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TRANSLATION, ADAPTATION, VALIDATION AND APPLICATION OF *"PATIENTS' PERCEPTION SAFETY CULTURE SCALE* (*PAPSCS*)*"* IN AN EGYPTIAN SURGICAL INPATIENT HEALTHCARE SETTING

Basem Farouk Abdel-Aziz*

**Assistant Professor, and Consultant of Public Health, Health Management, Planning and Policy, M.B.Ch.B., MPH, DPH. Department of Health Administration and Behavioral Sciences, High, Institute of Public Health, Alexandria University, Alexandria, Egypt. Contact: Basemfarouk@alexu.edu.eg, +201111880781. ORCID: 0000-0002-8498-4040*

Corresponding Author:
Basemfarouk@alexu.edu.eg

Abstract

Background: *Sundry studies are executed in high-income countries examining patient perceived safety culture (PaPSC) in healthcare settings. Paucity of analogous research in developing countries including Egypt is a motive behind this research pursuing translation, cross-cultural adaptation, reliability assessment, construct validation, and application of "Patients' Perception Safety Culture Scale (PaPSCS)" in a surgical inpatient setting in Alexandria Main University Hospital.*

Methods: *Cross-sectional survey with a random sample of (n=480) is executed using a formally forwardly-backwardly Arabic translated version of PaPSCS. Elevenitemed PaPSCS is purified by eliminating three apparently ambiguous insufficiently loading items. Collected sample is randomly split into two equal subsamples, one for explorative purposes and the other for confirmation. Factor analysis via structural equation modelling is employed to construct-validate PaPSCS.*

Results: *EFA rediscovered unidimensionality of PaPSCS and CFA confirmed reliability and convergent validity of the respecified model. PaPSCS has adequate psychometrics:*
- Chronbach's ∞ = .897; Guttman split-half coefficient = .867. ICC = (.897). χ^2/df =
2.257; SRMR = .0301; GFI = .957; AGFI = .914; NFI = .961; RFI = .940; IFI = .978;
TLI = .966; CFI = .978; RMSEA = 0.075. □c = .900. AVE = .529. Modified congeneric eight-itemed model does not satisfy the condition of tau- equivalence. Indicators are accorded differential weights corresponding to respective □s. PaPSCS score is the summative composite of weighted indicators' scores. Multi- group CFA proves model's full invariance across sociodemographic, personal, and clinical patient characteristics through four successive levels namely, configural, metric, scalar and residual. PaPSCS is harnessed to assess level of PaPSCS. PaPSC is gauged as "poor" on overall setting level of aggregation and unit/ department aggregation level. On the patient level of aggregation, PaPSCS is gauged as "Excellent" for 31.1%; "Mediocre" for 19.6%; "Poor" for 19.6% and "Very Poor" for 29.7%. "Specialty" departments display statistically significant lower PaPSCS than general units (26.5224 vs. 28.5484). Other sociodemographic, and clinical characteristics are unassociated with PaPSCS scores.

Conclusions: *Adapted PaPSCS is a valid and reliable tool. Implications for PaPSCS pruning and upgrading are discussed. Recommendations for continuous PaPSC monitoring and improvement are proposed. Limitations and avenues of future research are delineated.*

Keywords: *Patients' Perception Safety Culture Scale (PaPSCS), Cross-cultural Adaptation, Forward-backwards Translation, Scale Validation, Reliability, Structural Equation Modelling, Exploratory Factor Analysis, Multiple-group Confirmatory Factor Analysis, Measurement Invariance, Surgical Inpatient Setting*

BACKGROUND

Patient experience is kernel of worthy healthcare [1,2]. Surveying patients' perceptions of diverse aspects of healthcare - including surgical inpatient services- is a time-honored contrivance for assessment and improvement of healthcare systems [3]. Patient involvement in various aspects of healthcare monitoring and assessment is freshly expanded to patient safety (Psaf) issues [4-6]. Traditionally, safety culture (SC) has been investigated from providers' viewpoint [7, 8]. Around the globe many survey instruments have been developed and utilized to measure healthcare staff discernments of SC [9-11]. Nonetheless, these efforts must be supplanted by patients' perspective [12-15]. Even if some aspects of SC may not be directly perceptible to patients, their perception offers indispensable information complementing providers' viewpoint [4, 16]. Patients' perception of safety culture (*PaPSC*) is a recognized key feature of creditable healthcare, and *PaPSC* measures are commonly touted to support healthcare improvement efforts [13].

So far, *PaPSC* has received relatively little research attention, compared to conventional SC surveys focusing on providers' perspective [13, 17]. While staff SC surveys are more scope focused, *PaPSC* surveys cover a much wider range of themes [13]. Inpatients perceive SC through observation and interaction [4-6,13]. SC is a central facet of all-encompassing organizational culture that relies on dominant organizational shared values and norms [18]. These values and norms affect the attitudes, perceptions, and behaviors of providers and consumers [19]. SC is seen as a spring for observable, measurable and modifiable patterns of behavior [20].

Survey instruments of *PaPSC* embrace: - Hospital Survey on Patient Safety Culture (HSOPSC) [8]. Patient Measure of Organizational Safety (PMOS) [21]; Patient Safety Climate Tool (PSCT) [22]. Most recently, patients' Perception Safety Culture Scale (*PaPSCS*) is constructed by Monaca et al. (2020) by employing a multistep development approach including (*a*) literature review of survey instruments for patient experience and SC and (*b*) item categorization and selection [13]. *PaPSCS* is an elevenitemed measure focusing on *PaPSC* in healthcare settings that is purposely developed to enhance an increased recognition of patients' views and experiences on safetyrelevant aspects of healthcare and provide important inputs to Psaf improvement. According to Monaca et al. (2020) *PaPSCS* content validity has been corroborated by identifying *PaPSC* indicators from the literature, generating corresponding items, pretesting the tool, and procuring expert judgment. Monaca et al. study (2020) authenticated the unidimensional construct validity and internal consistency reliability of the *PaPSCS* where item loadings (□s) ranged between 0.71 and 0.88 and explained 65.2% of variance alongside a Chronbach's α (α) of .95. Mean interitem correlation (MIIC) was 0.6; and only one of interitem correlations (IICs) was 0.81 indicating no unusually high overlap [13].

A systematic review, conducted in developed countries disclosed that adverse events (AEs) occur in 9.2% of hospital admissions [23]. In low-income countries the state of affairs is even more precarious [24, 25]. East Mediterranean and African countries estimates illustrate that up to 18% of inpatient admissions are associated with AEs and 3% of these admissions are associated with permanent disability or mortality [26]. In a parallel streak, a meta-analysis of thirty-three researches reported that healthcare associated infections ensue at rates ranging from 5.7 to 19.1% in low-and middleincome countries [25]. A growing body of evidence uncovers that most in-hospital AEs are associated with surgical care [23, 27]. Annually there are at least seven million patients who suffer from surgical complications, embracing at least one million mortalities during or immediately succeeding surgeries. The origin of these AEs is seldom related to a dearth of technical skills but rather to an impoverished SC in healthcare setting [28]. Patient Safety Culture (PSC) has been defined by as "a coherent and integrated set of individual and organizational behaviors, based on shared beliefs and values, which continually seeks to reduce care-related harm among patients ". Routine standardized assessment of PSC within healthcare institutions is widely recommended to improve Psaf [28]. Creating a positive Patient Safety Culture (PSC) is an important strategy to improve Psaf and to meet the global challenge posed by AEs [29].

To the extent of the researcher's knowledge, there is no formal Arabian translation of *PaPSCS*. This article aims at translation, cross-cultural adaptation, validation, and application of *PaPSCS* in an Egyptian surgical inpatient setting. *PaPSCS* can contribute to patient SC standardized measurement and regularized improvement in an Arabian speaking context. Cross-cultural adaptation is indispensable to effectively acclimatize prominent Western instruments to non-western cultures and tongues. The process of adaption incorporates formal translation and rigorous validation procedures that are crucial to establishing an expressive, semantically, and conceptually equivalent tool with content and construct validities commensurate to the original tool and functional to assess *PaPSC* in a diverse national, linguistic, and cultural background [30]. The objectives of the present study are four-fold:-(i) formally translate the *PaPSCS* from English to Arabic; (ii) adapt and assess the reliability and construct validity of the translated *PaPSCS* in an Egyptian surgical inpatient setting; (ii) apply the adopted tool to characterize and calibrate the magnitude of overall *PaPSCS* and its individual items at various levels of aggregation namely, overall surgical setting; "general" surgery units, "specialty" surgery departments, individual units and departments, and patient level; (iv) and reconnoiter possible associations between *PaPSCS* score and some personal, sociodemographic and clinical patient characteristics.

Methods

An observational analytical cross-sectional study was conducted at surgical inpatient departments in Alexandria Main University Hospital (AMUH), Alexandria, Egypt, in the period from 26- June -2022 till 7- September- 2022, after obtaining permission from authorities of Faculty of Medicine - Alexandria University (AU). The study was approved on

19/5/2022 by the Ethics Committee of Faculty of Medicine/AU. The committee is a member of ICLAS; IRB NO: 00012098 and FWA NO: 00018699.

Study serial number is 0305576. Study was conducted in eight units and departments, encrypted as Unit1 through Unit8. Unit3 and Unit5 are "specialty" surgery departments while the other six are "general" surgery units. One "specialty" department and a "general" unit were not included since their heads did not give permission. Study population consisted of inpatients who attended the study setting during the study period. Patients eligible for the study were ≥ 16 years of age, whose length of stay was ≥ 48 hours, who were able and willing to participate. Intensive care, critical condition, confused and unconscious patients were excluded from the study for difficulty of collecting accurate data. The purpose of the study was expounded to participants, and they were assured about the confidentiality and anonymity of the collected data. Participation was voluntary and verbal informed consent was acquired.

Sample size was computed by the following formula: n = [P (1-P) Z2 / d 2] where: n = sample size collected using a simple random sampling technique, P = expected prevalence or proportion of PSC in the study population, d = degree of precision 5 %, Z = 1.96 (Z statistic for a 95% level of confidence), alpha = 0.05 [31, 32]. Since it was unworkable to come up with a good estimate for P from literature or practical experience in a similar setting, the researcher set P equal to 0.5 to yield the maximal estimation of the minimal required sample size as suggested by several authors [31, 33]. If the prevalence of the investigated phenomenon is conjectured to be between 10% and 90%, research experience indicated that it is appropriate to have a precision (d) of 5%, as this precision gives the width of 95% CI as 10% [32]. Given formula above and assuming (P) = .5, (d) = 5%, then required (n) = 384 patients as a minimally austere sample size. The sample size calculation formula does not need a finite population correction factor as the study population is infinite i.e., n/N < 0.05, where N is the population size [31, 32]. To assure the desired precision and anticipating nonresponse, missing data, or outlying cases the researcher oversampled by 25% of the minimal sample size [32]. Along these lines, it was decided to obtain a random sample of (384 * 1.25= 480). Using an equally stratified random sampling procedure, the sample was equally allocated amongst units/departments and between male and female patients, expressly, sixty patients were randomly selected from each unit/ department and were equally apportioned between males and females. Patients who refused to participate were replaced by others.

Monaca's et al. (2020) [13] original eleven-itemed PaPSCS was translated from English to Arabic employing translation guidelines recommended by WHO [34]. Translation procedure included an interactive process of forward and backward translation, supplemented by review procedures to assure conceptual, semantic, and technical equivalence of the translated version. Professional excellent bilingual translators warranted proficient translation [35]. Dependability of the translation method is part of the internal validity and construct equivalence of the tool [36, 37].

The ensuing six steps were performed. First, the eleven questionnaire items were forwardly translated from English to Arabic by three independent expert bilingual native Arabic speaking consultants who worked as physicians and public health professors at High Institute of Public Health [HIPH] and Faculty of Medicine, AU (step I). The three forwardly translated versions were then compared, conciliated, and incorporated into an Arabic version by an expert tripartite panel working collaboratively and using nominal group technique as a consensus procedure to effect requisite linguistic revisions of forward translation. Tripartite panel consisted of consultant physicians and professors of public health who were bilingual native Arabic speakers affiliated to HIPH, AU. Tripartite panel reviewed the three forwardly translated documents, checked all items, included their recommendations into the questionnaire and effected due adjustments to any awkwardly translated item to yield one pertinent forward translation (step II). Back translation into English was carried out by two independent bilingual professional certified English translators, who had no previous knowledge or access to *PaPSCS* (step III). Lastly the tripartite panel compared the two backward translations with the original English text to spot any critical difference between the original and the back-translated versions. There were no critical discrepancies, and the back-translated versions were pondered to be in consonance with the original text. Semantic and conceptual equivalence between the final Arabic version and the original English version were assured (step IV). Subsequently the final translated version was pretested through a pilot study carried out on 15 patients who were not included in the study. The pilot survey resulted in no modifications of the questionnaire (step V). No difficulties were met with the interview schedule and the translated document was formatted and finalized for use in the present study (step VI).

A specifically designed three-sectioned researcher-administered interview schedule was presented in Arabic to study participants. The first questionnaire section introduced the researcher to the participants and informed them that the leading purpose of the questionnaire was to elicit their responses about *PaPSC* regarding their current inpatient episode. The second section included items of personal, sociodemographic, and clinical data pertaining to participants' age, gender, marital status, formal educational level, occupational status, type of occupation, residence (urban/rural), dwelling (inside/outside Alexandria), unit/ department of admission, type of unit/ department of admission i.e., "general" or "specialty" surgery, and diagnosis. The third section contained the eleven-itemed Arabic version of *PaPSCS* designed to collect data appertaining to *PaPSC* construct. Questionnaire items (indicators/manifest variables) are "During the Whole Hospital Stay, I felt I was in "safe hands" $\{Q_1\}$; "I had the impression that Psaf was always a top priority" $\{Q_2\}$;
"The information exchange between physicians and nurses was very smooth " $\{Q_3\}$; " The physicians were well informed about my history and current medical condition and treatment" $\{Q_4\}$; "The nurses were well informed about my history and current medical condition and treatment" $\{Q_5\}$; "After handover (shift, transfer), staff knew all relevant information

necessary for my care" *{Q6}*; "Physicians and nurses worked together as a well-rehearsed team" *{Q7}*; "The different services (ward, x-ray, physiotherapy, etc.) are well coordinated " *{Q8}*; "I always knew who was responsible for my treatment and care" *{Q9}*; "Staff freely spoke up whenever they felt that something was amiss" *{Q10}*; and "There was always enough qualified staff available" *{Q11}*. Responses were anchored on a seven-point Likert scale ranging from 6 to zero in the following order: "Completely agree" (CA), "Agree to a great extent" (AG), "Somewhat agree" (AS), "Somewhat disagree" (DS), "Disagree to a large extent" (DG), "Completely disagree" (CD) and "Do not Know" (DN). On this basis the level of measurement is considered an interval scale suitable for correlational analyses and techniques.

The primary unrefined sample (S_1, n = 480) was employed to analyze sociodemographic, personal, and clinical patient characteristics. Preliminary screening (PS) was conducted on eleven-itemed (S_1) to scrutinize the distributions of manifest variables, identifying outliers, and assessing dataset penchant to carrying out factor analysis (FA). PS encompassed checking normality, outliers, IICs, determinant of the interitem correlation matrix (DIC), squared multiple correlations (SMCs), multicollinearity/singularity diagnostics, extraction communalities (ECs), residuals between observed and reproduced covariance matrices (Residus.), factor matrix (FX) using principle axis factoring (PAF), scale homogeneity and internal consistency including ∞, Guttman split-half reliability coefficient (Gutt), ∞ if item deleted (∞ IF), common interitem correlation (CIIC), and intraclass correlation coefficient (ICC). The refined sample (S_2) was randomly divided into two equal datasets (S_3) and (S_4). S_3 was reserved for purposes of Exploratory Factor Analysis (EFA) and S_4 for Confirmatory Factor Analysis (CFA) via Structural Equation Modeling (SEM).

