

# Risk and Protective Factors of Internet Addiction: A Meta-Analysis of Empirical Studies in Korea

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**Purpose:** A meta-analysis of empirical studies performed in Korea was conducted to systematically investigate the associations between the indices of Internet addiction (IA) and psychosocial variables. **Materials and Methods:** Systematic literature searches were carried out using the Korean Studies Information Service System, Research Information Sharing Service, Science Direct, Google Scholar, and references in review articles. The key words were Internet addiction, (Internet) game addiction, and pathological, problematic, and excessive Internet use. Only original research papers using Korean samples published from 1999 to 2012 and officially reviewed by peers were included for analysis. Ninety-five studies meeting the inclusion criteria were identified. **Results:** The magnitude of the overall effect size of the intrapersonal variables associated with internet addiction was significantly higher than that of interpersonal variables. Specifically, IA demonstrated a medium to strong association with “escape from self” and “self-identity” as self-related variables. “Attention problem”, “self-control”, and “emotional regulation” as control and regulation-relation variables; “addiction and absorption traits” as temperament variables; “anger” and “aggression” as emotion and mood and variables; “negative stress coping” as coping variables were also associated with comparably larger effect sizes. Contrary to our expectation, the magnitude of the correlations between relational ability and quality, parental relationships and family functionality, and IA were found to be small. The strength of the association between IA and the risk and protective factors was found to be higher in younger age groups. **Conclusion:** The findings highlight a need for closer examination of psychosocial factors, especially intrapersonal variables when assessing high-risk individuals and designing intervention strategies for both general IA and Internet game addiction.

**Key Words:** Internet addiction, meta-analysis, risk factors, protective factors, psychological variables

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## INTRODUCTION

The prevalence of Internet addiction in Korea is markedly high, ranging from 4.9% to 10.7%.<sup>1,2</sup> Within recent decades, Internet addiction has emerged as a serious public health issue in Korea. Thus, there is an urgent need to gain a comprehensive un-

derstanding of this phenomenon and to develop effective strategies for both prevention and intervention. Effective prevention and intervention requires a conceptual model that connects risk and protection factors, mediating processes, and maladaptive behaviors. To date, a number of risk and protective factors that contribute to the development and maintenance of Internet addiction have been identified. Despite a growing number of empirical investigations, theoretical models of Internet addiction have been slow to develop. Some attempts<sup>3-6</sup> have been made to explain Internet addiction by appealing to either intrapersonal or interpersonal perspectives: the intrapersonal perspective focuses on the individual's internal characteristics, such as temperament, self-esteem, negative emotions, etc.; while the interpersonal perspective emphasizes social support, peers, and parent-child relationships.<sup>7</sup> Davis,<sup>8</sup> one of the first proponents of theoretical models, assumed that maladaptive cognitions (e.g., rumination, self-doubt, and negative self-appraisal) play a central role in pathological Internet use. There has also been a focus on intrapersonal characteristics (e.g., vulnerability) as factors in Internet addiction. For example, several studies<sup>9-14</sup> have argued that people who experience low self-esteem or identity problems may become addicted to the Internet because they use it as a means to compensate for deficits in those areas. Some researchers have explored whether negative emotions such as depression,<sup>15-18</sup> anxiety,<sup>18</sup> loneliness,<sup>19-21</sup> and aggression/hostility<sup>22-24</sup> have a significant role in the development of Internet addictions. There is strong evidence that symptoms of depression are strongly associated with Internet addiction, and that individuals who have increased levels of depression are more susceptible to becoming addicted to the Internet.<sup>15-18</sup> In addition, several studies have reported positive associations between personality characteristics and temperament (e.g., introversion<sup>25</sup> and impulsivity/sensation seeking<sup>26-29</sup>) and Internet addiction. Control problems related to attention problem<sup>24,30</sup> and self-regulation<sup>31</sup> may be important variables as well.

By contrast, other researchers have explained Internet addiction in terms of interpersonal difficulties. From this perspective, the online space functions as a substitute for an unmet need for an actual relationship. In other words, the online space provides a rewarding sense of belonging, warmth, and well-being. Moreover, research has indicated that interpersonal problems such as social anxiety/shyness<sup>19,24,32</sup> and poor social competence<sup>23,32-34</sup> are positively correlated with Internet addiction. In fact, Internet addicts exhibit higher rates of

conflict with their parents,<sup>35</sup> report dysfunctional communication with their parents, and experience higher levels of familial conflict<sup>1,36</sup> than non-addicts. Thus, the interpersonal perspective highlights the roles of family dynamics, interpersonal factors, and developmental factors in the explanation of an adolescent's Internet addiction.

Although a number of studies have examined the features that make participants more vulnerable to developing an Internet addiction, these studies have not included a comprehensive list of the characteristics that could contribute to Internet addiction. In addition, not all of the potentially relevant psychosocial characteristics can be identified or incorporated into a single study. The establishment of a basic theoretical framework for the examination of the relative contributions of the psychosocial antecedent factors that predict Internet addiction requires an empirical synthesis of the literature. Thus, the present study aimed to document the relative strengths of the associations between Internet addiction and various psychosocial variables via meta-analytic techniques. In particular, given the high volume of research that has been conducted on this topic in Korea, it will be valuable to have more broad-based quantitative estimates of the effect sizes associated with the various possible risks and protective factors of Internet addiction. It may be particularly worthwhile to analyze the results of empirical studies that have been conducted in Korea and have not had exposure in international journals. The present study also addressed the extent that intrapersonal and interpersonal variables contribute to Internet addiction. In the field of substance abuse, researchers have already used an integrated framework that includes both of these variables to explain substance-use behaviors.<sup>37</sup> However, no attempt has been made to compare intrapersonal variables with interpersonal variables in Internet addiction. Thus, the present study aimed to investigate the magnitude of the effect sizes of intrapersonal and interpersonal variables therein.

The final purpose of this study was to examine the effects of a moderator on associations between psychosocial variables related to Internet addiction. With respect to psychosocial factors, there are several sources of variability: one example is related to the individual's age; research has not yet determined whether differences between psychosocial variables are related to age. However, there is some evidence that under similar levels of Internet usage (in terms of exposure, intensity, or duration), younger individuals may be more vulnerable to the negative consequences of Internet addiction than adults.<sup>29</sup> Furthermore, when individuals be-

gin to use Internet games at younger ages, they tend to show a higher rate of dependency on those games. Thus, in the current study, we examined whether there is a similar effect of age on the associations between psychosocial variables and Internet addiction.

Next, we examined whether the overall associations differ according to subtype of Internet addiction, specifically general Internet addiction versus Internet-game addiction. While Internet addiction is a broad concept that includes Internet chatting, shopping, and information searching, Internet-game addiction is associated with the compulsive playing of online games.<sup>38</sup> Internet-game addiction has received a relatively higher degree of media and academic attention than other types of Internet addiction because of the violent, destructive, and cruel content of many of the games and the increasing number of case reports of Internet-game copycat crimes in Korea. In addition, Internet addiction measures (including those for Internet-game addiction) are sometimes organized to suit a specific purpose or a specific population.<sup>39</sup> Therefore, it is both necessary and important to identify the distinctive factors that are associated with the Internet-game addiction subtype.

The primary aim of this meta-analysis is to evaluate the risk and protective factors associated with Internet addiction and to determine which of these factors are the most strongly correlated with Internet addiction in Korean subjects. Comparison between the intrapersonal and interpersonal variables on the magnitude of the effect size is also of major interest. The results of this analysis may promote better understanding of the characteristics of Internet addiction and may contribute to the development of effective treatment strategies. Second, potential moderators of the relationship between these psychosocial variables and Internet addiction are considered. Age was chosen as a sample-level moderator because of the implications for younger individuals and suggestions in the literature that there may be important differences in psychosocial factors related to age.<sup>40</sup> Finally, the subtype of addiction was chosen as a study-level moderator because there are different subtypes of Internet addiction. Differences in the strength of the associations according to age or the subtype of Internet addiction will have implications for understanding the age-specific (e.g., children versus adolescents versus adults) or medium-specific (e.g., general Internet addiction versus Internet-game addiction) correlates of Internet addiction. An increased understanding of these variables will enable interventions to be tailored to the needs of a specific population.

## MATERIALS AND METHODS

### Literature search

Two methods were used to locate studies for the meta-analysis. First, data from 1999 to 2012 were located by literature searches using the following databases: Korean Studies Information Service System, Research Information Sharing Service, Science Direct, and Google Scholar. The year 1999 was chosen as the starting year for the search because that is when active empirical inquiry into the psychological factors affecting Internet addiction first began. Although the clinical features of the behavioral problems related to Internet use have been described using diverse terminology (e.g., “Internet addiction,”<sup>741</sup> “pathological internet use,”<sup>742</sup> and “problematic Internet use”<sup>743</sup>), there is general acknowledgement among researchers that there are four components involved: 1) compulsive use, which often associated with a loss of a sense of time, or a neglect of basic drives; 2) withdrawal, which is indicated by anxiety-like symptoms, elevated irritability, anger and physical protestations, and depression when forced to discontinue or decrease Internet usage; 3) tolerance that necessitates the need for better equipment, more software, or more usage hours; and 4) negative repercussions, which includes arguments, lying, poor achievement, social isolation, and fatigue.<sup>43,44</sup> In this study, the terms “Internet addiction” and “pathological Internet use” are used interchangeably to denote the phenomena of compulsive Internet use, withdrawal, tolerance, and impaired social and psychological functioning. Therefore, the following key words were entered into the search databases separately and in combination: *Internet addiction, game addiction, pathological Internet use, problematic Internet use, excessive Internet use, and Internet game addiction*. Second, the references of the retrieved articles and book chapters were manually searched. Additional searches for unpublished studies were not conducted.

### Inclusion and exclusion criteria

All the retrieved studies were screened according to five inclusion criteria: 1) an original, published research paper that has undergone peer review (selection of methodologically valid studies that have been confirmed through the peer-review process is crucial in increasing the reliability of the interpretation of meta-analytic results, despite any concern regarding publication biases); 2) the study participants ranged in age from 7 (elementary school students) to 60 (adults)

years; 3) the presence of at least one psychosocial factor for Internet addiction (either risk or protective); 4) use of an acceptable definition of Internet addiction (i.e., either using adapted DSM-IV criteria for pathological gambling or substance abuse, or employing a cutoff point on a psychometrically standardized Internet addiction rating scale); and 5) the inclusion of enough information (e.g., correlation, t-value, n, F-value, *p*-value) to permit a calculation of effect size. When any of this information was missing, the study was excluded. Master's theses and doctoral dissertations were not included unless they were published in academic journals and underwent peer review.

Among the 163 studies originally identified from the literature search, 68 were excluded due to failure to meet the inclusion criteria. Articles were excluded because they were reviews of already published research and not new empirical studies (*n*=6), included preschool children (*n*=6), did not include any psychosocial factors for Internet addiction (*n*=34), did not use a psychometrically standardized Internet addiction measure (*n*=2), did not present the statistical estimates necessary for calculating effect sizes (*n*=17), or were not available (*n*=3). In total, 95 studies met the criteria for inclusion in the meta-analysis, of which 54 (56.8%) were related to Internet addiction, 41 (43.2%) were related to game addiction, 89 (93.6%) were published in a Korean journal, and 6 (6.4%) were published in an international journal.

### Coding of study variables

Studies were initially identified and coded by the first author. For reliability, five Master's-level psychology graduate students independently coded each article. Discrepancies were resolved by consensus between the first author and the five students. The kappa coefficient between the initial and subsequent coding was 0.64–1.00.

### Key variables and sub-variables

In total, 47 variables were retrieved from the 95 studies. A coding frame was used to categorize these variables into nine key variables that were based on the categorization of previous studies.<sup>45,46</sup> However, self-related variables were further sub-divided into self, emotion, temperament, and control/regulation-related variables. Among the nine key variables, six variables (self, emotion, control/regulation, temperament/personality, stress coping, and school functioning) were designated as “intrapersonal variables” and the remaining three (relational ability/quality, parent relationship, and family functioning) were designated as “inter-

personal variables,” in accordance with previous studies.<sup>7,37</sup>

At the final step, all the variables were classified as either a risk or protective factor. Risk factors were defined as variables that were associated with an increased risk of Internet addiction.<sup>47</sup> Thus, the direction of the correlation between the risk factors and pathological Internet use was positive. By contrast, protective factors were defined as variables that prevent or reduce vulnerability of the development of Internet addiction.<sup>47</sup> Thus, the direction of the correlation between the protective factors and pathological Internet use was negative.

The nine broad categories (key variables) of risk and protective factors included in the meta-analysis were 1) self-related, 2) emotion/mood-related, 3) control/regulation-related, 4) temperament/character related, 5) stress/coping, 6) school functioning, 7) relational ability/quality, 8) parent relationship, and 9) family functioning.

