VALIDATION OF THE RISK-TAKING AND SELF-HARM INVENTORY FOR ADOLESCENTS IN A PORTUGUESE COMMUNITY SAMPLE

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ABSTRACT

This paper aims to adapt and validate the Risk-taking and Self-harm Inventory for Adolescents (RTSHIA) in Portuguese language. Results confirm the two-factor structure originally proposed (Risk-taking; Self-harm). Both dimensions presented an adequate internal reliability and temporal stability. Convergent validity and socio-demographic differences are analyzed. Preventive and clinical implications are discussed.

Keywords: Confirmatory Factor Analysis; Portuguese version; Risk-taking and Self-harm Inventory for Adolescents; RTSHIA.

INTRODUCTION

Adolescence is often a developmental period of heightened vulnerability for emotional (e.g., depression and anxiety, suicidal behaviors) and behavioral problems (e.g., violent delinquency, sexual risk behaviors) (Steinberg, 2007, 2008; Wolfe & Mash, 2006). This is a great concern among health professionals and governments, since the leading causes of death among young people stem from accidents and violence resulting from high-risk behaviors (Irwin, Burg, & Cart, 2002; Wolfe & Mash, 2006). For instance, risk-taking behaviors account for 70% of adolescent mortality and this trend tends to begin in early adolescence and reach a peak in late adolescence (15-19 years old) (Irwin et al., 2002).

Risk-taking refers to the tendency to engage in behaviors that have the potential to be harmful or dangerous. The major risk behaviors during adolescence include alcohol and drug abuse, risky driving, unsafe sexual behavior, school failure and dropout, and delinquency/crime/violence (Steinberg, 2007, 2008). Data suggest that the engagement in a risk behavior (e.g., binge drinking) increase the likelihood of engaging in other risky behaviors (e.g., substance misuse, unsafe sexual behavior, self-injury) and other negative consequences that result from these behaviors, which might have negative implications on development later in life (Hair, Park, Ling, & Moore, 2009; Hawton, Saunders, & O'Connor, 2012). Thus, the engagement in high-risk behaviors contributes to morbidity and mortality among adolescents, and much of these behavioral causes is preventable (Irwin et al., 2002).

However, some of these behaviors seen as problematic are normative, biologically driven (Steinberg, 2007), instrumental and goal-directed to achieve important roles in adolescence (e.g., gaining peer acceptance, establishing autonomy from parents), which explains why risk behaviors can be so difficult to change and eliminate (Wolfe & Mash, 2006). Moreover, research consistently show that experimental risk behaviors are interconnected and the engagement in multiple risky behaviors enhances the likelihood of poor outcomes and may compromise short and long-term health (e.g., Hair et al., 2009; Hawton et al., 2012).

Other important issue in adolescence, which has received increasing attention, is internalizing problems such as depression, anxiety, deliberate self-harm and suicidal behaviors (Hawton et al., 2012; Wolfe & Mash, 2006). Indeed, the transition into adolescence is considered a vulnerable period for the onset and development of these internalized symptoms. In particular, for deliberate self-harm behaviors the rates are higher among younger cohorts (Klonsky, Muehlenkamp, Lewis, & Walsh, 2011; Madge et al., 2008, 2011). Self-injury is more common in adolescents and young adults as compared to adults and there is evidence that typically begins between the ages of 12 and 16 years old (Gratz & Chapman, 2009; Klonsky & Muehlenkamp, 2007; Klonsky et al., 2011).

In community samples of adolescents, studies have found approximately 10-15% of adolescents have self-injured at least one time (Laye-Gindhu & Schonert-Reichl, 2005; Muehlenkamp & Gutierrez, 2004; Ross & Health, 2002). Other data also indicate that adolescents are at higher risk than adults, with approximately 12-21% reporting lifetime history of deliberate self-harm without suicidal intent (e.g., Glassman, Weierich, Hooley, Deliberto, & Nock, 2007). Others have cited even higher rates, varying between 20 to 40% in community samples of young people (Cerrutti, Manca, Presaghi, & Gratz, 2011; Giletta, Scholte, Engels, Ciairano, & Prinstein, 2012; Mikolajczak, Petrides, & Hurry, 2009).

The most common methods of self-harm (SH) are skin cutting and self-hitting (Cerutti et al., 2011; Madge et al., 2008, 2011; Muehlenkamp & Gutierrez, 2004, 2007; Ross & Heath, 2002). Regarding sex differences, research indicate that SH is more common in female adolescents than in male adolescents (Giletta et al., 2012; Hawton et al., 2012; Klonsky et al., 2011; Laye-Gindhu & Shonert-Reichl, 2005; Madge et al., 2011; Ross & Heath, 2002). However, other studies have found similar rates for both genders (Cerutti et al., 2011; Gratz, 2001; Muehlenkamp & Gutierrez, 2004), with significant differences in methods of self-injury (Klonsky & Muehlenkamp, 2007). Females appear more likely to cut their skin, whereas males appear more likely to burn or hit themselves (Klonsky & Muehlenkamp, 2007; Laye-Gindhu & Shonert-Reichl, 2005; Rodham, Hawton, & Evans, 2004).

