An Investigation of Alternative Factor Models of Impulsivity using the UPPS-P

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Abstract

The UPPS-P measures impulsivity as a five-factor construct (lack of premeditation, lack of perseverance, positive urgency, negative urgency and sensation seeking). Drawing on a number of theoretical considerations and alternative conceptions of impulsivity, the current study used confirmatory factor analysis (N=1635) and multiple regression to evaluate and test alternative models comprising three, five, and a hierarchical model containing latent factors. The five factor and hierarchical models were shown to be valid and of near identical fit, whereas the three-factor model fit the data poorly. The current findings suggest that both the five factor and hierarchical models are useful applications of the UPPS-P. Depending on the purpose of future research, both models demonstrate utility in both risk assessment and treatment development. Multiple regression analysis revealed that positive urgency predicted problem gambling, which supports the predictive utility of impulsivity as a five factor construct. While the latent factors of the hierarchical model are consistent with emerging theory, those using the UPPS-P should not overlook the unique contributions of the five factors. As the current study found meaningful predictive distinctions between positive and negative urgency, utilising all five factors may increase measurement sensitivity and predictive utility.

The importance of impulsivity to extreme behaviour, and psychological and behavioural problems has long been recognised. As noted by Cyders (2015), impulsivity is the most common criterion in the DSM, and as such has clear implications for clinical disorders and abnormal patterns of behaviour. For example, research has linked impulsivity to problem gambling (Blain, Gill & Teese, 2015), aggression (Dvorak, Pearson & Kuvass, 2013), binge eating (Cyders & Smith, 2008), borderline personality disorder (DeShong & Kurtz, 2013), antisocial personality disorder (DeShong & Kurtz, 2013), bulimia nervosa (Cyders & Smith, 2008), and substance abuse (Gullo, Ward, Dawe, Powell & Jackson, 2011). Whilst impulsivity has been traditionally defined as, "a predisposition toward rapid, unplanned reactions to internal or external stimuli, without regard to the negative consequences of these actions to the impulsive individual or others" (Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001, p. 1784), more recent conceptualisations have focused on the multidimensional nature of the construct.

Models of Impulsivity

As noted by Zuckerman "Personality constructs with different names are often very similar" (1994, p. 56). Perhaps no more is this apparent than in the debate surrounding the "multidimensional" nature of impulsivity. For decades, there has been a lack of consensus on how to define and measure the concept of impulsivity (Gullo, Loxton & Dawe, 2014), impeding the current understanding of impulsivity and its links to behaviour (Tran, Teese, & Gill, 2018). Consequently a great deal of confusion and overlap exists across the similar constructs of impulsivity, disinhibition, sensation-seeking, and impulse control (Berg et al., 2015; Whiteside & Lynam, 2001). A recent seminal paper by Cyders (2015) highlighted that the lack of consensus, overlap, and misuse of the term impulsivity has slowed, and will continue to slow, the progress of science in this area.

Perhaps the most influential conceptualisation of impulsivity was originally proposed by Barratt (1959), comprising three components: lack of planning, lack of focus on the task at hand, and the tendency to act without delay. The Barratt Impulsive Scale (BIS; Barratt., 1959), currently in its 11th revision (BIS-11; Patton, Stanford & Barratt, 1995), is now arguably the most common self-report measure for the assessment of impulsiveness in both research and clinical settings. Despite its popularity, research (e.g., Vasconcelos, Malloy-Diniz & Correa, 2012) has suggested that the BIS-11 does not assess the three higher order factors it was originally designed to measure, and that the majority of studies utilising the BIS-11 report only the total score and ignore the subscales (Lane, Moeller, Steinberg, Buzby, & Kosten, 2007). The continued tendency to treat impulsivity as a unitary construct is inconsistent with research suggesting that different aspects of impulsivity relate differently to a range of behavioural and psychological problems (Reise, Moore, Sabb, Brown & London, 2013).

The UPPS and UPPS-P

The UPPS was developed in an attempt to address the multidimensional nature of impulsivity, and overcome the theoretical and measurement limitations inherent within the impulsivity domain. Through exploratory factor analysis and a theoretical grounding in McCrae and Costa's (1990) Five Factor Model, Whiteside and Lynam (2001) identified four distinct impulsivity domains; sensation seeking, (lack of) premeditation, (lack of) perseverance, and urgency. Urgency was later separated into positive and negative urgency by Cyders et al. (2007) to form the UPPS-P. We now present a brief summary of these factors.

