Running-head: Nurses' perceptions of physical restraint

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Validity and measurement invariance of the Physical Restraint Use Questionnaire (PRUQ) in nursing staff

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Abstract

Aims and objectives: We aimed to study the internal structure and measurement invariance of the Physical Restraint Use Questionnaire (PRUQ) and to compare perceptions, experience, and training, regarding use of physical restraint on the elderly between nursing-staff working in hospitals and nursing homes.

Background: Physical restraint of patients is still common in many countries, thus it is important to study the attitudes of nursing staff. One of the most commonly tools used to assess perceptions regarding its use is the PRUQ. However, gaps exist in its internal structure and measurement invariance across different groups of respondents.

Design: Cross-sectional multicenter survey.

Methods: Data were collected from nurses working in eight Spanish hospitals and 19 nursing homes. All registered nurses and nurse assistants (N=3838) were contacted, of whom 1635 agreed to participate. Confirmatory factor analysis was performed to determine internal structure and measurement invariance of PRUQ, after which scale scores and other measures of experience and training were compared between hospital-based (n=855) and nursing homes-based (n=780) nurses.

Results: The PRUQ showed three invariant factors across type of facility, and also professional category and sex. Nursing staff working in both types of facility scored similarly; prevention of therapy disruption and prevention of falls were rated more important. Nurses working in nursing homes reported using restraint "many times" more frequently (52.9% vs 38.6%), less severe lack of training (18.2% vs 58.7%) being perceived as more adequate (33.4% vs 17.7%), than hospital-based nurses.

Conclusions: These findings support PRUQ as a valid and reliable tool for assessing the importance given to the use of physical restraint in the elderly by nursing professionals,

regardless of the setting being studied.

Relevance to clinical practice: The information would help design more specifically the physical restraint training of nursing staff, and to plan institutional interventions aimed at reducing its use.

Keywords: confirmatory factor analysis; elderly; measurement invariance; nursing; physical restraint.

Physical restraint is a procedure commonly used in the acute hospitals and residential care settings of many countries to prevent adverse events, especially those related to falls and the accidental removal of medical treatment (Estévez-Guerra et al., 2017; Krüger, Mayer, Haastert, & Meyer, 2013). Restraint use often includes full side rails, vests, waist belts and wrist restraints (Minnick, Mion, Johnson, Catrambone, & Leipzig, 2007). The literature warns that the use of restraint can lead to physical and psychological harm, including the death of the patient (Bellenger, Ibrahim, Lovell & Bugeja, in press). There are also many ethical and legal issues concerning autonomy and freedom (Braun & Capezuti, 2000).

The use of physical restraint has been subjected to intense debate during recent decades and in some countries regulations have been developed in order to reduce it. The United States, for example, put in place a series of measures at the end of the 1980´s that decreased remarkably the overall rate of restraint usage in both acute and long-term care settings (Cleary & Prescott, 2015). In the USA these centers must abide by strict state and federal regulations (Braun & Capezuti, 2000; DHHS & CMS, 2016) in addition to complying with quality standards, such as those proposed by the Joint-Commission on Accreditation of Healthcare Organization (CPI, 2009). As a result, the policies of hospitals and nursing facilities have been changed, and before applying restraints, the use of less intrusive alternatives have to be considered; a physician´s prescription specifying circumstances and duration of use must be obtained if there is no other option, as well as discussing the decision with the patient or their legal representative prior to requesting informed consent (Braun & Capezuti, 2000; DHHS & CMS, 2016). If facilities do not comply with these regulatory standards, or inappropriate restraint is used where alternatives are available, centers can be exposed to liability and sanctions (Cleary & Prescott, 2015).

In other countries, however, progress in this area has not been so significant. Thus, prevalence studies show that restraints are still used frequently, from 12-33% in certain hospital

wards (Benbenbishty, Adam, & Endacott, 2010; Krüger et al., 2013), to more than 60% in nursing homes, when the use of bedrails is taken into account (Estévez-Guerra et al., 2017; Huang, Huang, Lin, & Kuo, 2014).

Although the characteristics of the elderly person and the care culture of the organization will affect the use of physical restraint, it is important to consider the role of professionals. In Spain, registered nurses, with 3-4 years of college education, are usually responsible for the care of patients, and nursing assistants, with 2 years of vocational training, undertake basic care (Martínez, 2007). Although none of these professionals can legally prescribe the use of restraints, it is known that they have a large influence on the decision-making process (Goethals, Dierckx de Casterlé, & Gastmans, 2012); and, thus, the knowledge, attitudes and perceptions of care personnel will act as powerful determinants of its use (Fariña-López et al., 2014; Suen et al., 2006). The analysis of this information will provide data of great value when trying to reduce the application of these devices.