The co-occurrence and high prevalence of risk-taking and deliberate self-harm among adolescents from community and clinical settings emphasize the advantages in the assessment of both behaviors simultaneously. Indeed, empirical evidence demonstrate that self-harm is linked with a range of negative consequences, such as psychosocial problems (e.g., social isolation, poor academic achievements, interpersonal conflicts), psychopathology (e.g., emotional distress/dysregulation, anger, depression, anxiety, impulsivity, dissociation, loneliness, self-punishment), health risk behaviors and risk for attempt suicide (Laye-Gindhu & Shonert-Reichl, 2005; Madge et al., 2011; Muehlenkamp & Gutierrez, 2007; Ross & Heath, 2002). In addition, Cerutti et al. (2011) demonstrate significant associations between deliberate self-harm and a variety of externalizing problems, including conduct problems, antisocial behavior, delinquent behavior, drug and alcohol use among community sample of young people. Taken together, these findings point out that adolescents who engage in multiple self-harming and risk-taking behaviors are likely to experience increased psychological impairment and may be at risk, albeit unintentionally, of death (Muehlenkamp & Gutierrez, 2007).

Given the high prevalence of RT and SH behaviors among adolescents and its consequent negative outcomes, reliable and valid assessment instruments can be highly useful tools in assessment of these behaviors (Klonsky et al., 2011). Among the available instruments for

assessing deliberate self-harm and suicidal attempts and their functions, motivations or reasons, several were developed specifically for used in research studies with adult population (Gratz, 2001; Guttierez, Osman, Barrios, & Kopper, 2001; Osman et al., 2001) that have been widely used in samples of adolescents (Cerutti et al., 2011; Muehlenkamp & Gutierrez, 2007). However, these measures have not been validated with adolescents (Vrouva et al., 2010). Moreover, the majority of research with adolescents' samples about deliberate self-harm and/or suicidal attempts asks specific screening questions (few items) in accordance with the aims of each study (Madge et al., 2008, 2011; Mikolajczak et al., 2009).

For adolescent population there are some self-report questionnaires to measure RT behaviors, such as the Adolescent Risk-Taking Scale (Alexander et al., 1990), the Involvement Scale of the Risk-Involvement Ratings (Lavery et al., 1993), the Adolescent Risk-Taking Questionnaire (Gullone, Moore, Moss, & Boyd, 2000) and the Adolescent Risk Behavior Screen (Jankowski et al., 2007). However, fewer instruments combine these two dimensions (RT and SH). The assessment of both behaviors simultaneously may become the instrument easier, more convenient and economical for young people.

Vrouva, Fonagy, Fearson, and Roussow (2010, p.852) developed the Risk-Taking and Self-harm Inventory for Adolescents (RTSHIA) that was originally designed to assess risk-taking (RT) and self-harm (SH) behaviors in adolescents from community and clinical settings. The RT-related items ranged from mild behaviors (e.g., smoking tobacco; taking chances while doing one's hobbies) to serious (e.g., gang violence; putting oneself at risk of sexual abuse). The SH-related items ranged again from milder behaviors (e.g., picking at wounds; pulling one's hair out) to more serious (e.g., taking an overdose; trying to commit suicide). This SH subscale include items related with self-mutilation behaviors, disordered eating, self-demeaning behavior and SH ideation, with or without suicidal intent. The majority of the items contain the word intentionally or the phrase to hurt or punish yourself in order to indicate specific deliberation or intentionality of the behavior (Vrouva et al., 2010).

The original study of RTSHIA' development and psychometric properties (Vrouva et al., 2010) was conducted in two samples of 651 adolescents from community with ages between 12 and 19 years old and 71 young people referred to mental health services for SH behavior with ages between 12 and 18 years old. The authors (Vrouva et al., 2010) performed an exploratory (EFA) and confirmatory factor analyses (CFA) of the RTSHIA. The initial development of the scale comprised 33 items and another one categorical item (absence *vs*. presence of deliberate self-harm). Before performing EFA, two items (21 and 26) were removed since these items presented low item reliability indices and excessive and positive skewness and kurtosis. The remaining 31 items (note that the categorical item is not included in the analysis) were subjected

to a series of unweighted least squares principal axis factoring. Two items (1, 2) were removed due to low communalities. Other three items (8, 9, 24) were removed because they were cross-loading items. Thus, the EFA final solution yielded 26 items and indicated a two-factor structure: Self-Harm (SH) explaining 49.8% of variance and Risk-taking (RT) explaining 10.8% of the variance and both accounted for 60.6% of the total variance. The RT factor consists of eight items, including illegal activities, school dropout, staying out late at night without parental knowledge, participating in gang violence, sexual RT (multiple sexual partners within a short period of time) and substance abuse (smoking tobacco, alcohol binge drinking and using illicit drugs). The SH factor, composed by eighteen items, include diverse forms of self-mutilation (e.g., cutting, burning, biting), overdosing and attempting suicide. This factor also comprised items concerning self-demeaning behavior, disordered eating and self-harm and suicidal thoughts (Vrouva et al., 2010). This SH factor also includes a categorical item (item 22) assessing the presence or absence of deliberate self-harm and the part(s) of the body that were deliberately injured, if applicable. The CFA results confirm two-factor oblique model, assuming that RT and SH are different but linked constructs (Vrouva et al., 2010). This result is also demonstrated by the correlation between both dimensions (r = .44). Additionally, the factorial invariance across of gender and age groups was demonstrated (Vrouva et al., 2010).

