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DEVELOPMENT OF A REVISED SHORT FRENCH VERSION OF THE UPPS-P IMPULSIVE BEHAVIOR SCALE

Mémoire de Maîtrise Universitaire ès Sciences en Psychologie

Orientation Psychologie Clinique

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Résumé

Introduction : L'impulsivité est un construit multidimensionnel et transdiagnostique impliqué dans l'étiologie d'une variété de troubles psychopathologiques et neurologiques. Le modèle UPPS-P de l'impulsivité, originellement développé par Lynam et al. (2006), est devenu dominant dans la recherche sur l'impulsivité. Il fait état de cinq dimensions – l'urgence négative, le manque de préméditation, le manque de persévérance, la recherche de sensations et l'urgence positive – permettant de rendre compte de la diversité des manifestations et comportements impulsifs. Sur la base de ce modèle, plusieurs échelles ont été développées dont notamment les échelles UPPS-P anglophone et francophone en 59 items (Lynam et al., 2006 ; Van der Linden et al., 2006) ainsi que leurs versions courtes en 20 items (Billieux et al., 2012 ; Cyders et al., 2014).

Objectifs : Dans l'échelle courte francophone UPPS-P actuelle développée par Billieux et al. (2012), les quatre items par dimension présentant les saturations les plus élevées ont été retenus. Bien que minimisant la variance d'erreur des items, cette approche peut amener à sélectionner des items redondants, impliquant ainsi un potentiel problème de validité de contenu. Ce mémoire universitaire s'applique donc à développer une version révisée de l'échelle courte francophone UPPS-P de l'impulsivité en 20 items en mobilisant plusieurs approches statistiques pour maintenir la représentativité du contenu de l'échelle UPPS-P originale en 59 items.

Méthodes : Deux échantillons de participant·e·s francophones tout-venant (N_1 = 1'027 ; N_2 = 151) ont complété respectivement les échelles francophones UPPS en 45 items et PUM (*Positive Urgency Measure*) en 14 items. Des analyses combinatoires ont été conduites pour générer tous les quadruplets d'items de chaque dimension du modèle UPPS-P présentant une cohérence interne satisfaisante. Ensuite, l'utilisation conjuguée de quatre approches statistiques – à savoir des analyses de réseau, de communauté, de partitionnement et de corrélation inter-items – a permis d'estimer la représentativité de contenu de chaque quadruplet. Finalement, les quadruplets les plus représentatifs du

contenu de l'échelle UPPS-P originale ont été soumis à l'évaluation de six expert·e·s *via* une analyse de validité de contenu.

Résultats : Les résultats de l'analyse de validité de contenu *via* l'évaluation des six expert·e·s ont indiqué que certains items inclus dans les quadruplets étaient inadéquats, compromettant ainsi le développement d'une échelle révisée courte en français de l'UPPS-P dans le contexte de ce mémoire universitaire. Cependant, ces résultats préliminaires ont permis d'identifier des pistes pour les recherches futures. Ces dernières ont été développées dans ce mémoire de maîtrise universitaire à travers la proposition d'un protocole de recherche comprenant une procédure complète.

Discussion : Ce mémoire de maîtrise universitaire présente une méthodologie de développement d'échelle courte centrée sur la représentativité de contenu ainsi qu'un protocole de recherche. Des recherches ultérieures s'appliquant au développement et à la validation d'une version révisée de l'échelle courte francophone UPPS-P de l'impulsivité en 20 items soutiendraient son utilité clinique transdiagnostique tout en réduisant considérablement son temps de passation, favorisant ainsi son intégration et utilisation dans les milieux cliniques et de la recherche.

Mots-clés : impulsivité, modèle UPPS-P, psychométrie, développement d'échelle courte, représentativité de contenu, analyses factorielles, modèles d'équations structurelles, analyses combinatoires, analyses de réseaux

Abstract

Introduction: Impulsivity is a multidimensional and transdiagnostic construct involved in the etiology of several psychopathological and neurological disorders. The UPPS-P model of impulsivity, initially developed by Lynam et al. (2006), has become dominant in impulsivity research. In the UPPS-P model, impulsivity is underlain by five dimensions – namely Negative Urgency, Lack of Premeditation, Lack of Perseverance, Sensation Seeking, and Positive Urgency – which account for the diversity of impulsive behaviors and manifestations. Based on this model, several scales have been developed, including the 59-item English and French UPPS-P scales (Lynam et al., 2006; Van der Linden et al., 2006) as well as their 20-item short-form versions (Billieux et al., 2012; Cyders et al., 2014).

Aims of the current dissertation: In the current UPPS-P short French version developed by Billieux et al. (2012), the four items per dimension with the highest loadings were retained. Although minimizing the items' error variance, this approach might lead to the selection of redundant items, thus implying a potential content validity issue. This Master's thesis therefore seeks to develop a revised version of the 20-item French UPPS-P Impulsive Behavior Scale by combining different statistical approaches to maintain the content coverage of the original 59-item UPPS-P scale.

Methods: Two samples of French-speaking participants (N_1 = 1'027; N_2 = 151) respectively completed the 45-item UPPS and 14-item PUM (Positive Urgency Measure) scales. Combinatorial analyses were conducted to generate all the quadruplets of items per dimension of the UPPS-P model which exhibit a satisfactory internal consistency. Then, the combined use of four statistical approaches – namely network, community, hierarchical cluster, and inter-item correlation analyses – allowed to estimate and to rank the content representativeness of each quadruplet of items. Finally, the most representative quadruplets of the original UPPS-P scale's content were submitted to expert appraisal to assess their representativeness and their validity regarding test content.

Results: The content validity analyses' results *via* expert appraisal indicated that some items included in the quadruplets were inadequate, hence compromising the development of a revised short French UPPS-P scale in the context of this Master's dissertation. However, these preliminary findings provided leads for future research which were developed in this Master's dissertation through the proposal of a research protocol describing a complete procedure.

Discussion: This Master's dissertation's methodology – centered on the preservation of content coverage – and research protocol provided insight into the conduction of further research. The development and the validation of a revised short French UPPS-P Impulsive Behavior Scale would support its transdiagnostic clinical utility while substantially reducing its time of administration, thus favoring its integration and usage in both clinical and research practices.

Keywords: impulsivity, UPPS-P model, psychometrics, short-form development, content coverage, factor analysis, structural equation modeling, combinatorial analysis, network analysis

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1. Introduction

The construct of impulsivity is prominent in psychology and psychiatry. In the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association, 2013), impulsivity is a frequently cited diagnostic criterion in various mental disorders. Developed by Lynam et al. (2006), the UPPS-P model of impulsivity describes five dimensions of the construct – *id est* Negative Urgency, Lack of Premeditation, Lack of Perseverance, Sensation Seeking, and Positive Urgency – that account for the broad range of impulsive behaviors and manifestations.

The UPPS-P model (Lynam et al., 2006) and its predecessor – the UPPS model (Whiteside and Lynam, 2001) – are widely cited and utilized in impulsivity-related research: a basic search conducted in May 2021 on the *PsycInfo* online database using the keywords "UPPS" and "UPPS-P" respectively yielded 915 and 455 results amongst which 538 (58.8%) and 338 (74.3%) emerged during the past five years.

1.1. Impulsivity and the UPPS-P model

Historically, Whiteside and Lynam (2001) first developed the four-faceted UPPS model by conducting exploratory factor analyses using a combination of four different impulsivity-related facets comprised in the Revised NEO Personality Inventory (NEO-PI-R; Costa & McCrae, 1992) – namely impulsiveness, excitement seeking, self-discipline, and deliberation – and of seventeen classical scales or subscales measuring impulsivity which were administered to 437 college students. The four resulting factors were coined as Negative Urgency, Lack of Premeditation, Lack of Perseverance, and Sensation Seeking. Amongst this study's instruments, 45 items were retained to construct the first UPPS Impulsive Behavior Scale which was validated four years later (Whiteside et al., 2005).

Firstly, in the UPPS model, the facet of Negative Urgency refers to the emission of an abrupt action or to the experience of an intense reaction when in an affective context of negative valence (Whiteside & Lynam, 2001). For example, the 45-item UPPS scale (Van der Linden, 2006; Whiteside & Lynam, 2001) measures Negative Urgency through item 36 (UPPS-EN: "*I often make matters worse because I act without thinking when I am upset.*" / UPPS-FR: "*J'aggrave souvent les choses parce que j'agis sans réfléchir quand je suis contrarié(e).*") and item 24 (UPPS-EN: "*When I am upset, I often act without thinking.*" / UPPS-FR: "*Quand je suis contrarié(e), j'agis souvent sans réfléchir.*").

Secondly, the facet of Lack of Premeditation is defined by the lack of consideration and reflection regarding the consequences of an action prior to its emission (Whiteside & Lynam, 2001). For example, the 45-item UPPS scale (Van der Linden, 2006; Whiteside & Lynam, 2001) measures Lack of Premeditation through item 39 (UPPS-EN: "*I usually think carefully before doing anything.*" / UPPS-FR: "*D'habitude je réfléchis soigneusement avant de faire quoi que ce soit.*") and item 13 (UPPS-EN: "*I like to stop and think things over before I do them.*" / UPPS-FR: "*Je préfère m'interrompre et réfléchir avant d'agir.*").

Thirdly, the facet of Lack of Perseverance refers to the difficulty to focus on the completion of demanding or dull tasks (Whiteside & Lynam, 2001). For example, the 45-item UPPS scale (Van der Linden, 2006; Whiteside & Lynam, 2001) measures Lack of Perseverance through item 22 (UPPS-EN: "*I finish what I start.*" / UPPS-FR: "*J'achève ce que je commence.*") and item 30 (UPPS-EN: "*I'm pretty good about pacing myself so as to get things done on time.*" / UPPS-FR: "*Je suis une personne productive qui termine toujours son travail.*").

Fourthly, the facet of Sensation Seeking is defined by the tendency to appreciate and to seek excitement as well as the openness to novel experiences regardless of their potential hazard (Whiteside & Lynam, 2001). For example, the 45-item UPPS scale (Van der Linden, 2006; Whiteside & Lynam, 2001) measures Sensation Seeking through item 19 (UPPS-EN: "*I quite enjoy taking risks.*" / UPPS-FR: "*J'éprouve du plaisir à prendre des risques.*") and item 33 (UPPS-

EN: "*I sometimes like doing things that are a bit frightening.*" / UPPS-FR: "*J'aime parfois faire des choses qui sont un petit peu effrayantes.*").

A posteriori, Cyders et al. (2007) hypothesized that the emission of rash actions was not only a potential response to negative affect (as defined by the Negative Urgency facet (Whiteside & Lynam, 2001)), but also to positive affect. Thus, Cyders et al. (2007) developed a new measure of what they coined as Positive Urgency – the 14-item Positive Urgency Measure (PUM) – and added Positive Urgency as a new facet to the original UPPS model (Whiteside & Lynam, 2001), thus developing the UPPS-P model and the 59-item UPPS-P Impulsive Behavior Scale (Lynam et al., 2006).

Therefore, fifthly, the facet of Positive Urgency refers – similarly to the facet of Negative Urgency – to the emission of an abrupt action or to the experience of an intense reaction when in an affective context of positive valence (Cyders & Smith, 2007). For example, the 14-item PUM scale (Billieux et al., 2012; Cyders et al., 2007) measures Positive Urgency through item 10 (PUM-EN: "*When I'm really enthusiastic, I tend not to think about the consequences of my actions.*" / PUM-FR: "*Quand je suis vraiment enthousiaste, j'ai tendance à ne pas penser aux conséquences de mes actions.*") and item 13 (PUM-EN: "*When I'm very happy, I feel as if it's normal to succumb to one's desires or go overboard about things.*" / PUM-FR: "*Quand je suis très heureux/heureuse, j'ai l'impression qu'il est normal de céder à ses envies ou de se laisser aller à des excès.*").

Furthermore, the multi-faceted nature of the UPPS-P model is crucial as to understand the wide range of impulsive manifestations (Smith et al., 2007); it is then of utmost importance for the UPPS-P Impulsive Behavior Scale's content to capture this broadness.

1.2. Impulsivity and psychopathology

Impulsivity is frequently mentioned in the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association, 2013) as a diagnostic criterion in several mental disorders. Moreover, numerous studies have shown the contribution of impulsivity to different psychopathological states, some of which are described non-exhaustively in the following paragraph.

Impulsivity and its facets play a role in substance use disorders regarding substances such as alcohol (Shin et al., 2012; Whiteside & Lynam, 2003) or tobacco (Billieux et al., 2007; Lee et al., 2015), but also in non-substance use disorders regarding behaviors such as problematic gambling (Hodgins & Holub, 2015), problematic Internet use (Cao et al., 2007) and problematic mobile phone use (Billieux et al., 2008). Furthermore, impulsivity and its facets are amongst others involved in symptoms linked to anxiety, attention-deficit hyperactivity disorder, depression, eating disorders and personality disorders (Cyders & Coskunpinar, 2011; d'Acremont & Van der Linden, 2007; Dawe & Loxton, 2004; Few et al., 2015; Miller et al., 2003).

Thus, impulsivity contributes to an extensive number of psychopathological states. Moreover, the differential contribution of the UPPS and UPPS-P facets in psychopathology are investigated in a growing number of studies (Berg et al., 2015; Billieux et al., 2008; Birthrong & Latzman, 2014; Derefinko et al., 2011; McCarty et al., 2017). Hence, the multidimensional conceptualization of the transdiagnostic construct of impulsivity in the UPPS-P model (Lynam et al., 2006) – in addition to being able to capture the wide range of impulsive manifestations (Smith et al., 2007) – is relevant to understand the heterogeneity of the contributions of impulsivity to the etiology of several psychopathological and neurological disorders.

1.3. Aims of the current dissertation

Several scales have been developed and validated based on the UPPS-P model (Lynam et al., 2006) such as the 59-item English and French UPPS-P scales (Lynam et al., 2006; Van der Linden et al., 2006). The two aforementioned scales were also developed and validated as 20-item short-form versions (Billieux et al., 2012; Cyders et al., 2014). However, in the current UPPS-P short French version developed by Billieux et al. (2012), the four items per facet with the highest loadings were retained. Although minimizing the items' error variance, this approach might lead to the selection of redundant items, thus implying a potential content validity issue as commented by Cyders et al. (2014).

Therefore, considering the relevancy of capturing the wide range of impulsive behaviors and manifestations through various psychopathological states, this Master's dissertation seeks to develop a revised version of the 20-item French UPPS-P Impulsive Behavior Scale (Billieux et al., 2012) by combining different statistical approaches whose principal objectives are to preserve the content coverage of the original 59-item UPPS-P scale and of its five facets.

2. Methods

Statistical analyses were conducted using *R* version 4.0.4 (R Core Team, 2021). The main analyses include exploratory and confirmatory factor analysis, internal reliability combinatorial analysis, network analysis, community analysis, hierarchical cluster analysis, and inter-item correlation analysis. Different versions of the resulting statistically pre-developed short revised French UPPS-P scale were then submitted to expert appraisal to assess its representativeness and its validity regarding test content.

2.1. Database description

The two separate 45-item French UPPS (UPPS-FR) and 14-item French PUM (PUM-FR) databases were provided by Dr. Joël Billieux, Associate Professor of Psychology at the University of Lausanne (Lausanne, Switzerland), and Dr. Lucien Rochat, Lecturer at the University of Geneva (Geneva, Switzerland). The UPPS-FR comprised a sample of 1'219 participants while the PUM-FR comprised 151, both along with their respective sociodemographic information and responses on all of the 45 UPPS-FR and 14 PUM-FR items.

In order to assess missing data treatment, identification of missingness patterns was conducted using the *mice R* package (van Buuren & Groothuis-Oudshoorn, 2011), which returned a homogeneous distribution of missing values amongst both the 45 UPPS-FR items and the 14 PUM-FR items. Regarding the raw UPPS-FR database, 192 participants for whom there was no data were omitted, while 25 participants did not provide data on only one item each, and one participant did not respond to 7 items (see Table 2.1.1.). Regarding the PUM-FR database, one underage participant (17 years old) was omitted, while only 3 participants did not respond to only one item each (see Table 2.1.2.).

Table 2.1.1. *UPPS-FR missing data patterns*

N	I3	I5	I9	I10	I12	I18	I19	I20	I23	I24	I25	I26	I27	I29	I30	I31	I34	I36	I38	I42	I43	I44	I8	I22	I39	I40	I13	NA
1'001																												0
3																											NA	1
1																										NA		1
1																									NA			1
2																								NA				1
1																							NA					1
1																						NA						1
1																					NA							1
1																				NA								1
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1																		NA										1
1																	NA											1
1													NA		NA	NA				NA	NA				NA	NA		7
1												NA																1
1											NA																	1
1										NA																		1
1									NA																			1
1								NA																				1
1							NA																					1
1						NA																						1
1					NA																							1
1				NA																								1
1			NA																									1
1		NA																										1
1	NA																											1

N column = Number of participants; I columns = UPPS-FR items; NA column = Sum of missing values for N; Green cell font indicates non-missing values; Red cell font indicates missing values

Table 2.1.2. *PUM-FR missing data patterns*

N	PUI4	PUI7	PUI14	NA
147				0
1			NA	1
1		NA		1
1	NA			1

N column = Number of participants; PUI columns = PUM-FR items; NA column = Sum of missing values for N; Green cell font indicates non-missing values; Red cell font indicates missing values

Participants for whom any response was missing were omitted using listwise deletion of missing data (Roth, 1994), hence keeping 1'001 complete cases for the UPPS-FR and 147 complete cases for the PUM-FR following analyses.

Thus, the retained UPPS-FR sample included self-selected French-speaking participants of lawful age from Switzerland (N = 886) and from France (N = 115). 51.6% of the sample's participants were women while 48.4% were men. The respondents' age ranged from 18 to 90 (M = 29.95; SD = 14.04). Regarding the PUM-FR database, the retained sample included self-selected French-speaking students at the University of Geneva (Switzerland) of lawful age. The respondents' age ranged from 18 to 48 (M = 22.98; SD = 5.19). 90.97% of the respondents were women while only 9.03% were men.

The UPPS-FR and PUM-FR items are rated on a 4-point Likert scale whose points are – in ascending order – labelled "Agree Strongly", "Agree Somewhat", "Disagree Somewhat", and "Disagree Strongly". According to Wu & Leung (2017), the less responses' modalities there are, the less probable that the discrete and ordinal data might fit a Gaussian distribution. Nevertheless, in order to check the non-normality assumption, Lilliefors univariate normality tests – which are particularly suited for when the distribution and its parameters are unknown (Razali & Wah, 2011) – were run using the *MVN R* package (Korkmaz et al., 2014) and returned non-normal distributions for each of the UPPS-FR and the PUM-FR items ($P < 0.001$). As to the dimensions' scores – which are calculated by adding each dimension's item responses and dividing them by the number of items included in the dimension – Lilliefors tests indicated that none follow a normal distribution either ($P < 0.05$). Then, as they are robust to departures from normality (Conover et al., 1981), Fligner-Killeen tests of homogeneity of variances were conducted within each of the five UPPS-FR and PUM-FR dimensions' items. The results presented heteroskedasticity amongst all of the five dimensions ($P < 0.05$).

2.2. Exploratory factor analyses

Although the factorial structures of the UPPS and UPPS-P scales have already been largely examined and validated (Billieux et al., 2012; Cyders et al., 2014; Van der Linden et al., 2006; Whiteside et al., 2005), exploratory factor analyses (EFA) were conducted to evaluate their reproducibility within both the UPPS-FR and the PUM-FR databases used in this dissertation.

Since polychoric correlations are more suitable when studying Likert scales' ordinal data because they allow for a better data fit in both exploratory (EFA) and confirmatory (CFA) factor analyses (Holgado-Tello et al., 2010), polychoric correlations matrices were computed for all of the 45 UPPS-FR and 14 PUM-FR items.

First, the appropriate number of factors to extract was investigated using the *psych R* package (Revelle, 2021) and the *EFAtools R* package (Steiner & Grieder, 2020). For this purpose, 6 routines were computed: the Scree Test (Cattell, 1966), the Very Simple Structure (Revelle & Rocklin, 1979), the Minimum Average Partial (Velicer, 1976), the Comparison Data (Ruscio & Roche, 2012), the Empirical Kaiser Criterion (Braeken & van Assen, 2017), and the Kaiser Criterion (Kaiser, 1960). Where applicable, routines were run on polychoric correlation matrices using an oblimin factoring rotation to allow for inter-factor correlations (Ford et al., 1986) and a Maximum Likelihood (ML) factoring method; a robust Maximum Likelihood (MLR) or a robust Weighted Least Squares (WLSM) factoring method would have been more adequate to the ordered, discrete, and non-normal data (Li, 2016), but both estimators were not available in most *R* packages performing EFA.

Since these extraction methods each present their own advantages and disadvantages, in addition to the fact that their respective use is notably dependent on many different parameters such as sample size, inter-factor correlations, or the number of items per factor, the number of factors to extract was estimated according to the consensus amongst these multiple approaches (Auerswald & Moshagen, 2019; Preacher et al., 2013). For the UPPS-FR

database, the number of factors to extract equaled the strongly expected 4-factor solution (Van der Linden et al., 2006; Whiteside et al., 2005), whereas the number of factors to extract from the PUM-FR database suggested a 2-factor solution (see Figure 2.2.1. and Table 2.2.2.). Since a one-factor solution was expected for the PUM-FR (Cyders et al., 2007; Cyders & Smith, 2007), both a one-factor solution and a two-factor solution ought to be further examined in exploratory and confirmatory factor analyses.

Figure 2.2.1. *UPPS-FR and PUM-FR scree plot*
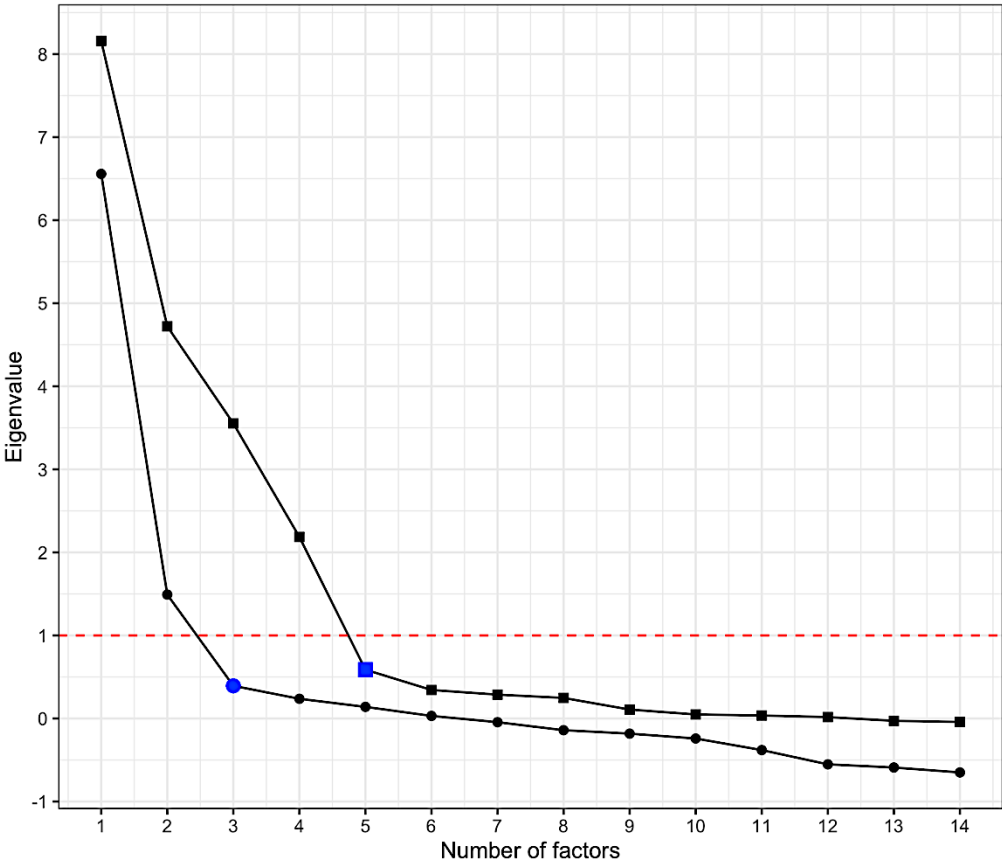
X-axis = Number of factors; Y-axis = Eigenvalue; Square-dotted line = UPPS-FR scree plot; Round-dotted line = PUM-FR scree plot; Dashed horizontal line = Kaiser Criterion; Blue square dot = Visually identified UPPS-FR scree plot break; Blue round dot = Visually identified PUM-FR scree plot break

Table 2.2.2. *UPPS-FR and PUM-FR number of factors*

DATA	VSS		MAP	CD		EKC	KC	SCREE
UPPS-FR	4		5	4	5	5	4	4
PUM-FR	1	2	2	2		2	2	2

Data = Database; VSS = Very Simple Structure (Revelle & Rocklin, 1979); MAP = Minimum Average Partial (Velicer, 1976); CD = Comparison Data (Ruscio & Roche, 2012); EKC = Empirical Kaiser Criterion (Braeken & van Assen, 2017); KC = Kaiser Criterion (Kaiser, 1960); SCREE = Scree Test (Cattell, 1966)

Based on the number of factors to extract, exploratory factor analysis (EFA) was conducted on the UPPS-FR and the PUM-FR databases; polychoric correlation matrices, oblimin factoring rotations, and ML factoring methods were specified according to the aforementioned accounts. For the UPPS-FR database, the EFA returned the strongly expected factorial structures except for item 38, loading low on Negative Urgency instead of Lack of Perseverance, and item 43, loading low on Lack of Premeditation instead of Negative Urgency (see Table 2.2.3.). The low cross-loadings for items 38 and 43 could be explained by this dissertation's EFA specifications or particular database; as they are low cross-loadings, further analyses on the UPPS-FR database were conducted on the UPPS validated factorial structure (Van der Linden et al., 2006; Whiteside et al., 2005). As to the PUM-FR database, the one-factor EFA returned the strongly expected factorial structure (Cyders et al., 2007; Cyders & Smith, 2007) and the two-factor EFA returned two factors that each contained 7 items (see Table 2.2.3.). Further analyses on the PUM-FR database were conducted on both the one-factor and the two-factor solutions.

