

Effects of time perspective and self-control on procrastination and Internet addiction

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Background and aims: College students experiencing stress show tendencies to procrastinate and can develop Internet addiction problems. This study investigated the structural relationship between time perspective and self-control on procrastination and Internet addiction. **Methods:** College students ($N = 377$) residing in South Korea completed the following questionnaires: the Pathological Internet Use Behavior Symptom Scale for Adults, the Zimbardo Time Perspective Inventory, the Self-Control Rating Scale, and the Aitken Procrastination Inventory. The sample variance-covariance matrix was analyzed using AMOS 20.0. **Results:** Time perspective had a direct effect on self-control and an indirect effect on Internet use and procrastination. In addition, self-control affected procrastination and Internet use. **Conclusions:** Individuals with a present-oriented time perspective tend to evidence poorer self-control, increasing the likelihood of procrastination and Internet addiction. Individuals with a future-oriented time perspective, on the other hand, tend to have stronger self-control, decreasing their risk of procrastination and Internet addiction.

Keywords: time perspective, self-control, procrastination, Internet addiction

INTRODUCTION

Internet addiction is defined as a loss of control in Internet behavior use and has been found to lead to various problems and maladjustment in daily lives (Jeon, Hyun, & Chun, 2011; Young, 1996). Although the ease of access to a variety of information is an asset of Internet use, overuse can often lead to Internet addiction, causing negative impacts on an individual's personal, financial, and professional life (Young, 1996). Internet addiction is increasing among all age groups in South Korea. According to a national study by the Ministry of Science, ICT, and Future Planning (2014), the Internet addiction rate was found to be 6.9% among 3- to 59-year-olds, 11.6% among 20-year-olds, 12.5% among college students, and 12.5% among teenagers.

Considering the high prevalence and severity of Internet addiction problems, researchers have tried to identify contributing variables affecting Internet addiction. Based on research conducted over the past couple of decades, time perspective (e.g., Park, Kim, & Hyun, 2011) and problems with self-control (e.g., Gottfredson & Hirschi, 1990) have been found to be significantly related to Internet addiction.

Procrastination

Procrastination is the tendency to delay a task or avoid it in a way that has negative effects on the individual (Tuckman, 1991). For example, procrastination is associated with feelings of frustration, regret, despair, and even self-blame.

It has also been found to negatively affect academic accomplishments and social relationships (Burka & Yuen, 1983). Procrastination has also been found to be multidimensional, including many components. Among the most significant components are time-related factors, such as errors in time management and difficulties predicting time accurately (Milgram, 1991). Individuals who chronically procrastinate tend to underestimate how long a task will take to complete (Aitken, 1982), spend less time than required on tasks (Ferrari & Dovidio, 2000), and begin work closer to deadlines than those who do not tend to procrastinate (Lay & Burns, 1991).

Prior studies have considered procrastination a representative problematic behavior among college students and have noted that procrastination is caused by an emphasis on the present (as opposed to the future). The tendency to consider the present as overly important has been found to affect work and school performance (e.g., Brown & Jones, 2004; Lasane & Jones, 2000). Harber, Zimbardo, and Boyd (2003) reported that time perspective is an important predictor of adjustment in a society where an individual is evaluated based on his/her ability to accomplish a task within a given time period.

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Time perspectives

Time perspective refers to one's attitude toward the passage of time (Zimbardo & Boyd, 1999). An individual develops a time perspective with an emphasis on the future, present, and/or past by interacting with environmental elements formed by how one's subjective experience influences one's decisions and behaviors. Zimbardo and Boyd (1999) distinguished the time perspectives of the *past* (past-positive/past-negative), perspectives of the *present* (present hedonistic/present fatalistic), and perspectives of the *future* as a way to determine how time perspective impacts one's life.

The present time perspective has been found to be associated with problematic behaviors, including substance abuse (Apostolidis, Fieulaine, & Soulé, 2006; Fieulaine & Martinez, 2010; Wills, Sandy, & Yaeger, 2001), risky behaviors (Scott-Parker, Watson, & King, 2009), and suicide (Laghi, Baiocco, D'Alessio, & Gurrieri, 2009). Recent Internet addiction studies have shown that the time element is a crucial variable between time perspective and Internet addiction. A present-oriented time perspective increases the risk of Internet addiction in school-aged children, whereas a future-oriented time perspective decreases the risk of Internet addiction (Kim, 2011; Park et al., 2011).