### Measures

The measures of Internet addiction varied across the studies. Because the Internet Addiction Test (IAT) was the first validated instrument to assess Internet addiction and it has been translated and validated using a Korean sample, it has been used widely in Korea; 49 studies in our meta-analysis used it. Given that many different screening instruments have been developed and validated in Korea over the last decade, we also included studies that used new measures, such as the K-scale and the Internet Addiction Scale for Korean Adolescents. Young's IAT,<sup>42</sup> the K-scale,<sup>48</sup> and Lee, et al.'s<sup>49</sup> scale for measuring the behavioral symptoms of adult pathological internet use were included as measures of Internet addiction. The game addiction measures were relatively diverse and included the game addiction version of the IAT, the game addiction version of the K-scale, the Internet Game Addiction Scale,<sup>50</sup> the Internet Addiction Scale for Korean Adolescents,<sup>51</sup> the Maladaptive Game Use Scale,<sup>52</sup> Pathological Online Game Use Scale,<sup>31</sup> the Internet Addiction Index,<sup>53</sup> and the child version of the K-Scale.<sup>54</sup> Variability in the measurement of Internet addiction across studies makes it necessary to determine whether these different measures can be reliably combined. Fortunately, accumulated evidence suggests that these measures are highly correlated with those widely used. The substantial associations found between the Internet addiction measures used by our included studies suggest that the current study's dependent variables are likely to be reliable. In addition, the reliability of the Korean version of the Internet addiction

measures was greater than  $r=0.72$ .<sup>31,43,49-53</sup> This is important because low reliability would have reduced the strength of the correlations between the psychosocial variables and Internet addiction, thereby undermining the validity of the accumulated findings across studies.

#### *Moderators*

Sample-level and study-level characteristics were examined as potential moderators of the association between psychological factors and internet addiction.

#### *Age*

Age was represented as a categorical moderator at three levels: 1) children 7–12 years old (i.e., elementary school students); 2) adolescents 13–18 years old (i.e., middle and high school students); and 3) adults 19 years or older (i.e., university/college and above).

#### *Type of addiction*

Internet addiction type was coded as either general Internet addiction or Internet-game addiction.

### **Meta-analytic procedures**

#### *Effect sizes*

The measure used for effect size was the weighted average of the sample correlation, the  $r$  statistic (range=-1.0–1.0). When not directly presented, correlations or  $t$  statistics were calculated from other statistics using methods suggested by Rosenthal.<sup>55</sup> Computation of an average correlation requires transformation of that correlation from each relevant hypothesis into Fisher's  $z$  and the weighting of this value by the sample size. In this way, correlations based on larger samples receive greater weight than those based on smaller samples. The average  $z$  value is then back-transformed to give  $r$ .<sup>56</sup> Similarly, a 95% confidence interval (CI) was computed for the population  $z$  value that was then transformed to a 95% CI for the average correlation. No outliers were removed prior to conducting the meta-analysis to avoid any potential overcorrection of sampling errors.

#### *Homogeneity analysis*

Homogeneity analyses were conducted using the chi-square statistic<sup>57</sup> to determine whether the variation found among the correlations was the result of chance. The degrees of freedom for the chi-square test are  $k-1$ , where  $k$  is the number of independent correlations. An insignificant chi-square

value indicates that the correlations are homogeneous and the average weighted effect size,  $r_+$ , represents the population effect size. In this case, estimates from a fixed-effects model were used. By contrast, a significant chi-square value indicates that the correlations are heterogeneous and a random-effects model can be used. Thus, we used a random effects model that calculated the error term on the basis of both within- and between-study variability and assumed that the individual studies originated from different populations with varying effect sizes.<sup>58</sup> By contrast, a fixed effects model assumes a common underlying effect for each study.<sup>58</sup> In sum, when homogeneity could be assumed, estimates from a fixed-effects model were used; when homogeneity was rejected, the estimates from a random-effects model were used and an additional analysis was conducted.

#### *Moderator analysis*

The effect-size homogeneity was evaluated using the  $Q_{\text{within}}$  ( $Q_w$ ) statistic.<sup>56</sup> When the hypothesis of homogeneity was rejected, moderators were examined to explain the heterogeneity among the effect sizes. We tested the study- and sample-level moderator variables using Comprehensive Meta-Analysis (Version 2) with a mixed-effects model and a  $p=0.05$  level of significance for the  $Q_{\text{between}}$  ( $Q_b$ ) statistic.

The effect sizes were gauged based on the guidelines by Cohen:<sup>59</sup> small ( $r=0.10$ ), medium ( $r=0.30$ ), and large ( $r=0.50$ ).

## **RESULTS**

### **Study characteristics**

Table 1 summarizes the studies' characteristics. Overall, 95 studies yielded 445 effect sizes, with the sample size for each study ranging from 61 to 6499 (*median*=476). The aggregate number of individuals sampled was 59283. Approximately equal numbers of studies presented only risk-factor outcomes (12.5%) or only protective-factor outcomes (16%), whereas the remaining studies presented both types of outcomes (71.5%). All the studies were published in journals and utilized a cross-sectional design. In addition, all the studies reported participant samples of mixed socioeconomic status, and most used a normal school-based sample (95.8%). A majority of the studies ( $n=79$ , 83.2%) also presented effect sizes separately for both sexes, although some ( $n=16$ , 16.9%) presented the effect size for only boys ( $n=11$ , 11.6%) or girls ( $n=5$ , 5.7%). Outcome effect sizes were assessed for sever-

**Table 1.** Summary of Studies Included in the Meta-Analysis (n=95)

Study	n	Sample type*	Age <sup>†</sup>	Gender <sup>‡</sup>	Type	Addiction Measure <sup>§</sup> (cronbach's $\alpha$ )	Source <sup>  </sup>
Hong (1999) <sup>75</sup>	992	1	4	3	Internet	1 (0.74)	1
Lee and Kwon (2001) <sup>76</sup>	189	1	3	3	Game	4 (0.80)	1
Kim and Cho (2002) <sup>77</sup>	650	1	5	3	Internet	1 (0.90)	1
Oh and Woo (2005) <sup>78</sup>	450	1	1	3	Game	7 (0.85)	1
Kim and Kim (2003) <sup>79</sup>	111	1	2	3	Internet	1 (0.91)	1
Bang and Cho (2003) <sup>80</sup>	719	1	7	3	Game	4 (0.83)	1
Byeon, et al. (2003) <sup>81</sup>	226	1	4	3	Internet	2 (0.95)	1
Lee (2003) <sup>82</sup>	739	1	1	3	Game	4 (0.90)	1
Lee (2003) <sup>83</sup>	388	1	5	3	Game	4 (0.91)	1
Jo and Bang (2003) <sup>84</sup>	223	1	7	3	Game	4 (n.a.)	1
Kwon and Kim (2004) <sup>85</sup>	601	1	1	3	Game	4 (0.86)	1
Ryu, et al. (2004) <sup>86</sup>	1670	1	3	3	Internet	1 (0.92)	1
Lee (2004) <sup>87</sup>	505	1	1	1	Game	4 (0.91)	1
Lee and Chang (2004) <sup>88</sup>	700	1	4	3	Game	4 (0.91)	1
Kang (2005) <sup>89</sup>	592	1	4	3	Internet	1 (n. a.)	1
Kim and Chong (2005) <sup>90</sup>	642	1	1	1	Internet	1 (0.91)	1
Yoon and Lee (2005) <sup>91</sup>	360	1	2	2	Game	4 (0.92)	1
Lee and Jeong (2005) <sup>92</sup>	272	1	1	3	Game	4 (0.90)	1
Lim, et al. (2005) <sup>93</sup>	550	1	5	3	Internet	1 (0.88)	1
Jang (2005) <sup>94</sup>	476	1	2	2	Game	6 (0.92)	1
Ha and Lee (2005) <sup>95</sup>	235	1	5	3	Internet	1 (0.93)	1
Kwon (2005) <sup>96</sup>	1279	1	2	3	Game	4 (0.93)	1
Kim and Boo (2007) <sup>97</sup>	950	1	5	3	Game	4 (0.91)	1
Jeon and Seo (2006) <sup>98</sup>	452	1	5	3	Internet	1 (0.88)	1
Yoon and Park (2006) <sup>99</sup>	1328	1	1	3	Internet	1 (0.91)	1
Lee and Chae (2006) <sup>100</sup>	150	1	3	1	Game	4 (0.82)	1
Lee, et al. (2012) <sup>101</sup>	259	1	3	1	Internet	1 (0.90)	1
Jeon (2006) <sup>102</sup>	104	1	4	3	Internet	1 (0.87)	1
Kim, et al. (2007) <sup>103</sup>	761	2	5	3	Internet	1 (0.93)	1
Kim, et al. (2007) <sup>104</sup>	659	1	1	3	Internet	1 (0.66)	1
Kim, et al. (2007) <sup>105</sup>	990	1	1	3	Internet	2 (0.93)	1
Kim, et al. (2007) <sup>106</sup>	357	1	2	1	Game	1 (0.78–0.87)	1
Suh and Lee (2007) <sup>107</sup>	350	1	4	3	Internet	1 (0.92)	1
Shin, et al. (2007) <sup>108</sup>	334	1	1	1	Game	3 (0.93)	1
Oh (2007) <sup>109</sup>	405	1	3	3	Internet	1 (0.92)	1
Jang and Lee (2007) <sup>110</sup>	754	1	1	3	Game	6 (0.92)	1
Joo (2007) <sup>111</sup>	428	1	2	3	Game	4 (0.81)	1
Han and Kim (2007) <sup>112</sup>	230	1	4	3	Game	4 (0.90)	1
Kang (2008) <sup>113</sup>	255	1	1	3	Internet	1 (0.89)	1
Kweon and Kweon (2008) <sup>114</sup>	746	1	1	3	Game	5 (0.92)	1
Kim (2008) <sup>115</sup>	297	1	2	3	Internet	1 (0.89)	1
Boo and Kweon (2008) <sup>116</sup>	612	1	2	3	Game	4 (0.90)	1
Son (2008) <sup>117</sup>	777	1	2	3	Game	3 (0.93)	1
Han and Ahn (2008) <sup>118</sup>	518	1	6	1	Internet	2 (0.90–0.94)	1
Kwon and Lee (2009) <sup>119</sup>	251	1	2	2	Internet	2 (0.98)	1
Kim (2009) <sup>120</sup>	1060	1	5	3	Internet	1 (0.82)	1
Kim (2009) <sup>121</sup>	226	4	8	3	Internet	2 (0.93)	1
Kim and Kim (2009) <sup>122</sup>	739	1	1	3	Internet	2 (0.92)	1
Nam (2009) <sup>123</sup>	453	1	4	3	Internet	2 (0.87)	1
Park, et al. (2009) <sup>124</sup>	950	1	5	3	Internet	2 (0.95)	1
Park and Kim (2009) <sup>125</sup>	484	1	3	1	Internet	2 (0.94)	1