One of the tools available for the measurement of perceptions of use of physical restraint is the Physical Restraint Use Questionnaire (PRUQ), initially developed by Strumpf and Evans (1988). This 17-item self-report questionnaire intends to evaluate the importance that professionals give to the use of physical restraint in patients (see Appendix). Hence, it is a test of typical performance, where answers are not right or wrong, but identify choices, preferences and strengths of feeling. Despite its relatively wide use in the field (e.g., Möhler & Meyer, 2014), studies on its psychometric properties are very scarce, which is not aligned with the recommendation of providing empirical evidence of psychometric properties in the particular settings in which the test is used (e.g., AERA, APA, & NCME, 2014). To our knowledge, only two published studies have provided evidence on validity of PRUQ scores based on internal structure. For the Japanese adaptation (Akamine, Yokota, Kuniyoshi, Uza, & Takakura, 2003), a

principal component analysis (PCA) with varimax rotation conducted in a sample of 162 licensed nurses and care workers showed three factors: providing a safe environment for patients and others (9 items), preventing therapy disruption (5 items), and preventing falls (3 items). As regards the Spanish adaptation (Fariña-López, Estévez-Guerra, Núñez González, Calvo Francés, & Penelo, 2016), a cross-validation strategy was employed in a sample of 830 registered nurses and nurse assistants. The PCA with oblimin rotation conducted in the first sub-sample showed the same three factors found by Akamine et al. (2003), which in turn were replicated in the second sub-sample with confirmatory factor analysis (CFA), after three pairs of item uniquenesses were able to be correlated, based on their similar wording. More recently, a validation of the Turkish adaptation in a sample of 95 hospital nurses has been published (Aydin Özkan, Karaca, & İster, 2017), focusing on content validity, in addition to reliability of PRUQ scores.

Given the few studies on the factor structure of PRUQ, there is still no information available about how the PRUQ dimensions function across several groups of respondents regarding type of facility, professional category or sex, and whether comparability between scores provided from these different groups is guaranteed. Measurement invariance deals with whether or not, under different conditions, measurements of the same attributes are yielded and, therefore, only when it is supported, can test scores be meaningfully compared. Thus, measurement invariance should precede any comparison of test scores between groups or over time.

Analysis of measurement invariance follows several sequential steps (e.g., Marsh et al., 2009; Vandenberg & Lance, 2000), and involves the comparison of progressive increasingly constrained nested models (from least to most restrictive): equal form (configural invariance), equivalence of factor loadings (metric or weak measurement invariance), item intercepts (scalar or strong measurement invariance), item residual variances or uniquenesses (strict measurement

invariance), correlated uniquenesses when appropriate, factor variances, factor covariances, and latent means (the latter as an alternative to more traditional ANOVA or *t*-test for comparison of observed scores). Step 1, equal form (configural invariance), which implies the same number of factors and the same items defining each construct, tests if the same simple structure exists in the sub-populations (Meredith, 1993). Step 2, equivalence of factor loadings (metric or weak measurement invariance) tests if the strength of the relation between each factor (underlying construct) and its associated items (manifest indicators) is the same for the groups being compared, i.e., if the constructs are the same across groups, thus, the factors have the same meaning. Step 3, equivalence of item intercepts (scalar or strong measurement invariance) tests whether items do not show differential item functioning (DIF) across groups, implying that mean differences at the item level can be explained because of differences in latent factors; an item does not display DIF if it measures the same in two groups, i.e., people with the same underlying trait level score the same in that item, regardless of the group they belong to. Step 4, equivalence of item uniquenesses (strict measurement invariance) tests if the item variance not accounted for by the factor is the same across groups, i.e., if items have the same quality as measurements of the underlying construct. Steps 5, 6, and 7 test the equivalence of structural parameters, which can be considered tests of population heterogeneity (Brown, 2006), that is, whether the variability or range of diversity (factor variances), inter-relationships among constructs (factor covariances), and mean levels of each underlying construct (latent means) vary across groups. For the latter, when only two groups are used in the analysis, step 7 can be skipped, because the preceding step 6 includes the significance test evaluating differences for each latent mean (Brown, 2006).

In sum, measurement invariance across type of facility and/or professional category may be particularly important for the PRUQ, given that researchers often investigate differences in such settings and, as seen before, violations of measurement invariance may preclude meaningful

interpretation of PRUQ measures. The same applies to the variable sex, which is used very often when describing or comparing PRUQ scores.

The aim of this study was two-fold. First, regarding psychometrics properties of the Spanish version of PRUQ, we carried out specifically (1a) to confirm the expected 3-factor structure across type of facility, professional category, and sex, (1b) to test measurement invariance in order to ensure that comparisons of observed PRUQ scores between these groups of respondents are meaningfully interpretable, and (1c) to evaluate the internal consistency of the derived scale scores. And second, then we aimed (2) to compare nurses' responses regarding their perceptions of the use of physical restraint on the elderly measured with PRUQ and their level of experience and training in the correct use of restraints and possible alternatives, in two types of facilities in Spain: hospitals and nursing homes.

Method

Participants and Design

A cross-sectional multicenter study was carried out in eight acute hospitals (3140 beds) and 19 nursing homes (2940 beds) located in several Spanish regions (Asturias, Canarias, Castilla-La Mancha, Catalunya, Galicia, and Madrid) selected by incidental sampling. For acute hospitals, all of them public teaching hospitals, the total population invited to participate consisted of 2487 nurses (1425 registered nurses and 1062 nursing assistants) from the following units: general surgery, intensive care, resuscitation, rehabilitation, traumatology, internal medicine, neurology, neurosurgery and medical-surgical. For nursing homes, the total population comprised 1351 nurses (204 registered nurses and 1147 nursing assistants). The inclusion criteria were: to be a registered nurse or nursing assistant, to have worked for at least one month in a unit where elderly people are regularly admitted, and to have responded to more than 50% of the

survey (as in Ware, Snow, Kosinski, & Gandek, 1993).