The fitted model was appraised according to degree of global and local model fit. Several model fit indices were used to examine the empirical goodness-of-fit of the hypothesized model regarding collected data. The indices included: Chi-square ($\chi 2$); relative χ^2 (or normed χ^2) i.e. χ^2/degrees of freedom(df) (χ^2/df); root mean square residual (RMR); standardized root mean square residual (SRMR); root mean square error of approximation (RMSEA) with its 90% confidence interval and P-close value; comparative fit index (CFI); goodness of fit index (GFI); Tucker Lewis index (TLI); normed fit index (NFI); incremental fit index (IFI); parsimony adjusted CFI (PCFI); parsimony adjusted NFI (PNFI); and relative fit index (RFI). Moreover, the model was assessed for convergent validity using composite reliability (□*c*) and average variance extracted (AVE). Criteria for of acceptable model fit: χ^2 ($p > .05$) normed $\chi^2 < 5$; goodness of fit indices ≥ .9; badness of fit indices < .1; parsimonious fit indices > .5. ∞, Gutt, and ICC > .7.; Δ CFI <.02, Δ SRMR < .015, Δ RMSEA < .015; AVE > .7; □*c* > .7; □ ≥≈ .5.

S_2 was used to assess tau- equivalence, parallelism; and subjected to multigroup CFA (MG-CFA) to assess multigroup equivalence or multigroup measurement invariance (invar.) across gender (males vs. females), age (< 50 vs. ≥ 50), marital status (married vs. unmarried), education (illiterate and read & write vs. higher educational levels), employment status (employed vs. otherwise), diagnostic category (gastrointestinal condition other than a neoplasm and neoplastic conditions vs. other diseases), residence (urban vs. rural), dwelling (inside vs. outside Alexandria), type of unit/department ("general" vs. "specialty" surgery) and two randomly split samples (s_3 vs. S_4). Steps of invar. testing occurred in the order of least to most restrictive nested models i.e., configural, metric, scalar, and residual, successively. Both $\Delta\chi^2$ and Δ alternative fit indices (AFIs) [viz. Δ CFI, Δ RMSEA, ΔSRMR] were used to compare nested models. The adapted validated model was employed on S_2 (n_2 = 454) for calculating: (i) frequencies and percentages of responses to various items of adopted *PaPSCS; and* (ii) calculating *PaPSCS* scores at various levels of aggregation explicitly overall setting, aggregate "general" surgery units, aggregate "special" surgery units, units/departments level and individual patient level. Indicators are weighted according to their respective standardized item (factor) loadings i.e., standardized regression coefficient (□s). For each level of aggregation, *PaPSCS* score is the summative composite of weighted item scores [38]. *PSC* is mathematically measured based on mean scale (factor) score [39, 40]. *PaPSCS* gradient for each level of aggregation is calculated as: - [Gradient = mean scale score for a level of aggregation/Number of scale items]. Scale gradient is computed according to level of aggregation such that: - Scale gradient at the level of individual patient = [∑ scale score for a case/number of scale items]; Scale gradient at the level of unit = [∑ scale scores for all cases in the unit / (number of sampled cases in a unit* number of scale items)]. Scale gradient at the level of "general" surgery units = [∑ scale scores for all cases in the "general" surgery units / (number of sampled cases in the "general" units* number of scale items)]. Scale gradient at the level of "specialty" surgery departments = [∑ scale scores for all cases in the "specialty" departments / (number of sampled cases in the "specialty" department* number of scale items)]. Scale gradient at the level of overall study setting = [∑ scale scores for all cases in the study setting / (number of sampled cases in the study setting* number of scale items)].

For every level of aggregation, categorization of *PaPSC* is gauged according to the following *PaPSCS* gradient thresholds: - *PaPSCS* scores: ≥90th percentile (Excellent *PaPSC*); < 90th to ≥ 80th percentiles (Very Good *PaPSC*); < 80th percentile to ≥ 70th percentiles (Good *PaPSC*); < 70th to ≥ 50th percentiles (Mediocre *PaPSC*); < 50th to ≥ 30th percentiles (Poor *PaPSC*); and < 30th percentile (Very Poor *PaPSC*).

t-test for *PaPSCS* latent mean (intercept) comparison was operated across various sociodemographic, personal and clinical patient attributes including, gender (male vs. females), education (illiterate & read and write vs. other educational levels), marital state (married vs. unmarried), employment status (employed vs. otherwise), residence (urban vs. rural), dwelling (inside vs. outside Alexandria), diagnosis (gastrointestinal conditions other than a neoplasm and neoplastic condition vs. other disease conditions) and type of surgery unit or department ("general" vs. "specialty" surgeries).

Analyses were conducted using SPSS.26® (Statistical Package of Social Sciencesversion 26), AMOS 26 ® (Analysis of Moment Structures)-version 26, and Excel 2019®. Parallel analysis (PA) was performed using O'Connor's (2000) SPSS syntax for PA [41]. Comparison among items means was executed using t-test calculator provided by MedCalc (2022) statistical software [42].

Results

Response rate is almost 100%. Barely five cases out of 480 (.01%) refuse to participate. The non-respondents (four males and a female) are replaced by other five patients. The non-responding woman appertains to Unit8, whereas the non-responding four men belong to the Unit2, Unit7 & Unit8. Because of the absence of missing data, final number of cases utilized in PS is the exact number of participants (n = 480). S_1 is drawn upon to portray participants sociodemographic, personal, and clinical characteristics. Age (in years) is normally distributed ($\bar{x}$ =46.5396 ± 15.7494), median (MR.) =46), mode (Mo.) = 55, (range =16-83), age skewness index (.007, S.E = .111). Age Kurtosis index (.897, S.E = .222). Precisely (77.9 %) are married, (12.9%) single and (9.2%) are divorced, separated or widowers/widows. Exactly (32.1%) are employed, (32.5%) housewives, (28.3%) unemployed, (2.7%) students and (4.4%) on pension. Semiskilled workers unskilled workers, skilled workers, farmers, merchants constitute (10.4%), (6.5%), (5.0 %), (3.3%) and (1.9%) in that order. Just (4.9%) are professionals, semi-professionals, governmental and nongovernmental employees. Exactly (34.8%) of participants are illiterate, (11.9%) can only read & write, (7.9%) merely completed primary school, (11%) barely completed preparatory school, (2.3%) completed solely secondary school, (11.9%) completed a commercial school, (10.4%) completed a technical school, (1.3 %) finished an agricultural school. (7.9%) completed college, and a meagre (.2%) have a postgraduate degree. The majority (62.3%) resides in urban areas, whilst (37.7%) reside in rural areas. A percentage of (68.5) dwell inside Alexandria, while the remaining (31.5%) dwell outside Alexandria. Indeed (31.9%) are diagnosed with a gastrointestinal condition other than a neoplasm; (18.1%) are diagnosed with a neoplasm; (11.9%) are afflicted with a vascular condition including diabetic complications; (8.3%) are ill with uretero-renal stone; (7.3%) suffer a traumatic accident; (5.8%) have an intervertebral disc prolapse; (5.6%) go through a thyroid disorder other than a neoplasm; (4.2%) complain from a urosurgical condition other than a stone or a neoplasm; (4.2%) have a plastic surgery condition including obesity; (2.3%) neurosurgical ailments other than intervertebral disc prolapse or neoplasm; (.4%) other conditions.

Using S_1, eleven-itemed *PaPSCS* dataset is screened. All ECs are ≥ .429 except Q_8, Q_9 & Q_{10}; FX indicates that all □s are ≥ .655 except for Q_8, Q_9 & Q_{10}; α if item deleted is (> .85) for all items; all corrected item-total correlations (CITCs) are > .60 3 except Q_8, Q_9 & Q_{10}; mean item total correlations (MITCs) are ≥ .414 exempting Q_8 and Q_9; CIIC = .374; MIIC is .406; SMCs ≥ .416 aside from Q_8, Q_9 & Q_{10}; α if item deleted range is .855-.878. (See table 1). α of the scale 0=.874. Gutt = .838, ICC =.874 (95% CI: .856- .890), p= .000. All IICs are significant (p = .000, two-tailed), positive with a range of .718 and .248 and a mean of .406. The assumption of univariate normality holds as there are no univariate outliers (indicator values range between 6 and zero); MR. and Mo. for all manifest variables are both six. $\bar{x}$ of manifest variables range between 5.07 and 4.02 and skewness and kurtosis indices are < |2.6| (See table 1).

Histograms, stem-and-leaf diagrams, and boxplots of manifest variables parade symmetrical distributions and appropriate proportions of distributional height to width of scores of all indicators and delivered a pictorial substantiation of their univariate normality.

Pairwise scatterplots of the eleven indicators expose a uniform oval (even cigarshaped) silhouettes indicative of central tendency with linear homoscedastic relations signaling the absence of bivariate outliers. A profile of IICs that conveys extra pledge of bivariate normality. Twenty-six multivariate outliers are detected with Mahalanobis distance > χ_c^2 = 31.6, df =11, p < .001. Multivariate normality of the dataset is assured since Mardia's kurtosis index is 1.54 indicative of non-violation of the assumption of multivariate normality and justifying the utilization of maximal likelihood estimator (MLE) for SEM.

The dataset is not afflicted with a multicollinearity or singularity problem since all IICs are < .8; DIC is .013 (i.e., > .00001); all tolerance values are > .39, all variance inflation factors < 2.6, and all conditioned indices are < 25; Kaiser-Meyer-Olkin measure of sampling adequacy (KMO) is marvelous .908. A significant Bartlett's test of sphericity (Bartlett's) {Approx. Chi-Square = 2048.751, df= 55, p= .000}. A significant Bartlett's provides an articulate global diagnostic clue that the eleven manifest variables are sufficiently intercorrelated, the IIC matrix is a factorable non-identity matrix and that the sample size is adequate for conducting FA. Individual items measures of sampling adequacy of the anti-image correlation matrix (MSA) are commendable with a range between of .947 to .845. Residus. range between | .219| and zero with an absolute trivial mean of |.0361|. There are only eleven nonredundant residus. > |0.05| constituting a (20.0%) that is copiously < (50%) threshold.

Based on PS, Q_8, Q_9 & Q_{10} are eliminated because their ECs <.4, SMCs <.4, CITCs < .6 and MITCs are < .4 (See table 1). Akin multivariate outlying twenty-six cases are taken away from the dataset to raise S_2. Therefore, S_2 consists of eight variables and 454 cases, and it is factorable. S_2 (n_2= 454) is randomly split into two equal subsamples S_3 and S_4 each embraces 227 cases. S_3 (n_3 = 227) is harnessed for explorative purposes whereas S_4 (n_4 = 227) is reserved for confirmative ends [43].

Table 1 Descriptive statistics, extraction communalities, factor matrix, and measures of reliability of eleven-itemed *PaPSCS* (n = 480)

Indicator	$\bar{X} \pm$ S.D.	Skew	Kurt	ECs	FX	SMCs	∞ IF	CITCs	MITCs
Q1	5.05±1.413	-1.707	2.466	.453	.673	0.553	.863	.610	.424
Q2	5.02± 1.544	-1.734	2.202	.550	.742	0.608	.859	.671	.464
Q3	4.54±2.140	-1.257	0.041	.429	.655	0.416	.861	.603	.414
Q4	5. 07±1.655	-1.912	2.599	.471	.687	0.435	.860	.637	.435
Q5	4.60±2.040	-1.220	-0.029	.443	.665	0.433	.860	.622	.423
Q6	4.55±2.075	-1.190	-0.092	.467	.684	0.470	.859	.639	.433
Q7	4.91±1.873	-1.716	1.611	.545	.738	0.498	.855	.693	.466
Q8	4.60±2.096	-1.251	-0.015	.287	.536	0.275	.869	.498	.348
Q9	4.02±2.328	-0.512	-1.572	.178	.421	0.175	.878	.400	.279
Q10	4.32±2.352	-0.985	-0.770	.317	.563	0.312	.868	.533	.365
Q11	4.93±1.832	-1.705	1.637	.429	.655	0.425	.861	.616	.418

∞ IF: Chronbach's α if item deleted
CITCs: Corrected item-total correlations.
ECs: Extraction communalities using PAF
FX: Factor matrix using PAF.
Kurt: Kurtosis
MITCs: Mean item total correlations
Skew: Skewness.
SMCs: Squared multiple correlations
Standard error of kurtosis is .222 for all cases
Standard error of skewness is .111 for all cases

S_3 is subjected to EFA to reconnoiter possible factorial structure of *PaPSCS*. Heuristically and before undertaking formal analytical tests of sampling adequacy (i.e., KMO and Bartlett's), a sample size of (n_3 =227) is anticipated to be adequate for FA contemplating a number of conventional guidelines. First, for an eightitemed inventory the participants to items ratio is (227/8 = 28.375), a ratio that is amply in concert with a rule-of- thumb endorsing a sample size ten times the number of scale items [44, 45]. Second, a sample size of (227) cases complies with a commended ($n \geq 100$) rule of the thumb [46-48]. A third rule of the thumb is the n to q rule, where q is the number of model's freely estimated parameters. This rule calls for at least ten participants for every contemplated freely estimated parameter, i.e., (n: q ≥ 10) [49]. Given: n = 227, q = 16, then, n: q = 227/16 = 14.19, which meets terms with the just cited rule. KMO = .881 (meritorious). Bartlett's is significant (Approx. Chi-Square = 1638.298, df= 28, p= .000) and provides an articulate global diagnostic clue that the eight manifest variables are sufficiently intercorrelated, the IIC matrix is a factorable non- identity matrix and that the sample size is adequate for conducting FA. DIC = 0.014. IICs are all significant (two-tailed, p = .000), ranging between .803 and .388 and MIIC of .514, signifying no unwarranted duplication or overlap of item content. MSA are laudable and range between .938 and .786. All ECs (using PAF) are weighty (≥ .439). Residus. ranged between | .266| and | .005| with a mean of |.065|. There are 14 (50%) nonredundant residus. with absolute values > 0.05. FX displays □s > .66. Total variance extracted (TVE) by the one-factor solution is (57.546%). The incremental increase in TVE by a second factor is 11.477%. Running a two-factor solution presented non-sizable □s on the second factor. Kaiser criterion (eigenvalues >1) is fulfilled for one factor only (eigen value = 4.604), whereas the next grand eigen value is barely .918. Hinge of the scree test (i.e., extraction of factors above an inflection point on a graph of plotted eigenvalues) deflects sharply at the one factor solution. PA (using Principal Component Analysis PCA) supports the one-factor solution as the simulated eigenvalues of all factors - but one- are > truly generated eigen values. These findings back the one-factor solution of eight – itemed *PaPSCS*. ∞ = .887; Gutt = .845; ICC = .887 (95% CI: .908- .864); p= .000; CIIC = .496; MIIC = .514; CITCs range between .735 and .626; SMCs range between .419 and 7.03. ∞ IF are in the range of .878 - .865.

Thereafter CFA – in an exploratory mode- is performed to investigate the soundness of the unidimensional eight-itemed *PaPSCS*. The model is specified and identified by fixing factor variance to one and regression weights of error terms each to one. Using MLE the model is estimated, and a minimum is achieved. The following fit indices are registered: $\chi 2$ = 160.922, df = 20, p= 0.000; χ^2/df = 8.05]; RMR = .174; GFI = .844; AGFI = .720; NFI = .834; RFI = .767; IFI = .851; TLI = .790; CFI = .850; RMSEA = 0.177; SRMR =0669. Discernibly the model does not fit satisfactorily and post hoc modification and respecification are deemed necessary. Modification indices (MI) are consulted and incrementally point to covarying error terms of Q_1 & Q_2 (i.e., covaring e_1 and e_2) and covarying error terms of Q_5 & Q_6 (i.e., covarying e_5 and e_6) (See figure 1). These two error terms covariances (Ercos.) are justifiable on theoretical basis given that each item pair share parallel wording, and each pair is uttered sequentially and have overlapping and semantically intimately related themes. Q_1 & Q_2 contain the lexeme "safe", run in the lemma "safe" and "safety". Q_1 & Q_2 share the illusory and arduous to distinguish themes of "safety feeling" and "safety impression". Q_5 & Q_6 share the common theme of information flow and nurses are included explicitly in Q_5 and implicitly Q_6. After specifying the above-mentioned error covariances, an acceptable global and local model fit is obtained for the respecified model. $\chi 2$ = 44.821, df = 18, p= 0.000; χ^2/df = 2.94; RMR = .105; SRMR = .0407; GFI = .952; AGFI = .903; NFI = .954; RFI = .928; IFI = .972; TLI = .956; CFI = .971; RMSEA = 0.081 (See table 2). All standardized covariance residuals (SCRs) range between zero and 1.702. Additionally, elements of the covariance residual matrix are normally and uniformly distributed near zero and have uniform variances across all levels of the manifest variables, i.e., they are homoscedastic. Also, the normal Q-Q plot of the standardized covariance residus. generated an approximately straight-line signifying that the resids. are coming from a normal distribution with a mean of zero, a finding that adds extra evidence to the adequacy of model fit. λs range between .80 and .61; □*c* = .888 and AVE = .5 (See table 3). □*c* > AVE and even if AVE is < 0.5, however □*c* is > 0.6, the convergent validity of the construct is still adequate [50]. Collectively these indices communicate an adequate fit of the model specified with two Ercos. As the fitted model is developed from MI, it is post-hoc and requires cross-validation and confirmation by an independent sample S_4.

