ARTIGO ORIGINAL
STREQ-25: CONSTRUCTION AND VALIDATION OF AN INSTRUMENT TO EVALUATE STRESS

STREQ-25: Construção e validação de um instrumento para avaliação do estresse

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ABSTRACT

Introduction: Quality of life (QOL) may refer to a conceptual and quite complex discussion due to specific definition lack and poor procedures and instruments able to measure it. In this study, QOL's instrument validation is based upon stressor and stress triggering agents. Foreign instruments may not always reach their goals as Brazilian and Latin American cultural differences shall compromise the data quality. In Brazil, questionnaires assessing organizational environment stress are scarce and often not validated. **Objective**: to demonstrate the construction and validation of an easy to apply instrument gathering stress and QOL. As a question problem, it was asked: What steps are to be followed for the construction and validation of an instrument? **Methods:** A 25 questions instrument was divided into four areas: Work environment; social relations; leisure; sleep. Six steps for instrument validation were followed: 1- Content Validity (or construct); 2- Internal Consistency; 3- Discriminant Validity; 4- Criterion Validity; 5- Concurrent Validity; and 6- Temporal Reproducibility. **Results:** The data is coherent to the instrument initially thought. **Conclusions:** The instrument is valid and reliable. It may be concluded that it effectively measures what it proposes to, consistently demonstrating success.

Keywords: Construction, validity, and instrument.

RESUMO

Introdução: Epistemologicamente debatida, a Qualidade de Vida (QV), pode remeter a uma discussão conceitual, bastante complexa, por consequência de uma delimitação específica, na carência de procedimentos e de elaboração de instrumentos que consigam medi-la. Sobretudo, a QV ressaltada neste estudo de validação de instrumento, aponta para o levantamento dos agentes estressores desencadeantes do estresse. O paradigma atual sobre elaboração de questionários, tange para a utilização de instrumentos estrangeiros que nem sempre conseguem alcançar seus objetivos; quanto a cultura brasileira e latino-americana, já que as diferenças; sociais, cultuais, religiosas e étnicas, podem comprometer a qualidade dos dados obtidos. São escassos os questionários existentes no Brasil sobre o estresse no ambiente organizacional, e vários deles, não foram validados. **Objetivo:** demonstrar as etapas de construção e validação de um instrumento; sobre estresse e QV, de fácil aplicação. Para a questão problema, pensou-se na seguinte problemática: Quais as etapas, a serem seguidas, para a construção e validação de um instrumento? **Métodos:** Construiu-se um instrumento composto por 25 questões, divididos em quatro domínios, a saber: ambiente de trabalho; relações sociais (afetivas e familiares); lazer; sono. Desta forma, foram seguidas as seis etapas clássicas para validação de instrumento, sendo: 1- Validade de Conteúdo (ou Constructo); 2- Consistência interna; 3- Validade discriminante; 4- Validade de critério; 5- Validade concorrente e 6- Reprodutibilidade temporal. **Resultados:** Os dados apresentaram coesão, em relação ao instrumento pensado inicialmente. **Conclusões:** O instrumento mostrou-se válido e confiável, podendo-se concluir que ele mede efetivamente aquilo a que se propõe, de forma consistente, demonstrando sucesso..

Palavras chave: Construção, Validação e Instrumento.

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INTRODUCTION

The stress is considered today as one of the "villains", for the health of the human being, understood as a disease, impacting negatively on life quality(QOL), and also on the productivity of human being, generating interest in the causes and the methods of stress reduction, by researchers [1,2,3,4].

The daily activities of the human being, such as: work, family obligations, financial life, transit and etc. has triggered the exacerbated increase of stress. Thus, the same ends up causing serious disorders, such as: insomnia, anxiety, and even, associated with the development of a series of diseases, such as: cancer, depression, diabetes and high blood pressure.

In particular, understanding the meaning of the word stress, contributes to the understanding and knowledge of the daily stressor agents, faced by the human being, because "stress, is the state manifested by a specific syndrome, consisting of all the nonspecific changes, produced in a biological system" [5].

It is understood that the stress can be a very strong effort of the individual, faced with a situation good or bad, that will change his or her life.