Measures

Sociodemographic and professional characteristics data. Sociodemographic data, extent of training in the correct use of restraints and possible alternatives, and experience in physical restraint with elderly patients was collected using an *ad hoc* survey designed for the present study.

Perception of Restraint Use Questionnaire (Evans & Strumpf, 1993). It comprises 17 items that rate the importance that professionals give to the use of physical restraint by using a 5-point Likert-type scale (1: *not at all important*; 5: *most important*) (see Appendix). Items are averaged into three scale scores, as aforementioned (Akamine et al., 2003): providing a safe environment (F1, 9 items), preventing therapy disruption (F2, 5 items) and preventing falls (F3, 3 items), in addition to a total score; therefore values for scale scores can range between 1 and 5. A higher score would indicate that the professional considers important the use of restraint in the situation described, what could be understood as a greater predisposition or favorable attitude to use it (Akamine et al., 2003; Aydin Özkan et al., 2017). We applied the Spanish adaptation (Fariña-López et al., 2016), which has shown adequate validity (3-factor structure) and reliability (internal consistency: $\alpha \geq .78$; 3-week temporal stability: $ICCa \geq .74$) in a sample of 830 registered nurses and nurse assistants (available upon request to the corresponding author). As mentioned in the introduction, the model previously confirmed in a Spanish sample by Fariña-López et al. (2016) included three correlated uniquenesses, based on inspection of the wording of the following items: items 1 and 2 ask about falling out of bed or chair, items 8 and 9 ask about pulling out a catheter or a feeding tube, and items 11 and 12 ask two related questions such as breaking open sutures and removing a dressing.

Procedure and Ethical Considerations

The Ethics Committee for Human Research of the authors' university approved the study (CEIH-2014-05). Written authorization was obtained from the hospitals and nursing homes. Participation was voluntary and data collection was anonymous (no identification data were required beyond demographical characteristics for sample description). Data collection took place from May 2012 to April 2013 in nursing homes. In a second phase of the research project, and once funding was obtained, information was collected in hospitals between February and October 2016.

A co-investigator distributed the questionnaires to the different units in an envelope, which also contained a personalized letter with the instructions and in which it explained the purpose of the study and information regarding confidentiality. After they were completed, the participants returned it, sealed, to the unit manager, where they were collected by the research team. Receipt of a completed questionnaire was interpreted as consent to participate in the study. In addition, permission was obtained from the authors of the original PRUQ to use and validate it in the Spanish population.

Data Analysis

Analyses were performed using the SPSS24 and MPlus7.11 programs. Internal structure of the PRUQ items was analyzed with CFA, using the robust maximum-likelihood (MLR) method of estimation, which is a full-information method suitable for handling missing data (Enders & Bandalos, 2001; Graham, 2009), and also robust to non-normality.

Firstly, for each group of responses across type of facility, professional category, and sex, the 3-factor model with three correlated uniquenesses proposed by Fariña-López et al. (2016) was evaluated, based on the original factor structure obtained by Akamine et al. (2003). We considered reasonable to maintain the three correlated uniquenesses between items 1 and 2, 8 and

9, and 11 and 12 due to their similar wording, in order to replicate the previous Spanish validation study, also taking into account that their inclusion did not meaningfully alter other parameter estimates (Marsh et al., 2013). A multi-group configural invariance model (equal form) with all parameters freed to vary across groups was then established. This means that one unique model jointly estimates separate parameters across each of the groups of respondents considered. The following goodness-of-fit indices were used (Jackson, Gillaspy, & Purc-Stephenson, 2009): chi-square (χ^2), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA). We considered the following thresholds: CFI and TLI > .90 and RMSEA < .08 for acceptable fit, and CFI and TLI > .95 and RMSEA < .06 for excellent fit (Brown, 2006; Marsh, Hau, & Wen, 2004).

Secondly, measurement invariance across type of facility, professional category and sex was performed following the common sequence explained previously (e.g., Vandenberg & Lance, 2000), by comparing progressively more constrained nested models across groups. For model identification we used the factor-variance strategy rather than the marker-variable strategy (see, e.g., Byrne, 2012; Kim & Yoon, 2011); for the first step (configural model), this strategy consists of freely estimating all factor loadings and intercepts, whereas factor variances and latent means are fixed, respectively, at 1 and 0 in both groups (for more detailed model identification, see, for example, Ezpeleta & Penelo, 2015), preventing using as marker-item that has not been proven to be non-invariant. For comparison between nested models, a decrease in CFI or TLI > .010 and an increase in RMSEA > .015 would indicate a meaningful decrement in fit and, therefore, non-invariance (Cheung & Rensvold, 2002). However, when sample sizes are quite unequal (as for analyses across sex), more stringent criteria for testing equivalence of factor loadings, item intercepts and uniquenesses were adopted: a decrease in CFI or TLI > .05 and an increase in RMSEA > .010 (Chen, 2007). These indexes and the proposed critical values have

been shown to be robust statistics for testing measurement invariance, not being affected by model complexity and sample size, (unlike the chi-square difference statistic which is sensitive to sample size), providing a highly sensitive statistical test, but not a practical test (Chen, 2007; Cheung & Rensvold, 2002). When full invariance was not obtained, partial invariance was examined based on modification indexes, by freeing parameters one at a time.

