CyberPsychology & Behavior
Volume 5, Number 4, 2002

Validation of a New Scale for Measuring Problematic Internet Use: Implications for Pre-employment Screening

RICHARD A. DAVIS, M.A., GORDON L. FLETT, Ph.D., and AVI BESSER, Ph.D.

ABSTRACT

The current study introduced a theory-driven, multidimensional measure of problematic Internet use: the Online Cognition Scale (OCS). Undergraduate students (n = 211) in an industrial/organizational psychology course completed the OCS, along with measures of procrastination, rejection sensitivity, loneliness, depression, and impulsivity. A confirmatory factor analysis indicated that problematic Internet use consists of four dimensions: diminished impulse control, loneliness/depression, social comfort, and distraction. As hypothesized, the OCS predicted all of the study variables in the expected directions. Representing a departure from previous research in this area, the current article focused on procrastination, impulsivity, and social rejection as key elements of problematic Internet use. Furthermore, interactive applications (e.g., chat) were most related to problematic Internet use, and scores on the OCS predicted being reprimanded at school or work for inappropriate Internet use. As a result, the utility of the OCS for both clinical assessment of Internet addiction and as an organizational preemployment screening measure to identify potential employees who are likely to abuse the Internet in the workplace (also known as "cyberslacking") were discussed.

INTRODUCTION

OVER THE PAST DECADE, the Internet has emerged as an essential medium for personal, academic, and occupational communication. An estimated 400 million users worldwide currently have access to the Internet,[1] and its proliferation continues. As our culture becomes increasingly dependent on such technologies, it is not surprising that some individuals demonstrate problematic behavior related to too much time online. Indeed, a growing body of research has investigated the nature of Internet addiction.[2,3] There has been much controversy and disagreement among researchers regarding the appropriateness of the term "Internet addiction,"[4] and several others have emerged, including *pathological Internet use*,[5,6] *Internet dependency*,[7,8] and *problematic Internet use*.[30] Such confusion is not uncommon during the early stages of developmental research into a new psychological condition. For example, similar debates have occurred among researchers of workaholism.[10] The work on workaholism was derived initially from the assumption that excessive working developed from an underlying addiction. The actual term was coined in jest by a professor of religion to describe his relationship with work.[11] Realizing that others experienced similar thoughts and behaviors, Oates conceptualized the behavior as an excessive and uncontrollable need to work incessantly that disturbs health, happiness, and relation-

Department of Psychology, York University, Toronto, Canada.

ships.[12] In reviewing the literature on problematic Internet use, one can see striking similarities not only in the actual descriptions of the constructs themselves by supplanting the word *work* with *using the Internet*, but also in the developmental lifecycle of the two constructs. The term Internet addiction was also first coined as a joke[13] and then later revised to reflect a more serious condition.[14] In addition, the workaholism literature remained confused for several years, particularly because there was disagreement over the nature of the construct itself and thus an absence of a psychometrically sound measure of it.[10]

One of the first steps in establishing a systematic research program on a new phenomenon is to develop, refine, and validate a measure, and then use it to explore the nature of the construct itself.[15] Although solid attempts have been made,[5,16] these measures have not received extensive psychometric testing, and the research that has been conducted thus far has often involved relatively small samples. Most importantly, the measures are not theory-driven.[6] Perhaps because they are atheoretical, current tests for problematic Internet use are also unidimensional, despite significant evidence of various associated dimensions. Some newer research has divided problematic Internet use into specific and generalized behavior.[6] Specific problematic Internet use refers to behavior focused on a particular online activity or application, such as online pornography or online gambling. Generalized problematic Internet use focuses on a more pervasive compulsion to be online and communicate with others.[6] Other features of problematic Internet use independently described in the literature include impulsivity,[17] loneliness,[5,18] low self-esteem,[19] depression,[20] social anxiety,[21] and social disinhibition.[5] The current study aims to provide a clearer and more comprehensive understanding of the various dimensions of problematic Internet use by further investigating these associations and how they contribute to the overall variance of the construct.

Another area of investigation has focused on the social usage of the Internet. Several studies suggest that the Internet is a solitary activity used to increase one's social sphere.[18] Individuals consistently report using the Internet to engage in social activity and derive a sense of communication pleasure,[22] yet paradoxically, the Internet tends to actually reduce one's social involvement.[18] The process occurs as individuals confine themselves to virtual communications and reduce time spent engaging in face-to-face interactions. Consequently, problematic Internet users find themselves lonely and lacking in human contact.[23] For some individuals, the Internet might be a way to purposefully avoid such social contact. Accordingly, the Internet becomes a buffer for threatening social interactions.[24] For example, a student who is too shy to ask a question in class might e-mail the professor afterwards, effectively reducing the social threat of an interaction. Other individuals who are sensitive to rejection might make requests via the Internet in order to avoid the emotional wounds that result from rejection. For these individuals, Internet communications might actually be adaptive. Multiple studies suggest that shy individuals feel reduced shyness while communicating with others online.[25,26] This social liberating experience might motivate increased dependence on the Internet as a means of communicating with others. Therefore, the current article aims to investigate the interaction between problematic Internet use, social comfort, and rejection sensitivity.