Table 1. Continued

Study	n	Sample type*	Age <sup>†</sup>	Gender <sup>‡</sup>	Type	Addiction Measure <sup>§</sup> (cronbach's $\alpha$ )	Source <sup>  </sup>
Park (2009) <sup>126</sup>	304	1	2	3	Internet	1 (0.80)	1
Back (2009) <sup>127</sup>	668	1	1	1	Game	3 (0.94)	2
Shin, et al. (2009) <sup>128</sup>	524	1	5	2	Game	9 (0.87)	1
Ahn, et al. (2009) <sup>129</sup>	677	1	2	3	Internet	2 (0.95)	1
Yoon and Nam (2009) <sup>130</sup>	2495	1	6	3	Internet	1 (0.89)	1
Lee, et al. (2009) <sup>131</sup>	404	1	1	3	Game	4 (0.92)	1
Pyo and Rhh (2009) <sup>132</sup>	570	1	5	2	Internet	2 (0.89)	1
Han and Wang (2009) <sup>133</sup>	622	1	5	3	Game	5 (0.95)	2
Kang and Lee (2010) <sup>134</sup>	930	1	2	1	Game	7 (0.92)	1
Kwon and Jang (2010) <sup>135</sup>	186	3	1	3	Internet	2 (0.98)	1
Kwon (2010) <sup>136</sup>	2197	1	5	3	Game	3 (0.93)	1
Kim (2010) <sup>137</sup>	272	1	3	3	Internet	2 (0.92)	1
Kim and Kim (2010) <sup>138</sup>	292	1	4	3	Internet	1 (0.90)	1
Kim, et al. (2010) <sup>139</sup>	750	1	4	3	Internet	2 (0.93)	1
Seo and Lim (2010) <sup>140</sup>	119	1	1	3	Game	11 (0.87)	2
Song (2010) <sup>141</sup>	825	1	2	3	Game	5 (0.95)	1
Shin and Lee (2010) <sup>142</sup>	400	1	2	3	Internet	2 (0.95)	1
Lee and Han (2010) <sup>143</sup>	61	1	2	3	Internet	2 (n. a.)	1
Jang (2010) <sup>144</sup>	167	2	5	3	Internet	2 (0.85)	2
Cho and Jang (2010) <sup>145</sup>	454	1	5	3	Game	5 (0.96)	1
Cho and Lim (2010) <sup>146</sup>	612	1	5	3	Game	4 (0.92)	1
Choi and Moon (2010) <sup>147</sup>	316	1	1	3	Game	5 (0.72–0.88)	1
Choi and An (2010) <sup>148</sup>	313	1	5	3	Game	6 (0.94)	1
Kwon and Jung (2011) <sup>149</sup>	133	1	2	1	Game	5 (0.85)	1
Kim and Chang (2011) <sup>150</sup>	470	1	4	3	Internet	1 (0.90)	1
Kim, et al. (2011) <sup>151</sup>	175	1	1	3	Internet	2 (0.90)	1
Kim, et al. (2011) <sup>152</sup>	709	1	5	3	Game	4 (0.94)	1
So, et al. (2011) <sup>153</sup>	203	1	5	3	Internet	1 (0.91)	1
Yang and Jo (2011) <sup>154</sup>	580	1	1	3	Internet	2 (0.88)	1
Lee, et al. (2011) <sup>155</sup>	203	1	5	3	Internet	2 (0.91)	1
Chang, et al. (2011) <sup>156</sup>	331	1	4	3	Internet	3 (0.91)	1
Cho (2011) <sup>157</sup>	6499	1	5	3	Internet	2 (0.80–0.89)	1
Jo (2011) <sup>158</sup>	597	1	1	3	Internet	1 (0.91)	1
Kim and Ha (2011) <sup>159</sup>	242	1	4	3	Internet	1, 2 (0.86)	1
Choi, et al. (2011) <sup>160</sup>	283	1	5	3	Internet	2 (0.94)	1
Hwang and Park (2011) <sup>53</sup>	300	1	4	3	Game	10 (0.81)	1
Kim (2012) <sup>161</sup>	606	1	2	3	Game	8 (0.95)	1
Yun, et al. (2012) <sup>162</sup>	71	1	2	3	Game	5 (0.96)	1
Park, et al. (2008) <sup>1</sup>	903	1	5	3	Internet	1 (0.88)	1
Yoo, et al. (2004) <sup>163</sup>	535	1	1	3	Internet	1 (0.92)	2, 3
Ha, et al. (2007) <sup>15</sup>	452	1	3	3	Internet	1 (0.92)	1
Kim, et al. (2006) <sup>17</sup>	1573	1	3	3	Internet	1 (0.80)	1
Kwon, et al. (2011) <sup>3</sup>	1136	1	2	3	Game	4 (0.80)	1
Seo, et al. (2009) <sup>4</sup>	676	1	2	3	Internet	2 (0.93)	1

\*Sample type: 1, school-based; 2, community-based; 3, psychiatric-based; 4, probation center-based, random sample.

<sup>†</sup>Age: 1, elementary student; 2, middle school student; 3, high school student; 4, above university/college student; 5, middle and high school student; 6, above high school student; 7, elementary to high school student; 8, above middle school student.

<sup>‡</sup>Gender: 1, male only; 2, female only; 3, female and male.

<sup>§</sup>Addiction measure: 1, Internet Addiction Test (IAT<sup>42</sup>); 2, the K-scale<sup>48</sup>; 3, Internet Game Addiction Diagnostic Scale<sup>49</sup>; 4, game addiction version of the IAT<sup>42</sup>; 5, game addiction version of the K-scale<sup>48</sup>; 6, the Internet Game Addiction Scale<sup>50</sup>; 7, the Internet Addiction Scale for Korean Adolescent<sup>51</sup>; 8, the Maladaptive Game Use Scale<sup>52</sup>; 9, the Pathological Online Game Use scale<sup>31</sup>; 10, the Internet Addiction Index<sup>53</sup>; 11, the child version of the K-Scale (2011)<sup>54</sup>.

<sup>||</sup>Source of information: 1, self; 2, parent; and 3, teacher.

al age groups: elementary school students (n=23, 24.2%), middle school students (n=21, 22.16%), high school students (n=9, 9.5%), and adults (n=14, 14.7%). Some studies utilized mixed samples: 23 (24.72%) examined subjects from middle and high school, and 5 (5.7%) used an alternative sample type. The 15 effect sizes from these latter five were excluded from the age moderator analysis. Various Internet addiction severity measures were used across the studies. Young's IAT was used in 49 studies (Internet addiction: 29 studies; game addiction: 20 studies) and the K-Scale was used in 30 studies (Internet addiction: 23 studies, game addiction: 7 studies). A number of other measures were used in the 16 remaining studies. All the studies relied on self-report, except for five that were based on parent and teacher reports.

### Overall estimates

The magnitude of the overall effect size for risk factors associated with Internet addiction was  $r=0.26$  [ $CI_{95}=0.24, 0.27$ ,  $Q_w(189)=2133.45$ ,  $p<0.001$ ] and that for the protective factors was  $r=-0.20$  [ $CI_{95}=-0.22, -0.19$ ,  $Q_w(254)=2608.72$ ,  $p<0.001$ ]. The effect size ( $r=0.26$ ) for the risk factors was significantly higher than that ( $r=0.20$ ) for the protective factors [ $Q_b(1)=1266.10$ ,  $p<0.001$ ], although both are considered small to medium based on Cohen's guidelines. On the other hand, the correlation between Internet addiction and the risk factors showed heterogeneity, as indicated by the  $Q$  test. The presence of significant heterogeneity indicates that one should be careful when generalizing the results of a fixed-effects model. When using the random-effects model, the effects of all moderators, including the sub-variables Internet-addiction type and age, were significant, and the indicators of both the risk and protective factors yielded a significant within-class effect. Thus, an additional analysis

was conducted for correlation coefficients for the intrapersonal versus interpersonal variables.

### Intrapersonal vs. interpersonal variables

Table 2 shows the comparative effect sizes for intrapersonal and interpersonal variables and both risk and protective factors. For risk variables, the magnitude of the overall effect size for intrapersonal variables ( $r=0.28$ ) associated with Internet addiction approached the medium level and was significantly higher than that for the interpersonal variables [ $r=0.21$ ,  $Q_b(1)=12.82$ ,  $p<0.001$ ]. This result was consistent with that for the protective factors; the effect size for the intrapersonal variables ( $r=-0.22$ ) related to protective factors was also higher than that for interpersonal variables [ $r=-0.18$ ,  $Q_b(1)=6.65$ ,  $p<0.01$ ], although both were far below the medium level.

All of the indicators yielded a significant within-classes effect, so an additional analysis of the weighted average correlation of the key variables was conducted. In addition, as a result of the  $Q$  test for homogeneity, a further subset analysis on the 47 sub-variables was conducted.

### Risk factor estimates

Table 3 presents the average corrected effect-size statistics for the nine key variables related to risk factors for Internet addiction.

Among the intrapersonal variables, the self-related variables were the strongest risk factors for Internet addiction, with effect sizes in Cohen's medium range.<sup>59</sup> The effect sizes for the self-variables showed significant variance [ $Q_w(12)=58.30$ ,  $p<0.001$ ]. A key outcome in the additional analysis of the self-related variables revealed that the "escape from self" variable was the strongest risk factor ( $r=0.42$ ) and showed homogeneous effects. The "attention problem" vari-

**Table 2. Comparison of Effect Sizes between Intrapersonal and Interpersonal Variables of Risk and Protective Factors**

	$k_s$	$R$	95% CI	$Q_w(df)$	$Q_b(df)$
Risk factors					
Intrapersonal variables	120	0.28	[0.26, 0.30]	1131.04 (119) <sup>†</sup>	12.82 (1) <sup>†</sup>
Interpersonal variables	70	0.21	[0.18, 0.24]	674.74 (68) <sup>†</sup>	
Total	190	0.26	[0.24, 0.27]	2133.45 <sup>†</sup>	
Protective factors					
Intrapersonal variables	119	-0.22	[-0.25, -0.20]	1680.63 (118) <sup>†</sup>	6.65 (1)*
Interpersonal variables	136	-0.18	[-0.20, -0.16]	902.13 (135) <sup>†</sup>	
Total	255	-0.20	[-0.22, -0.19]	2608.72 <sup>†</sup>	

CI, confidence interval.

\* $p<0.01$ .

<sup>†</sup> $p<0.001$ .



**Table 3.** Weighted Average Correlations and Homogeneity Analysis for the Risk Factors

Risk factors	$k_s$	$R$	95% CI	$Q_w$ (df)	$Q_b$ (df)
Intrapersonal variables					
Self	18	0.31	[0.28, 0.34]	58.30 (12) <sup>‡</sup>	224.00 (4) <sup>‡</sup>
(Virtual) self-efficacy	5	0.17	[0.07, 0.26]	27.06 (4) <sup>‡</sup>	
(Virtual) self-esteem	1	0.22	[0.09, 0.34]	-	
Escape from self	7	0.42	[0.38, 0.46]	19.15 (6)	
Self-discrepancy	4	0.19	[0.12, 0.26]	12.09 (3) <sup>‡</sup>	
Masking	1	0.23	[0.11, 0.34]	-	
Emotion/mood	66	0.27	[0.25, 0.30]	513.12 (63) <sup>‡</sup>	35.64 (2) <sup>‡</sup>
Depression/anxiety	43	0.26	[0.23, 0.29]	270.75 (42) <sup>‡</sup>	
Anger/aggression	19	0.34	[0.28, 0.40]	228.43 (18) <sup>‡</sup>	
Loneliness	4	0.20	[0.03, 0.35]	13.93 (3) <sup>‡</sup>	
Control/regulation	3	0.30	[0.22, 0.38]	4.51 (2)	-
Attention problems	3	0.30	[0.22, 0.38]	4.51 (2)	
Temperament/character	28	0.28	[0.23, 0.33]	267.72 (25) <sup>‡</sup>	6.87 (1) <sup>‡</sup>
Impulsive/novelty seeking	22	0.28	[0.23, 0.33]	240.84 (21) <sup>‡</sup>	
Addictive/absorption	3	0.30	[0.12, 0.47]	18.72 (2) <sup>‡</sup>	
Harm avoidant/dependent	3	0.28	[0.17, 0.39]	8.16 (2)*	
Stress coping	5	0.27	[0.23, 0.31]	9.28 (4)	-
Negative stress coping	5	0.27	[0.23, 0.31]	9.28 (4)	
Interpersonal variables					
Relational ability/quality	24	0.17	[0.13, 0.20]	89.44 (19) <sup>‡</sup>	41.21 (4) <sup>‡</sup>
Social anxiety/avoidance	10	0.21	[0.15, 0.26]	34.59 (9) <sup>‡</sup>	
Problematic peer relationships	9	0.27	[0.19, 0.37]	49.10 (8) <sup>‡</sup>	
Unstable peer attachments	2	0.15	[0.13, 0.30]	3.95 (1)*	
(Virtual) social efficacy	1	0.06	[0.01, 0.12]	-	
(Virtual) social presence	2	0.17	[0.05, 0.29]	1.80 (1)	
Parent relationship	39	0.20	[0.16, 0.23]	445.06 (35) <sup>‡</sup>	23.62 (3) <sup>‡</sup>
Negative parenting attitude	14	0.21	[0.14, 0.27]	135.50 (11) <sup>‡</sup>	4.40 (2)
Unspecified	8	0.20	[0.18, 0.23]	126.79 (7) <sup>‡</sup>	
Mother	3	0.18	[0.13, 0.24]	4.05 (2) <sup>‡</sup>	
Father	3	0.25	[0.20, 0.31]	4.66 (2) <sup>‡</sup>	
Dysfunctional communication	15	0.27	[0.20, 0.34]	271.54 (13) <sup>‡</sup>	0.21 (1)
Mother	9	0.27	[0.18, 0.37]	163.69 (8) <sup>‡</sup>	
Father	6	0.27	[0.15, 0.38]	107.85 (5) <sup>‡</sup>	
Parental Internet use control	8	0.13	[0.06, 0.20]	33.37 (7) <sup>‡</sup>	
Unstable parent attachment	2	0.09	[-0.05, 0.22]	0.05 (1)	
Family functioning	7	0.22	[0.10, 0.33]	64.51 (6) <sup>‡</sup>	-
Family conflict/discord	7	0.22	[0.10, 0.33]	64.51 (6) <sup>‡</sup>	

CI, confidence interval.

