Article

Examination of the Weinberger Adjustment Inventory—Short Form Among Portuguese Young Adults: Psychometrics and Measurement Invariance

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Abstract

The Weinberger Adjustment Inventory—Short Form (WAI-SF) is a multidimensional measure of behavioral adjustment frequently used with forensic, clinical, and community populations. However, no previous studies have examined the WAI-SF from a more modern psychometric perspective including second-order models, measurement invariance and a better estimation of reliability. The current sample is composed of female and male young adults ($N = 610$, $M = 21.33$ years, $SD = 3.09$, range = 18–37) from a university context in Portugal. Results indicated that both the four-factor intercorrelated and the four-factor second order models of the WAI-SF Distress and Restraint scales showed good fits. The WAI-SF Distress and Restraint scales were negatively and significantly correlated, and the intercorrelations between the subscales of each scale ranged from moderate to high. The WAI-SF scales and subscales mostly showed adequate to good reliability in terms of McDonald's Omega and the more traditional Cronbach's Alpha. Strong cross-gender measurement invariance was demonstrated, with females scoring significantly higher than males on the Anxiety subscale of the Distress scale, and on the Suppression of Aggression, Impulse Control, Consideration of Others, Responsibility subscales, and Restraint

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scale. The WAI-SF scales and subscales showed distinctive correlates with other measures (e.g., low self-control, psychopathy) and variables (e.g., delinquency seriousness, substance use). Considering our findings, the use of the WAI-SF is recommended among the Portuguese young adult population and its use in criminological research is encouraged.

Keywords
adjustment, assessment, Weinberger Adjustment Inventory—Short Form (WAI-SF), validation

Introduction

Psychopathology is a broad concept that encapsulates an individual's mental disorder symptoms and psychiatric impairment. Although psychopathology is highly heterogeneous, two superordinate features of psychopathology relate to inwardly damaging features known as internalizing symptoms that primarily manifest as anxiety and depression and outwardly damaging features known as externalizing symptoms that primarily manifest as aggression and conduct problems (Achenbach, 1966; Achenbach & Edelbrock, 1978; Markon, 2010; Wright et al., 2013). Given that both internalizing and externalizing features have significant associations with behavioral maladjustment and conduct problems, respectively (Achenbach et al., 2016; Memmott-Elison et al., 2020; Muniz et al., 2019; Soto-Sanz et al., 2019; Vaughn et al., 2011; Wibbelink et al., 2017), researchers strive to devise measures that incorporate both dimensions when assessing behavioral functioning among diverse populations.

The Weinberger Adjustment Inventory (WAI; Weinberger, 1991; Weinberger & Schwartz, 1990) was created to assess long-term social-emotional adjustment, the ability to minimize subjective distress while accommodating to the demands of external reality to achieve desired outcomes. The WAI-Short Form (WAI-SF) has the same multidimensional structure of the original WAI, but with only 37 items. Keeping with a broad conceptualization of psychopathology that encompasses internalizing and externalizing dimensions, the WAI and WAI-SF were developed to be used with older children and adults, and are composed of two primary scales. The Distress scale includes the four subscales Anxiety, Depression, Low Self-Esteem, and Low Well-Being and the Restraint scale includes the four subscales Impulse Control, Suppression of Aggression, Consideration of Others, and Responsibility. Individuals who are able to achieve a balance between Distress and Restraint are those who show better adjustment. There are two defensiveness scales, Denial of Distress and Repressive Defensiveness, which refer to defensiveness about normative experiences of distress and to claims of nearly absolute restraint, respectively, and a validity scale. Theoretically, the Distress scale would have associations with internalizing features and the Restraint scale would have associations with externalizing features (Cauffman et al., 2004; Farrell & Sullivan, 2000; Feldman & Weinberger, 1994; Huckaby et al., 1998).