Recently, some research from applied social psychology has also implicated procrastination as a key indicator of problematic Internet use. Lavoie and Pychyl tested the relationship between time spent online and procrastination.[27] Although time spent online represents only one element contributing to the variance of problematic Internet use,[5] this may explain why problematic Internet users typically have occupational and academic difficulties, most likely due to lapses in productivity.[2,28] In their web-based survey of 308 Internet users, Lavoie and Pychyl found that more than 50% of respondents reported frequent Internet procrastination, and they spent 47% of online time procrastinating.[27] Moreover, Internet procrastination was positively correlated with perceiving the Internet as entertaining and as providing a relief from stress.[27] Internet procrastination in the workplace has often been

called "cyberslacking" and can result in significant losses of productivity in the organization when such behavior is occurring in multiple employees in an organization over a period of time.[29]

The relationship between problematic Internet use and procrastination has important implications. Firstly, it implies that some people may use the Internet to cope with stress.[9] More specifically, procrastination involves cognitive task avoidance and engaging in activities with the implicit goal of distraction from things that one is supposed to do.[31] General procrastination is also related to negative affect and cognitive distortions associated with depression[32,33] and high perceived stress.[34] The current study attempts to further elucidate the associations among procrastination, distractibility, and other facets of problematic Internet use. Secondly, a validated measure of problematic Internet would be not only helpful for clinicians to assess the condition, but would also have significant utility as a preemployment screening measure for predicting future employees who might engage in cyberslacking behavior. Such psychological tests are used commonly to assess potential employees' personality and integrity in order for employers to predict counterproductive behaviors at work.[35] Therefore, the current study introduces psychometrically valid measure of problematic Internet use that has been designed as a global assessment tool for use in clinical assessment and as a preemployment screening device for use in organizational assessment.

As previously described, the current study also aims to establish an empirically based, predictable model of problematic Internet use. We hypothesized that the problematic Internet use construct four dimensions: loneliness/depression, diminished impulse control, distraction, and social comfort. We sought to confirm previous findings that problematic Internet use was associated with loneliness and decreased sociability. We also hypothesized that problematic Internet use would be related significantly to rejection sensitivity, procrastination, and getting in academic or occupational trouble for Internet use. Finally, we explored problematic Internet use as a mechanism for coping with stress, and discuss the significant implications of problematic Internet use in the workplace.

MATERIALS AND METHODS

Participants

The participants were 211 undergraduate psychology students, with a mean age of 21.73 (SD = 4.40 years). The sample included 104 men and 107 women. No significant age differences were found for men and women ($t[209] = -0.14$, $p = 0.89$). Ninety-six percent of the participants ($n = 202$) have access to the Internet in their current residence, 69% ($n = 145$) have broadband Internet access (either cable or DSL), and the participants spend an average of 13.1 h online in a normal week (SD = 10.59). Ten percent of participants ($n = 20$) have gotten in trouble at school or work for inappropriate Internet use.

Methods

Questionnaires were administered to 325 students in an industrial/organizational psychology class at a large Canadian university, of which 211 completed questionnaires were voluntarily returned.

Measures

Demographic questionnaire. A demographic questionnaire asked respondents about personal attributes, such as age and sex. In addition, the questionnaire asked respondents to indicate various behaviors related to Internet use, such as average number of hours online per week, connection speed to the Internet, Internet application most often used, and if they had ever been in trouble as a result of their Internet use.

Online Cognition Scale (OCS). The OCS is a 36-item questionnaire that measures problematic Internet use. Items were drawn from symptoms described in the literature on problematic Internet use, particularly focused on cognitions rather than behaviors,[6] and also adapted from related measures of procrastina-

tion, depression, impulsivity, and pathological gambling. Respondents rate the agreeableness on a seven-point Likert scale of such statements as: "I often keep thinking about something I experienced online well after I have logged off;" "I get more respect online than in real life;" and "Using the Internet is a way to forget about the things I must do but really don't want to do." The OCS contains four subscales: loneliness/depression, diminished impulse control, social comfort, and distraction. In addition, the OCS can be scored as a global measure of problematic Internet use. In the current study, the OCS demonstrated high internal consistency as a total measure of problematic Internet use ($\alpha = 0.94$) and for each of the four OCS dimensions: social comfort ($\alpha = 0.87$), loneliness/depression ($\alpha = 0.77$), diminished impulse control ($\alpha = 0.84$), and distraction ($\alpha = 0.81$). Item-total correlations were highly significant, ranging from 0.47 to 0.77 for social comfort, 0.49 to 0.81 for loneliness/depression, 0.50 to 0.76 for diminished impulse control, and 0.55 to 0.80 for distraction. Item-total correlations, means, standard deviations, and standardized alphas can be found in Appendix A.