S_4 (n_4 = 227) is used as a fresh sample to confirm the respecified model (See figure 1). Sample size is adequate on the same heuristics demarcated for S_3. KMO = .879.

Bartlett's Approx. Chi-Square = 1038.250, df= 28, p= .000. DIC = 0.009. IICs are all significant (two-tailed, p = .000) with a range of .830 to .397; MIIC = .541; CITCs range between .779 and .604; CIIC = .511; ∞ If are in the range of .877-891; ∞ = .897; Gutt = .867. ICC =.897 (95% CI: .916- .875), p= .000. MSA range between .930 and .810. All ECs (using PAF) range between .725-.410. FX displays □s in the range .779-.640. TVE by the one-factor solution is 60.059%. The incremental increase in TVE by a second factor is 8.437%. Running a two-factor solution presented non-sizable loadings on the second factor. Kaiser criterion is fulfilled for one factor only (eigen value 4.805), whereas next loftier eigen value is .675. Hinge of the scree plot deflects sharply at the one factor solution. PA (using PCA) supports the one-factor solution as the simulated eigenvalues of all factors - but one- are > truly generated eigen values. These findings back the one-factor solution of the eight– itemed *PaPSCS*.

Thereafter CFA is performed to confirm the respecified unidimensional model (see figure 1). The model is specified and identified by fixing factor variance and regression paths of error terms each to one. The respecified model with 18 free parameters fits adequately. Global fit indices include: $\chi2$ = 40.624, df = 18, p= 0.002; χ^2/df = 2.257; RMR = .106; SRMR = .0301; GFI = .957; AGFI = .914; NFI = .961; RFI = .940; IFI = .978; TLI = .966; CFI = .978; RMSEA = 0.075 (See table 2). There are eight (28.0%) nonredundant residus. with values > |0.05|. All SCRs are in the range of 1.342 – zero. Residus. are normally and uniformly distributed near zero and have uniform variances across all levels of the manifest variables, i.e., they are homoscedastic. Also, the normal Q-Q plot of the standardized residus. generates an approximately straight-line signifying that they are coming from a normal distribution with a mean of zero, a finding that adds extra evidence to the adequacy of local model fit. Range of (λ)s is between .81 and .66. □*c* = .900. AVE = .530. AVE is > .5 (See table 3). □*c* is > AVE which is another sign of convergent validity. Jointly these fit indices convey an adequate global and local fit of the respecified *PaPSCS* model (See figure 1).

Table 2 shows adequate global fit indices for S_2, S_3 and S_4, and group specific models. Group specific models are attained by categorizing S_2 to groups according to gender (males and females); age (< 55 and ≥ 55); marital status (married and unmarried); educational level (illiterate, and read-and-write, versus primary education and higher); employment status (employed in the work force versus housewives, students, pensionaries and unemployed); patients with gastrointestinal conditions other than neoplasm and neoplasms versus other ailments; patients with an urban residence versus those with a rural one; patients dwelling inside Alexandria versus those dwelling outside Alexandria; patients attending "general" surgery units versus those admitted to "specialty" units (See table 2).

Table 3 displays the range of □s, measures of reliability, convergent validity and residual analysis of S_2, S_3 and S_4, and group specific eight-itemed adapted *PaPSCS* models.

Table 2 Global fit indices for overall sample, two randomly split samples and group specific *PaPSCS* models

M	$\chi2$; df; ; p	$\chi2$/df	SRMR	CFI	IFI	NFI	TLI	PCFI	PNFI	RMSEA [Lo- Hi]; p-close	GFI
MS2	56.519; 18; .000	3.14	.0282	.980	.980	.971	.969	.630	.624	.069 [.049- .089]:.059	.969
MS3	44.821; 18; .000	2.94	.0407	.971	.972	.954	.956	.625	.613	.081 [.052- .111]:.042	.952
MS4	40.624; 18; .002	2.26	.0301	.978	.978	.961	.966	.629	.618	.075 [.044- .105]:.088	.957
MM	46.510; 18; .000	2.58	.0382	.971	.971	.954	.955	.624	.613	.083 [.054- .113]; .032	.951
MF	35.217; 18; .009	1.96	.0300	.983	.983	.966	.974	.632	.621	.066 [.032- .098]:.194	.963
MV	53.628; 18; .000	2.98	.0354	.969	.969	.954	.952	.623	.613	.082 [.057- .108]; .018	.954
MW	28.525; 18; .054	1.59	.0317	.987	.987	.966	.980	.635	.621	.060 [.000- .101]; .310	.958
MK	51.878; 18; .000	2.88	.0308	.978	.978	.967	.966	.629	.622	.073 [.050- .097]:.049	.964
MD	42. 578;18; .001	2.37	.0592	.945	.946	.910	.914	.608	.585	.118 [.072- .164]:.010	.898
MI	10.926; 18; .897	.607	.0150	1.00	1.00	.990	1.00	.643	.637	.000 [.000- .027]:.992	.987
ML	70.628; 18; .000	3.92	.0495	.944	.944	.927	.912	.607	.596	.111 [.048- .139]:.000	.930
ME	51.847; 18; .000	2.88	.0500	.944	.945	.919	.913	.607	.590	.113 [.078- .149]:.003	.922
MU	35.214; 18; .009	1.96	.0258	.987	.987	.975	.980	.635	.627	.056 [.027- .086]:.003	.972
MN	47.990; 18; .000	2.67	.0376	.970	.971	.954	.954	.624	.613	.085 [.056- .114]:.025	.949
MA	55.509; 18; .000	3.08	.0392	.962	.962	.945	.941	.618	.608	.097 [.069- .127]:.004	.939
MB	82.632; 18; .000	4.59	.0462	.946	.946	.932	.916	.608	.599	.112 [.088- .137]:.000	.930
MR	21.928; 18; .235	1.22	.0262	.995	.995	.973	.992	.640	.625	.036 [.000- .082]:.000	.967
MX	88.044; 18; .000	4.89	.0393	.954	.955	.944	.929	.614	.607	.112 [.089- .135]:.000	.933
MO	17.611; 18; .482	.978	.0334	1.00	1.00	.964	1.00	.643	.620	.000 [.000- .074]:.797	.969
MG	68.439; 18; .000	3.80	.0339	.968	.969	.958	.951	.622	.616	.091 [.069- .115]:.002	.952
MY	32.024; 18; .022	1.78	.0449	.966	.967	.928	.948	.621	.597	.082 [.031- .128]:.124	.937

M: Model; MS_2= Refined sample (n= 454) model; MS_3 = First random sample (n= 227) model; MS_4 = Second random sample (n= 227) model; MM: Males (n=231) model; MF: Females (n=223) model; MV: Age < 55 (n= 293) model; MW: age ≥ 55 (n= 161) model; MK: Married patients (n= 355) model; MD: Unmarried patients (n= 99) model; MI: Illiterate and read & write patients (n= 215) model; ML: Patients with primary education or higher (n= 239) model; ME: Patients in the employed workforce (n= 149) model; MU: Housewives, students, pensionaries and unemployed (n = 305); MN: Patients with gastrointestinal conditions other than neoplasm and neoplasms (n = 232); MA: Patients with conditions other than gastrointestinal and neoplasms (n = 222); MB: Patients with urban residence (n= 286); MB: Patients with rural residence (n= 168); MX: Patients dwelling inside Alexandria (n= 314); MX: Patients dwelling outside Alexandria (n= 140); MG: Patients attending "general" surgery units (n= 338); MY: Patients attending "specialty" surgery departments (n= 116).

Table 3 Range of loadings, reliability, convergent validity, and residual analysis of eight- itemed *PaPSCS* in various samples

M	λ s ran	α	Gutt	ICC (Lo Up)	CIIC	AVE	ρc	MASR	MSCR	|XSCR|	MACR
MS_2	.787-.671	.892	.856	.892(.876-.906)	.497	.513	.894	|.3467|	-.0026	|1.384|	|.0609|
MS_3	.803-.609	.887	.845	.887 (.864-.908)	.483	.500	.888	|.3527|	0.0132	|1.702|	|.0744|
MS_4	.809-.658	.897	.867	.897 (.875-.916)	.511	.530	.900	|.2744|	0.0031	|1.342|	|.0707|
MM	.790-.643	.889	.852	.889 (.866-.909)	.481	.506	.891	|.3720|	0.0111	|1.144|	|.0920|
MF	.807-.605	.896	.861	.896 (.874-.915)	.518	.525	.900	|.2643|	0.0060	|0.973|	|.0600|
MV	.770-.606	.880	.821	.880 (.858-.890)	.467	.488	.883	|.3754|	0.0046	|1.290|	|.0672|
MW	.824-.599	.908	.903	.908 (.885-.928)	.543	.559	.910	|.2372|	0.0009	|0.090|	|.0733|
MK	.791-.646	.894	.858	.894 (.876-.910)	.512	.515	.894	|.3699|	0.0690	|1.194|	|.0638|
MD	.807-.528	.887	.852	.887 (.851-.918)	.486	.526	.897	|.3633|	0.0244	|1.712|	|.1449|
MI	.803-.648	.908	.879	.908 (.888-.925)	.552	.553	.908	|.1339|	0.0001	|0.497|	|.0317|
ML	.764-.620	.878	.837	.878 (.853-.900)	.455	.483	.882	|.1049|	0.0144	|1.415|	|.1049|
ME	.789-.635	.875	.828	.875 (.842-.903)	.391	.498	.888	|.3989|	-.0044	|1.251|	|.1038|
MU	.789-.663	.895	.851	.895 (.877-.912)	.506	.522	.897	|.2800|	-.003 6	|1.079|	|.0584|
MN	.822-.641	.891	.865	.891 (.868-.911)	.494	.518	.895	|.3944|	-.0043	|1.441|	|.0679|
MA	.807-607	.893	.848	.893 (.870-.913)	.510	.514	.893	|.3514|	0.0043	|1.370|	|.0888|
MB	.816-.637	.883	.828	.883 (.861-.902)	.474	.493	.886	|.5019|	0.0142	|1.652|	|.0942|
MR	.839-.687	.904	.894	.904 (.880-.924)	.531	.544	.905	|.1988|	-.0079	|0.780|	|.0588|
MX	.810-.698	.904	.855	.904 (.887-.919)	.530	.551	.907	|.4323|	0.0002	|1.549|	|.0863|
MO	.730- .572	.859	.860	.859 (.821-.892)	.423	.433	.858	|.2561|	0.0017	|0.899|	|.0724|
MG	.818-.683	.902	.871	.902 (.885-.917)	.527	.542	.904	|.3826|	-.0030	|1.401|	|.0665|
MY	.809-.578	.861	.807	.861 (.819-.896)	.417	.443	.863	|.3078|	0.0052	|1.030|	|.1077|

M: Model; MS2= Refined sample (n= 454) model; MS3 = First random sample (n= 227) model; MS4 = Second random sample (n= 227) model; MM: males (n=231) model; MF: Females (n=223) model; MV: Age < 55 (n=293) model; MW: age ≥ 55 (n= 161) model; MK: married patients (n= 355) model; MD: unmarried patients (n= 99) model; MI: illiterate, and "read & write" patients (n= 215) model; ML: Patients with primary education or higher (n= 239) model; ME: Patients in the employed workforce (n= 149) model; MU: Housewives, students, pensionaries and unemployed (n = 305) model; MN: Patients with gastrointestinal conditions other than neoplasm and neoplasms (n = 232) model; MA: Patients with conditions other than gastrointestinal and neoplasms (n = 222) model; MB: Patients with urban residence (n= 286) model; MB: Patients with rural residence (n= 168) model; MX: Patients dwelling inside Alexandria (n= 314) model; MX: Patients dwelling outside Alexandria (n= 140) model; MG: Patients attending "general" surgery units (n= 338) model; MY: Patients attending "specialty" surgery departments (n= 116) model.

λs ran: Standardized item loadings range; α: Cronbach's alpha, Gutt: Guttman split-half reliability coefficient; ICC (Lo-Up): Intraclass reliability coefficient (lower bound and upper bound); CIIC: Common interitem correlation; ρ*c*: Raykov composite reliability coefficient; AVE: Average variance extracted; MASR: Mean absolute standardized covariance residual; MSCR: Mean standardized covariance residuals; XSCR: Maximal standardized covariance residual; MACR: Mean absolute covariance residual.

Q-Q: normal Q-Q plot of the SCRs generated a roughly straight-line denoting residuals coming from a normal distribution with a mean approximating zero and they are discernable for all models. N.B. □s are all significant at p < .001 two-tailed.

N.B. For all models, minimal covariance residual is zero.
N.B. Number of standardized covariance residuals > |2| is zero for all models.

Table 4 puts on view λs, Ercos., and error terms correlations pertaining to overall sample S_2, S_3, S_4, and group specific eight-itemed adapted *PaPSCS* models.

Table 4 λs, Ercos. and error terms correlations of adapted *PaPSCS* pertaining to S_2, S_3, S_4 and specific patient groups

M	λ_1	λ_2	λ_3	λ_4	λ_5	λ_6	λ_7	λ_{11}	∧ (S.E., p)	$r_{1,2}$	∨ (S.E., p)	$r_{5,6}$
MS_2	.673	.757	.698	.752	.671	.701	.787	.683	.593 (.063, < .001)	.637	.461(.120, < .001)	.218
MS_3	.609	.669	.710	.723	.648	.730	.803	.720	.691 (.085, < .001)	.665	.278, (.163 , .087)	.136
MS_4	.725	.809	.685	.774	.689	.680	.786	.658	.495, (.083, < .001)	.602	.641, (.174, < .001)	.298
MM	.627	.711	.643	.693	.626	.762	.756	.578	.753, (.103, < .001)	.677	-.009, (.160 , .995)	-.005
MF	.694	.771	.730	.803	.694	.599	.790	.626	.457, (.075, < .001)	.589	.961, (.181, < .001)	.445
MV	.606	.736	.650	.743	.647	.667	.770	.750	.545, (.073, < .001)	.601	.459, (.155 , .003)	.204
MW	.730	.768	.767	.748	.734	.765	.832	.641	.667, (.115, < .001)	.707	.454, (183, .013)	.246
MK	.646	.746	.720	.765	.705	.680	.791	.676	.630, (.073, < .001)	.645	.569, (.133, < .001)	.279
MD	.780	.804	.599	.696	.528	.807	.788	.746	.421, (.117, < .001)	.585	.209, (.253, .410)	.101
MI	.724	.787	.707	.800	.712	.723	.830	.648	.576, (.087, < .001)	.663	.808, (.152, <.001)	.474
ML	.620	.726	.684	.708	.629	.700	.764	.717	.611, (.089, < .001)	.622	.118, (.182, . 517)	.049
ME	.635	.677	.674	.741	.694	.789	.777	.642	.646, (.112, < .001)	.640	-.232, (.177, .190)	-.137
MU	.693	.789	.709	.759	.663	.668	.787	.699	.564, (.075, < .001)	.635	.763, (.158, < .001)	.337
MN	.736	.822	.721	.698	.643	.698	.779	.641	.336, (.071, <.001)	.547	.672, (.160, < .001)	.338
MA	.607	.697	.666	.807	.692	.707	.801	.735	.833, (.110, < .001)	.695	.242, (.176, .169)	.109
MB	.637	.752	.681	.689	.647	.687	.816	.692	.527, (.072, < .001)	.623	.537, (.155, < .001)	.246
MR	.709	.744	.697	.839	.716	.751	.745	.687	.745, (.122, < .001)	.670	.233, (177, < .001)	.124
MX	.710	.810	.698	.762	.715	.704	.809	.722	.465, (.065, < .001)	.600	.465, (.136, < .001)	.233
MO	.582	.635	.700	.729	.572	.702	.730	.592	.888, (.151, < .001)	.694	.440, (.238, < .065)	.192
MG	.695	.818	.734	.764	.686	.711	.786	.683	.469, (.063, < .001)	.606	.468, (.125, < .001)	.247
MY	.592	.597	.578	.714	.621	.668	.809	.714	.929, (.168, < .001)	.708	.503, (.302, <.096)	.188

M: Model; MS_2= Refined sample (n= 454) model; MS_3 = First random sample (n= 227) model; MS_4 = Second random sample (n= 227) model; MM: males (n=231) model; MF: Females (n=223) model; MV: MV: Age < 55 (n= 293) model; MW: Age ≥ 55 (n= 161) model; MK: Married patients (n= 355) model; MD: Unmarried patients (n= 99) model; MI: Illiterate, and "read & write" patients (n= 215) model; ML: Patients with primary education or higher (n= 239) model; ME: Patients in the employed workforce (n= 149) model; MU: Housewives, students, pensionaries and unemployed (n = 305) model; MN: Patients with gastrointestinal conditions other than neoplasm and neoplasms (n = 232) model; MA: Patients with conditions other than gastrointestinal and neoplasms (n = 222) model; MB: Patients with urban residence (n= 286) model; MB: Patients with rural residence (n= 168) model; MX: Patients dwelling inside Alexandria (n= 314) model; MX: Patients dwelling outside Alexandria (n= 140) model; MG: Patients attending "general" surgery units (n= 338) model; MY: Patients attending "specialty" surgery departments (n= 116) model.