Table 2.2.3. *UPPS-FR and PUM-FR EFA resulting factorial structures (items sorted by loadings)*

UPPS-FR					PUM-FR		
NU	**LPREM**	**LPERS**	**SS**		**PU**	**PU1**	**PU2**
I36	I39	I22	I21		PUI3	PUI3	PUI10
I41	I27	I4	I33		PUI8	PUI8	PUI11
I24	I40	I30	I37		PUI1	PUI1	PUI9
I28	I13	I34	I19		PUI2	PUI2	PUI13
I2	I35	I12	I3		PUI6	PUI6	PUI5
I45	I31	I16	I29		PUI7	PUI7	PUI14
I14	I5	I26	I25		PUI4	PUI12	PUI4
I18	I1	I8	I42		PUI12		
I10	I23	I20	I15		PUI5		
I32	I17		I44		PUI10		
I38	I9		I11		PUI9		
I6	I43		I7		PUI11		
					PUI14		
					PUI13		

NU = Negative Urgency; LPREM = Lack of Premeditation; LPERS = Lack of Perseverance; SS = Sensation Seeking; PU = Positive Urgency (one-factor solution); PU1 = Positive Urgency Factor 1 (two-factor solution); PU2 = Positive Urgency Factor 2 (two-factor solution); I = UPPS-FR items; PUI = PUM-FR items; Red font color indicates non-validated factorial structure

2.3. Confirmatory factor analyses

Following the exploratory factor analyses (EFA), UPPS-FR and PUM-FR latent variable models were created using the *lavaan R* package (Rosseel, 2012) to evaluate and compare their respective fit indices and to confirm a factor structure for each of the databases. The latent variable models were fitted for confirmatory factor analysis (CFA) by specifying the ordinal nature of the data and by using a robust Weighted Least Squares estimator (WLSM) with a Satorra-Bentler correction (Eye & Clogg, 1994) for the aforementioned purposes of robustness to non-normality (Li, 2016).

Inspired from the models tested in previous UPPS and UPPS-P examinations and validations (Billieux et al., 2012; Cyders et al., 2014; Van der Linden et al., 2006; Whiteside et al., 2005), five UPPS-FR and twelve PUM-FR latent variable models postulating different relationships amongst the impulsivity constructs were created. Then, the models were compared on the basis of five different robust fit indices: the Satorra-Bentler corrected Chi-Squared (χ^2), the robust Comparative Fit Index (CFI), the robust Tucker-Lewis Index (TLI), the robust Root Mean Squared Error of Approximation (RMSEA), and the Satorra-Bentler corrected Standardized Root Mean Squared Residual (SRMR) (Hu & Bentler, 1999). The combined use of the robust RMSEA and the Satorra-Bentler corrected SRMR is adequate as to reject models with misspecified factor covariances and misspecified factor loadings; for the two aforementioned fit indices, Hu and Bentler (1999) recommend a RMSEA smaller than 0.08 or than 0.05 and a SRMR smaller than 0.11 or than 0.06 for a better fit. In addition, while a model's SRMR fit index satisfies the previously mentioned cutoff values, Hu and Bentler (1999) recommend CFI and TLI incremental fit indices greater than 0.90 or than 0.95 for a better fit.

UPPS-FR models were fitted as listed below: a one-factor model (see Table 2.3.1., Model 1), a four intercorrelated factors model (see Table 2.3.1., Model 2), a four independent factors model (see Table 2.3.1., Model 3), a *g* hierarchical model (see Table 2.3.1., Model 4), and a hierarchical model where the Lack of Premeditation and the Lack of Perseverance constructs are comprised in a higher-order construct which Cyders and Smith (2007) named "Deficits in Conscientiousness" (see Table 2.3.1., Model 5). According to Hu and Bentler's (1999) cutoff values, Model 2 presented the best fit indices and was therefore retained (see Figure 2.3.2.).

Table 2.3.1. *UPPS-FR models' fit indices*

Model	χ^2	df	CFI	TLI	RMSEA	SRMR
Model 1	37'179.392*	945	0.633	0.615	0.172	0.154
Model 2	7'652.071*	939	0.934	0.93	0.073	0.074
Model 3	16'550.614*	945	0.813	0.804	0.122	0.122
Model 4	14'594.354*	945	0.853	0.846	0.109	0.108
Model 5	7'721.845*	942	0.93	0.926	0.075	0.076

χ^2 = Satorra-Bentler corrected Chi-Squared; df = Satorra-Bentler corrected Chi-Squared degrees of freedom; CFI = Robust Confirmatory Fit Index; TLI = Robust Tucker-Lewis Index; RMSEA = Robust Root Mean Squared Error of Approximation; SRMR = Satorra-Bentler corrected Standardized Root Mean Squared Residual; One asterisk indicates p-values *P* < 0.001; Green cell font indicates best fitting model

Figure 2.3.2. *UPPS-FR retained model*
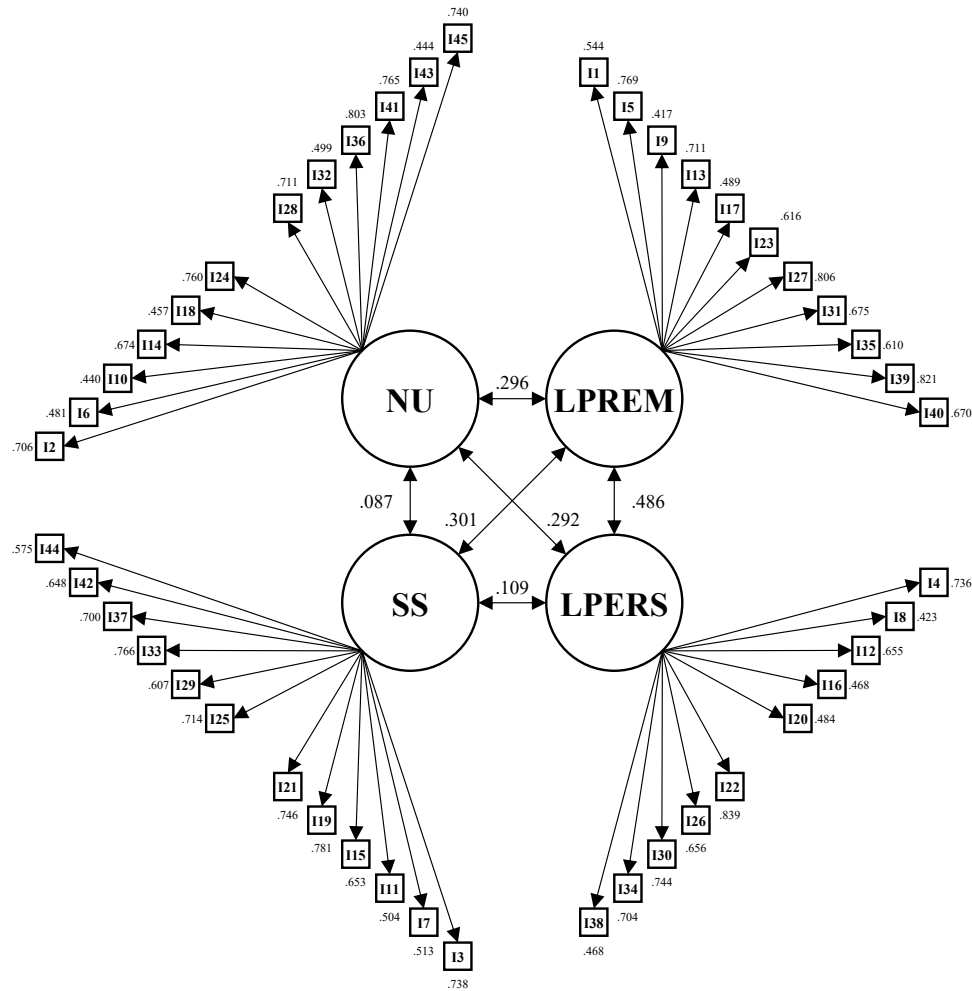
NU = Negative Urgency; LPREM = Lack of Premeditation; LPERS = Lack of Perseverance; SS = Sensation Seeking; I = UPPS-FR items; Round shapes indicate latent constructs; Square shapes indicate manifest indicators and their respective loadings; Arrows between round shapes indicate interfactor correlations

Since five pairs of PUM-FR items exhibited high polychoric correlation coefficients (greater than 0.80), each PUM-FR model had two variations: one not specifying high correlations and one specifying high correlations. Both one-factor and two-factor models were created. Thus, PUM-FR models were fitted as listed below: a one-factor model (see Table 2.3.3., Model 1a and 1b), a two intercorrelated factors model (see Table 2.3.3., Model 2a and 2b), a two independent factors model (see Table 2.3.3., Model 3a and 3b), a *g* hierarchical model (see Table 2.3.3., Model 4a and 4b), a two-factor model comprising only

the first factor (see Table 2.3.3., Model 5a and 5b), and a two-factor model comprising only the second factor (see Table 2.3.3., Model 6a and 6b). According to Hu and Bentler's (1999) cutoff values, Model 6b presented the best fit indices and was therefore retained (see Figure 2.3.2.).

Table 2.3.3. *PUM-FR models' fit indices*

Model	Variation	χ^2	df	CFI	TLI	RMSEA	SRMR
Model 1	a	629.943**	77	0.94	0.929	0.179	0.144
	b	337.924**	72	0.974	0.967	0.123	0.106
Model 2	a	290.744**	76	0.977	0.973	0.111	0.097
	b	186.022**	71	0.989	0.986	0.081	0.077
Model 3	a	1'342.798**	77	0.826	0.794	0.305	0.255
	b	1'259.34**	72	0.838	0.795	0.305	0.249
Model 4	a	301.69**	77	0.973	0.968	0.12	0.105
	b	256.382**	72	0.98	0.974	0.108	0.096
Model 5	a	45.846**	14	0.995	0.993	0.086	0.059
	b	38.743**	11	0.996	0.993	0.087	0.051
Model 6	a	143.022**	14	0.96	0.94	0.192	0.1
	b	24.28*	12	0.997	0.995	0.056	0.042

Variation column = Model non-specification of high correlations (a), Model specification of high correlations (b); $\chi2$ = Satorra-Bentler corrected Chi-Squared; df = Satorra-Bentler corrected Chi-Squared degrees of freedom; CFI = Robust Confirmatory Fit Index; TLI = Robust Tucker-Lewis Index; RMSEA = Robust Root Mean Squared Error of Approximation; SRMR = Satorra-Bentler corrected Standardized Root Mean Squared Residual; Double asterisks indicates p-values $P < 0.001$; Single asterisk indicates p-values $P < 0.05$; Green cell font indicates best fitting model

Figure 2.3.4. *PUM-FR retained model*

For both of the UPPS-FR and the PUM-FR retained models, the standardized loadings estimates were computed (see Table 2.3.5. and Table 2.3.6. respectively).

Table 2.3.5. *UPPS-FR CFA resulting factorial structure (items sorted by loadings)*

NU	LOADINGS	LPREM	LOADINGS	LPERS	LOADINGS	SS	LOADINGS
I36	0.803	I39	0.821	I22	0.839	I19	0.781
I41	0.765	I27	0.806	I30	0.744	I33	0.766
I24	0.760	I5	0.769	I4	0.736	I21	0.746
I45	0.740	I13	0.711	I34	0.704	I3	0.738
I28	0.711	I31	0.675	I26	0.656	I25	0.714
I2	0.706	I40	0.670	I12	0.655	I37	0.700
I14	0.674	I23	0.616	I20	0.484	I15	0.653
I32	0.499	I35	0.610	I38	0.468	I42	0.648
I6	0.481	I1	0.544	I16	0.468	I29	0.607
I18	0.457	I17	0.489	I8	0.423	I44	0.575
I43	0.444	I9	0.417			I7	0.513
I10	0.440					I11	0.504

NU = Negative Urgency; LPREM = Lack of Premeditation; LPERS = Lack of Perseverance; SS = Sensation Seeking; I = UPPS-FR items

Table 2.3.6. *PUM-FR CFA resulting factorial structure (items sorted by loadings)*

PU2	LOADINGS
PUI9	0.798
PUI10	0.777
PUI13	0.730
PUI11	0.716
PUI5	0.639
PUI4	0.591
PUI14	0.573

PU2 = Positive Urgency Factor 2 (two-factor solution); PUI = PUM-FR items

2.4. Internal consistency combinatorial analyses

For internal consistency reliability purposes, the resulting UPPS-P-FR short scale should exhibit a minimal *alpha* coefficient (Cronbach, 1951) of 0.7 for

each construct that the short scale is measuring (Boateng et al., 2018; Smith et al., 2000). Nevertheless, although a high *alpha* coefficient value is often preferred to demonstrate a scale's homogeneity, it compromises the extent of the content coverage of its items, thus making the scale narrow (Boyle, 1991; Streiner, 2003). In order to ensure the reliability of the UPPS-P-FR short scale while preserving its content coverage, the $\alpha \geq 0.7$ rule-of-thumb was applied to every possible combination of four items for each construct – while accounting for the *alpha*'s confidence intervals – without trying to maximize the coefficient's value.

First, the lower value of the *alpha*'s confidence intervals was set to 0.7; using the mathematical procedure from Feldt et al. (1987), the corresponding raw *alpha* value was then calculated (see Formula 2.4.1.).

Formula 2.4.1. *Cronbach's alpha lower endpoint and raw values*

$$\zeta_{low} = 1 - \left[(1 - \hat{\zeta}) \cdot F(1 - \alpha/2) \right]$$

$$0.7 = 1 - \left[(1 - \hat{\zeta}) \cdot F(1 - 5/2) \right]$$

$$\hat{\zeta} = 1 + \left[(0.7 - 1) \div F(1 - 5/2) \right]$$

ζ_{low} = Cronbach's *alpha* lower endpoint value; $\hat{\zeta}$ = Estimated Cronbach's *alpha* raw value; F = Quantile function; α = Significance level (= 5%)

Then, to compute the *F* function (see Formula 2.4.1.), the quantile function was calculated using *R* by specifying the sample size – respectively for the UPPS-FR and the PUM-FR database – as well as the significance level of 5% (which is equal to *P* = 0.05). As a result, the raw Cronbach's *alpha* values to ensure a 0.7 lower endpoint were α = 0.725 for the UPPS-FR dataset and α = 0.758 for the PUM-FR dataset.

So as to obtain all possible reliable combinations of four items for each UPPS-FR and PUM-FR construct, a loop was programmed. If the combination's *alpha* was greater than or equal to the abovementioned raw *alpha* values, the combination was kept; if not, it was discarded. As a result, each loop returned between 7 and 64 reliable combinations. Amongst all of the printed combinations, some items were systematically absent (see Table 2.4.2.). Since these items could not ensure the scale's reliability, they were deleted and omitted from further analyses.

Table 2.4.2. *Non-reliable items*

NU	LPREM	LPERS	SS	PU2
I6	I9	I8	–	PUI14
		I16		
		I20		
		I38		

NU = Negative Urgency; LPREM = Lack of Premeditation; LPERS = Lack of Perseverance; SS = Sensation Seeking; PU2 = Positive Urgency Factor 2 (two-factor solution); I = UPPS-FR items; PUI = PUM-FR items; Red font color indicates non-reliable items

2.5. Content broadness analyses

In order to allow for the UPPS-P-FR short scale, its factors and its items to exhibit a broad content coverage, different statistical approaches were set up on each factor (Smith et al., 2000): network analyses, community analyses, hierarchical cluster analyses, and inter-item polychoric correlations analyses. Based on all possible reliable combinations of four items per construct, ranks were created for each items' quadruplet based on its resulting edge-weights' sum, its communities and clusters membership, as well as its sum of correlations. Thus, the conjugated use of the abovementioned approaches provided a consensually rank-estimated selection of the five broadest quadruplets, whose extensiveness was then subjected to expert appraisal through content validity analysis.

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Before continuing, in addition to the items omitted due to their non-reliability (according to the previous internal consistency combinatorial analyses), more items were excluded for theoretical reasons from the following explorations (see Table 2.5.1.). Regarding the Negative Urgency construct, its definition stipulates the emission of an abrupt act when in an affective context of negative valence (Whiteside & Lynam, 2001); the five items with questions which do not specifically mention negative affect – namely the items 2, 10, 32, 43 and 45 – were consequently excluded (for example UPPS-EN item 2: "*I have trouble controlling my impulses.*" / UPPS-FR item 2: "*J'ai des difficultés à contrôler mes impulsions.*"). Then, concerning the Sensation Seeking construct, the six items with questions which mention domain-specific sensational activities (Billieux et al., 2014) – namely the items 15, 21, 29, 37, 42 and 44 – were also excluded in order not to narrow down the content coverage of the Sensation Seeking construct in the UPPS-P-FR short scale (for example UPPS-EN item 18: "*I would enjoy water skiing.*" / UPPS-FR item 15: "*Ça me plairait de faire du ski nautique.*"). However, no items from the Lack of Premeditation, Lack of Perseverance and Positive Urgency (Factor 2) were excluded (except for the non-reliable items).

Table 2.5.1. *Excluded items*

NU	LPREM	LPERS	SS	PU2
I2	I1	I4	I3	PUI4
I6*	I5	I8*	I7	PUI5
I10	I9*	I12	I11	PUI9
I14	I13	I16*	I15	PUI10
I18	I17	I20*	I19	PUI11
I24	I23	I22	I21	PUI13
I28	I27	I26	I25	PUI14*
I32	I31	I30	I29	
I36	I35	I34	I33	
I41	I39	I38*	I37	
I43	I40		I42	
I45			I44	

NU = Negative Urgency; LPREM = Lack of Premeditation; LPERS = Lack of Perseverance; SS = Sensation Seeking; PU2 = Positive Urgency Factor 2 (two-factor solution); I = UPPS-FR items; PUI = PUM-FR items; Red font color indicates all excluded items; One asterisk indicates non-reliable excluded items; Black font color indicates retained items

2.5.1. Network analyses

Network analyses were conducted using the *bootnet R* package (Epskamp et al., 2018). Psychological networks are complex systems of interrelations consisting of nodes – represented in this case by the constructs' items – and of edges, which describe the relationships between the nodes (Borsboom & Cramer, 2013). In this dissertation, network analyses were computed for the purpose of examining the weights of the relationships in all possible quadruplets of items with the aims to identify the weaker subnetworks, thus highlighting quadruplets covering broader content without subtracting them from the complexity of the complete network.

This dissertation's five networks (one per construct) were estimated through a Gaussian Graphical Model – which computes the graphical structure of nodes and edges signifying partial correlations (Lauritzen, 1996) – using the High-Dimensional Undirected Graph Estimation (HUGE) method (Zhao et al., 2012): in order to satisfy the non-normality of the UPPS-FR and PUM-FR items, the

variables were non-paranormally transformed (Liu et al., 2009) before applying the graphical lasso algorithm (Friedman et al., 2008) tuned on the basis of the model's Extended Bayesian Information Criterion (EBIC) (Foygel & Drton, 2010). In addition, since the items were ordinal, polychoric correlations were specified in the estimations.

Then, communities of items were searched for in the five resulting estimated networks using the *igraph R* package (Csardi & Nepusz, 2006). For this purpose, the walktrap community algorithm – a community detection function – was implemented: through random walks on the networks' graphs, locally dense subnetworks of nodes and edges were detected as similar structures and considered as communities (Pons & Latapy, 2005). As aforementioned, community membership was one approach to evaluate the content coverage of the different items' quadruplets.

Finally, the five resulting estimated networks were plotted as unweighted graphs comprising their respective items as nodes – embedded according to their community membership – and partial correlations as edges (see Figure 2.5.1.1. for the Negative Urgency illustration, see Appendix 6.1. for all illustrations).

Figure 2.5.1.1. *Estimated network (Negative Urgency illustration)*
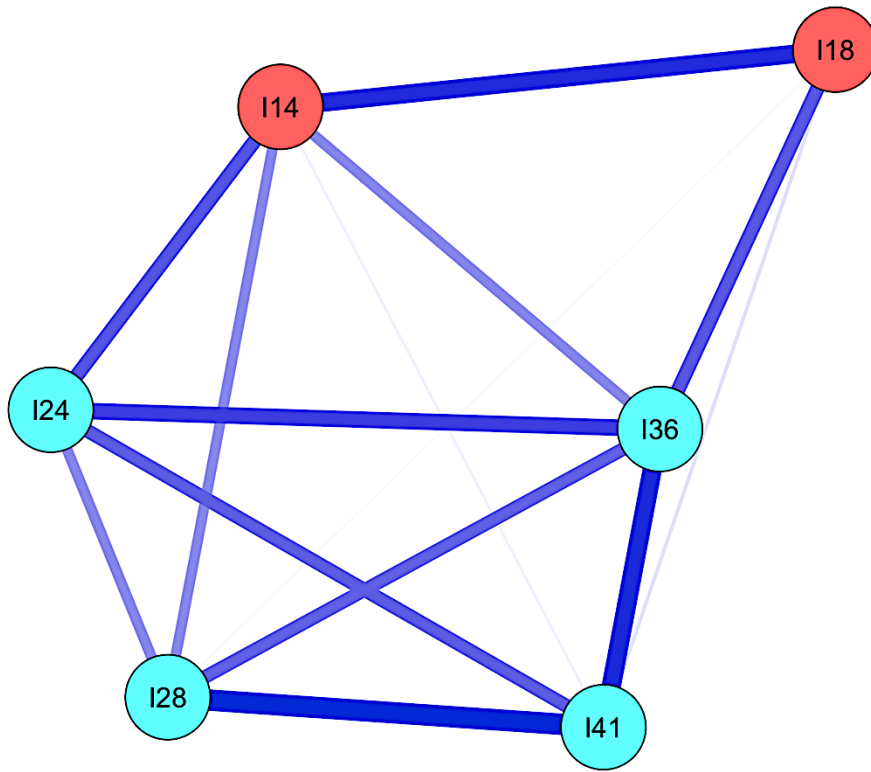
I = UPPS-FR items; Round shapes indicate nodes; Blue colored lines indicate edges; Distance in-between nodes, edges' length, edges' width and edges' color transparency indicate partial correlations coefficients' value; Light red colored round shapes indicate community 1; Light cyan colored round shapes indicate community 2

As to compare the edge-weights in-between the nodes, 1'000 non-parametric bootstraps (Efron & Tibshirani, 1993) for each of the five estimated networks were calculated to approximate the 95% confidence intervals of the edge-weights, *id est* to assess the accuracy of the obtained results (Epskamp et al., 2018) (see Figure 2.5.1.2. for the Negative Urgency illustration, see Appendix 6.2. for all illustrations).

Figure 2.5.1.2. *Edge-weights' accuracy (Negative Urgency illustration)*
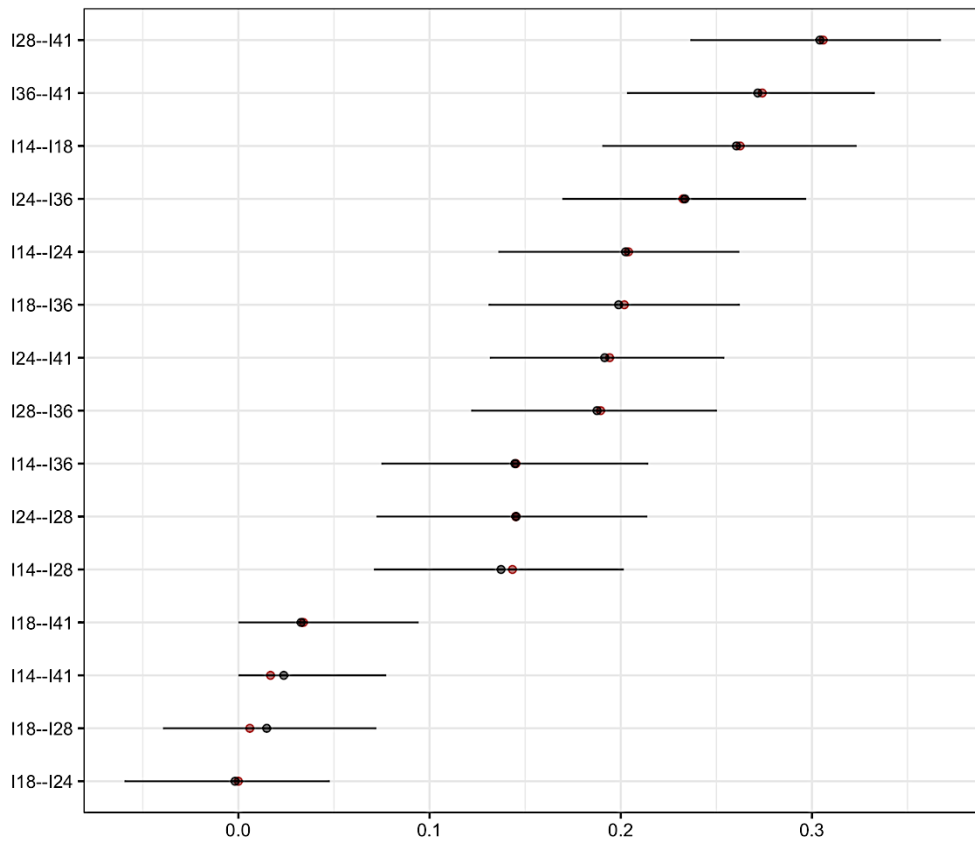
X-axis = Mean edge-weights; Y-axis = Edges (ranked by mean edge-weights); I = UPPS-FR items; Red colored dots indicate sample mean edge-weights; Black colored dots indicate bootstrap mean edge-weights; Black colored horizontal lines indicate bootstrapped confidence intervals of edge-weights

Then, as to ensure the plausibility of the edge-weights' comparison, 1'000 supplementary case-dropping subset bootstraps – an *alias* for the *m*-out-of-*n* bootstraps (Chernick, 2008) – for each of the five estimated networks were calculated to examine the permanence of the order of the edge-weights when certain subjects are removed, *id est* to assess the stability of the obtained results (Epskamp et al., 2018). For this purpose, the Correlation Stability coefficient was used to quantify the maximum proportion of dropped subjects while keeping a correlation with the original sample equal to or higher than 0.7; the five coefficients ranged from 0.672 to 0.75 or greater (see Table 2.5.1.3.), which indicated a satisfactory stability (Epskamp et al., 2018).

Table 2.5.1.3. *Edge-weights' stability*

NETWORK	CS
NU	0.75
LPREM	0.75
LPERS	0.75
SS	0.672
PU2	0.673

NU = Negative Urgency; LPREM = Lack of Premeditation; LPERS = Lack of Perseverance; SS = Sensation Seeking; PU2 = Positive Urgency Factor 2 (two-factor solution); CS column = Correlation Stability coefficient

After assessing the accuracy and the stability the five estimated networks' edge-weights, bootstrapped difference tests (Epskamp et al., 2018) – using the abovementioned non-parametric bootstraps (Efron & Tibshirani, 1994) – were computed at a significance level of $\alpha = 5\%$. (see Figure 2.5.1.4. for the Negative Urgency illustration, see Appendix 6.3. for all illustrations).