The psychometric properties and predictive validity of the WAI and its short form have been examined in community (Blagov & Singer, 2004; Moilanen, 2007; Pincus & Boekman, 1995; Weinberger, 1997; Weinberger & Schwartz, 1990), correctional (Huckaby et al., 1998; Steiner et al., 1999; Vaughn et al., 2014), and forensic/clinical populations (Weinberger, 1997) with overall supportive findings. Across studies, the Distress scale correlates with internalizing features (Blagov & Singer, 2004; Moilanen, 2007; Weinberger & Schwartz, 1990) and the Restraint scale correlates with externalizing features (DeLisi et al., 2010; Vaughn et al., 2014; Weinberger & Schwartz, 1990) including criminal recidivism (Steiner et al., 1999). These findings suggest that the WAI and WAI-SF denote a universality of measurement in that significant associations are evident across samples that have very different psychopathology profiles and differential internalizing and externalizing symptoms.

Despite its promise, researchers have been slow to translate and validate the WAI measures across cultures. The French version of the WAI (Paget et al., 2010) was validated among a general community sample ($N = 159$). A principal component analysis revealed that the factor structure of the French WAI resembled the original one, despite the fact that the Consideration of Others subscale did not belong to the Restraint scale. The subscales presented reliabilities in terms of Cronbach's alpha ranging from .65 to .85. The Distress scale presented positive correlations with alexithymia, anxiety and depression, while the Restraint, Defensiveness, and Composite scales presented negative correlations with alexithymia, anxiety and depression. The Mexican version of the WAI (Romo-González et al., 2014) was validated among an adult sample ($N = 452$) of Spanish-speaking participants. After analyzing the discriminatory power of the items using the extreme groups method and principal components analysis with varimax rotation, this version of the WAI was reduced to 44 items divided into four factors: Self-control, Subjective experience of distress, Defensiveness, and Consideration of others. These four factors presented reliabilities in terms of Cronbach's alpha ranging from .69 to .84. The authors considered the factorial structure of their Mexican version of the WAI to be conceptually congruent with the original WAI since other studies found similar differences in terms of factor structure (e.g., Farrell & Sullivan, 2000; Sumter et al., 2008). The Persian version of WAI-SF (Saeedi et al., 2016) was validated among a student sample ($N = 230$) from the University of Tehran (Iran). Confirmatory factor analysis (CFA) suggested a latent three-factor structure of the WAI-SF, namely Distress, Restraint and Repressiveness, although the fit was mediocre (RMSEA = .08, CFI = .85, and IFI = .85). The Persian WAI-SF presented adequate positive significant correlations of Distress with depression and anxiety, and also negative significant correlations of Distress with mindfulness.

In addition to the slowness with which researchers have translated and validated the WAI, criminologists have under-utilized the WAI as well despite its two dimensions that bear on diverse forms of antisocial behavior. Prior research found that Restraint had strong inverse associations and Distress had smaller albeit significant associations with delinquency (Cauffman et al., 2004) among youth in juvenile custody. Other studies employing data from the same setting reported consistent associations with antisocial behavior using the WAI as a measure of low self-control (Jones et al., 2007)

and that both Distress and Restraint correlated with prior delinquency history (Steiner et al., 1999). Other studies of serious juvenile offenders employed subscales of the WAI (e.g., suppression of aggression) but found that it was not related to waiver to adult criminal court (Loughran et al., 2010). Longitudinal effects between Restraint and delinquency involvement have also been reported among elementary school children in the community (Feldman & Weinberger, 1994). To date, there are promising associations between the WAI and antisocial conduct, but there are derived from mostly the same data source (e.g., youth in the California Youth Authority), and much less is known about associations among persons in the community.

Current Study

The aim of the current study is to conduct a cross-cultural translation and validation process of the WAI-SF into European-Portuguese (Pt-Pt), while examining it from a more modern psychometric perspective that includes the confirmation of second-order models that legitimize the use of total scores, cross-gender measurement invariance and a better estimation of reliability using McDonald's Omega. Focusing on the Distress and Restraint scales, we expect that the WAI-SF Portuguese version will demonstrate the original subjacent latent structure, that the subscales will be significantly intercorrelated, will show adequate reliability, demonstrate adequate patterns of associations with other measures (e.g., low self-control, social desirability), and criterion validity with other variables (e.g., substance abuse, delinquency acts). We also expected that cross-gender measurement invariance will be demonstrated and that males will score significantly lower on the subscales of the Restraint scale.