– λ_1, λ_2, λ_3, λ_4, λ_5, λ_6, λ_7, & λ_{11} are standardized item loadings of indicators Q_1, Q_2, Q_3, Q_4, Q_5, Q_6, Q_7 and Q_{11} respectively. All item loadings are significant at $p < .001$ two-tailed.

- ∧: error covariance between first and second *PaPSCS* items.
- ∨: error covariance between fifth and six *PaPSCS* items.
- Ercos.: error terms covariances.
- $r_{1,2:}$ Correlation between error terms of first and second *PaPSCS* items.
- $r_{5,6:}$ Correlation between error terms of fifth and sixth *PaPSCS* items.
- S_2: Overall sample with n_2= 454; $S_{3:}$ first randomly split sample, $S4_{:}$ second randomly split sample,

Table 5 demonstrates eight indicators' intercepts (means) pertaining to S_2, S_3, S_4 and group specific eight-itemed adapted *PaPSCS* models.

Table 5 Intercepts of indicators of adapted *PaPSCS* pertaining to overall sample, subsamples and specific patient groups

M	ι_1 ±SD (S.E.	ι_2 ±SD (S.E.	ι_3 ±SD (S.E.	ι_4 ±SD (S.E.	ι_5 ±SD (S.E.	ι_6 ±SD (S.E.	ι_7 ±SD (S.E.	ι_{11} ±SD (S.E.
MS_2	5.10±1.35(.063	5.10±1.43(.067	4.58±2.11 (.099	5.16±1.52(.072	4.70± 1.95(.092	4.59±2.05(.096	4.98±1.79(.084	4.96±1.79(.084
MS_3	5.08±1.31(.087	5.08±1.40(.093	4.64± 1.03(.135	5.25±1.35(.088	4.68±1.92(.128	4.49±2.05(.136	4.92±1.84(1.22	5.04±1.72(1.14
MS_4	5.12±1.39(.092	5.12±1.47(.098	4.52±2.20(.146	5.06±1.70(.113	4.71±1.98(.132	4.69±2.05(.136	5.04±1.75(.116	4.89±1.87(.124
MM	5.05±1.41(.093	5.05±1.51(.100	4.51±2.20(.145	5.10±1.56(.103	4.71±2.01(.132	4.59±2.09(.137	4.89±1.93(.127	4.87±1.92(.127
MF	5.16±1.29(.086	5.16±1.35(.090	4.65±2.02(.135	5.21±1.49(.099	4.69±1.90(.127	4.58±.2.18(.135	5.07±.1.64(.110	5.05±1.64(.110
MV	5.13±1.24(.072	5.09±1.37(.080	4.65±2.03(.119	5.23±1.40(.082	4.69±1.93(.112	4.57±2.06(.120	5.01±1.74(.101	5.03±1.66(.097
MW	5.08±1.53(.121	5.13±1.55(.122	4.49±2.26(.178	5.00±1.72(.135	4.69±2.00(.158	4.61±2.04(.161	4.91±1.89(.149	4.85±2.00(.158
MK	5.12±1.36(.072	5.12±1.42(.075	4.63±2.06(.109	5.16±1.49 (.079	4.73±1.89(.100	4.52±2.08(.110	5.02±1.72(.091	4.92±1.78(.094
MD	5.03±1.32(.133	5.03±1.48(.149	4.40±2.31(.232	5.13±1.65(.165	4.59±2.15(.216	4.83±1.94(.195	4.83±2.03(.204	5.05±1.84(.185
MI	5.09±1.43(.097	5.13±1.43(.098	4.70±2.07(.141	5.14±1.60(.109	4.84±1.91(.130	4.88±1.85(.126	5.07±1.66(.113	4.99±1.81(.123
ML	5.12±1.28(.082	5.08±1.43(.093	4.46±2.15(.139	5.18±1.46(.094	4.57±1.98(.128	5.31±2.19(.141	4.89±1.90(.123	4.94±1.79(.116
ME	5.10±1.28(.105	5.15±1.39(.114	4.65±2.05(.168	5.20±1.37(.112	4.78±1.93(.158	4.75±1.99(.163	5.11±1.65(.135	5.03±1.75(.143
MU	5.11±1.38(.079	5.08±1.45(.083	4.54±2.15(.123	5.13±1.60(.091	4.66±1.96(.112	4.50±2.08(.119	4.91±1.86(.106	4.93±1.82(.104
MN	5.19±1.32(.087	5.20±1.32(.087	4.63±2.09(.137	5.28±1.37(.090	4.74±1.91(.126	4.76±1.90(.125	4.97±1.77(.116	5.00±1.80(.118
MA	5.01±1.38(.092	5.00±1.54(.103	4.52±2.15(.144	5.02±1.66(.111	4.65±1.99(.134	4.40±2.19(.147	4.98±1.82(.122	4.93±1.79(.120
MB	5.14±1.26(.074	5.17±1.33(.079	4.64±2.10(.124	5.23±1.45(.085	4.75±1.94(.115	4.95±2.03(.120	5.00±1.75(.104	5.04±1.72(.101
MR	5.04±1.50(.115	4.99±1.59(.122	4.46±2.13(.165	5.02±1.65(.127	4.61±1.97(.152	4.58±2.09(.161	4.94±1.85(.143	4.84±1.91(.148
MX	5.12±1.34(.075	5.13±1.41(.079	4.61±2.10(.118	5.16±1.57(.088	4.72±1.94(.109	4.56±2.08(.117	4.94±1.84(.104	5.01±1.77(.100
MO	5.07±1.38(.117	5.02±1.49(.126	4.50±2.18(.182	5.15±1.43(.121	4.64±1.99(.168	4.65±1.99(.168	5.06±1.69(.143	4.86±1.84(.156
MG	5.18±1.35(.073	5.16±1.40(.076	4.73±2.01(.109	5.23±1.46(.080	4.75±1.93(.105	4.79±1.93(.105	4.99±1.80(.098	5.09±1.69(.092
MY	4.89±1.34(.125	4.93±1.53(.142	4.15±2.35(.218	4.94±1.68(.156	4.54±2.02(.187	4.03±2.29(.213	4.96±1.77(.165	4.60±2.03(.189

M: Model; MS_2= Refined sample (n= 454) model; MS_3 = First random sample (n= 227) model; MS_4 = Second random sample (n= 227) model; MM: males (n=231) model; MF: Females (n=223) model; MV: MV: Age < 55 (n= 293) model; MW: Age ≥ 55 (n= 161) model; MK: Married patients (n= 355) model; MD: Unmarried patients (n= 99) model; MI: Illiterate, and "read & write" patients (n= 215) model; ML: Patients with primary education or higher (n= 239) model; ME: Patients in the employed workforce (n= 149) model; MU: Housewives, students, pensionaries and unemployed (n = 305) model; MN: Patients with gastrointestinal conditions other than neoplasm and neoplasms (n = 232) model; MA: Patients with conditions other than gastrointestinal and neoplasms (n = 222) model; MB: Patients with urban residence (n= 286) model; MB: Patients with rural residence (n= 168) model; MX: Patients dwelling inside Alexandria (n= 314) model; MX: Patients dwelling outside Alexandria (n= 140) model; MG: Patients attending "general" surgery units (n= 338) model; MY: Patients attending "specialty" surgery departments (n= 116) model.

- ι_1, ι_2, ι_3, ι_4, ι_5, ι_6, ι_7, & ι_{11} are intercepts of indicators Q_1, Q_2, Q_3, Q_4, Q_5, Q_6, Q_7 and Q_{11} respectively.
- t-test among each consecutive pair of intercepts reveals insignificant differences at $p < .001$.
- All standard errors are significant at $p < .001$ two-tailed.

As the fitted model meets the condition of congenerity the investigation proceeded to assess its tau-equivalence and parallelism utilizing S_2. Tau-equivalence is tested by imposing equality constraints on θs. It is realized that the fit of the tau equivalent model is significantly worse than of the congeneric model. For the congeneric model: $\chi^2_{(18)} = 56.519$, p = .000; for the tau-equivalent model: $\chi^2_{(25)} = 125.367$, p = .000. χ^2 diff. = $\chi^2_{(25)} - \chi^2_{(18)} = 125.367_{(25)} - 56.519_{(18)} = 68.848_{(7)}$; significant as calculated $\chi^2 > \chi_c^2$, at .001 (i.e., 68.848> 24.32). As the condition of tau-equivalence is not fulfilled the analysis do not proceed to test for parallelism. Thereafter weighted rather than equal indicator scoring has been used to calculate *PaPSCS* score. Indicators are accorded differential weights in accordance with their respective □s calculated by deployment of S2 (see figure 1).

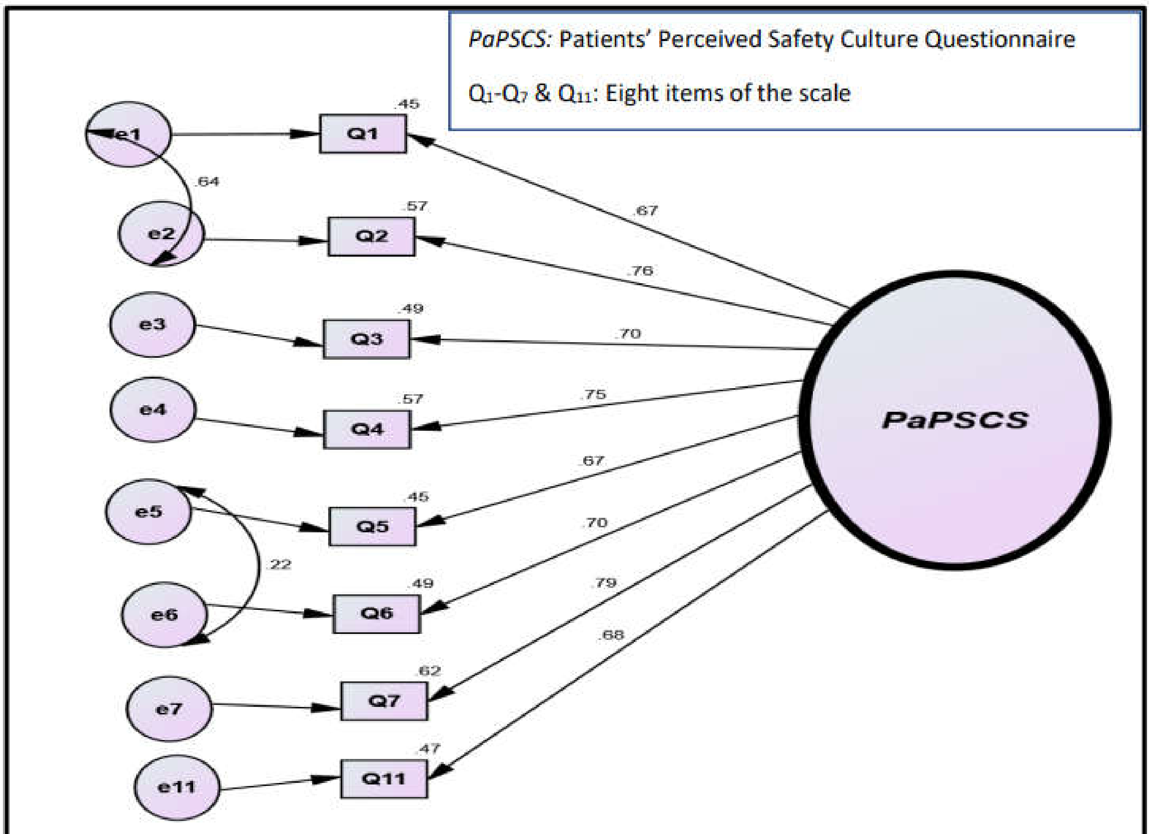

Figure 1. Adapted eight-itemed PaPSCS measurement model with standarized estimates

Harnessing S_2 the confirmed *PaPSCS* model is subjected to (MG-CFA) and assessed for invar. across various patient groups categorized according to gender, age, marital status, education, employment, diagnosis, residence, dwelling, unit/department of admission and across S_1 and S_2. The model adequately fits across all these categories (See table 6). Model's invar. is authenticated throughout four successive levels, namely, configural (testing unconstrained model across groups), full metric (imposing equality constraints on the □s across groups), full scalar (imposing equality constraints on the intercepts across groups), and residual (imposing equality constraints on disturbances across groups) (See table 7).