In regard to reliability, both factors revealed high internal consistency with Cronbach's alpha of .85 for RT and .93 for SH. In addition, both components had a good three-month test-retest reliability (r = .90 and r = .87 for RT and SH, respectively), indicating a temporal stability over the time (Vrouva et al., 2010). Concerning convergent validity, the RTSHIA was found to be significantly associated with depressive affect, borderline features, several psychopathological symptoms and dissociative experiences. In particular, RT had positive and high correlation with substance abuse, unruly behavior, delinquent predisposition, impulsive propensity, and moderate correlation with depressive affect. There was a negative correlation between RT and anxious feelings. In turn, SH associated highly and positively with suicidal tendency, introversive, self-devaluation, childhood abuse and depressive affect, borderline features and dissociative experiences (Vrouva et al., 2010).

Recent research about injuries and risk-taking behaviors in adolescents' Portuguese population revealed that the high rates of injury-related events are linked to violence (e.g., fighting and carrying weapons) and substance use (alcohol and drugs) (Vital, Oliveira, Machado, & Matos, 2011). Two other studies, about self-harm in Portuguese adolescents, showed prevalence rates ranging between 15.6% in last 12 months (Reis, Matos, Ramiro, & Figueira, 2012) and 27.7% in a lifetime history (Gonçalves, Martins, Rosendo, Machado, & Silva, 2012). These studies used some injury-related items to assess separately these risk or destructive behaviors. Other study, conducted in a large sample of Portuguese adolescents from community, presented a self-report

questionnaire developed to assess self-harm and its functions, impulsivity behavior and suicide ideation, named The Impulse, Self-harm and Suicide Ideation Questionnaire for Adolescents (ISSIQ-A; Barreto et al., 2015).

Despite the high prevalence of risk-taking and self-harm behaviors in Portuguese adolescents (Cunha, Xavier, & Paiva, 2013; Ferreira, Matos, & Diniz, 2011; Gonçalves et al., 2012; Guerreiro et al., 2009; Reis et al., 2012; Vital et al., 2011; Xavier, Cunha, Pinto-Gouveia, & Paiva, 2013), the available assessment instruments to measure simultaneously RT and SH behaviors are still scarce.

Therefore, the main goal of this paper is to adapt and validate the Portuguese version of the Risk-taking and Self-harm Inventory for Adolescents (RTSHIA). Specifically, this study examines the factor structure of the RTSHIA using a Confirmatory Factor Analysis approach and explores the construct-related validity. In the convergent validity study, theoretically-related constructs were chosen, namely measures of general affective states, minor life events and interpersonal relations with peers. According to the state-of-the-art, it is hypothesized that risk-taking and self-harm is positively associated with negative affect, daily disruptions in life and negative peer relationships. Inversely, negative correlations between risk-taking and self-harm and positive affect are expected.

METHOD

Participants

The sample consists of 868 adolescents, which of 382 are boys (44%) and 486 are girls (56%), from 7th to 12th grade (years of education' $M = 9.89$, $SD = 1.47$). The mean age was 15.32 (SD = 1.66) years old, ranging from 12 to 19. There are sex differences concerning age, $t_{(866)} = -2.540$, $p = .011$, and years of education, $t_{(866)} = -3.275$, $p = .001$, indicating that girls are older and have more years of education than boys (M_{age} = 15.44, SD_{age} = 1.66 *vs*. M_{age} = 15.16, SD_{age} = 1.65; $M_{years.education}$ = 10.00, $SD_{years.education}$ =1.45 *vs*. $M_{years.education}$ = 9.68, $SD_{years.education}$ = 1.47).

For the test-retest purposes, a sample of 57 adolescents was used, including 29 boys (50.9%) and 28 girls (49.1%), with a mean age of 14.9 (SD = 0.91), and a mean of years of education of 8.53 (SD = 0.50).

Measures

The **Risk-taking and Self-harm Inventory for Adolescents** (**RTSHIA**; Vrouva et al., 2010) is a self-report questionnaire to assess risk-taking (RT) and self-harm (SH) behaviors in adolescents from community and clinical settings. This measure is initially composed by 34 items. The 12 RT-related items ranged from mild behaviors, such as smoking tobacco and taking chances while doing one's hobbies, to serious RT, such as participating in gang violence and putting oneself at risk of sexual abuse. The 22-SH related items include intentionally behaviors to hurt oneself, ordered in terms of severity. This SH items are about self-mutilation (e.g., cutting, burning, biting, scratching one's skin, etc.), disordered eating (e.g., starving oneself, eating too much and using laxatives), self-demeaning behavior (e.g., staying in a relationship with somebody who repeatedly hurt one's feelings and trying to make oneself suffer by thinking horrible things about oneself) and SH ideation with or without suicidal intent (e.g., thinking seriously about harming a part of one's body, trying to commit suicide). There is an item about SH leading to hospitalization or to an injury severe enough to require medical care. There is also one dichotomous question about the part(s) of the body that were deliberately injured, if applicable, followed by options (e.g., torso, belly, buttocks, hands, arms, fingers, nails). Except for this dichotomous item, all items are rated on a 4-point scale (0 = *never*; 1 = *once*; 2 = *more than once*; 3 = *many times*) referring to lifelong history. Higher scores on RT and SH subscales are indicative of higher involvement in RT and SH behaviors, respectively.

