACQ (ρ = 0.773, *p* < 0.001), with a 95% confidence interval of 0.711 to 0.823 (Table 3). This suggests that the PAC scale performs well in measuring the positive caregiving experience construct.

Divergent validity

To assess divergent validity, Spearman's rank-order correlations were computed between PAC total scores and measures of caregiver burden (Zarit Burden Interview, ZBI). PAC scores were negatively correlated with caregiver burden (ZBI-12), ρ = −0.790, *p* < 0.001, with a 95% confidence interval of −0.836 to −0.732 (Table 3). This implies that the PAC scale measures a construct that is the opposite of the construct measured by ZBI-12.

Table 3: Spearman Correlations between PAC Scale, PACQ and ZBI-12

Variables	PAC Scale Total Score		
	ρ (rho)	95% CI	p-value
PACQ Total Score	0.773	0.711 to 0.823	<0.001
ZBI-12 Total Score	-0.790	−0.836 to −0.732	<0.001

Bold p-value = statistical significance at the level of significance set at 0.05

Confirmatory Factor Analysis

A confirmatory factor analysis (CFA) was conducted using AMOS version 26 to test the hypothesised two-factor structure of the Positive Aspects of Caregiving Scale (PAC) among Nigerian caregivers of persons with mental illness (Figure 1). The two latent constructs evaluated were Self-affirmation (PAC1–PAC6) and Outlook on life (PAC7–PAC9), as proposed in the original instrument.

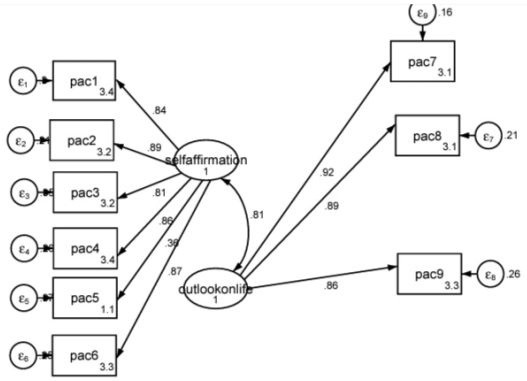

Figure 1: Path diagram for the Two-factor model of Positive Aspect of Caregiving (PAC) Scale

The CFA model demonstrated excellent fit to the data based on both absolute and incremental fit indices: Chi-square (χ^2) = 42.22, df = 26, p = 0.023; CMIN/DF = 1.62; Comparative Fit Index (CFI) = 0.989; Tucker-Lewis Index (TLI) = 0.985; Goodness-of-Fit Index (GFI) = 0.957; Adjusted GFI (AGFI) = 0.926; Root Mean Square Error of Approximation (RMSEA) = 0.054, 95% CI [0.020 - 0.083], p-close = 0.382 (Table 4).

Table 4: Indices showing how well the model fits the data

Model Fit Index	Value	Interpretation
Chi-square (CMIN)	42.217	Significant (p=0.023), but acceptable due to large sample size
CMIN/DF	1.624	Good (<3.0 is acceptable)
GFI	0.957	Good (≥0.90 is acceptable)
AGFI	0.926	Good (≥0.90 is acceptable)
CFI	0.989	Excellent (≥0.95)
TLI	0.985	Excellent (≥0.95)
RMSEA	0.054	Values between 0.05 and 0.08 are good
PCLOSE	0.382	Not significant – good sign
Hoelter .05	198	Adequate sample size

GFI = Goodness-of-Fit Index, AGFI = Adjusted Goodness-of-Fit Index, CFI = Comparative Fit Index, TLI = Tucker-Lewis Index, RMSEA = Root Mean Square Error of Approximation

All items demonstrated statistically significant standardised loadings ($p < 0.001$) on their respective factors, indicating strong convergence with the latent constructs. Factor loadings ranged from 0.892 to 1.501 for Self-affirmation and from 0.892 to 0.959 for Outlook on life (Table 5).

Table 5: Factor loading of PAC Scale Items

Item Content Providing help to the care recipient has…	Factor	Estimate	p-value
Made me feel more needed	Self-Affirmation	1.000 (fixed)	
Enabled me to appreciate life more	Self-Affirmation	1.118	<0 .001
Made me feel important	Self-Affirmation	1.019	<0 .001
Made me feel good about myself	Self-Affirmation	1.068	< 0.001
Strengthened my relationship with the care recipient	Self-Affirmation	1.501	< 0.001
Made me feel more confident about my abilities	Self-Affirmation	1.094	<0 .001
Made me feel appreciated	Outlook on Life	1.000 (fixed)	
Gave more meaning to my life	Outlook on Life	0.959	< 0.001
Made me feel stronger as a person	Outlook on Life	0.892	<0 .001

Bold p-value = statistical significance at the level of significance set at 0.05

The two latent factors were positively and strongly correlated ($r = 0.760$, $p < 0.001$), supporting the conceptual relatedness of self-affirmation and outlook on life as positive aspects of the caregiving experience. These findings of the CFA provide empirical support for the two-factor structure of the PAC scale in a Nigerian caregiving population. These findings indicate that the scale maintains construct validity in this cultural context and can reliably assess caregivers' positive experiences.

Discussion

This study evaluated the psychometric properties of the 9-item Positive Aspects of Caregiving (PAC) Scale among informal caregivers of individuals with mental disorders in a Nigerian mental health facility. The findings indicate that the PAC scale is a reliable and valid tool for assessing positive caregiving experiences in this population. These results provide initial support for the use of the PAC scale in the Nigerian context, contributing to the growing literature on positive caregiving in low- and middle-income countries (LMICs), particularly in sub-Saharan Africa.