There are a number of other positive benefits to a future-oriented time perspective. A future-oriented time perspective is closely related to positive results, such as academic achievement (Barber, Munz, Bagsby, & Grawitch, 2009) and life satisfaction (Zhang & Howell, 2011). Individuals with a primarily future-oriented time perspective have higher academic achievement, use effective learning strategies, use time more efficiently, and procrastinate less compared with individuals with a limited future-oriented time perspective (Harber et al., 2003).

Self-control

Self-control is the ability to control one's cognitions, emotions, and behaviors by both (a) delaying immediate gratification to obtain a better result in the future (Mischel & Mischel, 1983) and (b) adjusting to one's social and situational needs in the absence of an external enforcer (Kopp, 1982). High self-control has been found to be closely related to various positive outcomes, such as increased academic achievement, a lower probability of delinquency and crime, and more positive societal impact. Low self-control in individuals has also been found to lead to poorer academic impediment, and increased aggression, substance abuse, Internet addiction, among other maladaptive behaviors (Gottfredson & Hirschi, 1990; Tangney, Baumeister, & Boone, 2004). This is because individuals with low self-control are highly impulsive, respond immediately to their environmental stimuli, seek immediate gratification, and prefer simple tasks. In addition, they have been found to have a lack of diligence and perseverance, seek adventure, and are more prone to delinquency and crime due to a tendency toward dangerous situations (Gottfredson & Hirschi, 1990).

Specifically, self-control affects academic work, maladaptive behavior, negative emotional experiences, psychological obsession, and interpersonal relationship (Lee &

Ahn, 2002). Studies on procrastination have noted that the lack of self-control results in procrastination (Tuckman, 1998; Vohs & Heatherton, 2000). Students with high self-control are well aware of the learning procedure and are successful at balancing the speed of performing a task and time of completion by properly using strategies to adjust and control their learning behaviors. On the other hand, students with low self-control have difficulty with those procedures, resulting in procrastination (Bratslavsky & Baumeister, 1998; Vohs & Heatherton, 2000).

Researchers have previously investigated the relationship between time perspective, self-control, procrastination, and Internet addiction. Those studies have shown a clear significant relationship among those variables. In addition, it appears there is an agreement that time perspective and self-control are dispositional constructs (Fieulaine & Martinez, 2010) and function as causes for procrastination and Internet addiction problems. However, to date, the study results have not been consistent regarding the causal relationships among those variables (e.g., Fieulaine & Martinez, 2010). While time perspective and self-control have been found to be correlated (e.g., Barber et al., 2009; Joireman, Balliet, Sprott, Spangenberg, & Schultz, 2008), Wills et al. (2001) stated that time perspective leads to greater self-control. It is clear that self-control affects problematic behaviors including Internet use and procrastination (e.g., Gottfredson & Hirschi, 1990; Tangney et al., 2004). Thus, we tested the effect of time perspective and self-control on procrastination and Internet addiction problem behaviors. Specifically, we developed and tested a model whereby time perspective affects self-control, resulting in procrastination and Internet addiction.

METHODS

Participants

A total of 400 college students residing in South Korea voluntarily participated in this study. Among the 400 participants, data of 23 participants were excluded prior to analysis due to missing responses. Thus, data of 377 participants were analyzed and included in this study. The average age of the sample was 21.99 years ($SD = 3.49$); 34.7% ($n = 131$) were males and 65.3% ($n = 246$) were females. Participants reported that the places they used the Internet were the following: their bedroom (72.9%), living room (9.8%), and other places (9%). The number of days participants used the Internet per week was reported as follows: 6–7 days (53.6%), 4–5 days (22.3%), and 2–3 days (16.7%). In addition, the average length of time participants used the Internet per day was reported as follows: 2 hr (28.1%), 1 hr (18.3%), and 3 hr (17.2%).