Method

Participants

Six-hundred and ten university students ($M = 21.33$ years, $SD = 3.09$, range = 18–37) participated voluntarily in the present study. This convenience sample was subdivided into females ($n = 392$, $M = 21.21$ years, $SD = 3.08$, range = 18–37) and males ($n = 218$, $M = 21.55$ years, $SD = 3.10$, range = 18-37 years), with no significant differences in terms of age ($F = 1.708$, $p = .19$). It was collected from the University of Minho at Braga (situated at the Gualtar campus, northern region of Portugal). These participants were mostly Portuguese (97.1%) and Brazilian nationals (2.1%).

Measures

Weinberger Adjustment Inventory (WAI). The WAI (Weinberger, 1991; Weinberger & Schwartz, 1990) is a self-report multidimensional measure of adjustment (total of 84 items). Its shorter version, the WAI- Short Form (WAI-SF), possesses the same multidimensional structure of the original WAI, but with less items (total of 37 items). The psychometric properties of the inventory have been examined in community,

forensic and clinical populations, and it can be used across a wide range of ages if the individuals read at or above approximately the fourth-grade level. The WAI-SF is composed of two primary scales: Distress (12 items; includes the four subscales Anxiety, Depression, Low Self-Esteem, and Low Well-Being) and Restraint (12 items; includes the four subscales Impulse Control, Suppression of Aggression, Consideration of Others, and Responsibility). The WAI-SF subscales (3 items per subscale) can also be used separately to assess the particular construct of interest (e.g., depression). In addition, there are two defensiveness scales: Denial of Distress, which refers to defensiveness about normative experiences of distress, and Repressive Defensiveness, which refers to claims of nearly absolute restraint, that can also be used separately, and a Validity scale. All WAI-SF items in the current study were formatted as 5-point Likert scales with anchors 1 (=*False/Almost never*) and 5 (=*True/Almost always*). Subscale scores are attained by summing the respective items (after reverse scoring the reversible items), and total scales scores can also be used. An elevated prevalence of the construct measured (e.g., anxiety) is reflected in higher scores. Previous reported reliability values for the WAI-SF Distress and Restraint scales ranged from .86 to .89 and .78 to .84, respectively. For the current study reliability values will be given below in the Results section.

Low Self-Control Scale (LSCS). The LSCS (Grasmick et al., 1993) is a self-report measure of low self-control. It encompasses six factors (total of 23 items), namely: Impulsivity, Simple Tasks, Risk Seeking, Physical Activities, Self-Centered, and Temper. All LSCS items in the current study were formatted as 4-point Likert scales with anchors 1 (=*Strongly disagree*) and 4 (=*Strongly agree*). Factor scores are attained by summing the respective items, and a total score can also be attained. An elevated prevalence of low self-control is reflected in higher scores. The LSCS Portuguese version was employed in the current study (Pechorro, DeLisi, et al., in press). Reliability for this study was $\alpha = .86$.

Psychopathy—Short Dark Tetrad (SD4). This is a self-report subscale (7 items) of the Short Dark Tetrad (Paulhus et al., 2021) measure of personality that encompasses four factors with seven items each (total of 28 items), namely: Psychopathy, Narcissism, Machiavellianism and Sadism. All SD4 items in the current study were formatted as 5-point Likert scales with anchors 1 (= *trongly disagree*) and 5 (=*Strongly agree*). Factor scores are attained by summing the respective items, and the use of a total score is not recommended. An elevated prevalence of psychopathic dark traits is reflected in higher scores. The SD4 Portuguese version was employed in the current study (Pechorro, Karandikar, et al., in press). Reliability for this study was $\alpha = .87$.

Sadism—Short Dark Tetrad (SD4). This is a self-report subscale (7 items) of the Short Dark Tetrad (Paulhus et al., 2021) measure of personality that encompasses four factors with seven items each (total of 28 items). All SD4 items in the current study were formatted as 5-point Likert scales with anchors 1 (=*Strongly disagree*) and 5 (=*Strongly*

agree). Factor scores are attained by summing the respective items, and the use of a total score is not recommended. An elevated prevalence of psychopathic dark traits is reflected in higher scores. The SD4 Portuguese version was employed in the current study (Pechorro, Karandikar, et al., in press). Reliability for this study was $\alpha = .82$.