Negative urgency. Negative urgency is the inclination to act rashly when experiencing negative emotions (Zsila, Bőthe, Demetrovics, Billieux & Orosz , 2017). It is seen as one of the two factors commonly related to taking rash actions under heightened

emotional states (Cyders & Smith, 2008). Increased urgency has been related to a number of disorders or problematic behaviour, including aggression (Dvorak, Pearson & Kuvass, 2013), binge eating (Cyders & Smith, 2008), borderline personality disorder (Cyders & Smith, 2008; DeShong & Kurtz, 2013; Whiteside, Lynam, Miller & Reynolds, 2005), antisocial personality disorder (DeShong & Kurtz, 2013; Whiteside et al., 2005), substance abuse (Cyders & Smith, 2008), bulimia nervosa (Cyders & Smith, 2008), problem gambling (Blain et al., 2015; Whiteside et al., 2005), and post-traumatic stress disorder (Price, Connor & Allen, 2017).

Lack of perseverance. Perseverance is the ability to remain focused on boring or difficult tasks (Zsila et al., 2017). Lack of perseverance has been linked to borderline personality disorder (DeShong & Kurtz, 2013; Whiteside et al., 2005) and attention deficit hyperactivity disorder (Whiteside & Lynam, 2001). It has been theorized that higher lack of perseverance specifically would denote a predominantly inattentive type of ADHD, as this relates to difficulty remaining on task or sustaining attention (Whiteside & Lynam, 2001).

Lack of premeditation. Premeditation is the tendency to think through or consider the possible outcomes of an action (Zsila et al., 2017). Lack of premeditation has been linked to psychopathy (Whiteside & Lynam, 2001), borderline personality disorder (DeShong & Kurtz, 2013), antisocial personality disorder (DeShong & Kurtz, 2013; Whiteside et al., 2005) and ADHD (Whiteside & Lynam, 2001). In contrast to lack of perseverance, Whiteside and Lynam (2001) theorized that premeditation may have a stronger correlation with the predominately hyperactive subtype of ADHD. Of note, lack of premeditation is the only normally self-aware process captured by the UPPS-P. As such, it is also the only factor of impulsivity that has been directly related to aspects of executive functioning (Nordvall, Stigsdotter & Jonsson, 2017).

Sensation seeking. Sensation seeking is defined as both the openness to new experiences, and the seeking out of exciting activities (Zsila et al., 2017). Sensation seeking has been linked to antisocial personality disorder (DeShong & Kurtz, 2013; Whiteside et al., 2005) and borderline personality disorder (Whiteside et al., 2005). In the work of Evans-Polce, Schuler, Schulenberg & Patrick (2018), using a similar scale to that of the UPPS-P for measure sensation seeking, women were shown to have both lower scores in sensation seeking and substance use than males, however the correlation between sensation seeking and substance use was stronger for men.

Positive urgency. Not included in the original UPPS (Whiteside & Lynam, 2001), positive urgency is the inclination to act rashly when experiencing positive emotions (Zsila et al., 2017). It is seen as the other factor, in addition to negative urgency, related to taking rash actions under heightened emotional states (Cyders & Smith, 2008). Increased positive urgency has been noted in individuals suffering PTSD symptoms, however not as strongly as in negative urgency (Price et al., 2017). In addition to this, increased positive urgency has been linked to response inhibition deficits (Johnson, Tharp, Peckham, Sanchez & Carver, 2016), and problem gambling (Blain et al., 2015).

Since conceptualisation, the UPPS-P has undergone a number of further developments, such as the creation and validation of a 20 item short form (Cyders, Littlefield, Coffey & Karyadi 2014), and a number of translations in various languages (e.g. Verdejo-García, Lozano, Moya, Alcázar & Pérez-García, 2010). Despite its popularity, conjecture exists as to whether a five factor model is the best way to understand impulsivity, or whether this five factor model is merely an extension upon fewer underlying factors. The current model of the UPPS-P is shown in Figure 1.