Measures

Pathological Internet Use Behavior Symptom Scale for Adults. Based on the cognitive model of pathological Internet use by Davis (2001), Lee, Choi, Lee, Ban, and Lee (2007) developed this scale to measure pathological Internet use. This scale consists of 20 items, rated from "not at all" (1)

to “very likely” (4) on a Likert scale, with a total score of 20–100. Higher scores indicate a stronger tendency for Internet addiction and pathological Internet use. This scale includes statements such as “I become restless or irritable when I am required to reduce my time online” and “I often use the Internet as a way to escape my problems or to change my mood.” In this study, the Cronbach’s α score of this scale was .93.

The Zimbardo Time Perspective Inventory (ZTPI). This scale was originally developed by Zimbardo and Boyd (1999). Yune and Kim (2012) translated this scale into Korean and found support for its reliability and validity. While this scale originally had 56 items consisting of five subscales (past positive, past negative, present fatalistic, present hedonistic, and future-oriented), this study only used the statements pertaining to present- and future-oriented time perspectives (47 items). The sample items include: “Fate determines much in my life,” “If things do not get done on time, I don’t worry about it,” and “Ideally, I would live each day as if it were my last.” Each item is rated on a Likert scale ranging from “very unlikely” (1) to “very likely” (5), with a total score of 37–235 points. In this study, the reliability coefficient was .73 for the present-oriented time perspective scale scores and .76 for the future-oriented time perspective scale scores.

Self-Control Rating Scale. Tangney et al. (2004) originally developed this scale. Hong, Kim, Kim, and Kim (2012) translated it into Korean and found support for its reliability and validity. This scale consists of 36 items, with each item rated on a Likert scale ranging from “not at all” (1) to “very likely” (5). The potential total score ranges from 36 to 180. Sample items include: “I have a hard time breaking bad habits,” “I get distracted easily,” and “I refuse things that are bad for me, even if they are fun.” In this study, the Cronbach’s α score of this scale was .83.

Aitken Procrastination Inventory. Originally developed by Aitken (1982) to measure procrastination in college students, Park (1998) translated it into Korean and found support for its reliability and validity. This inventory consists of 19 items, with each item rated on a Likert scale ranging from “not at all” (1) to “very likely” (5). The potential total score ranges from 19 to 95. A higher score

indicates more frequent procrastination behavior when working on academic activities. Sample items include: “I delay starting things until the last minute” and “Even when I know a job needs to be done, I never want to start it straight away.” In this study, the Cronbach’s α score of this scale was .75.

Procedures

Participants were given a packet of questionnaires that included questions regarding demographics, Internet addiction, time perspective, self-control, and procrastination. No direct compensation was provided for study participation.

Analysis

We developed a study model to analyze the direct and indirect effects of time perspective, self-control, and procrastination on Internet addiction among college students. Figure 1 is a statistical model derived from Figure 2. Each theoretical variable in the model is estimated as a mathematically measurable latent variable using the index variables.

A desirable model fit index should not be sensitive to sample size (Hu & Bentler, 1999), factor in model complexity, and should have clear evaluation criteria (Kim, Kim, & Hong, 2009). We thus used the following criteria to evaluate model fit: goodness-of-fit index, Tucker–Lewis index, root mean square error of approximation, and comparative fit index. The direct effects among variables in the model were tested at a statistical significance level of .05, and the indirect effects were tested at a significance level of .05 following the bootstrapping process in AMOS 20.0.

Multivariate normality for the 11 observed variables in the structural equation model was tested using AMOS 20.0 to determine the estimation method for the statistical model. Both univariate skewness (absolute value ≤ 3.0) and kurtosis (absolute value ≤ 10.0) met the criteria of normality (see Table 1). In addition, the hypothesis of multivariate normality was met. Therefore, we used the maximum likelihood estimation (MLE) method to estimate the model fit and parameters.

