Assessing procrastination in Korean: A study of the translation and validation of the Pure Procrastination Scale and a reexamination of the Irrational Procrastination Scale in a student and community sample

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Abstract: Procrastination refers to voluntarily delay an intended course of action despite expecting that it might have negative consequences. It is usually assessed by self-reports, and the two most frequently used scales are the Pure Procrastination Scale (PPS) and the Irrational Procrastination Scale (IPS). The current study sought to investigate the reliability and validity of the two scales in Korean by translating the PPS from English and to reexamine a previous translation of the IPS. The aim is to promote further research on procrastination and to enhance a cross-cultural comprehension of the construct in different contexts. Hence, confirmatory factor analyses were conducted using data from 551 participants in a student and community sample. Convergent and discriminant validity, internal consistency, and test-retest reliability were also assessed. A three-factor solution exhibited an adequate fit for the PPS; decisional procrastination, implemental procrastination, and timeliness and promptness, although a one-factor solution with only the implemental part performed equally well. Meanwhile, a one-factor solution exhibited a reasonable fit for the IPS. Both scales correlated moderately with anxiety, $r = .36$-.37, depression, $r = .37$-.38, self-efficacy,

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The authors of the current study all have backgrounds in counseling and clinical psychology and are trained in cognitive behavior therapy. Their research includes the assessment and treatment of psychiatric disorders, for instance, providing evidence-based interventions via the Internet, validation of self-report measures, and supporting university students with mental health problems. The authors also have a shared interest in studies on procrastination, such as exploring cultural differences and measurement issues. Moreover, two of the authors have extensive research experience in the field, for example, evaluating different treatment formats that involve varying degrees of guidance, investigating subgroups of procrastinators, and examining procrastination across nations. The current study is part of a wider partnership aimed at facilitating a research collaboration in psychology between Korea and Sweden.

PUBLIC INTEREST STATEMENT
Procrastination is a common phenomenon that most people can relate to. It involves the delay of an intended course of action despite being aware of the negative consequences that are associated with that delay. Apart from creating stress and frustration, procrastination can affect performance and result in mental distress. Most studies in the field rely on self-reports determining the degree of procrastination, but translations in different languages do not always exist. The current study validated a Korean version of one of the most widely used scales and examined its properties and relationships with other measures. The aim was to explore how valid and reliable it is via statistical techniques often labelled psychometrics, thereby facilitating research on procrastination in Korean.
$r = -0.34$ to $-0.38$, and quality of life, $r = -0.32$ to $-0.34$, all in the expected directions, but not so for perfectionism, $r = 0.09-0.10$. Internal consistencies, Cronbach’s $\alpha = .93$ (the PPS) and $.85$ (the IPS), and test-retest reliabilities (two weeks), $r = .88$ (the PPS) and $.83$ (the IPS), were good. The findings indicate that the Korean versions might be reliable and valid for researching procrastination.

**Subjects:** Mental Health; Clinical Psychology; Psychology; Health Psychology; Psychometrics/Testing & Measurement Theory; Counseling Psychology

**Keywords:** confirmatory factor analysis; Korean; procrastination; psychometrics; scales

1. **Introduction**

Procrastination refers to the inclination “to voluntarily delay an intended course of action despite expecting to be worse off for the delay” (Steel, 2007, p. 66) and is considered to be a prevalent issue in both the general public and in academic settings (Klingsieck, 2013). Although as many as one-fifth of the adult population and more than half of the student population report experiencing difficulties related to procrastination (Day et al., 2000; Ferrari et al., 2007; Horriot & Ferrari, 1996), the number of individuals with clinical problems is most likely lower (Rozental & Carlbring, 2014). Nonetheless, procrastination can be regarded as an irrational behavior that may lead to increased stress and worry, lower mood, and have a negative impact on performance in school and at work (Sirois, 2007). Recent epidemiological research also revealed a relationship between higher levels of procrastination, psychiatric symptomatology, and lower satisfaction with life (Klein et al., 2017), suggesting that it could result in detrimental outcomes if it becomes a recurrent behavioral pattern.