Socially desirable response set-5 (SDRS-5). This is a self-report measure designed to assess socially desirable responses. The five items that compose the SDRS-5 (Hays et al., 1989) originated from the item pool of the form A of the Marlowe–Crowne. All SDRS-5 items in the current study were formatted as 5-point Likert scales with anchors 1 (=*Strongly disagree*) and 5 (=*Strongly agree*). The total score is attained by summing the items, after reversing the appropriate items. The SDRD-5 Portuguese version was employed in the current study (Pechorro et al., 2016). Reliability for this study was $\alpha = .64$.

General Delinquency Seriousness Classification (GDSC). This index was used with a self-report format, adapted to the Portuguese reality, to classify criminal behaviors reported by participants (Loeber et al., 1998). The GDSC ranges from 0 (=*no delinquency acts reported*) to 5 (=*two or more acts of serious delinquency reported*—e.g., breaking and entering, assault, rape, attempted murder).

A self-report questionnaire designed to measure sociodemographic variables (e.g., nationality, sex, age) was also employed to complement the psychometric measures described above. This questionnaire also included a set of questions about substance use, namely alcohol, tobacco, cannabis, and heroin/cocaine, during the last 12 months, formatted as 5-point Likert scales with anchors 0 (=*Almost never/Never*) and 4 (=*Almost always/Always*).

Procedures

We began the cross-cultural adaptation and validation process of the WAI-SF with the translation/back-translation procedure (American Educational Research Association, 2014; Widenfelt et al., 2005). The translation into the European Portuguese language spoken in Portugal was done by the lead author, taking into consideration potential semantic discrepancies that included linguistic/conceptual issues. The back-translation that followed was independently done by a native English speaker translator fluent in Portuguese with considerable experience in translating psychometric instruments. The original WAI-SF and back-translated WAI-SF were then compared and adjusted in terms of equivalence by consensus among the lead author and the translator. A small-scale pilot study was then conducted to ensure that the participants could easily comprehend the all the items. This pilot study revealed that some small additional adjustments were necessary. This concluded the final version of the Portuguese (Pt-Pt) version of the WAI-SF (available upon request).

The Ethics committee of the University of Minho provided the authorization to conduct the online assessment of the participants. After being informed about the current study, participants were asked to voluntarily and anonymously complete

questionnaires. Mandatory informed consents were obtained from all participants. No form of compensation was provided to the participants.

Analyses

The EQS software (version 6; Bentler, 2006) was used with correlation matrixes and Maximum Likelihood robust methods that are adequate to analyze non-normal multivariate data and are resistant to outliers. The size of the collected sample is in line with the recommendations of at least a ratio of 10:1 (number of participants per number of items) when conducting CFA (Kline, 2015). The criteria for the assessment of model fit included the Comparative Fit Index (CFI) and Incremental Fit Index (IFI) > .90, Root Mean Square Error of Approximation (RMSEA 90% CI) < .08, and lowest Akaike Information Criterion (AIC); and for a good fit: CFI and IFI > .95, RMSEA 90% CI < .06, and lowest AIC (Blunch, 2016; Maroco, 2021). Satorra-Bentler chi-square/degrees of freedom ($SB\chi^2/df$) was also provided (adequate if <5, good if <3). We followed Brown's (2015) recommendation of adopting a .40 standardized loading cut-off for the exclusion of items. Several different models were examined for the Distress and Restraint scales: a model where all the items loaded on one factor; a model with intercorrelated factors where items loaded onto the four factors of each scale; and a model with first-order factors where items loaded onto the four factors of each scale and onto a second-order higher factor. No modification indices were used to improve the fit of the different models. Measurement invariance (weak and strong) were examined using $\Delta SB\chi^2(df)$, CFI, and RMSEA (90% C.I.) (Putnick & Bornstein, 2016). The statistical analysis also included other psychometric analysis procedures, namely descriptive statistics (means, standard deviations, ranges), ANOVAs with effect size (partial Eta squared – η_p^2), Pearson correlations (low if <.20, high if >.50, and moderate if in between), and reliability. Reliability was examined using item-total correlations (ITC; adequate if >.20), mean item intercorrelations (MII; adequate if in the range .15–.50), and Cronbach's alpha and omega coefficients (marginal if >.60, adequate if >.70, good if >.80; Clark & Watson, 2019; Hayes & Coutts, 2020; Maroco, 2021).