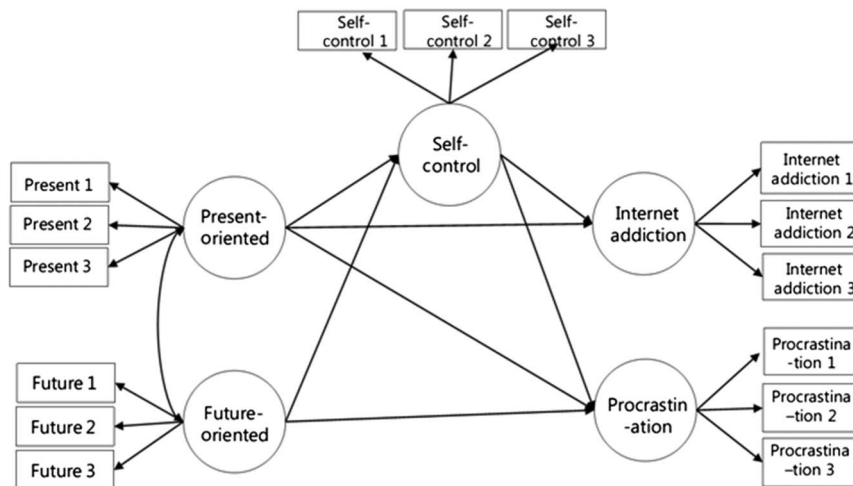


Figure 1. Originally hypothesized structural model

RESULTS

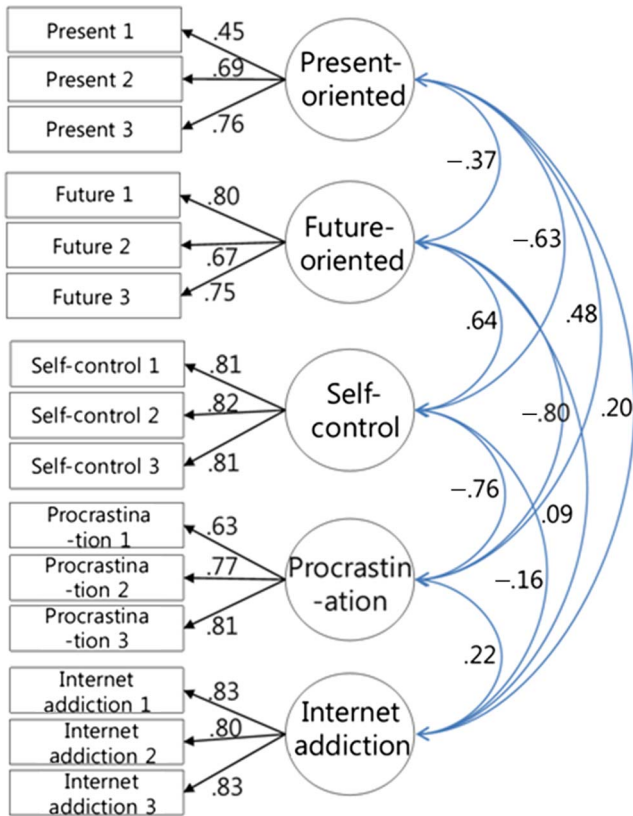


Figure 2. Measurement model with parameter estimates

Ethics

The Institutional Review Board at Chung-Ang University approved this study and all participants consented to attend the study after being informed about purpose and procedures of the study.

Model fit: The measurement model

Before testing for our structural model using structural equation modeling, we examined the fit of the measurement model. We used the MLE method and a two-step confirmation procedure for evaluating model fit (Kline, 2011; Moon, 2009). As shown in Table 2, the evaluation of the model fit indices showed that all indices, including the RMSEA of the measurement model, were acceptable.

The relationship between each latent variable was tested. The results showed that the factor loading and the standardized regression coefficient values for the index variables for all latent variable loadings were .46–.84. The correlations among the latent variables were .9–.80. Since the correlation between Internet addiction and future orientation was not significant ($r = .09$, ns), we excluded this path from subsequent analyses (see Figure 2).