Figure 2.5.1.4. *Bootstrapped difference test (Negative Urgency illustration)*
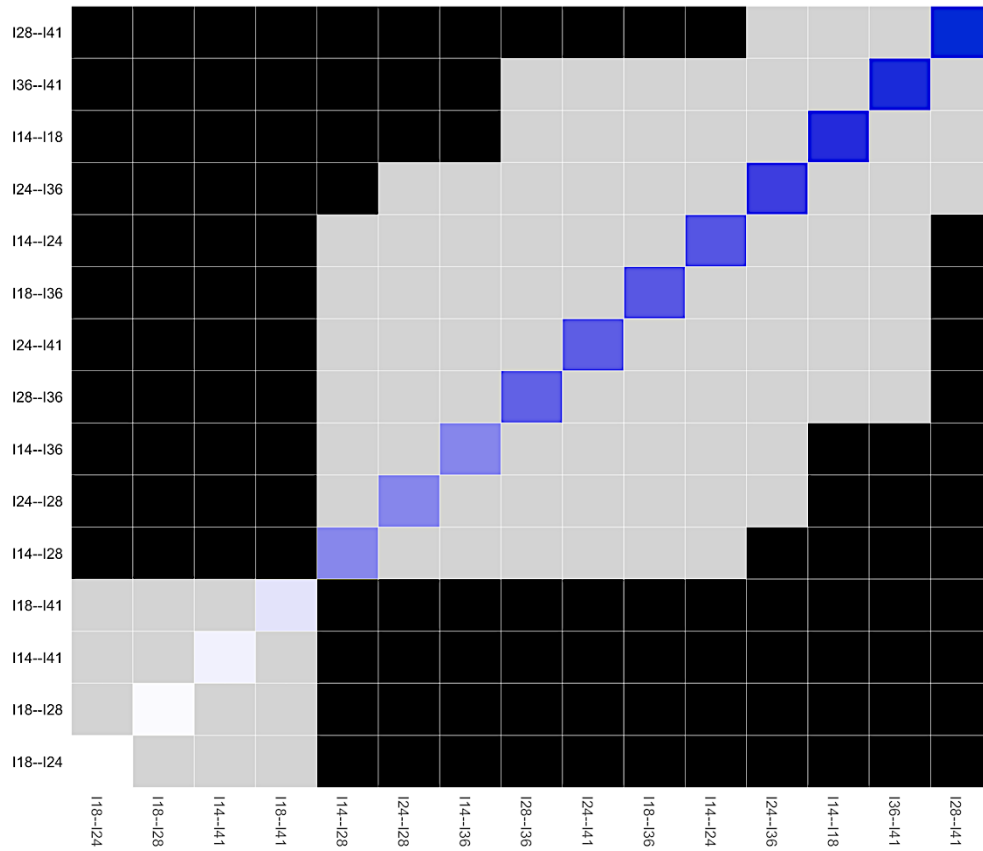
X-axis = Edges (ranked by mean edge-weights); Y-axis = Edges (ranked by mean edge-weights); I = UPPS-FR items; Blue colored boxes indicate mean edge-weights; Blue colored boxes transparency indicates mean edge-weights' value; Gray colored boxes indicate non-significant differences (α = 5%); Black colored boxes indicate significant differences (α = 5%)

Then, as to compare the edge-weights, mean differentiation ranks were calculated for each edge (see Formula 2.5.1.5.) to inform about which of the edges were the weakest, thus informing about which of the items' pairs covered the broadest content. As aforementioned, edge-weights were one approach to evaluate the content coverage of the different items' quadruplets.

Formula 2.5.1.5. *Mean differentiation ranks*

$$MDR_E = \sum_{i=1}^{N_E} \frac{r_{i_E}}{N_E}$$

MDR_E = Mean differentiation rank for edge E; i = Summation index; N_E = Number of non-significantly different edges for edge E; r_{i_E} = Rank of the ith non-significantly different edge for edge E

2.5.2. Hierarchical cluster analyses

Hierarchical cluster analyses were conducted using the *ICLUST* function in the *psych R* package (Revelle, 2021) as a complement to the previous networks' community analyses. This procedure is usually applied to create multiple relatively independent partitions of homogenous items (Revelle, 1979); it was here used for its opposite purpose, *id est* to investigate the heterogeneity in-between different partitions and amongst the constructs' respective quadruplets of items in order to ensure a broader content coverage (Boyle, 1991; Streiner, 2003).

The *ICLUST* procedure is focused on homogeneity as it creates clusters from a correlation matrix input on the basis of two reliability coefficients – particularly Cronbach's *alpha* (Cronbach, 1951) and Revelle's *beta* (Revelle, 1979) – until both of their values reach a maximum. While the formulas for the two reliability coefficients are essentially similar, their distinction resides in the fact that Cronbach's *alpha* coefficient is calculated using the average inter-item covariance whereas Revelle's *beta* coefficient is calculated using the minimal inter-item covariance (Zinbarg et al., 2005). Each of the five constructs were looked up for specifying polychoric correlation matrices and an ascending number of clusters from one to four (see Figure 2.5.2.1. for the Negative Urgency illustration, see Appendix 6.4. for all illustrations).

**Figure 2.5.2.1.** *Hierarchical clustering (Negative Urgency illustration)*
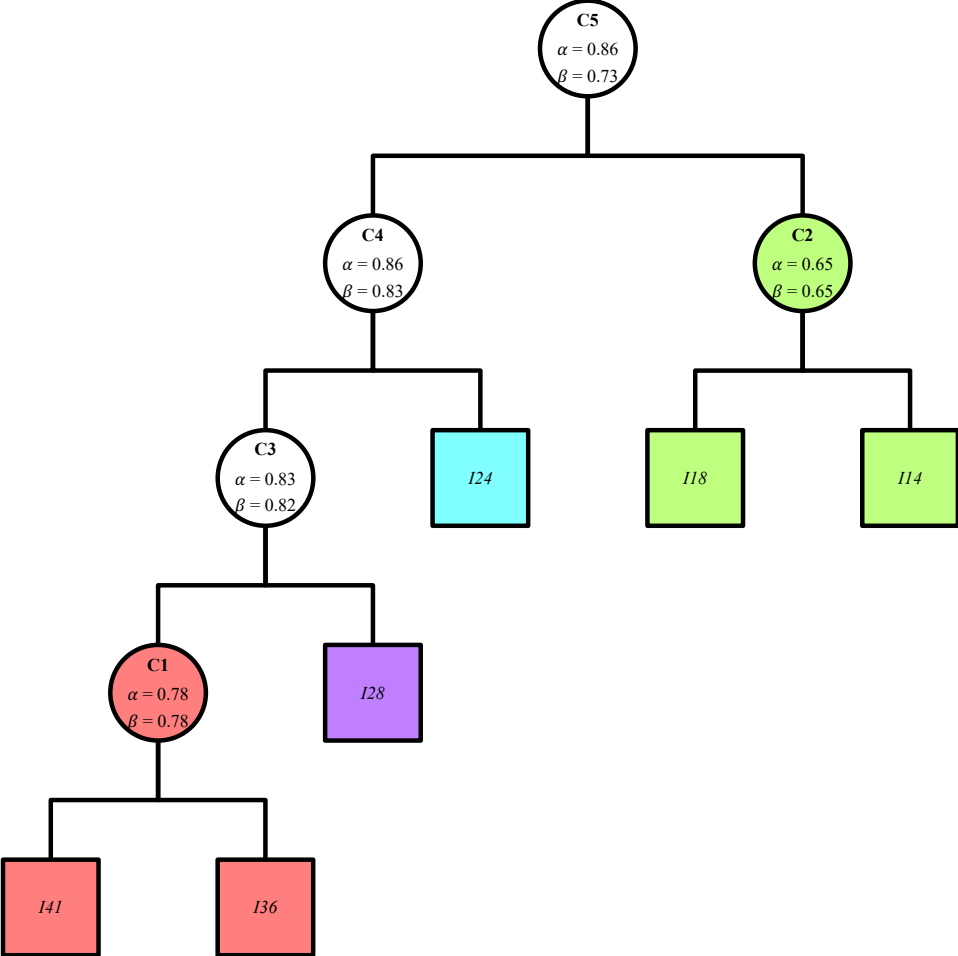
C = Cluster; I = UPPS-FR items; α = Cronbach's *alpha* coefficient; β = Revelle's *beta* coefficient; Round shapes indicate clusters; Square shapes indicate items; Light red colored shapes indicate cluster 1; Light green colored shapes indicate cluster 2; Light cyan colored shapes indicate cluster 3; Light violet colored shapes indicate cluster 4

Then, the hierarchical cluster membership of the different items' quadruplets was computed to inform about which quadruplets represent the higher number of hierarchical clusters, thus covering the broadest content.

2.5.3. Inter-item polychoric correlations analyses

According to Smith et al. (2000), the lower the inter-item correlations, the broader the content coverage; thus, inter-item polychoric correlations were investigated using the *psych R* package (Revelle, 2021) (see Figure 2.5.3.1. for the Negative Urgency illustration, see Appendix 6.5. for all illustrations).

Figure 2.5.3.1. *Inter-item polychoric correlations (Negative Urgency illustration)*
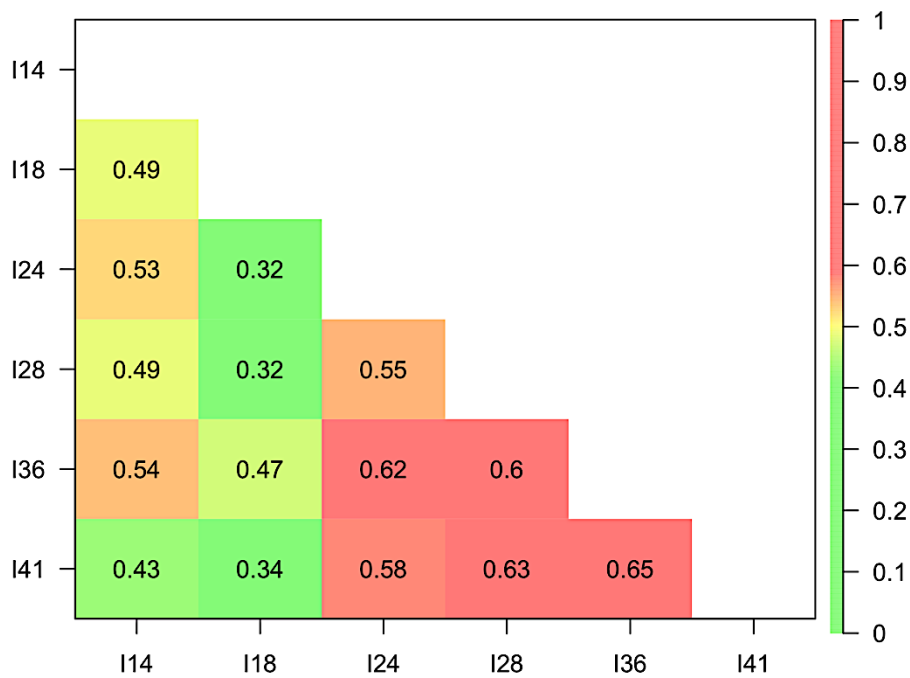
X-axis = Items; Y-axis = Items; I = UPPS-FR items; Colored boxes' numbers and gradient indicate inter-item polychoric correlation coefficients

As to determine for which quadruplets of items the content coverage was the broadest, the inter-item polychoric correlation coefficients of the six respective

items' pairs per quadruplet were summed and then ranked from lowest to highest, *id est* from broadest to narrowest according to this approach.

2.5.4. Content broadness analyses' results

Based on the abovementioned approaches investigating the content coverage, all reliable items' quadruplets – *id est* whose Cronbach's *alpha* lower endpoint is equal to or greater than 0.7 in each of the five constructs – were ranked according to their respective sums of mean differentiation ranks, communities and clusters membership, as well as sums of inter-item polychoric correlation coefficients. This consensually rank-estimated selection of the broadest quadruplets – prior to their subjection to expert appraisal through content validity analysis – allowed for the retainment of three quadruplets per construct: one primary solution, one alternative solution, and one narrow solution. The two-overall best-ranked quadruplets generated the primary and alternative solutions whilst the overall worst quadruplets generated the narrow solutions for the purpose of integrating a control condition to the content validity analysis' (see Table 2.5.4.1 for the Negative Urgency illustration, see Appendix 6.6. for all illustrations).

Table 2.5.4.1. *Generated solutions (Negative Urgency illustration)*

DIM	QUAD	MDR	IIC	COM	CLU	RMDR	RIIC	RCOM	RCLU	MEANR	SOLR
NU	1	52.000	2.964	2	3	7	4	1	2	3.50	6
NU	2	49.500	2.910	2	3	5	2	1	2	2.5	3
NU	3	46.000	2.914	2	2	2	3	1	3	2.25	2
NU	4	54.500	3.324	2	4	10	8	1	1	5.00	8
NU	5	51.500	3.204	2	4	6	7	1	1	3.75	7
NU	6	52.000	3.343	2	3	7	10	1	2	5.00	8
NU	7	53.500	3.340	2	3	9	9	1	2	5.25	10
NU	8	43.000	2.887	2	4	1	1	1	1	1.00	1
NU	9	46.000	2.973	2	3	2	5	1	2	2.5	3
NU	10	49.000	3.014	2	3	4	6	1	2	3.25	5
NU	11	63.000	3.628	1	3	11	11	2	2	6.50	11

DIM column = UPPS-P factor; NU = Negative Urgency; QUAD column = Numbering for the reliable quadruplet of items; MDR column = Sum of mean differentiation ranks for the quadruplet; IIC column = Sum of inter-item polychoric correlation coefficients for the quadruplet; COM column = Communities membership for the quadruplet; CLU column = Clusters membership for the quadruplet; RMDR column = Rank of the sum of mean differentiation ranks for the quadruplet amongst other quadruplets; RIIC column = Rank of the sum of inter-item polychoric correlation coefficients for the quadruplet amongst other quadruplets; RCOM column = Rank of the communities membership for the quadruplet amongst other quadruplets; RCLU column = Rank of the clusters membership for the quadruplet amongst other quadruplets; MEANR column = Mean rank of the quadruplet; SOLR column = Final rank of the quadruplet amongst other quadruplets; Green cell font indicates first ranks; Yellow cell font indicates second ranks; Red cell font indicates last ranks

2.6. Content validity analyses

In addition to the conjugated statistical approaches which led to the selection of the broadest reliable items' quadruplets, content validity was assessed through expert appraisal. For this purpose, an online survey was implemented using *Qualtrics XM* in order to collect the responses of a panel of experts regarding the content coverage of the three previously retained quadruplets per construct (*id est* the primary solution, the alternative solution, and the narrow solution). The experts' average response and agreement about the broadest solution for each construct were then analyzed.

Following the recommendations of Smith et al. (2000) and Boateng et al. (2018), eight highly knowledgeable experts about the UPPS-P model (Lynam et al., 2006) were approached, informed about the current Master's dissertation, and asked to examine the content coverage of the three previously retained solutions per construct. Beforehand, the approached experts had to confirm that they were participating voluntarily and that they were meeting both of the following eligibility criteria: firstly, the experts had to hold a PhD in Psychology and to have used the UPPS-P model (Lynam et al., 2006) in their doctoral dissertation and, secondly, experts had to be native French speakers or at least fluent in French. Out of the eight approached experts, six eligible experts agreed to participate in the content validity analyses and completed the online survey.

The online survey presented to the experts the primary, alternative, and narrow solutions in a random order for each UPPS-P construct. The experts were asked three different types of questions per construct. Firstly, they were asked to rate on a 4-point Likert scale the content preservation of each solution compared to the 10 to 12 construct's items included in the original 59-item UPPS-P French scale; the collected data was then of ordinal nature. Secondly, they were asked which of the three solutions best and worst preserved the original content; the collected data was then of categorical nature. Thirdly, they were asked what original content was non-preserved in each of the three solutions; the collected data was then of qualitative nature.

Once all of the content validity analysis' data was collected, responses' frequencies as well as interrater agreement analyses were conducted using the *irr R* package (Gamer et al., 2019). Responses' frequencies were calculated for both of the aforementioned ordinal and categorical variables in order to rank the constructs' solutions. According to Lynn (1986), the probability of chance agreement is negligible over a threshold of five judges, thus ensuring the appropriateness of calculating interrater agreement. In order to do so, two different statistical coefficients were computed. For the ordinal variables, two-way Intraclass Correlation Coefficients (ICC) with F-tests (Shrout & Fleiss, 1979) were calculated because of the ordinal nature of the data, of the number of experts being higher than two and of the interrater differences in the respective

responses' qualitative explanations (Hallgren, 2012). For the categorical variables, Fleiss' *kappa* (Fleiss, 1971) were calculated because of the categorical nature of the data and of the number of experts being higher than two (Hallgren, 2012). Thus, by conjugating the measures of the responses' frequencies and of the two interrater agreement indices, the procedure led to the ranking of the solutions as evaluated by the six experts (see Table 2.6.1.).

Table 2.6.1. *Content validity analyses' results*

SOL	NU	LPREM	LPERS	SS	PU
SOL 1	3.167	2.667*	3.333	2.833***	3.167
	++/-	------***	+/---	------***	++/--
SOL 2	2.833	3.333*	3.167	3.167***	3.667
	+/---	+++++***	++/---	+	++++
SOL 0	3.000	3.333*	3.500	4.000***	3.333
	+++/--	+	+++	+++++***	----

SOL column = Items' quadruplets; SOL 1 = Primary broad solution; SOL 2 = Alternative broad solution; SOL 0 = Control narrow solution; NU = Negative Urgency; LPREM = Lack of Premeditation; LPERS = Lack of Perseverance; SS = Sensation Seeking; PU = Positive Urgency; Values indicate ordinal questions' mean response; Mathematical symbols indicate categorical questions' frequencies such as the positive symbols indicate votes for "broadest solutions" while negative symbols indicate votes for "most narrow solutions"; Green cell font indicates first-ranked experts' response regarding the broadest solution; Yellow cell font indicates second-ranked experts' response regarding the broadest solution; Red cell font indicates third-ranked experts' response regarding the broadest solution; Single asterisks indicate interrater agreements presenting p-values such as $P \leq 0.05$; Double asterisks indicate interrater agreements presenting p-values such as $P \leq 0.01$; Triple asterisks indicate interrater agreements presenting p-values such as $P \leq 0.001$

Nonetheless, the content validity analyses' results did not confirm the appropriateness of the statistically broadest items' quadruplets: responses' frequencies associated to the primary solution and to the alternative solution were often low, whereas interrater agreement was often low and non-significant. Furthermore, the experts rated the narrow solution as the broadest regarding the Lack of Perseverance and the Sensation Seeking constructs. In order to

understand what led to these results, the experts' comments about the primary solutions were consulted and analyzed.

Concerning the Negative Urgency's primary solution (see Table 2.6.2. for the primary solution, see Appendix 6.7. for all solutions), although this solution was rated as being the broadest, three experts described the affect's intensity, variety, or accuracy as being too little.

Table 2.6.2. *Negative Urgency's primary solution*

UPPS-FR	UPPS-EN
I18. Parfois quand je ne me sens pas bien, je ne parviens pas à arrêter ce que je suis en train de faire même si cela me fait me sentir plus mal.	**I18.** Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse.
I24. Quand je suis contrarié(e), j'agis souvent sans réfléchir.	**I24.** When I am upset I often act without thinking.
I28. Quand je me sens rejeté(e), je dis souvent des choses que je regrette ensuite.	**I28.** When I feel rejected, I will often say things that I later regret.
I36. J'aggrave souvent les choses parce que j'agis sans réfléchir quand je suis contrarié(e).	**I36.** I often make matters worse because I act without thinking when I am upset.

UPPS-FR column = 45-item French UPPS items; UPPS-EN column = 45-item English UPPS items (for translation purposes); I prefix = Item (followed by numbering)

Concerning the Lack of Premeditation's primary solution (see Table 2.6.3. for the primary solution, see Appendix 6.7. for all solutions), two UPPS-FR items – namely item 5 and item 31 – were frequently cited by the experts. Three experts reported item 5 as inadequate since it did not mention the reflection on the consequences of an action before its emission (Whiteside & Lynam, 2001). Five

experts reported item 31 as being inappropriate, for it would not be inherent to the Lack of Premeditation's construct, or for it would rather be a personality trait.

Table 2.6.3. *Lack of Premeditation's primary solution*

UPPS-FR	UPPS-EN
I5. Ma manière de penser est d'habitude réfléchie et méticuleuse.	**I5.** My thinking is usually careful and purposeful.
I27. D'habitude je me décide après un raisonnement bien mûri.	**I27.** I usually make up my mind through careful reasoning.
I31. Je suis une personne prudente.	**I31.** I am a cautious person.
I40. Avant de me décider, je considère tous les avantages et inconvénients.	**I40.** Before making up my mind, I consider all the advantages and disadvantages.

UPPS-FR column = 45-item French UPPS items; UPPS-EN column = 45-item English UPPS items (for translation purposes); I prefix = Item (followed by numbering)

Concerning the Lack of Perseverance's primary solution (see Table 2.6.4. for the primary solution, see Appendix 6.7. for all solutions), three experts reported that the solution was inadequate since it omitted mentioning attentiveness regarding the completion of demanding or dull tasks (Whiteside & Lynam, 2001). Besides, two experts commented on item 12 being confusing since it comprised a double negative grammatical construction.

Table 2.6.4. *Lack of Perseverance's primary solution*

UPPS-FR	UPPS-EN
I4. Je préfère généralement mener les choses jusqu'au bout.	**I4.** I generally like to see things through to the end.
I12. Je n'aime vraiment pas les tâches inachevées.	**I12.** Unfinished tasks really bother me.
I30. Je suis une personne productive qui termine toujours son travail.	**I30.** I am a productive person who always gets the job done.
I34. Une fois que je commence un projet, je le termine presque toujours.	**I34.** Once I start a project, I almost always finish it.

UPPS-FR column = 45-item French UPPS items; UPPS-EN column = 45-item English UPPS items (for translation purposes); I prefix = Item (followed by numbering)

Concerning the Sensation Seeking's primary solution (see Table 2.6.5. for the primary solution, see Appendix 6.7. for all solutions), four experts commented that item 11 was inappropriate since it assumed that every subject would have to like sports and games. This comment alone would explain the raters' strong preference for the narrow solution which did not contain item 11.

Table 2.6.5. *Sensation Seeking's primary solution*

UPPS-FR	UPPS-EN
I3. Je recherche généralement des expériences et sensations nouvelles et excitantes.	**I3.** I generally seek new and exciting experiences and sensations.
I11. J'aime les sports et les jeux dans lesquels on doit choisir son prochain mouvement très rapidement.	**I11.** I like sports and games in which you have to choose your next move very quickly.
I25. Je me réjouis des expériences et sensations nouvelles même si elles sont un peu effrayantes et non-conformistes.	**I25.** I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.
I33. J'aime parfois faire des choses qui sont un petit peu effrayantes.	**I33.** I sometimes like doing things that are a bit frightening.

UPPS-FR column = 45-item French UPPS items; UPPS-EN column = 45-item English UPPS items (for translation purposes); I prefix = Item (followed by numbering)

Finally, concerning the Positive Urgency's primary solution (see Table 2.6.6. for the primary solution, see Appendix 6.7. for all solutions), the experts' main comments were similar to those regarding the Negative Urgency's primary solution, *id est* that some affect or wordings were too intense (*exempli gratia* "[...] deliriously happy, [...]" in item 5 and "[...] getting carried away." in item 9).

Table 2.6.6. *Positive Urgency's primary solution*

PUM-FR	PUM-EN
PUI5. Quand je suis follement heureux/heureuse, j'ai tendance à perdre le contrôle de moi-même.	**PUI5.** When I'm deliriously happy, I tend to lose control of myself.
PUI9. Quand je suis ravi/ravie, je sens que je ne peux pas m'empêcher de m'emballer.	**PUI9.** When I'm delighted, I can't stop myself from getting carried away.
PUI10. Quand je suis vraiment enthousiaste, j'ai tendance à ne pas penser aux conséquences de mes actions.	**PUI10.** When I'm really enthusiastic, I tend not to think about the consequences of my actions.
PUI13. Quand je suis très heureux/heureuse, j'ai l'impression qu'il est normal de céder à ses envies ou de se laisser aller à des excès.	**PUI13.** When I'm very happy, I feel as if it's normal to succumb to one's desires or go overboard about things.

PUM-FR column = 14-item French PUM items; PUM-EN column = 14-item English PUM items (for translation purposes); PUI prefix = Item (followed by numbering)

In summary, the content validity analysis through expert appraisal revealed that certain quadruplets of items – which were extracted from the original 45-item UPPS and 14-item PUM scales – did not sufficiently represent the construct to which they belong when referring to Whiteside & Lynam (2001) or to Cyders et al. (2007), or that they were not relevant enough. Although some items were eliminated *a priori* due to theoretical reasons before conducting the conjugated content coverage statistical analyses (see Table 2.5.1.), the content validity analyses' results disclosed the inappropriateness of some items that were not *a priori* omitted. Although the primary and alternative solutions were not supported, hence compromising the development of a revised short French UPPS-P scale in the context of this Master's dissertation, the current findings can be used to inform and guide future attempts to develop and test the psychometric properties of a revised short French UPPS-P Impulsive Behavior Scale. Thus, in

lieu of the results' section, a research protocol for further research is elaborated and comprehensively described.

3. Elaboration of a research protocol

Although the results of this Master's dissertation did not allow for the creation of a revised short French UPPS-P scale, they provided useful preliminary data to inform and guide future research. Thus, a research protocol was elaborated: in addition to a fine-tuned methodology of this dissertation's methods, a procedure regarding sampling, administration, validity and reliability evidence is described.

3.1. Development of the revised short French version of the UPPS-P

The main limitation of this Master's dissertation was the enterprise of statistical content broadness analyses on some non-appropriate items which were later criticized by the six experts through content validity analysis. Thus, this dissertation's methodology would be reiterated on an appropriate pool of items.

In order to retain the adequate pool of items, the implementation of a Delphi technique would be suitable. The aims of the Delphi technique are to bring the opinions of highly knowledgeable experts about a specific domain to a consensus on a certain object (Dalkey & Helmer, 1963). Following the recommendations of Vernon (2009), experts about the UPPS-P model (Lynam et al., 2006) would be recruited according to the two eligibility criteria used in this dissertation's content validity analysis, *id est* firstly to hold a PhD in Psychology and to have used the UPPS-P model in their doctoral dissertation and, secondly, to be native French speakers or at least fluent in French. Then, as the Delphi technique is an iterative method (Vernon, 2009), experts would be involved in different rounds – until consensus is reached – in order to comment the 52 items included in the 45-item French UPPS scale and in the 14-item French PUM scale's 7-item second factor, which was the only factor in the model retained in this dissertation's PUM confirmatory factor analysis (see Figure 2.3.4.). The experts' task would revolve around the appropriateness of each item *vis-à-vis* their construct's definition and around the relevance of each item regarding other matters; the objective – which was an issue of the current

methodology highlighted by its results – would be to suppress or to modify certain items that would not be suitable for the revised short French UPPS-P scale. Throughout the rounds, experts would get access to their peers' anonymous comments from the previous rounds, thus allowing them to align to the group's opinion, to maintain or to modify their opinion (Vernon, 2009). The Delphi method would conclude once the group's consensus would have reached a predetermined level (Vernon, 2009).

