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简体中文ProScan问券分析和摘要

Simplified Chinese ProScan Survey Analysis and Summary

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当开发和使用一项工具，例如ProScan 问券时，评估该工具的心理计量特性至关重要。 心理计量特性，例如可靠性和有效性，通常用于评估一项工具的一致性和准确性，这在解释ProScan问券结果时非常重要。

When developing and utilizing an instrument, such as the ProScan Survey, it is crucial to assess psychometric properties of the instrument. Psychometric properties, such as reliability and validity, are often used to assess consistency and accuracy of the instrument, which is important when interpreting the ProScan results.

可靠性和有效性（信度和效度）/ Reliability and Validity

可靠性是指将测量误差的随机来源最小化的程度，同时是指一个测试如何可靠的或一致的测量一项个性特质（Henson, 2001）。 克伦巴赫（Cronbach）的alpha（α）是测量可靠性的标准，可接受的标准通常定义为.70或更高（Cronbach，1951年）。 可靠性系数越大，就表示测试的分数越有可能重复发生或越是可靠的。 有效性的定义是，一项工具在多大程度上能够成功的测量原来预计测量的内容（Messick, 1989）， 可以使用多种方法来展示有效性的证据，其中包括探索性因子分析（EFA）。 探索性因子分析基于每个项目或项目群组都能有效地描述了一个抽象概念的基础，例如构成ProScan问券的五个抽象概念：支配性，表达性，耐心性，精确性和逻辑性。 探索性因子分析量测是非常复杂且严格的，这对于必须确定一项测量工具所产生的分数是否有效是非常理想的。

Reliability is an extent to which random sources of measurement error are minimized, and refers to how dependably or consistently a test measures a characteristic (Henson, 2001). Cronbach's alpha α is a measure of reliability, with acceptable levels commonly defined as .70 and above (Cronbach, 1951). The larger the reliability coefficient, the more repeatable or reliable the test scores. Validity is defined as the extent to which an instrument measures what it is intended to measure (Messick, 1989). Evidence of validity can be demonstrated utilizing a variety of methods including exploratory factor analysis (EFA). EFA is based on the idea that each item or group of items effectively describes a construct, such as the five constructs that comprise the ProScan: Dominance, Extroversion, Pace, Conformity and Logic. EFA assessment is complex and rigorous, which is ideal when determining whether scores form an instrument are valid.

研究背景 / Study Background

在2018年，进行了一项以评估英文版ProScan问券的心理计量特性研究。 结果表明，当以英文版的问券进行的量测时，ProScan问券得到可接受的的心理计量特性。 但是，针对一项工具的单一语言版本进行评估不仅重要，更重要的是要针对该工具所使用的所有语言进行评估。 在某一种文化或语言有效的工具，对另一种文化或语言不见得有效，这是一个称为文化交叉翻译的概念。 由于心理计量特性会根据人口特征和所使用工具的翻译而产生变化，因此，确保ProScan问券的简体中文版也还能够持续一贯的且准确的达成心理计量特性非常重要。

In 2018, a study was conducted to assess psychometric properties of the ProScan in the English language. Results demonstrated that the ProScan had acceptable psychometric properties when assessing English responses. However, it is not only important to assess an instrument in a single language, but rather all of the languages in which the instrument is used. What works well for one culture or language, may not work as well for another. This is a concept referred to as cultural cross-translation. Since psychometric properties can change based on population characteristics and instrument translation, it was very important to ensure that the ProScan was also performing consistently and accurately in the Simplified Chinese language.

目的 / Purpose

本研究的目的是确保ProScan问券对说中文的人同样有效果； 因此，本研究针对近30,000人进行了信度和效度评分的的心理计量评估。
The purpose of this study was to ensure that the ProScan Survey was performing well for Chinese language speakers; therefore, a psychometric assessment of reliability and validity of scores was performed on nearly 30,000 individuals.