\* $p < 0.05$ .<sup>‡</sup> $p < 0.01$ .<sup>‡</sup> $p < 0.001$ .

able in the control/regulation-variables category was also a strong risk factor ( $r=0.30$ ). The variables temperament, emotion/mood, and stress/coping all had similar effect sizes that ranged from 0.27 to 0.28. The effect size for the addictive/absorption trait ( $r=0.30$ ) was the strongest risk factor among the temperament/character variables. The effect sizes for impulsive/novelty seeking ( $r=0.28$ ) and the depen-

dent/harm-avoidant ( $r=0.28$ ) traits were also significant. The effect sizes for the emotion/mood key variables varied significantly [ $Q_w(63)=513.12, p < 0.001$ ]. The subset analysis for these variables indicated the highest effect size for the anger/aggression trait ( $r=0.34$ ). Thus, anger/aggression is the most important risk factor in this group. The effect sizes for the variables in the depression/anxiety category

( $r=0.26$ ) also approached significance, with the exception of the loneliness variable ( $r=0.20$ ). For the stress/coping variables, the negative stress coping trait ( $r=0.27$ ) was significant.

The effect sizes for the interpersonal variables of relational ability/quality ( $r=0.17$ ), parent relationship ( $r=0.20$ ), and family functioning ( $r=0.22$ ) were small and ranged from 0.17 to 0.22. Thus, these effect sizes were smaller than those of the intrapersonal variables. However, a detailed examination of the relational ability/quality key variables revealed that the problematic peer relationship variable had relatively significant small-to-medium effect sizes ( $r=0.27$ ). Within the parent relationship set, the effect size for the dysfunctional communication variable approached significance ( $r=0.27$ ), and the unstable parent attachment variable was the least associated with Internet addiction ( $r=0.09$ ).

### Protective factor estimates

The weighted average correlations and homogeneity analysis for the protective factors for the intrapersonal and interpersonal variables are presented in Table 4. The average corrected correlation for the protective factor of Internet addiction was  $r=-0.20$  [ $CI_95=-0.22, -0.19, Q(254)=2608.13, p<0.001$ ], which is relatively smaller than that for the risk factors (Table 2). For the intrapersonal variables and similar to the results for risk factors, control/regulation ( $r=-0.33$ ) was significant and the most important protective factor against Internet addiction. The effects of the other protective factors were small, with  $r=-0.11, -0.11, \text{ and } -0.14$  for emotion/mood, stress/coping, and temperament/character, respectively. Because there was a high degree of variability across the eight key variables, an additional subset analysis was conducted. For the control/regulation-related key variables, the estimates for emotional regulation ( $r=-0.38$ ) and self-control ( $r=-0.31$ ) exceeded the medium value. Among the self-variables, self-identity ( $r=-0.36$ ) was the strongest protective factor against Internet addiction, indicating a substantially larger effect size than that of self-esteem ( $r=-0.19$ ) and self-efficacy [ $r=-0.19; Q(2)=20.19, p<0.001$ ]. In addition, the effect size for school adjustment within the school functioning variable was  $-0.33$ , indicating a strong association.

The magnitude of the effect size for the interpersonal variables relational ability/quality ( $r=-0.17$ ), parent relationship ( $r=-0.21$ ), and family functioning ( $r=-0.17$ ) as protective factors was small-to-medium. According to the subset analysis for the relational ability/quality variables, the effect siz-

es for sociability, social support, peer attachment and social efficacy respectively were  $-0.19, -0.15, -0.20, \text{ and } -0.15$ , respectively, and did not significantly differ in magnitude [ $Q(3)=1.99, n.s.$ ]. For the parent relationship variables, the effect size for parental supervision ( $r=-0.27$ ) was quite strong (but is based on only three studies), compared to those for stable parental attachment ( $r=-0.22$ ), positive parenting attitude ( $r=-0.18$ ), and functional communication [ $r=-0.20; Q(2)=6.51, p<0.05$ ].

### Effects of sample and study characteristics

We investigated whether the effect sizes associated with the risk and protective factors shown in Table 5 and 6 differed depending on the characteristics for which studies had been coded (i.e., whether these characteristics operated as moderator variables).

#### Sample-level moderator

##### Age

A detailed examination of the risk-factor effect sizes by age group is shown in Table 5. First, the effect sizes for the intrapersonal risk variables among elementary school students, middle and high school students, and college students and above were significantly associated with stronger effect sizes than those for children of younger ages [ $r=0.32$  vs.  $0.26, \text{ vs. } 0.29; Q_b(2)=6.97, p<0.05$ ]. Specifically, temperament/character ( $r=0.35$  vs.  $0.24, \text{ vs. } 0.32$ ),  $Q_b(2)=10.91, p<0.05$ , and stress coping ( $r=0.31$  vs.  $0.26, \text{ vs. none}$ ),  $Q_b(1)=5.03, p<0.05$ , were significantly higher among elementary school students. Interestingly, there was a similar and strong effect size of temperament/character for the younger and adult age groups than the adolescent group. Nevertheless, there were no significant age differences in the association of interpersonal variables with Internet addiction in general, ( $r=0.24$  vs.  $0.19, \text{ vs. } 0.17$ ),  $Q_b(2)=3.25, n.s.$ , although the effect size for parent relationship was significantly higher in the children age group than the other two ( $r=0.25$  vs.  $0.16, \text{ vs. } 0.09$ ),  $Q_b(2)=12.63, p<0.01$ .

Second, most of the effect sizes for the protective factors did vary with age, except for the parent relationship variable ( $r=-0.23$  vs.  $-0.19, \text{ vs. } -0.13$ ),  $Q_b(2)=5.24, n.s.$ , the family functioning variable ( $r=\text{none}$  vs.  $-0.19, \text{ vs. } -0.07$ ),  $Q_b(1)=1.15, n.s.$ , and the school adjustment variable ( $r=-0.26$  vs.  $-0.22, \text{ vs. none}$ ),  $Q_b(1)=0.22, n.s.$  Specifically, the intrapersonal protective factors that were significantly associated with stronger effect sizes for the younger age group were

self ( $r=-0.33$  vs.  $-0.18$ , vs.  $-0.20$ ),  $Q_b(2)=21.28$ ,  $p<0.001$ , and control/regulation ( $r=-0.41$  vs.  $-0.26$ , vs.  $-0.26$ ),  $Q_b(2)=13.38$ ,  $p<0.001$ , temperament ( $r=-0.42$  vs.  $-0.18$ , vs. none),

$Q_b(1)=25.08$ ,  $p<0.001$ . Meanwhile, the effect size of stress/coping ( $r=-0.12$  vs.  $-0.15$ , vs.  $-0.02$ ),  $Q_b(2)=11.31$ ,  $p<0.01$ , as a protective factor was significantly larger for adoles-

**Table 4. Weighted Average Correlations and Homogeneity Analysis for the Protective Factors**

Protective factors	<i>k</i>	<i>r</i>	95% CI	$Q_w$ ( <i>df</i> )	$Q_b$ ( <i>df</i> )
<b>Intrapersonal variables</b>					
Self	42	-0.20	[-0.25, -0.16]	633.56 (41) <sup>‡</sup>	20.19 (2) <sup>‡</sup>
Self-identity	4	-0.36	[-0.39, -0.32]	6.89 (3)	
Self-esteem	29	-0.19	[-0.25, -0.12]	470.76 (28) <sup>‡</sup>	
Self-efficacy	9	-0.19	[-0.26, -0.11]	62.97 (8) <sup>‡</sup>	
Emotion	2	-0.11	[-0.19, -0.02]	0.67 (1)	
Satisfaction/well-being	2	-0.11	[-0.19, -0.02]	0.67 (1)	
Control/regulation	30	-0.33	[-0.38, -0.27]	410.57 (28) <sup>‡</sup>	1.14
Self-control	28	-0.31	[-0.37, -0.25]	405.99 (27) <sup>‡</sup>	
Emotional regulation	2	-0.38	[-0.49, -0.26]	4.58 (1)*	
Temperament/character	10	-0.14	[-0.18, -0.09]	29.99 (7) <sup>‡</sup>	37.09 (2) <sup>‡</sup>
Positive characteristics/personality	8	-0.25	[-0.22, -0.15]	29.99 (7) <sup>‡</sup>	
Reward dependence	1	-0.04	[-0.13, 0.05]	-	
Persistence	1	-0.03	[-0.12, 0.06]	-	
Stress coping	18	-0.11	[-0.13, -0.09]	24.87 (15)*	35.10 (2) <sup>‡</sup>
Positive stress coping	9	-0.07	[-0.10, -0.04]	13.07 (8)	
Problem-solving ability	7	-0.20	[-0.25, -0.16]	11.71 (6)*	
Leisure activity/satisfaction	2	-0.10	[-0.12, -0.08]	0.11 (1)	
School Functioning	17	-0.26	[-0.34, -0.18]	168.17 (15) <sup>‡</sup>	22.22 (1) <sup>‡</sup>
School adjustment	4	-0.33	[-0.44, -0.22]	11.41 (3) <sup>‡</sup>	
Academic efficacy	13	-0.20	[-0.31, -0.09]	156.75 (12) <sup>‡</sup>	
<b>Interpersonal variables</b>					
Relational ability/quality	65	-0.17	[-0.18, -0.15]	210.96 (61) <sup>‡</sup>	10.61 (3)*
Sociability	18	-0.19	[-0.22, -0.15]	63.90 (17) <sup>‡</sup>	
Social support	35	-0.15	[-0.18, -0.12]	111.68 (40) <sup>‡</sup>	1.99 (3)
Unspecified	10	-0.15	[-0.22, -0.08]	50.19 (9) <sup>‡</sup>	
Teacher	7	-0.15	[-0.22, -0.09]	22.72 (6) <sup>‡</sup>	
Parent	9	-0.16	[-0.22, -0.11]	20.29 (8)*	
Peer	9	-0.14	[-0.18, -0.11]	14.58 (8)	
Peer attachment	2	-0.20	[-0.26, -0.14]	0.60 (1)	
Social efficacy	10	-0.15	[-0.22, -0.08]	37.01 (9)	
Parent relationship	57	-0.21	[-0.21, -0.16]	150.18 (44) <sup>‡</sup>	6.51 (2)*
Stable parent attachment	6	-0.22	[-0.27, -0.18]	9.35 (5)*	
Positive parenting attitude	14	-0.18	[-0.27, -0.08]	72.97 (11) <sup>‡</sup>	3.45 (2)
Unspecified	10	-0.19	[-0.23, -0.12]	104.81 (6) <sup>‡</sup>	
Mother	2	-0.18	[-0.26, -0.11]	5.68 (1)*	
Father	2	-0.15	[-0.32, -0.03]	-	
Functional communication	34	-0.20	[-0.22, -0.17]	135.45 (31) <sup>‡</sup>	2.16 (2)
Unspecified	19	-0.20	[-0.25, -0.14]	114.98 (18) <sup>‡</sup>	
Father	9	-0.20	[-0.24, -0.16]	15.60 (8)*	
Mother	6	-0.20	[-0.24, -0.17]	4.88 (5)	
Parental supervision	3	-0.27	[-0.34, -0.20]	7.36 (2)*	
Family functioning	14	-0.17	[-0.26, -0.07]	290.94 (13) <sup>‡</sup>	-
Family cohesiveness/intimacy	14	-0.17	[-0.26, -0.07]	290.94 (13) <sup>‡</sup>	

CI, confidence interval.

\* $p<0.05$ .

<sup>‡</sup> $p<0.01$ .

<sup>‡</sup> $p<0.001$ .