Model fit and parameter estimates: The originally posited structural model

Because the measurement model was associated with good fit and the estimate of the structural regression model was theoretically verified, fit for the structural model was estimated using the MLE method. The results showed that all model fit indices, including the RMSEA, met the criteria (see Table 3). As shown in Table 4, the path coefficients of the structural model for *present-oriented* → *procrastination* ($\beta = .046$, ns), *present-oriented* → *Internet addiction* ($\beta = .186$, ns), *self-control* → *Internet addiction* ($\beta = -.046$, ns) pathways were statistically non-significant. Based on these results, we deleted the non-significant paths and created a more parsimonious revised model. Following this revision of the model, the *self-control* → *Internet addiction*

Table 1. Correlation matrix, means, standard deviations, skewness, and kurtosis for the observed variables

Variables	1	2	3	4	5
1. PTP	–				
2. FTP	–.340*	–			
3. Self-control	–.579*	.524*	–		
4. Internet addiction	.232*	.067	–.141*	–	
5. Procrastination	.403*	–.632*	–.638*	.163*	–
Mean	72.45	42.47	114.04	48.39	53.70
SD	8.35	6.20	13.36	14.19	7.80
Skewness	.158	–.389	.031	.070	.288
Kurtosis	.139	1.031	.374	–.634	.875

Note. PTP: present time perspective; FTP: future time perspective. * $p < .05$.

Table 2. Model fit indices for the measurement model

Model	χ^2	df	GFI	TLI	CFI	RMSEA
Measurement model	170.459	80	.947	.952	.963	.055 (95% CI: .043–.066)

Note. df: degrees of freedom; GFI: goodness-of-fit index; TLI: Tucker–Lewis index; CFI: comparative fit index; RMSEA: root mean square error of approximation.

Table 3. Model fit indices for the study model

Model	χ^2	df	GFI	TLI	CFI	RMSEA
Study model	201.769	82	.937	.938	.951	.062 (95% CI: .052–.073)

Note. df: degrees of freedom; GFI: goodness-of-fit index; TLI: Tucker–Lewis index; CFI: comparative fit index; RMSEA: root mean square error of approximation.

Table 4. Parameter estimates of original study model

Variance	B	SE	CR	p	β
PTP → Self-control	-1.123	.164	-6.849	<.001	-.460
FTP → Self-control	1.522	.208	7.322	<.001	.468
PTP → Procrastination	.069	.103	.673	.501	.046
PTP → Internet addiction	.660	.334	1.976	.050	.186
FTP → Procrastination	-1.035	.147	-7.023	<.001	-.522
Self-control → Procrastination	-.246	.052	-4.745	<.001	-.403
Self-control → Internet addiction	-.067	.125	-.538	.591	-.046

Note. PTP: present time perspective; FTP: future time perspective; SE: standard error; CR: critical ratio.

pathway became significant (after deleting the *present-oriented* → *procrastination* and *present-oriented* → *Internet addiction* pathways).

Model fit and parameter estimates: The revised structural model

The revised model eliminated the *present-oriented* → *procrastination* and *present-oriented* → *Internet addiction* pathways, previously found to be insignificant. This revised model evidenced the strongest goodness of fit. Also, as seen

in Table 5, the revised model was associated with good model fit based on all indices and the parsimony criterion. We thus chose the revised model as the final model to test the hypothesized direct and indirect effects.

Direct and indirect effects

The revised model fit the data well and was used to estimate the parameters (see Figure 3). After estimating each of the direct and indirect effects in the revised model, statistical significance was tested (see Table 6). As shown in Table 7,

Table 5. Model fit indices for the revised model

Model	χ^2	df	GFI	TLI	CFI	RMSEA
Revised model	205.374	84	.936	.938	.951	.062 (95% CI: .051–.073)

Note. df: degrees of freedom; GFI: goodness-of-fit index; TLI: Tucker–Lewis index; CFI: comparative fit index; RMSEA: root mean square error of approximation.