Therefore, it is beneficial to know the stressor variables, capable of negatively influencing on QOL, of this post-modern society [6], namely: exacerbation, Low productivity, discouragement, interpersonal difficulties [7].

Thus, the life style determines the human being health and consequently influences in their routine activities, such as; eating habits, physical and or leisure and also, the professional activities. The life style, is closely connected to QOL, the individual who manages to have healthy habits, ends up balancing his or her homeostasis and consequently, well-being, thus lowering his or her stress levels.

QOL is a subject that in the past two decades, is gaining importance in various sectors of society; in public health and in the areas of public policies management, has been closely connected to clinical practices of daily living of these services, because data on aspects of QOL has been of utmost importance for the same, in decision making [8,9].

Professionals from several areas of knowledge has shown a great interest in the

construct, which in fact is multidimensional, being realized the large number of scientific production published in this respect [9,10].

Therefore, QOL is closely linked to the balance of activities per day developed by human beings. In other words, when it is possible to preserve the professional activities, the personal and vice- versa.

In order to assess more accurately the QOL, this should encompass three fields that are interrelated in human life; the physical aspect, the psychological and social aspects. For both, the most used method by which it has been done measures and evaluations of QOL in the recent decades, is the use of questionnaires, which like any other scientific tool, must gather methodological validated criteria [11].

For this reason, the difficulty and complexity of the conceptual specific limit on QOL, recommends the production of instruments capable of measuring it and or evaluating it, taking due care not to be biased, but based on the comments impartial.

Nevertheless, an important issue that must be considered is the applicability of foreign questionnaires, which although, are subject to adaptation, not always manage to reach their desirable goals, since that the social, religious and ethnic differences, can compromise the quality of the obtained data. In addition, there are few existing questionnaires in Brazil, and yet, most of the times, they have not been tested, regarding their reproducibility and validation.

To do so, this research has raised the following issue: What are the steps to be followed for the construction and validation of an instrument?

These arguments justify this research, and the development of an instrument that respects all stages of methodological validation, significant for the individual's health[12].

OBJECTIVE:

To demonstrate the steps of construction and validation of an instrument; on stress and QOL, easy to apply.

METHODS:

To achieve the maximum in the question of rigor and statistical processing, it was followed the assumptions of the Big Four namely: Sample size; Effect size; Significance and Poder do teste (Power test). For the sizing of the sample, it was used the equation

proposed by Schulz[13].

4.1 - Casuistic

This research is characterized by an exploratory, descriptive study with the intention of examining quantitative-qualitative analysis of the process validation of the instrument called StreQ-25.

4.2-Sample

The population, universe of this research was chosen at random and consisted of 65 people, being that 54.5% were male and 43.9 were female. The participants were students and employees belonging to public and private companies, located in the interior of São Paulo, in the cities of Piracicaba and Registro.

After the composition of the sample group recruited, it was chosen a moderator, which was essential in order to pass the importance of the research, as well as, the information contained in the instrument correctly and motivating.

The choice of the sample group occurred after the discussion of the researchers, taking into account the object of the research study.

The mean age was 21.14 years (± 4.73).

The power of the test was estimated at 0.61 the effect of the size of the sample, calculated between the two groups was 0.87 considered as great as reported[14]. As to the function performed, participants engaged in various functions.

As a form of protection of anonymity, the questionnaire did not have any form of identification of the person evaluated, preserving his or her identity.

4.3 - Exclusion criterion

To compose a sample student who did not work were excluded, therefore, the ones that did not have formal work, duly registered, i.e., without any employment bond.

4.4. Inclusion criteria

It was included in the research sample, those students that have proven to have a formal job in the Employment Registration Book, to be over 18 years old; to be studying a college degree.

Before starting the study, all respondents were informed of the procedures and objectives involved in the research and signed the Informed Consent Form (ICF), for the accomplishment of the inquiries made within the questionnaire StreQ-25. When

they were invited, they decided to participate in the research, of their own accord. The questionnaires were answered twice, at an interval of 15 days.