Table 6: *PaPSCS* measurement model multiple group analyses across diverse patient groups

Nested Models	χ^2 (*df, P*)	χ^2/df	SRMR	CFI	TLI	RMSEA (90%CI; P-close)	IFI	NFI	PCFI
Samples ^									
Unconstrained	85.445(36, .000)	2.373	.0407	.975	.961	.055(.040-.070; .270)	.975	.958	.627
MWs	101.123(44, 000)	2.298	.0464	.971	.963	.054(.040-.067; .316)	.971	.950	.763
Mis	111.267(52, 000)	2.140	.0461	.970	.968	.050(.037-.063; .470)	.970	.945	.901
MRs	131.107(62, 000)	2.115	.0456	.965	.968	.050(.038-.061; .501)	.965	.935	1.00
Gender (S2)									
Unconstrained	81.728 (36, 000)	2.720	.0382	.977	.964	.053(.038-.068; .351)	.977	.960	.628
MWs	95.816 (44, 000)	2.178	.0421	.974	.967	.051(.037-.062; .430)	.974	.953	.765
Mis	98.824 (52, 000)	1.902	.0420	.976	.975	.045(.031-.058; .730)	.976	.952	.907
MRs	155.299(62, 000)	2.505	.0476	.953	.958	.058(.046-.069; .126)	.953	.924	1.00
Age (S2)									
Unconstrained	82.154 (36, 000)	2.282	.0354	.977	.964	.053(.038-.069; .342)	.977	.959	.628
MWs	99.085 (44, 000)	2.252	.0498	.972	.964	.053(.039-.066; .358)	.972	.951	.764
Mis	106.234 (52, 000)	2.043	.0498	.972	.970	.048(.035-.061; .579)	.973	.948	.903
MRs	145.926 (62, 000)	2.354	.0504	.957	.961	.055(.043-.066; .238)	.957	.928	1.00
Marital (S2)									
Unconstrained	94.456 (36, 000)	2.624	.0308	.971	.955	.060(.045-.075; .126)	.971	.954	.624
MWs	99. 851 (44, 000)	2.269	.0329	.972	.964	.053(.039-.067; .342)	.972	.951	.764
Mis	109.975 (52, 000)	2.115	.0327	.971	.969	.050(.037-.063; .498)	.971	.946	.902
MRs	154.636 (62, 000)	2.494	.0366	.954	.958	.057(.046-.069; .133)	.954	.952	1.00
Education(S2)									
Unconstrained	81.554 (36, 000)	2.265	.0150	.977	.965	.053(.038-.068; .356)	.978	.961	.628
MWs	96. 355 (44, 000)	2.190	.0262	.974	.967	.051(.037-.065; .418)	.974	.953	.765
Mis	113.159 (52, 000)	2.176	.0271	.970	.967	.051(.038-.064; .429)	.970	.945	.900
MRs **Employment** (S2)	183.345 (62, 000)	2.957	.0495	.940	.946	.066(.055-.077; .009)	.940	.911	1.00
Unconstrained	87.061 (36, 000)	2.418	.0500	.974	.960	.056(.041-.071; .239)	.974	.957	.626
MWs	95. 327 (44, 000)	2.167	.0616	.974	.967	.051(.037-.065; .441)	.974	.953	.765
Mis	98.502 (52, 000)	1.894	.0616	.976	.975	.044(.031-.058; .739)	.976	.951	.907
MRs	121.569 (62, 000)	1.961	.0647	.970	.973	.046(.034-.058; .688)	.970	.940	1.00
Disease									
Unconstrained	103.499(36, .000)	2.875	.0376	.966	.947	.064(.050-.079; .049)	.967	.950	.621
MWs	120.190 (44, 000)	2.732	.0460	.962	.951	.062(.049-.075; .067)	.962	.941	.756
Mis	130.218 (52, 000)	2.504	.0461	.961	.958	.058(.045-.070; .146)	.961	.937	.892
MRs	168.289 (62, 000)	2.714	.0503	.947	.952	.062(.051-.073; .043)	.947	.918	1.00
Residence (S2)									
Unconstrained	104.560(36, .000)	2.904	.0462	.965	.946	.065(.051-.080; .042)	.966	.948	.620
MWs	118.224 (44, 000)	2.687	.0525	.962	.952	.061(.048-.075; .081)	.963	.942	.756
Mis	122.720 (52, 000)	2.360	.0527	.964	.961	.055(.042-.067; .249)	.964	.939	.895
MRs	136.522 (62, 000)	2.202	.0506	.962	.966	.052(.040-.063; .396)	.962	.933	1.00
Dwelling (S2)									
Unconstrained	105.654(36, .000)	2.935	.0393	.965	.946	.065(.051-.080; .038)	.966	.949	.620
MWs	111.256(44, .000)	2.529	.0419	.966	.957	.058(.045-.072; .150)	.967	.946	.759
Mis	115.971(52, .000)	2.230	.0420	.968	.966	.052(.051-.065; .372)	.968	.944	.899
MRs	145.777(62, .000)	2.351	.0524	.958	.962	.055(.051-.066; .240)	.958	.929	1.00
Unit (S2)									
Unconstrained	100.463(36, .000)	2.791	.0339	.968	.950	.063(.049-.078; .069)	.968	.951	.622
MWs	107.832(44, .000)	2.451	.0347	.968	.960	.057(.043-.070; .197)	.968	.948	.761
Mis	130.389(52, .000)	2.507	.0350	.961	.958	.058(.045-.070; .144)	.961	.937	.892
MRs	202.007(62, .000)	3.258	.0441	.930	.937	.071(.060-.082; .001)	.930	.902	1.00

χ^2= Chi-square; *df*= Degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; CI = Confidence interval; RMSEA = Root Mean Square Error of Approximation; (S_2) = Refined sample (n = 454); (S_3) = First random sample (n=227); (S_4) = Second random sample (n=227); Gender is grouped into males (n= 231) and females (n= 223); Age is categorized as those below 55 (n=293) and otherwise (n= 161); Marital status is grouped into married (n= 355) and otherwise (n= 99); Educational status is categorized as illiterate and those who read and write (n = 215) and otherwise (n= 239); Employment status is grouped as those in the employed workforce (n= 149) and otherwise (n= 305); Disease category is categorized as those with gastrointestinal conditions other than a neoplasm or neoplasms (n = 232) and otherwise (n= 222); Residence is classified as those who have urban (286) and rural (n= 168) residence ; Dwelling is sorted as those dwelling inside (n=314) and outside (n=140) Alexandria; Type of unit is grouped as between patients in "general" surgery units (n= 338) and those in "specialty" surgery departments (n = 116).
^ Two samples (S_3 & S_4)
MWs: Measurement weights
Mis: Measurement intercepts
MRs: Measurement residuals

Table 7: Nested *PaPSCS* model comparison for testing invariance across various patient groups

Models	Δ χ^2	χ_c^2 (*df*)	|Δ SRMR|	|Δ CFI|	|Δ RMSEA|	Invar.
Samples ¤						
Conf. Invar.	-------	-------	-------	-------	-------	√
F. M. Invar.	15.678 (N.)	26.12 (*8*)	0.0057 (N.)	.004 (N.)	.001 (N.)	√
F. S. Invar.	10.114 (N.)	26.12 (8)	0.0003 (N.)	.001 (N.)	.004 (N.)	√
F. R. Invar.	19.840 (N.)	29.59 (10)	0.0003 (N.)	.005 (N.)	.000 (N.)	√
Gender (S2)						
Con. Invar.	-------	-------	-------	-------	-------	√
F. M. Invar.	14.088 (N)	26.12 (*8*)	0.0039 (N.)	.003 (N.)	.002 (N.)	√
F. S. Invar.	3.008 (N.)	26.12 (8)	0.0001 (N.)	.002 (N.)	.006 (N.)	√
F. R. Invar.	56.475 (S)	29.59 (10)	0.0056 (N.)	.023 (S)	.013 (N.)	√
Age (S2)						
Conf. Invar	-------	-------	-------	-------	-------	√
F. M. Invar.	16.931(N.)	26.12 (*8*)	0.0144 (N.)	.005 (N.)	.000 (N.)	√
F. S. Invar.	7.149 (N.)	26.12 (8)	0.0000 (N.)	.000 (N.)	.005 (N.)	√
F. R. Invar.	39.692 (S)	29.59 (10)	0.0006 (N.)	.009 (N.)	.007 (N.)	√
Marital (S2)						
Conf. Invar.	-------	-------	-------	-------	-------	√
F. M. Invar.	5.395 (N.)	26.12 (*8*)	0.0021 (N.)	.001 (N.)	.007 (N.)	√
F. S. Invar.	10.124 (N.)	26.12 (8)	0.0002 (N.)	.001 (N.)	.003 (N.)	√
F. R. Invar.	44.661 (S)	29.59 (10)	0.0039 (N.)	.017 (N.)	.007 (N.)	√
Education (S2)						
Conf. Invar.	-------	-------	-------	-------	-------	√
F. M. Invar.	14.801 (N.)	26.12 (*8*)	0.0112 (N.)	.003 (N.)	.002 (N.)	√
F. S. Invar.	16.804 (N.)	26.12 (8)	0.0009 (N.)	.004 (N.)	.000 (N.)	√
F. R. Invar.	70.186 (S)	29.59 (10)	0.0224 (S)	.030 (S)	.015 (N.)	?!
Employment (S2)						
Conf. Invar.	-------	-------	-------	-------	-------	√
F. M. Invar.	8.266 (N.)	26.12 (*8*)	0.0116 (N.)	.000 (N.)	.005 (N.)	√
F. S. Invar.	3.175 (N.)	26.12 (8)	0.0000 (N.)	.002 (N.)	.007 (N.)	√
F. R. Invar.	23.067 (N.)	29.59 (10)	0.0031 (N.)	.006 (N.)	.004 (N.)	√

χ_c^2 = Critical χ^2 at .001 level of significance; *df*= Degrees of freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; Invar. = Invariance; S = Significant Change in model fit; N. = Nonsignificant change of model fit; (S_2) = refined sample (n = 454); (S_3) = First random sample (n=227); (S_4) = Second random sample (n=227); Gender is grouped into males (n= 231) and females (n= 223); Age is categorized as those below 55 (n=293) and otherwise (n= 161); Marital status is grouped into married (n= 355) and otherwise (n= 99); Educational status is categorized as illiterate and those who read and write (n = 215) and otherwise (n= 239); Employment status is grouped as those in the employed workforce (n= 149) and otherwise (n= 305); Disease category is categorized as those with gastrointestinal conditions or neoplasms (n = 232) and otherwise (n= 222); Residence is classified as those who have urban residence (286) and otherwise (n= 168); Dwelling is sorted as those dwelling inside Alexandria (n=314) and otherwise (140); Type of unit is grouped as between patients in "general" surgery units (n= 338) and those in "specialty" surgery departments (n = 116). Conf. Invar. : Configural invariance; F. M. Invar. : Full metric invariance; F. S. Invar. : Full scalar invariance F. R. Invar. : Full residual invariance. S_2: Refined sample (n_2 = 454); ¤ Two samples (S_3 & S_4). S_3: First randomly split sample sample (n_3 = 227); S_4: Second randomly split sample (n_4 = 227);

- |Δ CFI| > .020 is a criterion of significant change.
- |Δ RMSEA| > .015 is a criterion of significant change.
- |Δ SRMR| > .015 is a criterion of significant change.

√: Established invariance ?!: Questionable noninvariance because of mixed evidence.

Table 7: Continued

Models	Δ χ^2	χ_c^2 (*df*)	|Δ SRMR|	|Δ CFI|	|Δ RMSEA|	Invar.
Disease (S2)						
Conf. Invar.	-------	-------	-------	-------	-------	√
F. M. Invar.	16.691(N.)	26.12 (*8*)	0.0084 (N.)	.004 (N.)	.001 (N.)	√
F. S. Invar.	10.028 (N.)	26.12 (8)	0.0001 (N.)	.001 (N.)	.004 (N.)	√
F. R. Invar.	38.071 (S)	29.59 (10)	0.0042 (N.)	.014 (N.)	.004 (N.)	√
Residence (S2)						
Con. Invar.	-------	-------	-------	-------	-------	√
F. M. Invar.	13.664 (N.)	26.12 (*8*)	0.0063 (N.)	.003 (N.)	.004 (N.)	√
F. S. Invar.	4.496 (N)	26.12 (8)	0.0002 (N.)	.002 (N.)	.006 (N.)	√
F. R. Invar.	13.802 (N.)	29.59 (10)	0.0021 (N.)	.002 (N.)	.003 (N.)	√
Dwelling (S2)						
Conf. Invar	-------	-------	-------	-------	-------	√
F. M. Invar.	5.602 (N.)	26.12 (*8*)	0.0026 (N.)	.001 (N.)	.007 (N.)	√
F. S. Invar.	4.715 (N.)	26.12 (8)	0.0001 (N.)	.002 (N.)	.006 (N.)	√
F. R. Invar.	29.806 (S)	29.59 (10)	0.0104 (N.)	.010 (N.)	.003 (N.)	√
Unit (S2)						
Conf. Invar.	-------	-------	-------	-------	-------	√
F. M. Invar.	7.369(N.)	26.12 (*8*)	0.0008 (N.)	.000 (N.)	.006 (N.)	√
F. S. Invar.	22.557(N.)	26.12 (8)	0.0003 (N.)	.007 (N.)	.001 (N.)	√
F. R. Invar.	71.618 (S)	29.59 (10)	0.0091 (N.)	.029 (S)	.013 (N.)	?!

χ_c^2 = Critical χ^2 at .001 level of significance; *df*= Degrees of freedom; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; Invar. = Invariance; S = Significant Change in model fit; N. = Nonsignificant change of model fit; (S_2) = refined sample (n = 454); (S_3) = First random sample (n=227); (S_4) = Second random sample (n=227); Gender is grouped into males (n= 231) and females (n= 223); Age is categorized as those below 55 (n=293) and otherwise (n= 161); Marital status is grouped into married (n= 355) and otherwise (n= 99); Educational status is categorized as illiterate and those who read and write (n = 215) and otherwise (n= 239); Employment status is grouped as those in the employed workforce (n= 149) and otherwise (n= 305); Disease category is categorized as those with gastrointestinal conditions or neoplasms (n = 232) and otherwise (n= 222); Residence is classified as those who have urban residence (286) and otherwise (n= 168); Dwelling is sorted as those dwelling inside Alexandria (n=314) and otherwise (140); Type of unit is grouped as between patients in "general" surgery units (n= 338) and those in "specialty" surgery departments (n = 116). Conf. Invar. : Configural invariance; F. M. Invar. : Full metric invariance; F. S. Invar. : Full scalar invariance F. R. Invar. : Full residual invariance. S_2: Refined sample (n_2 = 454); ¤ Two samples (S_3 & S_4). S_3: First randomly split sample sample (n_3 = 227); S_4: Second randomly split sample (n_4 = 227);

- |Δ CFI| > .020 is a criterion of significant change.
- |Δ RMSEA| > .015 is a criterion of significant change.
- |Δ SRMR| > .015 is a criterion of significant change.

√: Established invariance ?!: Questionable noninvariance because of mixed evidence.

As regards eight *PaPSCS* items, (64.18%) of patients give a "CA" response; (9.28%) CA; (15.39%) AS; (1.73%) DS; (.72%) AG; (6.58%) CD; and (4.98%) DN (See table 8).

Table 8 Frequency and (%) of responses to adapted *PaPSCS* for the overall setting (n_2 = 454)

Response Item	CA		AG		AS		DS		DG		CD		DN	
	No.	(%)	No.	(%)	No.	(%)	No	(%)	No.	(%)	No.	(%)	No.	(%)
Q_1	263	(57.9)	64	(14.1)	93	(20.5)	7	(1.5)	2	(0.4)	22	(4.8)	3	(0.7)
Q_2	278	(61.2)	53	(11.7)	81	(17.8)	7	(1.5)	7	(1.5)	24	(5.3)	4	(0.9)
Q_3	264	(58.1)	32	(7)	72	(15.9)	5	(1.1)	2	(0.4)	27	(5.9)	52	(11.5)
Q_4	302	(66.5)	47	(10.4)	62	(13.7)	6	(1.3)	1	(0.2)	26	(5.7)	10	(2.2)
Q_5	268	(59.0)	38	(8.4)	59	(13.0)	15	(3.3)	3	(0.7)	47	(10.4)	24	(5.3)
Q_6	263	(57.9)	31	(6.8)	66	(14.5)	10	(2.2)	5	(1.1)	45	(9.9)	34	(7.5)
Q_7	297	(65.4)	37	(8.1)	64	(14.1)	4	(0.9)	4	(0.9)	25	(5.5)	27	(5.9)
Q_{11}	296	(65.2)	35	(7.7)	62	(13.7)	9	(2.0)	2	(0.4)	23	(5.1)	27	(5.9)
Total	2331	(64.18)	337	(9.28)	559	(15.39)	63	(1.73)	26	(.72)	239	(6.58)	181‹	(4.98)

CA: "Completely agree", "AG: Agree to a great extent", AS: "Somewhat agree", DS: "Somewhat disagree", DG: "Disagree to a large extent", CD: "Completely disagree", DN: "Do not Know".
Percentages on the last raw are calculated as: (Column total*100)/ (454*8)

PaPSCS gradient is gauged as "poor" for overall setting of aggregation (n_2= 454); "general" surgery level of aggregation (n_g = 338); "Specialty" surgery level of aggregation (n_s = 116), and individual units of aggregation (See table 9). On the individual patient level of aggregation 31.1% flaunt "Excellent" level; 19.6% "Mediocre"; 19.6% "Poor"; and 29.7% "Very Poor".

Table 9 *PaPSCS* mean, gradient and categorization of *PaPSC* at various levels of aggregation

Aggregation Level	Mean Scale Score	Maxi	Mini	Gradient	Category
Overall setting (n_2= 454)	28.0307	34.32	0.000	3.504	Poor
"General" Units (n_g = 338)	28.5484	34.32	0.000	3.569	Poor
"Specialty" Units (n_s = 116)	26.5224	34.32	5.68	3.315	Poor
Unit 1 (n_{u1} = 58)	28.4802	34.32	0.000	3.560	Poor
Unit 2 (n_{u2} = 58)	29.2307	34.32	5.68	3.654	Poor
Unit 3 (n_{u3} = 57)	26.5494	34.32	5.68	3.319	Poor
Unit 4 (n_{u4} = 55)	30.0639	34.32	5.68	3.758	Poor
Unit 5 (n_{u5} = 59)	26.4964	34.32	5.68	3.312	Poor
Unit 6 (n_{u6} = 55)	26.0536	34.32	0.000	3.257	Poor
Unit 7 (n_{u7} = 58)	28.9404	34.32	0.000	3.618	Poor
Unit 8 (n_{u8} = 54)	28.4651	34.32	2.64	3.558	Poor

- Maxi= Maximal scale score for a given level of aggregation
- Mini = Minimal scale score for a given level of aggregation
- Mean scale score at a given level of aggregation = ∑ scale score for all cases at a given level of aggregation divided by number of cases at the given level of aggregation
- Gradient = Mean scale score/Number of scale item

Patients admitted to "specialty" departments have a significantly inferior latent mean *PAPSCS* score than those admitted to "general" units. in other words, *PAPSCS* score is related to type of surgical inpatient setting. Latent mean differences across other sociodemographic, personal, and clinical patients' characteristics are not statistically significant; in other words, *PAPSCS* score is not associated with these attributes (See table 10).