The **Positive and Negative Affect Schedule** (**PANAS**; Watson, Clark, & Tellegen, 1988; Portuguese version for Children and Adolescents by Carvalho, Baptista, & Gouveia, 2004) consists of 20-item scale that comprise two mood scales, one measuring positive affect (PA; 10-items) and other measuring negative affect (NA; 10-items). Respondents are asked to rate the extent to which they have experienced each particular emotion during the past week, using a 3-point scale (1 = *not at all*; 2 = *sometimes*; 3 = *many times*). The scores may range between 10 and 30 for each subscale and higher scores reflect greater positive affect and negative affect, respectively. In the original study, Watson and colleagues (1988) found high alpha reliabilities, ranging from .86 to .90 for PA and from .84 to .87 for NA. The Portuguese version (Carvalho et al., 2004) presented good internal consistency for both subscales, with Cronbach's alpha of .76 for PA and .83 for NA. In the present study, the Cronbach's alpha coefficients were .80 for PA and .86 for NA.

The **Daily Hassles Microsystem Scale** (**DHMS**; Seidman et al., 1995; Portuguese version by Paiva, 2009) assesses the perceived daily hassles within four microsystems, such as the family, peer, school, and neighborhood contexts. This scale comprises 25 items and five-factor structure: (i) school hassles (5 items), that assess perceived difficulties in academic area (e.g.,

"trying to make good grades"); (ii) family hassles (4 items), which represent parental or family conflict (e.g., "trouble with parents over how you spend your time after school and on weekends"); (iii) neighborhood hassles (5 items), which assess hassles in the neighborhood (e.g., "being scared by someone in your neighborhood"); (iv) peer hassles (5 items), which represent trouble with friends (e.g., "trouble with friends over beliefs, opinions and choices"); and (v) resources hassles (6 items), which represent hassles over lack of resources, primarily in the home (e.g., "not having your own room"). For each item, respondents answer *yes* or *no* to whether the event "hasn't happened this month", and if the hassles had occurred, how much of a hassles it was, on a 4-point scale (1= *not at all a hassles*; 4= *a very big hassles*). According to the original study, rating of "hasn't happened this month" and "not at all a hassle" were scored as 1 in calculating the hassles intensity scores, in order to avoid missing subjects. This scale allows the sum of scores for each hassles subscale and the total score of the hassles intensity (25 items), and high scores indicate greater levels of daily hassles within microsystems. The original study (Seidman et al., 1995) found internal consistency reliability ranging between adequate and low. The 25-item total daily hassles intensity scale had a good internal consistency (α = .89). In the present study we only used peer hassles subscale (α = .77) and total score (α = .80) because the others daily hassles subscales revealed inadequate internal consistency.

The **Peer Relations Questionnaire** (**PRQ**) for Children (Rigby & Slee, 1993; Portuguese version by Silva, 2010) assesses styles of interpersonal relations. This scale consists of 20 items, in which 6 items assess the tendency to bully others (e.g., "I like to make other kids scared of me"), 5 items measuring the tendency to be victimized by others (e.g., "I get picked on by other kids"), 4 items measuring the tendency to act in a prosocial or cooperative way (e.g., "I share things with others") and the remaining items as filler. Responses for each item were answered according to a 4-point scale (1= *never*; 4= *very often*). High scores indicate greater frequencies on each behavioral tendency. Rigby and Slee (1993) found good internal consistency reliability for the three factors ranging between .75 and .78 for Bully subscale; .86 and .78 for Victim subscale; .71 and .74 for Prosocial subscale. In the present study the Cronbach's alpha were adequate, with α = .70 for Bully subscale, α = .74 for Victim subscale, and α = .67 for Prosocial subscale. In this study only Bully and Victim subscales were considered.

Procedures

According to recommendations of the International Test Commission (ITC, 2005), the scale went through a rigorous translation and back-translation process in order to guarantee the comparability of content of the RTSHIA Portuguese version and the original one. Firstly, a psychologist with strong English language skills, spoken and written, translated the items into

Portuguese. Lexical and conceptual aspects were analyzed in order to maintain each item content. Then, an English translator verified the content of the final version of the RTSHIA through a back-translation process, repeated until the meaning of each item corresponded to the original item of the RTSHIA.

Previous to the administration of the questionnaires, ethical approvals were obtained by the Ministry of Education and the National Commission for Data Protection from Portugal. Then, the Head Teacher of the school and parents were informed about the goals of the research and gave their consent. Adolescents were informed about the purpose of the study and aspects of confidentiality. They voluntarily participated by filled out the instruments in the classroom. The teacher and researcher were present to provide clarification if necessary and to ensure confidential and independent responding.

RESULTS

Preliminary data analysis

Data were tested for univariate and multivariate normality (skewness (Sk) > |3| and kurtosis (Ku) > |10|; Kline, 2005), and several items showed excessive and positive values of asymmetry and univariate and multivariate kurtosis, indicating that the data were multivariate non-normal. To address this issue, the weighted least squares means and variance adjusted (WLSMV) estimation was chosen (Flora & Curran, 2004). This asymmetric distribution of the data may be due to the behavioral nature of the construct assessed in this questionnaire. Indeed, some items were developed to measure high-risk behaviors (i.e., risk-taking and self-harm) and in a non-clinical sample is expected that there are a huge amount of respondents who never had these behaviors in their long lifetime. Additionally, in the analyses, it seems important to comprise respondents who never had done these risk behaviors in order to compare these individuals with those who engage in more than one risk-taking and/or self-harm behaviors. To inspect for possible outliers Mahalanobis Distance squared (D^2) were used and results suggest the presence of some high values, but we decide by the maintenance of them in order to preserve the factor's variability (Kline, 2005).

Data Analysis

Statistical analyses were carried out using PASW Software (Predictive Analytics Software, version 18, SPSS, Chicago, IL, USA) for PCs and Mplus, version 6.11 (Muthén & Muthén, 1998-2012).