Internal consistency of the PRUQ scale scores based on the final CFA model was evaluated with the omega coefficient (McDonald, 1999), which has been recommended as a better choice than traditional Cronbach's alpha coefficient (Revelle & Zinbarg, 2009).

Next, comparisons among the three derived PRUQ scale scores by type of facility were performed with a two-way mixed ANOVA, considering a 2 (type of facility; between-subject variable) × 3 (scale scores: F1, F2, and F3; within-subject variable) design, whereas the comparison of the total score was conducted with Students' *t*-test. Effect sizes were measured with Cohen's *d*, and interpreted following the usual rules of thumb: a small effect for absolute values ranging between 0.20 and 0.50, medium between 0.50 and 0.80, and large above 0.80 (Cohen, 1992). Lastly, comparisons of the categorical variables, measuring experience and training on use of physical restraint by type of facility were performed using chi-square tests.

Results

Sample and Missing Data Analysis

Data from 1635 participants were incorporated after excluding those that did not meet inclusion criteria (n = 108: 33 with incomplete data on more than 50% of the items of the PRUQ, 50 with missing information regarding the professional category, and 25 who worked in units not included in the study), which represents a response rate of 42.6%. Table 1 shows the characteristics of this final sample, composed by 855 professionals working in hospitals and 780

in nursing homes.

As regards PRUQ responses, only 37 participants (2.3%) showed missing values for more than one item. The item-mean substitution method was used at the scale level (Graham, 2009), rounding off to discrete values due to the low percentage of missing data (0.91%).

Internal Structure, Measurement Invariance and Internal Consistency of PRUQ

Item mean (and standard deviation) values ranged from 2.14 to 4.28 (0.92-1.38). Given that some items deviated slightly from normality (maximum skewness of 1.31 and maximum kurtosis of 1.23, in absolute value; Muthén & Kaplan, 1992), support for the use of a robust method of estimation (MLR) was accomplished. Table 2 presents the item correlation matrix (minimum .23; mean .43; maximum.89).

Table 3 displays the results of CFAs and measurement invariance analyses. The fit for baseline models within each group (models #0a and #0b) and for configural invariance across groups (models A1, B1, and C1) was mostly acceptable (CFI ≥ .918, TLI ≥ .902, RMSEA ≤ .080), except for RMSEA = .083 in hospitals (model A0a). Altogether, support for the 3-factor model solution with three correlated uniquenesses between items 1 and 2, 8 and 9, and 11 and 12, based on Fariña-López et al. (2016), was obtained.

As regards type of facility, almost full invariance was obtained, since all factor loadings, item intercepts except one (item 13), and all uniquenesses were equivalent across nursing staff working in hospitals and nursing homes, in addition to correlated uniquenesses and factor variances and factor covariances. Thus, partial strict invariance can be assumed because more than 80% of parameters were found to be invariant (Dimitrov, 2010). Latent means (fixed at 0 in the hospital group) were slightly lower in the nursing home group for F1-providing a safe environment ($d = -0.23$; $p < .001$), and moderately higher for F3-preventing falls ($d = 0.34$; $p < .001$), and to a lesser extent for F2-preventing therapy disruption ($d = 0.17$; $p = .001$).

In relation to professional category and sex, full invariance was attained, with all parameters being equivalent, both across registered nurses and nursing assistants and across females and males. For the former, latent means (fixed at 0 in the registered nurse group) were higher in the nursing assistant group for all three factors (*d* values between 0.56 and 0.61, all $p < .001$); and for the latter, latent means (fixed at 0 in the female group) were slightly lower in the male group for both F1-providing a safe environment and F2-preventing therapy disruption ($d = -0.17$; $p \leq .038$) and also lower, but moderately, for F3-preventing falls ($d = -0.40$; $p < .001$).

These findings provide support for the equivalence of PRUQ scores for professionals working in hospitals and nursing homes, for both registered nurses and nurse assistants and for females and males, and the comparisons of scale scores between these groups will be readily interpretable. The fit for this 3-factor model in the whole sample (model D in Table 3) was satisfactory [$\chi^2(113) = 1227.6$, CFI = .927, TLI = .912, RMSEA = .078], and far better than that for an alternative 1-factor model [$\chi^2(116) = 3306.0$, CFI = .790, TLI = .754, RMSEA = .130]. All standardized factor loadings were above .60 and statistically significant ($p < .001$), and factor correlations were between .59 and .73 ($p < .001$), providing evidence for three inter-related but distinguishable factors (Figure 1).

Internal consistency was satisfactory, with omega values of .94 for F1-providing a safe environment, .95 for F2-preventing therapy disruption, .85 for F3-preventing falls, and .95 for the total score.