Table 10 Adapted *PAPSCS* latent mean score comparisons across sociodemographic, personal, and clinical patients' characteristics

Variables	$\bar{X} \pm SD$	t value	df	Two-tailed sig.	Mean Difference	Standard Error of Difference	95 % C. I. of the Difference Lower	Upper
Gender								
Males (n_m= 231)	27.74 ±7.930	-.817	452	.414	-.58576	.71669	-1.9942	0.8227
Females (n_f= 223)	28.33 ±7.315							
Age								
16- < 55 (n_{16}= 293)	28.20 ±7.177	.650	452	.516	.48663	.74914	- .9856	2.0303
≥ 55 (n_{55}= 161)	27.72 ±8.409							
Marital Status								
Married (n_m= 355)	28.08 ±7.539	.284	452	.833	.24697	.86824	- 1.4593	0 .9533
Unmarried (n_u= 99)	27.84 ±7.990							
Education								
Ill and R & W (n_r= 215)	28.50 ± 7.70	1 .256	452	.210	.90016	.71686	- .50864	2.3090
≥ Primary (n_p= 239)	27.60 ± 7.56							
Employment								
Employed (n_e= 149)	28.48 ±7.184	.876	452	.382	.66805	.76296	- .83132	2.1674
Otherwise (n_o= 305)	27.81 ±7.843							
Residence								
Urban (n_u= 286)	28.32 ±7.301	1.057	452	.291	.78393	.74171	- .67371	2.2416
Rural (n_r= 168)	27.54 ±8.162							
Dwelling								
Inside Alex. (n_x= 314)	28.09 ±7.847	.267	452	.789	.20742	.77633	- 1.3182	1.7331
Outside Alex. (n_y= 140)	27.89 ±7.148							
Unit/Department								
General surg. (n_g= 338)	28.55 ±7.531	2.481	452	.013 *	2.2593	.81655	.42122	3.6306
Specialty surg. (n_s= 116)	26.52 ±7.753							
Diagnosis								
G.I.T. & Neo. (n_t= 232)	28.46 ±7.340	1.228	452	.220	.87962	.71609	- .52765	2.2869
Other diseases (n_d= 222)	27.58 ±7.916							

Alex.: Alexandria; C.I.: Confidence Interval; df: degrees of freedom; G.I.T & Neo.: Gastrointestinal tract diseases other than a neoplasm and neoplastic conditions; Ill and R & W: Illiterate and Read & write; Surg. : surgery; Two-tailed sig.: Two-tailed significance at .05 level.

Discussion

The present article recces *PaPSCS* as a measure explicitly focusing on evaluating *PaPSC*. *PaPSCS* interjects to both a comprehensive view of patients' experience of healthcare and an extra balanced approach to *PaPSC* measurement in healthcare settings [13]. A well-developed instrument scrupulously and rigorously translated, with stout reliability and robust validity, adapted and applied into another culture allows for international studies to compare results of assessing specific constructs across settings, languages, and cultures. Such endeavor facilitates utilization of existing instruments, building knowledge and transcultural generalizations in scientific efforts to impact global health [51].

The two-way translation process of *PaPSCS* is performed by qualified translators with excellent command of source and target languages as well as proficiency of healthcare concepts and terms. Cross-cultural research not uncommonly requires the translation of a tool from one linguistic/cultural context to another. Core to the process of validation is the assumption that the tool in the target language will measure the same construct in the same way it is measured in the source language [52]. In across-cultural research, this essential requirement is typically referred to as construct equivalence, that is defined as 'the degree to which a construct measured by a questionnaire in one cultural or linguistic group is comparable to the construct measured by the same test in another cultural or linguistic group [53]. Translation followed by back-translation is a common procedure used to assess the understandability of a source text and diminish threats to construct equivalence prior to finalizing the target language text [54]. Construct equivalence begins with item equivalence [55, 56]. Confirmation of construct equivalence is usually judged post translation by the statistical criteria of reliability, construct validity and measurement equivalence or invar. across groups [5760].

As regards sociodemographic and personal patients' attributes, there is an abundant correspondence between study findings and earlier research conducted in 2019 in the same establishment by Abdel-Aziz [61]. A striking difference, though, is related to the rate of unemployment, being 10.4% in Abdel-Aziz's 2019 study compared to a 28.3% in the present one. This overextension of reported unemployment could be connected to the turmoil and challenges of Covid-19 pandemic followed by the Russo-Ukrainian conflict with disproportionate impact on the poor and working-class [62, 63]. More than one third (34.8%) of study participants are illiterate. Presently, the rate of illiteracy in Egypt is approximately 34.2% [64]. Egypt illiteracy rates stand at 14.4% for males, 26% for females [65]. Then the high proportion of patients with no or low educational attainment is an impediment if the study is contemplated to be replicated on a broader scale since illiteracy compels data collection through an interviewer administered questionnaire rather than a self-administered one. High illiteracy rate is a constrictive ingredient for future more extensive research efforts. Precisely half of study population is afflicted with gastrointestinal condition -other than a neoplasm- or a neoplastic one. Gastrointestinal conditions are one of the most prevalent ailments and necessitates around 25% of all surgical operations [66, 67]. Adjacently neoplasms are also a leading cause of morbidity and mortality worldwide and numerous cases require surgical therapy [68-70].

The present study seals a gap concerning the translation, adaptation, validation, and application of *PaPSCS* in an Egyptian context. In a Western culture prior work with the model gave a demonstration of the soundness of using the eleven-itemed *PaPSCS*.

In the present study PS indicated the obliteration of three questionnaire items, viz. Q_8, Q_9, & Q_{10}. Statistical logic behind their elimination can be reinforced by theoretic rationale, experiential judgement, and pragmatic thought for purposes of scale purification [71], parsimony [72], enhancement of psychometric properties [73, 74] and fostering the scale rigor [75]. Multi-item reflective scale-purification process is widespread in empirical research and is carried out to improve the measurement properties of newly developed or already existing scales [76,77]. Overtly as well as covertly, Q_8, Q_9 & Q_{10} are complex, ambiguous, and vague "manifest" variables. These "reference" variables are not specific interrogations that may motivate decisive clearcut responses. Rather they have the potential to deflect concentration, divert attention, and incite dissonant, ambivalent, or equivocal states of the mind. These three questions are not only double-barreled they are also multi-barreled. Q_8 simultaneously probes three different services (turfs) plus countless unspecified services (territories), namely, ward, x-ray, physiotherapy. Afterwards Q_8 concludes with the open ended "etc." which adds to the mysterious, enigmatic, and shadowy complexion of the inquiry posed by Q_8. Indisputably, "et cetera" is not well serving -even counterproductive- in this script and should be removed or substituted by exact well-specified inquiry or inquiries I needed. Therefore, Q_8 is an unclear multi-barreled question that combines several points of issues in one survey item. Segmenting Q_8 would not solve the problem as dedicating a question to each service (ward, radiology, physiotherapy, etc.) would result in elongating the questionnaire by quite a lot of items that would rather escalate the measure of time, effort and finances needed to finalize the questioning process. Moreover, stretching the instrument may detract responders' attention away from priority demands and diminish tools psychometric properties. In any case the content and construct validity of the improved scale must be scrutinized. Analogously Q_9 disregards or discounts the complex multidisciplinary nature of modern healthcare. Q_9 is articulated in the single pronoun ["who was responsible"] and is assumptively loaded and burdened by the postulation that healthcare is the responsibility of one individual. In each healthcare setting the provision of services is not the responsibility of a single man or woman, rather it is the responsibility of numerous persons, entities, or constituencies. Rather than being a single-handed endeavor, modern healthcare is a cooperative effort among clinical and non-clinical staff at professional, paraprofessional and non-professional levels, from various specialties at various departments/units and sundry hierarchical tiers of care even if care is delivered in the same hospital there are many constituents (e.g., radiology, laboratory, clinical pathology departments, and anesthesiology) engaged and involved with the responsibility of providing care . Care in modern healthcare organizations is usually a multipart process with responsibility falling under a myriad of departments [20]. In other words, utterance of Q_9 in the single pronoun format is far from being precise or meticulous as it discounts the collective nature of modern healthcare.

Additionally, Q_9 is loaded by the false assumption that healthcare provision is the responsibility of one human person. More attention is deserved to heed the realistic collective, multi-inter-& trans-disciplinary nature of healthcare provision by manifold compound and complex entities of natural as well as judicial persons. Worth mentioning is the point that articulating Q_9 in the plural pronoun is not going to solve the problem since it would be consequentially transformed into a double or multibarreled query. In a similar vein, $Q_{10}$is phrased nebulously since it is concerned with an unstipulated unspecified alleged awry act ["Whenever they felt that something was amiss"]. Q_{10} is vague and indistinct as regards timing, nature of the purported erroneous "something". Moreover, staff as worded in Q_9 is indistinct, blurred and doubt-stirring as there are myriad staff involved in the process of providing healthcare services. In this respect Q_{10} can also be pondered complex multi-barreled question that needs to be reworded or broken down into a number of questions each of which is designed to inquire about a distinct "thing". Cloudy questions need to be removed or reformulated to distinctively depict a specific situation or be eliminated altogether. Eliminating ambiguous items is consonant with the melody of attention economics and management through filtering out of unimportant or irrelevant queries [78]. It cannot be overemphasized that language patterns that hide or confuse issues can create cognitive dissonance remarkably so in patients with no, low, and very low educational attainment! Awkwardly formatted questions can result in fallacious responses. False knowledge is more dangerous than ignorance [79,80]. Issues of accuracy and relevance have a bearing on the content and construct validity and adaptation of an instrument. $Q_{8,}$ Q_9 & Q_{10} can generate perplexity in the minds of respondents due to multiple collaborators involved in the delivery of their care. Therefore Q_8, Q_9 & Q_{10}, in their present formats, are puzzling, mystified, mystifying, baffling, tricky or even misleading and such questions need to be avoided. Complex, loaded, double- and multi-barreled questions are not fit for survey purposes and need to be reworded, reformulated, or done without. However, future empirical research should be directed to examine the tenability (or lack thereof) of dropping items Q_8, Q_9, Q_{10} and its impact on content and construct validity of *PPSCS* in Egyptian and non-Egyptian settings. Multi-item scales must be carefully developed such as each constituent item is meticulously selected to capture a specific element of the construct under scrutiny [81]. There are three distinguishable qualities of scale purification, namely internal item consistency, external item consistency, and judgmental item quality [82]. The latter is assessed through judicious critical analysis, while the former two merits are assessed statistically. Statistical criteria use quantitative data, with the purpose of comparing the results of a calculation to a cut-off value or conducting an inferential test [83]. On the other hand, judgmental criteria are grounded on a qualitative assessment of the appropriateness of textual data, such as the wording of an item and their application relies on methodological, theoretical, and practical domain knowledge [75]. Such judgmental criteria relate to what is traditionally discoursed as content validity [84]. A number of scholars have raised some concerns over lack of consistency and guidance regarding item retention/rejection [85]. Besides, judgmental equivalents are identified for several criteria that were customarily statistically assessed. During the present study scale purification took place according to statistical and judgmental criteria. Despite their different qualities, statistical procedures and judgmental theoretical reasoning are complementary [86]. They provide two balancing arms that are reciprocally supportive rather than mutually exclusive. Statistical criteria assess quantitative data using standardized techniques, whereas judgmental criteria build on the intellectual interpretation of qualitative data [76].

After establishing that the dataset satisfies the requirements for FA, the study proceeded to explore a viable factorial structure of *PAPSCS*. EFA pointed to the one-factor construct with two Ercos. that explains > 60% of variance. TEV of 60% is not greatly different from results recorded by Monaca et al. (2020) [13]. To validate the respecified model, empirical replication in another sample is particularly important [87]. Adopted model configuration is affirmed by executing CFA on another fresh sample (S_4) so as to guard against capitalizing on chance or falling prey to spurious sample-specific associations in the exploratory sample (S_3). Measures that are reliable, valid and can be used across populations and cultures are indispensable to measurement matters, nonetheless the development of new measures is an expensive, effortful, and timeconsuming process. An array of existing measures can provide a cost-effective alternative, but to take this expedient step with confidence, researchers must ensure that the existing measure is appropriate for the newfangled study. CFA is one way to do so.

The adapted model has an outstanding internal consistency reliability and convergent validity. $\infty \geq .8$ is very good, indicating that the items are measuring the same construct. The minimum acceptable value for ∞ is 0.70; below this value the internal consistency and homogeneity is low. The maximum expected functional ∞ value is 0.90. ∞ values > .9 signify potential item redundancy or duplication. If ∞ is too high, it may suggest that some items are superfluous as they are testing the same question but in a different guise. *PaPSCS* (α) in Monaca's et al. (2020) study [13] was .95, and one of its IICs was > .81, values that support present study claim that some scale items may need elimination or modifications (see next paragraph). Similarly, a Gutt of .80 or greater is generally considered a good sign of internal consistency reliability [88, 89]. All standardized □s are positive and range between 0.67 and 0.79 which is not vastly different from those reported by Monaca et al. (2020) [13].

Ercos. are justifiable statistically as well as on substantial theoretic basis. Ercos. can be the result of items (Q_1 & Q_2) and (Q_5 & Q_6) occurring consecutively with each pair having similar meaning, akin wording, and query about closely related and overlapping themes. Q_1 and Q_2 use the words "safe" and "safety" correspondingly. Also, the "feeling" in Q_1 could be mixed up with "impression" as used in Q_2. Frequently there is intricacy characterizing a feeling from an impression. Distinguishing between a "feeling" and an "impression" regularly required a considerable measure of introspection that is not uncommonly illusive. Illusion is linked to erroneous sensations, perceptions, and memories [90, 91]. Comparably both Q_5 and Q_6 inquire about "information flow" theme. Q_5 is confined to nurses and Q_6 includes nurses as it alludes to staff in general [92]. It is professed that Ercos. are possible among items using similar wordings or appearing sequentially or near to each other on the questionnaire [93]. Along similar lines it is acknowledged that measurement errors (MEs) can be caused by method effects in self-reported measures. On the other hand, MEs can be the result of similar meaning or close to the meanings of words and phrases. Allowing MEs to correlate based on specification search counsel improved model fit in an initial exploratory sample (S_3) well as in cross-validation confirmatory sample (S_4), a finding that points toward robustness of parameter estimates, especially that Ercos. are significant in magnitude. Hermida (2015) [94] takes the position that Ercos. are better avoided and acknowledges that oftentimes such correlations are preordained since solemnly taking the side of absolute unconditional doing without Ercos. can vastly compromise model fit along with the possibility for model misspecification as an adverse effect of a fundamentalist stance against Ercos. specially, when they are of a statistically significant magnitude such as the case in the present study. Ercos. noticeably enhanced *PAPSCS* model fit. Based on apt statistical and substantial deliberations Ercos. are acceptable and indeed necessary, justified and conservatively used. In the present study context, Ercos. are justified and regarded as benign parameters, basically mopping up some unsolicited residual variance. This is especially rightful as a bi-or multi-dimensional structure is ruled out both on statistical and theoretical basis. Ercos. are the more anticipated due to the unidimensional structure of *PaPSCS*. Two Ercos. of the adapted model do not disguise a masked or buried latent variable. However, a caveat in this junction is that significant Ercos. could be pointers towards a measurement problem indicating a need to reword, rephrase or remove one item out of each pair {Q_1, Q_2}, {Q_5 & Q_6}as $Q_{1\ \text{and}}$ Q_5 are candidates for further review. Q_1 can be chosen for revision (rephrasing or removal) as the phrase "safe hands" is metaphoric and hyphenated. Underscoring the figurative character of the item. This figurative (metaphoric) expression may not be the finest wording of the questionnaire item. Figurative language in Q_1 can be contrasted with literal language in Q_2, which articulates the inquiry explicitly rather than by reference to metaphors. A metaphor, by definition, departs from a literal use of the word. Thus, in its present state Q_1 could be unclear, puzzling, perplexing, baffling, mystifying, bewildering, befuddling, distracting, confounding or even confusing to many if not all respondents. This bamboozling is even more accentuated taken the prevalent low educational attainment level of respondents. Moreover, there is an overlap, overlay, intersection, correspondence, similarity, and commonality between Q_1 & Q_2. It is not a coincidence that Q_1 has the lowest –marginally acceptable- item reliability or SMC. In a similar way it is patent that Q_5 & Q_6 are overlapping where the latter embraces the former whether in targeted personnel or domain of inquiry. Ercos. occur in the situation that manifest variables have not been precisely (specifically/clearly) defined/stated or not measured straightforwardly, and so responses can be afflicted [95]. Again, it is not coincidental that Q_5 has – together with Q_1- the lowest - though marginally acceptable- item reliability and is a possible candidate for forthcoming adjustment. Grounding on the forecited considerations the author postulates that Q_1 and Q_5 are redundant, and their ejection or amendment can improve the construct validity of *PaPSCS* without necessarily detracting from its content validity. The proposed elimination/modification is supposed to augment the psychometric properties of a more parsimonious nonredundant measure that can do without any Ercos. Future empirical research is called for to assert or falsify this conjecture. During cross-cultural scale adaptation some items can be candidates of mandated inevitable exodus due to fastidious contingencies of setting and populace. Detecting redundant items, while adhering to foundational conceptualizations, is closely tied to man's need for profound knowledge and interminable necessity of constructing more precise, robust, parsimonious, and utile tools.