Barratt Impulsiveness Scale 11 (BIS-11). The BIS is a 30-item questionnaire that measures impulsivity as a trait independent of anxiety.[36] Items are keyed on a four-point Likert scale, ranging from Rarely/Never (scored as 1) to Almost always/Always (scored as 4). The BIS demonstrates high concurrent validity, correlating positively with disinhibition and psychoticism, and significantly differentiating undergraduate males from substance abuse patients, psychiatric patients, and inmates in a correctional facility.[37] In the current study, the IBAS showed moderately good internal consistency ($\alpha = 0.73$).

Center for Epidemiological Studies Depression Scale (CES-D). The CES-D is a 20-item scale that measures depressive symptomatology in the general population, with an emphasis on the affective component—depressed mood.[38] Items are assessed on a scale from 0 to 4, ranging from "Rarely or none of the time (less than 1 day)" to "Most or all of the time (5–7 days)," and consist of self-statements such as "I felt depressed," "I talked less than usual," and "I had crying spells." The CES-D has demonstrated high reliability in both the general population ($\alpha = 0.85$) and the psychiatric population[37] ($\alpha = 0.90$). Validity studies have indicated that the CES-D has excellent concurrent validity, correlating significantly with a number of other depression and mood scales.[38] In the current study, the CES-D demonstrated high internal consistency ($\alpha = 0.89$).

UCLA Loneliness scale (version 3). The UCLA Loneliness scale measures loneliness conceptualized as a unidimensional emotional response to a discrepancy between desired and achieved levels of social contact.[39] The scale consists of 20 items about the frequency of various lonely-related feelings, such as "How often do you feel alone," "How often do you feel no one really knows you well," and "How often do you feel people are around you but not with you." The UCLA Loneliness scale has been used extensively in student populations[37] and has demonstrated to be related to problematic Internet in multiple studies.[18] Consistent with previous research, the UCLA Loneliness scale was highly reliable in the current study ($\alpha = 0.88$)

Procrastinatory Cognitions Inventory (PCI). The PCI is an 18-item measure of trait procrastination and negative affect.[40] Items consist of dilatory behavior and thoughts about what one ought to be doing, but is not. Respondents rate on a five-point Likert scale the frequency of such cognitions over the past two weeks. Sample items include, "Why can't I do what I should be doing;" "I'm behind in my studies this time, but next time it will be different;" and "I'm such a procrastinator, I'll never reach my goals." The PCI has shown high reliability ($\alpha = 0.94$) and divergent validity from trait procrastination, trait anxiety, negative affect, and dilatory behavior.[40] In our study, the PCI also showed high internal consistency ($\alpha = 0.93$)

Internet Behavior and Attitude Scale (IBAS). The IBAS is a 25-item measure of social aspects of Internet use and feelings of competency online.[5] Items consist of self-statements related to

online experiences, reasons for using the Internet, and typical Internet behavior. Sample items include, "I have pretended to be someone of the opposite sex while online" and "Going online makes it easier for me to do research." Scores on the IBAS are strongly associated with severity of problematic Internet use symptoms.[5] The IBAS was highly reliable in the current study, as measured by standardized Cronbach's alpha ($\alpha = 0.87$).

Rejection Sensitivity Questionnaire (RSQ). The RSQ is a measure that assesses an individual's sensitivity to rejection in social situations.[41] The measure presents 18 brief hypothetical scenarios in which the respondent must make a request of a significant other that might result in rejection (e.g., "You ask someone you don't know well out on a date" and "You ask a friend to do you a big favor"). Respondents are then asked to rate on a six-point scale how concerned or anxious they would be about making the request and whether or not they would expect the other person to accept/ honor the request. In the current study, the RSQ was high in internal consistency ($\alpha = 0.86$).

RESULTS

Analytic strategy

An appropriate data analytic approach should be confirmatory rather than exploratory due to the fact the OCS was developed on a theoretical basis assuming four dimensions that should define the construct of Problematic Internet Use. Consequently, in the first step, we summed the underlying four dimensions testing for possible gender differences, and then estimated the contribution of each scale (i.e., factor loading and explained variance) to the underlying construct. A Confirmatory Factor Analysis (CFA) was utilized to estimate the fit of the assumed five dimensions to the empirical data.

Preliminary analysis

A MANOVA was conducted with gender as the independent variable, and the four dimensions (diminished impulse control, distraction, social comfort, and loneliness/depression) as dependent variables. Results indicated no significant gender differences for any of the four OCS dimensions. Hence, in subsequent analyses, we considered the sample as a whole. Means, standard deviations, and univariate *F*'s are presented in Table 1.