The research project started by the appreciation of the Ethics Committee from the Universidade Metodista de Piracicaba – UNIMEP, approved under the protocol n# 50/2014.

The significance level adopted was 5% in all statistical tests

STAGES OF CONSTRUCTION OF STREQ-25 - ANALYSIS AND RESULT OF DATA

5.1 Content validity

The validity of content allows that the measuring instrument embraces the questions correctly. Its rigor focuses on how the instrument measures the items identified as important, for the measurements that were studied and raised initially during the research. Content validity refers to the level of measurement that the instrument is able to prove a peculiar domain, whose content is intended to measure, that is, if it protects the different facets of its object, and if the same, cannot be attributed to others.

The instruments can generate results in two ways: 1 - In order to form a profile, it is considered the scores of each domain and the same, are quoted individually, sequentially, forming a profile. 2 - to form a single overall scores, the domains are aggregated. Some instruments allow to approach both forms15. Regarding the answers regarding the questions of StreQ-25, these were developed on the scale of Lickert, opting to follow, from the "lowest" perception for the "highest" perception, in order to facilitate the syntax and the score of each of the four areas of StreQ-25, example:

(1) nothing, (2) very little, (3) Moderately, (4) a lot, (5) completely;

(1) Awful, (2) reasonable, (3) at the average, (4) good, (5) excellent.

(1) never, (2) rarely, (3) Sometimes (4) repeatedly, (5) always.

(1) Extremely low, (2) low, (3) moderate, (4) elevated, (5) extreme.

This organizational form prevents the exchange of scores of questions, and although one respondent marks the questions, in a very divergent way at the answers, marking for example; the question of the number 1(a) mark the option number 5(five) for the test and retest

for the same question, mark the option number 1(one). Individuals who behave this way, or that respond the instrument in less than 5 minutes must be eliminated from the sample, since it denotes a lack of commitment and seriousness toward the research [16].

The questionnaire items were developed based on a review of the literature on the major stressor components that permeate the lives of human beings. The instrument StreQ-25 was structured with 25 items, divided in four areas, namely: Work environment; social relations (affective and family); leisure; sleep. Each domain contains 6 items, being that the last item, assesses the general stress state of the human being.

Prior to the application of the instrument the same was discussed and debated among 3 researchers, namely; two from the area of Physical Education and one from the area of psychology.

For this step, a question has been rewritten, question number 18 which mentioned; ""How often do you go to the mall?" As it limited the population of a city, in which there were no malls, an alternative to leisure.

Thus, the question mentioned was redesigned to: "How often do you go shopping, while leisure? "

The reformulation of the question, proposes alternatives to purchasing, in other places while pleasure; with those related to the center of the city, for example, achieving in this way, to embrace all the respondents, both who dwells in small towns, or in large centers.

It is clear that before the recasting of the question, the same presented limitation to its response to the individuals studied.

To keep the items in the scale, it was used as a criterion the concordance of 100% between the evaluators, that is, two evaluators would need to agree on their responses. In this way, the 25 items were kept, because there was an agreement between the two judges concerning the relevance and scope, advancing to the semantic and the hermeneutical aspects of the questions

The final version of the instrument, for this phase, required 3 months. At the end of the analysis the researchers made themselves satisfied; with the completion of the questionnaire.

In the confirmatory factorial structural analysis of the StreQ-25, the data collected were tested in order to verify whether they had cohesion, in relation to the instrument thought initially.

Thus, Table 1 shows the structure (domains and facets) of StreQ-25.

Table 1 - StreQ-25- domains and facets

Domains	Facets of each domain
D1- Work environment	Satisfaction with work
	Satisfaction with work accomplished
	Employee valuation
	Amount of work
	Accessibility
D2 - Social Relations (Affective and Family)	Satisfaction with the where he or she lives
	Family satisfaction
	Sexual life satisfaction
	Friendship satisfaction
D3- Leisure	Free time satisfaction
	Physical activities at the free time
	Time for himself or herself
D4-Sleeping	Poor quality of sleep
	Daytime sleepiness
	Humor interference
General question about stress	General question about stress perception

In the confirmatory factorial analysis, the comparative fit indices (CFI) were calculated adequate for this structure of domains and facets between the groups, with IACs of 0.886 and 0.807 respectively.