Comparison between hospitals and nursing homes on perception of use of physical restraint

Given the adequate results for CFA, direct PRUQ scores were calculated by applying the simple weighting method (e.g., Abad, Olea, Ponsoda & García, 2011), which are shown by type of facility in Table 4. For the 2 × 3 two-way mixed ANOVA, where the three subscale scores were considered as a repeated measures factor, the interaction term (center × scale) was

statistically significant, $F(2, 3244) = 49.45$, $p < .001$. Simple effects of type of facility within each subscale score showed that professionals in hospitals scored higher than those in nursing homes for F1-providing a safe environment, whereas the opposite pattern was observed for F2-preventing therapy disruption and F3-preventing falls, although all these differences were within the range of null or small effect sizes ($|d| \leq 0.28$). Results for these comparisons of direct scores matched those found for latent means using invariance analysis, showing low or null effects. Furthermore, the simple effects of subscale scores within each type of facility also showed a slightly different pattern: in hospitals F1-providing a safe environment scores were much lower than both F2-preventing therapy disruption ($MD = -0.94$, 95% CI [−0.89, −1.00], $p < .001$, $d = -0.98$) and F3-preventing falls ($MD = -0.85$, 95% CI [−0.79, −0.91], $p < .001$, $d = -0.86$) scores, and F2-preventing therapy disruption was very slightly higher than F3-preventing falls ($MD = 0.09$, 95% CI [0.04, 0.15], $p = .002$, $d = 0.10$), whereas in nursing homes F1-providing a safe environment scores were even lower than both F2-preventing therapy disruption ($MD = -1.21$, 95% CI [−1.15, −1.27], $p < .001$, $d = -1.34$) and F3-preventing falls ($MD = -1.27$, 95% CI [−1.21, −1.33], $p < .001$, $d = -1.42$) scores, but F2-preventing therapy disruption and F3-preventing falls did not differ ($MD = -0.06$, 95% CI [−0.12, 0.00], $p = .064$, $d = -0.07$). The total score, which is the average of the 17 PRUQ items regardless of its scale, did not differ by type of facility ($p = .653$, $d = -0.02$).

Table 5 shows the comparisons between the two types of facilities for the remaining measures regarding the use of physical restraint in elderly patients. In relation to application of restraint, a lower proportion of hospital nurses had used them "many times" (38.6% vs. 52.9%), and more of them had used them "sometimes" or "seldom" (59.3% vs. 45.0%) more than nursing home nurses, whereas the proportion of nursing staff that had "never" applied them was the same in both groups (2.1%). In addition, a lower proportion of professionals working in hospitals said

they had received some training (41.3% vs. 81.8%), had read related documentation (40.7% vs. 65.7%), and considered their training sufficient (17.7% vs. 33.4%).

Discussion

This is the first study to analyze measurement invariance of the PRUQ, based on the internal structure found by Akamine et al. (2003), with the Japanese adaptation, and replicated by Fariña-López et al. (2016) with the Spanish version. The PRUQ items presented an acceptable 3-factor structure: importance of providing a safe environment for patients and others, prevention of therapy disruption and prevention of falls. Moreover, nearly full measurement invariance was achieved across type of facility, and also across professional category and sex. Our findings show that all factor loadings and item intercepts were equivalent across the several groups of responses considered, with one exception: Item 13 ("Providing quiet time or rest for an overactive older person") showed higher scores for hospital nurses than those in nursing homes, given the same underlying level of "providing a safe environment". The fact that almost full strict invariance can be assumed implies that comparisons of observed PRUQ scale scores are readily interpretable, and differences found would reflect true differences in the latent constructs. To our knowledge, this issue has not been considered before with any of the versions of the PRUQ currently available. Internal consistency, which can also be assumed to be equivalent across groups of responses, given invariance of uniquenesses and factor variances, was excellent, with higher values for the two first dimensions, and lower, but still satisfactory, for the shorter third dimension.

As regards the direct mean scores, the ratings given by hospital nurses were slightly higher than those assigned by nursing home nurses for the importance of providing a safe environment, whereas the opposite pattern was observed for the prevention of therapy disruption

and the prevention of falls. However, taking into account the magnitude of the differences found (main effect around 0.17 points in absolute value in a scale ranging from 1 to 5), we consider that the effect of type of facility on PRUQ scores is low. Results for comparison of latent means across professional category and sex using invariance analyses matched those found in a previous study in nursing homes (Fariña-López et al., 2014), with nursing assistants scoring considerably higher than registered nurses, and females slightly higher than males.

In relation to the comparison of the three PRUQ scale scores, and as has been found in other studies (Huang et al., 2014; Krüger et al., 2013; Minnick et al., 2007; Möhler & Meyer, 2014), in general, nurses are strongly committed to ensuring a safe environment for elderly patients and preventing interference with treatments, regardless of the fact that they are restricting patient mobility. Possibly, patients are seen as vulnerable and fragile, a perception that will encourage a pro-restraint attitude (Estévez-Guerra et al., 2017).