OCS four dimensions: a confirmatory factor analysis

To confirm the overall fit and acceptability of the Problematic Internet Use construct, a CFA[42] was performed using AMOS software[43] based on the variance-covariance metrics. We tested the fit of this model using standardized maximum likelihood estimations. In evaluating the overall goodness of fit for this model, the following criteria were used: a chi-squared (χ^2) p value, which if $p > 0.05$ indicates that there are no statistically significant discrepancies between the observed data and the hypothesized model and the chi-squared/df ratio. Since chi-squared is known to be effected by the number of measures and sample size,[44]

TABLE 1. MEANS AND STANDARD DEVIATIONS OF THE OCS DIMENSIONS FOR MEN AND WOMEN

	Gender			
	Men (n = 104)		*Women (n = 107)*	
	M	*SD*	*M*	*SD*
OCS dimensions				
Loneliness/depression	16.05	6.50	16.63	6.73
Diminished impulse control	27.17	10.29	26.06	10.69
Distraction	24.86	8.17	23.79	8.35
Social comfort	34.45	12.09	32.49	11.76

we also reported criteria that specify the amount of covariation in the data that is accounted for by the hypothesized model relative to a null model that assumes independence among variables. In addition, these criteria are also adjusted for the sample size: The Adjusted Goodness of Fit Index Fit Index[45] (NFI), the Robust Comparative Fit Index[46] (CFI) and the Goodness of Fit Index[47] (GFI). For the CFI, GFI, and NFI a cutoff of 0.90 is generally accepted as indicating a good fit, where 1.0 indicates a perfect fit. Finally, we also reported the Root Mean Square Error of Approximation[48] (RMSEA), which should be <0.05.

Correlation metrics, means, and standard deviations of the four OCS observed variables are presented in Table 2. These data were provided to depict the first order correlation among the separate observed indicator variables (i.e., among the subscales), which is not available through the assessment of the association of each dimension to the construct. In addition, this table includes the association between each of these dimensions with the other variables in the study.

We specified a latent construct—Problematic Internet Use (PIU)—determined by four indicators (impulsivity, loneliness/depression, distraction, and social comfort) of the OCS measure. The specified CFA model (Fig. 1) was found to fit the observed data well (RMSEA = 0.001; $\chi^2[2, n = 211] = 2.52$; $\chi^2_{/df} = 1.26$; $p = 0.28$; GFI = 0.99; AGFI = 0.97; CFI = 1.0; NFI = 1.0). This model explained 80%, 65%, 52%, and 72% of the variance of diminished impulse control, loneliness/depression, distraction, and social comfort, respectively. As can be seen in Figure 1, all factor loadings and coefficients were significant and in the expected direction (path coefficient = 0.85; path coefficient = 0.72; $t = 11.57$; $p < 0.0001$ for distraction; path coefficient = 0.90; $t = 15.81$; $p < 0.0001$ for diminished impulse control; path coefficient = 0.81; $t = 13.94$, $p < 0.0001$ for loneliness/depression).

As can be seen, the assumed four OCS dimensions underlying the PIU construct were confirmed. After verifying the acceptability of the underlying construct and its four subscales, we continued to explore the unique contribution of each of these dimensions to the prediction of related outcomes. These outcomes include procrastination, depression, impulsivity, rejection sensitivity, loneliness, number of hours online per week, occupational or academic reprimand for Internet use, and main declared purpose of Internet use.

One of the aims of the current study is to determine the combined association of the four subscales with each of the above outcome variables while controlling for their shared variance.

In order to address these aims, the following analyses were performed:

1. Zero-order correlations describing the OCS four dimensions and the study variables' associations and their magnitudes.
2. Multiple regression analyses for the simultaneous association of the four OCS subscales with each of the study variables.
3. Multiple analyses of variance (MANOVAs) for the association between the OCS subscales and the categorical variables: (1) occupational or academic reprimand for Internet use and (2) declared purpose of Internet use.

Correlational analysis

The correlations between each of the four dimensions with the study variables are presented in Table 2. As can be seen, the loneliness/depression and social comfort dimensions of the OCS were positively correlated with number of hours online per week, rejection sensitivity, and procrastination. As predicted, they were also highly associated with other measures of loneliness and depression, and highly related to problematic Internet use as measured by the IBAS. There was no relationship between loneliness/depression or social comfort and impulsivity. The distraction and diminished impulse control dimensions of the OCS were positively associated with number of hours online per week, rejection sensitivity, depression, loneliness, and procrastination. Likewise, they were both highly related to a global measure of impulsivity and problematic Internet use.