It has been proposed (e.g., Rochat et al., 2010; Smith et al., 2007; Zsila et al., 2017) that lack of premeditation and lack of perseverance should belong to the same higher order

factor, which has been commonly referred to as lack of conscientiousness. Lack of conscientiousness is defined as a lack of prolonged thought or focus on a task both before and after beginning it. To this end, moderate correlations are commonly reported between lack of premeditation and lack of perseverance (MacKillop et al., 2016; Whiteside et al., 2005), suggesting these two factors may be measuring a latent factor not identified in this model.

In addition, positive urgency and negative urgency have been shown to be highly correlated (MacKillop et al., 2016), indicating that these factors could be measuring a higher order factor which has previously been referred to as urgency, or an individual's susceptibility to acting rashly based on their emotional state, regardless of valence (positive or negative) (Cyders & Smith, 2008; Smith & Cyders, 2016; Zsila et al., 2017). The resultant changes would produce a three factor model as shown in Figure 2.

With a theoretical grounding in McCrae and Costa's (1990) Five Factor Model, a broader-based theory of personality, there is reason to believe that impulsivity-specific theories could offer a stronger theoretical basis for the UPPS-P. Such theories may identify impulsivity-specific higher-order latent factors such as lack of conscientiousness and urgency, while maintaining the five first order factors. For example, there has been significant support from personality and developmental perspectives for dual-system pathways based around sensation seeking and impulsivity (Gullo et al., 2014; Kuntsche, Kuntsche, Thrul & Gmel, 2017; Littlefield & Sher, 2010; Shin, Hong & Jeon, 2012; Shulman et al., 2016; Stautz & Cooper, 2013). Approaches such as Gray's (1970; 1982) Reinforcement Sensitivity Theory (RST), and Dawe's (Dawe & Loxton, 2004) 2-Component Approach to Reinforcing Substances (2-CARS) are examples of such approaches. These perspectives have highlighted dual pathways reflecting the influence of approach (reward sensitivity/sensation seeking), and inhibition (impulse control/impulsivity) mechanisms on behaviour (Gullo et al., 2014; Stautz, Dinc & Cooper, 2017). These dual pathways have received recent support from

neurodevelopmental studies (see Crone, van Duijvenvoorde & Peper, 2016; Spear, 2013, for reviews). The resulting theoretical model is similar to that of Zsila at al. (2017), in which the short form of the UPPS-P was utilized to provide a hierarchical structure that is shown in Figure 3.

The current study attempted to further clarify the factor structure of impulsivity proposed by the UPPS-P by comparing the original five factor model (Figure 1) to both a three factor model (Figure 2), and a hierarchical model (Figure 3). The study used confirmatory factor analysis (CFA) to compare these models in terms of fit to a set of data. It is believed that, while the original model will be valid, the theoretically supported hierarchical model will provide a better fit than the current model of the UPPS-P. In addition, the predictive validity of the three and five factor models were tested against problem gambling as measured by the Problem Gambling Severity Index (PGSI).

Method

Participants

Upon ethics approval, adult participants were recruited via posts on social media, such as Facebook, with links to an online questionnaire containing demographic questions, the UPPS-P, and the PGSI hosted by Qualtrics (2018), a digital survey platform. Data was pooled from a series of smaller projects to test the validity of the UPPS-P across the different models. A total of 3479 participants responded. For the purpose of the confirmatory factor analyses, 1844 were removed due to missing data. The 1635 retained participants' demographic details are presented below in Table 1. As can be seen participants were relatively young with a mean age of 22.47 years for confirmatory factor analyses, with gender being reasonably equally distributed. For analyses involving the PGSI, 806 participants with complete data were retained (315 males, 455 females, mean age 22.35 years). All cases with

missing data were deemed Missing Completely at Random (MCAR) and deleted, as such no imputation methods were utilised in this study (Enders, 2006).