Descriptive statistics were computed to explore frequencies for RT and SH, and demographic variables. Sex differences were tested using independent samples t tests. Additionally, age groups and academic grade differences were tested using one-way independent ANOVA. The post hoc Games-Howell procedure was chosen because it is the most powerful comparatively with others post hoc tests and is also accurate when population variances are different or when data are not normally distributed (Field, 2013). The internal reliability was analyzed through Cronbach's alpha coefficient and corrected item-total correlations, which values were considered adequate higher than .3 (Field, 2013). Pearson correlation coefficients were performed to explore the relationships between RTSHIA and positive and negative affect (PANAS), daily hassles microsystems (DHMS) and peer relationships (PRQ) (Tabachnick & Fidell, 2007).

A Confirmatory Factorial Analysis (CFA) was performed using Mplus (Muthén & Muthén, 1998-2012) to confirm the two-factor structure of the RTSHIA (Vrouva et al., 2010) in a Portuguese adolescents' sample. This technique of CFA from Structural Equation Modelling (SEM) family is used to study the relationships between a set of observed variables and a set of continuous latent variables (Muthén & Muthén, 1998-2012), according with a given theoretical model (Maroco, 2010). We chose this methodology because prior research indicates two factor oblique model for the RTSHIA, assuming that risk-taking (RT) and self-harming (SH) behaviors are different but linked constructs (Vrouva et al., 2010). A robust weighted least square (WLSMV) parameter estimation was chosen over other estimation methods (Brown, 2006; Flora & Curran, 2004). This WLSMV estimator has been recommended for multivariate nonnormal data and for categorical and ordinal variables (Brown, 2006; Muthén, 1984; Muthén, du Toit, & Spisic, 1997), based on simulation studies (Hsu, 2009). As stated before, the non-normal distribution of our data may be explained by the behavioral nature of the constructs assessed in this questionnaire.

In the evaluation of the model, we used the Chi-square test (χ^2), which assess the discrepancy between the proposed theoretical model and the data; and smaller values indicate better model-fit (Kline, 2005). However, since this index is very sensitive to sample size and to the violation of the multivariate normality assumption (Schermelleh-Engel, Moosbrugger & Muller, 2003) we used simultaneously other global fit indices. The following statistics and recommended cut-points were used to evaluate overall model fit: Comparative Fit Index (CFI $\geq$ .95, very good; Hu & Bentler, 1999),Tucker-Lewis Index (TLI $\geq$ .95, very good; Hu & Bentler, 1999), Root Mean Square Error of Approximation (RMSEA $\leq$ .05, very good fit; $\leq$.08, acceptable fit; $\geq$ .10, poor fit; Hu & Bentler, 1999) and Weighted Root-mean-square Residual (WRMR $\leq$ 1; Yu, 2002).

We conducted model respecification, i.e., modifications to the original hypothesized model to have a better fitting or more parsimonious model. Modification involved checking factor loadings to ensure their significance and examining Mplus derived modification statistics. The improvement of model fit was based on Modification Index (MI; values equal to or greater than 10; $p < .001$; Sörbom, 1989).

In regard to local adjustment, we analyzed the individual parameters in the model: items' standardized loadings (λ) and individual reliability (R^2) to ensure the appropriateness of the estimates and their statistical significance (Kline, 2005). Usually, it is expected that all items of the factor present values of $\lambda \geq .50$, indicating the factorial validity of the model, and $R^2 \geq .25$ suggesting item's individual reliability (Kline, 2005).

Study I: Confirmatory Factor Analysis

Prior to performing the CFA and similar to the original study (Vrouva et al., 2010) two items (21 and 26) were discarded. In the Portuguese adolescents' sample, more than 98% of respondents answered never to those items and this result in excessive positive Skewness (10.21 and 11.54, respectively) and Kurtosis (113.50 and 141.22, respectively). Although also asymmetric, the remaining items were answered positively (once, more than once, or many times) by at least 5% of the sample.

A CFA was conducted to test the latent two-factor oblique structure of the Portuguese version of RTSHIA. This scale comprised two latent variables (Risk-taking and Self-harm) and 31 observed variables (31-items). The results of CFA show a significant value of the chi-square test, WLSMV $\chi^2_{(433)} = 1005.211$, $p < .001$, and a good global model-fit: CFI = .957, TLI = .954, RMSEA = .039, p (rmsea ≤ .05) = 1.000, 90% CI = [0.036, 0.042], WRMR = 1.473. However, regarding local adjustment, the standardized loadings ($\lambda \geq .50$) are of low to strong magnitude. The following items have the smallest standardized estimates: item 4 ($\lambda = .395$) and item 1 ($\lambda = .469$), which correspond to the Risk-taking Factor (F1); and item 23 ($\lambda = .378$), which correspond to the Self-harm Factor (F2). The remaining estimates for the standardized factor loadings range from .584 (item 3 from F1) to .944 (item 20 from F2). Additionally, those items present the lowest *R*-square coefficients (i.e., the amount of variance accounted for by the respective factor): item 4 ($R^2 = .156$), item 1 ($R^2 = .220$) and item 23 ($R^2 = .143$). Given that these items individually are particularly weak for explaining each latent factor and may indicate very high levels of error (Hooper, Coughlan, & Mullen, 2008), we have chosen to remove them from the model. The remaining variables have R^2 values that range from .341 (item 3 from F1) to .891 (item 20 from F2).