Because procrastination is not a condition that is assessed by diagnostic criteria, as compared to depression, measuring the degree to which an individual procrastinates relies heavily on scales that are based on self-reports (Rozental & Carlbring, 2014). A number of examples exist in the literature (for an overview, see Steel, 2010). However, more recent attempts at refining these have been made and resulted in two scales with improved reliability and validity: the Pure Procrastination Scale (PPS; Steel, 2010) and the Irrational Procrastination Scale (IPS; Steel, 2010). The former originates from a meta-analytic inquiry where items were aggregated from five separate instruments, e.g., the General Procrastination Scale (Lay, 1986), which were then inspected using both exploratory and confirmatory factor analyses. The findings demonstrated that out of the 93 original items that were included, a total of 12 items could give rise to a “puruer” scale and were therefore retained, e.g., “I don’t get things done on time” (item 10), argued to measure three aspects of the same construct, that is, decisional procrastination, implemental procrastination, and timeliness and promptness. The PPS is scored on a five-point Likert-scale ranging from 1 (“Very seldom/Not true of me”) to 5 (“Very often true/True of me”), and with higher scores indicating greater levels of procrastination (range 0–60). The IPS was on the other hand developed by Steel (2002), in line with the concept of procrastination representing an irrational delay (Andreou, 2007), e.g., “I delay tasks beyond what is reasonable” (item 7), which primarily concerns the implemental attributes of the construct. This scale has nine items, three of which are reversed (2, 6, and 9), and is scored on the same type of five-point Likert-scale as the PPS. Several translations and studies have been conducted on the two scales, indicating that they correlate highly with each other, $r = .87$ (Steel, 2010), exhibit good convergent validity with additional instruments of procrastination, $r = .69-.87$, and have good internal consistencies, $\alpha = .92$ (the PPS) and $.91$ (the IPS) (Svardal & Steel, 2017) as well as good test-retest reliabilities, $r = .89$ (the PPS; Rebetez et al., 2014) and $.84$ (the IPS; Guilera et al., 2018; Rozental et al., 2014). Both scales also demonstrate good discriminant validity given their moderate positive correlations with anxiety and depression (Rozental et al., 2014), and moderate negative correlations with satisfaction with life (Guilera et al., 2018; Rebetez et al., 2014), all in the expected directions given by prior meta-analytic evidence (Steel, 2007; Van Eerde, 2003). Moreover, the scales are presently the most frequently used in relation to studying procrastination and can be used in parallel.
for validation purposes as well as to investigate specific aspects in more detail, such as implemental procrastination (Steel, 2010; Svartdal & Steel, 2017).

The PPS and the IPS are currently available in a number of different languages, e.g., Swedish (Rozental et al., 2014), Norwegian (Svartdal, 2015), and Indonesian (Prayitno et al., 2013). Research related to these translations has however revealed slightly different factorial structures compared to what was initially proposed by Steel (2010). For instance, the PPS has been tested using a confirmatory factor analysis in several studies (Rebetz et al., 2014; Rozental et al., 2014; Svartdal et al., 2016; Svartdal & Steel, 2017), with the most recent and comprehensive investigation suggesting that a one-factor structure consisting of items 4–8 (labeled implemental procrastination) or a three factor-structure seem to exhibit the best fit (Svartdal & Steel, 2017). As for the IPS, prior evidence mostly points to a one-factor structure (Prayitno et al., 2013; Rozental et al., 2014; Svartdal et al., 2016), where the reversely scored items can be removed entirely from the scale as they likely constitute a statistical artefact (Schmitt & Stuits, 1985). Understanding the factorial structures of the PPS and the IPS is important to confirm their underlying constructs (Lewis, 2017), thereby providing valid and reliable translations that can be used in both research and various clinical settings. Despite the fact that studies on procrastination are now being conducted in many parts of the world, some researchers and clinicians lack versions of the scales in their native languages, especially in Asian countries. Hence, the aim of the current study was to investigate the psychometric properties of the PPS and the IPS in Korean via confirmatory factor analysis. The results from this could in turn be helpful when conducting randomized controlled trials of treatment interventions for procrastination, i.e., having sound scales available for determining the outcomes, but also to explore cross-cultural issues, e.g., prevalence in different countries. The PPS is one of the most widely used scales on procrastination in the literature and therefore suitable for translation and validation in additional contexts. Meanwhile, the IPS has been translated to Korean in a previous study (Hyunjiin, 2015), but the dissemination of its findings is restricted by the fact that it was not published in English. In addition, this investigation did not explore the link between procrastination and, for instance, psychiatric symptomatology, and did not include an assessment of its test-retest reliability. Also, having both scales available in Korean can facilitate further research on procrastination, both from the perspective of studying it in a novel context, but also allowing a closer investigation of specific aspects of the construct and how this might differ across cultures, i.e., decisional procrastination, implemental procrastination, and timeliness and promptness.

In line with the aim of the current study, the best possible fit with data was explored using a priori models of the scales obtained from the literature. For this purpose, participants in a student and community sample were recruited, given that students usually exhibit a greater degree of procrastination in general (Day et al., 2000; Steel & Ferrari, 2013), while individuals in the community might be more representative of an adult working population. Moreover, both the PPS and IPS were used to determine their convergent validity, while discriminant validity was tested using instruments on perfectionism, anxiety, depression, self-efficacy, and quality of life. Administering both the PPS and the IPS were based on the idea that they would demonstrate a strong correlation with each other given their shared theoretical constructs and the fact that both have been recommended to use in parallel for validation purposes (Steel, 2010; Svartdal & Steel, 2017). Meanwhile, prior research has indicated moderate and positive correlations with psychiatric symptomatology, such as lower mood and greater anxiety (Rozental et al., 2014). In addition, both scales are hypothesized to exhibit moderate positive correlations with perfectionism (Stöber, 2001), and moderate negative correlations with self-efficacy and quality of life, comparable to what has been found using other instruments for measuring procrastination (Guilera et al., 2018; Rebetz et al., 2014; Steel, 2007). Lastly, both the internal consistency and the test-retest reliability of the PPS and the IPS were explored as these aspects are of particular interest in conducting clinical research.
2. Materials and methods