Then, as the Delphi technique would have led to retaining a pool of appropriate items, each construct's items would be submitted to the statistical analyses conducted in this dissertation's methods, *id est* internal reliability combinatorial analysis, network analysis, community analysis, hierarchical cluster analysis, and inter-item correlation analysis (see Section 2.4. and Section 2.5.). Subsequently, the statistically generated broad items' quadruplets would undergo content validity analysis using the procedure described in this dissertation's methods (see Section 2.6.). A new panel of experts who would not have been previously involved in the Delphi technique would be recruited for the content validity analysis.

The aforementioned stages of the forethought research protocol would ultimately lead to the construction of the 20-item revised short French UPPS-P scale, which would then be administered to the study's participants.

3.2. Participants and procedure

The recruitment of a self-selected sample of N participants would ideally take place in university classes as well as on online social networks to compensate for the students' potential age homogeneity and sex imbalance; multisite recruitment in different European French-speaking countries such as Switzerland, Belgium and France would be adequate. The respondents would have to meet the two following eligibility criteria: to be of lawful age and to be native French speakers or at least fluent in French.

For the purpose of data collection, an online survey would be implemented. In addition to being informed about the study's context and aims, the online survey would inform the participants about their tasks, the estimated time T of the survey's completion, the anonymity and confidentiality of the treatment of their data, and the potential compensation; furthermore, they would have to confirm meeting the two aforementioned eligibility criteria as well as to confirm the voluntary nature of their participation. Sociodemographic information such as sex, age, nationality, highest level of education and clinical diagnoses would be gathered prior to the instruments' self-administration. In order to ask for a future second completion of the revised short French UPPS-P scale – for test-retest stability purposes – as well as to distribute the potential compensation, an optional field asking for the respondents' email addresses would be implemented.

In addition to the 20-item revised short French UPPS-P scale, the administration would also consist of the five following supplementary instruments: the 15-item short French Barratt Impulsiveness Scale (BIS; Rousselle & Vigneau, 2016), the 14-item French Hospital Anxiety and Depression Scale (HADS; Bocéréan & Dupret, 2014), the 10-item French Alcohol Use Disorders Identification Test (AUDIT; Gache et al., 2005), the 15-item short French Problematic Mobile Phone Use Questionnaire (PMPUQ; Lopez-Fernandez et al., 2018), and the 11-item short French Behavioral Inhibition System and Behavioral Activation System Scales (BIS/BAS; Studer et al., 2016).

Assuming that each item would approximately take 15 seconds to complete, the estimated time T of administration of the six instruments – which total sum of items equals 85 – would be of *circa* 21.25 minutes.

In order to determine the required sample size when studying latent variable models, one would either rely on referring to rules-of-thumb (Boateng et al., 2018) or on running a Monte Carlo simulation (Muthén & Muthén, 2002). Amongst the several proposed rules-of-thumb, Nunnally (1967) suggested a ratio of 10 participants per indicator while Comrey and Lee (1992) denoted a sample size of 300 as good. Nevertheless, a more adequate method to estimate

the appropriate minimal sample size which allows for satisfactory misspecified model rejection would be to run a Monte Carlo simulation with a Structural Equation Model using the *simsem R* package (Jorgensen et al., 2021). For this purpose, the hierarchical model retained in the current 20-item short French UPPS-P scale (Billieux et al., 2012) was translated into a theoretical Structural Equation Model using *lavaan* syntax (Rosseel, 2012). Then, 50 sample replications with sample sizes ranging from 50 to 500 were generated using the Monte Carlo method for the aforementioned theoretical model; a non-normal distribution was inferred from the UPPS-FR and PUM-FR datasets used in this dissertation. The results presented the fit indices' cutoff values associated to various sample sizes (see Table 3.2.1.). Thus, according to Hu and Bentler's (1999) cutoff values, RMSEA, CFI, and SRMR satisfactory fit indices were obtained for an estimated $N \geq 282$ complete cases. However, a higher number of participants would be necessary to compensate for missing data, to ensure robustness to non-normality, and as running Monte Carlo simulations with different seeds yields slightly different estimations.

Table 3.2.1. *Fit indices cutoff values in association with sample size*

N	CFI	RMSEA	SRMR
50	0.899	0.087	0.107
100	0.91	0.079	0.099
200	0.932	0.063	0.082
282	0.95	0.05	0.069
300	0.953	0.047	0.066
400	0.975	0.031	0.049
500	0.997	0.014	0.033

N column = Sample size; CFI column = Confirmatory Fit Index; RMSEA column = Root Mean Squared Error of Approximation; SRMR column = Standardized Root Mean Squared Residual; Green cell font indicates threshold for satisfactory fit indices' cutoff values

Once this section's procedure would have been conducted, the collected data would undergo different analyses as to provide validity and reliability evidence (see Section 3.3. and Section 3.4.).

3.3. Validity evidence

Validity evidence was forethought following the *Standards for Educational and Psychological Testing* published by the American Educational Research Association (2011) as well as the recommendations of Smith et al. (2000) and of Boateng et al. (2018). Four types of relevant information concerning validity – namely internal structure, test content, relationships with criteria, and relationships with conceptually related constructs – were investigated or included in the research protocol for future conduction.

3.3.1. Validity evidence regarding internal structure

In order to provide validity evidence regarding internal structure (American Educational Research Association, 2011), confirmatory factor analyses would be implemented and conducted following the procedure described in this dissertation's methods (see Section 2.3.). On the basis of previously validated models (Billieux et al., 2012; Cyders et al., 2014; Van der Linden et al., 2006; Whiteside et al., 2005), different UPPS-P latent variable models would be fitted with various specifications of hierarchies and covariances. The retained UPPS-P model would present satisfactory CFI, TLI, RMSEA and SRMR fit indices according to Hu and Bentler's (1999) cutoff values.

3.3.2. Validity evidence regarding test content

The content validity analysis through expert appraisal – which would be conducted in the scale's development stage (see Section 3.1.) following the procedure described in this dissertation's methods (see Section 2.6.) – would

provide validity evidence regarding test content (American Educational Research Association, 2011).

3.3.3. Validity evidence regarding relationships with criteria and conceptually related constructs

The 15-item short French Barratt Impulsiveness Scale (BIS; Rousselle & Vigneau, 2016) – initially developed by Barratt (1959) – would provide validity evidence regarding relationships with criteria (American Educational Research Association, 2011) since both the UPPS-P and the BIS scales measure the construct of impulsivity (Billieux et al., 2012; Rousselle & Vigneau, 2016). The eleventh version of the BIS (BIS-11; Patton et al., 1995) comprises three subscales – attentional impulsiveness, motor impulsiveness, and non-planning impulsiveness – which would respectively present associations firstly with the Lack of Perseverance construct's score, secondly with both the Negative Urgency and the Positive Urgency constructs' scores, and thirdly with the Lack of Premeditation construct's score (Stanford et al., 2009). However, the BIS-11 would not present any association with the Sensation Seeking construct since it was specifically constructed orthogonally to this "action-oriented" construct (Stanford et al., 2009).

The 14-item French Hospital Anxiety and Depression Scale (HADS; Bocéréan & Dupret, 2014), the 10-item French Alcohol Use Disorders Identification Test (AUDIT; Gache et al., 2005), the 15-item short French Problematic Mobile Phone Use Questionnaire (PMPUQ; Lopez-Fernandez et al., 2018) and the 11-item short French Behavioral Inhibition System and Behavioral Activation System Scales (BIS/BAS; Studer et al., 2016) would provide validity evidence regarding relationships with conceptually related constructs (American Educational Research Association, 2011). Although the aforementioned instruments' constructs of interest could be measured using other scales, the instruments were retained due to their number of items being lower than their respective alternative tests.

Although the HADS was initially developed for clinical use in health institutions (Zigmond & Snaith, 1983), some studies conducted on non-patient samples demonstrated its sensitivity when administered to the general population (Crawford et al., 2001; Hinz & Brähler, 2011). The HADS consists of two 7-item subscales measuring the constructs of anxiety and of depression (Bocéréan & Dupret, 2014). The 14-item French HADS anxiety subscale's score (Bocéréan & Dupret, 2014) would present significant associations with the Negative Urgency construct's score while the depression subscale's score would present significant associations with the Negative Urgency, the Lack of Premeditation, and the Lack of Perseverance constructs' scores (Berg et al., 2015).

The World Health Organization's AUDIT is a screening test which assesses alcohol consumption, dependence and harmful use (Saunders et al., 1993). The 10-item French AUDIT total score (Gache et al., 2005) would present significant associations with the five UPPS-P constructs' scores (Berg et al., 2015; McCarty et al., 2017).

Developed by Billieux et al. (2008), the PMPUQ assesses four mobile phone related facets such as prohibited use, dangerous use, dependence, and financial problems. Thus, the 15-item short French PMPUQ (Lopez-Fernandez et al., 2018) prohibited use facet would present significant associations with the Lack of Premeditation construct's score, the dangerous use facet would present significant associations with the Negative Urgency, the Sensation Seeking, and the Positive Urgency constructs' scores, the dependence facet would present significant associations with the Negative Urgency and the Positive Urgency constructs' scores and, finally, the financial problems facet would present significant associations with the Negative Urgency, the Lack of Perseverance, and the Positive Urgency constructs' scores (Billieux et al., 2008).

The BIS/BAS is a two-scale questionnaire used to measure the Behavioral Activation and Inhibition Systems described by Gray (1981). Amongst the 11-item short French Behavioral Inhibition System and Behavioral Activation System Scales (BIS/BAS; Studer et al., 2016), the 5-item Behavioral Inhibition Scale would hypothetically present significant associations with the Negative

Urgency, the Sensation Seeking (negative association), and the Positive Urgency constructs' scores, while the 6-item Behavioral Activation Scale would hypothetically present significant associations with the Negative Urgency, the Sensation Seeking (positive association), and the Positive Urgency constructs' scores (with respect to the hypotheses and results in Verdejo-García et al. (2010)).

Two-tailed Pearson's product-moment correlations – which suit both normal and non-normal distributions (Havlicek & Peterson, 1976) – would be calculated between tests' or dimensions' scores (Boateng et al., 2018). Effect size would be reported according to Cohen's classification (Cohen, 1988) and would confirm relationships with criteria as well as known psychopathological associations between the UPPS-P constructs (Lynam et al., 2006) and the abovementioned instruments (see Table 3.3.3.1.). Besides, it would be possible to obtain relationships that were not aforementioned.

Table 3.3.3.1. *Relationships between UPPS-P and other instruments' constructs*

SCALES	SUBSCALES	NU	LPREM	LPERS	SS	PU
BIS	BIS-AI			•		
BIS	BIS-MI	•				•
BIS	BIS-NI		•			
HADS	HADS-A	•				
HADS	HADS-D	•	•	•		
AUDIT	AUDIT	•	•	•	•	•
PMPUQ	PMPUQ-PU		•			
PMPUQ	PMPUQ-DU	•			•	•
PMPUQ	PMPUQ-DE	•				•
PMPUQ	PMPUQ-FP	•		•		•
BIS/BAS	BIS/BAS-I	•			•	•
BIS/BAS	BIS/BAS-A	•			•	•

NU = Negative Urgency; LPREM = Lack of Premeditation; LPERS = Lack of Perseverance; SS = Sensation Seeking; PU = Positive Urgency; BIS = Barratt Impulsiveness Scale; BIS-AI = Barratt Impulsiveness Scale's Attentional Impulsiveness Subscale; BIS-MI = Barratt Impulsiveness Scale's Motor Impulsiveness Subscale; BIS-NI = Barratt Impulsiveness Scale's Non-Planning Impulsiveness Subscale; HADS = Hospital Anxiety and Depression Scale; HADS-A = Hospital Anxiety and Depression's Anxiety Subscale; HADS-D = Hospital Anxiety and Depression's Depression Subscale; AUDIT = Alcohol Use Disorders Identification Test; PMPUQ = Problematic Mobile Phone Use Questionnaire; PMPUQ-PU = Problematic Mobile Phone Use Questionnaire's Prohibited Use Subscale; PMPUQ-DU = Problematic Mobile Phone Use Questionnaire's Dangerous Use Subscale; PMPUQ-DE = Problematic Mobile Phone Use Questionnaire's Dependence Subscale; PMPUQ-FP = Problematic Mobile Phone Use Questionnaire's Financial Problems Subscale; BIS/BAS = Behavioral Inhibition System and Behavioral Activation System Scales; BIS/BAS-I = Behavioral Inhibition System and Behavioral Activation System Scales' Behavioral Inhibition Scale; BIS/BAS-A = Behavioral Inhibition System and Behavioral Activation System Scales' Behavioral Activation Scale; Dots indicate hypothetical significant (positive or negative) relationships between UPPS-P constructs' scores and other instruments' constructs' scores

3.4. Reliability evidence

In addition to the previously mentioned forms of validity evidence, reliability evidence was forethought following the *Standards for Educational and Psychological Testing* (American Educational Research Association, 2011), the recommendations of Smith et al. (2000) and of Boateng et al. (2018). Two types of relevant information concerning reliability – namely test-retest and internal consistency – were investigated or included in the research protocol for future conduction.

3.4.1. Test-retest reliability evidence

The respondents who would have submitted their email address would be contacted two weeks after their first completion of the online survey and would be proposed a second administration of the revised short French UPPS-P scale. Test-retest stability would be measured using two-tailed Pearson's product-moment correlations between the first and second administrations' dimensions' scores in order to appreciate the consistency of the scores over time (Boateng et al., 2018) by referring to Cohen's classification of effect sizes (Cohen, 1988).

3.4.2. Internal consistency reliability evidence

Internal consistency would be measured using the Cronbach's *alpha* coefficient (Cronbach, 1951); an *alpha* value greater than 0.70 would indicate satisfactory internal consistency (Boateng et al., 2018). Since the UPPS-P scale is multidimensional, Cronbach's *alpha* would be calculated for each of its five dimensions (Smith et al., 2000). Furthermore, *a priori* estimates of the alpha coefficient for each UPPS-P construct would be computed during the development stage (see Section 3.1.) following the internal consistency combinatorial analyses' procedure described in this dissertation's methods (see Section 2.4.).

3.5. Additional psychometric properties' analyses

As to demonstrate the psychometric qualities of the revised short French UPPS-P scale, content broadness analyses and analyses under the Item Response Theory framework (IRT) would be conducted.

Firstly, the procedure described in this dissertation's methods involving network analyses, community analyses, hierarchical cluster analyses, and inter-item polychoric correlations analyses would be conducted (see Section 2.5.). The

results of the aforementioned analyses would inform about how broad the content coverage of the revised short French UPPS-P scale would be.

Secondly, unidimensional two-parameter IRT of polytomous items would be conducted on each factor using the *mirt R* package (Chalmers, 2012) to compute each item's discrimination and difficulty. For the items are of ordinal nature, the specified item type would be Samejima's Graded Response Model (Samejima, 1969) – which consists of sequential two-parameter logistic models – and the latent distribution would be estimated using an empirical histogram (Bock & Aitkin, 1981) on account of the untested assumption of a normal latent trait distribution. The results of the aforementioned analyses would inform about different items' properties, such as about how well the items would distinguish between subjects with different levels of the latent trait, and about how well the items' response modalities would be sensitive to different levels of the latent trait (Van der Linden & Hambleton, 1997).

3.6. Time saving estimates

Assuming that each item would approximately take 15 seconds to complete, the estimated time of completion of the 20-item revised short French UPPS-P Impulsive Behavior Scale would be of *circa* 5 minutes, thus saving around two thirds of the time necessary to complete the 59 items comprised in the UPPS and in the PUM scales.

4. Discussion

4.1. General discussion

Many variant methodological approaches are applied in short-form development studies. This dissertation was hence carried out through a lens of meticulousness, *id est* with respect to several guidelines, with respect to the consensus between multiple statistical approaches, and with respect to the full extent of possible items' combinations.

In order to develop a revised short French UPPS-P Impulsive Behavior Scale, this Master's dissertation firstly conducted exploratory and confirmatory factor analyses which highlighted that the best-fitting model for the four latent constructs of Negative Urgency, Lack of Premeditation, Lack of Perseverance and Sensation Seeking was a four intercorrelated factors model while the best-fitting model for the Positive Urgency construct was a one-factor model comprising 7 items loading on one of the two EFA-identified factors.

Secondly, internal reliability combinatorial analyses presented a novel method to generate all satisfactory reliable quadruplets of items without focusing on the maximization of the internal consistency, thus preserving the scale and its items from content homogeneity.

Thirdly, the conjugated statistical analyses comprising network analyses, community analyses, hierarchical cluster analyses and inter-item correlation analyses emphasized a multi-approach strategy of conservation of the scale's items content coverage as a prime focus. This methodology provided a detailed insight into the constructs' structure and into the constructs' items' interrelations.

Fourthly, the content validity analysis *via* expert appraisal revealed that certain quadruplets of items did not sufficiently represent the construct to which they belong when referring to Whiteside & Lynam (2001) or to Cyders et al. (2007), or that they were not relevant enough. Although preventing the finalization of

the scale's development, the results of the content validity brought to light new strategies to fine-tune the methodology for further research's conduction: a research protocol was thus thoroughly elaborated to guide the future development of the revised short French UPPS-P Impulsive Behavior Scale.

4.2. Limitations

The principal limitation of this dissertation was the enterprise of statistical content broadness analyses involving non-adequate items of the original UPPS-P Impulsive Behavior Scale. The implementation of a Delphi method as to omit or modify certain items before the conduction of statistical and content validity analyses would have most likely led to satisfactory results regarding the content coverage of the statistically generated items' quadruplets and ultimately to the development of a revised short UPPS-P Impulsive Behavior Scale. The insight provided by the six experts who participated in the content validity analyses was beneficial as to overcome the issue in further research.

Another limitation was the partition of the data into the UPPS Impulsive Behavior Scale and the PUM Positive Urgency Measure separate datasets which comprised two different samples of participants. A unique sample of participants for the two aforementioned scales would have allowed – in *lieu* of independent statistical analyses – for the obtainment of a single CFA model as well as higher-scale statistical broadness analyses conducted on the five UPPS-P constructs at once, *id est* higher-scale insight into the UPPS-P structure and into the 59 items' interrelations.

4.3. Perspectives for further research

In addition to the presentation of a methodological approach to short-form development, a research protocol for the future conduction of the development of a revised short French UPPS-P Impulsive Behavior Scale was highlighted. According to this Master's dissertation, it would be interesting to proceed to the

implementation of a Delphi method as to retain an appropriate pool of items prior to the reiteration of this dissertation's methods and to the conduction of this dissertation's research protocol. Moreover, further research would be part of an Open Science approach: the development of a revised short French UPPS-P Impulsive Behavior Scale – conducted as a pre-registered study – would constitute the first psychometric study of questionnaire validation in which the forethought hypotheses and analyses are pre-registered.

The UPPS-P scale is a promising instrument for measuring impulsivity and its facets: the future development – centered on the preservation of content coverage – and validation of a revised short French UPPS-P Impulsive Behavior Scale would support its transdiagnostic clinical utility while substantially reducing its time of administration, thus favoring its integration and usage in both clinical and research practices.

5. References

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6. Appendix

6.1. Estimated networks

Appendix 6.1.1. *Estimated network (Negative Urgency illustration)*
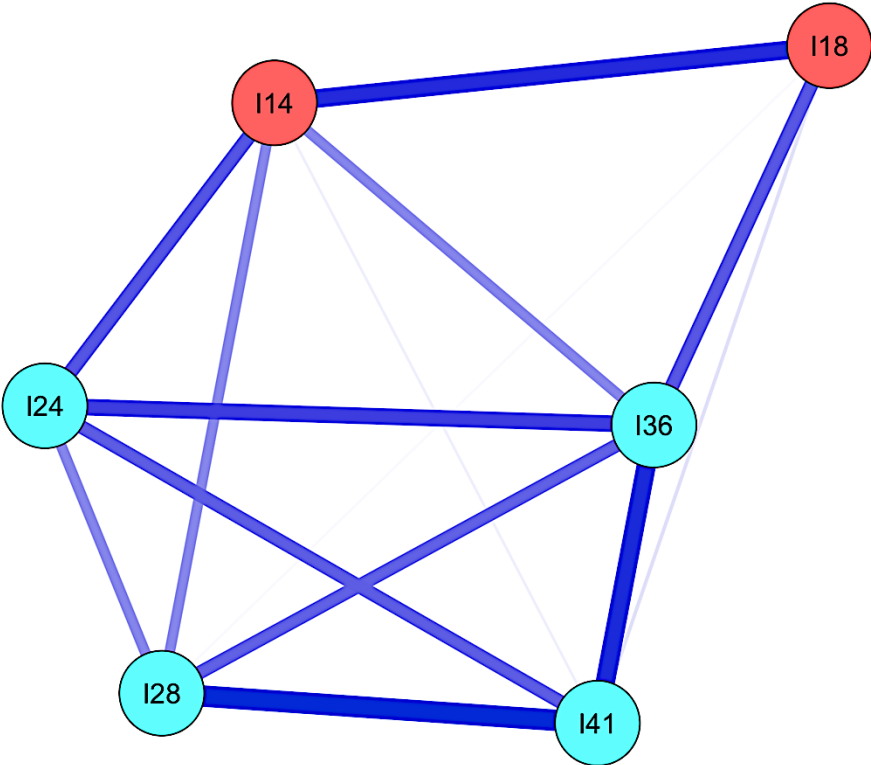
I = UPPS-FR items; Round shapes indicate nodes; Blue colored lines indicate edges; Distance in-between nodes, edges' length, edges' width and edges' color transparency indicate partial correlations coefficients; Light red colored round shapes indicate community 1; Light cyan colored round shapes indicate community 2

Appendix 6.1.2. *Estimated network (Lack of Premeditation illustration)*
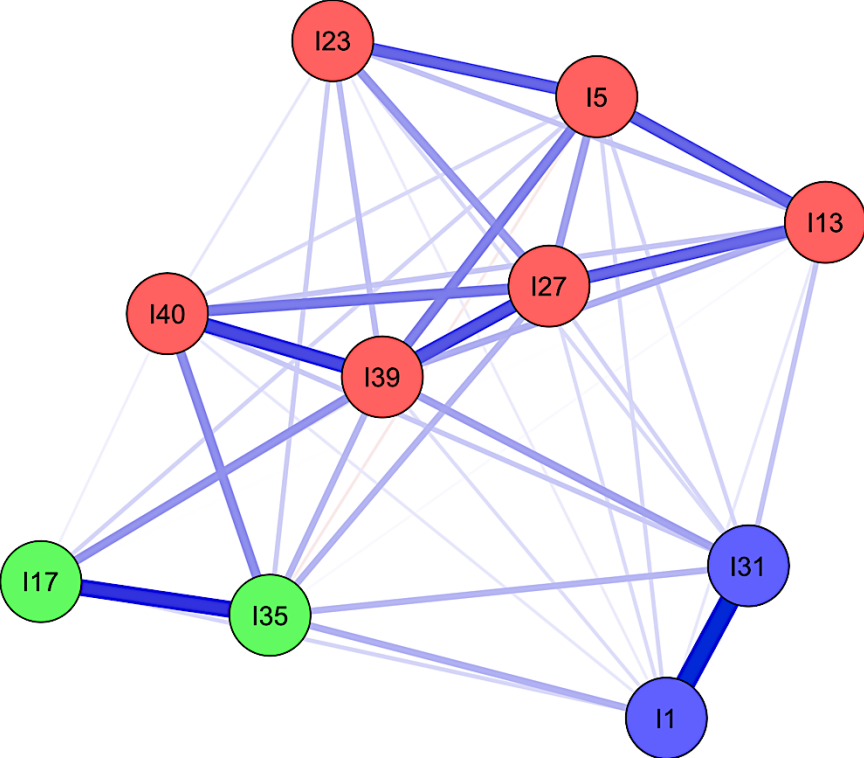
I = UPPS-FR items; Round shapes indicate nodes; Blue colored lines indicate edges; Distance in-between nodes, edges' length, edges' width and edges' color transparency indicate partial correlations coefficients; Light red colored round shapes indicate community 1; Light lime green colored round shapes indicate community 2; Light blue colored round shapes indicate community 3

Appendix 6.1.3. *Estimated network (Lack of Perseverance illustration)*
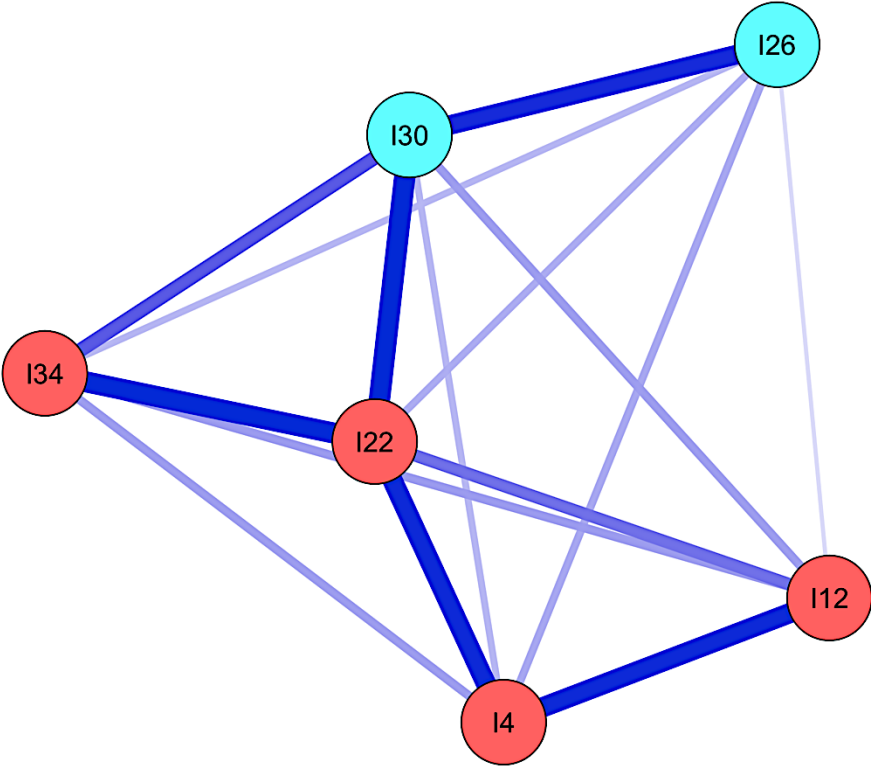
I = UPPS-FR items; Round shapes indicate nodes; Blue colored lines indicate edges; Distance in-between nodes, edges' length, edges' width and edges' color transparency indicate partial correlations coefficients; Light red colored round shapes indicate community 1; Light cyan colored round shapes indicate community 2