For an instrument to be used outside its original setting (i.e., source language and cultural context), across-cultural validation, translation and adaptation are needed [51]. Crosscultural adaptation is a process that looks at both languages (i.e., translation) and cultural acclimatization (i.e., culturally relevant content) for use in another cultural milieu. An increasing body of literature describes achieving effective cross-cultural adaptation by following multiple validation steps. The most common of these steps include content validation utilizing expert content feedback, translation, and back-translation; and construct evaluation using FA [51, 96-98]. Through the rigorous use of these methods, a culturally equivalent instrument can be produced [30]. Cross-cultural adaptation as an approach taken to employ existing instruments in other cultural, language or geographic contexts has manifold advantages to adapting an existing instrument, including cost, time and effort savings compared to new tool development creating a new instrument [96]. The adapted model has adequate global and local fit indices and adequate convergent validity and □s. All indicators are of considerable magnitude and reliability as revealed by SMCs ranging from 4.5 to .62. The fitted model proves to be tau inequivalent. Tauinequivalence entails the assignment of differential item weighting according to respective □s. Various indicators are not equally appreciated (weighted) by a patient. Prospective research should not only reproduce the general pattern of *PaPSCS* construct (in its prototype or adapted form) but also examine causes lurking behind the differential score weights assigned to construct indicators. Such investigations further refine the validity and diagnostic utility of the instrument throughout SC improvement efforts. A better understanding of the within and beyond-person and setting SC phenomenology and dynamics can lead to improved diagnostics, intervention approaches, and safety management strategies. Therefore, tau-inequivalence points to possible need of qualitative research methods (QRMs) in tandem with quantitative research methodologies (QQRMs). QRMs incorporate unstructured interview schedules (UISs), naturalistic observation methods (NOMs), participant observation methods (POMs) and experience sampling methodologies. UISs allow respondents to dialog in considerable depth, picking their own words. UISs generate a wealth of qualitative data that aids the researcher develop a real and dynamic sense of a patient's appreciation of a particular inpatient situation. NOMs involve observing patients in their routine in-hospital environment, focusing on collecting, evaluating, and describing non-numerical data. Analogously POMs help an investigator joining a group of people with a shared identity to gain a deeper understanding and knowledge of the actors, interactions, scenes, and events taking place at the researched facility. QRMs is especially needed to grasp particular features and underlying mechanisms of tau-inequivalence within the stream, traces and shades of safetythreatening incidents thus complementing areas that QQRMs can cover only with difficulty, if ever. QRMs can capture and note fine nuances and tinges related to safety concerns thus provide a fresh perspective towards a deeper understanding and profound knowledge of what is cropping up regarding Psaf issues. Differentiations and variance of approaches and perspectives are part and parcel of acquiring deeper comprehension [79]. Ecological study methods (ESMs) can pinpoint manifest variables prioritized for improvement efforts. During ESMs patients are asked to provide self-reports of their perceptions, emotions, or environment, at diverse moments and distinct instances through their impatient experience. ESMs investigation strategies take account of minimizing memory biases, hypothesis testing at the between- and within-person levels and maximizing population and ecological validities. ESMs – among other QRMs- are suggested by the author as appropriate for studying the minutes of daily inpatient lives in surgical wards and hence greater and sharper levels of generalizability to genuine innumerable and ofttimes unexpected situations and unimagined scenarios. ESMs can assure how well do the findings translate from the highly simplified and controlled domain of the structured questionnaire where the questionee is merely exposed to selected predesigned queries delivered by a questioner, to the chaotic and frequently ungovernable and uncontrollable challenging clutter of real-life setups where all sorts of inducements and provocations possibly coexist and perhaps conflict [79]. In organizational psychology research, culture is described by both QQRMs and QRM [18]. In a related vein a mixedmethod case study (survey, interview and document analysis) can be employed [39]. Moving forward, besides comprehensive/general intervention programs, it is better and important to tailor targeted interventions to the unique individualized patient characteristics. The author believes that this customization (personalization) is important to prevaricate oversimplification as equally weighted □s does not fit all. A Plasteline study on healthcare safety advocates the necessity of a customized patient-centered approach that builds on existing strengths and targets areas of improvement opportunities to optimize SC [99].

Tau-inequivalence points to the direction of a patient centered safety paradigm – where safety practices are justly tailored for each customer needs and requirements [100,101]. Proper comparison of a construct between groups depends primarily on ensuring equivalence/invariance of meaning of the construct across compared groups. In other words, it is imperative to assess the invar. of the construct across various groups via multigroup invar. testing to assure robust construct scores comparability across juxtaposed groups. Invar. assesses the psychometric equivalence of a construct across groups and demonstrates that a construct has the same meaning to contrasted groups. In the present study compared groups are categorized according to sociodemographic, personal, and clinical characteristics. Adapted *PaPSCS* fulfills four successive levels of invar. explicitly, model form (pattern/structural/configural), weak (metric/ □s), strong (scalar/measurement intercepts) and strict (residual invar. /Invariant uniqueness). Full model invar. is established across all levels and categorizations. Configural invar. points to equivalence of overall structure of the measurement model across groups. In other words, *PaPSCS* is reproducible, replicable, and spatiotemporally stable across groups from a structural perspective as far as its general pattern (configuration) is concerned. Metric invar. denotes that □s are equivalent across groups. Scalar invar. signifies equivalence of item intercepts for metric invariant items. In other words, scalar invar. means that mean differences in the latent construct capture all mean differences in the shared variance of the items. Residual Invar. (equivalence of residuals of metric and scalar invariant items) means that the sum of specific variance (variance of the item that is not shared with the factor) and error variance (measurement error) is similar across groups. Although a required component for full factorial Invar. [102]; testing for residual Invar. is not a prerequisite for testing mean differences because the residuals are not part of the latent factor, so Invar. of the item residuals is inconsequential to interpretation of latent mean differences [103]. On this account, many researchers omit testing for strict invar. However, strict invar is reported as a finale of Invar. stepladder [87].

All tests of nested models for gauging multigroup Invar. are clearcut and unequivocal apart from some tests of full residual Invar. as $\Delta \chi^2$ is significant antithetical to some AFIs that are insignificant (See table 7). Classically, Invar. is evaluated using a single criterion, significance $\Delta \chi^2$ for two nested models [104-106]. Recently, however, numerous investigators have shifted from a focus on absolute fit in terms of χ^2 to a focus on AFIs because in large samples, χ^2 is overly sensitive to small, trivial deviations from a "perfect" model [107-110]. Reporting AFIs is associated with higher levels of achieved Invar. [87]. The number of participants included in tests of Invar. is known to affect the power of the tests, and hence the test's sensitivity to detecting differences in absolute model fit. Because χ^2 increases in power to reject the null hypothesis as the sample size increases, having a larger total sample may lead to over-rejection of Invar. tests if the change in χ^2 is the only criterion used to evaluate fit. Changes in AFIs is less sensitive to sample size [108], but some evidence suggests that measures of absolute model fit (like the RMSEA) over-reject correct models in small samples ($n < 100$) [111]. As it becomes common practice to use AFIs as fit criteria, sample size (assuming adequate power) may be less important to the level of Invar. achieved as AFIs are less sensitive to sample size.

Therefore, use of the χ^2 difference test as the only index of model fit would be associated with lower levels of Invar.; and use of AFIs would be associated with higher levels of measurement Invar. Then again, there is increased use of ΔAFIs instead of, or as a supplement to, $\Delta\chi^2$ [87].

All in all, full Invar. suggests that *PaPSC* construct has a comparable structure and meaning (conceptual frame of reference) to various groups and on different measurement occasions in the same group. Full scalar Invar. amply signifies the feasibility of unbiased across groups intercept (mean) comparison. Therefore, *PaPSC* construct can be meaningfully contrasted and construed across groups or across time. Methodologists suggest that comparing means across groups or time using a noninvariant model is akin to comparing "apples to oranges" or any sort of dissimilar objects. Hence the necessity of establishing multigroup Invar. At least pending the scalar level as a priori to testing mean differences or differential relations of the construct across groups (e.g., males & females; literate & illiterate, etc.) [87].

PaPSCS reflects perceptions from a patients' standpoint. In the present study, concerning eight modified *PaPSCS* items, (64.18%) of patients give a CA response; (9.28%) AG; (15.39%) AS. Monaca et al., 2020 study [13] informed that (45.05%) strongly agree on eleven *PaPSCS* items; and (30.11%) somewhat agree on the eleven items. In other words, magnitude of overall item agreement is (88.85%) in the present study (table 8) compared to (75.16%). Overall agreement is apparently lower in Monaca et al., 2020 study conducted in the more developed Western hemisphere, where data were collected from June to December 2015 via an online patient survey conducted routinely by a health insurer [13]. In complementary modus, the present study demonstrates that (9.03%) disagreed to an extent or another on all *PaPSCS* items compared to (11.62%) in Monaca et al.'s 2020 survey [13]. These figures of disagreement are somewhat comparable, even apparently greater in the Western study. In the present study *PaPSC* is categorized as poor at overall setting, "general" surgery, "Specialty" surgery, and individual departments and units (table 9). A former study conducted to investigate PSC in the hospitals of Northeast Libya documented that the current state of PSC in Libyan hospitals is very weak and there is an immense need for improvement of sub-optimal safety perceptions [112]. Another previous study that explored PSC in a Northern Nigerian Teaching Hospital established that PSC was poor [113]. A third preceding study concluded that PSC in Slovenian out-of-hours primary care clinics is suboptimal and needs improvement [114]. An ex-study in Saudi Arabia revealed inferior perceptions of PSC with a mean score of 3.9 out of 5 [39].

The deficiency of *PaPSC* could be attributed to increased patient aspirations and expectations [115], or the evolving complexity in healthcare systems, and consequent rise of patient harm in health care facilities [116]. Unremittingly rising patient expectation needs to be managed adequately in order to improve clinical and non-clinical outcomes and decrease liability [115]. Understanding *PaPSC* is a step towards apprehending patients' expectations and enhancing initiatives striving to enhancing their contentment levels from a safety point of view.

Menace to Psaf comes from medication errors. Estimating the prevalence of medication errors is arduous due to the varying definitions and classification systems employed. Rates can vary depending on the denominator used (e.g., patient, prescription, or a specific medication). The challenge is compounded by variations in health care system organization and the availability and use of incident reporting systems [117-119]. Healthcare-associated infections is another menace to Psaf that befall in seven and ten out of every one-hundred hospitalized patients in high-income countries and low- and middle-income countries in that order [120]. Unsafe surgical care procedures instigate complications in up to onequarter of patients. Almost seven million surgical patients suffer significant complications annually, one million of whom die during or immediately following surgery [116]. Unsafe injection practices in healthcare localities can transmit infections, including hepatitis B and C and HIV, and pose direct hazard to patients and healthcare workers and account for a burden of harm estimated at 9.2 million Disability Adjusted Life Years (DALYs) [121]. Diagnostic errors occur in around five percent of adults in outpatient settings, more than half of which have the potential to set off severe harm. Most persons will suffer a diagnostic error in their lifetime [122]. Unsafe transfusion practices imperil patients to the jeopardy of adverse transfusion reactions and the transmission of infections [123]. Awe-inspiring incidence rates of adverse transfusion reactions are reported by numerous hemovigilance systems [124]. Radiation errors engage overexposure to radiation and cases of wrongpatient and wrong-site identification [125]. An analysis of three decades of published data on safety in radiotherapy counts that the overall incidence of errors is around 15 per 10,000 treatment courses [126]. Sepsis is not uncommonly antibiotic resistant and often fails to be timely diagnosed can swiftly complicate into generalized septicemia and lead to deteriorating clinical conditions and death. Sepsis affects an estimated thirty-one million people worldwide and bring about o'er five million deaths annually [127]. Venous thromboembolism is one of the most common and preventable causes of patient mischief, contributive to one-third of the complications attributable to hospitalization. Annually, there are an estimated 3.9 million cases in high-income countries and six million cases in low- and middle-income countries [128].

Measuring *PaPSC* at tiered planes of aggregation is a requisite stride in the road of monitoring, assessing, evaluating, controlling, streamlining, and directing safety management energies at successive hierarchical organizational echelons starting from patient centered management, thru unit/department management until overall organization and healthcare system levels. This multi-tier monitoring typology supports the need for speedy and high-performance safety loads responses. It maintains an organizational safety network that can mitigate budding safety threats and prevent care snafues. Multi-tiered sensors and feedback loops maintains incessant visibility, unremitting perceptibility and unrelenting luminescence indispensable for assailing healthcare blind spots and combating safety violations and offences.

The statistically significant intercept (mean latent factor score) difference between *PaPSC* in "general" units vs. "specialty" departments could be due to the latter's riskier and more challenging and demanding nature. Specialty surgeries are contemplated as scarier, more "difficult", trying, problematic and need lengthier training periods than general surgery [129]. In every case raised patient expectations should not be left out of the logger. Expectations, with reference to healthcare, allude to an anticipation or a belief about what is to be encountered in a consultation or an encounter in the healthcare system. It is the mental picture that patients will have of the process of interaction with the system [130].

Managing patient expectations can improve patient-provider relations and *PaPSC* and can also save an organization from potential financial debits (e.g., lawsuits) and reputation losses (e.g., media campaigns).

PaPSC is a key aspect of patient-centered care and is tied to the patient experience and health outcomes. Healthcare professionals can help improving *PaPSC* through patientcentered care strategies and incorporating the patient as part of the care team. Properly engaging patients, driving up patient satisfaction, and listening to patients are critical to supporting *PaPSC* initiatives. Clinicians and administrators alike must assure that patients and their significant others are knowledgeable about their healthcare to assist prevention of medical errors from falling through the cracks [131]. It is well known that healthcare provision in surgical departments and units, is tremendously multifaceted and is determined by technical, social, moral, contextual, ethical, and legal aspects. These factors continually shape, create, and recreate the specifics and minutiae of any proposed intervention. Taking care of a setting's environment in its wider conception plainly, physical, chemical, biological, psychological, cultural, economic, financial, legal, and political facades can ensure prevention of adverse Psaf events and enhance *PaPSC*. Therefore, it is equally important for healthcare managers to take advantage of *PaPSCS* model of SC in assessing their Psaf enhancement initiatives. *PaPSC* can be enriched by fostering cleanliness, proper lightening, quiet, rest, recreation, communication, coordination, and proper record keeping and supplying an adequate number of well-trained and knowledgeable staff [132-134].