Results

Our WAI-SF validation study began by examining the subjacent latent factor structure. The Mardia normalized estimate was above the cutoff value of 5 that suggests the presence of non-normality, so robust statistics (e.g., $SB\chi^2$) were employed (Bentler, 2006). Table 1 presents the different goodness of fit indices obtained with regard to the CFA models. The goodness of fit indices for one-factor of the Distress and Restraint scales did not reach acceptable values. The four-factor intercorrelated models and the four-factor second order models of the Distress and Restraint scales obtained the best fits, with all items loading above the .40 recommended cutoff.

Table 2 displays the standardized item loadings for the 4-factor model of the Distress and Restraint scales. All items displayed loadings above the .40 recommended cutoff.

Table 1. Fit Indexes for the Different Models of the WAI-SF Distress and Restraint Scales.

Models	$SB\chi^2/df$	IFI	CFI	RMSEA (90% CI)	AIC
Distress					
1-factor	14.96	.78	.75	.15 (.14–.16)	698.20
4-factor intercorrelated	2.97	.97	.97	.06 (.05–.07)	47.37
4-factor second order	3.28	.97	.97	.06 (.05–.07)	63.08
Restraint					
1-factor	15.31	.53	.53	.15 (.14–.16)	719.38
4-factor intercorrelated	2.47	.96	.96	.05 (.04–.06)	23.12
4-factor second order	2.36	.96	.96	.05 (.04–.06)	18.52

Note. WAI-SF = Weinberger Adjustment Inventory—Short Form.

Table 2. Loadings for the Four-Factor Structure of the Distress and Restraint scales.

Items	Loadings
Distress	
Anxiety	
I worry too much about things that aren't important.	.60
I feel nervous or afraid that things won't work out the way I would like them to.	.71
In recent years, I have felt more nervous or worried about things than I have needed to.	.69
Depression	
I often feel sad or unhappy.	.90
I feel lonely.	.73
I get into such a bad mood that I just feel like sitting around and doing nothing.	.76
Low self-esteem	
I really don't like myself very much.	.79
I'm not very sure of myself.	.85
I usually feel I'm the kind of person I want to be.	.75
Low well-being	
I usually think of myself as a happy person.	.88
I'm the kind of person who has a lot of fun.	.67
I feel very happy.	.90
Restraint	
Suppression of aggression	
People who get me angry better watch out.	.77
If someone tries to hurt me, I make sure I get even with them.	.69
I lose my temper and "let people have it" when I'm angry.	.61

(continued)

Table 2. (continued)

Items	Loadings
Impulse control	
I do things without giving them enough thought.	.67
I become "wild and crazy" and do things other people might not like.	.83
When I'm doing something for fun (e.g., partying, acting silly), I tend to get carried away and go too far.	.74
Consideration of others	
Before I do something, I think about how it will affect the people around me.	.78
I think about other people's feelings before I do something they might not like.	.89
I make sure that doing what I want will not cause problems for other people.	.85
Responsibility	
When I have the chance, I take things I want that don't really belong to me.	.69
I will cheat on something if I know no one will find out.	.62
I do things that I know really aren't right.	.67

Note. WAI-SF = Weinberger Adjustment Inventory—Short Form.

Table 3 shows the intercorrelations and reliability of WAI-SF. The Distress and Restraint scales were negatively and significantly correlated, and the intercorrelations between the subscales of each scale ranged from moderate to high. The reliability values can be mostly considered adequate to good.

We examined the cross-gender invariance of the WAI-SF Distress and Restraint scales (see Table 4) before conducting gender comparisons. Results revealed the presence of both weak and strong measurement invariance.

Table 5 displays the descriptive statistics of the WAI-SF and comparisons of the male and female samples using ANOVAs with effect sizes included. Significant differences were detected between the samples regarding the Anxiety subscale of the Distress scale, and the Suppression of Aggression, Impulse Control, Consideration of Others, Responsibility subscales and the Restraint scale. The Impulse Control subscale and the Restraint scale were the only ones that reached a medium effect size of $\eta_p^2 = .06$.