We further examine the modification indices that indicate the need for possible respecification of the model: the highest value suggests add a path from item 24 to the F1 latent variable and to the F2 latent variable, indicating that the item 24 loading in both factors (also termed as cross-loading) and consequently may not contributing for a clear definition of the RTSHIA's factors; for this reason, the item 24 was removed.

The respecified model (without items 4, 1, 23 and 24) showed a very good factorial validity and better fit to data. Although the Chi-square test showed a value of WLSMV χ^2 (323) = 719.424, $p < .001$, the overall fit indexes indicated a very good fit to the data: CFI = .967, TLI = .966, RMSEA = .038, p (rmsea $\leq$ .05) = 1.000, 90% CI [0.034, 0.041], WRMR = 1.365. The correlation between RT and SH subscales was r = .43.

All items presented standardized loadings greater than .50, ranging between λ = .562 (item 6) and λ = .946 (item 20) and all the path values were statistically significant ($p < .001$), indicating a good factorial validity. In addition, all items showed R^2 clearly above the cut point of .25, ranging between R^2 = .316 (item 6) and R^2 = .895 (item 20). The Standardized Factor Loadings and Squared Multiple Correlations (R^2) for all items of the respecified model of RTSHIA are presented at Table 1. Overall, the modified model demonstrated a very good global and local adjustment for the Portuguese version of the RTSHIA. Thus, we considered this a plausible model for explaining the factorial structure of the Portuguese version of the RTSHIA.

Study II: Reliability of the Portuguese version of the RTSHIA

Concerning item reliability, the 10-items that composed the RT dimension showed item-total correlations ranging between .311 (item 9) and .653 (item 10). The 17-items from SH dimension showed item-total correlations raging between moderate to high. Although item 27 showed the lowest item-total correlation (.279), it was kept because if removed the overall reliability did not improve (cf. Table 2). The corrected item-total correlations demonstrated adequate values that confirm the adequacy of these items to the overall measure and its internal consistency. This Portuguese version of RTSHIA presented a good internal consistency for both dimensions, with Cronbach's alpha coefficients of .79 for RT (10 items) and .89 for SH (17 items) (cf. Table 2).

Test-retest reliability

In the test-retest reliability (Pearson r), 57 adolescents completed a retest of the RTSHIA after a 3-week interval. The RTSHIA showed good test-retest reliability with correlation coefficients of r = .90 ($p < .001$) for both subscales.

Table 1

Standardized Factor Loadings and Squared Multiple Correlations (R^2) for the items considered in the final model of the Portuguese version of RTSHIA

RTSHIA Item	**Standardized Factor Loadings**	***R²***
F1 – Risk-taking		
2	.608	.370
3	.582	.339
5	.766	.587
6	.562	.316
7	.625	.391
8	.706	.499
9	.733	.537
10	.824	.678
11	.906	.820
12	.856	.733
F2 – Self-harm		
13	.884	.781
14	.749	.561
15	.746	.557
16	.716	.512
17	.785	.616
18	.853	.727
19	.884	.781
20	.946	.895
25	.643	.413
27	.644	.415
28	.593	.352
29	.815	.664
30	.615	.379
31	.835	.697
32	.768	.589
33	.784	.615
34	.699	.488

Table 2

Means, standard deviations, item-total correlations, Cronbach's alphas for two factors and Cronbach's alpha if item deleted (N= 868)

Item	*M*	*SD*	*r* item-total	Cronbach's Alpha
Risk-taking (10 items)	3.87	4.32		.79
2	0.53	0.90	.403	.78
3	1.08	1.00	.431	.78
5	0.21	0.59	.539	.76
6	0.12	0.44	.346	.78
7	0.10	0.41	.341	.78
8	0.16	0.55	.443	.77
9	0.06	0.30	.311	.79
10	0.45	0.83	.653	.74
11	0.29	0.75	.648	.75
12	0.88	1.12	.622	.75
Self-harm (17 items)	3.45	5.79		.89
13	0.24	0.63	.681	.88
14	0.09	0.39	.467	.89
15	0.21	0.56	.581	.89
16	0.16	0.51	.511	.89
17	0.26	0.67	.595	.89
18	0.23	0.60	.688	.88
19	0.10	0.40	.596	.89
20	0.26	0.65	.809	.88
25	0.16	0.52	.462	.89
27	0.04	0.27	.279	.89
28	0.40	0.69	.434	.89
29	0.46	0.83	.691	.88
30	0.06	0.31	.304	.89
31	0.33	0.74	.694	.88
32	0.35	0.74	.592	.89
33	0.06	0.31	.468	.89
34	0.04	0.23	.384	.89

Study III: Construct Validity

Descriptive Data Concerning Sex, Age and Grade in School

Total scores of the RTSHIA subscales were computed by summing up the responses to the 10 items of the RT dimension and 17 items of the SH dimension, yielding a possible score range of 0-30 for RT and 0-51 for SH. The RT total score has values of skewness of 1.59 and kurtosis of 2.65. The SH total score presented values of skewness of 2.48 and kurtosis of 6.50. These values do not violate the assumption of normality, as recommended by Kline (2005) (skewness (Sk) > |3| and kurtosis (Ku) > |10|).

Means, standard deviations, t-test Student for sex differences and ANOVA's *F* for age and grade differences are shown in Table 3. Concerning sex, there were significant differences between boys and girls for RT, $t_{(775.507)} = 3.85$, $p < .001$, and for SH, $t_{(865.626)} = -3.82$, $p < .001$. Results showed that boys have more risk-taking behaviors than girls. In turn, girls report more self-harm behaviors comparatively with boys.