2.1. Participants
In total, 551 participants were included in the current study. First, students at a medium-sized university in South Korea were invited via email to participate in a study on procrastination. In total, 299 individuals agreed to take part (2.9% of the student population at the university). No monetary or credit compensation was offered. Second, university alumni were emailed to recruit family members and friends (community sample). Of these, 252 individuals signed up for the study, and 214 (84.9%) agreed to fill out a second round of the PPS and the IPS two weeks later (a voucher for one cup of coffee at Starbucks was distributed when completing the retest). The choice of only having the community sample respond to the scales twice was due to convenience issues. Recruitment to the current study took place between February 12 and 13 April 2019. The characteristics of the participants are provided in Table 1. Given that the student sample was recruited from a distance-learning university in South Korea, most of the participants were older and had a different career prior to their studies, explaining their demographic composition. Given that recruitment was made via email, it is unclear to what extent individuals read about the current study and declined to participate. However, for those responding, there were no missing data as all scales and demographics were mandatory to complete.

| Table 1. Sample characteristics |
|--------------------------------|
|                              |
| **Student sample**<sup>a</sup> (n = 299) | **Community sample** (n = 252) | **Full sample** (n = 551) |
| Age (years): M (SD) | 40.3 (11.0) | 40.6 (9.3) | 40.4 (10.3) |
| Gender: n (% Female) | 228 (76.3) | 205 (81.3) | 433 (78.6) |
| Relationship status: | | | |
| Single | 113 (37.8) | 86 (34.1) | 199 (35.8) |
| Married/partner | 170 (56.9) | 153 (60.7) | 323 (58.6) |
| Divorced | 13 (4.3) | 7 (2.8) | 20 (3.6) |
| Bereaved | 1 (0.3) | 5 (2.0) | 6 (1.1) |
| Other | 2 (0.7) | 1 (0.4) | 3 (0.5) |
| Children: n (% Yes) | 164 (54.8) | 153 (60.7) | 317 (57.5) |
| Educational level: | | | |
| High-school graduate | 105 (35.1) | 13 (5.2) | 118 (21.4) |
| College dropout | 71 (23.7) | 11 (4.4) | 82 (14.9) |
| College graduate | 85 (28.4) | 164 (65.1) | 249 (45.2) |
| University dropout | 27 (9.0) | 63 (25.0) | 90 (16.3) |
| University graduate | 11 (3.7) | 1 (0.4) | 12 (2.2) |
| Vocational status | | | |
| No vocation | 64 (21.4) | 53 (21.0) | 117 (21.1) |
| Part-time (< 40 hours/week) | 35 (11.7) | 37 (14.7) | 72 (13.1) |
| Full-time contract | 27 (9.0) | 21 (8.3) | 48 (8.7) |
| Full-time regular | 110 (36.8) | 106 (42.1) | 216 (39.2) |
| Self-employed | 26 (8.7) | 21 (8.3) | 47 (8.5) |
| Other | 37 (12.4) | 14 (5.6) | 51 (9.3) |
| Psychotropic medication: n (% Yes) | 55 (18.4) | 40 (15.9) | 95 (17.2) |
| Psychotherapy: n (% Yes) | 114 (38.1) | 134 (53.2) | 248 (45.0) |

<sup>a</sup>The student sample was recruited from a distance-learning university in South Korea with primarily older students, hence the sample characteristics.
2.2. Instruments
Procrastination was examined by distributing the PPS and the IPS. The PPS includes 12 items that measure the “pure” construct of procrastination (for a theoretical review and discussion of the scales, see the introduction), e.g., “I find myself running out of time” (item 9). The PPS is scored on a five-point Likert-scale, 1 (“Very seldom/Not true of me”) to 5 (“Very often true/True of me”), but does not explicitly state during what timeframe it refers to. The IPS consists of nine items (2, 6, and 9 are reversely scored) and examines irrational delay, e.g., “My life would be better if I did some activities or tasks earlier” (item 3). The IPS is also scored on a five-point Likert-scale, 1 (“Very seldom/Not true of me”) to 5 (“Very often true/True of me”), and similarly, does not include a timeframe. The PPS was translated from English to Korean and then back-translated to ensure that the meaning and essence of the items were retained. A few minor changes were proposed during this process. With regard to the IPS, a Korean translation already existed and was thus used for the current study (Hyunjiin, 2015).