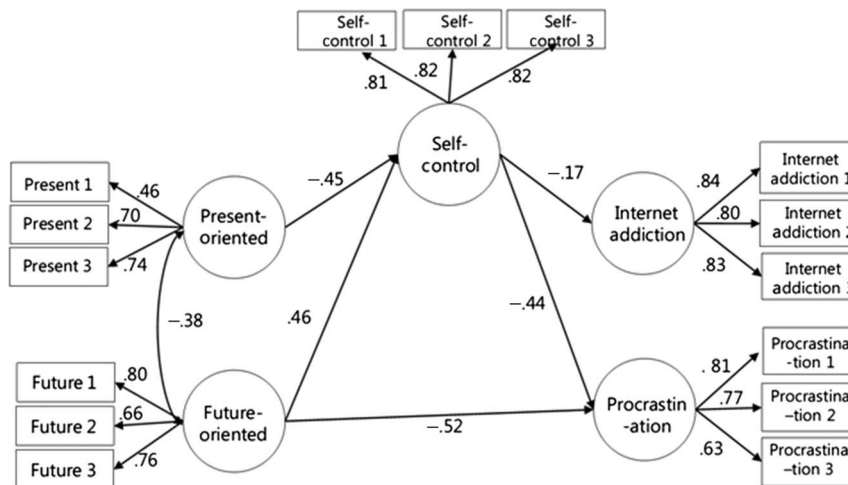


Figure 3. Revised structural model with parameter estimates

Table 6. Direct effects, indirect effects, and total effects of the final model

Effect	Path	β	<i>p</i>	95% Confidence interval	
				Bootstrap percentile	Bootstrap with bias-corrected
Direct	PTP → Self-control	-.455	.003	(-.560, -.301)	(-.567, -.313)
	FTP → Self-control	.459	.006	(.385, .647)	(.376, .640)
	FTP → Procrastination	-.516	.007	(-.838, -.463)	(-.823, -.432)
	Self-control → Procrastination	-.441	.008	(-.493, -.112)	(-.512, -.152)
	Self-control → Internet addiction	-.175	.005	(-.291, -.059)	(-.288, -.056)
Indirect	PTP → Procrastination	.201	.013	(.046, .238)	(.051, .242)
	PTP → Internet addiction	.079	.004	(.026, .142)	(.027, .144)
	FTP → Procrastination	-.203	.013	(-.270, -.068)	(-.289, -.085)

Note. PTP: present time perspective; FTP: future time perspective.

Table 7. Parameter estimates of final model

Variance	<i>B</i>	SE	CR	<i>p</i>	β
PTP → Self-control	-1.077	.160	-6.721	<.001	-.455
FTP → Self-control	1.494	.209	7.162	<.001	.459
FTP → Procrastination	-1.023	.145	-7.059	<.001	-.516
Self-control → Internet addiction	-.253	.086	-2.948	.003	-.175
Self-control → Procrastination	-.269	.040	-6.735	<.001	-.441

Note. PTP: present time perspective; FTP: future time perspective; SE: standard error; CR: critical ratio.

all path coefficients were significant. We also found that present orientation and future orientation directly affected self-control and self-control directly affected Internet addiction and procrastination. The relationship between present orientation and Internet addiction was significantly mediated by self-control. The relationship between future orientation and Internet addiction was significantly mediated by procrastination. In other words, present orientation and future orientation affect Internet addiction and procrastination via self-control. This is because high present orientation decreases self-control resulting in increased Internet addiction and procrastination. In addition, high future orientation increases self-control resulting in decreased Internet addiction and procrastination.

DISCUSSION

The aim of this study was to examine the relationship among time perspective, self-control, Internet use, and procrastination. To verify the pathways in which time perspective affects self-control, Internet addiction, and procrastination, we used a structural equation model by testing the effects of model fit and the path coefficients. As a result, it was found that time perspective affects self-control, resulting in procrastination and Internet addiction. The implications of the results are as follows.

Time perspective directly affected self-control and indirectly affected Internet use and procrastination. Related to previous findings, time perspective has not only been found to affect decision-making, but also emotions, cognition, and motivation (Carstensen, Isaacowitz, & Charles, 1999). Barkley’s (1997) self-regulation theory explains that the mechanisms underlying an individual’s problem-solving

skills are closely related to time perception. The process of predicting current situations and future outcomes helps develop thinking abilities and appropriate problem-solving mechanisms by choosing beneficial actions in the long run and considering alternate actions when processing relevant information. If time perspective is not developed, impulsive actions tend to occur, despite their harmful long-term consequences.