Measures

UPPS-P Impulsive Behavior Scale. The UPPS-P (Lynam, Smith, Whiteside & Cyders, 2006; Whiteside & Lynam, 2001) is a 59 item measure of impulsivity in which participants are requested to respond to statements on a four-point Likert-type response scale, ranging from *1 = strongly agree*, to *4 = strongly disagree*. This scale consists of five factors; negative urgency (12 items, e.g. "When I am upset I often act without thinking"), positive urgency (14 items, e.g., "When I am very happy, I can't seem to stop myself from doing things that can have bad consequences."), lack of premeditation (11 items, e.g., "I have a reserved and cautious attitude toward life."), lack of perseverance (10 items, e.g., "I generally like to see things through to the end") ,and sensation seeking (12 items, e.g., "I like sports and games in which you have to choose your next move very quickly"). Cronbach's alpha ranged from α =.82 (lack of perseverance) to α =.94 (positive urgency) in the current study.

Problem Gambling Severity Index. The PGSI, originally created as the Canadian Problem Gambling Index (Ferris & Wynne, 2001), is a nine item measure of problem gambling in which participants are requested to respond to statements on a four-point Likert-type response scale, ranging from *0 = Never*, to *3 = Almost Always*. This scale only measures the single factor of problem gambling and all questions pertain to the past 12 months (item e.g. Have you bet more than you could really afford to lose?). Cronbach's alpha for the current study was α = .952.

Confirmatory Factor Analysis

In order to compare these models confirmatory factor analysis was conducted using SPSS Amos. The values used to compare these models include; χ^2, the comparative fit index

(CFI), Tucker-Lewis Index (TLI), root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). Typically for good fit, a model should have a non-significant χ^2, a CFI and TLI of above .9, an RMSEA of below .08 and an SRMR of below .08 (Parry, n.d.). However, Cheung and Rensvold (2002) suggest that almost all goodness of fit indexes, excluding RMSEA, are affected by the number of items per factor and the number of factors within any model. As such, aside from RMSEA, these hard cut off values cannot be used to determine goodness of fit, yet, by using nested models, it is still possible to compare these values between models. To achieve nested models, a single model among those being tested, is require to contain all the variables of the other models to approximate model complexity, minimising the effect these influences may have on any interpretations of model fit in comparison to other models.

Multiple Regression

In order to compare the predictive capabilities of the suggested higher order factors and original factors of the UPPS-P multiple regression analysis was utilised using SPSS. The factor totals were calculated and averaged as per UPPS-P instructions (lack of conscientiousness and urgency being an average of the total of their first order factors). The values used to compare these factors include; adjusted R^2, model significance, and the factors' individual predictive significance. With three and five predictors, power analyses revealed an effect size of 0.1 would require samples of 176 and 204 respectively, whilst an effect size of 0.4 would require sample sizes of 48 and 56 respectively.

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Results

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Confirmatory Factor Analysis

Sample means were similar to those obtained by Cyders et al. (2007) across three studies, for all factors (Negative urgency as Urgency $M = 2.28$, 2.21 and 2.28; Premeditation

as deliberation $M = 2.08$, 2.05 and 1.91; Perseverance $M = 1.94$, 1.83 and 1.74; Sensation

seeking $M = 2.89$, 2.93 and 2.83; Positive urgency $M = 1.86$, 1.58 and 1.75.) This

demonstrates the comparable nature of the gathered data set.

As confirmatory factor analysis requires at least 5-20 participants per parameter

(Suhr, 2006). Sample size for the seven potential factors investigated by this research

required 35-140 participants to yield statistically valid results. The assumption of a priori

model specification was met, as the models being tested were pre-specified. The assumption

of nested models for comparison was met, as all tested model factors are incorporated into the

suggested hierarchical model. The assumption of multivariate normality was met, as the VIF

values for each factor grouping of items was below the acceptable value of 10, and for the

majority of items, below the preferred value of three. In order to ascertain the most

appropriate factor structure of impulsivity using the UPPS-P, three models were tested for fit.

The fit indices of each model can be found in Table 1. It is important to note that all factors

were loaded onto by their respective questionnaire items.

The first model, presented in Figure 1, displays the current model of the UPPS-P.

Values presented in model figures represent either correlations or regression weights, also

referred to as loadings. In Figure 1 and Figure 2, all values represent correlations. In Figure 3,

values presented directly above double headed curved arrows represent correlations, where

values presented adjacent to straight single headed arrows represent factor loadings. As

expected, Figure 1 demonstrates a moderate correlation between lack of premeditation and

lack of perseverance, and a strong correlation between positive urgency and negative

urgency. In comparison, the remaining correlations varied from very weak to weak. Of note

is the negative correlation between lack of perseverance and sensation seeking. As RMSEA

for this model is significant, the 90% confidence interval was interpreted. Given that the

RMSEA confidence interval for this model did not exceed the value of .08, this model was deemed as having good fit.