For validation purposes, several other instruments were also administered. Perfectionism was examined using the Clinical Perfectionism Questionnaire (CPQ; Fairburn et al., 2003), with 12 items measuring the clinical aspects of perfectionism, e.g., “Have you pushed yourself really hard to meet your goals?” (item 1). The CPQ is scored on a four-point Likert-scale, 1 (”Not at all”) to 4 (“All of the time”), and has two reversed items (items 2 and 8), and a timeframe of one month. Anxiety was assessed with the Generalized Anxiety Disorder—7 Items (GAD-7; Spitzer et al., 2006), which is frequently used as a screening tool for anxiety disorders, e.g., “Not being able to stop or control worrying” (item 2). The GAD-7 is scored on a four-point Likert-scale, 0 (“Not at all”) to 3 (“Nearly every day”), and uses a timeframe of two weeks. Depression was determined using the Patient Health Questionnaire—9 Items (PHQ-9; Kroenke et al., 2001), often applied as a screening tool for depression, e.g., “Little interest or pleasure in doing things” (item 1). The PHQ-9 is scored on a four-point Likert-scale, 0 (“Not at all”) to 3 (“Nearly every day”), with a timeframe of two weeks. Self-efficacy was explored with the General Self-Efficacy Scale (GSE; Schwarzer & Jerusalem, 1995), which is comprised of 10 items measuring the global construct of self-efficacy, e.g., “When I am confronted with a problem, I can usually find several solutions” (item 8). The GSE is scored on a four-point Likert-scale, 1 (“Not at all true”) to 4 (“Exactly true”), however, it does not utilize a predefined timeframe. Quality of life was assessed using the Brunnsviken Brief Quality of Life Scale (BBQ; Lindner et al., 2016), which includes 12 items that explore the quality of life in six domains, e.g., leisure and learning—“I am satisfied with my leisure time; I have the opportunity to do what I want in order to relax and enjoy myself”—as well as the subjective level of importance of that domain, e.g., “My leisure time is important to me.” The BBQ is scored on a five-point scale, 0 (“Do not agree at all”) to 4 (“Strongly agree”), but it does not utilize a predetermined timeframe. Each domain in the BBQ is then multiplied by the level of importance before being summed to a total score. For the internal consistencies of each instrument in the current study, see Table 7. Both GAD-7 (Ahn et al., 2019) and PHQ-9 (Park et al., 2010) were available in Korean, but the CPQ and the BBQ underwent the same process of translation and back-translation for the purpose of the current study.

2.3. Procedure
Given the nature of the research of the current study, ethics approval was not deemed required by the ethics committee at the Seoul Cyber University. However, all participants provided informed consent, agreeing to submit their responses anonymously and that data could be presented on a group level-basis. When invited, participants followed a weblink to an online survey conducted using Google Forms, where the demographics and items were completed. For those in the community sample agreeing to fill out a second round of the PPS and the IPS, another email was sent out two weeks later.

2.4. Data analysis
All analyses were performed on jamovi version 1.0.8.0 (The jamovi project, 2019). Independent samples t-tests were used to detect potential differences between the student and community samples. Confirmatory factor analyses were conducted to test a priori models of the PPS and the
IPS found in the literature. Model fit was inspected using the likelihood-ratio $\chi^2$-test ($p < .05$), the Tucker-Lewis Index (TLI; $\geq .95$), the Comparative Fit Index (CFI; $\geq .95$), and the Root Mean Square Error of Approximation (RMSEA; $\leq .06$), goodness-of-fit indices are presented within parentheses (Hu & Bentler, 1999). Using the best fitting solutions, internal consistencies were explored, i.e., Cronbach’s $\alpha$, while both convergent and discriminant validity were assessed using the correlations between the PPS, the IPS, and all of the other instruments administered in the current study. In addition, test-retest reliabilities were examined using the correlations between two measurement points, i.e., two weeks apart.

3. Results

3.1. Descriptive statistics

Descriptive statistics for the instruments can be found in Table 2. Independent samples t-tests did not reveal a difference between the samples on any of the variables. On average, participants scored in the mid-range of procrastination. This was also the case for perfectionism. In addition, participants were just below the cutoff (5) for anxiety and worry on the GAD-7 and just above the cutoff (5) used for further screening of depression on the PHQ-9. In terms of self-efficacy, the scores were almost in the top quartile. Participants rated their quality of life to be in the mid-range. Thus, the scores revealed only mild levels of psychiatric symptomatology, and relatively high self-efficacy and quality of life, suggesting that the participants are representative of the general population.

3.2. Confirmatory factor analysis

For the confirmatory factor analyses, both samples were merged into one dataset as there were no differences between them in terms of their scores. Five a priori models of the PPS were obtained from the literature and used in the confirmatory factor analyses. These included two separate one-factor structures, two separate two-factor structures, and, lastly, one single three-factor structure (see Table 3). Overall, the three-factor structure proposed by Svartdal and Steel (2017) exhibited an adequate fit (within parentheses are the factor labels in their original study), but only one of three goodness-of-fit indices were fulfilled. Factor 1 is composed of items 1–3 (decisional procrastination), factor 2 consists of items 4–8 (implemental procrastination), and factor 3 involves items 9–12 (timeliness and promptness).