TABLE 2. CORRELATIONS, MEANS, AND STANDARD DEVIATIONS FOR THE STUDY VARIABLES

Variables	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*
1. Hours online	—	—	—	—	—	—	—	—	—	—	—
2. BIS-11	0.05	—	—	—	—	—	—	—	—	—	—
3. RSQ	0.09	0.02	—	—	—	—	—	—	—	—	—
4. CES-D	−0.02	0.24***	0.32***	—	—	—	—	—	—	—	—
5. UCLA Loneliness	0.07	0.08	0.48***	0.53***	—	—	—	—	—	—	—
6. PCI	0.08	0.47***	0.22***	0.45***	0.41***	—	—	—	—	—	—
7. IBAS	0.27***	0.18**	0.29***	0.23***	0.40***	0.30***	—	—	—	—	—
8. OCS Loneliness/ depression	0.41***	0.09	0.35***	0.15*	9.31***	0.25***	0.51***	—	—	—	—
9. OCS Impulsivity	0.38***	0.22***	0.35***	0.17**	0.34***	0.34***	0.54***	0.71***	—	—	—
10. OCS Distraction	0.18**	0.25***	0.30***	0.30***	0.31***	0.50***	0.55***	0.59***	0.66***	—	—
11. OCS Social comfort	0.24***	0.09	0.41***	0.18**	0.37***	0.23***	0.62***	0.70***	0.76***	0.58***	—
M	13.08	69.92	8.49	15.14	41.26	51.09	54.04	16.34	26.60	24.32	33.46
SD	10.60	9.44	3.02	10.44	10.50	15.05	7.53	6.61	10.48	8.26	12.09

*$p < 0.05$.
**$p < 0.01$.
***$p < 0.001$.
$n = 211$ (two-tailed test).

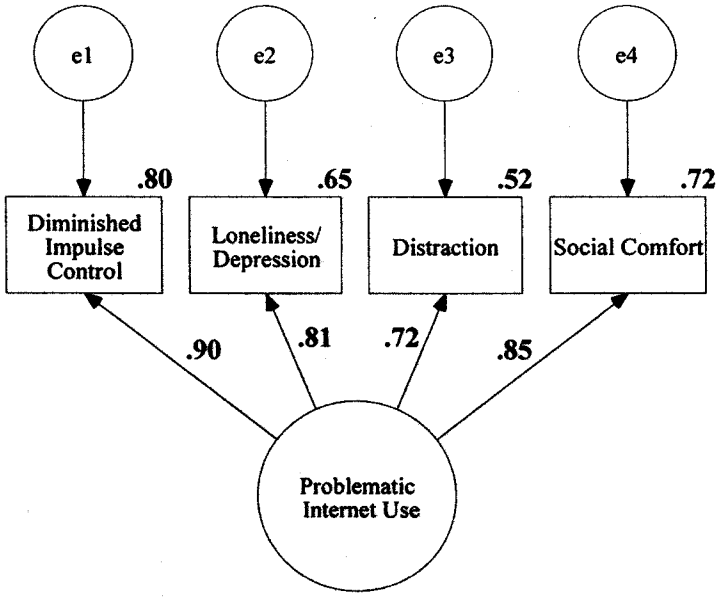

FIG. 1. Confirmatory Factor Analysis (CFA) of the four OCS dimensions as indicators of the Problematic Internet Use (PIU) construct. Numbers represent maximum likelihood estimates for the factor loadings obtained in the CFA model.

Regression analysis

Multiple regression analyses (MRs) were conducted with the four OCS dimensions as predictors and each of the continuous variables as the criteria. These analyses allowed for the evaluation of expected associations between the subscales and other related constructs, thus evaluating the OCS's criteria predictive validity and its convergent and discriminant validity with related theoretical constructs. As can be seen in Table 2, the correlations between the four subscales are almost all significant in the expected directions with the criteria variables. Furthermore, MR analysis allows us to control for the shared variance among the predictors (i.e., the four OCS subscales) and then estimate each dimension's contribution to the prediction above and beyond their association with each other.

Six multiple regressions models were conducted with the four OCS dimensions as predictors (p values are based on two-tailed tests). In the first regression, number of hours online per week was the dependent criterion. This model revealed that 23% of the variance of number of hours online per week was significantly explained by the OCS four subscales (Multiple $R = 0.48$; $F[4,206] = 15.432$; $p < 0.0001$), with high levels of loneliness/depression and of diminished impulse control found to be positively associated with number of hours online per week ($\beta = 0.41$; $t = 4.35$; $p < 0.0001$; and $\beta = 0.39$; $t = 3.64$; $p < 0.0003$, respectively). Distraction and social comfort were found to be negatively associated with number of hours online per week ($\beta = -0.18$; $t = -2.20$; $p < 0.03$; and $\beta = -0.24$; $t = -2.38$; $p < 0.02$, respectively).

The MR model for loneliness indicated that high scores on social comfort relate significantly to participants reporting high scores of loneliness ($\beta = 0.24$; $t = 2.26$; $p < 0.03$). Conversely, OCS loneliness/depression, OCS diminished impulse control, and OCS distraction were not found to be significant predictors of loneliness ($\beta = 0.04$; *ns*; $\beta = 0.05$; *ns*; $\beta = 0.12$; *ns*, respectively). This model significantly explained 15% of the variance of loneliness (Multiple $R = 0.39$; $F[4,206] = 9.405$; $p < 0.0001$).