Table 3

Means (M) and standard deviations(SD) for the RTSHIA by sex, age and grade (N=868)

			RT			SH		
		N	***M***	***SD***	***t/F***	***M***	***SD***	***t/F***
Sex	Boys	382	4.51	4.53	3.85***	2.63	5.02	-3.82***
	Girls	486	3.36	4.09		4.09	6.26	
Age	12-14	312	2.47	3.25	34.45***;	3.63	5.68	3.02; 2.62
	15-16	322	4.11	4.09		3.79	6.45	
	17-18	234	5.39	5.22	31.49***	2.74	4.86	
Grade	7-8	191	2.14	3.13	38.51***;	3.57	5.33	0.39; 0.41
	9-10	370	3.60	4.01		3.59	6.02	
	11-12	307	5.26	4.85	37.37***	3.21	5.80	
Total		868	3.87	4.32		3.45	5.79	

Note. ***p<.001. RTSHIA = Risk-taking and Self-harm Inventory for Adolescents; RT = Risk-taking subscale; SH = Self-harm subscale.

A one-way ANOVA was used to examine the differences between age groups for RT and SH behaviors. Since the assumption of homogeneity of variance was compromised for this data (Levene's F test: $p < .001$ and $p = .003$ for RT and SH subscales, respectively), the Welch's F and Brown-Forsythe's *F* were used, indicating that at least two or the three age groups differ

significantly on their means scores of RT subscale, Welch's $F_{(2, 509.33)} = 34.45$, $p < .001$; Brown-Forsythe's $F_{(2, 630.55)} = 31.49$, $p < .001$. No significant differences were found for SH subscale, Welch's $F_{(2, 569.25)} = 3.02$, $p = .05$ and Brown-Forsythe's $F_{(2, 858.49)} = 2.62$, $p = .073$. Results of the *post hoc* comparisons, using the Games-Howell *post hoc* procedure, showed that younger adolescents (12-14 years old) had significantly lower levels of risk-taking behaviors than the older groups (15-16 and 17-19 years old). Results also indicated that the adolescents with 15-16 years old report less risky behaviors than the older group (17-19 years old).

Concerning years of education, there were differences between grade groups in RT behaviors, Welch's $F_{(2, 526.99)} = 38.506$, $p < .001$ and Brown-Forsythe's $F_{(2, 794.62)} = 37.37$, $p < .001$). No differences were found for SH behaviors. Results of the Games-Howell *post hoc* procedure comparison showed that adolescents from 7-8 grades reported less engagement in risk-taking than adolescents from 9-10 grades and from 11-12 grades. Additionally, adolescents who frequent 9-10 grades manifest less risky behaviors than adolescents who frequent 11-12 grades.

Convergent Validity

To evaluate the convergent-related validity of the RTSHIA, Pearson product moment correlation coefficients were calculated between the RTSHIA subscales and positive and negative affect (measured by PANAS), daily hassles microsystems (measured by DHMS) and peer relationships (measured by PRQ). Results indicated that the RT subscale have only a significant and moderate correlation with the tendency to bully others ($r = .35$, $p < .001$; $N = 794$). In terms of affect subscales, SH subscale presented a moderate and positive correlation with negative affect ($r = .36$, $p < .001$; $N = 867$) and a low and negative correlation with positive affect ($r = -.19$, $p < .001$; $N = 867$). Regarding its relationship with daily hassles microsystems, SH was positively and moderately correlated with daily hassles intensity ($r = .42$, $p < .001$; $N = 458$) and SH had a positive and moderate association with daily peers hassles ($r = .34$, $p < .001$; $N = 458$). In addition, SH had a significant and moderate correlation with the tendency to be victimized by others ($r = .28$, $p < .001$; $N = 794$).

DISCUSSION

Literature consistently shows that adolescence is often a developmental period of heightened vulnerability for engagement in risk-taking behaviors and for the first appearance of self-harm behaviors (Klonsky et al., 2011; Steinberg, 2007, 2008, 2010a, 2010b; Vrouva et al., 2010). Thus, reliable and validated instruments for this age group can be highly useful tools for identifying, assessing and preventing such behaviors (Klonsky et al., 2011). Therefore, the main goal of this study is to adapt and validate the Portuguese version of the Risk-taking and Self-harm

Inventory for Adolescents. We analyzed the psychometric properties of the RTSHIA and confirmed its two-factor structure using a sample of Portuguese adolescents with ages between 12 and 19 years old, from 7th to 12th grade in middle and secondary schools.

Results from CFA support the two-factor model of the RTSHIA, similar to the original study (Vrouva et al., 2010). Prior to performing CFA and similar to the original study (Vrouva et al., 2010) items 21 and 26 were discarded due to its excessive and positive asymmetric distribution. In CFA, using a WLSMV estimator, a respecified model was found by removed items 1 ("taking chances while doing ones hobbies"), 4 ("being suspended or dropped out of school") and 23 ("Pulling one's hair out") because its smallest local adjustment; and item 24 ("deliberately inhaling something harmful, excluding cigarette smoke or drugs") because it loaded positively in both factors, which may not contributing for a clear definition of the RTSHIA's factor. These results are similar to Vrouva and colleagues' study (2010), except for items 4 and 23, which are removed in our Portuguese sample. These results may be due to the fact that in Portugal the education is compulsory up to age 18 and the suspension is usually an exceptional decision. In addition, it seems that Portuguese adolescents do not perceive the behavior of pulling their hair out as a punitive and deliberately harmful behavior. Thus, results from CFA support that the Portuguese version of the RTSHIA includes two-factors: the RT factor, which consists of ten items and the SH factor, which comprises seventeen items. Overall, the respecified model evidenced a very good fit to the data, with good global and local adjustments for the Portuguese version on the RTSHIA.