However, it should be noted that a similar fit was found for the one-factor structure put forward by Svartdal et al. (2016), and reflects the best fitting solution in the current study. In this case, the factor consists of only items 4–8, i.e., implemental procrastination. Table 4 contains the factor loadings for each item.

| Table 2. Descriptive statistics |
|---------------------------------|
| Scale | Range in scores | Student sample ($n = 299$) | Community sample ($n = 252$) | Full sample ($n = 551$) |
|-------|-----------------|--------------------------|----------------------------|-----------------------|
| PPS   | 12–60           | 28.0 (9.1)               | 29.0 (9.1)                  | 28.3 (9.1)            |
| IPS   | 9–45            | 23.4 (5.8)               | 23.9 (6.1)                  | 23.6 (5.9)            |
| CPQ   | 12–48           | 26.3 (4.9)               | 25.5 (5.0)                  | 25.9 (5.0)            |
| GAD-7 | 0–21            | 4.6 (4.7)                | 4.6 (4.8)                   | 4.6 (4.8)             |
| PHQ-9 | 0–27            | 5.6 (5.4)                | 5.1 (5.0)                   | 5.4 (5.3)             |
| GSE   | 1–40            | 28.5 (3.8)               | 28.3 (4.0)                  | 28.4 (3.9)            |
| BBQ   | 0–96            | 53.3 (16.7)              | 54.0 (17.6)                 | 53.6 (17.1)           |

PPS = Pure Procrastination Scale; IPS = Irrational Procrastination Scale; CPQ = Clinical Perfectionism Questionnaire; GAD-7 = Generalized Anxiety Disorder—7 Items; PHQ-9 = Patient Health Questionnaire—9 Items; GSE = General Self-efficacy Scale; BBQ = Brunsviken Brief Quality of Life Scale.
Table 3. Goodness-of-fit indices based on a priori-models of the Pure Procrastination Scale (n = 551)

| Model | χ²   | df | TLI | CFI | RMSEA | 95% CI |
|-------|------|----|-----|-----|-------|--------|
| One-factor structure | | | | | | |
| Steel (2010) | 558* | 54 | .85 | .88 | .13 | .12, .14 |
| Svardal et al. (2016)* | 21* | 5 | .98 | .99 | .08 | .04, .11 |
| Two-factor structure | | | | | | |
| Rebetez et al. (2014) | 343* | 43 | .90 | .92 | .11 | .10, .12 |
| Rozental et al. (2014) | 495* | 53 | .87 | .90 | .12 | .11, .13 |
| Three-factor structure | | | | | | |
| Svardal et al. (2016) and Svardal and Steel (2017)* | 281* | 51 | .93 | .95 | .08 | .08, .10 |

TLI = Tucker-Lewis Index; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; df = Degrees of Freedom; CI = Confidence Interval.

*p < .05.

*A one-factor structure composed of only the implemental part of the Pure Procrastination Scale (items 4–8).

*Same three-factor structure in both studies.

Bold model reflects the best fitting solution in the current study.

Table 4. Factor loadings for each item for the best fitting solution of the Pure Procrastination Scale, i.e., Svardal et al. (2016) (n = 551)

| Items | Factor 1 |
|-------|-----------|
| 4. In preparation for some deadlines, I often waste time by doing other things | .87* |
| 5. Even jobs that require little else except sitting down and doing them, I find that they seldom get done for days | .86* |
| 6. I often find myself performing tasks that I had intended to do days before | .89* |
| 7. I am continually saying “I’ll do it tomorrow” | .79* |
| 8. I generally delay before starting on work I have to do | .77* |

*p < .05.

In terms of the IPS, four different a priori models were found and used in four confirmatory factor analyses (see Table 5). These included two separate one-factor structures, i.e., with/without the reversed items (2, 6, and 9), and two separate two-factor structures. None of the models were able to fulfill all the goodness-of-fit indices, although a one-factor structure without the reversed items met two of three and therefore seems to exhibit a better fit than one with these items included. Table 6 contains the factor loadings for each item, and it should be noted that two of them might be problematic, item 3 (.22) and 5 (.47).

3.3. Convergent and discriminant validity

Using the best fitting solutions, the PPS (only the implemental part) and the IPS (without the reversed items) were correlated with all the instruments to explore the relationships with different constructs (see Table 7). Overall, there was a strong correlation between the two procrastination scales. Also, both had small positive correlations with perfectionism, moderate positive correlations with anxiety and depression, and moderate negative correlations with self-efficacy and quality of life.
Table 5. Goodness-of-fit indices based on a priori models of the Irrational Procrastination Scale (n = 551)

| Model Type | χ² | df | TLI | CFI | RMSEA | 95% CI |
|------------|----|----|-----|-----|-------|--------|
| One-factor structure | Steel (2010) and Svartdal et al. (2016) | 128* | 27 | .94 | .95 | .08 | .07, .10 |
| | Without the reversed items | 54* | 9 | .95 | .97 | .10 | .07, .12 |
| Two-factor structure | Prayitno et al. (2013) | 115* | 25 | .94 | .96 | .08 | .07, .10 |
| | Rozental et al. (2014) | 107* | 25 | .94 | .96 | .07 | .06, .09 |

TLI = Tucker-Lewis Index; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; df = Degrees of Freedom; CI = Confidence Interval.

*p < .05.