**Table 5. The Moderation Effect of Age on Effect Sizes of Risk and Protective Factors**

	Elementary school student			Middle & high school student			Above college student			$Q_b$			
	$k$	$r$	95% CI	$Q_w$	$k$	$r$	95% CI	$Q_w$	$k$		$r$	95% CI	$Q_w$
<b>Risk factors</b>													
1 <sup>§</sup>	2	0.36	[0.22, 0.49]	7.53 <sup>†</sup>	11	0.21	[0.16, 0.35]	244.10 <sup>‡</sup>	5	0.27	[0.20, 0.34]	17.35 <sup>‡</sup>	1.51
2	17	0.31	[0.24, 0.37]	136.99 <sup>‡</sup>	36	0.27	[0.23, 0.30]	315.41 <sup>‡</sup>	11	0.29	[0.23, 0.35]	36.20 <sup>‡</sup>	1.63
3	3	0.30	[0.22, 0.38]	4.51	-	-	-	-	-	-	-	-	-
4	8	0.35	[0.29, 0.41]	33.09 <sup>‡</sup>	15	0.24	[0.17, 0.30]	126.50 <sup>‡</sup>	4	0.32	[0.20, 0.43]	18.89 <sup>‡</sup>	10.91*
5	3	0.31	[0.25, 0.36]	0.73	2	0.26	[0.06, 0.45]	3.52	-	-	-	-	5.03*
Intra total	33	0.32	[0.28, 0.36]	189.05 <sup>‡</sup>	64	0.26	[0.23, 0.29]	735.93 <sup>‡</sup>	20	0.29	[0.25, 0.33]	76.63 <sup>‡</sup>	6.97*
7	8	0.22	[0.16, 0.85]	21.45 <sup>‡</sup>	10	0.23	[0.15, 0.31]	69.19 <sup>‡</sup>	6	0.19	[0.09, 0.29]	30.02	0.34
8	19	0.25	[0.19, 0.30]	198.02 <sup>‡</sup>	15	0.16	[0.12, 0.21]	121.15 <sup>‡</sup>	2	0.09	[-0.05, 0.22]	0.05	12.63 <sup>‡</sup>
9	2	0.16	[0.08, 0.23]	1.35	4	0.19	[0.02, 0.35]	47.94 <sup>‡</sup>	-	-	-	-	10.53
Intra total	29	0.24	[0.20, 0.28]	218.90 <sup>‡</sup>	29	0.19	[0.15, 0.23]	309.70 <sup>‡</sup>	8	0.17	[0.08, 0.26]	31.30 <sup>‡</sup>	3.25
Total	62	0.28	[0.25, 0.31]	495.17 <sup>‡</sup>	93	0.24	[0.21, 0.26]	1272.96 <sup>‡</sup>	28	0.25	[0.21, 0.29]	171.38 <sup>‡</sup>	5.64
<b>Protective factors</b>													
1	7	-0.33	[-0.37, -0.28]	16.62*	20	-0.18	[-0.22, -0.13]	117.28 <sup>‡</sup>	13	-0.20	[-0.27, -0.13]	94.13 <sup>‡</sup>	21.28 <sup>‡</sup>
2	-	-	-	-	2	-0.11	[-0.19, -0.02]	0.67	-	-	-	-	-
3	10	-0.41	[-0.48, -0.39]	82.65 <sup>‡</sup>	14	-0.26	[-0.33, -0.18]	169.96 <sup>‡</sup>	5	-0.26	[-0.39, -0.12]	53.72 <sup>‡</sup>	13.38 <sup>‡</sup>
4	2	-0.42	[-0.47, -0.37]	0.08	8	-0.18	[-0.24, -0.11]	30.64 <sup>‡</sup>	-	-	-	-	25.80 <sup>‡</sup>
5	4	-0.12	[-0.17, -0.07]	3.62	12	-0.15	[-0.19, -0.10]	45.97 <sup>‡</sup>	2	-0.02	[-0.08, 0.04]	0.00	11.31 <sup>‡</sup>
6	5	-0.26	[-0.35, -0.17]	16.02 <sup>‡</sup>	12	-0.22	[-0.35, -0.09]	165.25 <sup>‡</sup>	-	-	-	-	0.22
Intra total	28	-0.32	[-0.37, -0.27]	258.47 <sup>‡</sup>	68	-0.19	[-0.22, -0.16]	605.46 <sup>‡</sup>	20	-0.20	[-0.26, -0.14]	185.50 <sup>‡</sup>	19.73 <sup>‡</sup>
7	19	-0.19	[-0.22, -0.16]	41.00 <sup>‡</sup>	38	-0.15	[-0.18, -0.13]	128.71 <sup>‡</sup>	7	-0.15	[-0.21, -0.08]	23.13 <sup>‡</sup>	16.06 <sup>‡</sup>
8	24	-0.23	[-0.26, -0.19]	123.86 <sup>‡</sup>	27	-0.19	[-0.22, -0.15]	122.28 <sup>‡</sup>	4	-0.13	[-0.24, -0.02]	13.32 <sup>‡</sup>	5.24
9	-	-	-	-	11	-0.19	[-0.24, -0.15]	30.12 <sup>‡</sup>	1	-0.07	[-0.28, -0.06]	0.00	1.15
Intra total	43	-0.21	[-0.24, -0.19]	174.08 <sup>‡</sup>	76	-0.17	[-0.19, -0.15]	289.73 <sup>‡</sup>	12	-0.14	[-0.19, -0.09]	38.46 <sup>‡</sup>	8.89*
Total	71	-0.25	[-0.28, -0.23]	-17.39	144	-0.18	[-0.20, -0.16]	896.85 <sup>‡</sup>	32	-0.18	[-0.22, -0.14]	226.57 <sup>‡</sup>	20.28 <sup>‡</sup>

CI, confidence interval.

\*  $p < 0.05$ .

<sup>†</sup>  $p < 0.01$ .

<sup>‡</sup>  $p < 0.001$ .

<sup>§</sup>1, self; 2, emotion; 3, control/regulation; 4, temperament; 5, stress/coping; 6, school adjustment; 7, relational ability/quality; 8, parent relationship; 9, family functioning; Intra, intrapersonal variables; Inter, interpersonal variables.

**Table 6.** The Moderation Effect of Type of Addiction on Effect Sizes of Risk and Protective Factors

	Internet addiction				Game addiction				$Q_b$
	$k_s$	$R$	95% CI	$Q_w$	$k_s$	$r$	95% CI	$Q_w$	
<b>Risk factors</b>									
1 <sup>§</sup>	9	0.25	[0.15, 0.35]	155.14 <sup>†</sup>	9	0.29	[0.21, 0.37]	127.09 <sup>†</sup>	0.30
2	42	0.27	[0.23, 0.30]	331.90 <sup>†</sup>	24	0.31	[0.26, 0.35]	208.23 <sup>†</sup>	1.66
3	1	0.34	[0.26, 0.41]	-	2	0.28	[0.15, 0.40]	3.19	1.32
4	15	0.28	[0.22, 0.34]	114.27 <sup>†</sup>	13	0.28	[0.21, 0.35]	143.00 <sup>†</sup>	0.01
5	1	0.38	[0.18, 0.55]	-	4	0.27	[0.20, 0.34]	7.90*	1.14
Intra total	68	0.26	[0.23, 0.29]	612.72 <sup>†</sup>	52	0.30	[0.27, 0.34]	493.21 <sup>†</sup>	3.12
7	14	0.21	[0.15, 0.28]	100.86 <sup>†</sup>	10	0.23	[0.17, 0.28]	27.34 <sup>†</sup>	0.08
8	25	0.23	[0.18, 0.28]	384.17 <sup>†</sup>	14	0.19	[0.14, 0.24]	76.60 <sup>†</sup>	1.07
9	5	0.25	[0.11, 0.38]	45.41 <sup>†</sup>	2	0.13	[-0.08, 0.33]	4.80*	0.98
Inter total	44	0.23	[0.18, 0.27]	380.56 <sup>†</sup>	26	0.18	[0.15, 0.22]	178.76 <sup>†</sup>	2.30
Total	112	0.25	[0.23, 0.27]	1120.66 <sup>†</sup>	78	0.26	[0.24, 0.29]	969.39 <sup>†</sup>	0.68
<b>Protective factors</b>									
1	27	-0.18	[-0.22, -0.14]	197.23 <sup>†</sup>	15	-0.25	[-0.32, -0.22]	92.25 <sup>†</sup>	3.35
2	-	-	-	-	2	-0.11	[-0.19, -0.02]	0.67	-
3	15	-0.29	[-0.38, -0.20]	265.63 <sup>†</sup>	15	-0.33	[-0.40, -0.26]	136.95 <sup>†</sup>	0.49
4	7	-0.17	[-0.25, -0.09]	27.72 <sup>†</sup>	3	-0.29	[-0.34, -0.25]	20.91 <sup>†</sup>	1.79
5	10	-0.09	[-0.13, -0.06]	22.93 <sup>†</sup>	8	-0.19	[-0.25, -0.12]	20.46 <sup>†</sup>	7.01 <sup>†</sup>
6	6	-0.31	[-0.52, -0.06]	155.73 <sup>†</sup>	11	-0.20	[-0.27, -0.13]	34.57 <sup>†</sup>	0.09
Intra total	65	-0.20	[-0.24, -0.16]	760.50	54	-0.26	[-0.29, -0.22]	556.39 <sup>†</sup>	4.09*
7	29	-0.15	[-0.18, -0.12]	133.77 <sup>†</sup>	36	-0.18	[-0.21, -0.16]	80.92 <sup>†</sup>	3.09
8	35	-0.21	[-0.24, -0.17]	234.43 <sup>†</sup>	22	-0.19	[-0.21, -0.16]	55.83 <sup>†</sup>	0.85
9	10	-0.15	[-0.27, 0.02]	259.97 <sup>†</sup>	4	-0.20	[-0.25, -0.14]	3.87	0.45
Intra total	74	-0.17	[-0.19, -0.15]	373.83 <sup>†</sup>	62	-0.20	[-0.22, -0.18]	373.83 <sup>†</sup>	3.46
Total	139	-0.19	[-0.21, -0.16]	1896.93 <sup>†</sup>	116	-0.22	[-0.24, -0.20]	616.27 <sup>†</sup>	3.83

CI, confidence interval.

\* $p < 0.05$ .

<sup>†</sup> $p < 0.01$ .

<sup>‡</sup> $p < 0.001$ .

<sup>§</sup>1, self; 2, emotion; 3, control/regulation; 4, temperament; 5, stress/coping; 6, school adjustment; 7, relational ability/quality; 8, parent relationship; 9, family functioning; Intra, intrapersonal variables; Inter, interpersonal variables.

cents than for any other age group.

On the other hand, relational ability/quality ( $r = -0.19$  vs.  $-0.15$ , vs.  $-0.15$ ),  $Q_b(1) = 16.06$ ,  $p < 0.01$ , was the only interpersonal variable that showed significant differences among the age groups.

### Study-level moderators

#### Internet addiction type

A detailed examination of the risk-factor effect sizes by study-level moderator is shown in Table 6. It is important to note that almost all the effect sizes for the risk factors did not vary according to the subtype of Internet addiction. Similarly, those for the protective factors did not vary by subtype. However, there was one exception: the stress/coping variable was significantly associated with a stronger effect size

for the Internet-game addiction measure ( $r = -0.09$  vs.  $-0.19$ ),  $Q_b(1) = 7.01$ ,  $p < 0.01$ . The proposed effect of the measure type on the psychosocial factors of Internet addiction was not supported.

## DISCUSSION

The present study sought to quantify the relationships between psychosocial factors and Internet addiction in Korean participants. The present meta-analysis included results from 95 articles and involved combined sample sizes that ranged from 61 to 6499 subjects, with 59283 in total. This large sample can provide a considerable empirical basis for determining the strongest risk and protective factors of Internet addiction.

The most noteworthy finding of the meta-analyses was that intrapersonal variables had medium-to-strong average correlations with Internet addiction, whereas interpersonal variables had small-to-medium average correlations. In addition, intrapersonal variables were statistically shown to have larger effects on Internet addiction than interpersonal variables. This indicates that Internet addiction in Korea is more strongly associated with intrapersonal stress and vulnerable traits than with interpersonal difficulties. In other words, incompetence or difficulties in dealing with developmental challenges such as real self-ideal self-discrepancy are more likely to predispose certain individuals to overuse and become addicted to the Internet rather than difficulties in dealing with interpersonal conflicts. It is likely that people become easily susceptible to Internet addiction when they suffer from distress and negative emotions associated with intrapersonal difficulties. This suggests that high-risk individuals can be identified by assessing intrapersonal vulnerabilities in developmental stages and can be prevented through therapeutic methods that target inner vulnerabilities.

The interpersonal variables for relational ability/quality, parent relationship, and family functioning were all below the medium level, contrary to prior studies that indicated interpersonal variables are critical factors in Internet addiction.<sup>19,23,24,32-37</sup> In particular, Korean researchers<sup>60,61</sup> have paid particular attention to the parent-child relationship as a strong predictor of Internet addiction because Korean parents' authoritarian style of child-rearing and lack of communication, influenced by Confucianism, have been discussed as a contributing factor to other adolescent behavioral problems. However, our meta-analysis demonstrated that the effect of interpersonal variables on Internet addiction is smaller than expected.