In the MR model for the prediction of procrastination OCS showed to significantly explain 26% of the variance (Multiple $R = 0.51$; $F[4,206] = 17.212$; $p < 0.0001$) with a significant contribution of distraction ($\beta = 0.52$; $t = 6.29$, $p < 0.0001$). Participants high on distraction reported significantly high levels of procrastination. Conversely, loneliness/depression, di-

minished impulse control, and social comfort were not found to be significant predictors of procrastination ($\beta = -0.06$; *ns*; $\beta = 0.15$, *ns*; $\beta = -0.14$; *ns*, respectively).

Overall, 10% of the variance of participants' depressive symptoms were explained by the OCS subscales (Multiple $R = 0.31$; $F[4,206] = 5.418$; $p < 0.0004$), with only high scores on the distraction subscales contributing to the predictive variance ($\beta = 0.34$; $t = 3.71$; $p < 0.0003$). Conversely, loneliness/depression, diminished impulse control, and social comfort were not found to be significant predictors of procrastination ($\beta = -0.03$; *ns*; $\beta = -0.08$; *ns*; $\beta = 0.07$; *ns*, respectively).

Levels of impulsivity were found to be significantly associated with high scores on the diminished impulse control ($\beta = 0.31$; $t = 2.67$; $p < 0.008$), and distraction ($\beta = 0.24$; $t = 2.68$; $p < 0.008$) subscales on the OCS, and almost significantly in the opposite direction with the OCS social comfort subscale ($\beta = 0.20$; $t = -1.85$; $p < 0.065$). There was no significant prediction for loneliness/depression ($\beta = 0.13$, *ns*). This model significantly explained 10% of the impulsivity scores (Multiple $R = 0.32$; $F[4,206] = 5.855$; $p < 0.0002$).

Eighteen percent of the variance of participants' rejection sensitivity scores were found to be explained by the model (Multiple $R = 0.43$; $F[4,206] = 11.391$; $p < 0.0001$), whereas high level of OCS social comfort was the only significant predictor ($\beta = 0.30$; $t = 2.87$; $p < 0.004$). Participants who scored high on social comfort reported high levels of rejection sensitivity. Conversely, loneliness/depression, diminished impulse control, and distraction were not found to be significant predictors of loneliness ($\beta = 0.09$, *ns*; $\beta = 0.01$, *ns*; $\beta = 0.06$, respectively).

Multiple analyses of variance

A MANOVA with occupational or academic reprimand for Internet use (admitted versus nonadmitted) as the independent variable and the four OCS dimensions as the dependent variables revealed significant differences. Results indicated that participants with identified reprimands are significantly higher on OCS loneliness/depression ($F[1,209] = 5.15$; $p < 0.02$), OCS diminished impulse control ($F[1,209] = 5.99$; $p < 0.01$), and OCS distraction ($F[1,209] = 3.87$; $p < 0.05$) than participants who have not been reprimanded. The high levels of social comfort reported by participants with identified reprimands were barely significant ($F[1.209] = 2.88$, two-tailed; $p < 0.09$). Table 3 presents means and standard deviations of the OCS dimensions for the identified and nonidentified reprimanded participants.

A MANOVA with main declared purpose of Internet use (interactive applications, e-mail, and web surfing) as the independent variable and the four OCS dimensions as the dependent variables also revealed significant differences. Results indicated significant differences for loneliness/depression ($F[2,208] = 5.36$; $p < 0.005$), diminished impulse control ($F[2,208] = 5.78$, $p < 0.004$), and social comfort ($F[2,208] = 3.55$; $p < 0.03$). No significant differences were found for distraction ($F[2,208] = 2.04$, *ns*). Table 4 presents means and standard deviations of the OCS dimensions for the declared purpose of Internet use groups.

TABLE 3. MEANS AND STANDARD DEVIATIONS OF THE OCS DIMENSIONS AMONG IDENTIFIED AND NONIDENTIFIED REPRIMANDED PARTICIPANTS

	Reprimanded			
	Identified (n = 20)		*Nonidentified (n = 119)*	
	M	*SD*	*M*	*SD*
OCS dimensions				
Loneliness/depression	19.50	5.08	16.01	6.67
Diminished impulse control	32.00	11.99	26.04	10.18
Distraction	27.75	6.39	23.96	8.36
Social comfort	37.80	13.79	33.00	11.85

TABLE 4. MEANS AND STANDARD DEVIATIONS OF THE OCS DIMENSIONS FOR MAIN DECLARED PURPOSE OF USE

	Main declared purpose					
	Interaction (n = 74)		*E-mail (n = 108)*		*Surfing the web (n = 29)*	
	M	*SD*	*M*	*SD*	*M*	*SD*
OCS dimensions						
Loneliness/depression	18.20	6.34	15.01	6.29	16.55	7.29
Diminished impulse control	29.28	10.78	24.27	9.58	28.46	11.29
Distraction	25.73	7.32	23.86	8.51	22.41	9.26
Social comfort	35.66	11.55	31.32	12.06	35.79	12.54

Planned comparisons contrasting interactive applications and web surfing with e-mail indicated that participants reporting that e-mail is their main purpose for using the Internet were significantly lower on loneliness/depression ($F[1,208] = 6.29$; $p < 0.01$), impulsivity ($F[1,208] = 9.44$; $p < 0.002$), and social comfort ($F[1,208] = 6.42$; $p < 0.01$).