Same one-factor structure in both studies.

Two-factor structure with the three reversed items loading only on factor 2.

Bold model reflects the best fitting solution in the current study.

Table 6. Factor loadings for each item for the best fitting solution of the Irrational Procrastination Scale, i.e., without the reversed items (n = 551)

| Items | Factor 1 |
|-------|----------|
| 1. I put things off so long that my well-being or efficiency unnecessarily suffers | .84* |
| 2. My life would be better if I did some activities or tasks earlier | .22* |
| 3. When I should be doing one thing, I will do another | .72* |
| 4. At the end of the day, I know I could have spent the time better | .47* |
| 5. I delay tasks beyond what is reasonable | .87* |
| 6. I procrastinate | .84* |

*p < .05.

Table 7. Correlations between instruments (n = 551)

| PPS | IPS | CPQ | GAD-7 | PHQ-9 | GSE | BBQ | M | SD | α |
|-----|-----|-----|-------|-------|-----|-----|----|----|----|
| PPS | -   | -   | -     | -     | -   | -   | -  | -  | -  |
| IPS | .84*| -   | -     | -     | -   | -   | 28.3 | 9.1 | .93* |
| CPQ | .09*| .10*| -     | -     | -   | -   | 23.6 | 5.9 | .85* |
| GAD-7| .37*| .36*| .41*  | -     | -   | -   | 25.9 | 5.0 | .74  |
| PHQ-9| .38*| .37*| .33*  | .75*  | -   | -   | 4.6  | 4.8 | .93  |
| GSE | -.38*| -.34*| -.01  | -.35* | -.42*| -   | 5.4  | 5.3 | .88  |
| BBQ | -.32*| -.34*| -.07  | -.36* | -.41*| .51*| 28.4 | 3.9 | .87  |

PPS = Pure Procrastination Scale; IPS = Irrational Procrastination Scale; CPQ = Clinical Perfectionism Questionnaire; GAD-7 = Generalized Anxiety Disorder—7 Items; PHQ-9 = Patient Health Questionnaire—9 Items; GSE = General Self-efficacy Scale; BBQ = Brunnsvikien Brief Quality of Life Scale.

*p < .05.

*The internal consistencies concerns the full versions of the one-factor solutions.

Models used for the PPS and the IPS reflect the best fitting solutions in the current study.
3.4. Internal consistency

Using data from the total sample of 551 participants, $\alpha = .93$ for the PPS (only the implemental part). Furthermore, $\alpha$ was comparable when only using data from the student sample or the community sample, .93 and .94, respectively. Removing any of the items did not improve the internal consistency. Similarly, $\alpha = .85$ for the IPS without the reversed items with similar estimates between samples, .84 and .86, respectively. In addition, there was only a minor improvement in internal consistency, .87, following the removal of item 3 (“My life would be better if I did some activities or tasks earlier”).

3.5. Test-retest reliability

In total, 214 participants (84.9%) responded to the scales a second time, two weeks following the first occasion, yielding a high test-retest reliability, $r = .88$ for the PPS (only the implemental part) and .83 for the IPS (without the reversed items).

4. Discussion

The current study translated and validated a Korean version of one of the most frequently used procrastination scales, the PPS, while also reexamining a previous translation of the IPS, with the aim of promoting further research on the topic in an Asian context (Tables 8 and 9 provide an overview of the wording of the items in English and Korean). Overall, the results indicated that both can be used to assess the level of procrastination in a student and a community population. The scales exhibited good internal consistencies, $\alpha = .93$ (the PPS) and .85 (the IPS) for the best fitting solutions for the scales. Furthermore, the test-retest reliabilities were also high, $r = .88$ (the PPS) and .83 (the IPS). These estimates are better than those found by Rozental et al. (2014) for a Swedish translation of both scales with $\alpha = .78$ (the PPS) and .76 (the IPS) and with a median test-retest reliability (between two weeks in a 10-week treatment period) of .84. However, participants in their study were recruited as part of a clinical trial, which might have affected the temporal stability of their procrastination. The results are also in line with those of Rebetez et al. (2014) for a French translation of the PPS, with $\alpha = .89$, and $r = .87$ (one week), and those of Guiler et al. (2018) for a Spanish version of the IPS, $\alpha = .90$ and an intraclass correlation coefficient (between two weeks and two months) of .84. Similar findings can also be found elsewhere in the literature for both instruments (c.f., Svartdal et al., 2016; Svartdal & Steel, 2017).