There is, therefore, a need for the training of nurses, and continued professional development, concerning risks and complications of restraint, but especially in alternatives that respect the dignity and autonomy of the person (Goethals et al., 2012; Suen et al., 2006). As can be seen in Table 5, although the majority of professionals had applied physical restraint, more than 88% had received very little or no training, nor had they read documentation related to this issue. In fact, more than 80% of hospital-based nurses (and almost 75% in the whole sample) considered their training insufficient. However, in other countries, like the United States, federal and state requirements encourage restraint application only by properly trained personnel (Braun & Capezuti, 2000).

The results also show that there is a significant difference in the level of training received by professionals, being greater in the case of nursing home staff. Nevertheless, this training does not appear to have influenced their perception of the use of physical restraint. In this sense, it

seems that Spanish professionals still consider it an important procedure, especially if the data obtained in this study are compared with those collected in other countries (Kong, Song, & Evans, in press; Kurata & Ojima, 2014).

Nevertheless, a number of initiatives to limit the use of restraint on the elderly have been developed in recent years in many Spanish centers, and the implementation of training programs aimed at improving the delivery of person-centered care have been initiated (Muñiz et al., 2016). Therefore, we hope that there will be a significant change of attitude among professionals with respect to this procedure in the near future.

One of the limitations of the study is the moderate rate of participation (42.6%). Despite this, the sample size was large enough for the analyses conducted. In addition, the selection of centers did not follow a randomized sampling procedure. However, studying the internal structure and measurement invariance of items does not require the use of a representative sample of the population, which would be mandatory if providing norms for the interpretation of PRUQ scores. Nevertheless, data came from a large number of centers across several regions of Spain, and PRUQ scores where very similar in the majority of cases, so we consider that the results could be extrapolated to the country as a whole. Likewise, at the international level, our findings are aligned with previous results obtained in several countries, showing that nursing staff considers it more important to apply restraint to prevent both therapy disruption and falls. Another limitation is that we could only administer the PRUQ, preventing us from providing evidence on the convergent and discriminant validity of test scores. Further studies, applying another instrument assessing similar constructs, could fill this gap.

Implications for nursing management and Conclusions

Given the role that nurses play in decisions to apply restraint, especially in those countries where it is still a common practice, and the influence that their attitudes and knowledge might

have on this process, the data obtained in this type of study should make it possible to design their training with a special regard to restraint. In addition, institutional initiatives to create environments free of restraint should be promoted to help improve the quality of care.

The PRUQ seems to be a very adequate tool for detecting situations in which professionals consider the use of physical restraint on older people to be most important, regardless of the settings being explored. Thus, the Spanish version of the PRUQ can be used with psychometric guarantees to assess and to compare perceptions across different type of nursing staff, centers, and sex, given the equivalence of its factor structure.

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What does this paper contribute to the wider global clinical community?

• Physical restraint is still a common practice during the care of the elderly in hospitals and nursing homes. The Physical Restraint Use Questionnaire (PRUQ) assesses perceptions in these settings, but gaps exist regarding its internal structure.

• The PRUQ proves to be reliable and valid when evaluating perceptions on physical restraint use across type of center, professional category and sex, ensuring meaningful interpretation and comparison of test scores.

• The situations identified as more important for using physical restraint in elderly may help to design more specifically the training of nursing staff and to plan institutional interventions aimed at reducing its use.

Table 1: Characteristics of the final sample

		Hospitals (n = 855)	Nursing homes (n = 780)	Total (N = 1635)
Professional category	Registered nurses	508 (59.4%)	169 (21.7%)	677 (41.4%)
	Nursing assistants	347 (40.6%)	611 (78.3%)	958 (58.6%)
Sex	Females	722 (85.0%)	676 (89.7%)	1398 (87.2%)
	Males	127 (15.0%)	78 (10.3%)	205 (12.8%)
Age (years)	Mean (*SD*)	40.7 (8.98)	39.7 (10.33)	40.2 (9.65)
	Range	20-63	19-65	19-65
Experience (Years)	Mean (*SD*)	14.6 (8.24)	11.2 (8.01)	13.0 (8.31)

Table 2. PRUQ item correlation matrix for the total sample (N = 1635)

	pq1	pq2	pq3	pq4	pq5	pq6	pq7	pq8	pq9	pq10	pq11	pq12	pq13	pq14	pq15	pq16
pq2	.75															
pq3	.47	.58														
pq4	.35	.39	.60													
pq5	.29	.33	.47	.63												
pq6	.41	.44	.52	.55	.59											
pq7	.32	.34	.46	.56	.75	.60										
pq8	.43	.45	.40	.34	.34	.46	.40									
pq9	.41	.44	.42	.34	.34	.46	.40	.89								
pq10	.41	.42	.40	.34	.33	.46	.39	.80	.86							
pq11	.37	.39	.40	.39	.40	.48	.45	.71	.73	.74						
pq12	.32	.34	.39	.39	.42	.41	.45	.61	.64	.64	.80					
pq13	.34	.36	.47	.50	.59	.54	.59	.40	.42	.41	.42	.41				
pq14	.34	.33	.39	.46	.48	.48	.50	.38	.38	.37	.43	.39	.60			
pq15	.23	.23	.31	.44	.55	.40	.55	.31	.32	.30	.32	.32	.53	.46		
pq16	.32	.31	.33	.39	.44	.45	.46	.40	.41	.37	.43	.38	.47	.52	.47	
pq17	.30	.28	.35	.47	.48	.41	.48	.36	.37	.34	.39	.39	.54	.56	.52	.61