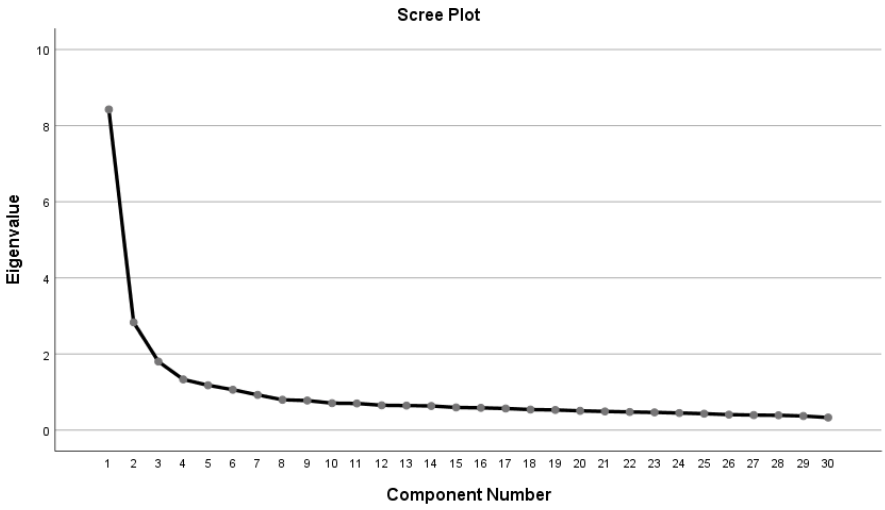
可靠性（信度）分析 / Reliability Analysis

首先，进行一个可靠性分析，以确定ProScan问券的内部一致性在讲中文的人群中是否为可接受的，为此，本研究使用克伦巴赫（Cronbach）的alpha（α）得出可靠性系数。 克朗巴赫（Cronbach's）的α值用于测量可靠性，通常是介于0到1之间，本研究中个性特质分数的可靠性显示很高（α= .89）。 该系数为0.89意味着，所解释的所有方差之89%是由于真实得分，只有11%是由于测量误差， 而这89%远远高于可接受的标准70%，本研究结果非常良好，说明ProScan问券得到的分数实际上是可靠而且一致的， 这意味着ProScan问券是一份值得信赖的工具，可以放心使用。
First, a reliability analysis was conducted to determine whether internal consistency of the ProScan was acceptable in Chinese language speakers. To do this, the reliability coefficient was produced using Cronbach's α. Cronbach's α, which is a measure of reliability between zero and one, revealed that reliability of Trait scores was high (α = .89). This coefficient of .89 means that 89% of the variance explained is due to true score and 11% is due to measurement error. The 89% is well above the acceptable criteria of 70%, which is extremely good and indicates that scores are in fact reliable and consistent. This means that the ProScan is a trustworthy instrument that can be used confidently.

有效性（效度）分析 / Validity Analysis

再者，本研究进行了探索性因子分析（EFA），此因子分析的主要目标是为一项工具中包含的问题项目之间的相互关系建模（Frey, 2018），这些关系是基于问题项目之间的相关性，通常是通过测量项目的方差和协方差来实现的。方差可以分为两种类型：公共和唯一。公共方差是指在一组项目之间共享的方差量数。例如，如果有6个项目构成一个因子，称为支配性，则我们希望这些项目具有较高量的共享方差，因为这些项目的目的是解释同一个因子。但是，用于解释支配性的项目与用于解释耐心性的项目之间可能没有大量的共享方差。唯一方差是方差非公共的任何部分，可以视为特定方差或错误方差。特定方差是对于某一特定项目非常独特的方差，而误差方差代表由于测量误差而产生的方差。
Next, an exploratory factor analysis (EFA) was conducted. The primary goal of factor analysis is to model the interrelationships between items of questions that comprise an instrument (Frey, 2018). These relationships are based on correlations between items. This is typically accomplished through assessment of variance and covariance of items. Variance can be partitioned into two types: common and unique. Common variance refers to the amount of variance that is shared among a set of items. For example, if there are 6 items that comprise the factor referred to as Dominance, we expect these items to have a high amount of shared variance since these items are attempting to explain the same factor. However, items that are meant to explain Dominance may not have a high amount of shared variance with items that explain Pace. Unique variance is any portion of variance that is not common, and can be considered specific or error variance. Specific variance is variance that is specific to a particular item, while error variance represents variance that is due to measurement error.