| Table 8. The Pure Procrastination Scale in English and Korean |
|-------------------------------------------------------------|
| **English**                                                 | **Korean**                               |
| 1. I delay making decisions until it’s too late             | 나는 너무 늦을 때까지 결정을 미룬다.         |
| 2. Even after I make a decision I delay acting upon it       | 심지어 결정을 내린 후에도 나는 그것을 행동으로 옮기 는 것을 미룬다. |
| 3. I waste a lot of time on trivial matters before getting to the final decisions | 나는 몇 가지 일의 마감일을 앞두고 종종 다른 것을 하느라 시간을 허비한다. |
| 4. In preparation for some deadlines, I often waste time by doing other things | 나는 여러 가지 일의 마감일을 앞두고 종종 다른 것을 하느라 시간을 허비한다. |
| 5. Even jobs that require little else except sitting down and doing them, I find that they seldom get done for days | 나는 그것이 아니서 진행하면 되는 그런 일들도 마칠 동안 즐처럼 끝내지 못하곤 한다. |
| 6. I often find myself performing tasks that I intended to do before                                 | 나는 종종 마칠 전에 하고자 했던 일을 지급해서야 하는 나 자신을 발견하고 한다. |
| 7. I am continually saying “I’ll do it tomorrow”                                        | 나는 계속 “그 일을 내일 해서 되지”라는 말을 한다. |
| 8. I generally delay before starting on work I have to do                                       | 나는 내가 해야만 하는 일을 시작할 때까지 앞으로 미룬다. |
| 9. I find myself running out of time                                                                     | 나는 결국 시간이 부족하다는 것을 깨닫게 된다. |
| 10. I don’t get things done on time                                                                        | 나는 일들을 제때에 마치지 못한다. |
| 11. I am not very good at meeting deadlines                                                                   | 나는 마감일을 지키는 것을 잘 못한다. |
| 12. Putting things off till the last minute has cost me money in the past                                         | 나는 과거에 마지막까지 일을 미루는 바람에 급한적 손 해를 본 적이 있다. |
For convergent and discriminant validity, the PPS and the IPS were highly correlated with each other with $r$ of .84, which is expected given that both measure the same underlying construct, i.e., procrastination (Steel, 2010). Furthermore, the relationships between both scales and the other instruments revealed comparable albeit moderate correlations ranging from −.32 to .38. All the associations were also in the assumed directions, i.e., positive correlations with anxiety and depression, negative correlations with self-efficacy and quality of life. This is similar to what was found by Rozental et al. (2014) with regard to the GAD-7 (42 and .37), the Montgomery Åsberg Depression Rating Scale (Svanborg & Åsberg, 2001) (.35 and 33), and the Quality of Life Inventory (Frisch et al., 1992) (−.32 and −.25). Corresponding relationships between the PPS and the Satisfaction with Life Scale (Diener et al., 1985) have also been found, $r = −.23$ to −.32 (Guillera et al., 2018; Rebetez et al., 2014). Two meta-analyses have also corroborated these results, mean correlations for anxiety $r = .22$, and depression $r = .28$–.30 (Steel, 2007; Van Eerde, 2003), although, in these cases, other instruments were used to determine procrastination. Similarly, there is evidence that procrastination is associated with lower levels of self-efficacy, mean correlations $r = −.38$ (Steel, 2007). Hence, the findings from the current study are in line with previous research, lending further support to the notion of procrastination being positively correlated with psychiatric symptomatology and negatively correlated with aspects related to quality of life and to being able to pursue personally relevant goals (Rozental & Carlbring, 2014).

| English                                                                 | Korean                                                                 |
|------------------------------------------------------------------------|------------------------------------------------------------------------|
| 1. I put things off so long that my well-being or efficiency unnecessarily suffers | 나는 모든 일을 너무 미루어서 불필요하게 마음이 힘들어지거나 일의 효율을 훼손해뜨리곤 한다. |
| 2. If there is something I should do, I get to it before attending to lesser tasks (R) | 나는 해야 할 일이 생기면 그보다 덜 중요한 일에 마음을 빼앗기기 전에 바로 그 일에 착수하는 편이다. |
| 3. My life would be better if I did some activities or tasks earlier | 주어진 일이나 과제를 미루지 않고 좀 더 빨리한다면 내 삶은 더 낙관적 것이다. |
| 4. When I should be doing one thing, I will do another | 나는 어떤 일을 꺼내 해야만 하는데도 그 일이 아닌 다른 일을 먼저 하라고 한다. |
| 5. At the end of the day, I know I could have spent the time better | 하루를 마칠 때면 나는 시간을 좀 더 잘 보냈어야 했다고 생각하곤 한다. |
| 6. I spend my time wisely (R) | 나는 시간을 현명하게 사용한다. |
| 7. I delay tasks beyond what is reasonable | 나는 주어진 일을 필요 이상으로 미룬다. |
| 8. I procrastinate | 나는 일을 늦 미룬다. |
| 9. I do everything when I believe it needs to be done (R) | 나는 해야 할 필요가 있다고 생각하는 것은 제때 해치운다. |

There were however only small correlations for both the PPS and the IPS with perfectionism, $r = .09$ and .10, respectively, which contradicts recent research on the relationship between the two constructs (Siros et al., 2017). This could be due to the fact that the latter actually consists of two so-called higher-order dimensions (Bieling et al., 2004): perfectionistic strivings, e.g., imposing self-oriented standards, and perfectionistic concerns, e.g., experiencing negative evaluations by others. According to a meta-analysis by Siros et al. (2017), only the dimension of perfectionistic concerns is positively related to procrastination (.23), while the dimension of perfectionistic strivings actually exhibits a negative relationship (−.22). However, an instrument such as the CPQ assesses both, which may explain the small correlations found during the current study.