5.2 - Internal Consistency

Regarding the analysis for the internal consistency of the data, it was thought about the application of Cronbach's alpha coefficient, being the same the essence of the theory of generalization which is probably the most widely accepted formulation in terms of reliability, whose idea is what aspects of tests or scales, such as items, subject or assessors, are sampled from a pre-defined domain [17].

The alpha coefficient was described in 1951 by Lee J. Alpha [18]. This index is used to measure the reliability of the internal consistency of a scale, that is, in order to assess the magnitude in which the items of an instrument are correlated [17].

In other words, the Cronbach alpha coefficient is the average of the correlations between the items that are part of an instrument [19].

For some authors [20] it is necessary that the issues

investigated in the questionnaire, exhibit the same scale of measurement.

In relation to the Cronbach alpha values equal to or greater than 0.70, these are considered acceptable [21]. However, other authors [22] recognize as acceptable cutoff values equal to or greater than 0.60. However, usually alpha values between 0.80 and 0.90 are preferred [19].

For the analysis of the internal consistency, it is desirable that the items to be moderately correlated with each other and that each item has a correlation with the total scores of the construct. For a measure to be valid, while average of a given construct, it needs to be reliable. Although the reliability is a necessary condition, this is not a sufficient condition. However, the reliability of a mediated may be the first step to determine its validity [20].

In relation to reliability; there are three basic ways to measure it and these seek to determine the proportion of variance in a scale. Fundamentally, it is correlated the scores obtained through a scale with the results of reproduction: test and re-test; sensitivity to change (considered as part of validity) and internal consistency, which requires the implementation of an instrument [23].

Thus, the variables used in the calculation of the coefficient of Cronbach's Alpha are: the number of questions of the instrument (K), the variance of each question (s2i) and the total variance of the instrument (St2).

For the final version of the StreQ-25, it was obtained the Cronbach's alpha coefficient (0.839) considered high and satisfactory, to both groups, respectively (test and retest, alpha = 0.808; Group 2: alpha= 0.816), because the values close to 1, have a higher reliability of responses obtained.

However, three questions presented negative reliability for the coefficient of Cronbach, being the questions 3 (0609); 18 (0,694) and 22 (0,583) that is, if they were excluded from the questionnaire the alpha coefficient would increase 7.0% in the test and also, in the retest Being that the question 3 would be equal to 72.6%, the question 18 to 82.7% and the question 22 would be 69.5%.

These three questions are found in the domain; Working environment, (question number 3) – "Do you feel satisfied with your performance at the company? "; leisure, (question number 18) – "How often do you go shopping, while leisure? "; sleep, (question number 22) – - "Do You Need medication to sleep? "

Thus, the questions mentioned cover various aspects, and they may influence the issues related to work, finances and others relating to health and life quality of individuals.

Concerning the psychometric point of view, the results demonstrate the complexity to develop a questionnaire, since that important questions, should not fail to be mentioned, since their contribution to the research and or even point, due to point to certain prejudices, or taboos.

In this way, these questions are beneficial

to the well-being of human beings and therefore, it was decided to keep them because when analyzing each question, it is noticed that in the case of the question number three: " Do you feel satisfied with your performance in the company? " This question demonstrates that the feeling of professional achievement, not only brings satisfaction but also trust, thereby improving the psychosocial environment.

However, when the worker does not feel this satisfaction with his or her work, this becomes demotivating, tedious, taking the worker, in many cases, to absenteeism and even to become depressed; increasing the possibility of occurrence of bullying, by colleagues, due to his or her non-acceptance into the work environment and consequently, the company itself.

In relation to the question number 18: "How often do you go shopping, while leisure? " It is verified his or her relationship with the very question of job satisfaction, because the enpowerment of the same, reflects positively in other areas of the human being.
A person satisfied with his or her work, manages to take pleasure in small things, related to his or her personal life.

That is, the question regarding job satisfaction, it ends up influencing the entire personal life of the worker, needing this way, extra care on the part of the company concerning: the satisfaction of its employee in the work environment.