Table 6 shows the correlations of WAI-SF with other measures used to establish external validity, namely low self-control, psychopathy, sadism, and social desirability. The Distress subscales tended to show mostly low to moderate positive correlations with these measures, while the Restraint subscales tended to show mostly moderate to high negative correlations with the same measures, with the exception of the social desirability measure.

Table 3. Correlation Matrix and Reliability of the WAI-SF Scales and Subscales.

	1	2	3	4	5	6	7	8	9	10
1. Distress	1									
2. Anxiety	.70***	1								
3. Depression	.90***	.55***	1							
4. Low self-esteem	.85***	.46***	.69***	1						
5. Low well-being	.73***	.25***	.59***	.53***	1					
6. Restraint	−.15***	.03	−.21***	−.13**	−.12**	1				
7. Supp. of aggression	−.18***	−.09*	−.22***	−.16***	−.08*	.75***	1			
8. Impulse control	−.15***	−.02	−.21***	−.15***	−.07	.79***	.48***	1		
9. Cons. of others	.06	.21***	.03	.06	−.11**	.62***	.25***	.27***	1	
10. Responsibility	−.16***	−.03	−.21***	−.16***	−.07	.78***	.52***	.58***	.25***	1
Item-total correlation range	.43–.80	.49–.59	.65–.78	.66–.76	.64–.80	.44–.61	.48–.62	.35–.48	.74–.82	.49–.55
Mean inter-item correlation	.42	.45	.63	.64	.67	.32	.47	.56	.73	.44
Cronbach's Alpha	.90	.70	.83	.85	.86	.85	.73	.79	.89	.69
McDonald's Omega	.91	.71	.84	.86	.87	.86	.74	.79	.90	.70

Note. WAI-SF = Weinberger Adjustment Inventory—Short Form; Supp. of aggression = suppression of aggression; Cons. of others = consideration of others.
***$p < .001$. **$p < .01$. *$p < .05$

Table 4. Invariance of the Four-Factor Intercorrelated Model of the WAI-SF Scales.

Model	$SB\chi^2$ (*df*)	$\Delta SB\chi^2$ (*df*)	CFI	RMSEA (90% C.I.)
Distress				
Configural model	227.26 (96)	—	.96	.07 (.06–.08)
Weak/metric invariance	237.37 (104)	8.29 (7)	.96	.07 (.05–.08)
Strong/scalar invariance	256.57 (114)	28.55 (18)	.96	.06 (.05–.07)
Restraint				
Configural model	181.24 (96)	—	.95	.05 (.04–.07)
Weak/metric invariance	191.06 (104)	9.66 (8)	.95	.05 (.04–.06)
Strong/scalar invariance	197.50 (114)	19.09 (18)	.95	.05 (.04–.06)

Note. WAI-SF = Weinberger Adjustment Inventory—Short Form.

Table 5. Descriptive Statistics and Gender Comparisons of the WAI-SF Scales and Subscales.

	Male *M* (*SD*)	Female *M* (*SD*)	*F*, *p* Value	η_p^2
1. Distress	30.34 (10.28)	31.78 (10.20)	2.77, .10	.01
2. Anxiety	9.74 (2.90)	10.90 (2.83)	23.02, <.001	.04
3. Depression	6.91 (3.57)	7.32 (3.56)	1.87, .17	.00
4. Low self-esteem	6.64 (3.16)	6.86 (3.51)	.59, .44	.00
5. Low well-being	7.05 (3.04)	6.69 (2.77)	2.12, .14	.00
6. Restraint	49.29 (7.34)	53.13 (6.25)	46.58, <.001	.07
7. Supp. of aggression	12.84 (2.49)	13.52 (2.15)	12.17, .001	.02
8. Impulse control	11.67 (2.59)	13.16 (2.15)	58.31, <.001	.09
9. Cons. of others	11.99 (2.69)	12.65 (2.43)	9.68, .002	.02
10. Responsibility	12.79 (2.35)	13.80 (1.93)	32.36, <.001	.05

Note. WAI-SF = Weinberger Adjustment Inventory—Short Form; Supp. of aggression = suppression of aggression; Cons. of others = consideration of others.