Building a positive patient experience is about more than simply making the patient happy. Ensuring Psaf and that the patient does not experience preventable harms are equally important to enhance patient experience. *PaPSC* is a *sine quo non* for a positive patient experience. *PaPSC* go hand in hand with patient satisfaction and quality of care [115,131]. In general, safety in healthcare has two dimensions: the tangible and technical part as well as the intangible and personal art. Much as the former is important, as man continues to develop the technical currency of healthcare system and infrastructure, the incorporeal domain is just as critical. What patients think of their experience with the healthcare system must matter to the healthcare planners, managers, and policy makers because this experience, as much as the technical quality of care, will determine how people utilize the system and how they benefit from it. Somehow, technological innovations in medicine seem to have shifted some of the physicians' attention away from the subtle art of personal patient care [135,136]. Exploring *PaPSC* is crucial for ensuring delivery of healthcare of the highest quality that conforms with specifications and meets – even exceeds – ever spiraling patient expectations. Therefore, judicious application of *PaPSCS* can achieve a satisfactory balance between patient expectations, providers' obligations, and priorities set by healthcare planners and policymakers [115].

A 4.98% of eight *PaPSCS* items "do not know response" is not miniscule amount. Patients' obliviousness is more dangerous than mere disagreement. Unawareness and lack of knowledge are signs of disempowerment [61]. Patient witlessness points to the need of patient education, information, and communication. Adequate information must be shared with patients, and this would include clinical, managerial, and prognostic information which are key to promoting the concept of *PaPSC*. Psaf guidelines do emphasize patient empowerment (PE) as a principal aspect of care [134] . PE is one of the ways recommended to enhance, maintain, or even restore patients' trust, confidence, and *PaPSC* [133,137]. One of the resolutions of WHO's is to promote Psaf by increasing patients' understanding, awareness, engagement, and empowerment, so as to work towards safer cultures of the healthcare delivery system [116,138].

"Luck runs out, but safety is good for life." "Safety isn't expensive, it's priceless.", are some quotes designed and propagated to improve SC in organizations. Safety quotes are a great way to communicate key safety concepts clearly and make sure healthcare team is always on the lookout for potential safety issues . Leadership is indispensable to advance SC and empower patients and healthcare teams to make safety a priority in our healthcare systems [139].

Conclusion

Study findings have the potential to inform policy and practice related to *PaPSC* in surgical units and departments in AMUH. The managerial and administrative implications that flow from validation of *PAPSCS* model are forthright. *PaPSCS* can be employed to provide the organization with a baseline for monitoring, assessment, evaluation, and development initiatives. *PaPSCS* provides decision-makers with useful information identifying critical areas to address continuous safety improvement efforts. Creating robust *PaPSC* can be borne as a quality strategy. The dimension of safety is one of the cornerstones of quality of care; and there is a lasting interplay between PSC and quality of healthcare delivery systems. *PaPSC* is a principal ingredient and a condition of quality. Then, a safety glitch is also a quality setback. *PaPSC* is not a solo technique that can be exercised to better quality, but rather a field encompassing several multi-level initiatives and possible interventions that can underwrite amendment, improvement and upgrading. These initiatives can be centered on the adapted *PaPSCS* and pondered as cogs operated in an overall healthcare system to expedite safer care. SC is acknowledged as the attitudes, shared values, beliefs, norms, practices, policies, procedures, regulations, guidelines, protocols, and behaviors about safety issues in everyday practice. According to study findings there is ample room for improvement. Interventions construed to augment *PaPSC* include four keystone zones of action coupled with unremitting monitoring and evaluation, namely, (i) countrywide general safety policies and plans; (ii) AEs reporting systems; (iii) patient empowerment; and (iv) safety- oriented context sensitive training for the healthcare personnel. Bearing in mind the complex and dynamic character of *PaPSC*, it is not unexpected that patient-centered, unit/department, organizational and system level safety interventions are indispensable, including professional, paraprofessional and nonprofessional personnel training and education, clinical governance systems, safety protocols and standards, and patient, family and significant others involvement, engagement, and empowerment strategies. Organizational policy should seek to ensure that consumers have access to sufficient information to make informed choices. Recurrently SC is embedded in collective and social decision-making processes and contexts. Apropos *PaPSC* institutions should start out by defining, communicating, and conferring their safety vision, mission, and values and formulate strategies, policies, and procedures to match their values, and set an action plan specifically designed to enhancement of *PaPSC*, then monitor, assess, and evaluate achievements with predetermined objectives and landmarks.

PAPSCS can be directed towards improving actions and behaviors pertaining to deficient *PAPSCS* items. Augmenting positive behaviors can change cognitions, intentions, attitudes, norms and eventually SC. Training programs are to be tailored to increase providers' actual and perceived capabilities and willingness to foster a more elaborate *PaPSC* in their workplaces. Changes in these features should produce desired changes in behavioral intentions and, given sufficient control over behavioral manifest items depicted in the *PAPSCS*. Involving healthcare providers (especially physicians and nurses) in the execution, analysis, and interpretation of *PAPSCS* surveys can enhance their actual and perceived control, attitudes and beliefs, especially salient ones i.e., those readily accessible in memory. *PAPSCS* surveys are assiduously looked-for as a diagnostic tool to steer and guide continuous SC improvement efforts. The adapted eight-itemed *PAPSCS* directly highlights items readily accessible to behavioral intervention efforts. A reliable and valid *PaPSCS* has the potential to bequeath snapshots providing deeper insights into the underlying latent factor and its manifest indicators. Once candidate items have been selected for improvement change efforts, this is where the management creativity and experience come into foreplay to develop apt interventions such as persuasive communications (pamphlets, fliers), face to face discussions, observational learning and modeling, lecturing, and undergraduate or postgraduate curriculum amendments. It is selfevident that requisite resources (human and non-human) should be in place. When quantitatively selecting and prioritizing targets for behavioral intervention the mean levels and relative weights of manifest variables are of tremendous import. Firstly, computing mean levels of manifest variables pinpoint how much room is there for change in a specified indicator i.e., items with lower means have a greater potential to defer diminishing economic returns. Secondly, computing □s can give hand in determining the "vital few and the essential many" interventions. Targeting relatively weigher items is expected to produce weightier and more probable (or reliable) improvements in *PAPSC*.

The higher an indicator's reliability (SMC) the loftier the expected returns. These principles correspond with the principles of efficiency, parsimony, least effort and pursuing regression paths of least resistance. A relatively frail regression path can fittingly point at marginal or trivial yield vis-a-vis *PAPS.* In that case, even if it were addressed, it would have little value-adding potential. Therefore, it can be concluded that it is reasonable to principally target an intervention at any one of the three major indicators (premier amount of variance explained) in the model so long as there is feasible room for change. Over again the apposite balance must be sought. Estimates of relative weights of manifest variables (□s) even if typically, and customarily interpreted as corresponding to the comparative importance of an indicator, may be influenced by dynamics that may have little to do with their relative importance. Notably, □s are affected by error variance of assessing indicators. Low variability in the responses of an indicator could render this variable less correlated with the latent variable and would thus receive low regression coefficient and even lower SMC. The relative weights of regression paths may thus not be the sole guide for targeting an intervention. Continuous empirical research, experimentation, interventional studies, and evaluations should take place as part of overall quality improvement philosophy and implementation via quality techniques such as Demings' iterative problem solving and improvement cycle of Plan-Do-Study-Act [140,141]. So long as a given indicator is at a relatively muffled magnitude prior to an intervention, a significant amplification of its bearing can have a sturdy touch in *PaPSC* improvement efforts. These aspects cannot be left to conjecture, then continuous clinical experiments and interventional studies must take hold. Iterative feedforwards and feedback cycles are crucial [142].

PaPSCS is a wide-reaching validated tool that can provide a quantitative tool to define strengths and weaknesses of *PaPSC* as well as Psaf outcome measures. Boosting healthcare leadership can act as a hefty catalyst for *PaPSC* improvements. As *PaPSC* significantly differs between general and specialty surgeries, and *PaPSC* items do not load equally on their latent variable tailored approaches appear judicious and practical overall. An array of interventions at diverse levels of the healthcare system are on hand to recuperate *PaPSC*. At the national level, States should espouse and implement Psaf strategies based on a systems standpoint, uplifting, and coordinating various safety-orientated programs, *PaPSC* labors should preferably start at this level. At the organizational level, the investigated tool can provide the basis for a clear evidence-based safety protocols, guidelines and standards and the prospect for blame-free AEs reporting system. Well-thought educational and training programs are to be launched for various manpower categories and reluctant stakeholders should be convinced of the value and import of such endeavors. Bounteous devotion must be accorded to PE initiatives. Empowerment as a positive democratic social value is becoming a prominent priority for healthcare policymakers all over the world. PE programs are to be steered towards the aim of amplifying consumers' participation, involvement, engagement, advocacy, influence, and control in connection with problems, decisions, therapies, actions, and interactions touching or bearing upon their health, including the wellbeing of their families, friends, relatives, and significant others. From the efficiency angle, investments in identifying, diagnosing, and addressing the most burdensome adverse indicators in concerned respective settings are vital.

Traditional wisdom as well as scientific acumen clearly demonstrate that the costs of prevention are always lower than those of failure. An ounce prevention is more worthy than a pound of cure is an eternal piece of wisdom. To efficaciously, sustainably, and adaptively tackle *PaPSC* issues, leadership across all levels of the healthcare system is a stipulation. National public health safety strategies must entail making the necessitous arsenal of expertise and validated instruments available and accessible to patrons and benefactors to build a safer healthcare system. In every possible scenario, QQRMs should be supplemented with QRMs. SC – with its attendant values and norms- is the foundation of Psaf as it guides attitudes, perceptions, and behavior of organizational stakeholders and points their attention to safety issues and encourages safe work practices [19]. Even if some aspects of SC may not be directly accessible to patients their insight is necessary to providing a comprehensive assessment [6, 18]. All efficacious corporations embrace a paradigm of SC. It is compatible with a pragmatic orientation that every business can be improved, and every establishment should improve the world around [79].

Limitations and future research directions

This piece of research provides a looked-for roadmap highlighting steps of *PAPSCS* translation, item purification, specification, psychometric testing, evaluation, respecification, validation, cross-validation, full Invar. establishment, application, as well as avenues and directions for future research efforts intended to revisit, reassess, revise, amend and improve *PaPSCS*. However, findings of the study are not meant to be extrapolated beyond surgical units and departments in AMUH. By its very design the present study is restricted to surgical units/departments in one institution in one constituency in Alexandria governorate. To reinforce study generalizability to AMUH the study needs to be replicated in other departments notably the internal medicine. To be generalizable to AU hospitals the study needs to be replicated in other AU affiliated hospitals such as El-Shatby Pediatric University hospital, El-Shatby Gynecology& Obstetric university hospital, El-Hadara orthopedics University hospital, El-Hadara neuropsychiatry University hospital. Moreover, extending study generalizability entails replicating it in other Egyptian healthcare settings preferably representing twenty-seven Egyptian Governorates. Additionally, the present study is confined to a less fortunate segment of the Egyptian population and needs to be extended to more privileged social strata with less unfortunate socioeconomic, educational, and occupational achievements. This study provides no information about sectors other than university hospitals in Alexandria and needs to be extended to other sectors of the Egyptian healthcare system including health insurance, private and not-for-profit institutions.

Upcoming studies need to examine the trans-cultural plasticity of *PaPSCS* through testing the elimination/modification hypothesis - provided in this study- concerning pruning off items Q_8, Q_9 & Q_{10}. In other words, further studies need to be pursued to confirm or falsify the theoretical justifications and claims of purging or modifying items Q_8, Q_9 & Q_{10} from the archetype *PaPSCS*. The need to covary disturbance terms of items pairs {Q_1 & Q_2}and {Q_5 & Q_6} calls for further probing by future studies. These studies should experiment on rephrasing these four items to make them more suitable for the Egyptian Arabic context. Q_1 & Q_5 have equal and lowest indicator reliabilities and future studies could be designed to contemplate and deliberate their elimination or rephrasing and the consequences on content and construct validity of *PaPSCS*. Efforts should be directed to acknowledge and attain a generalizable documented Arabic version of the *PaPSCS* by way of replicating and extending the study to represent the twenty-seven Egyptian Governorates, twenty-two member countries of the Arab league, and countless Arab speech communities all over the globe.

Abbreviations

α: Chronbach's α; ∞ IF: ∞ if item deleted; θs Item loadings; λs: Standardized item(factor) loadings i.e. standardized regression coefficient; *ρc:* Composite reliability; χ^2: Chisquare; χ^2/df: Relative (normed) χ^2, χ^2diff.: χ^2 difference; AEs: Adverse events; AFI:
Alternative fit indices; G: Agree to a great extent; AMOS: Analysis of a Moment
Structures, AMUH: Alexandria Main University Hospital; AS: Somewhat agree; AU:
Alexandria University; Bartlett's: Bartlett's test of sphericity; CA : Completely agree; CD: Completely disagree; CFA: Confirmatory factor analysis; CFI: Comparative fit index; CIIC: Common interitem correlation; CITCs: Corrected item-total correlations; df: Degrees of freedom; DG: disagree to a large extent; DIC: Determinant of the interitem correlation matrix; DN: Do not know; DS: Somewhat disagree; Ecs: Extraction communalities; Ercos.: Error terms covariances; ESMs: Ecological study methods; EFA: Exploratory factor analysis; FA: Factor analysis; FX: Factor matrix; GFI: Goodness of fit index; Gutt: Guttman split-half reliability coefficient; HSOPSC: Hospital Survey on Patient Safety Culture; ICC: Intraclass correlation coefficient; IFI: Incremental fit index; IICs: Interitem correlations; MEs: Measurement errors; Invar.: Measurement invariance; KMO: Kaiser-Meyer-Olkin Measure of sampling adequacy; MI: Modification indices;

MLE: Maximal likelihood estimator; MITCs: Mean item total correlations; MR.: Median; Mo. : Mode; MSA: Individual items measures of sampling adequacy of the anti-image correlation matrix; MG-CFA: Multigroup CFA; n: Number of cases in the unrefined sample (n= 480); n_2: Number of cases in the refined sample (n_2 = 454); n_3: Number of cases in the first randomly split sample (n_3 = 227); n_4: Number of cases in the second randomly split sample (n_4 = 227); NFI: Normed fit index; NOMs: Naturalistic observation methods; PA: Parallel analysis, PAF: Principle axis factoring; *PaPSC*: Patients' perception of safety culture; *PaPSCS*: Patients' Perception Safety Culture Scale; PCA: Principal component analysis; PCFI: Parsimony adjusted CFI; PMOS: Patient Measure of Organizational Safety; PNFI: Parsimony adjusted NFI; POMs: Participant observation methods, PS: Preliminary screening; PSC: Patient Safety Culture; Psaf: Patient safety; PSCT: Patient Safety Climate Tool; q: Number of model's freely estimated parameters; Q_1 thru Q_{11}: Eleven *PaPSCS* items (see methods section); QQRMs: Quantitative research methodologies; QRMs: Qualitative research methods; Residus.:

Residuals between observed and reproduced covariance matrices; RFI: Relative fit index; RMSEA: Root mean square error of approximation; RMR: Root mean square residual; S_1: Primary unrefined sample (n = 480); S2: Refined sample (n_2 = 454); S_3: First randomly split sample (n_3= 227); S_4: Second randomly split sample (n_4= 227); SC: Safety culture, SEM: Structural equation modelling; SMCs: Squared multiple correlations, SRMR: Standardized root mean square residual; SPSS: Statistical Package of Social Sciences; SCRs: Standardized covariance residuals; TVE: Total variance extracted; UISs: Unstructured interview schedules.

Declarations

Ethics approval and consent to participate

Approval of the ethics committee of Faculty of Medicine (Alexandria University) was obtained for conducting the research on 19 May 2022. The committee is a member of ICLAS; IRB NO: 00012098 and FWA No: 00018699. Study serial number is 0305576. An informed verbal consent was taken from the study participants after explanation of the purpose and benefits of the research. Anonymity and confidentiality were assured and maintained. All methods have been carried out in accordance with the guidelines and regulations of Declaration of Helsinki.

Consent for publication

Not applicable.

Availability of data and materials

Data are available from the author on reasonable request.

Competing interests

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