With regard to the factorial structure of the scales, several confirmatory factor analyses were performed using a priori models obtained from the literature. For the PPS, a three-factor solution exhibited an adequate fit. This is in line with the previous findings presented by Svartdal and Steel (2017): decisional procrastination (items 1–3), implemental procrastination (items 4–8), and timeliness and promptness (items 9–12). Furthermore, this fits well with the original concept of the scale.
put forward by Steel (2010). However, it should be noted that it only fulfilled one goodness-of-fit index. Also, a one-factor structure that only includes items 4–8 had a similar fit, which matches the results of Svartdal et al. (2016). In that study, data taken from six different countries were able to demonstrate that the factor implemental procrastination captures “procrastination as well as the complete PPS” (Svartdal et al., 2016, p. 7), indicating that a shorter and more condensed version of the instrument could be just as useful as the full scale. Hence, in relation to the current study, it might be argued that a one-factor solution actually displays a better fit. Moreover, these five items performed in a similar manner across populations, which was not the case for the factor timeliness and promptness. Thus, it is plausible that this latter part of the PPS is more susceptible to cultural differences, such as norms for meeting deadlines and punctuality, warranting some caution when conducting research in different contexts.

In terms of the IPS, the best fitting model was a one-factor structure removing the reversed items (2, 6, and 9). This is in line with prior studies on the scale (Steel, 2010; Svartdal et al., 2016), suggesting it has a unifactorial construct. This is also confirmed by, Rozental et al. (2014), who found that only the reversely scored items loaded on a second factor, i.e., a statistical artefact (Schmitt & Stuits, 1985). Hence, evidence from multiple sources points to a one-factor structure of the IPS and to the fact that the removal of the reversed items could be considered in the future. However, two items demonstrated much smaller factor loadings (items 3 and 5), which was most notable for item 3. It is unclear why this is the case, especially considering the fact that prior research has found higher estimates (.68 and .64) (Rozental et al., 2014), thus warranting further research into whether cultural issues could have created this difference.

In sum, the results from the current study suggest that the Korean translation of the PPS could provide researchers and clinicians with a scale for assessing procrastination that is relatively reliable and valid, with a similar finding being made for the IPS in reexamining a previously translated version. However, a number of limitations should be taken into account when reviewing the results. First, none of the tested a priori models fitted data particularly well, as not all goodness-of-fit indices were met. For the PPS and the IPS, one-factor solutions seem to demonstrate better fits, but further research is warranted in order to refine the scales. This could involve a modern test theory approach, for example, Rasch analysis, that can explore item and person fit, as well as determine if items work similarly across demographics (Wright, 1996). Second, the lack of objective benchmarks in determining procrastination creates difficulties in establishing validity. In comparison with depression or anxiety disorder, which can be assessed using a clinical interview and diagnostic criteria, procrastination lacks a gold standard against which scales can be tested. Attempts at overcoming this problem have been proposed (Klingsieck, 2013), but have not yet been examined more systematically. Future research on the PPS and the IPS should therefore incorporate some type of benchmarking to properly evaluate their validity and perhaps also clinical cutoffs. In addition, the current study relied on two scales that originate from an evaluation by Steel (2010). Although they share theoretical concepts and the PPS is derived from a meta-analytic inquiry, including a separate instrument on procrastination could have been useful to establish convergent validity in the current study, e.g., the General Procrastination Scale (Lay, 1986). Third, despite recruiting participants from both a student and a community sample, the characteristics were relatively homogeneous. The majority was females in their 40s with a college degree, which could impact the scales’ generalizability. Addressing this issue will require additional data from much more heterogeneous populations, which should be performed in the future to examine measurement invariance and the extent to which it could influence responses among different groups (Meredith, 1993). Fourth, considerable effort was devoted to translating the items to ensure that the meaning and the essence of each were retained in Korean. Nevertheless, it is possible that cultural or translation issues affected this process and, in turn, how items were subsequently interpreted by the participants. No attempt at exploring this was made, e.g., cognitive interviews (Krosnick, 1999). Such an endeavor should be considered in future research of the scales as it could provide valuable insights not only in relation to the wording of the items but also into how procrastination itself is regarded. Fifth, an online survey was distributed to a student and a community sample to collect data. However, efforts to investigate the response rate
or potential differences between responders and non-responders were not made. This was not considered feasible given the circumstances surrounding the procedures used, but it could have been the case that some characteristics affected the responses, e.g., certain demographics or level of procrastination, which should thus be viewed as a limitation. Sixth, neither the PPS nor the IPS includes a timeframe during which procrastination is to be assessed. Hence, when responding to the items, participants are asked to rate a general feature of themselves. However, using such a global measure may create some problems when using the scales in a clinical setting because it affects the possibility of evaluating changes caused by the interventions being used. Future research should therefore investigate how well both can be applied clinically and whether a predefined timeframe should be included.

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The authors declare no competing interests.

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