Table 7 shows the correlations of WAI-SF with other variables used to establish external criterion-related validity, namely delinquency seriousness and alcohol, tobacco, cannabis, and heroin/cocaine abuse.

Discussion

The present investigation was the first to examine the WAI-SF among young adults from Portugal, while paying particular attention to the confirmation of second-order models that legitimize the use of total scores, cross-gender measurement invariance and a better estimation of reliability using McDonald's Omega. CFAs results showed that both the four-factor intercorrelated and the four-factor second order models of the WAI-SF Distress and Restraint scales showed good fits when compared to the 1-factor model. Contrary to previous validation studies conducted in other countries (e.g.,

Table 6. Correlations of the WAI-SF Scales and Subscales With Other Psychometric Measures.

	Low self-control	Psychopathy	Sadism	Social desirability
1. Distress	.26***	.04	.02	−.10*
2. Anxiety	.18***	−.07	.01	−.05
3. Depression	.29***	.11*	.05	−.11*
4. Low self-esteem	.24***	.04	−.01	−.12**
5. Low well-being	.07	.02	.07	.05
6. Restraint	−.59***	−.58***	−.49***	.38***
7. Supp. of aggression	−.51***	−.50***	−.46***	.36***
8. Impulse control	−.55***	−.51***	−.38***	.24***
9. Cons. of others	−.20***	−.21***	−.12**	.22***
10. Responsibility	−.50***	−.40***	−.45***	.28***

Note. WAI-SF = Weinberger Adjustment Inventory—Short Form; Supp. of aggression = Suppression of aggression; Cons. of others = consideration of others.
*$p < .05$. **$p < .01$. ***$p < .001$.

Table 7. Correlations of the WAI-SF Scales and Subscales With Other Variables.

	Crime seriousness	Alcohol	Tobacco	Cannabis	Heroin/ Cocaine
1. Distress	.02	−.11**	−.08	−.09*	−.00
2. Anxiety	−.02	−.13**	−.05	−.09*	−.06
3. Depression	.07	−.07	−.02	−.03	.04
4. Low self-esteem	−.00	−.08	−.12**	−.11*	.00
5. Low well-being	−.01	−.07	−.07	−.07	−.01
6. Restraint	−.25***	−.14**	−.17***	−.20***	−.17***
7. Supp. of aggression	−.18***	−.04	−.12**	−.19*	−.14**
8. Impulse control	−.21***	−.18***	−.14**	−.21***	−.09*
9. Cons. of others	−.14**	−.09*	−.11*	−.13**	−.10*
10. Responsibility	−.22***	−.10*	−.14**	−.16***	−.13**

Note. WAI-SF = Weinberger Adjustment Inventory—Short Form; Supp. of aggression = suppression of aggression; Cons. of others = consideration of others.
*$p < .05$. **$p < .01$. ***$p < .001$.

Paget et al., 2010; Romo-González et al., 2014) we obtained support for the latent factor structure identified by Weinberger (1997). Since the second order models of the WAI-SF Distress and Restraint scales also showed good fits, this legitimizes the use of total scores for these scales.

The intercorrelations of the WAI-SF scales revealed that the Distress and Restraint scales were negatively and significantly correlated as expected, and that the intercorrelations between the subscales of each scale were positive ranging from moderate to

high (Weinberger, 1997). The reliability values can be mostly considered adequate to good since McDonald's Omega and the more traditional Cronbach's Alpha were above the recommended .70 cut-off (the exception was the Responsibility subscale which obtained an alpha of .69). As expected, the Omega values were mostly higher than Alpha values (Hayes & Coutts, 2020). The reliability values we obtained in the current study were mostly higher than the values reported in previous validation studies (e.g., Paget et al., 2010; Romo-González et al., 2014). Some subscales presented higher than expected mean item intercorrelations (e.g., Consideration of Others subscale, Low Well-Being subscale) suggesting some excessive homogeneity of the items that compose these scales.

In terms of measurement invariance across gender, there was evidence of weak and strong invariance. Such invariance results indicate that this model is sharing an appropriate level of equivalence across gender that justifies unbiased group mean comparisons. Our investigation is the only study we are aware of that examined measurement invariance of the WAI-SF. Establishing invariance is fundamental before proceeding to group comparison (e.g., across gender, across age).