Individuals with a present-oriented time perspective have lower self-control, whereas those with a future-oriented time perspective have higher self-control (Barber et al., 2009; Wills et al., 2001). This study revealed the same results. The present-oriented time perspective had a negative effect on self-control, whereas the future-oriented time perspective had a positive effect. Thus, it is important to identify one’s time perspective, alleviate the present-oriented time perspective, and enhance the future-oriented time perspective to improve self-control.

Second, self-control directly affected procrastination and Internet addiction. Self-control had a significant effect on college students’ representative problematic behavior of Internet addiction and procrastination. Generally, individuals with low self-control have a higher chance of experiencing problematic behaviors than those with high self-control (Gottfredson & Hirschi, 1990; Tangney et al., 2004). This is because having high self-control tends to lead people to delay instant gratification for greater satisfaction in the future. On the other hand, those with poor self-control tend to seek out immediate reward and pleasure. The finding that self-control directly impacted problematic behaviors suggests that increasing self-control is essential for reducing problematic behaviors, such as Internet addiction and procrastination.

Third, time perspective affected Internet addiction behaviors, and this pathway was mediated by self-control.

Several time perspective studies indicated that the relationship between time perspective and problematic behaviors is indirect (Barber et al., 2009; Fieulaine & Martinez, 2010; Wills et al., 2001). In addition, time perspective produces strong self-control (Wills et al., 2001) and self-control affects academic work, maladaptive behavior, negative emotional experiences, psychological obsession, and interpersonal relationships (Lee & Ahn, 2002). These previous studies appear to support the current result that self-control functions as a mediator between time perspective and problematic behaviors.

We also found that individuals with the present-oriented time perspective were likely to have low self-control, which leads to a higher chance of Internet addiction. In contrast, those with the future-oriented time perspective were likely to have high self-control, and thus have a lower chance of experiencing procrastination. Due to discrepancies of relationships among these variables, previous studies emphasized the need for exploration of causation among them (e.g., Fieulaine & Martinez, 2010; Milfont & Schwarzenthal, 2014). Recent studies have focused on future-oriented time perspective and its impact on various mental health-related behaviors including substance use and eating disorders. Milfont and Schwarzenthal (2014) reported that self-control increases willingness for delayed gratification and improves the ability to focus on future goals which play an important role in contributing to future perspective.

Thus, our findings are meaningful as prior studies on time perspective have failed to fully describe the pathways leading to Internet addiction and procrastination. We confirmed the pathways leading to procrastination and Internet addiction considering time perspective and self-control. As self-control is a representative variable affecting procrastination and Internet addiction, and is also affected by time perspective, this study will be a useful reference for studies of Internet addiction and maladaptive problematic behaviors. In addition, the results will be helpful for developing an effective intervention program to treat procrastination and Internet addiction. It is important to effectively illustrate the diverse variables and pathways drawn by these variables, leading to maladaptive behaviors, to prevent Internet addiction and procrastination. The significant pathways found in this study indicate that it is important not only to increase self-control to reduce procrastination and Internet addiction but also to increase the overall quality of life by altering an individual's time perspective. Thus, the results of this study will be helpful for future prevention programs.

This study had several limitations. First, the sample was composed of non-clinical participants. Thus, Internet addiction and procrastination were not in the clinically elevated range overall. Future studies are needed to verify the effect of time perspective and self-control in the clinical samples with higher levels of Internet addiction and procrastination. In addition, this study only considered self-control as a factor affecting the relationships among time perspective, Internet addiction, and procrastination. Future studies need to consider additional factors affecting Internet addiction and procrastination, particularly given that other variables have been found to be associated with Internet addiction and procrastination. Additional systematic studies with more variables would make it possible to verify the effect of

time perspective on procrastination and Internet addiction in greater detail.

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Authors' contribution: JK, HH, and M-HH designed this study. JK and JL co-wrote the manuscript. HH performed the statistical analysis. M-HH supervised the study and supported the interpretation of results.

Conflict of interest: The authors declare no conflict of interest.

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