Appendix 6.1.4. *Estimated network (Sensation Seeking illustration)*
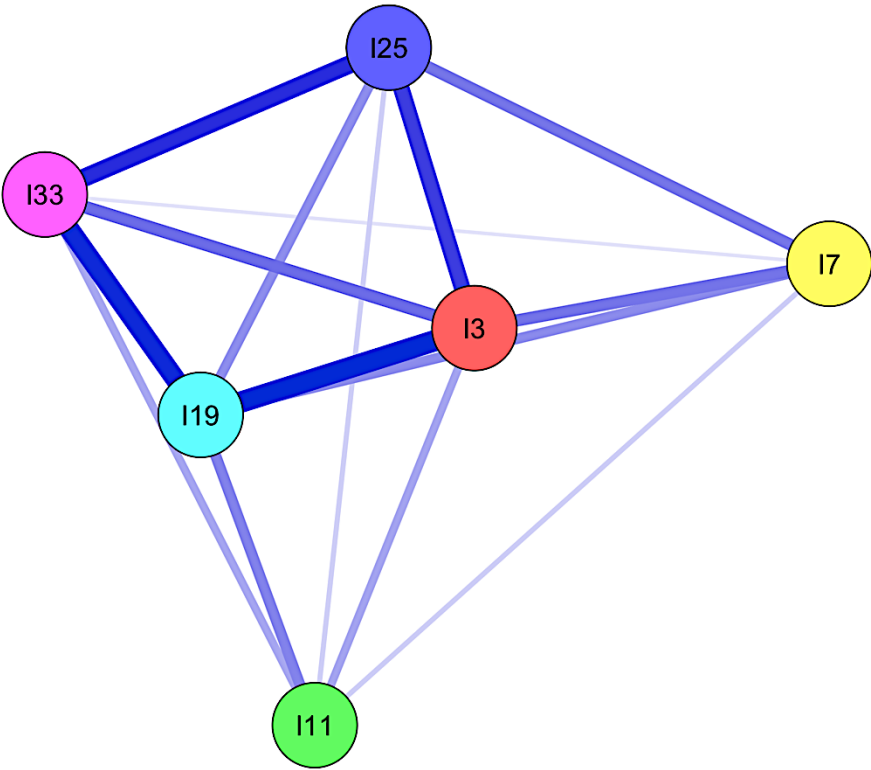
I = UPPS-FR items; Round shapes indicate nodes; Blue colored lines indicate edges; Distance in-between nodes, edges' length, edges' width and edges' color transparency indicate partial correlations coefficients; Light red colored round shapes indicate community 1; Light yellow colored round shapes indicate community 2; Light lime green colored round shapes indicate community 3; Light cyan colored round shapes indicate community 4; Light blue colored round shapes indicate community 5; Light magenta colored round shapes indicate community 6

Appendix 6.1.5. *Estimated network (Positive Urgency illustration)*
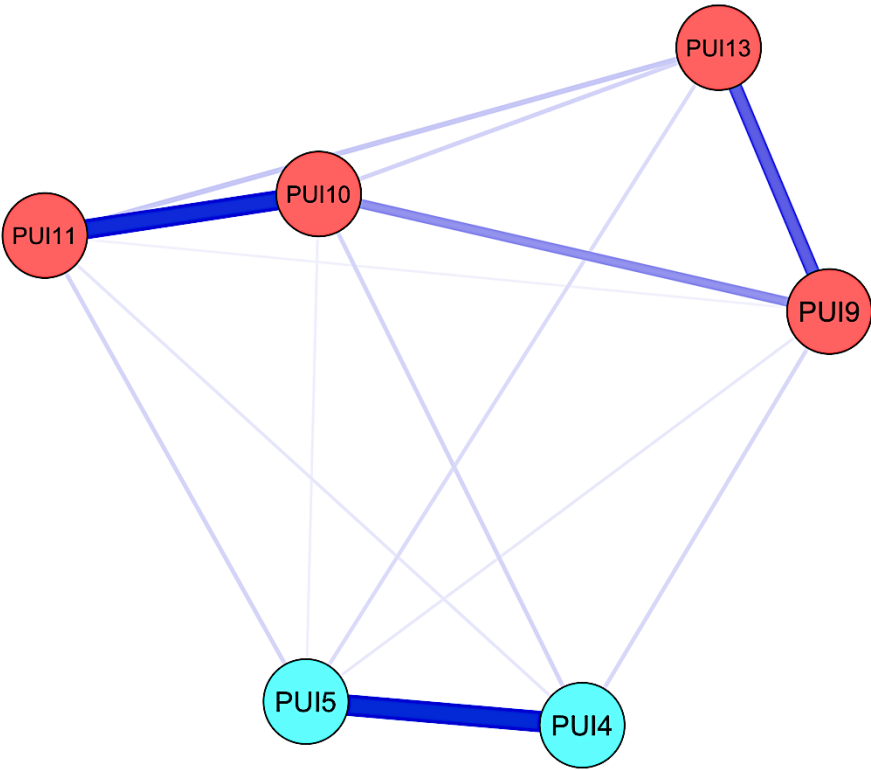
PUI = PUM-FR items; Round shapes indicate nodes; Blue colored lines indicate edges; Distance in-between nodes, edges' length, edges' width and edges' color transparency indicate partial correlations coefficients; Light red colored round shapes indicate community 1; Light cyan colored round shapes indicate community 2

6.2. Edge-weights' accuracy

Appendix 6.2.1. *Edge-weights' accuracy (Negative Urgency illustration)*
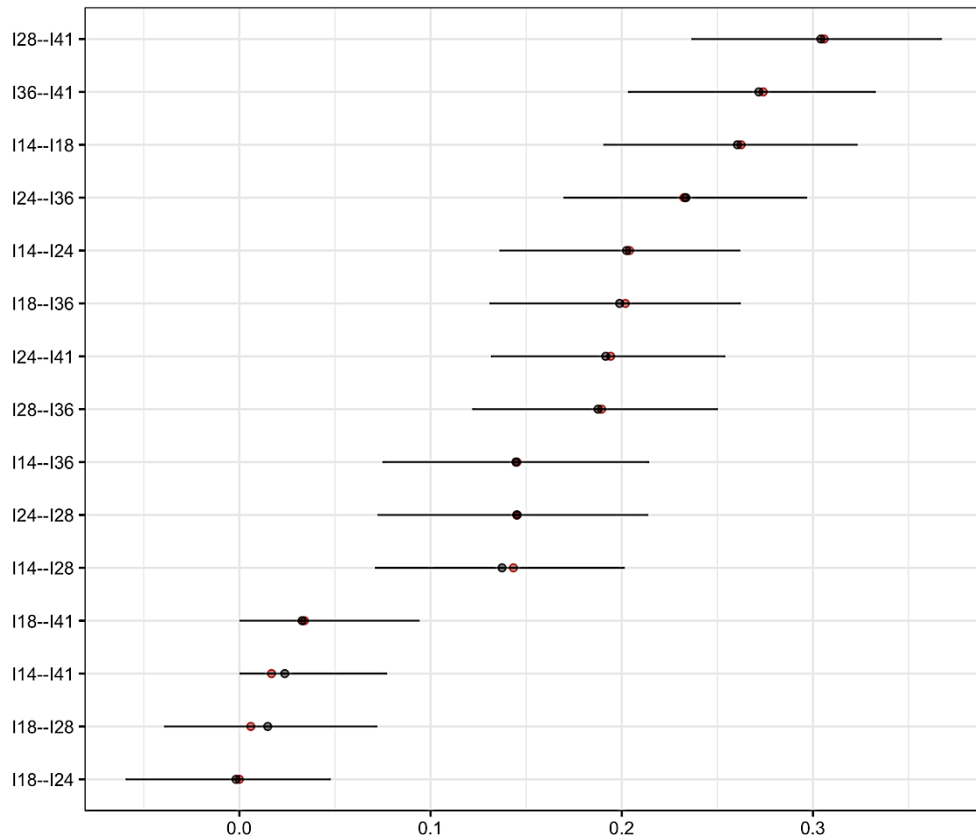
X-axis = Mean edge-weights; Y-axis = Edges (ranked by mean edge-weights); I = UPPS-FR items; Red colored dots indicate sample mean edge-weights; Black colored dots indicate bootstrap mean edge-weights; Black colored horizontal lines indicate bootstrapped confidence intervals of edge-weights
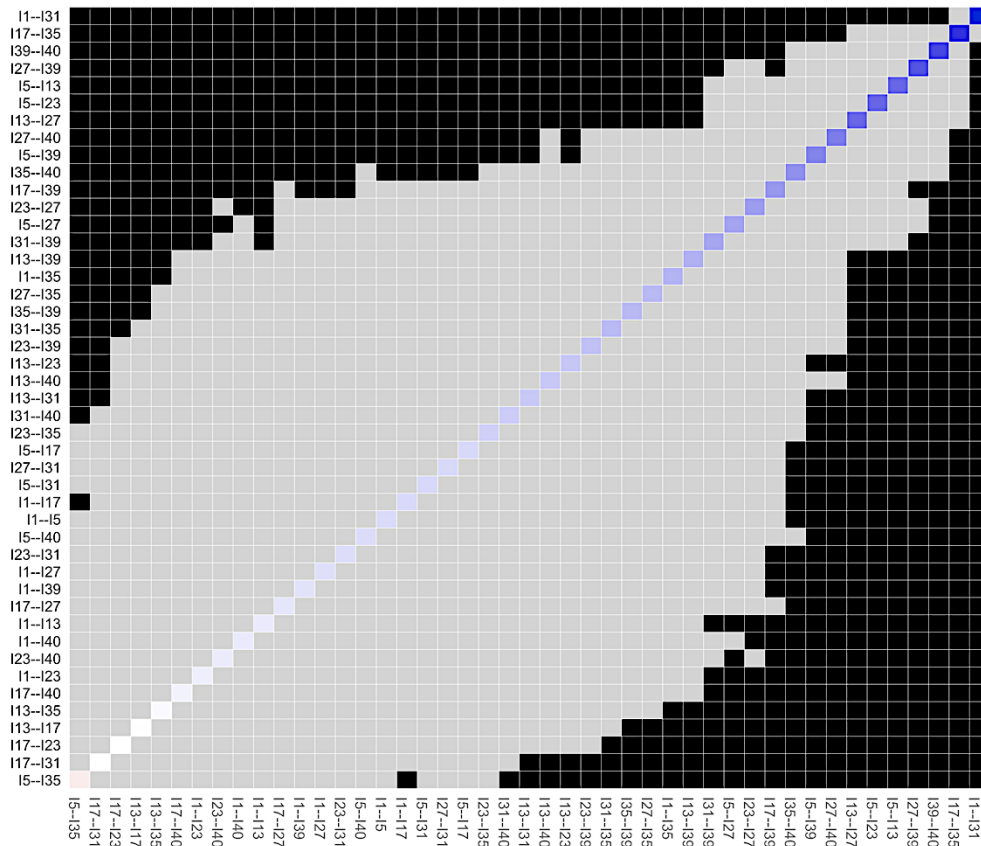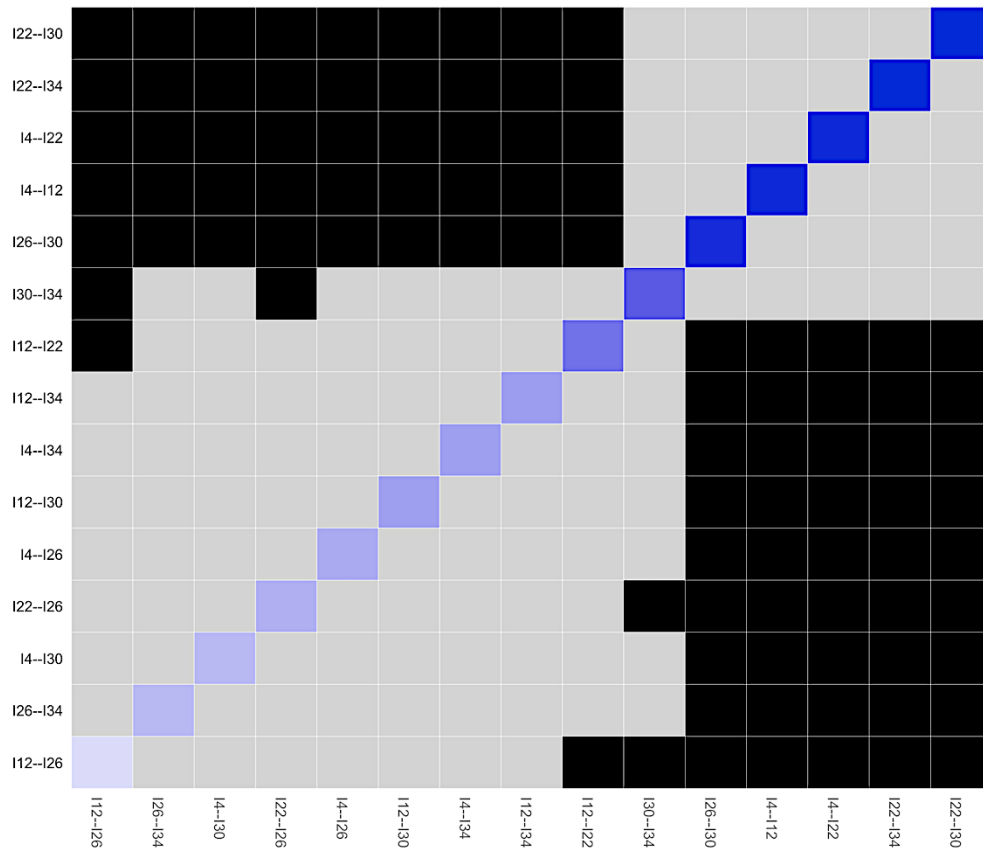
Appendix 6.2.2. *Edge-weights' accuracy (Lack of Premeditation illustration)*
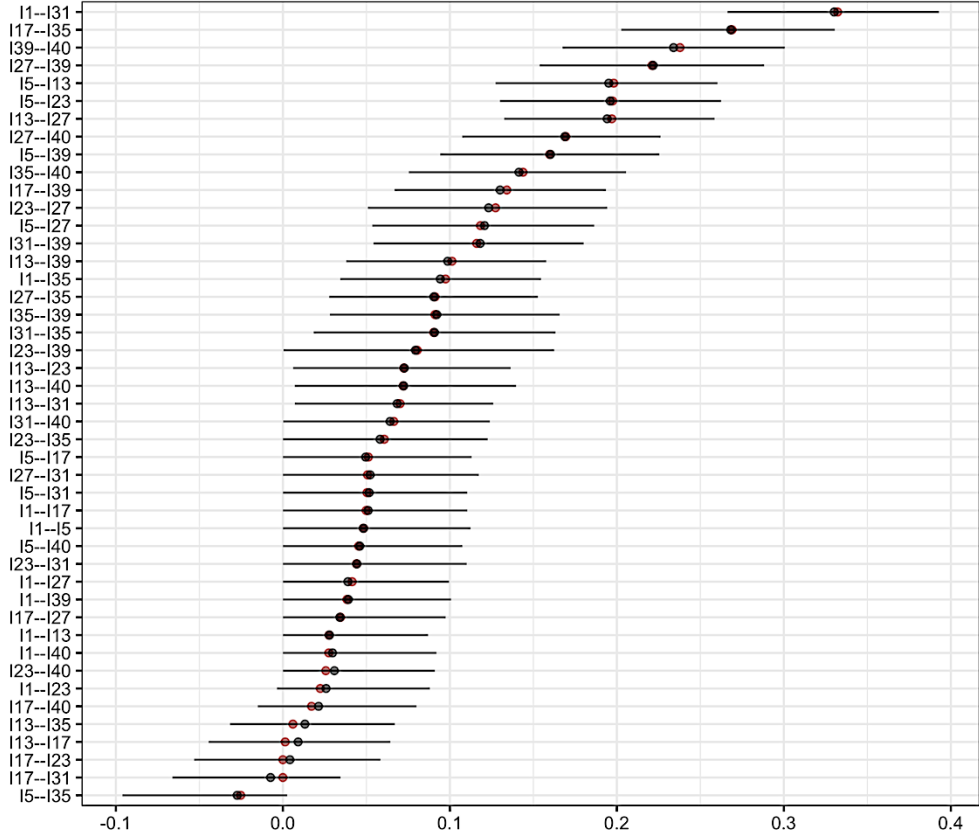
X-axis = Mean edge-weights; Y-axis = Edges (ranked by mean edge-weights); I = UPPS-FR items; Red colored dots indicate sample mean edge-weights; Black colored dots indicate bootstrap mean edge-weights; Black colored horizontal lines indicate bootstrapped confidence intervals of edge-weights

Appendix 6.2.3. *Edge-weights' accuracy (Lack of Perseverance illustration)*
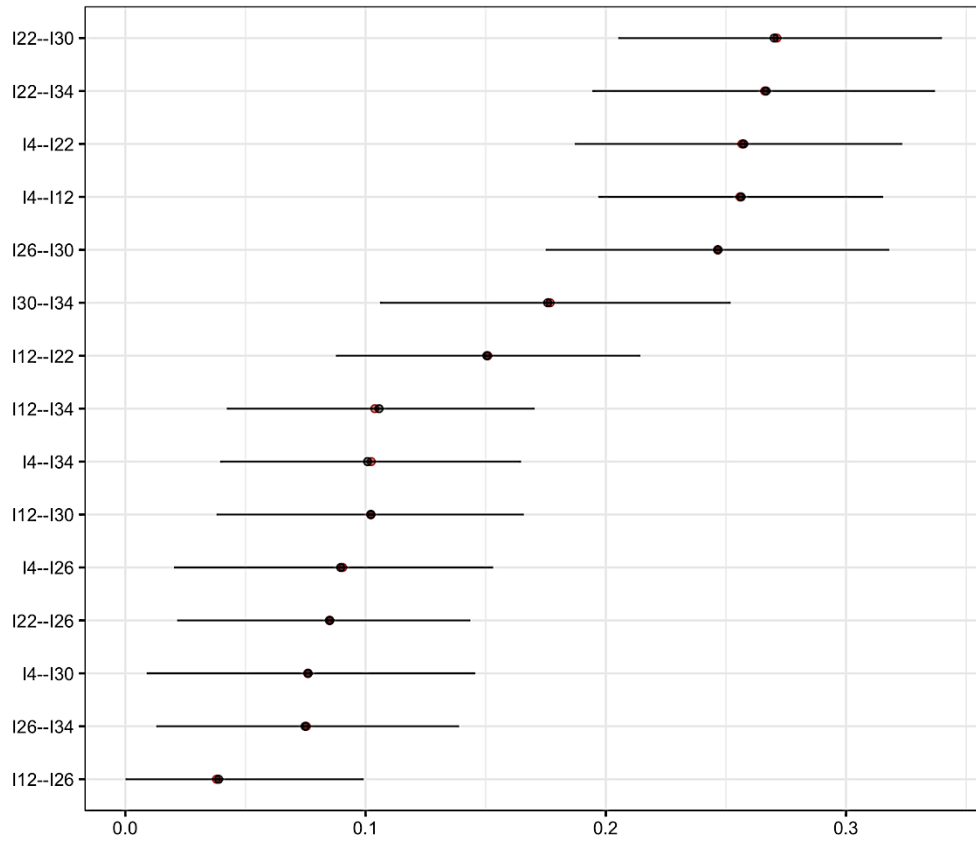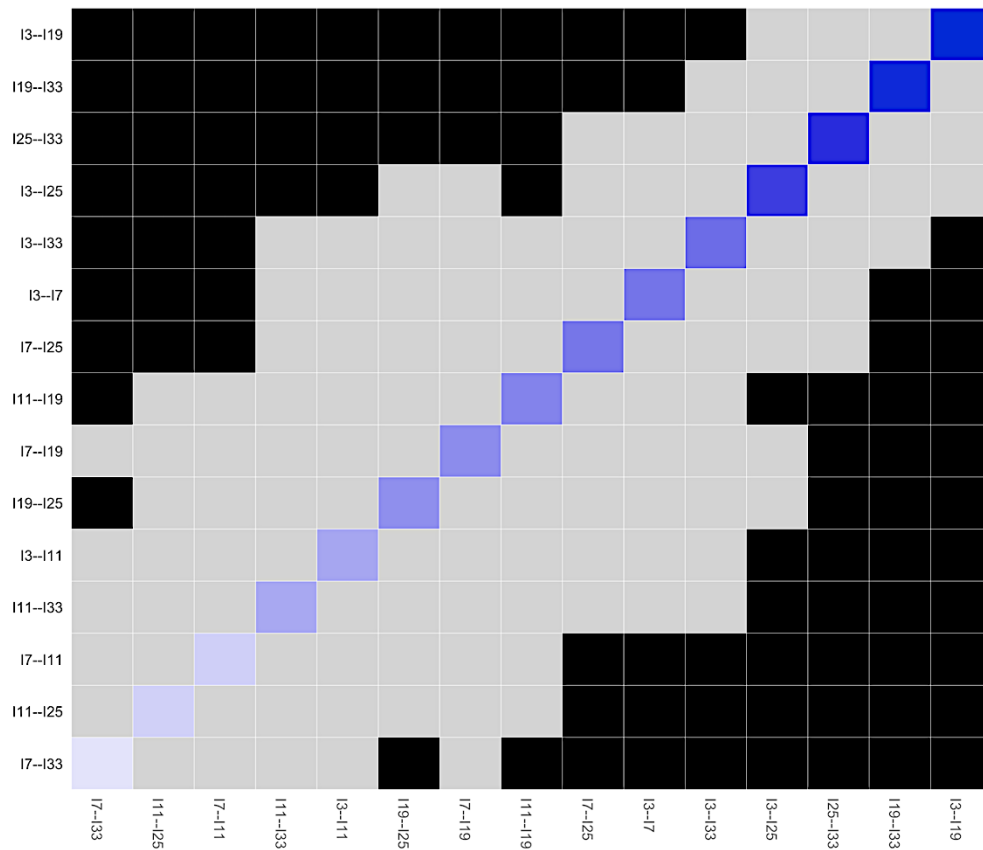

X-axis = Mean edge-weights; Y-axis = Edges (ranked by mean edge-weights); I = UPPS-FR items; Red colored dots indicate sample mean edge-weights; Black colored dots indicate bootstrap mean edge-weights; Black colored horizontal lines indicate bootstrapped confidence intervals of edge-weights

Appendix 6.2.4. *Edge-weights' accuracy (Sensation Seeking illustration)*
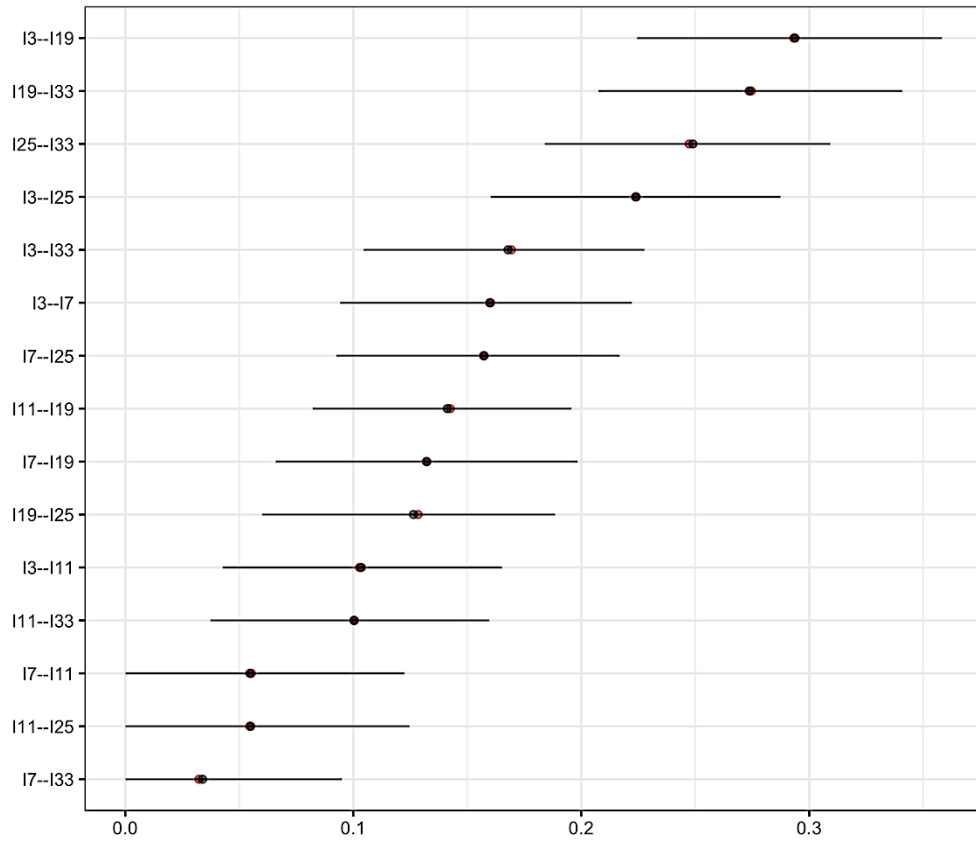
X-axis = Mean edge-weights; Y-axis = Edges (ranked by mean edge-weights); I = UPPS-FR items; Red colored dots indicate sample mean edge-weights; Black colored dots indicate bootstrap mean edge-weights; Black colored horizontal lines indicate bootstrapped confidence intervals of edge-weights