The second tested model, presented in Figure 2, displays the three factor model that combines negative and positive urgency into urgency, and lack of perseverance and lack of premeditation into lack of conscientiousness, without retaining the first order factors. As shown in Figure 2, Model 2 showed very weak correlations between lack of conscientiousness and sensation seeking, and sensation seeking and urgency. Additionally, a weak correlation between lack of conscientiousness and urgency is noted in this model. This model also had a significant RMSEA value, and as such the 90% confidence interval was interpreted. Given the confidence interval exceeded the value of .08, the fit of this model is not good.

The third tested model, presented in Figure 3, is the theoretically suggested hierarchical model, in which negative and positive urgency are under the latent factor urgency, and lack of perseverance and lack of premeditation are under lack of conscientiousness, while retaining their positions as first order factors. As shown in Figure 3, Model 3 showed significant loadings of lack of premeditation and lack of perseverance on lack of conscientiousness, and significant loadings of positive urgency and negative urgency on urgency. The model additionally displayed very weak correlations between lack of conscientiousness and sensation seeking, and lack of conscientiousness and urgency, with a weak correlation between sensation seeking and urgency. This model also had a significant RMSEA, as such 90% confidence intervals were interpreted. The 90% confidence interval was below the cut off value of .08, and as such model 3 was considered to have good fit.

Independent samples T-test

Independent-samples t-tests were run to determine if there were gender differences in PGSI and the current factors of the UPPS-P, and the theoretical higher order factors of the UPPS-P (315 males, 455 females). Homogeneity of variances was assumed, except for the PGSI (p <.001). Males scored significantly higher than females on the PGSI, $t(471.24) = 4.44$, $p < .001$, $d = .355$, and sensation seeking, $t(768) = 3.59$, $p < .001$, $d = .290$. Females scored significantly lower on negative urgency, $t(768) = -2.87$, $p = .004$, $d = .210$. Due to the implications of genders effects on PGSI scores, gender was controlled for in the following regressions.

Hierarchical Multiple Regression

Sample means for these sub-groups of the population for the UPPS-P factors were similar to those found in Cyders et al. (2007), again demonstrating the comparable nature of the data set. While the PGSI had a high range of participant values, the average participant value was at low-risk, which is typical of distributions in community samples of gamblers (Blain, Gill, & Teese, 2014).

Hierarchical multiple regression analyses were conducted to compare the predictive utility of the five and three factor models respectively, while controlling for gender, and are shown in Table 2. Across both analyses, linearity was determined by visual interpretation of partial regression plots and plots of studentized residuals and unstandardized predicted values. Homoscedasticity was determined by visual interpretation of plots of studentized residuals versus unstandardized residuals. Multicollinearity was not present in this data as all values of VIF were within the acceptable range of below 10. While there were 20 outliers, as determined by a studentized deleted residual greater than ±3, none of these were considered as leverage points, as determined by leverage values above .05, or influential points, as determined by Cook's Distance values of above 1. As such all cases were retained.

The first multiple regression predicted the PGSI from the five factors of UPPS-P, controlling for gender. The regression coefficients for the final model are displayed in Table 2 below. Gender was a significant predictor at step 1 explaining 2.3% of variance. At step 2 gender and the five factors of the UPPS-P explained 12.2% of the variance in problem gambling (R^2 adj =.115, $F(6,799) = 18.50$, $p < .001$). The addition of the five factors significantly increased the prediction of PGSI score, R^2 change = .099, F(5, 799) = 18.052, p < .001. Positive urgency and gender were the only factors to significantly predict problem gambling, $p < .001$.

The second multiple regression predicted the PGSI from the three factor model of UPPS-P, controlling for gender. Gender was a significant predictor at step 1 explaining 2.3% of variance. At step 2 gender and the three factors of the UPPS-P explained 11.4% of the variance in problem gambling (R^2 adj =.11, $F (4,801) = 25.86$, $p < .001$). The addition of the three factors significantly increased the prediction of PGSI score, R^2 change = .092, F(3, 801) = 27.60, p < .001. Urgency and gender were the only factors to significantly predict problem gambling, $p < .001$.