Each of the eight sub-intrapersonal variables among the risk and protective factors had effect sizes that can be characterized as medium to strong ( $r \geq 0.30$ ) according to Cohen's guidelines.<sup>59</sup> First, as stated above, the "escape from self" variable appeared to have a homogeneous effect on addiction, and that effect was larger than that of the other self-related variables. This suggests that the tendency to "escape from the self" is a major factor in accounting for Internet addiction. Adolescence has been described as a period in which identity formation is a central developmental task. Achieving a sense of personal autonomy and an identity that is separate from the family is often distressful. Thus, adolescents who suffer from a great deal of distress when

faced with a reality that does not meet their high expectations or ideals<sup>3,62</sup> could rigidly rely on the Internet in an attempt to eliminate their dissatisfaction or distress. Moreover, youths strive to find their authentic self by trying out different potential self-identities and by breaking their social inhibitions through use of the Internet. The Internet can be an inexpensive way of experimenting with various sides of the potential self and moving past the apprehension with the unidentified self. Thus, immediate reinforcement from an easily accessible space may make users preoccupied with receiving transient satisfaction from the virtual self, which may in turn lead to Internet addiction.<sup>63</sup> This may be a particularly important mechanism for Korean children and adolescents. Korean youngsters have been shown to be afflicted with an ideal-real self-discrepancy that arises from high expectations that are focused on academic success and the resulting negative self-evaluation and mood.<sup>3</sup>

Moreover, the greatest magnitude of negative effect size among the self-variables was for "self-identity," which indicates that awareness of one's unique identity functions as a strong protective factor against Internet addiction. Thus, youngsters who suffer from an identity crisis should be given more attention, whereas therapists and educators should focus on early prevention and intervention by promoting self-identity achievement.

Second, control/regulation-related variables also had stronger effect sizes than any other variables. Specifically, the magnitudes of the negative effects of both emotional regulation and self-control were stronger than the medium level as protective factors for these variables, whereas the average correlation for attention problems approached the medium size as risk factors. This suggests that increased self-control enables people to reasonably control their use of the Internet, thereby preventing its addictive potential. These results are also consistent with other findings indicating that Internet addicts are weaker at controlling their behaviors, impulses, or emotions than average Internet users.<sup>9,61</sup> In this regard, enhancing an individual's level of self-control should be considered as one essential intervention strategy. This may be related to the result that emotion clarity/regulation as a protective factor also showed a stronger effect size than any other variable. Emotional regulation is used to denote the various skills required for monitoring and managing one's experiences and expressions of, and responses to, emotions.<sup>64</sup> Thus, poor self-regulators may turn to the avoidant medium of the Internet. This avoidant coping strategy leads them into being trapped in a vicious circle of expo-

sure to a negative emotional state, which in turn leads to repetitive Internet use. Attentional control problems as a risk factor for Internet addiction also seems to be connected to the issue of self-control. Previous studies have suggested that poor neurocognitive skills in children with attention problems is an independent risk factor for substance-related disorders.<sup>65</sup> This is also true for youngsters with an Internet addiction. Children with an attention control problem may show deficiencies in strategic flexibility, planning, working memory, and the self-monitoring of behavior,<sup>67,68</sup> which may interfere with their effective control and regulation in terms of their Internet use.

Third, these results show that an individual's temperament and character are two of the major determinants in becoming addicted to the Internet. All of the obsessive/absorption, novelty seeking/impulsivity, and harm avoidant/dependent traits were shown to be important risk factors for Internet addiction. This was an expected result because novelty-seeking and obsessive traits are well-known risk factors for both substance addiction<sup>69,70</sup> and Internet addiction.<sup>27,29</sup> It is notable that a high level of the harm-avoidant/dependent trait has been suggested as another important risk factor by Korean researchers, and it has been shown to have a relatively higher effect on Internet addiction than other factors. This may indicate that users who have sensitive temperaments and a low threshold for external stimuli are more likely to become addicted to the Internet than other users in Korea.

Fourth, negative stress coping was associated with a large effect size. Specifically, non-addicted Internet users more frequently took part in various stress-releasing activities such as attendance at leisure or club activities, compared to their addicted counterparts.<sup>71,72</sup> In addition, adolescents appeared to be more vulnerable when they had fewer diverse stress coping strategies and, thus, inflexibly used the Internet as a means of stress release. Therefore, it is important to provide education about Internet addiction that encourages students to engage in alternative leisure activities and to develop alternative means stress reduction.

Finally, among the emotion/mood variables, anger/aggression appeared to have a substantial impact on Internet addiction, despite its heterogeneity. Anger/aggression has been shown to be associated primarily with substance addiction;<sup>73</sup> meanwhile, it has also been shown to be predictive of Internet addiction.<sup>22,23</sup> A possible explanation for the effect of negative emotions on Internet addiction is that the Internet can be used as an easily accessible alternative method to defuse

negative emotional states such as repressed anger, aggression, and hostility. This may be, at least in part, because the Internet is the only way to release latent aggressive impulses that are not acceptable in society but can be expressed in the online world.<sup>74</sup> The resultant temporarily "unplugged" emotional state becomes rewarding in itself, and, unfortunately, results in users becoming addicted to the medium.

The findings of this study are summarized as follows. First, the major factors accounting for Internet addiction were distress from identity struggles and a negative mood. These factors were also associated with a lack of a coping strategy that led the addicted individual to an avoidant method of stress management. That is, online activities allowed the individual to escape from self-dissatisfaction, relieve emotional distress, and deal with stress. Second, the next strongest risk factor was difficulty with control/regulation, including poor attention control, self-control, and emotional regulation. Third, the last set of psychosocial variables associated with Internet addiction comprised temperaments, such as the individual's impulsivity/novelty seeking, obsessive/absorption, and harm avoidant/dependent traits.

This meta-analysis showed that demographic characteristics may moderate the relationship between risk and protective factors and Internet addiction. The proposed effect of age on the psychosocial factors was partly supported: the associations for younger children were significantly higher than those for adolescents and adults for the intrapersonal variables. This is consistent with the notion that young people may be more vulnerable to the addictive aspects of the Internet than adults,<sup>74</sup> and that they may be more readily influenced by internal conditions because they are still experiencing brain development. By contrast, for the college-student group, temperament was the only variable that exceeded a medium effect size. This suggests that the tendency toward Internet addiction in adults is somewhat innate and habitually formed. Thus, it may be that adults do not become addicted to the Internet because they are vulnerable to psychosocial causes, but rather because they have a genetic predisposition toward addiction. In other words, it may be that younger people who are experiencing psychosocial distress are more likely to turn to the Internet use as an escape from reality, whereas older people who experience temperamental vulnerabilities are more likely to become addicted to Internet activities.

Within interpersonal variables as risk factors, we found that a parent/child relationship problem was more strongly correlated with Internet addiction among elementary school

students than it was for any other age group. This can be explained as follows. Losing a good relationship with a parent may be much more stressful and risky for individuals in their prepubescent years than during puberty or adulthood because young children have not yet completely separated from their parents psychologically or physically. In other words, at this age, they are still significantly influenced by their parents. Thus, a parental relationship problem could be a greater risk factor for Internet addiction among elementary school children than older children.

The hypothesis that there would be differences in psychosocial variables related to Internet addiction subtype was not supported. Some prior studies have distinguished game addiction from Internet addiction, focusing particularly on the destructive or violent aspects of online games and the psychological causes of game addiction. However, the results of this study suggest that game addiction and Internet addiction may be associated with similar psychological factors. These findings support the perspective that Internet addiction and game addiction may be distinctive expressions of the same underlying vulnerability. Whether other, more powerful, psychosocial factors are associated with game addiction in particular remains an open question. However, taking into consideration that quite a large number of studies were included in this review, that they are different manifestations of the same underlying process merits further attention. Furthermore, the similarity in the psychological profiles for each subtype has intervention implications. First, to be maximally effective, treatments for these problem behaviors may need to focus on the general Internet-use pattern rather than on specific Internet activities. Second, the comorbidity of psychological issues such as negative emotions, interpersonal problems, and self-related difficulties suggests that Internet-game addiction and general Internet addiction have common underlying etiologies and consequences. Regardless of the debate regarding the conceptualization of these problem behaviors, these findings clearly indicate that individuals classified as Internet-game addicts and Internet addicts may require similar assistance in enhancing their psychological functioning.

This study has several limitations. First, the direction of the relation between the psychosocial variables and Internet addiction is hard to determine due to the use of a cross-sectional research design. In order to determine causality, prospective research to ascertain whether psychosocial variables are symptomatic of Internet addiction or whether Internet addiction is symptomatic of psychosocial problems is necessary.

The implementation of analytical methods that can test causal relationships, rather than merely examining the degree of associations, is recommended so that antecedents and consequences of Internet addiction can be clearly differentiated.<sup>39</sup> Second, as we have indicated, some of the current analyses suffered from a relatively small number of available studies. As the research literature on the association between psychosocial factors and Internet addiction continues to develop, future meta-analyses will be able to replicate and extend the present findings to lend more confidence in our conclusions, particularly for the relevant moderator variables. Finally, because the present meta-analysis included only Korean studies, future meta-analytic reviews that include data from international participants should be conducted. It will then be possible to compare the psychosocial causes of Internet addiction in a way that reflects cultural differences.

Despite these limitations, the results of this study have several suggestions and implications. First, this is the first meta-analytic study to be primarily concerned with the psychosocial correlates of Internet addiction and with identifying the features that either increase or decrease an individual's risk of developing an addiction. Second, while previous studies investigating the associations between psychosocial factors and Internet addiction have rarely analyzed the comparative effects of intrapersonal and interpersonal variables, the present meta-analytic study revealed that intrapersonal variables have a greater contribution than interpersonal variables. Thus, intrapersonal problems must be seriously considered when developing strategies to prevent Internet addiction and in planning educational programs for Koreans who are addicted to the Internet. In addition, high-risk individuals can be identified via an assessment of psychological traits (e.g., temperamental vulnerabilities) so that further methods of protection from Internet addiction can be developed. Further, these findings have some additional implications regarding the most appropriate types of treatment and prevention programs. For example, such programs should aim to improve the psychological factors related to self-identity problems and negative emotions as well as influence changes in Internet use. Finally, the present study contributes to the field by taking a step toward understanding the psychosocial factors through which vulnerable people develop an Internet addiction. Although confined to Koreans, the results of this study are expected to provide the basic data for developing a better theoretical overview of Internet addiction.