Table 3: Goodness-of-fit indices for measurement invariance analyses of PRUQ

	Goodness-of-fit indices				Comparison			
Model	χ^2 (df)	CFI	TLI	RMSEA	Models	ΔCFI	ΔTLI	ΔRMSEA
Measurement invariance across type of facility								
A0a: hospitals (*n* = 855)	775.2 (113)	.922	.906	.083				
A0b: nursing homes (*n* = 780)	683.5 (113)	.920	.904	.080				
A1: configural (equal form)	1458.7 (226)	.921	.905	.082				
A2: A1 plus equal factor loadings (weak invariance)	1531.9 (240)	.917	.906	.081	A2 vs. A1	−.004	.001	−.001
A3: A2 plus equal intercepts (strong invariance)	1802.0 (254)	.901	.894	.086	A3 vs. A2	*−.016*	*−.012*	.005
A3+: A3 except 1 intercept unequal (partial)	1701.1 (253)	.907	.900	.084	A3+ vs. A2	−.010	−.006	.003
A4: A3+ plus equal uniquenesses (strict invariance)	1720.8 (270)	.907	.907	.081	A4 vs. A3+	0	.007	−.003
A5: A4 plus equal CU	1743.7 (273)	.906	.906	.081	A5 vs. A4	−.001	−.001	0
A6: A5 plus equal factor variances and covariances	**1774.1 (279)**	**.904**	**.907**	**.081**	A6 vs. A5	−.002	.001	0
Measurement invariance across professional category								
B0a: registered nurses (*n* = 677)	599.6 (113)	.925	.910	.080				
B0b: nursing assistants (*n* = 958)	778.8 (113)	.918	.902	.078				
B1: configural (equal form)	1385.3 (226)	.921	.905	.079				
B2: B1 plus equal factor loadings (weak invariance)	1451.9 (240)	.918	.907	.079	B2 vs. B1	−.003	.002	0
B3: B2 plus equal intercepts (strong invariance)	1599.3 (254)	.908	.902	.080	B3 vs. B2	−.010	−.005	.001
B4: B3 plus equal uniquenesses (strict invariance)	1729.8 (271)	.901	.900	.081	B4 vs. B3	−.007	−.002	.001
B5: B4 plus equal CU	1697.5 (274)	.903	.904	.080	B5 vs. B4	.002	.004	−.001
B6: B5 plus equal factor variances and covariances	**1756.7 (280)**	**.900**	**.902**	**.080**	B6 vs. B5	−.003	−.002	0
Measurement invariance across sex								
C0a: females (*n* = 1398)	1093.1 (113)	.924	.909	.079				
C0b: males (*n* = 205)	261.3 (113)	.926	.911	.080				
C1: configural (equal form)	1363.3 (226)	.924	.909	.079				
C2: C1 plus equal factor loadings (weak invariance)	1399.5 (240)	.923	.913	.078	C2 vs. C1	−.001	.004	−.001
C3: C2 plus equal intercepts (strong invariance)	1422.2 (254)	.922	.917	.076	C3 vs. C2	−.001	.004	−.002
C4: C3 plus equal uniquenesses (strict invariance)	1431.4 (271)	.923	.923	.073	C4 vs. C3	.001	.006	−.003
C5: C4 plus equal CU	1408.2 (274)	.925	.925	.072	C5 vs. C4	.002	.002	−.001
C6: C5 plus equal factor variances and covariances	**1426.7 (280)**	**.924**	**.926**	**.071**	C6 vs. C5	−.001	.001	−.001
Single-group (whole sample; *N* = 1635)								
D: 17-item and 3-factor with 3 CU	1227.6 (113)	.927	.912	.078				

Note. dg: degrees of freedom; CFI: Comparative Fit Index; TLI: Tucker-Lewis Index; RMSEA: Root Mean Squared Error of Approximation; CU: correlated uniquenesses.

In bold: final model for each measurement invariance analysis.

Table 4: Descriptives and comparison for PRUQ direct scores between groups

	Hospital	Nursing home	Comparison between groups		
PRUQ measurement (1 to 5 points)	*M* (*SD*)	*M* (*SD*)	*MD* (95% CI)	*t* (*p*-value)	Cohen's *d*
F1: Providing safe environment	3.05 (1.01)	2.88 (0.96)	0.17 (0.08; 0.27)	3.50 (< .001)	0.17
F2: Prevention of therapy disruption	3.99 (0.91)	4.09 (0.83)	−0.10 (−0.18; −0.01)	−2.20 (.028)	−0.11
F3: Prevention of falls	3.90 (0.97)	4.14 (0.79)	−0.25 (−0.33; −0.16)	−5.57 (< .001)	−0.28
PRUQ total score	3.48 (0.86)	3.46 (0.76)	0.02 (−0.06; 0.10)	0.449 (.653)	0.02