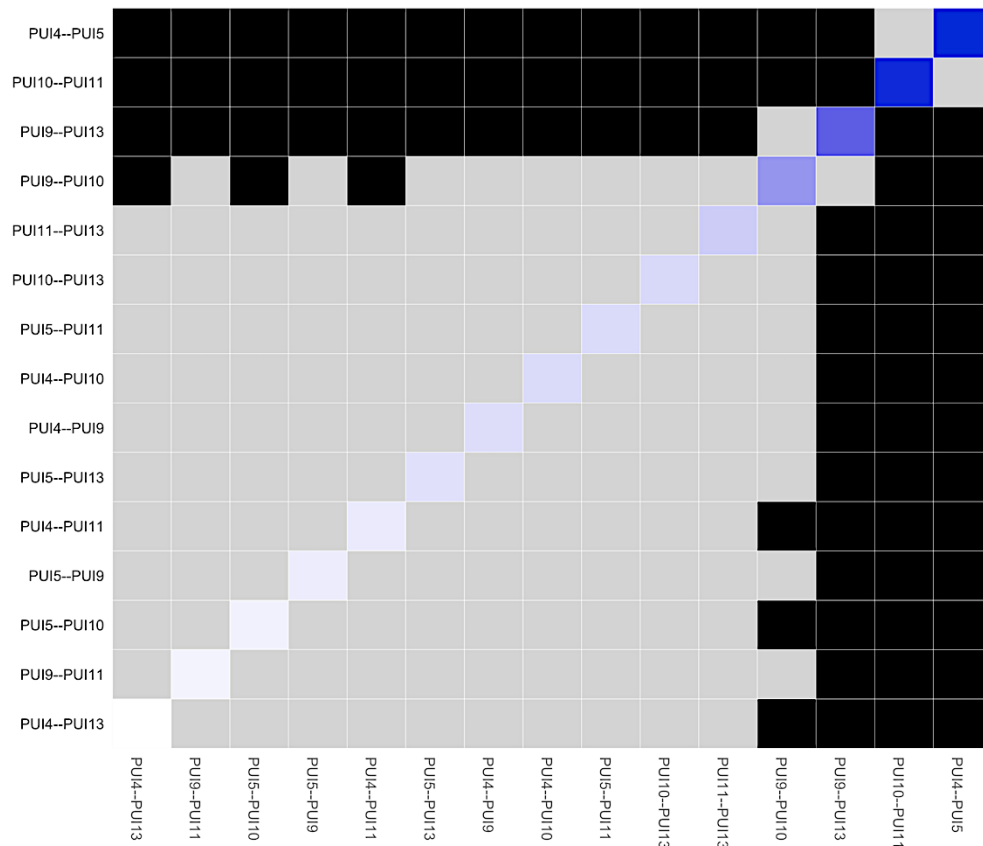**Appendix 6.2.5.** *Edge-weights' accuracy (Positive Urgency illustration)*
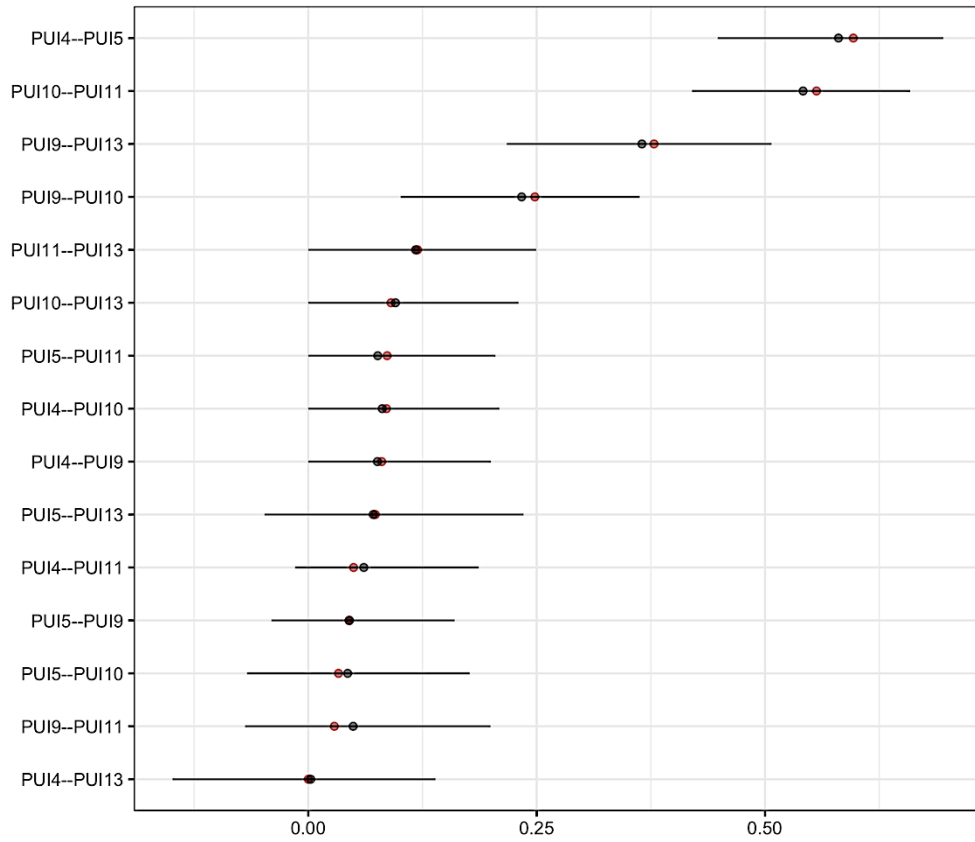
X-axis = Mean edge-weights; Y-axis = Edges (ranked by mean edge-weights); PUI = PUM-FR items; Red colored dots indicate sample mean edge-weights; Black colored dots indicate bootstrap mean edge-weights; Black colored horizontal lines indicate bootstrapped confidence intervals of edge-weights

6.3. Bootstrapped difference tests

Appendix 6.3.1. *Bootstrapped difference test (Negative Urgency illustration)*
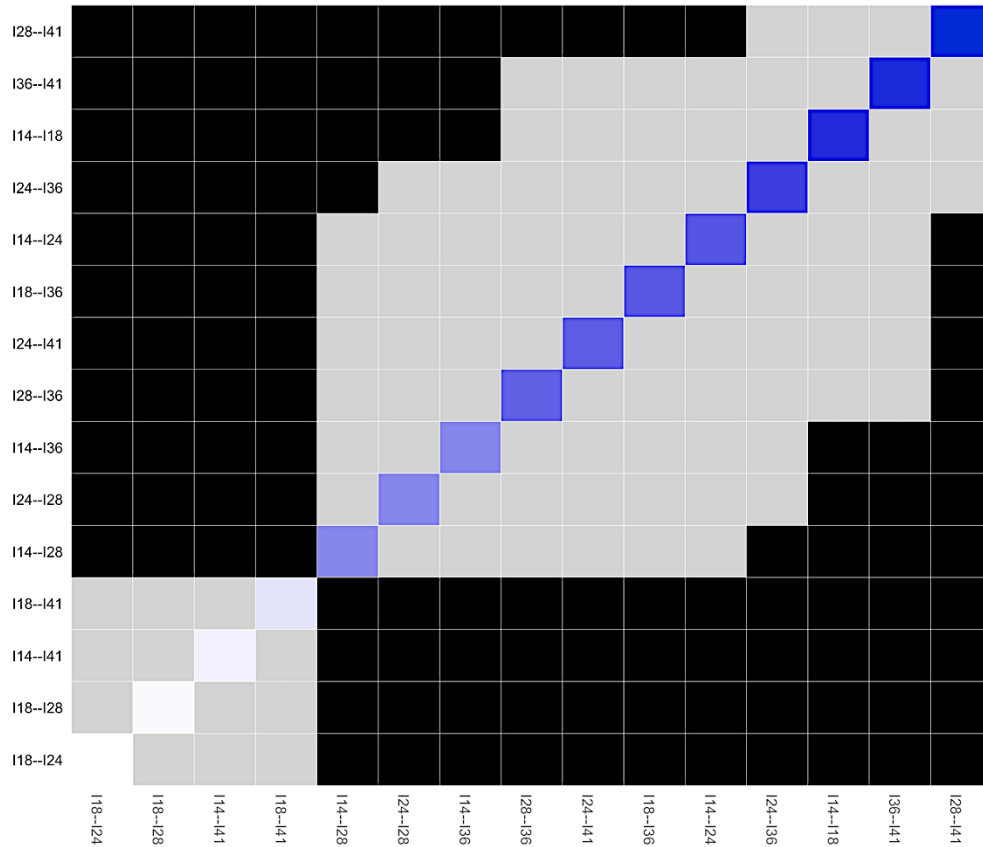
X-axis = Edges (ranked by mean edge-weights); Y-axis = Edges (ranked by mean edge-weights); I = UPPS-FR items; Blue colored boxes indicate mean edge-weights; Blue colored boxes transparency indicate mean edge-weights' value; Gray colored boxes indicate non-significant differences (α = 5%); Black colored boxes indicate significant differences (α = 5%)

Appendix 6.3.2. *Bootstrapped difference test (Lack of Premeditation illustration)*

X-axis = Edges (ranked by mean edge-weights); Y-axis = Edges (ranked by mean edge-weights); I = UPPS-FR items; Blue colored boxes indicate mean edge-weights; Blue colored boxes transparency indicate mean edge-weights' value; Gray colored boxes indicate non-significant differences ($\alpha = 5\%$); Black colored boxes indicate significant differences ($\alpha = 5\%$)

Appendix 6.3.3. *Bootstrapped difference test (Lack of Perseverance illustration)*

X-axis = Edges (ranked by mean edge-weights); Y-axis = Edges (ranked by mean edge-weights); I = UPPS-FR items; Blue colored boxes indicate mean edge-weights; Blue colored boxes transparency indicate mean edge-weights' value; Gray colored boxes indicate non-significant differences (α = 5%); Black colored boxes indicate significant differences (α = 5%)

Appendix 6.3.4. *Bootstrapped difference test (Sensation Seeking illustration)*

X-axis = Edges (ranked by mean edge-weights); Y-axis = Edges (ranked by mean edge-weights); I = UPPS-FR items; Blue colored boxes indicate mean edge-weights; Blue colored boxes transparency indicate mean edge-weights' value; Gray colored boxes indicate non-significant differences (α = 5%); Black colored boxes indicate significant differences (α = 5%)

Appendix 6.3.5. *Bootstrapped difference test (Positive Urgency illustration)*

X-axis = Edges (ranked by mean edge-weights); Y-axis = Edges (ranked by mean edge-weights); PUI = PUM-FR items; Blue colored boxes indicate mean edge-weights; Blue colored boxes transparency indicate mean edge-weights' value; Gray colored boxes indicate non-significant differences (α = 5%); Black colored boxes indicate significant differences (α = 5%)

6.4. Hierarchical clusterings

Appendix 6.4.1. *Hierarchical clustering (Negative Urgency illustration)*
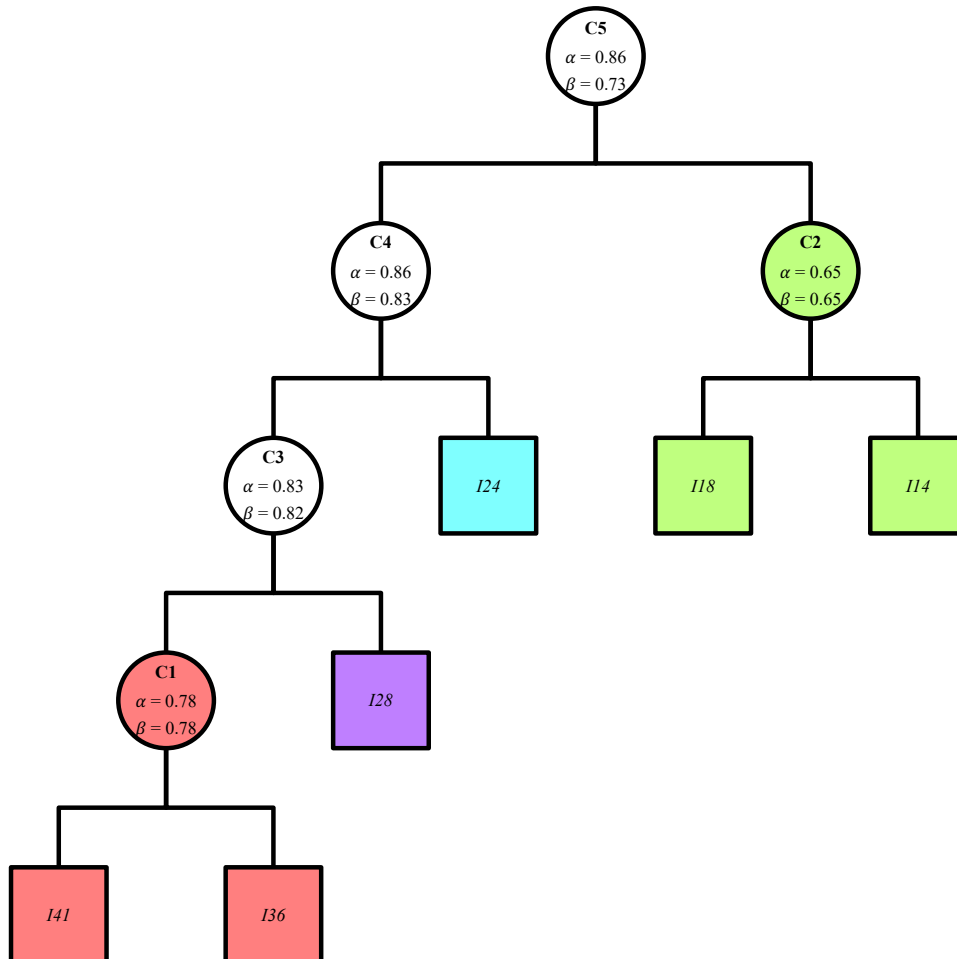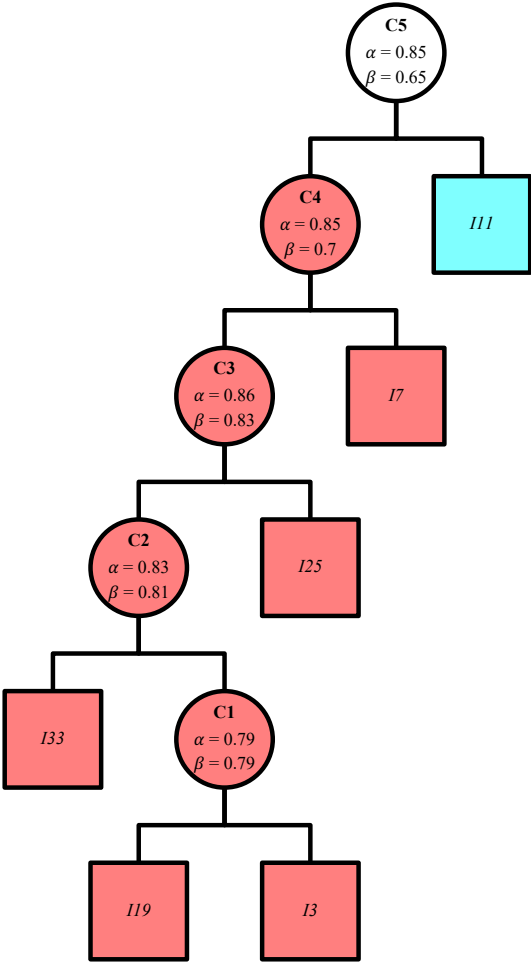

C = Cluster; I = UPPS-FR items; α = Cronbach's *alpha* coefficient; β = Revelle's *beta* coefficient; Round shapes indicate clusters; Square shapes indicate items; Light red colored shapes indicate cluster 1; Light green colored shapes indicate cluster 2; Light cyan colored shapes indicate cluster 3; Light violet colored shapes indicate cluster 4

**Appendix 6.4.2.** *Hierarchical clustering (Lack of Premeditation illustration)*
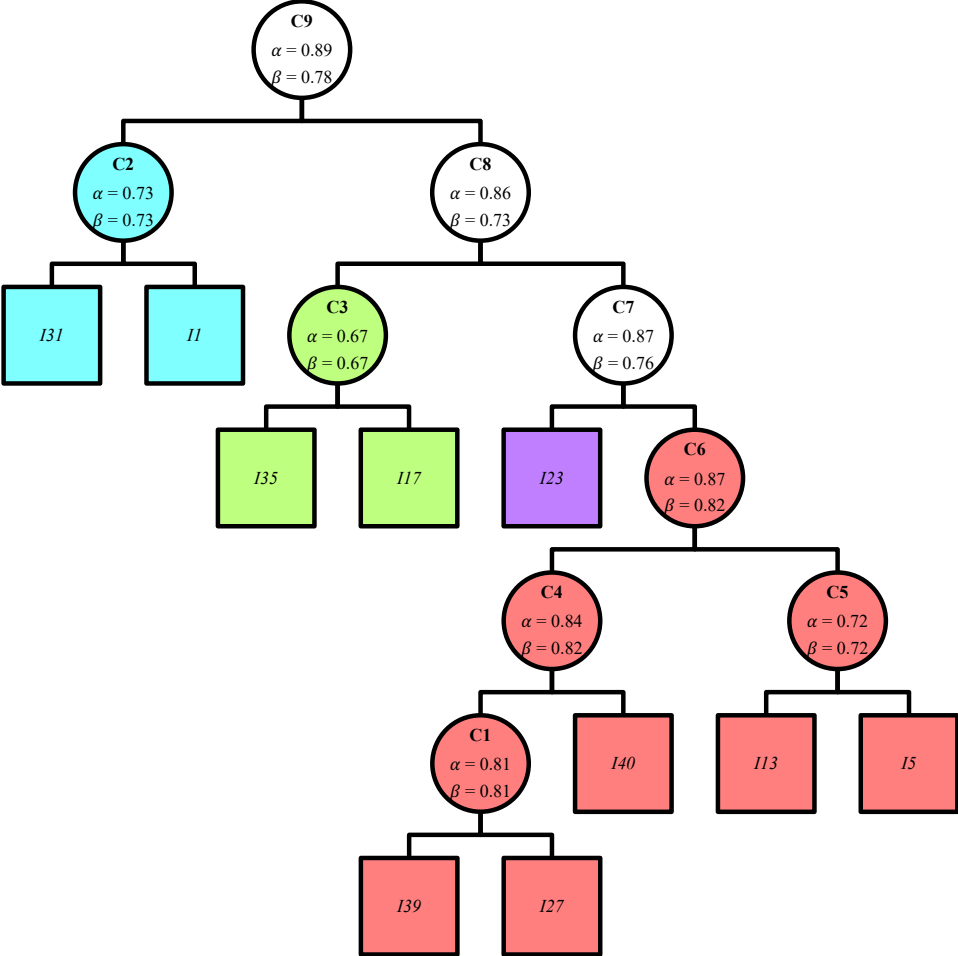
C = Cluster; I = UPPS-FR items; α = Cronbach's *alpha* coefficient; β = Revelle's *beta* coefficient; Round shapes indicate clusters; Square shapes indicate items; Light red colored shapes indicate cluster 1; Light green colored shapes indicate cluster 2; Light cyan colored shapes indicate cluster 3; Light violet colored shapes indicate cluster 4

Appendix 6.4.3. *Hierarchical clustering (Lack of Perseverance illustration)*
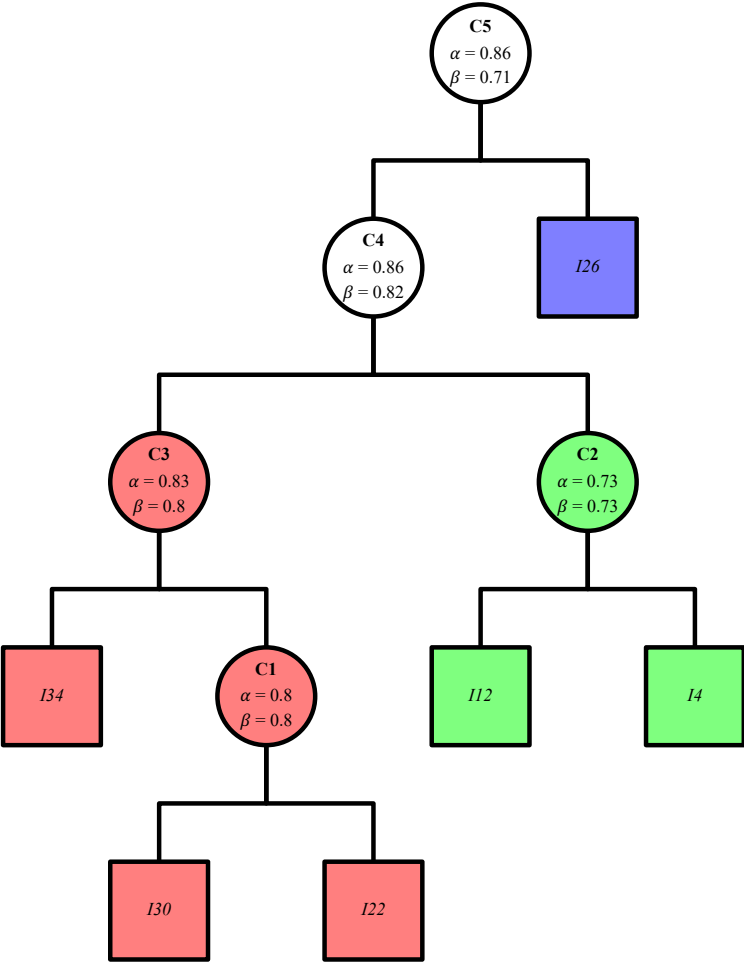
C = Cluster; I = UPPS-FR items; α = Cronbach's *alpha* coefficient; β = Revelle's *beta* coefficient; Round shapes indicate clusters; Square shapes indicate items; Light red colored shapes indicate cluster 1; Light lime green colored shapes indicate cluster 2; Light blue colored shapes indicate cluster 3

Appendix 6.4.4. *Hierarchical clustering (Sensation Seeking illustration)*

C = Cluster; I = UPPS-FR items; α = Cronbach's *alpha* coefficient; β = Revelle's *beta* coefficient; Round shapes indicate clusters; Square shapes indicate items; Light red colored shapes indicate cluster 1; Light cyan colored shapes indicate cluster 2

Appendix 6.4.5. *Hierarchical clustering (Positive Urgency illustration)*
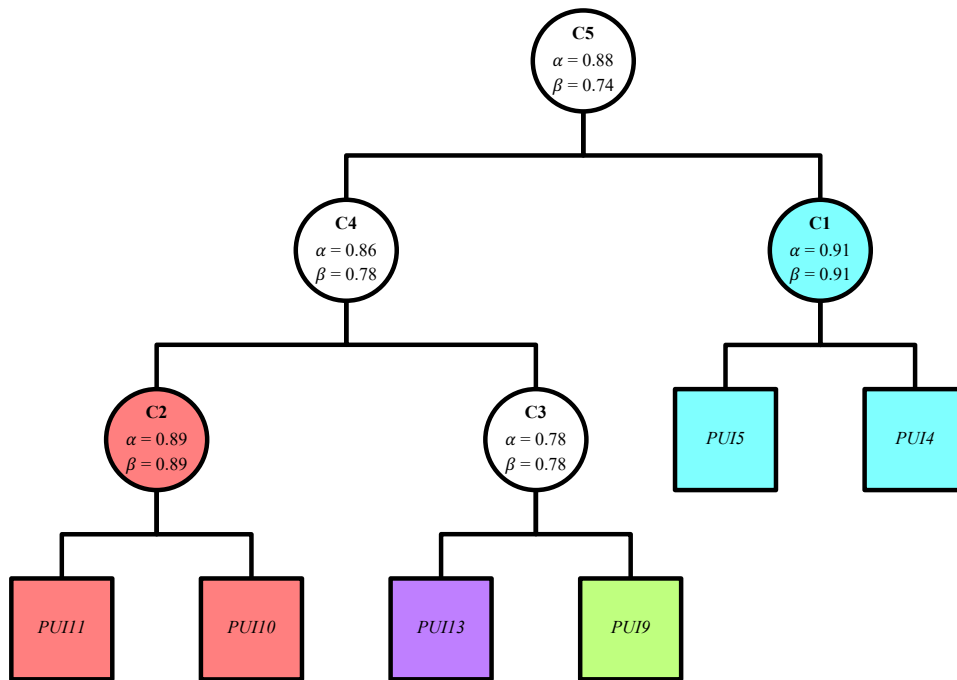
C = Cluster; PUI = PUM-FR items; α = Cronbach's *alpha* coefficient; β = Revelle's *beta* coefficient; Round shapes indicate clusters; Square shapes indicate items; Light red colored shapes indicate cluster 1; Light green colored shapes indicate cluster 2; Light cyan colored shapes indicate cluster 3; Light violet colored shapes indicate cluster 4
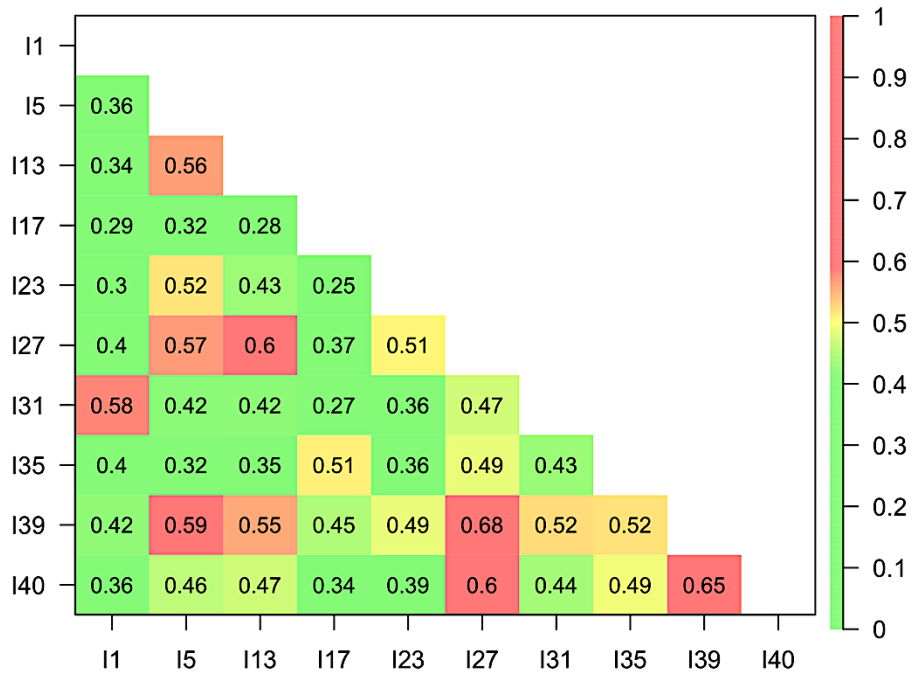
6.5. Inter-item polychoric correlations