The internal consistency of the PAC scale in this study was high, with a Cronbach's alpha of 0.89, which exceeds the recommended threshold of 0.70 for acceptable reliability. This is consistent with previous studies that reported Cronbach's alpha ranging from 0.83 to 0.90 among caregivers in high-income countries (22, 24). The high internal consistency indicates that the scale items are coherently measuring the underlying construct of positive caregiving experiences (24).

The negative correlation between PAC scale and caregiver burden as measured by the ZBI-12 indicates good discriminant validity. This finding aligns with previous research suggesting that caregivers who report higher levels of positive caregiving experiences also tend to experience less perceived burden and are less likely to experience psychological distress (27, 28). It highlights the duality of caregiving, where positive and negative experiences can coexist but remain inversely related (8).

Confirmatory factor analysis supported the two-factor structure of positive caregiving experience, reinforcing the construct validity of the scale in this

setting. This factor structure aligns with the original conceptualisation by Tarlow et al. (2004), who proposed these two dimensions as core domains of positive caregiving (24). The two-factor structure observed in this study is consistent with validations conducted in the United States (24) and South Korea, supporting the cross-cultural applicability of the PAC construct. However, some studies, particularly in East Asian contexts, have reported variations in factor structure which may reflect cultural differences in caregiving perception and experience (22, 23). Our findings affirm the relevance of the original two-factor structure in the Nigerian cultural setting, where caregiving is often perceived as a moral or familial obligation and is deeply embedded in religious and communal values.

A major strength of this study is its focus on a previously under-researched population: informal caregivers of individuals with mental illness in sub-Saharan Africa. Most previous PAC scale validations have focused on dementia or chronic illness caregiving in high-income settings. By validating the scale in Nigeria, this study broadens the cultural scope of the PAC and contributes to the evidence base needed for caregiver assessment tools in mental health settings across LMICs.

In addition, the study employed confirmatory factor analysis, providing robust evidence for the factor structure and construct validity of the scale. The use of a well-established instrument for caregiver burden (ZBI-12) further strengthens the construct validity findings.

Also, while the study was conducted in a single mental health facility in Lagos, it is important to emphasise that the ethnic, cultural and religious diversity of Lagos state as a cosmopolitan economic hub of Nigeria constitutes a major strength in improving the generalizability of the findings of this study.

Despite its contributions, this study has some limitations. First, the use of a cross-sectional design limits the ability to assess test-retest reliability and responsiveness of the PAC scale over time. Longitudinal studies would be beneficial in evaluating the stability of positive caregiving experiences.

Second, social desirability bias may have influenced responses, as caregivers may be inclined to emphasise positive aspects of caregiving, especially in face-to-face data collection. While this is a common limitation in self-reported studies, future research could consider anonymous or mixed-method approaches to reduce bias.

Conclusion

This study demonstrates that the 9-item Positive Aspects of Caregiving (PAC) Scale is a psychometrically sound instrument for assessing positive caregiving experiences among informal caregivers of individuals with mental disorders in Nigeria. The scale showed strong internal consistency, a stable two-factor structure, and good discriminant validity with caregiver burden. These findings support the PAC scale's utility in both clinical and research settings for identifying caregivers who may benefit from strength-based interventions and support programs.

Incorporating assessments of positive caregiving experiences into routine mental health care can provide a more holistic understanding of caregiver well-being, promote resilience, and ultimately enhance patient and caregiver outcomes in sub-Saharan Africa and similar contexts.

List of Abbreviations

AGFI: Adjusted Goodness-of-Fit Index
AMOS: Analysis of Moment Structures
CFA: Confirmatory Factor Analysis
CFI: Comparative Fit Index
CMIN/DF: Chi-square Minimum Discrepancy divided by Degrees of Freedom
GFI: Goodness-of-Fit Index
LMICs: Low- and Middle-Income Countries
PAC: Positive Aspects of Caregiving
PACQ: Positive Aspects of Caregiving Questionnaire
PCLOSE: P-value for Close Fit
RMSEA: Root Mean Square Error of Approximation
SPSS: Statistical Product and Services Solution
TLI: Tucker-Lewis Index
ZBI: Zarit Burden Interview
ZBI-12: 12-item Zarit Burden Interview

Declarations

Ethics approval and consent to participate

Ethical approval was obtained from the Health Research and Ethics Committee of the Federal Neuropsychiatric Hospital, Yaba (FNPHY/HREC/2025/001/06/40). Written informed consent was obtained from all participants. Confidentiality and anonymity were strictly maintained. Caregivers were informed that their participation was voluntary and that they had the right to withdraw at any time without consequences. No financial burden was placed on the participants.

Consent for publication

This was obtained from all authors.

Availability of data and materials
The data obtained and analysed are available upon request from the corresponding author, IOA.

Competing interests
The authors declared that they have no competing interests.

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Author's contributions
AIO was the project leader.
AIO, KYA, AOR and OOA were responsible for idea generation and study conceptualisation.
AIO, LAA and AOC performed the data collection.
AIO, KYA, AOR, BMA and OOA made conceptual contributions.
AIO, AOC, and BMA did the data analysis.
AIO, KYA, AOR, LAA and AOC wrote the discussion.

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