Discussion

In partial support of the hypothesis, both the current five factor model of impulsivity and the theoretically based hierarchical model were shown to be valid interpretations within the context of the 59 items of the UPPS-P, while the three factor model was not supported. It is therefore argued that both the original 5-factor UPPS-P impulsivity model and the hierarchical model represent valid applications of the UPPS-P.

The hierarchical model (see Figure 3) retaining all first order factors and introducing higher-order latent factors of lack of conscientiousness and urgency, was shown to be of good fit to the data. Given that all first order factors in this model significantly loaded onto their

respective latent factors, and all correlations between factors were of similar strengths, this interpretation of impulsivity in the context of the UPPS-P is valid. The slight decrease of .001 in CFI and TLI, and slight increase of .002 in SRMR in this model compared to the five factor model, could be explained by the added model complexity resulting from the two additional factors. This seems especially likely as the RMSEA values, which have been shown to be unaffected by model complexity (Cheung & Rensvold, 2002), are identical between the two models. As such this model is considered to be an almost identical fit, in all goodness of fit values, with the five factor model. No further models were identified for investigation during this process.

With regards to the hierarchical model, the moderate correlation between lack of premeditation and lack of perseverance (r = .51), is consistent with MacKillop et al., (2016) and Whiteside et al. (2005), and further validate the implied existence of the latent factor of lack of conscientiousness (Rochat et al., 2010; Smith et al., 2007). Additionally, the strong correlation between positive and negative urgency (r = .65) suggests the existence of a second latent variable (urgency) (Cyders & Smith, 2008; Smith & Cyders, 2016; MacKillop et al., 2016; Zsila et al., 2017). The findings from this model serve to further justify the validity of the hierarchical model when applied to the UPPS-P, whereby lack of premeditation and lack of perseverance fall under the higher order factor of lack of conscientiousness, and positive urgency and negative urgency under the higher order factor of urgency.

Further evidence of the validity of both the five factor and hierarchical structures of the UPPS-P was demonstrated by the lack of support for the three factor model being tested. The decreased CFI and TLI, and increased SRMR and RMSEA of this model compared to the original model, demonstrates that removing the first order factors in favour of latent factors, jeopardizes the accuracy and explanatory power of the UPPS-P. The importance of retaining first order factors is consistent with the research of DeShong and Kurtz (2013), in

which certain factors were shown to independently vary in cases of borderline personality disorder or antisocial personality disorder.

The decision of which model to support (five factor or hierarchical) must come down to practicality and theoretical justification (Gunzler & Morris, 2015). It could be argued that as the UPPS-P is a tool, then only the useful parts should be kept, and the more parsimonious five factor model should be retained. However, from a theoretical perspective, the literature suggests that the additional latent factors of lack of conscientiousness; containing lack of perseverance and lack of premeditation (Rochat et al., 2010; Smith et al., 2007; Zsila et al., 2017), and urgency; containing both positive and negative urgency (Cyders & Smith, 2008; Smith & Cyders, 2016; Zsila et al., 2017), exist, and have utility. As such we suggest that the best model to use depends on the application context.

The multiple regression results highlight the importance of retaining the original five factors. The amount of variance in problem gambling explained by the UPPS-P in both the hierarchical and five factor models was consistent with ranges of 11% to 18% found in previous research (Blain, Gill & Teese, 2014). Specifically, in the case of problem gambling, both positive urgency and urgency were found to have been significant predictors in their respective models. This would suggest that an individual who is highly susceptible to acting rashly based on their emotional state, or high in urgency, would be more likely to engage in gambling to a problematic level. More specifically, those more influenced when in a positive emotional state, or high in positive urgency are more likely to engage in problematic gambling behaviours. As such it appears that valence is an important consideration in impulsively urgent gambling. The utility of considering valence would be lost using the three factor model or when focusing on the high order factors in the hierarchical model.

This study was limited by a number of issues related to the method of sampling. The average age of 22.23 years this study may not accurately represent older populations. Additionally, this study relied on self-report data and did not control for social desirability. We also did not address how the UPPS-P may be influenced by age and culture. The current findings could be tested for the short form of the UPPS-P, the SUPPS, to investigate the impact, if any, on the factor structure of the models tested in the current research.