DISCUSSION

This study introduces a theory-driven, multidimensional measure of problematic Internet use. Furthermore, it confirms that problematic Internet use is more than merely spending too much time online. To establish the convergent and discriminate validity of the OCS, we investigated the association between various cognitive and behavioral variables and the OCS dimensions of problematic Internet use. The CFA model of problematic Internet use indicates that the construct consists of four dimensions: diminished impulse control, loneliness/depression, distraction, and social comfort. Internet-related diminished impulse control involves obsessive cognitions about the Internet and an inability to reduce Internet use despite the desire to do so. As indicated by relatively low endorsement of items in this dimension, diminished impulse control is clearly an indicator of more severe problematic Internet use. This is consistent with previous studies that indicate impulsivity is related to risk-taking and other dangerous behaviors,[49] which may be related to online gambling, online sex, and engaging in illegal activities online (e.g., sending viruses, exchanging child pornography online, sharing MP3 files). The loneliness/depression dimension of problematic Internet use involves feelings of worthlessness and depressive cognitions related to the Internet. This is consistent with previous research[18] that indicates a strong relationship between loneliness and problematic Internet use. Furthermore, it confirms that depressogenic cognitions play an important role in exacerbating problematic Internet use symptoms.[6]

A closely related dimension of problematic Internet use is social comfort. Results from this study indicate that individuals who are lonely tend to use the Internet for the purpose of social comfort. That is, the Internet is used a tool to reach out to others and increase one's social network. In addition, social comfort involves feelings of safety and security in being a part of that social network, despite the fact that it is a virtual network. The current study focused on social comfort and general loneliness, as assessed by the UCLA Loneliness Scale. Loneliness can be conceptualized and assessed in a variety of ways, including social loneliness, emotional loneliness, and family loneliness.[50] Future research in this area can be expanded to examine problematic Internet use and other aspects of loneliness.

The results also indicate that individuals who use the Internet for social comfort are highly sensitive to rejection. Rejection sensitivity has been described as a disposition that involves the anticipation of rejection and this can lead to self-protective reactions.[41] Therefore, the Internet is a way to explore social communications without the threat of rejection. While

this is an adaptive endeavor, too much of a reliance on the online social network is indicative of problematic Internet use.

The final dimension of problematic Internet use is distraction. Internet distraction involves using the Internet as an activity of avoidance. The individual uses the Internet in order to be distracted from a stressful event, task, or stream of thought. Distraction has been conceptualized as an avoidance-oriented form of coping with negative implications for personal adjustment.[51] Not surprisingly, in light of these observations, the results of the current study showed that distraction is highly related to procrastination and history of being reprimanded at school or work for improper Internet use.

This relationship among distraction, procrastination, and problematic Internet use has important implications in organizations. Procrastination is negatively related to other personality traits, such as conscientiousness and agreeableness,[52] which have well-established associations with productivity and work performance.[53] Furthermore, procrastination is positively related to stress and negative self-evaluation,[34] and negatively with productivity.[60] If the employee is spending so much time online and avoiding work tasks, productivity in the organization also suffers. Consider, for example, a company of 500 employees with an average salary of $10 per employee. If the average amount of time wasted on the Internet is a conservative 2 h per week, problematic Internet use is costing the company $470,000 per year. That does not include the considerable costs associated with legal liability, adverse publicity, increased bandwidth, job turnover, and other significant effects of problematic Internet use in the workplace. To deter such costs, an entire industry of employee Internet management has emerged.[1] Current solutions for managing employee Internet abuse are generally focused on software that monitors employee Internet use and filters inappropriate websites.[54] However, some researchers have recently suggested that such software is invasive and thus reduces job satisfaction.[54] Another popular deterrent has been instituting Internet access policies[55] (IAPs). There have been alternative suggestions in the literature, including closer supervision and educational programs.[56] Nonetheless, despite this growing problem and the financial ramifications of employee Internet abuse, there has been little investigation into the effectiveness of such programs or offering alternative management solutions. We suggest that one alternative solution is to be preventative rather than reactive. One way to achieve this is by using the OCS as a preemployment screening measure that predicts problematic Internet use. In organizations that offer employees free Internet use, using a psychological test that predicts counterproductive behavior is a proactive management solution. Similar tests are commonly used to filter other unwanted behaviors, such as the common use of integrity tests to identify theft. Integrity tests have been successful in predicting theft in a variety of studies and applied settings.[57] Therefore, as part of the application process, as many as 4 million applicants across North America complete integrity tests before being hired each year.[57] This includes overt integrity tests as well as personality tests that assess relevant traits, such as conscientiousness and social conformity.[58] Currently, 107 million workers worldwide have access to the Internet at work,[1] and an estimated 26% of their online time is spent engaging in personal rather than work-related usage.[59] Such significant time and energy being wasted online suggest a clear need for identifying those who will most likely engage in cyberslacking behavior, and placing the applicant in a job without Internet temptation. We believe that the OCS should prove to be quite useful in the contexts.