Particularly, it is known that an employee satisfied with his or her position and situation, within his or her working environment, will hardly ever to need sleeping medications, as mentioned in Question number twenty-two: Do you need medication to sleep?

However, those workers who make use of psychotropic drugs for sleeping, either for any reason, often oblivious to the work, usually do not reveal the use of any substance to sleep, for fear of being singled out as: unbalanced, for those who are unaware of the importance of sleeping medication for sleep induction and still, exactly by ignorance, lack of knowledge regarding the use of these psychotropic drugs to the health and well-being of the human being, remaining always the impression that those who make use of the substance, can suffer from some mental disorder. However, the negative reliability of the questions presented, may even infer that the respondent had mood oscillations; from the first to the second fortnight, since that respectively they were answered, at the end and middle of the month; which suggests that in the first fortnight, the respondent is with a good part of his or her salary committed to expenditures and in the middle of the month, is in possession of his or her next paycheck.

Therefore, the salary perception and the absence of the same, may demonstrate variations and significant changes of personal well-being, understood at the moment, as mood oscillations.

5.3 - Discriminatory validity

The discriminatory validity, represents the

category whose values differ among themselves [24], or when their values are analogies, supposedly zero, with a test capable of measuring a trace, regardless of personality [25]

Thus, it seems that the measure to be analyzed, is not related unduly with indicators of another construct. Its use assists in the evaluation of the instrument, regarding its performance, at the distinction among different groups.

The test of discriminatory validity occurs when it is made a comparison between measures that hypothetically have no connection, consisting of the dexterity to differentiate the value studied, therefore, the measurements with the power of discriminatory validity are known as great construct validity [26].

Particularly, because its measures despite of its techniques differ among themselves and its point of connection found in the results of the same is divergent, even so, there will be few chances of this being attributed to an error. Thus, some authors [27], have given preference to multivariate analysis methods that use a measure which measures the variations, errors, after developing measurement scales that can help in the measure of discriminating power (reliability and validity) of an instrument

To this end it was calculated the Rho of Tarkkonen, held from the ratio between the variances for the two groups and were obtained values rather high, group 1, Rho= 0.770 and for group 2, Rho= 0.893, which attests to the ability of the instrument to discriminate different groups.

5.4 Criterion validity-

The criteria validity, reverberates in the occurrence of the figures used for the forecast, or evaluation of a situation. In other words, it is able to predict an outcome or provide an opinion on the existence of an attitude or current condition [28].

It makes mention of the level of connection between the test scores and other dimensions of implementation, assimilated independently or simultaneously to the test, therefore, it often relates to a certain factor, and it may be influenced by factors that are not connected to a predictor variable (test), and consequently, to factors that affect the degree of efficiency of the coefficient of validity.

Thus, the criterion validity is related to the ability of the instrument to function as a predictor, present or future, of another independent variable, identified as criterion [28]. When the criterion validity is to measure the results present, it is named convergent validity and when it measures future results, it is named predictive validity.

Therefore, convergent validity and competency are beneficial, but insufficient for the legitimation of a value, because its gathering may be precedent of an error [26]. The predictive validity is determined by analogy through conceptual values, related and formed in the dexterity of the measure to validate hypotheses. However, the value assigned to the criterion

validity, is proven with other approaches that are capable of measuring the same qualities.

Nevertheless, there are other forms of measurement, whose measures should be responsive to check different qualities in specific variables; being specific to the most important characteristics and appropriate to the object of study [29].

In this way, the strong connection of the measurement instruments, to the standard criteria, will attest greater criterion validity.

However, lower correlations can reverberate in the absence of the validity of the predictor, and it may point out that the assessment used is dubious.

When evaluating the criterion validity, this should occur through the comparison of the results obtained through the validation instrument proposed, with the results of another instrument, which has already been validated.

At this stage of the validation process, it was used an equation of the predictive equation comparing the maximum and minimum scores of the instrument proposed, with the values identified in the general area of Stressometer (instrument also answered by the respondents), included from the linear regression, in order to compare the determinant matrix of two instruments, which can be seen in Table 2, which the results exhibit. Table 2 – linear regression between the general area of the stressometer and minimum and maximum scores of the questions from StreQ-25.