Conclusions

The current study assessed the fit of a theoretically supported hierarchical model of the UPPS-P, in comparison to the three-factor model, and the current five factor model using confirmatory factor analysis. The five factor and hierarchical models were both shown to be statistically valid, while the three-factor model was rejected. It is proposed that both the theoretical hierarchical model, and the original five factor model demonstrate adequate applications of the UPPS-P. While the latent factors of the hierarchical model are consistent with emerging theory, those using the UPPS-P should not overlook the unique contributions of the five factors. As the current study found meaningful predictive distinctions between positive and negative urgency, utilising all five factors may increase measurement sensitivity and predictive utility.

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Table 1

Tested Models CFA Fit Indices.
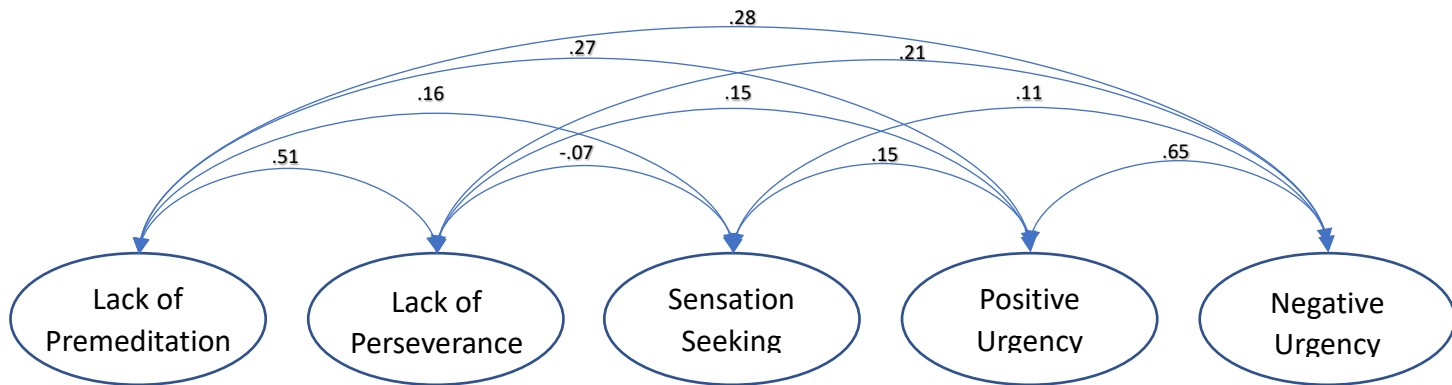
Model	df	χ^2	CFI	TLI	RMSEA (90% CI)	SRMR
1	1642	12214.450*	.793	.784	.063* (.062 - .064)	.089
2	1649	18731.236*	.665	.653	.080* (.079 - .081)	.100
3	1645	12268.818*	.792	.783	.063* (.062 - .061)	.091