然后数据经过测试以确认是否适合进行探索性因子分析，进行的测试名名称为Kaiser-Meyer Olkin。Kaiser-Meyer Olkin的测试结果值为0.93，可能的范围是介于0到1之间，分数接近1.0表示该数据非常适合进行探索性因子分析。由于数据显示合适，因此开始更进一步的分析，下一步骤即是进行探索性因子分析，应用主成分分析（PCA）提取因子。此方法将所有可用方差（公共和唯一）考虑其中，并寻求变量的线性组合，以便提取最大方差。确定因子提取的标准包括特征向量，方差的累积百分比和特徵值圖。研究人员经常使用特征向量大于1.0的规则，从特征向量最大的因子（即代表每个最基本的因子所占的方差）具有最大的变异性（方差），依此类推，到特征向量较小或为负的因子，这些通常会从结果报告中删除。研究建议，保留所有因子，直到完成50％累积方差的解释。在特徵值圖可以将y轴上的特征向量和在x轴上的因子视觉化，我们应该期望可以在图上看到一个高点和有一个斷裂系數，产生一个明显的转折。本研究决定应该展示大约五个因子（如图1），这些因子都是经由本特徵值圖与先前提到的五个提议的个性特质标准所支持。由于预计展示多个因子，因此选择使用轮流交替的方法，此外，因为不期望这些因子有任何相关，因此使用了方差最大化旋转方法（Varimax）。本研究预期，在初始结果中，所有低于.200的模式系数（载荷）均被抑制。根据因子载荷，将所有项目都被“分组”，形成五个因子，该五个因子中的每一个都被命名，构成ProScan问券中的五项个性特质。



Data were then tested to confirm suitability for an EFA. A test called the Kaiser-Meyer Olkin was conducted. Results of the Kaiser-Meyer Olkin had a value of .93, with a possible range of zero to 1.0. Scores closer to 1.0 indicate that the data are highly suitable for an EFA. Since data were considered suitable, further analysis commenced. Next, the EFA was conducted. Factors were extracted using a Principal Component Analysis (PCA). This method considers all available variance (common and unique) and seeks linear combinations of variables such that maximum variance is extracted. Criteria to determine factor extraction included Eigenvalues, cumulative percentage of variance and a scree plot. Often researchers use the Eigenvalue greater than 1.0 rule. The factor with the largest Eigenvalue (which represents the variance accounted for by each underlying factor) has the most variance and so on, down to factors with small or negative Eigenvalues that are usually omitted from solutions. It is suggested to retain factors until 50% of cumulative variance is explained. The scree plot visualizes Eigenvalues on the y-axis and factors on the x-axis. We should expect to see a plot that has a very high point and a break in the factor with a distinct elbow. It was determined that approximately five factors should be present, which was supported by the scree plot (Figure 1) and previously mentioned criteria of the five proposed traits. Since more than one factor was expected to be present, a rotation method was chosen. Since the factors were not expected to be correlated, an orthogonal rotation method (Varimax) was utilized. All pattern coefficients (loadings) below .200 were suppressed in the initial results. All items were “grouped” according to factor loadings, forming five factors. Each of these factors were named, forming the five traits that comprise the ProScan.

结果与结论 / Results and Conclusions

研究结果显示，大多数模式系数的值都落在中等到高，并且载荷在此五项因子上，研究的结果指出有效性的证据，为使用ProScan问券提供了可靠的依据。 实际上，ProScan问券的信度和效度分析结果非常好，其结果与英语版问券的分析结果非常相似， 简体中文版问券的可靠性比英文版问券高出6%，这代表非常好的结果。 探索性因子分析的结果展示出，使用简体中文版问券和英文版问券针对支配性，表达性，耐心性，精确性，和逻辑五项因子进行的测量结果非常相似，两种语言版本ProScan问券测量结果的相似度正是我们希望看到的。

Results revealed that the majority of pattern coefficients were moderate to high and loaded on to five factors. Results suggest evidence of validity, providing justification for use of the ProScan. In fact, the results of the reliability and validity analysis were excellent, and very similar to the analytic findings that were documented for the English language. Reliability in the Simplified Chinese language was 6% higher than in the English language, which is very good. Results from the EFA demonstrated that the five factors of Dominance, Extroversion, Pace, Conformity and Logic are being measured very similarly in both the Simplified Chinese language and the English language. These results are exactly what we hoped to see in terms of similarity between the results of the two languages.

当使用简体中文版ProScan问券时，每个人都应该非常有信心，因为使用ProScan问券测量五项因子得到非常高的一致性（信度）， 同时也应该对ProScan问券的效度充满信心，因为该问券能够成功的测量原来预计测量的内容，这意味着五项因子都能够准确的测量。 这些结果令人鼓舞，并证明了ProScan问券严格的开发过程，以及该工具本身的正当性。

When using the ProScan in the Simplified Chinese language, individuals should feel confident that the ProScan is measuring the five factors with very high consistency. Individuals should also feel confident that the ProScan is measuring what it purports to measure, meaning the five factors are being measured accurately. These results are very encouraging, and demonstrate the rigor in which the ProScan was developed, and the integrity of the instrument itself.

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