Domain	β	t	p
General domain stressometer	0,117	0,855	0,396

Legend: Percentage of explained variance: 59%; β = Beta; t= Test t; p = variance of p

Thus, it was calculated the R^2 adjusted whose result (0.59), evidences that the percentage of explained variance of 59% is satisfactory, being considered elevated, since the literature attests that a good result must be greater than 50%, which proves how much these domains explain the QVT.

5.5 - Concurrent validity

It is used the concurrent validity when it is compared the results of the application of an instrument, with those of another similar. Therefore, in order to evaluate the efficiency of the Stre-Q25, its results were compared with the results of another instrument; the stressometer. For that, the domains were added, which had a score of 0-100, allowing to determine each domain and the general sum, describing the stress of the evaluated individuals.

This step was made up of the averages of the instrument, which have normal distribution in the t-Test for independent samples.

All domains showed significance 0.003, considered excellent, attesting that the instrument exhibits elevated concurrent ability. Meaning that the StreQ corresponds as well as the stressometer, whose values are equivalent to

0.3% of significance.

In order to determine the efficiency of StreQ-25 when confronted with other instruments, we established the following criteria: all the respondents in the second data collection, in addition to StreQ-25, also answered the stressometer. Thus, the results of the general domains of StreQ-25 were compared by means of the general domains of the stressometer.

Such figures show that the general domains of StreQ-25 when are correlated significantly with the general domains of the stressometer, are probably measuring what the instrument proposes to measure, describing the proposed instrument in this research.

5.6 - temporal Reproducibility

The temporal reproducibility was performed from the calculation of the kappa coefficient that uses the strategy for test and retest with the workers. This phase can be determined as: coefficient of stability, because it measures the stability of the responses in a time interval of 15 days Its index occurs by means of the connection of the scores of application of a first test with the application of a second test, to the same respondents. The mean error in the answers is related to the implementation of the respondent. For the measurement of reproducibility, it is used the application of psychometrics, as it studies the difference between people, behaviors, attitudes, and may determine thereby, the quality of a questionnaire, since there is no point of a questionnaire being well drafted, but on the

contrary to obtain reliable reproductive and valid data because inadequate instruments, without methodological rigor, can make the data confused and not allow the generalization to the population [30].

The reliability of an instrument in phase of test-retest is proven when it is calculated the correlation coefficient between the values assigned by the surveyed individuals in two different moments, being enough in order to dodge of memories, of the responses reported in the first test.

In other words, at this step, the goal is to apply the same survey instrument, for the same respondents, however, at different times, as it seeks the measure of stability in time; although the researcher needs, at this moment of the research, to opt for a choice of a time interval not too large, in order to decrease the effects of remembrance of responses and also, take care to ensure that the time interval is not too short, interfering in the effects of the events that interfered in the research development.

The results obtained have occurred through the Kappa coefficient (K), which measures the degree of agreement between the results obtained in the collections; for the classification criteria were the ones adopted by [31]. The value obtained for this coefficient was K = 0.46, which is considered a moderate concordance between the two applications (test and retest). However, before such a moderate concordance, it was hypothesized that this

population was negligent in responding the same questionnaire 15 days later, since no student reported the occurrence of catastrophic event in his or her life that had relevance, and/or that showed something that could have impacted on their lives, in the research days. However, the value obtained denotes its positive correlation and signals that the instrument is reproducible in time.

CONCLUSION

The results of reproducibility reported the use of appropriate and moderate statistical procedures, as reported in the literature. Thus, further studies are necessary with different populations to ascertain the reproducibility of the StreQ25, which in this study was considered median.

The instrument was valid and reliable, before the criteria analyzed. It can be concluded that the same measures effectively what it proposes, consistently, demonstrating success, as a psychometric instrument; because the results were satisfactory for the solution of the problem of research presented.

CONFLICTS OF INTEREST: There are not any.

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Observação: Os autores declaram não existir conflitos de interesses de qualquer natureza