*$p < .001$, the full range of fit statistics is provided in the appendices (see appendix D)
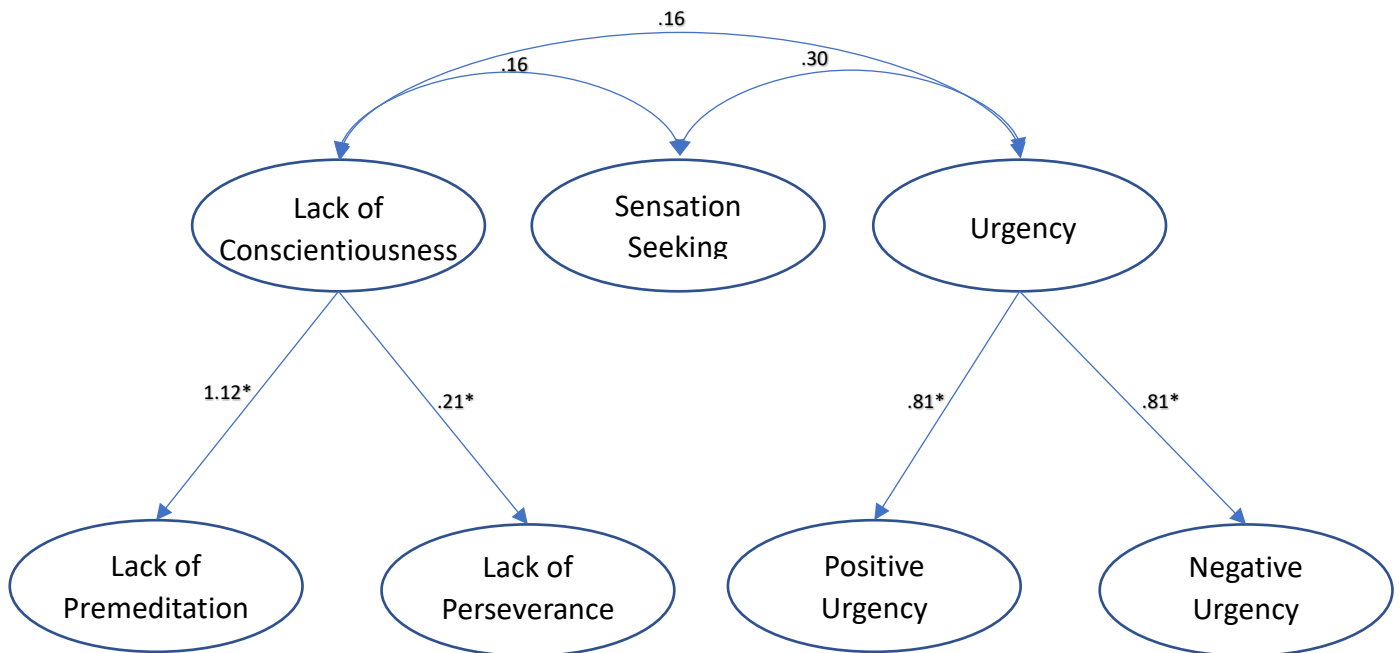
Figure 1. Current model of the UPPS-P construct of impulsivity.

Shown without questionnaire item loadings. All questionnaire items loaded significantly onto their respective factors with *p* < .001.
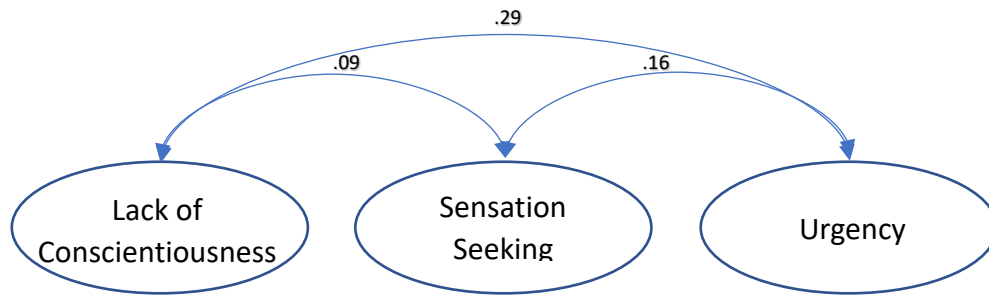
Figure 2. Three factor model of the UPPS-P. Shown without questionnaire item loadings.

All questionnaire items loaded significantly onto their respective factors with *p* < .001.

Figure 3. Hierarchical model of the UPPS-P.

This model retains all first order factors.

Shown without questionnaire item loadings. *$p < .001$. All questionnaire items loaded significantly onto their respective factors with $p < .001$.

Table 2

Multiple Regression Summary across Five and Three Factor Models Predicting Problem Gambling

Factor	B	SE$_B$	β	p	sr^2
Gender	-1.070	.247	-.151	.000	.023
Five Factor Model					
Gender	-.934	.244	-.132	.000	.016
Negative Urgency	.299	.289	.048	.301	.001
Premeditation	.406	.329	.048	.217	.002
Perseverance	.085	.300	.011	.777	<.001
Sensation Seeking	-.052	.240	-.008	.829	<.001
Positive Urgency	1.683	.315	.259	.000	.031
Three Factor Model					
Gender	-.983	.240	-.139	.000	.018
Conscientiousness	.454	.353	.047	.198	.002
Urgency	1.917	.260	.276	.000	.061
Sensation Seeking	.120	.228	.019	.599	<.001