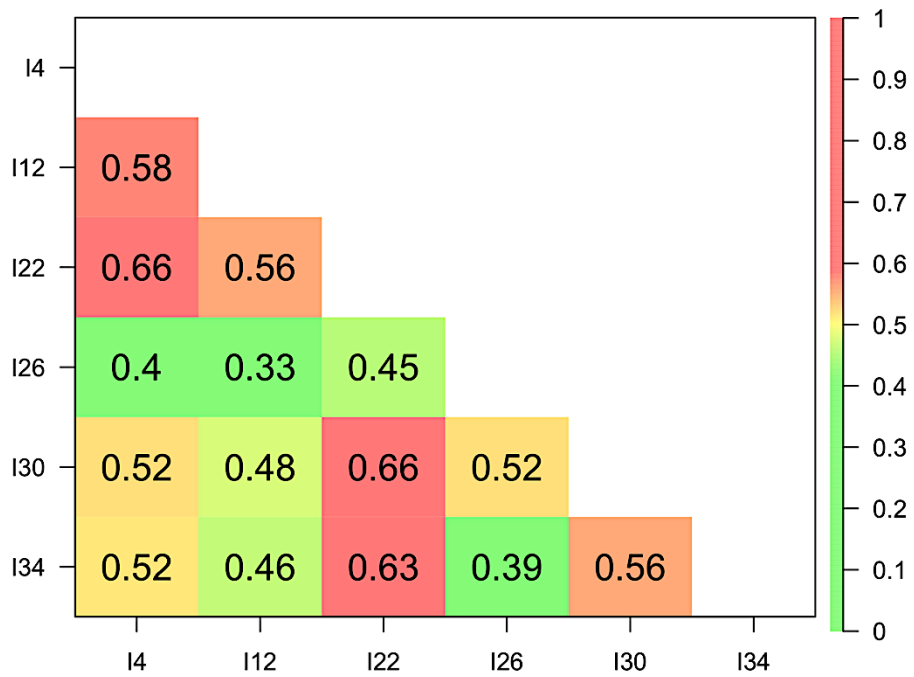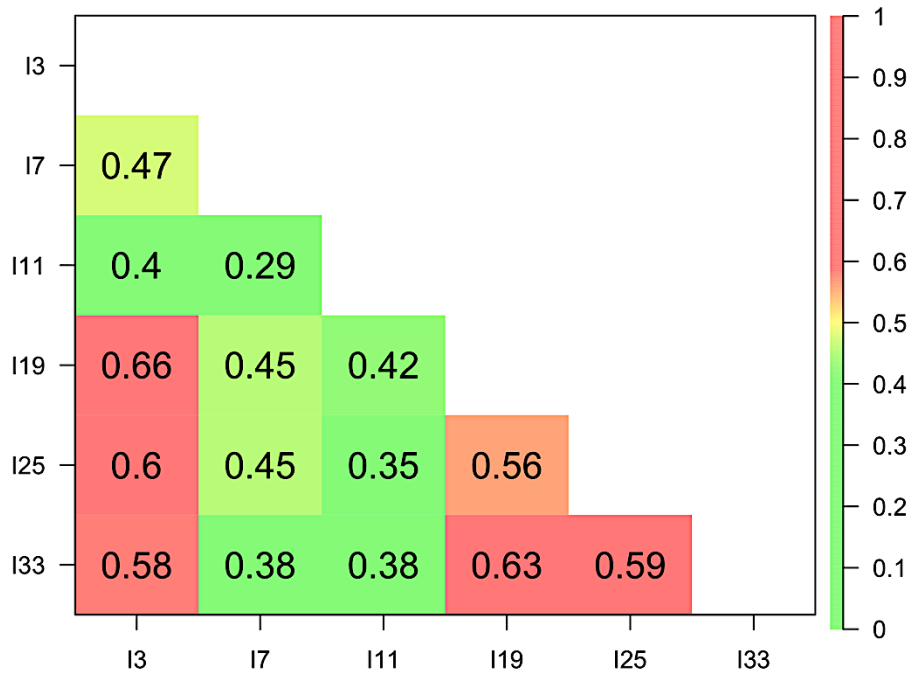**Appendix 6.5.1.** *Inter-item polychoric correlations (Negative Urgency illustration)*
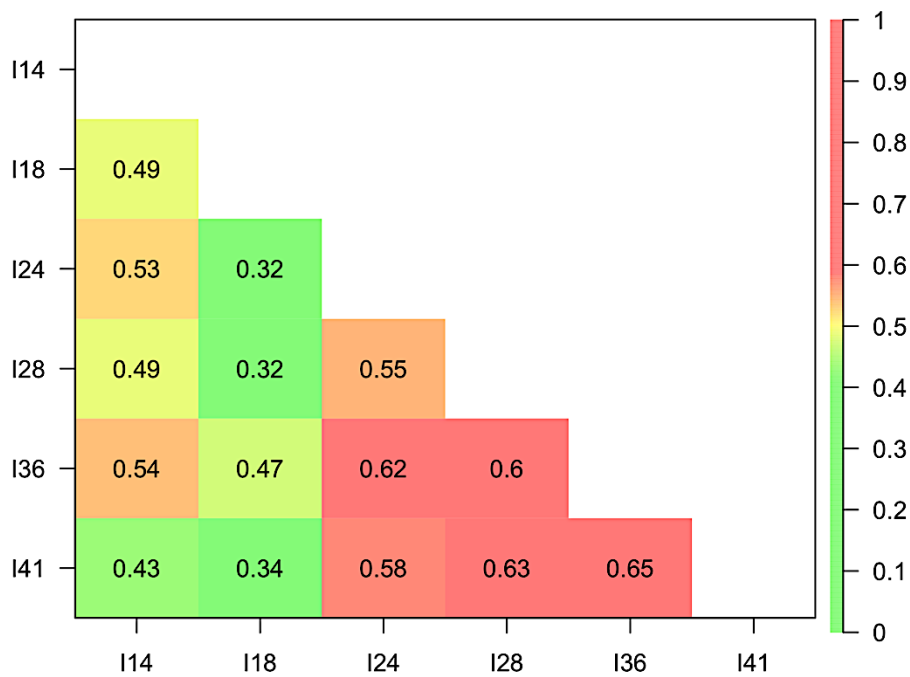
X-axis = Items; Y-axis = Items; I = UPPS-FR items; Colored boxes' numbers and gradient indicate inter-item polychoric correlation coefficients

Appendix 6.5.2. *Inter-item polychoric correlations (Lack of Premeditation illustration)*

X-axis = Items; Y-axis = Items; I = UPPS-FR items; Colored boxes' numbers and gradient indicate inter-item polychoric correlation coefficients

Appendix 6.5.3. *Inter-item polychoric correlations (Lack of Perseverance illustration)*
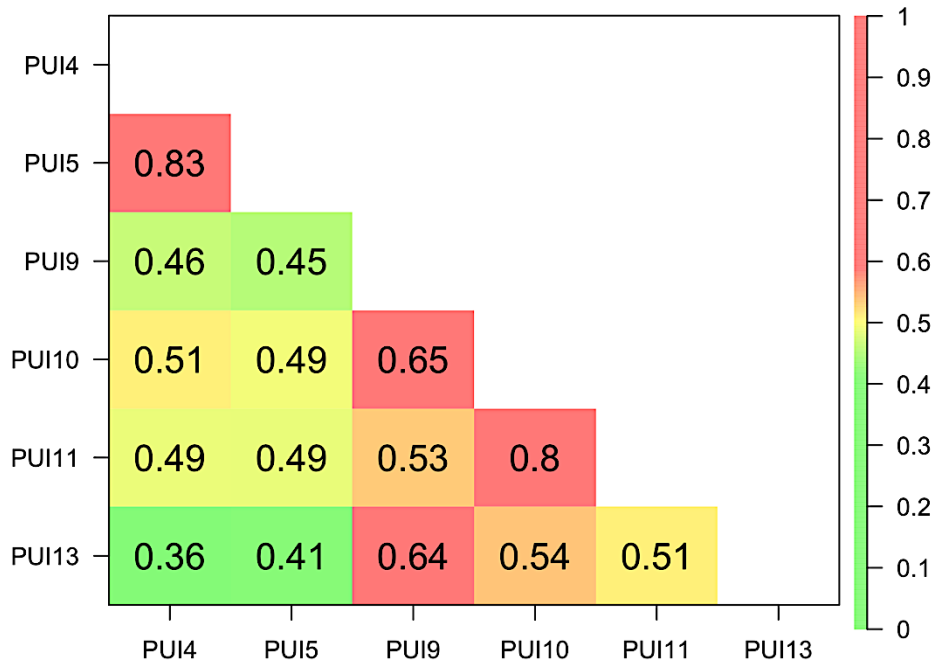

X-axis = Items; Y-axis = Items; I = UPPS-FR items; Colored boxes' numbers and gradient indicate inter-item polychoric correlation coefficients

Appendix 6.5.4. *Inter-item polychoric correlations (Sensation Seeking illustration)*

X-axis = Items; Y-axis = Items; I = UPPS-FR items; Colored boxes' numbers and gradient indicate inter-item polychoric correlation coefficients

Appendix 6.5.5. *Inter-item polychoric correlations (Positive Urgency illustration)*

X-axis = Items; Y-axis = Items; PUI = PUM-FR items; Colored boxes' numbers and gradient indicate inter-item polychoric correlation coefficients

6.6. Generated solutions

Appendix 6.6.1. *Generated solutions (Negative Urgency illustration)*

DIM	QUAD	MDR	IIC	COM	CLU	RMDR	RIIC	RCOM	RCLU	MEANR	SOLR
NU	1	52.000	2.964	2	3	7	4	1	2	3.50	6
NU	2	49.500	2.910	2	3	5	2	1	2	2.5	3
NU	3	46.000	2.914	2	2	2	3	1	3	2.25	2
NU	4	54.500	3.324	2	4	10	8	1	1	5.00	8
NU	5	51.500	3.204	2	4	6	7	1	1	3.75	7
NU	6	52.000	3.343	2	3	7	10	1	2	5.00	8
NU	7	53.500	3.340	2	3	9	9	1	2	5.25	10
NU	8	43.000	2.887	2	4	1	1	1	1	1.00	1
NU	9	46.000	2.973	2	3	2	5	1	2	2.5	3
NU	10	49.000	3.014	2	3	4	6	1	2	3.25	5
NU	11	63.000	3.628	1	3	11	11	2	2	6.50	11

DIM column = UPPS-P factor; NU = Negative Urgency; QUAD column = Numbering for the reliable quadruplet of items; MDR column = Sum of mean differentiation ranks for the quadruplet; IIC column = Sum of inter-item polychoric correlation coefficients for the quadruplet; COM column = Communities membership for the quadruplet; CLU column = Clusters membership for the quadruplet; RMDR column = Rank of the sum of mean differentiation ranks for the quadruplet amongst other quadruplets; RIIC column = Rank of the sum of inter-item polychoric correlation coefficients for the quadruplet amongst other quadruplets; RCOM column = Rank of the communities membership for the quadruplet amongst other quadruplets; RCLU column = Rank of the clusters membership for the quadruplet amongst other quadruplets; MEANR column = Mean rank of the quadruplet; SOLR column = Final rank of the quadruplet amongst other quadruplets; Green cell font indicates first ranks; Yellow cell font indicates second ranks; Red cell font indicates last ranks

Appendix 6.6.2. *Generated solutions (Lack of Premeditation illustration)*

DIM	QUAD	MDR	IIC	COM	CLU	RMDR	RIIC	RCOM	RCLU	MEANR	SOLR
LPREM	1	152,400	3,017	2	2	10	11	2	2	6,25	7
LPREM	2	150,931	2,994	2	2	9	6	2	2	4,75	3
LPREM	3	162,400	3,072	2	2	22	21	2	2	11,75	24
LPREM	4	165,400	3,106	2	2	26	25	2	2	13,75	26
LPREM	5	163,500	2,967	2	2	25	3	2	2	8,00	12
LPREM	6	184,643	3,183	1	2	38	29	3	2	18,00	34
LPREM	7	171,669	3,144	1	2	30	27	3	2	15,50	31
LPREM	8	157,500	3,034	2	2	15	17	2	2	9,00	16
LPREM	9	197,400	3,558	1	1	42	42	3	3	22,50	42
LPREM	10	174,000	3,254	1	1	32	33	3	3	17,75	33
LPREM	11	158,500	3,067	2	2	18	20	2	2	10,50	20
LPREM	12	173,000	3,282	1	1	31	35	3	3	18,00	34
LPREM	13	163,400	2,982	2	2	24	5	2	2	8,25	15
LPREM	14	183,596	3,346	1	2	37	37	3	2	19,75	38
LPREM	15	158,143	3,033	1	2	17	16	3	2	9,50	17
LPREM	16	167,169	3,089	1	2	28	23	3	2	14,00	27
LPREM	17	161,900	3,247	2	2	21	31	2	2	14,00	27
LPREM	18	134,500	2,946	2	2	1	1	2	2	1,50	1
LPREM	19	153,400	3,167	2	2	11	28	2	2	10,75	22
LPREM	20	192,900	3,542	1	1	40	40	3	3	21,50	40
LPREM	21	157,500	3,074	2	2	15	22	2	2	10,25	19
LPREM	22	156,346	3,030	2	2	13	13	2	2	7,50	11
LPREM	23	165,926	3,260	1	2	27	34	3	2	16,50	32
LPREM	24	154,000	2,996	1	2	12	8	3	2	6,25	7
LPREM	25	138,026	2,977	1	2	2	4	3	2	2,75	2
LPREM	26	162,900	3,247	2	2	23	32	2	2	14,75	29
LPREM	27	149,000	2,995	2	2	8	7	2	2	4,75	3
LPREM	28	157,400	3,195	2	2	14	30	2	2	12,00	25
LPREM	29	158,846	2,999	2	2	19	9	2	2	8,00	12
LPREM	30	193,900	3,549	1	1	41	41	3	3	22,00	41
LPREM	31	147,000	3,048	2	2	3	19	2	2	6,50	9
LPREM	32	148,846	3,033	2	2	7	15	2	2	6,50	9
LPREM	33	169,900	3,016	2	2	29	10	2	2	10,75	22
LPREM	34	175,900	3,090	2	2	33	24	2	2	15,25	30
LPREM	35	178,346	2,957	2	2	36	2	2	2	10,50	20
LPREM	36	147,926	3,024	2	3	5	12	2	1	5	5
LPREM	37	147,926	3,033	2	3	5	14	2	1	5,50	6
LPREM	38	177,426	3,306	1	2	34	36	3	2	18,75	36

DIM	QUAD	MDR	IIC	COM	CLU	RMDR	RIIC	RCOM	RCLU	MEANR	SOLR
LPREM	**39**	147,400	3,107	3	3	4	26	**1**	**1**	8,00	12
LPREM	**40**	177,900	3,355	2	2	35	38	**2**	**2**	19,25	37
LPREM	**41**	187,746	3,421	2	2	39	39	**2**	**2**	20,50	39
LPREM	**42**	158,846	3,047	3	3	19	18	**1**	**1**	9,75	18

DIM column = UPPS-P factor; LPREM = Lack of Premeditation; QUAD column = Numbering for the reliable quadruplet of items; MDR column = Sum of mean differentiation ranks for the quadruplet; IIC column = Sum of inter-item polychoric correlation coefficients for the quadruplet; COM column = Communities membership for the quadruplet; CLU column = Clusters membership for the quadruplet; RMDR column = Rank of the sum of mean differentiation ranks for the quadruplet amongst other quadruplets; RIIC column = Rank of the sum of inter-item polychoric correlation coefficients for the quadruplet amongst other quadruplets; RCOM column = Rank of the communities membership for the quadruplet amongst other quadruplets; RCLU column = Rank of the clusters membership for the quadruplet amongst other quadruplets; MEANR column = Mean rank of the quadruplet; SOLR column = Final rank of the quadruplet amongst other quadruplets; Green cell font indicates first ranks; Yellow cell font indicates second ranks; Red cell font indicates last ranks

Appendix 6.6.3. *Generated solutions (Lack of Perseverance illustration)*

DIM	QUAD	MDR	IIC	COM	CLU	RMDR	RIIC	RCOM	RCLU	MEANR	SOLR
LPERS	1	54,500	3,451	2	2	4	6	1	2	3,25	5
LPERS	2	54,500	3,400	1	2	4	5	2	2	3,25	5
LPERS	3	43,000	3,110	2	2	1	1	1	2	1,25	1
LPERS	4	54,000	3,218	2	3	3	2	1	1	1,75	2
LPERS	5	57,000	3,543	2	2	6	7	1	2	4,00	7
LPERS	6	50,500	3,344	2	2	2	4	1	2	2,25	3
LPERS	7	57,000	3,218	2	2	6	3	1	2	3,00	4

DIM column = UPPS-P factor; LPERS = Lack of Perseverance; QUAD column = Numbering for the reliable quadruplet of items; MDR column = Sum of mean differentiation ranks for the quadruplet; IIC column = Sum of inter-item polychoric correlation coefficients for the quadruplet; COM column = Communities membership for the quadruplet; CLU column = Clusters membership for the quadruplet; RMDR column = Rank of the sum of mean differentiation ranks for the quadruplet amongst other quadruplets; RIIC column = Rank of the sum of inter-item polychoric correlation coefficients for the quadruplet amongst other quadruplets; RCOM column = Rank of the communities membership for the quadruplet amongst other quadruplets; RCLU column = Rank of the clusters membership for the quadruplet amongst other quadruplets; MEANR column = Mean rank of the quadruplet; SOLR column = Final rank of the quadruplet amongst other quadruplets; Green cell font indicates first ranks; Yellow cell font indicates second ranks; Red cell font indicates last ranks

Appendix 6.6.4. *Generated solutions (Sensation Seeking illustration)*

DIM	QUAD	MDR	IIC	COM	CLU	RMDR	RIIC	RCOM	RCLU	MEANR	SOLR
SS	1	52,889	3,194	4	1	7	8	1	2	4,50	8
SS	2	52,667	3,173	4	1	6	7	1	2	4,00	7
SS	3	52,056	3,078	4	1	5	6	1	2	3,50	5
SS	4	48,889	2,982	4	2	1	3	1	1	1,50	2
SS	5	54,500	3,068	4	2	8	5	1	1	3,75	6
SS	6	49,389	2,897	4	2	2	1	1	1	1,25	1
SS	7	66,389	3,612	4	1	9	9	1	2	5,25	9
SS	8	50,667	3,064	4	1	4	4	1	2	2,75	4
SS	9	50,500	2,930	4	2	3	2	1	1	1,75	3

DIM column = UPPS-P factor; SS = Sensation Seeking; QUAD column = Numbering for the reliable quadruplet of items; MDR column = Sum of mean differentiation ranks for the quadruplet; IIC column = Sum of inter-item polychoric correlation coefficients for the quadruplet; COM column = Communities membership for the quadruplet; CLU column = Clusters membership for the quadruplet; RMDR column = Rank of the sum of mean differentiation ranks for the quadruplet amongst other quadruplets; RIIC column = Rank of the sum of inter-item polychoric correlation coefficients for the quadruplet amongst other quadruplets; RCOM column = Rank of the communities membership for the quadruplet amongst other quadruplets; RCLU column = Rank of the clusters membership for the quadruplet amongst other quadruplets; MEANR column = Mean rank of the quadruplet; SOLR column = Final rank of the quadruplet amongst other quadruplets; Green cell font indicates first ranks; Yellow cell font indicates second ranks; Red cell font indicates last ranks

Appendix 6.6.5. *Generated solutions (Positive Urgency illustration)*

DIM	QUAD	MDR	IIC	COM	CLU	RMDR	RIIC	RCOM	RCLU	MEANR	SOLR
PU	1	47,800	3,389	2	3	5	4	1	2	3,00	4
PU	2	54,000	3,605	2	2	7	7	1	3	4,50	7
PU	3	48,300	3,441	2	3	6	6	1	2	3,75	6
PU	4	46,000	3,201	2	3	1	2	1	2	1,50	1
PU	5	47,300	3,412	2	3	4	5	1	2	3,00	4
PU	6	46,300	3,176	2	4	3	1	1	1	1,50	1
PU	7	46,000	3,239	2	3	1	3	1	2	1,75	3
PU	8	54,800	3,668	1	3	8	8	2	2	5,00	8

DIM column = UPPS-P factor; PU = Positive Urgency; QUAD column = Numbering for the reliable quadruplet of items; MDR column = Sum of mean differentiation ranks for the quadruplet; IIC column = Sum of inter-item polychoric correlation coefficients for the quadruplet; COM column = Communities membership for the quadruplet; CLU column = Clusters membership for the quadruplet; RMDR column = Rank of the sum of mean differentiation ranks for the quadruplet amongst other quadruplets; RIIC column = Rank of the sum of inter-item polychoric correlation coefficients for the quadruplet amongst other quadruplets; RCOM column = Rank of the communities membership for the quadruplet amongst other quadruplets; RCLU column = Rank of the clusters membership for the quadruplet amongst other quadruplets; MEANR column = Mean rank of the quadruplet; SOLR column = Final rank of the quadruplet amongst other quadruplets; Green cell font indicates first ranks; Yellow cell font indicates second ranks; Red cell font indicates last ranks

6.7. Solutions

Appendix 6.7.1.1. *Negative Urgency primary solution*

UPPS-FR	UPPS-EN
I18. Parfois quand je ne me sens pas bien, je ne parviens pas à arrêter ce que je suis en train de faire même si cela me fait me sentir plus mal.	**I18.** Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse.
I24. Quand je suis contrarié(e), j'agis souvent sans réfléchir.	**I24.** When I am upset I often act without thinking.
I28. Quand je me sens rejeté(e), je dis souvent des choses que je regrette ensuite.	**I28.** When I feel rejected, I will often say things that I later regret.
I36. J'aggrave souvent les choses parce que j'agis sans réfléchir quand je suis contrarié(e).	**I36.** I often make matters worse because I act without thinking when I am upset.

UPPS-FR column = 45-item French UPPS items; UPPS-EN column = 45-item English UPPS items (for translation purposes); I prefix = Item (followed by numbering)

Appendix 6.7.1.2. *Negative Urgency alternative solution*

UPPS-FR	UPPS-EN
I14. Quand je ne me sens pas bien, je fais souvent des choses que je regrette ensuite, afin de me sentir mieux tout de suite.	**I14.** When I feel bad, I will often do things I later regret in order to make myself feel better now.
I18. Parfois quand je ne me sens pas bien, je ne parviens pas à arrêter ce que je suis en train de faire même si cela me fait me sentir plus mal.	**I18.** Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse.
I36. J'aggrave souvent les choses parce que j'agis sans réfléchir quand je suis contrarié(e).	**I36.** I often make matters worse because I act without thinking when I am upset.
I41. Quand la discussion s'échauffe, je dis souvent des choses que je regrette ensuite.	**I41.** In the heat of an argument, I will often say things that I later regret.

UPPS-FR column = 45-item French UPPS items; UPPS-EN column = 45-item English UPPS items (for translation purposes); I prefix = Item (followed by numbering)

Appendix 6.7.1.3. *Negative Urgency narrow solution*

UPPS-FR	UPPS-EN
I24. Quand je suis contrarié(e), j'agis souvent sans réfléchir.	**I24.** When I am upset I often act without thinking.
I28. Quand je me sens rejeté(e), je dis souvent des choses que je regrette ensuite.	**I28.** When I feel rejected, I will often say things that I later regret.
I36. J'aggrave souvent les choses parce que j'agis sans réfléchir quand je suis contrarié(e).	**I36.** I often make matters worse because I act without thinking when I am upset.
I41. Quand la discussion s'échauffe, je dis souvent des choses que je regrette ensuite.	**I41.** In the heat of an argument, I will often say things that I later regret.

UPPS-FR column = 45-item French UPPS items; UPPS-EN column = 45-item English UPPS items (for translation purposes); I prefix = Item (followed by numbering)

Appendix 6.7.2.1. *Lack of Premeditation primary solution*

UPPS-FR	UPPS-EN
I5. Ma manière de penser est d'habitude réfléchie et méticuleuse.	**I5.** My thinking is usually careful and purposeful.
I27. D'habitude je me décide après un raisonnement bien mûri.	**I27.** I usually make up my mind through careful reasoning.
I31. Je suis une personne prudente.	**I31.** I am a cautious person.
I40. Avant de me décider, je considère tous les avantages et inconvénients.	**I40.** Before making up my mind, I consider all the advantages and disadvantages.

UPPS-FR column = 45-item French UPPS items; UPPS-EN column = 45-item English UPPS items (for translation purposes); I prefix = Item (followed by numbering)

Appendix 6.7.2.2. *Lack of Premeditation alternative solution*

UPPS-FR	UPPS-EN
I13. Je préfère m'interrompre et réfléchir avant d'agir.	**I13.** I like to stop and think things over before I do them.
I23. J'ai tendance à valoriser et à suivre une approche rationnelle et "sensée" des choses.	**I23.** I tend to value and follow a rational, "sensible" approach to things.
I39. D'habitude je réfléchis soigneusement avant de faire quoi que ce soit.	**I39.** I usually think carefully before doing anything.
I40. Avant de me décider, je considère tous les avantages et inconvénients.	**I40.** Before making up my mind, I consider all the advantages and disadvantages.

UPPS-FR column = 45-item French UPPS items; UPPS-EN column = 45-item English UPPS items (for translation purposes); I prefix = Item (followed by numbering)

Appendix 6.7.2.3. *Lack of Premeditation narrow solution*

UPPS-FR	UPPS-EN
I5. Ma manière de penser est d'habitude réfléchie et méticuleuse.	**I5.** My thinking is usually careful and purposeful.
I13. Je préfère m'interrompre et réfléchir avant d'agir.	**I13.** I like to stop and think things over before I do them.
I27. D'habitude je me décide après un raisonnement bien mûri.	**I27.** I usually make up my mind through careful reasoning.
I39. D'habitude je réfléchis soigneusement avant de faire quoi que ce soit.	**I39.** I usually think carefully before doing anything.

UPPS-FR column = 45-item French UPPS items; UPPS-EN column = 45-item English UPPS items (for translation purposes); I prefix = Item (followed by numbering)

Appendix 6.7.3.1. *Lack of Perseverance primary solution*

UPPS-FR	UPPS-EN
I4. Je préfère généralement mener les choses jusqu'au bout.	**I4.** I generally like to see things through to the end.
I12. Je n'aime vraiment pas les tâches inachevées.	**I12.** Unfinished tasks really bother me.
I30. Je suis une personne productive qui termine toujours son travail.	**I30.** I am a productive person who always gets the job done.
I34. Une fois que je commence un projet, je le termine presque toujours.	**I34.** Once I start a project, I almost always finish it.

UPPS-FR column = 45-item French UPPS items; UPPS-EN column = 45-item English UPPS items (for translation purposes); I prefix = Item (followed by numbering)

Appendix 6.7.3.2. *Lack of Perseverance alternative solution*

UPPS-FR	UPPS-EN
I4. Je préfère généralement mener les choses jusqu'au bout.	**I4.** I generally like to see things through to the end.
I22. J'achève ce que je commence.	**I22.** I finish what I start.
I26. Je m'organise de façon à ce que les choses soient faites à temps.	**I26.** I'm pretty good about pacing myself so as to get things done on time.
I30. Je suis une personne productive qui termine toujours son travail.	**I30.** I am a productive person who always gets the job done.

UPPS-FR column = 45-item French UPPS items; UPPS-EN column = 45-item English UPPS items (for translation purposes); I prefix = Item (followed by numbering)

Appendix 6.7.3.3. *Lack of Perseverance narrow solution*

UPPS-FR	UPPS-EN
I4. Je préfère généralement mener les choses jusqu'au bout.	**I4.** I generally like to see things through to the end.
I22. J'achève ce que je commence.	**I22.** I finish what I start.
I30. Je suis une personne productive qui termine toujours son travail.	**I30.** I am a productive person who always gets the job done.
I34. Une fois que je commence un projet, je le termine presque toujours.	**I34.** Once I start a project, I almost always finish it.

UPPS-FR column = 45-item French UPPS items; UPPS-EN column = 45-item English UPPS items (for translation purposes); I prefix = Item (followed by numbering)

Appendix 6.7.4.1. *Sensation Seeking primary solution*

UPPS-FR	UPPS-EN
I3. Je recherche généralement des expériences et sensations nouvelles et excitantes.	**I3.** I generally seek new and exciting experiences and sensations.
I11. J'aime les sports et les jeux dans lesquels on doit choisir son prochain mouvement très rapidement.	**I11.** I like sports and games in which you have to choose your next move very quickly.
I25. Je me réjouis des expériences et sensations nouvelles même si elles sont un peu effrayantes et non-conformistes.	**I25.** I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.
I33. J'aime parfois faire des choses qui sont un petit peu effrayantes.	**I33.** I sometimes like doing things that are a bit frightening.