We then examined known-groups validity. The comparisons of female and male participants revealed that females obtained significantly higher scores on the Suppression of Aggression, Impulse Control, Consideration of Others, and Responsibility subscales, and Restraint scale, and also on the Anxiety subscale of the Distress scale. It is a fact that most of the literature recognizes that females tend to exhibit better self-control and more anxiety when compared to males (e.g., Gottfredson & Hirschi, 1990; Jalnapurkar et al., 2018; Muftić & Updegrove, 2018; Pechorro et al., 2021). Again, our findings suggest such differences between females and males are factual, and not caused by measurement invariance problems.

Finally, we examined the correlations of WAI-SF with other measures (low self-control, psychopathy, sadism, and social desirability) and variables (delinquency seriousness and alcohol, tobacco, cannabis, and heroin/cocaine abuse) used to establish external validity. Is this aspect also, the current study has theoretical and research implications as well. In criminology, there are several general theories of crime, some of which emphasize conditions such as self-control (Gottfredson & Hirschi, 1990) or psychopathy (DeLisi, 2016; Hare, 1996) that are overwhelmingly externalizing in their orientation whereas other theories emphasize constructs such as strain (Agnew, 1992) or temperament (DeLisi & Vaughn, 2014) that have both externalizing and internalizing dimensions. Although there are certainly offenders who exhibit an almost entirely externalizing degree of psychopathology, such as primary psychopaths, most offenders exhibit more varied psychopathology containing elements of anxiety, depression, anger, hostility, and other factors. The current models show that both Distress and Restraint are germane to diverse antisocial conditions and substance use although effects for Restraint are larger and more frequent. In the event that criminological theory has potentially underemphasized internalizing features (see, Daniels & Holtfreter, 2019; Jolliffe et al., 2019; Ozkan et al., 2019; Reising et al., 2019), the WAI-SF provides a measurement opportunity to examine behavioral adjustment from a broader dispositional perspective.

Our findings also show the differential associations between Distress and Restraint and antisocial conditions that differ in terms of their severity. For low self-control, significant correlations are seen for the Distress scale and three of the four subscales spanning Anxiety, Depression, and Low Self-Esteem. For psychopathy, there is only one small correlation with Depression, and for sadism, there were no significant correlations. In contrast, Restraint and all of its subscales are significantly correlated with low self-control, psychopathy, and sadism suggesting these conditions are overwhelmingly externalizing in their valence. A bevy of studies recently compared the predictive validity of psychopathy and self-control among diverse samples, and produced a multitude of findings (cf., Altikriti et al., 2020; Armstrong et al., 2020; Connolly et al., 2017; DeLisi et al., 2021). It would be interesting to see whether our findings replicate in samples using clinical, forensic, or correctional data. On the issue of replication among non-community samples, there is a particular advantage of the WAI-SF since it is brief and simple to use which are attractive features to incarcerated populations (Huckaby et al., 1998).

In terms of study limitations and relating to the aforementioned point, our sample of university students are generally benign in terms of their antisocial features compared to correctional clients (Moffitt, 1993; Payne & Chappell, 2008), and as such are unlikely to present clinical impairments in self-regulation, psychopathy, or sadism, which is why replication with diverse study populations is needed. Our university sample provides a basic roadmap for the associations between these variables, but enriched samples of more clinically-meaningful subgroups are needed to see how the various self-regulation and distress constructs manifest in justice system contact. The self-reported measures raise two additional issues that should be considered when interpreting the findings. There is likely shared methods variance that could inflate estimates herein and the self-report of antisocial conditions, such as psychopathy and sadism are very different in severity from forensic assessments of these conditions.

Author Note

All listed authors should have contributed to the manuscript substantially and have agreed to the final submitted version.

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Ethical Approval

The Ethics committee of the University of Minho provided the authorization to conduct the assessment of the participants.

Informed Consent

Participants were informed and asked to voluntarily and anonymously complete questionnaires. Mandatory informed consents were obtained from all participants.

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Data Availability

Data is available upon reasonable request.

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