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## REFERENCES

- Park SK, Kim JY, Cho CB. Prevalence of Internet addiction and correlations with family factors among South Korean adolescents. *Adolescence* 2008;43:895-909.
- Yang CK, Choe BM, Baity M, Lee JH, Cho JS. SCL-90-R and 16PF profiles of senior high school students with excessive internet use. *Can J Psychiatry* 2005;50:407-14.
- Kwon JH, Chung CS, Lee J. The effects of escape from self and interpersonal relationship on the pathological use of Internet games. *Community Ment Health J* 2011;47:113-21.
- Seo M, Kang HS, Yom YH. Internet addiction and interpersonal problems in Korean adolescents. *Comput Inform Nurs* 2009;27:226-33.
- Liu CY, Kuo FY. A study of Internet addiction through the lens of the interpersonal theory. *Cyberpsychol Behav* 2007;10:799-804.
- Gackenbach J. *Psychology and the internet: Intrapersonal, interpersonal, and transpersonal implications*. 2nd ed. New York, NY: Academic Press; 2011.
- Petratis J, Flay BR, Miller TQ. Reviewing theories of adolescent substance use: organizing pieces in the puzzle. *Psychol Bull* 1995;117:67-86.
- Davis RA. A cognitive-behavioral model of pathological internet use. *Comput Hum Behav* 2001;17:187-95.
- Niemz K, Griffiths M, Banyard P. Prevalence of pathological Internet use among university students and correlations with self-esteem, the General Health Questionnaire (GHQ), and disinhibition. *Cyberpsychol Behav* 2005;8:562-70.
- Kim HK, Davis KE. Toward a comprehensive theory of problematic Internet use: Evaluating the role of self-esteem, anxiety, flow, and the self-rated importance of Internet activities. *Comput Hum Behav* 2009;25:490-500.
- Stieger S, Burger C. Implicit and explicit self-esteem in the context of internet addiction. *Cyberpsychol Behav Soc Netw* 2010;13:681-8.
- Huang YR. Identity and intimacy crises and their relationship to internet dependence among college students. *Cyberpsychol Behav* 2006;9:571-6.
- Israelashvili M, Kim T, Bukobza G. Adolescents' over-use of the cyber world—Internet addiction or identity exploration? *J Adolesc* 2012;35:417-24.
- Mazalin D, Moore S. Internet use, identity development and social anxiety among young adults. *Behav Chang* 2004;21:90-102.
- Ha JH, Kim SY, Bae SC, Bae S, Kim H, Sim M, et al. Depression and Internet addiction in adolescents. *Psychopathology* 2007;40:424-30.
- Young KS, Rogers RC. The relationship between depression and internet addiction. *Cyberpsychol Behav* 1998;1:25-8.
- Kim K, Ryu E, Chon MY, Yeun EJ, Choi SY, Seo JS, et al. Internet addiction in Korean adolescents and its relation to depression and suicidal ideation: a questionnaire survey. *Int J Nurs Stud* 2006;43:185-92.
- Lee SB, Lee KK, Paik KC, Kim HW, Shin SK. Relationship between internet addiction and anxiety, depression, and self efficacy in middle and high school students. *J Korean Neuropsychiatr Assoc* 2001;40:1174-84.
- Caplan SE. Relations among loneliness, social anxiety, and problematic Internet use. *Cyberpsychol Behav* 2007;10:234-42.
- Lemmens JS, Valkenburg PM, Peter J. Development and validation of a game addiction scale for adolescents. *Media Psychol* 2009;12:77-95.
- Peters CS, Malesky LA. Problematic usage among highly-engaged players of massively multiplayer online role playing games. *Cyberpsychol Behav* 2008;11:481-4.
- Ko CH, Yen JY, Liu SC, Huang CF, Yen CF. The associations between aggressive behaviors and internet addiction and online activities in adolescents. *J Adolesc Health* 2009;44:598-605.
- Harman JP, Hansen CE, Cochran ME, Lindsey CR. Liar, liar: internet faking but not frequency of use affects social skills, self-esteem, social anxiety, and aggression. *Cyberpsychol Behav* 2005;8:1-6.
- Yen JY, Ko CH, Yen CF, Wu HY, Yang MJ. The comorbid psychiatric symptoms of Internet addiction: attention deficit and hyperactivity disorder (ADHD), depression, social phobia, and hostility. *J Adolesc Health* 2007;41:93-8.
- Ebeling-Witte S, Frank ML, Lester D. Shyness, Internet use, and personality. *Cyberpsychol Behav* 2007;10:713-6.
- Cao F, Su L, Liu T, Gao X. The relationship between impulsivity and Internet addiction in a sample of Chinese adolescents. *Eur Psychiatry* 2007;22:466-71.
- Ko CH, Yen JY, Chen CC, Chen SH, Wu K, Yen CF. Tridimensional personality of adolescents with internet addiction and substance use experience. *Can J Psychiatry* 2006;51:887-94.
- Mottram AJ, Fleming MJ. Extraversion, impulsivity, and online group membership as predictors of problematic internet use. *Cyberpsychol Behav* 2009;12:319-21.
- Lin SSJ, Tsai CC. Sensation seeking and internet dependence of Taiwanese high school adolescents. *Comput Hum Behav* 2002;18:411-26.
- Yoo HJ, Cho SC, Ha J, Yune SK, Kim SJ, Hwang J, et al. Attention deficit hyperactivity symptoms and internet addiction. *Psychiatry Clin Neurosci* 2004;58:487-94.
- Kim EJ, Namkoong K, Ku T, Kim SJ. The relationship between online game addiction and aggression, self-control and narcissistic personality traits. *Eur Psychiatry* 2008;23:212-8.
- Lavin MJ, Yuen CN, Weinman M, Kozak K. Internet dependence in the collegiate population: the role of shyness. *Cyberpsychol Behav* 2004;7:379-83.
- İskender M, Akin A. Social self-efficacy, academic locus of control, and internet addiction. *Comput Educ* 2010;54:1101-6.
- Ghassemzadeh L, Shahraray M, Moradi A. Prevalence of internet addiction and comparison of internet addicts and non-addicts in Iranian high schools. *Cyberpsychol Behav* 2008;11:731-3.
- Yen JY, Yen CF, Chen CC, Chen SH, Ko CH. Family factors of internet addiction and substance use experience in Taiwanese adolescents. *Cyberpsychol Behav* 2007;10:323-9.
- Ni X, Yan H, Chen S, Liu Z. Factors influencing internet addiction in a sample of freshmen university students in China. *Cyberpsychol Behav* 2007;10:323-9.

- chol Behav 2009;12:327-30.
37. Grunbaum JA, Tortolero S, Weller N, Gingiss P. Cultural, social, and intrapersonal factors associated with substance use among alternative high school students. *Addict Behav* 2000;25:145-51.
  38. Kim DH. Effects of aggressive personality, video games' violence and characters' roles of violent games for middle school students' aggression [master's thesis]. Seoul, Korea: Korea University; 2008.
  39. Douglas AC, Mills JE, Niang M, Stepchenkova S, Byun S, Furrini C, et al. Internet addiction: meta-synthesis of qualitative research for the decade 1996-2006. *Comput Hum Behav* 2008;24:3027-44.
  40. Chou C, Condrón L, Belland JC. A review of the research on internet addiction. *Educ Psychol Rev* 2005;17:363-88.
  41. Goldberg I. Internet Addiction Disorder [Internet] 1996 [Cited on 2004, November 20]. Available from: <http://www.psychom.net/iadcriteria.html/>.
  42. Young KS. Internet addiction: the emergence of a new clinical disorder. *Cyberpsychol Behav* 1998;1:237-44.
  43. Shapira NA, Lessig MC, Goldsmith TD, Szabo ST, Lazoritz M, Gold MS, et al. Problematic internet use: proposed classification and diagnostic criteria. *Depress Anxiety* 2003;17:207-16.
  44. Beard KW, Wolf EM. Modification in the proposed diagnostic criteria for Internet addiction. *Cyberpsychol Behav* 2001;4:377-83.
  45. Kang HY, Son CN. A meta analysis on the variables related Internet and game addiction. *Korean J Health Psychol* 2007;12:733-44.
  46. Lee HJ. The study on the factor and the process of adolescent's internet addiction: focused on mixed method using meta-analysis and in-depth interview. 2009. Seoul, Korea: Yonsei University; 2009.
  47. Arthur MW, Hawkins JD, Pollard JA, Catalano RF, Baglioni AJ Jr. Measuring risk and protective factors for substance use, delinquency, and other adolescent problem behaviors. The Communities That Care Youth Survey. *Eval Rev* 2002;26:575-601.
  48. Kim CT, Kim DI, Park JK, Lee SJ. A study on internet addiction counseling and the development of prevention programs. Seoul, Korea: Ministry of Information and Communication; 2002.
  49. Lee HC, Choi KY, Lee SM, Ban JC, Lee SY. Development of a self-report scale for measuring behavioral symptoms of adults' pathological internet use. *Korean J Clin Psychol* 2007;26:765-91.
  50. Kim YJ. Development of adolescent internet game addiction scale and psychosocial vulnerability factors of internet game addiction [master's thesis]. Seoul, Korea: Ajou University; 2002.
  51. Kang MC, Oh IS. Development of Internet Addiction Scale for Korean Adolescent. *Korean Educ Psychol J* 2002;16:247-74.
  52. Korea Creative Content Agency. Maladaptive game use scale. Comprehensive scale for assessing game behavior manual. Seoul, Korea: Creative Content Agency; 2011.
  53. Hwang HS, Park SB. The impact of user's psychological experience on online game addiction: perceived reality and sense of presence. *J Community Sci* 2011;11:471-505.
  54. National Information Society and Agency. Third standardization of Korean Internet Addiction Proneness Scale. Seoul, Korea: National Information Society Agency; 2011.
  55. Rosenthal R. Meta-analytic procedures for social research (revised edition). Thousand Oaks, CA: SAGE Publications; 1991.
  56. Hedges LV, Olkin I. *Statistical Methods for Meta-analysis*. Orlando, FL: Academic Press; 1985.
  57. Hunter JE, Schmidt FL, Jackson GB, American Psychological Association. Division of Industrial-Organizational Psychology. Meta-analysis: cumulating research findings across studies. Beverly Hills, CA: Sage; 1982.
  58. Cooper H, Hedges LV. *The handbook of research synthesis*. New York, NY: The Russel Sage Foundation; 1993.
  59. Cohen J. *Statistical power analysis for the behavioral sciences*. 2nd ed. Hillsdale, NJ: Erlbaum; 1988.
  60. Oh WO. Factors influencing internet addiction tendency among middle school students in Gyeong-buk area. *Taehan Kanho Hakhoe Chi* 2003;33:1135-44.
  61. Lee S, Nam YJ. Internet addiction in correlation to friendship and internet use of adolescents. *J Korean Home Econ Assoc* 2004;42:1-16.
  62. Baumeister RF. Suicide as escape from self. *Psychol Rev* 1990; 97:90-113.
  63. Morahan-Martin J, Schumacher P. Incidence and correlates of pathological Internet use among college students. *Comput Hum Behav* 2000;16:13-29.
  64. Grolnick WS, Bridges LJ, Connell JP. Emotion regulation in two-year-olds: strategies and emotional expression in four contexts. *Child Dev* 1996;67:928-41.
  65. Biederman J, Wilens TE, Mick E, Faraone SV, Spencer T. Does attention-deficit hyperactivity disorder impact the developmental course of drug and alcohol abuse and dependence? *Biol Psychiatry* 1998;44:269-73.
  66. Tapert SF, Baratta MV, Abrantes AM, Brown SA. Attention dysfunction predicts substance involvement in community youths. *J Am Acad Child Adolesc Psychiatry* 2002;41:680-6.
  67. Sergeant J. The cognitive-energetic model: an empirical approach to attention-deficit hyperactivity disorder. *Neurosci Biobehav Rev* 2000;24:7-12.
  68. Cepeda NJ, Cepeda ML, Kramer AF. Task switching and attention deficit hyperactivity disorder. *J Abnorm Child Psychol* 2000;28: 213-26.
  69. Wills TA, Cleary SD. Peer and adolescent substance use among 6th-9th graders: latent growth analyses of influence versus selection mechanisms. *Health Psychol* 1999;18:453-63.
  70. Hampson SE, Andrews JA, Barckley M. Childhood predictors of adolescent marijuana use: early sensation-seeking, deviant peer affiliation, and social images. *Addict Behav* 2008;33:1140-7.
  71. Joh H. A study on preventive measures against internet addiction of the youth [master's thesis]. Seoul, Korea: Sogang University; 2003.
  72. Lin CH, Lin SL, Wu CP. The effects of parental monitoring and leisure boredom on adolescents' Internet addiction. *Adolescence* 2009;44:993-1004.
  73. Gerra G, Angioni L, Zaimovic A, Moi G, Bussandri M, Bertacca S, et al. Substance use among high-school students: relationships with temperament, personality traits, and parental care perception. *Subst Use Misuse* 2004;39:345-67.
  74. Griffiths MD, Hunt N. Dependence on computer games by adolescents. *Psychol Rep* 1998;82:475-80.
  75. Hong CH. Proceedings of the Korean Psychological Association Division of Clinical Psychology Diss Collect Summer Conf. Seoul, Korea: Korean Clinical Psychology Association; 1999. p.127-32.
  76. Lee SY, Kwon JH. Impulsivity, Social problem-solving abilities, and communication style of adolescent Internet game addicts. *Korean J Clin Psychol* 2001;20:67-80.
  77. Kim JW, Cho OK. The relationship between self-control, social-environmental factors and internet game addiction. *Theory Pract Educ* 2002;12:477-500.