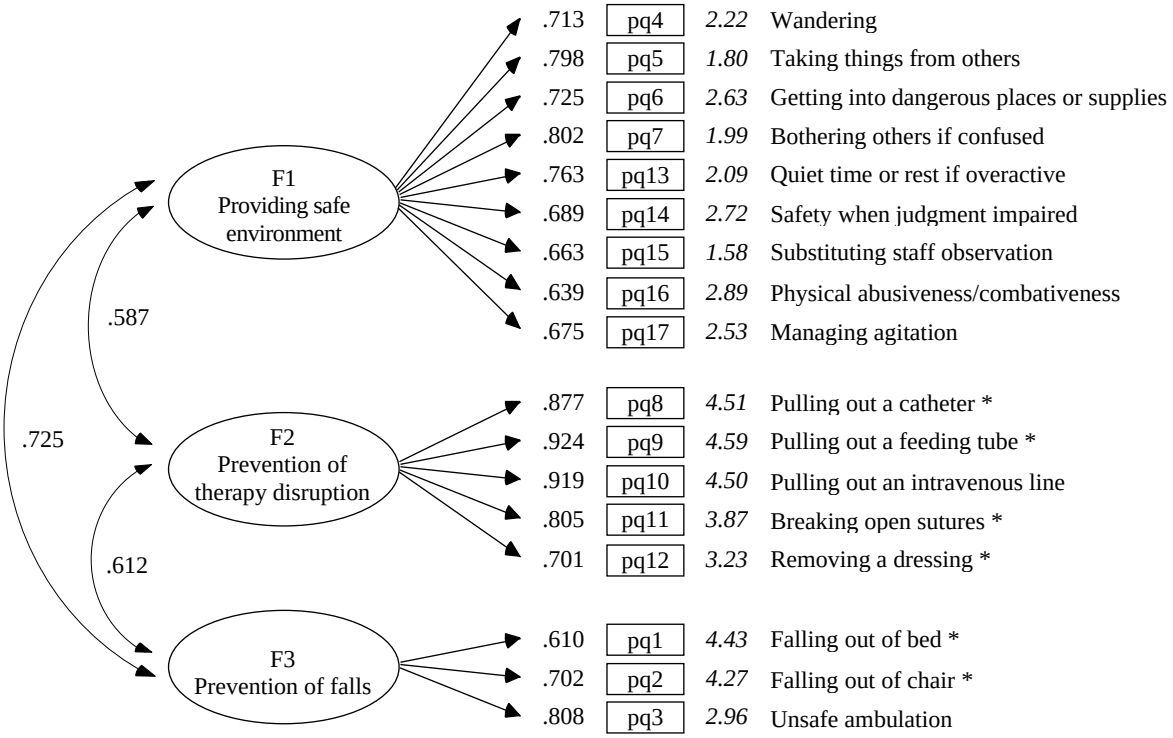
MD: mean difference.

Table 5: Experience with physical restraint

Categorical measures		Hospitals (n = 855)	Nursing homes (n = 780)	χ^2 (df)	p
Application in elderly	Many times	327 (38.6%)	410 (52.9%)	36.52 (3)	< .001
	Sometimes	407 (48.0%)	297 (38.3%)		
	Seldom	96 (11.3%)	52 (6.7%)		
	Never	18 (2.1%)	16 (2.1%)		
Training received	> 3 courses or >10 hours	17 (2.0%)	126 (16.3%)	317.42 (3)	< .001
	1-2 courses or 5-10 hours	94 (11.0%)	158 (20.4%)		
	Occasional activities	242 (28.3%)	349 (45.1%)		
	None/Do not remember	501 (58.7%)	141 (18.2%)		
Documentation read	> 5 articles	32 (3.7%)	112 (14.5%)	130.04 (3)	< .001
	3-5 articles	66 (7.7%)	113 (14.6%)		
	1-2 articles	250 (29.3%)	284 (36.6%)		
	None/Do not remember	506 (59.3%)	266 (34.3%)		
Sufficient training	Yes	151 (17.7%)	257 (33.4%)	52.88 (1)	< .001
	No	701 (82.3%)	512 (66.6%)		

Figure legends

Figure 1: Standardized parameters for the final model of PRUQ items (Model D in Table 3).



Appendix. Perceptions of Restraint Use Questionnaire (PRUQ).

Following are reasons sometimes given for restraining older people. In general, how important do you believe the use of physical restraints are for each reason listed?

1 = *not at all important* 3 = *Somewhat important* 5 = *Most important*

	1	2	3	4	5
1. Protecting an older person from falling out of bed?					
2. Protecting an older person from falling out of chair?					
3. Protecting an older person from unsafe ambulation?					
4. Preventing an older person from wandering?					
5. Preventing an older person from taking things from others?					
6. Preventing an older person from getting into dangerous places or supplies?					
7. Keeping a confused older person from bothering others?					
8. Preventing an older person from pulling out catheter?					
9. Preventing an older person from pulling out a feeding tube?					
10. Preventing an older person from pulling out an IV line?					
11. Preventing an older person from breaking open sutures?					
12. Preventing an older person from removing a dressing?					
13. Providing quite time or rest for an overactive older person?					
14. Providing for safety when judgment is impaired?					
15. Substituting for staff observation?					
16. Protecting staff or other patients from physical abusiveness/combativeness?					
17. Managing agitation?					