Regarding reliability of the Portuguese version of the RTSHIA both subscales revealed good internal consistency and a high test-retest reliability for a 3-week period. These findings are similar to those found for the RTSHIA's original study (Vrouva et al., 2010).

In study III we analyzed the construct validity of RTSHIA and descriptive data for sex, age and grade. Significant differences in mean scores of RT and SH dimensions were found for sex, with boys engaging in more risk-taking behaviors, whereas girls endorsing more self-harm. These findings are in line with empirical data showing that the heightened vulnerability to risk-taking may be greater for males adolescents than for females adolescents (Shulman, Harden, Chein, & Steinberg, 2014) and that self-harm is more common in female adolescents than in male adolescents (Giletta et al., 2012; Hawton et al., 2012; Klonsky et al., 2011; Laye-Gindhu & Shonert-Reichl, 2005; Madge et al., 2011; Ross & Heath, 2002).

Moreover, the present study also showed significant differences in mean score of RT for age and years of education. Results indicate that younger adolescents (12-14 years old) had significantly lower levels of risk-taking behaviors than older adolescents (15-16 and 17-19 years old). Results also indicated that the adolescents with 15-16 years old report less risky behaviors

than the older group (17-19 years old). The same pattern was found for school grade. Empirical evidence demonstrates that risk-taking is higher during adolescence than during preadolescence or adulthood (Steinberg, 2008, 2010a). According to social neuroscience perspective, "risk-taking increases between childhood and adolescence as a result of changes around the time of puberty" (Steinberg, 2008, p.83), due to the alterations in "the socio-emotional brain system", which may lead to increased reward-seeking (Steinberg, 2008, 2010a). This occurs mainly in middle adolescence (roughly 14-17) because this period is characterized by high sensation-seeking and low impulse control, elevate peer pressure and immature self-regulation abilities (this last one happens gradually and is not complete until the mid-20s) (Steinberg, 2007, 2008, 2010a, 2010b).

The convergent validity analyses indicate significant associations between RTSHIA subscales and positive and negative affect, daily hassles microsystems and peer relationships, in the expected direction. There is a significant and positive correlation between risky behaviors and the tendency to bully others. No significant correlations were found between RT and the other measures. For SH subscale, results from correlation analysis suggest that adolescents who report more self-harm behaviors tend to experience more levels of negative affect and lower levels of positive affect. Adolescents who endorse more self-harm tend to have intensity levels of daily hassles and more daily peer hassles. In addition, young people who report more self-harm behaviors tend to be victimized by others. These data are consistent with empirical literature reporting a significant link between risky behavior and deliberate self-harm and social, emotional and psychological impairments (Cerutti et al., 2011; Klonsky et al., 2011; Laye-Gindhu & Shonert-Reichl, 2005; Madge et al., 2011; Muehlenkamp & Gutierrez, 2007; Ross & Heath, 2002; Steinberg, 2007, 2008; Vrouva et al., 2010).

Some limitations should be noted when interpreting our findings. Whilst the whole sample was of adequate size, there are significant sex differences in age and years of education, suggesting that the girls' sample size may have larger weight in the analysis. Since our sample drew from non-clinical population the generalizability of the results to clinical samples of adolescents may be limited. Thus, future research on RTSHIA should include both non-clinical and clinical samples and other statistical methodologies. Indeed, the use of a clinical sample and statistical procedures, such as Receiver Operating Characteristic (ROC) curve (Krzanowski & Hand, 2009), would enable us to determine cut-off points according to which the diagnostic utility of RTSHIA would be contemplated. As a result, the RTSHIA could be used as a screening instrument to identify adolescents at risk of developing self-harm and risk-taking clinical conditions.

Although the presence of risk-taking and deliberate self-harm behaviors is a transversal and critical health problem across cultural contexts, the different cultural-specific views of what

constitutes risky behaviors and deliberate self-harm may vary. Both social norms that regulate behaviors and the manifestation of risk-taking and deliberate self-harm (e.g., methods, motivations or functions, diagnostic correlates) may vary across different cultural contexts. Thus, cross-cultural and cross-national studies clearly are needed to corroborate this hypothesis. For this purpose, the use and validation of the same assessment tools in different countries and languages can facilitate cultural comparison studies.

Despite the aforementioned limitations, the present results suggest that the RTSHIA, in its Portuguese version, is a valid and reliable instrument to assess simultaneously risk-taking and self-harm behaviors among adolescents. This validation study of the RTSHIA for a one of the most widely spoken language in the world will allows for multi-cultural assessment and further comparisons of the targeted behaviors. Since this study shows the adequacy of the factorial structure of RTSHIA in Portuguese adolescents, the same framework of assessing the risk-taking and self-harm may also be analyzed in other countries and languages other than English speakers. Thus, the use and validation of standard assessment tools will allow the examination of these behaviors as a global phenomenon and their culturally-specific variations.

Acknowledgements

This research has been supported by the first author, Ana Xavier, Ph.D. Grant (grant number: SFRH/BD/77375/2011), sponsored by Portuguese Foundation for Science and Technology, Portugal (FCT) and the European Social Fund (POPH).

The authors would like to thank Professor Bruno de Sousa for statistical support.

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