UPPS-FR column = 45-item French UPPS items; UPPS-EN column = 45-item English UPPS items (for translation purposes); I prefix = Item (followed by numbering)

Appendix 6.7.4.2. *Sensation Seeking alternative solution*

UPPS-FR	UPPS-EN
I3. Je recherche généralement des expériences et sensations nouvelles et excitantes.	**I3.** I generally seek new and exciting experiences and sensations.
I11. J'aime les sports et les jeux dans lesquels on doit choisir son prochain mouvement très rapidement.	**I11.** I like sports and games in which you have to choose your next move very quickly.
I19. J'éprouve du plaisir à prendre des risques.	**I19.** I quite enjoy taking risks.
I25. Je me réjouis des expériences et sensations nouvelles même si elles sont un peu effrayantes et non-conformistes.	**I25.** I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.

UPPS-FR column = 45-item French UPPS items; UPPS-EN column = 45-item English UPPS items (for translation purposes); I prefix = Item (followed by numbering)

Appendix 6.7.4.3. *Sensation Seeking narrow solution*

UPPS-FR	UPPS-EN
I3. Je recherche généralement des expériences et sensations nouvelles et excitantes.	**I3.** I generally seek new and exciting experiences and sensations.
I19. J'éprouve du plaisir à prendre des risques.	**I19.** I quite enjoy taking risks.
I25. Je me réjouis des expériences et sensations nouvelles même si elles sont un peu effrayantes et non-conformistes.	**I25.** I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.
I33. J'aime parfois faire des choses qui sont un petit peu effrayantes.	**I33.** I sometimes like doing things that are a bit frightening.

UPPS-FR column = 45-item French UPPS items; UPPS-EN column = 45-item English UPPS items (for translation purposes); I prefix = Item (followed by numbering)

Appendix 6.7.5.1. *Positive Urgency primary solution*

PUM-FR	PUM-EN
PUI5. Quand je suis follement heureux/heureuse, j'ai tendance à perdre le contrôle de moi-même.	**PUI5.** When I'm deliriously happy, I tend to lose control of myself.
PUI9. Quand je suis ravi/ravie, je sens que je ne peux pas m'empêcher de m'emballer.	**PUI9.** When I'm delighted, I can't stop myself from getting carried away.
PUI10. Quand je suis vraiment enthousiaste, j'ai tendance à ne pas penser aux conséquences de mes actions.	**PUI10.** When I'm really enthusiastic, I tend not to think about the consequences of my actions.
PUI13. Quand je suis très heureux/heureuse, j'ai l'impression qu'il est normal de céder à ses envies ou de se laisser aller à des excès.	**PUI13.** When I'm very happy, I feel as if it's normal to succumb to one's desires or go overboard about things.

PUM-FR column = 14-item French UPPS items; PUM-EN column = 14-item English UPPS items (for translation purposes); PUI prefix = Item (followed by numbering)

Appendix 6.7.5.2. *Positive Urgency alternative solution*

PUM-FR	PUM-EN
PUI4. Quand je suis d'excellente humeur, j'ai tendance à perdre le contrôle de moi-même.	**PUI4.** When I'm in an excellent mood, I tend to lose control of myself.
PUI10. Quand je suis vraiment enthousiaste, j'ai tendance à ne pas penser aux conséquences de mes actions.	**PUI10.** When I'm really enthusiastic, I tend not to think about the consequences of my actions.
PUI11. Quand je suis vraiment enthousiaste, j'ai tendance à agir sans réfléchir.	**PUI11.** When I'm really enthusiastic, I tend to act without thinking.
PUI13. Quand je suis très heureux/heureuse, j'ai l'impression qu'il est normal de céder à ses envies ou de se laisser aller à des excès.	**PUI13.** When I'm very happy, I feel as if it's normal to succumb to one's desires or go overboard about things.

PUM-FR column = 14-item French UPPS items; PUM-EN column = 14-item English UPPS items (for translation purposes); PUI prefix = Item (followed by numbering)

Appendix 6.7.5.3. *Positive Urgency narrow solution*

PUM-FR	PUM-EN
PUI9. Quand je suis ravi/ravie, je sens que je ne peux pas m'empêcher de m'emballer.	**PUI9.** When I'm delighted, I can't stop myself from getting carried away.
PUI10. Quand je suis vraiment enthousiaste, j'ai tendance à ne pas penser aux conséquences de mes actions.	**PUI10.** When I'm really enthusiastic, I tend not to think about the consequences of my actions.
PUI11. Quand je suis vraiment enthousiaste, j'ai tendance à agir sans réfléchir.	**PUI11.** When I'm really enthusiastic, I tend to act without thinking.
PUI13. Quand je suis très heureux/heureuse, j'ai l'impression qu'il est normal de céder à ses envies ou de se laisser aller à des excès.	**PUI13.** When I'm very happy, I feel as if it's normal to succumb to one's desires or go overboard about things.

PUM-FR column = 14-item French UPPS items; PUM-EN column = 14-item English UPPS items (for translation purposes); PUI prefix = Item (followed by numbering)

6.8. UPPS, PUM and short UPPS-P scales

Appendix 6.8.1. *45-item English UPPS Impulsive Behavior Scale*

Whiteside, S. P., & Lynam, D. R. (2001). The Five Factor Model and impulsivity: Using a structural model of personality to understand impulsivity. *Personality and Individual Differences*, *30*(4), 669–689. https://doi.org/10.1016/S0191-8869(00)00064-7

Below are a number of statements that describe ways in which people act and think. For each statement, please indicate how much you agree or disagree with the statement. If you Agree Strongly circle 1, if you Agree Somewhat circle 2, if you Disagree somewhat circle 3, and if you Disagree Strongly circle 4. Be sure to indicate your agreement or disagreement for every statement below. Also, there are questions on the following pages.

Item	Question	Agree Strongly	Agree Somewhat	Disagree Somewhat	Disagree Strongly
1	I have a reserved and cautious attitude toward life.	1	2	3	4
2	I have trouble controlling my impulses.	1	2	3	4
3	I generally seek new and exciting experiences and sensations.	1	2	3	4
4	I generally like to see things through to the end.	1	2	3	4
5	My thinking is usually careful and purposeful.	1	2	3	4
6	I have trouble resisting my cravings (for food, cigarettes, etc.).	1	2	3	4
7	I'll try anything once.	1	2	3	4
8	I tend to give up easily.	1	2	3	4
9	I am not one of those people who blurt out things without thinking.	1	2	3	4
10	I often get involved in things I later wish I could get out of.	1	2	3	4
11	I like sports and games in which you have to choose your next move very quickly.	1	2	3	4
12	Unfinished tasks really bother me.	1	2	3	4
13	I like to stop and think things over before I do them.	1	2	3	4
14	When I feel bad, I will often do things I later regret in order to make myself feel better now.	1	2	3	4
15	I would enjoy water skiing.	1	2	3	4
16	Once I get going on something I hate to stop.	1	2	3	4
17	I don't like to start a project until I know exactly how to proceed.	1	2	3	4
18	Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse.	1	2	3	4
19	I quite enjoy taking risks.	1	2	3	4
20	I concentrate easily.	1	2	3	4
21	I would enjoy parachute jumping.	1	2	3	4

22	I finish what I start.	1	2	3	4
23	I tend to value and follow a rational, "sensible" approach to things.	1	2	3	4
24	When I am upset I often act without thinking.	1	2	3	4
25	I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.	1	2	3	4
26	I'm pretty good about pacing myself so as to get things done on time.	1	2	3	4
27	I usually make up my mind through careful reasoning.	1	2	3	4
28	When I feel rejected, I will often say things that I later regret.	1	2	3	4
29	I would like to learn to fly an airplane.	1	2	3	4
30	I am a productive person who always gets the job done.	1	2	3	4
31	I am a cautious person.	1	2	3	4
32	It is hard for me to resist acting on my feelings.	1	2	3	4
33	I sometimes like doing things that are a bit frightening.	1	2	3	4
34	Once I start a project, I almost always finish it.	1	2	3	4
35	Before I get into a new situation I like to find out what to expect from it.	1	2	3	4
36	I often make matters worse because I act without thinking when I am upset.	1	2	3	4
37	I would enjoy the sensation of skiing very fast down a high mountain slope.	1	2	3	4
38	There are so many little jobs that need to be done that I sometimes just ignore them all.	1	2	3	4
39	I usually think carefully before doing anything.	1	2	3	4
40	Before making up my mind, I consider all the advantages and disadvantages.	1	2	3	4
41	In the heat of an argument, I will often say things that I later regret.	1	2	3	4
42	I would like to go scuba diving.	1	2	3	4
43	I am always able to keep my feelings under control.	1	2	3	4
44	I would enjoy fast driving.	1	2	3	4
45	Sometimes I do things on impulse that I later regret	1	2	3	4

[R] = Items to reverse; Negative Urgency = 2[R] + 6[R] + 10[R] + 14[R] + 18[R] + 24[R] + 28[R] + 32[R] + 36[R] + 41[R] + 43 + 45[R]; Lack of Premeditation = 1 + 5 + 9 + 13 + 17 + 23 + 27 + 31 + 35 + 39 + 40; Lack of Perseverance = 4 + 8[R] + 12 + 16 + 20 + 22 + 26 + 30 + 34 + 38[R]; Sensation Seeking = 3[R] + 7[R] + 11[R] + 15[R] + 19[R] + 21[R] + 25[R] + 29[R] + 33[R] + 37[R] + 42[R] + 44[R]

Appendix 6.8.2. *45-item French UPPS Impulsive Behavior Scale*

Van der Linden, M., d'Acremont, M., Zermatten, A., Jermann, F., Larøi, F., Willems, S., Juillerat, A.-C., & Bechara, A. (2006). A French adaptation of the UPPS Impulsive Behavior Scale: Confirmatory factor analysis in a sample of undergraduate students. *European Journal of Psychological Assessment*, *22*(1), 38–42. https://doi.org/10.1027/1015-5759.22.1.38

Vous trouverez ci-dessous un certain nombre d'énoncés décrivant des manières de se comporter ou de penser. Pour chaque affirmation, veuillez indiquer à quel degré vous êtes d'accord ou non avec l'énoncé. Si vous êtes Tout à fait d'accord avec l'affirmation encerclez le chiffre 1, si vous êtes Plutôt d'accord encerclez le chiffre 2, si vous êtes Plutôt en désaccord encerclez le chiffre 3, et si vous êtes Tout à fait en désaccord encerclez le chiffre 4. Assurez-vous que vous avez indiqué votre accord ou désaccord pour chaque énoncé ci-dessous. Il y a encore d'autres énoncés sur la page suivante.

Item	Question	Tout à fait d'accord	Plutôt d'accord	Plutôt en désaccord	Tout à fait en désaccord
1	J'ai une attitude réservée et prudente dans la vie.	1	2	3	4
2	J'ai des difficultés à contrôler mes impulsions.	1	2	3	4
3	Je recherche généralement des expériences et sensations nouvelles et excitantes.	1	2	3	4
4	Je préfère généralement mener les choses jusqu'au bout.	1	2	3	4
5	Ma manière de penser est d'habitude réfléchie et méticuleuse.	1	2	3	4
6	J'ai des difficultés à résister à mes envies (pour la nourriture, les cigarettes, etc.).	1	2	3	4
7	J'essayerais tout.	1	2	3	4
8	J'ai tendance à abandonner facilement.	1	2	3	4
9	Je ne suis pas de ces gens qui parlent sans réfléchir.	1	2	3	4
10	Je m'implique souvent dans des situations dont j'aimerais pouvoir me sortir par la suite.	1	2	3	4
11	J'aime les sports et les jeux dans lesquels on doit choisir son prochain mouvement très rapidement.	1	2	3	4
12	Je n'aime vraiment pas les tâches inachevées.	1	2	3	4
13	Je préfère m'interrompre et réfléchir avant d'agir.	1	2	3	4
14	Quand je ne me sens pas bien, je fais souvent des choses que je regrette ensuite, afin de me sentir mieux tout de suite.	1	2	3	4
15	Ça me plairait de faire du ski nautique.	1	2	3	4
16	Une fois que je commence quelque chose je déteste m'interrompre.	1	2	3	4
17	Je n'aime pas commencer un projet avant de savoir exactement comment procéder.	1	2	3	4
18	Parfois quand je ne me sens pas bien, je ne parviens pas à arrêter ce que je suis en train de faire même si cela me fait me sentir plus mal.	1	2	3	4
19	J'éprouve du plaisir à prendre des risques.	1	2	3	4
20	Je me concentre facilement.	1	2	3	4
21	J'aimerais faire du saut en parachute.	1	2	3	4
22	J'achève ce que je commence.	1	2	3	4
23	J'ai tendance à valoriser et à suivre une approche rationnelle et « sensée » des choses.	1	2	3	4

24	Quand je suis contrarié/contrariée, j'agis souvent sans réfléchir.	1	2	3	4
25	Je me réjouis des expériences et sensations nouvelles même si elles sont un peu effrayantes et non-conformistes.	1	2	3	4
26	Je m'organise de façon à ce que les choses soient faites à temps.	1	2	3	4
27	D'habitude je me décide après un raisonnement bien mûri.	1	2	3	4
28	Quand je me sens rejeté/rejetée, je dis souvent des choses que je regrette ensuite.	1	2	3	4
29	J'aimerais apprendre à conduire un avion.	1	2	3	4
30	Je suis une personne productive qui termine toujours son travail.	1	2	3	4
31	Je suis une personne prudente.	1	2	3	4
32	C'est difficile pour moi de me retenir d'agir selon mes sentiments.	1	2	3	4
33	J'aime parfois faire des choses qui sont un petit peu effrayantes.	1	2	3	4
34	Une fois que je commence un projet, je le termine presque toujours.	1	2	3	4
35	Avant de m'impliquer dans une nouvelle situation, je préfère savoir ce que je dois en attendre.	1	2	3	4
36	J'aggrave souvent les choses parce que j'agis sans réfléchir quand je suis contrarié/contrariée.	1	2	3	4
37	J'aimerais la sensation de skier très vite sur des pentes raides.	1	2	3	4
38	Il y a tant de petites tâches qui doivent être faites que parfois je les ignore simplement toutes.	1	2	3	4
39	D'habitude je réfléchis soigneusement avant de faire quoi que ce soit.	1	2	3	4
40	Avant de me décider, je considère tous les avantages et inconvénients.	1	2	3	4
41	Quand la discussion s'échauffe, je dis souvent des choses que je regrette ensuite.	1	2	3	4
42	J'aimerais aller faire de la plongée sous-marine.	1	2	3	4
43	Je suis toujours capable de maîtriser mes émotions.	1	2	3	4
44	J'aimerais conduire vite.	1	2	3	4
45	Parfois je fais des choses sur un coup de tête que je regrette par la suite.	1	2	3	4

[R] = Items à renverser; Urgence Négative = 2[R] + 6[R] + 10[R] + 14[R] + 18[R] + 24[R] + 28[R] + 32[R] + 36[R] + 41[R] + 43 + 45[R]; Manque de Préméditation = 1 + 5 + 9 + 13 + 17 + 23 + 27 + 31 + 35 + 39 + 40; Manque de Persévérance = 4 + 8[R] + 12 + 16 + 20 + 22 + 26 + 30 + 34 + 38[R]; Recherche de Sensation = 3[R] + 7[R] + 11[R] + 15[R] + 19[R] + 21[R] + 25[R] + 29[R] + 33[R] + 37[R] + 42[R] + 44[R]

Appendix 6.8.3. *14-item English Positive Urgency Measure*

Cyders, M. A., Smith, G. T., Spillane, N. S., Fischer, S., Annus, A. M., & Peterson, C. (2007). Integration of impulsivity and positive mood to predict risky behavior: Development and validation of a measure of positive urgency. *Psychological Assessment*, *19*(1), 107–118. https://doi.org/10.1037/1040-3590.19.1.107

Below are a number of statements that describe ways in which people act and think. For each statement, please indicate how much you agree or disagree with the statement. If you Agree Strongly circle 1, if you Agree Somewhat circle 2, if you Disagree somewhat circle 3, and if you Disagree Strongly circle 4. Be sure to indicate your agreement or disagreement for every statement below.

Item	Question	Agree Strongly	Agree Somewhat	Disagree Somewhat	Disagree Strongly
1	When I'm very happy, I feel as if I can't stop myself from doing things that could have negative consequences.	1	2	3	4
2	When I'm in an excellent mood, I tend to find myself in situations that could cause problems for me.	1	2	3	4
3	When I'm very happy, I tend to do things that could create problems in my life.	1	2	3	4
4	When I'm in an excellent mood, I tend to lose control of myself.	1	2	3	4
5	When I'm deliriously happy, I tend to lose control of myself.	1	2	3	4
6	Other people would say that I make poor choices when I'm extremely pleased with something.	1	2	3	4
7	Other people get angry or worried about the things I do when I feel very enthusiastic.	1	2	3	4
8	When something makes me very happy, I tend to do things that could have negative consequences.	1	2	3	4
9	When I'm delighted, I can't stop myself from getting carried away.	1	2	3	4
10	When I'm really enthusiastic, I tend not to think about the consequences of my actions.	1	2	3	4
11	When I'm really enthusiastic, I tend to act without thinking.	1	2	3	4
12	When I'm really happy, I often find myself in situations that would normally make me uncomfortable.	1	2	3	4
13	When I'm very happy, I feel as if it's normal to succumb to one's desires or go overboard about things.	1	2	3	4
14	I'm surprised by the things I do when I'm in an excellent mood.	1	2	3	4

[R] = Items to reverse; Positive Urgency = 1[R] + 2[R] + 3[R] + 4[R] + 5[R] + 6[R] + 7[R] + 8[R] + 9[R] + 10[R] + 11[R] + 12[R] + 13[R] + 14[R]

Appendix 6.8.4. *14-item French Positive Urgency Measure*

Billieux, J., Rochat, L., Ceschi, G., Carré, A., Offerlin-Meyer, I., Defeldre, A.-C., Khazaal, Y., Besche-Richard, C., & Van der Linden, M. (2012). Validation of a short French version of the UPPS-P Impulsive Behavior Scale. *Comprehensive Psychiatry*, *53*(5), 609–615. https://doi.org/10.1016/j.comppsych.2011.09.001

Vous trouverez ci-dessous un certain nombre d'énoncés décrivant des manières de se comporter ou de penser. Pour chaque affirmation, veuillez indiquer à quel degré vous êtes d'accord ou non avec l'énoncé. Si vous êtes Tout à fait d'accord avec l'affirmation encerclez le chiffre 1, si vous êtes Plutôt d'accord encerclez le chiffre 2, si vous êtes Plutôt en désaccord encerclez le chiffre 3 et si vous êtes Tout à fait en désaccord encerclez le chiffre 4. Assurez-vous que vous avez indiqué votre accord ou désaccord pour chaque énoncé ci-dessous.

Item	Question	Tout à fait d'accord	Plutôt d'accord	Plutôt en désaccord	Tout à fait en désaccord
1	Quand je suis très heureux/heureuse, j'ai l'impression de ne pas pouvoir m'empêcher de faire des choses qui peuvent avoir des conséquences négatives.	1	2	3	4
2	Quand je suis d'excellente humeur, j'ai tendance à me mettre dans des situations qui pourraient me causer des problèmes.	1	2	3	4
3	Quand je suis très heureux/heureuse, j'ai tendance à faire des choses qui pourraient entraîner des problèmes dans ma vie.	1	2	3	4
4	Quand je suis d'excellente humeur, j'ai tendance à perdre le contrôle de moi-même.	1	2	3	4
5	Quand je suis follement heureux/heureuse, j'ai tendance à perdre le contrôle de moi-même.	1	2	3	4
6	Les autres diraient que je fais de mauvais choix lorsque je suis extrêmement content/contente de quelque chose.	1	2	3	4
7	Les autres sont choqués/choquées ou inquiets/inquiètes à propos des choses que je fais lorsque je me sens très enthousiaste.	1	2	3	4
8	Quand quelque chose me rend très heureux/heureuse, j'ai tendance à faire des choses qui peuvent avoir des conséquences négatives.	1	2	3	4
9	Quand je suis ravi/ravie, je sens que je ne peux pas m'empêcher de m'emballer.	1	2	3	4
10	Quand je suis vraiment enthousiaste, j'ai tendance à ne pas penser aux conséquences de mes actions.	1	2	3	4
11	Quand je suis vraiment enthousiaste, j'ai tendance à agir sans réfléchir.	1	2	3	4
12	Quand je suis vraiment heureux/heureuse, je me retrouve souvent dans des situations qui, normalement, me mettraient mal à l'aise.	1	2	3	4
13	Quand je suis très heureux/heureuse, j'ai l'impression qu'il est normal de céder à ses envies ou de se laisser aller à des excès.	1	2	3	4
14	Je suis surpris des choses que je fais lorsque je suis d'excellente humeur.	1	2	3	4

[R] = Items à renverser; Urgence Positive = 1[R] + 2[R] + 3[R] + 4[R] + 5[R] + 6[R] + 7[R] + 8[R] + 9[R] + 10[R] + 11[R] + 12[R] + 13[R] + 14[R]

Appendix 6.8.5. *20-item short English UPPS-P Impulsive Behavior Scale*

Cyders, M. A., Littlefield, A. K., Coffey, S., & Karyadi, K. A. (2014). Examination of a Short Version of the UPPS-P Impulsive Behavior Scale. *Addictive Behaviors*, *39*(9), 1372–1376. https://doi.org/10.1016/j.addbeh.2014.02.013

Below are a number of statements that describe ways in which people act and think. For each statement, please indicate how much you agree or disagree with the statement. If you Agree Strongly circle 1, if you Agree Somewhat circle 2, if you Disagree somewhat circle 3, and if you Disagree Strongly circle 4. Be sure to indicate your agreement or disagreement for every statement below.

Item	Question	Agree Strongly	Agree Somewhat	Disagree Somewhat	Disagree Strongly
1	I generally like to see things through to the end.	1	2	3	4
2	My thinking is usually careful and purposeful.	1	2	3	4
3	When I am in great mood, I tend to get into situations that could cause me problems.	1	2	3	4
4	Unfinished tasks really bother me.	1	2	3	4
5	I like to stop and think things over before I do them.	1	2	3	4
6	When I feel bad, I will often do things I later regret in order to make myself feel better now.	1	2	3	4
7	Once I get going on something I hate to stop.	1	2	3	4
8	Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse.	1	2	3	4
9	I quite enjoy taking risks.	1	2	3	4
10	I tend to lose control when I am in a great mood.	1	2	3	4
11	I finish what I start.	1	2	3	4
12	I tend to value and follow a rational, "sensible" approach to things.	1	2	3	4
13	When I am upset I often act without thinking.	1	2	3	4
14	I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional.	1	2	3	4
15	When I feel rejected, I will often say things that I later regret.	1	2	3	4
16	I would like to learn to fly an airplane.	1	2	3	4
17	Others are shocked or worried about the things I do when I am feeling very excited.	1	2	3	4
18	I would enjoy the sensation of skiing very fast down a high mountain slope.	1	2	3	4
19	I usually think carefully before doing anything.	1	2	3	4
20	I tend to act without thinking when I am really excited.	1	2	3	4

[R] = Items to reverse; Negative Urgency = 6[R] + 8[R] + 13[R] + 15[R]; Lack of Premeditation = 2 + 5 + 12 + 19; Lack of Perseverance = 1 + 4 + 7 + 11; Sensation Seeking = 9[R] + 14[R] + 16[R] + 18[R]; Positive Urgency = 3[R] + 10[R] + 17[R] + 20[R]

Appendix 6.8.6. *20-item short French UPPS-P Impulsive Behavior Scale*

Vous trouverez ci-dessous un certain nombre d'énoncés décrivant des manières de se comporter ou de penser. Pour chaque affirmation, veuillez indiquer à quel degré vous êtes d'accord ou non avec l'énoncé. Si vous êtes Tout à fait d'accord avec l'affirmation encerclez le chiffre 1, si vous êtes Plutôt d'accord encerclez le chiffre 2, si vous êtes Plutôt en désaccord encerclez le chiffre 3 et si vous êtes Tout à fait en désaccord encerclez le chiffre 4. Assurez- vous que vous avez indiqué votre accord ou désaccord pour chaque énoncé ci-dessous.

Item	Question	Tout à fait d'accord	Plutôt d'accord	Plutôt en désaccord	Tout à fait en désaccord
1	D'habitude je réfléchis soigneusement avant de faire quoi que ce soit.	1	2	3	4
2	Quand je suis vraiment enthousiaste, j'ai tendance à ne pas penser aux conséquences de mes actions.	1	2	3	4
3	J'aime parfois faire des choses qui sont un petit peu effrayantes.	1	2	3	4
4	Quand je suis contrarié/contrariée, j'agis souvent sans réfléchir.	1	2	3	4
5	Je préfère généralement mener les choses jusqu'au bout.	1	2	3	4
6	Ma manière de penser est d'habitude réfléchie et méticuleuse.	1	2	3	4
7	Quand la discussion s'échauffe, je dis souvent des choses que je regrette ensuite.	1	2	3	4
8	J'achève ce que je commence.	1	2	3	4
9	J'éprouve du plaisir à prendre des risques.	1	2	3	4
10	Quand je suis ravi/ravie, je sens que je ne peux pas m'empêcher de m'emballer.	1	2	3	4
11	Une fois que je commence un projet, je le termine presque toujours.	1	2	3	4
12	J'aggrave souvent les choses parce que j'agis sans réfléchir quand je suis contrarié/contrariée.	1	2	3	4
13	D'habitude je me décide après un raisonnement bien mûri.	1	2	3	4
14	Je recherche généralement des expériences et sensations nouvelles et excitantes.	1	2	3	4
15	Quand je suis vraiment enthousiaste, j'ai tendance à agir sans réfléchir.	1	2	3	4
16	Je suis une personne productive qui termine toujours son travail.	1	2	3	4
17	Quand je me sens rejeté/rejetée, je dis souvent des choses que je regrette ensuite.	1	2	3	4
18	Je me réjouis des expériences et sensations nouvelles même si elles sont un peu effrayantes et non-conformistes.	1	2	3	4
19	Avant de me décider, je considère tous les avantages et inconvénients.	1	2	3	4
20	Quand je suis très heureux/heureuse, j'ai l'impression qu'il est normal de céder à ses envies ou de se laisser aller à des excès.	1	2	3	4

[R] = Items à renverser;; Urgence Négative = 4[R] + 7[R] + 12[R] + 17[R]; Manque de Préméditation = 1 + 6 + 13 + 19; Manque de Persévérance = 5 + 8 + 11 + 16; Recherche de Sensation = 3[R] + 9[R] + 14[R] + 18[R]; Urgence Positive = 2[R] + 10[R] + 15[R] + 20[R]