78. Oh IS, Woo GG. The psycho-social factors related to elementary children's computer game addiction. *Korean J Couns* 2005;6:563-71.
79. Kim KS, Kim JH. A study on adolescent's level of internet addiction by their perceived relationships with parents. *Korean J Hum Ecol* 2003;6:15-25.
80. Bang HJ, Cho AM. Relationship between family function and adolescents' internet game-related behavior. *Korean J Dev Psychol* 2003;16:1-22.
81. Byeon YS, Kim EH, Shin SJ, Kim HS, Kim JH, Gu JE, et al. Addiction to internet among university students and its relationships with self-esteem and depression. *Nurs Sci* 2003;15:61-72.
82. Lee KN. The effects of children's perception of communications with mothers and self-control on game addiction. *J Korean Home Econ Assoc* 2003;41:77-91.
83. Lee HG. Effects of individual- and social-related factors and motives for game playing on game concentration and game addiction. *Korean J Youth Stud* 2003;10:355-80.
84. Jo AM, Bang HJ. The effects of parent, teacher, and friend social support on adolescents' game addiction. *Korean J Youth Stud* 2003;10:249-75.
85. Kwon YH, Kim CN. The relationship between computer game addiction and the impulsiveness, aggression, and emotional intelligence of elementary school students. *J Korean Community Nurs* 2004;15:460-70.
86. Ryu EJ, Choi KS, Seo JS, Nam BW. [The relationships of Internet addiction, depression, and suicidal ideation in adolescents]. *Taehan Kanho Hakhoe Chi* 2004;34:102-10.
87. Lee KN. The individual and environmental variables that affect children's game addiction tendency. *J Korean Home Econ Assoc* 2004;42:99-118.
88. Lee KM, Chang SS. Self-concept, escaping from the self and social support of internet addictive user. *Korean J Couns Psychother* 2004;16:743-56.
89. Kang S. Structural equation model analysis of relationships between adolescents' attitude of interpersonal relationships, self-esteem, regulation and internet addiction. *Stud Korean Youth* 2005;16:165-94.
90. Kim YH, Chong YS. Parent-child communication, peer relationship and internet addiction in children. *J Korean Home Econ Assoc* 2005;43:103-14.
91. Yoon M, Lee Y. A structural model of the relationships among perceived social support, computer game addiction, and academic achievement. *Korea J Educ Methodol Stud* 2005;17:183-96.
92. Lee C, Jeong G. The relations between elementary pupils' game addiction, aggression and personality. *J Korean Assoc Inform Educ* 2005;9:417-38.
93. Lim JS, Kang SG, Kim SS. A study on the factors affecting adolescents' internet addiction for the preventive education of internet addiction. *Community Korean Assoc Comput Educ* 2005;8:75-83.
94. Jang JH. The impact of needs for internet use and psychosocial variables on game addiction of adolescents: comparison by sex. *J Future Oriented Youth Soc* 2005;2:39-55.
95. Ha JH, Lee HK. The effects of optimism, self-efficacy in the real life, self-efficacy in the cyber-space, hardiness, internet-immersion, on adolescents' internet addiction. *Korean J Couns* 2005;6:919-32.
96. Kwon JH. The internet game addiction of adolescents: temporal changes and related psychological variables. *Korean J Clin Psychol* 2005;24:267-80.
97. Kim KW, Boo JM. The Relationship between Flow State, Addiction Orientation in Online Games and Personal Psychological Factors: with focuses on self-esteem, self-control, depression, aggressiveness and tendency in sensation seeking. *Korean J Couns* 2007;7:1169-87.
98. Jeon YJ, Seo MY. High-school students' internet addiction and related variables. *J Korean Home Econ Assoc* 2006;44:13-25.
99. Yoon YM, Park HM. Personal and environmental predictors of internet addiction in higher grade elementary school students. *Korean J Child Health Nurs* 2006;12:34-43.
100. Lee YK, Chae KM. Relations of computer game addiction and social relationship, adjustment of adolescent. *Korean J Clin Psychol* 2006;25:711-26.
101. Lee JM, Kim M, Kim JH. The relationships among adolescent's internet addiction, negative emotions, metacognition and meta-mood: gender differences in high school students. *J Soc Sci Res* 2012;17:77-97.
102. Jeon HJ. The attachment style and psychological characteristics of internet addiction among college students. *Korean J Youth Stud* 2006;13:137-59.
103. Kim SJ, Park WM, Park SB. The relationship between internet addiction and personal, familial, social and school related causes. *Korean J Sch Psychol* 2007;4:193-211.
104. Kim SY, Choi SY, Kim B. The impact of self-consciousness, stress, and internet use control on internet addiction among adults. *Korea Soc IT Serv J* 2007;6:47-67.
105. Kim YH, Son HM, Yang YO, Cho YR, Lee NY. Relation between internet game addiction in elementary school students and student's perception of parent-child attachment. *J Korean Acad Child Health Nurs* 2007;13:383-9.
106. Kim EJ, Kim MG, Kim JH. Effects of academic self-efficacy, communication apprehension, on students' online game addiction via social presence and life satisfaction. *Korean J Educ Psychol* 2007;21:209-31.
107. Suh SY, Lee YH. The relationships between daily hassles, social support, absorption trait and internet addiction. *Korean J Clin Psychol* 2007;26:391-405.
108. Shin HM, You MS, Cho YJ. Relationships between children's stress-coping styles and risk of internet gaming addiction. *J Early Child* 2007;28:233-47.
109. Oh WO. Factors influencing internet addiction among high school students. *J Korean Acad Child Health Nurs* 2007;13:81-9.
110. Jang MK, Lee EK. A study on the effect of need for internet use and parent related variables on game addiction. *Korean J Couns Psychother* 2007;19:1125-38.
111. Joo AR. Correlations among internet games addiction, self-esteem and physical health in middle school students. *J Korean Acad Community Health Nurs* 2007;18:331-9.
112. Han HK, Kim JH. Influence of self-identities in real space and virtual space on game addiction and maladaptation: focused on the users of online role playing game. *Korean J Communi Inf* 2007;37:342-76.
113. Kang RH. A study of relationship between children's internet addiction and communication with parents and psychological variables. *Korean J Fam Welf* 2008;9:129-48.
114. Kweon SH, Kweon SN. The effect of children's perception of parenting attitude and learned helplessness on computer game addiction. *J Korea Soc Comput Inf* 2008;13:59-69.
115. Kim JU. The relationship among middle school students' internet addiction, self-control and mental health. *Second Educ Res*

- 2008;56:1-22.
116. Boo JM, Kweon SY. Predictors of on-line game addiction of junior-high school students. *J Fish Mar Sci Educ* 2008;20:390-9.
  117. Son JH. Relationship between impulsiveness and game addiction in adolescents: verifying the mediating effects of oiettolie propensity. Seoul: Seoul Womens Univ.; 2008.
  118. Han KH, Ahn KS. A study on comparison of effect to internet addiction for adolescents and university students. *J Korea Inst Youth Fac Environ* 2008;6:5-18.
  119. Kwon YG, Lee YS. The impact of parental relationships perceived by adolescent children on their internet addiction. *J Hum Underst Couns* 2009;30:101-18.
  120. Kim K. The study on the internet addiction influencing factor and coping strategies for juvenile. *J Korea Soc Comput Inf* 2009;14:157-65.
  121. Kim EY. Psycho-sociologic characteristics related internet addiction for the youth in probation. *J Adolesc Welf* 2009;11:1-23.
  122. Kim KS, Kim K. Parent related factors in internet game addiction among elementary school students. *J Korean Acad Child Health Nurs* 2009;15:24-33.
  123. Nam CY. College students' internet addiction tendency and related variables. *J Adolesc Welf* 2009;11:121-40.
  124. Park KA, Kim HS, Lee HJ, Kim OH. The effect of family and personal variable of internet addicted young adults. *Korean J Health Psychol* 2009;14:41-51.
  125. Park YU, Kim JT. Internet addiction, self-esteem, self-control, and impulsiveness among male high school students. *J Hum Underst Couns* 2009;30:119-34.
  126. Park ES. The effects of internet addictive tendency on the self-esteem and leisure activities of middle school students. *J Couns Psychol* 2009;9:1-35.
  127. Baek JE. A study of elementary school students' internet game addiction and related variables. *Korean J Play Ther* 2009;12:111-27.
  128. Shin W, Choi M, Kim J. The effects of the three resilience factors on problematic online game uses. *J Cybercommunity* 2009;26:43-81.
  129. Ahn SY, Kim HJ, Yun SH, Cheon SM. The effect of middle school students recognized dysfunctional home to internet addiction: by the medium of depression and self-esteem. *Korean J East West Sci* 2009;12:33-46.
  130. Yoon HM, Nam YO. Self-esteem, depression, impulsiveness and social relations in adolescents with internet addiction. *J Hum Ecol* 2009;13:125-43.
  131. Lea E, Lee JY, Lee KH, Lee EJ. Clusters by children's emotional clarity and emotional intensity over computer game addiction. *Korea J Youth Couns* 2009;17:32-48.
  132. Pyo H, Rhh M. Exploring of the psychological models to explain adolescence's internet addiction. *Korean J Health Psychol* 2009;14:531-48.
  133. Han S, Wang S. Verification of the moderating effects of the variables related to adolescents' addiction to internet game and aggression. *J Educ Res* 2009;7:51-72.
  134. Kang YD, Lee EH. The influence of passion on computer game addiction and the mediating role of hostility and social skills in the relation of computer game addiction to interpersonal relation and social anxiety. *Korean J Health Psychol* 2010;15:529-48.
  135. Kwon SK, Jang EY. Internet use among children: an exploratory study of comorbid disorders and predictors. *Korean J Clin Psychol* 2010;29:1067-86.
  136. Kwon JH. The mediation model verification of interpersonal skills on impulsivity, aggression and game addiction: comparative analysis on school levels. *J Korea Soc Comput Inf* 2010;15:87-98.
  137. Kim Y. Effects of perceived parental attitude and masking on internet addiction. *Korean J Couns Psychother* 2010;22:885-900.
  138. Kim JH, Kim KS. Mediating effects of psychological function in the relations between family function and internet addiction of college students. *J Fam Relat* 2010;15:155-71.
  139. Kim HS, Choi YH, Yoo SJ. The study on the relations among ego-identity, stress, and internet addiction in high school students. *J Korean Acad Psychiatr Ment Health Nurs* 2010;19:173-85.
  140. Seo MY, Lim EM. Infants' and low-grade elementary students' internet game addiction tendency and the relationship between game addiction tendency and personality characteristics. *J Child Educ* 2010;19:163-75.
  141. Song H. The relationship between adolescent's impulsiveness and internet game addiction. *Korean Acad Mental Health Soc Work Autumn Conf* 2010;1:225-55.
  142. Shin JS, Lee CH. The effects of self-control and social support on the adolescents' internet addiction. *Korean J Youth Stud* 2010;17:105-28.
  143. Lee J, Han KH. Difference analysis of risk and protection factors for internet addiction between computer science gifted students and average students. *J Gift Talent Educ* 2010;20:1005-26.
  144. Jang MK. A study on the relationship between parent related variables and game addiction through the perceptions of parent. *Korean J Youth Stud* 2010;17:47-66.
  145. Cho YH, Jang JC. Relation among youth's participation grade in sports, self-esteem, and propensity to internet game addiction. *Korean J Sports Sci* 2010;19:207-18.
  146. Cho CB, Lim JS. Parent-child interaction and internet games addiction and delinquency in adolescence. *Korean J Youth Stud* 2010;17:197-226.
  147. Choi JE, Moon SB. Structural analysis on school-aged children's internet game addiction and its related variables. *Korean J Child Educ Care* 2010;10:149-68.
  148. Choi TS, An JY. The effect of psychological environment of home and interpersonal relationship skills on adolescents' internet game addiction. *J Korea Soc Comput Inf* 2010;23:131-40.
  149. Kwon JY, Jung HJ. Research on the realities and problem behavior pattern of internet game addiction: centering on male middle school students from City "J". *Korean Assoc Addict Crime Rev* 2011;1:50-68.
  150. Kim DE, Chang S. The effect of self-discrepancy and the way of stress coping on the internet addiction. *J Stud Guid Couns* 2011;29:89-110.
  151. Kim DH, Nam SK, Lee SM. Examining internet addiction and its related variables based on choice theory perspectives. *Educ Methodol Stud* 2011;23:63-75.
  152. Kim JY, Lee JH, Yoon YW. Pathway from domestic violence to adolescents' internet game addiction: focusing on mediating effect of parental attachment. *Korean J Soc Welf* 2011;63:59-82.
  153. So SS, Myung JS, Kim CS. A study of predicting variables for internet addiction in adolescence. *Korean J Health Psychol* 2011;16:521-35.
  154. Yang MS, Jo EJ. A study on internet addiction and parental marital conflict, parenting attitudes, and parental monitoring and control as perceived by elementary school children. *Korean Assoc Hum Ecol* 2011;20:339-51.

155. Lee SJ, Kim GA, Hong CH. The effects of internet use motivation and stress coping on adolescent's pathological internet use: focused on gender difference. *Korean J Woman Psychol* 2011; 16:265-84.
156. Chang MS, Park GP, Jung SH, Woo SW. The relationship among dependent and avoidant personality trait, psychological trait and addiction. *Korean J East West Sci* 2011;14:1-19.
157. Cho YJ. The influence of dysfunctional parent-adolescent communication on game addiction: the moderating effects of leisure satisfaction using Ping's two-step approach. *Korean J Youth Stud* 2011;18:27-48.
158. Jo HI. The effect of elementary school students' perceived parenting attitude and internet use motives on internet addiction: Self-control as a mediator. *J Adolesc Welf* 2011;13:269-87.
159. Kim HS, Ha JC. A study on the factors inducing internet addiction of college students. *J Korean Data Inf Sci Soc* 2011;22:437-48.
160. Choi HJ, Choi YS, Ahn YJ. The effect of parents' raising attitude, self-control, and peer relationship on adolescents' internet addiction. *J Fam Relat* 2011;15:113-33.
161. Kim DW. An analysis on the difference of juvenile delinquency by online game addiction. *Korean Assoc Crim Psychol* 2012;8: 5-33.
162. Yun SI, An HS, Oh SW. The influence of the attachment of parents and the stress of school life middle-school students to the internet game addiction. *J Digit Policy Manag* 2012;10:221-7.
163. Yoo HJ, Cho SC, Ha J, Yune SK, Kim SJ, Hwang J, et al. Attention deficit hyperactivity symptoms and internet addiction. *Psychiatry Clin Neurosci* 2004;58:487-94.