Returning to the current results, to add further to the predictive validity of the OCS, we investigated the relationship between scores on the OCS and getting in trouble at work or school because of inappropriate Internet use. The results indicate that being reprimanded is significantly related to OCS scores, thus supporting the utility of the OCS as a predictor of future critical incidents in the workplace.

Finally, to determine which Internet applications are most problematic, we first classified applications as interactive applications (e.g., chat, instant messaging), e-mail, and web surfing. The results indicate a significant interac-

tion between OCS scores and preferred Internet application. Individuals who reported that their most frequently used Internet activities were Interactive applications or web surfing demonstrated significantly higher levels of problematic Internet use than those individuals whose primary Internet activity consists of e-mail. This suggests a need for companies to implement employee Internet management strategies that not only monitor web surfing habits, but also monitor interactive applications such as chat and instant messaging, which are becoming increasingly popular online.

In summary, the purpose of this study was to describe the dimensions of problematic Internet use, provide evidence that these dimensions can be measured in a reliable and valid way, and demonstrate that these dimensions are related to counterproductive behaviors. Further testing of the OCS in both clinical and organizational samples will strengthen the predictive validity of the scale, and help uncover other facets of this phenomenon. Likewise, it will be important in future work to establish the efficacy of the OCS as a clinical assessment tool and as part of an industrial/organizational intervention. We believe that this article represents an important step in furthering the empirical study of problematic Internet use and will provide a basis for future work in this area.

APPENDIX A

OCS items categorized by dimension	*M*	*SD*	*Item-total correlations*
Social comfort			
I am most comfortable online.	3.25	1.86	0.60*
I feel safest when I am on the Internet.	2.01	1.29	0.77*
You can get to know a person better on the Internet than in person.	2.06	1.42	0.60*
I often find it peaceful to be online.	3.25	1.66	0.74*
I can be myself online.	4.01	1.81	0.53*
I get more respect online than "in real life."	2.10	1.36	0.74*
People accept me for who I am online.	3.98	1.61	0.47*
Online relationships can be more fulfilling than offline ones.	1.68	1.18	0.61*
I am at my best when I am online.	1.84	1.16	0.69*
I wish my friends and family knew how people regard me online.	1.96	1.33	0.64*
The Internet is more "real" than real life.	1.43	0.98	0.55*
I say or do things on the Internet that I could never do offline.	2.74	1.83	0.67*
When I am online, I can be carefree.	3.14	1.63	0.64*
		$\alpha = 0.87$	
Loneliness/depression			
Few people love me other than those I know online.	1.44	0.94	0.49*
I am less lonely when I am online.	2.57	1.73	0.65*
I cannot see myself ever without the Internet for too long.	3.22	1.92	0.81*
The Internet is an important part of my life.	4.11	1.77	0.78*
I feel helpless when I don't have access to the Internet.	2.91	1.75	0.76*
I am bothered by my inability to stop using the Internet so much.	2.09	1.39	0.55*
		$\alpha = 0.77$	
Diminished impulse control			
I often keep thinking about something I experienced online well after I have logged off.	1.44	0.94	0.66*
When I am on the Internet, I often feel a kind of "rush" or emotional high.	2.24	1.38	0.61*
I use the Internet more than I ought to.	3.64	1.88	0.68*
People complain that I use the Internet too much.	2.19	1.94	0.71*
I never stay on longer than I had planned.	4.70	1.72	0.51*
When I am not online, I often think about the Internet.	1.74	1.21	0.67*
The offline world is less exciting than what you can do online.	1.81	1.40	0.50*
I can't stop thinking about the Internet.	1.49	0.91	0.64*
Even though there are times when I would like to, I can't cut down on my use of the Internet.	2.49	1.52	0.75*
My use of the Internet sometimes seems beyond my control.	1.99	1.46	0.76*
		$\alpha = 0.84$	

APPENDIX A *(continued)*

OCS items categorized by dimension	*M*	*SD*	*Item-total correlations*
Distraction			
When I am online I don't think about my responsibilities.	2.97	1.58	0.56*
When I have nothing better to do, I go online.	4.69	1.76	0.57*
I find that I go online more when I have something else I am supposed to do.	3.26	1.80	0.75*
When I am online, I don't need to think about offline problems.	2.58	1.63	0.55*
I sometimes use the Internet to procrastinate.	4.61	1.81	0.76*
I often use the Internet to avoid doing unpleasant things.	3.16	1.74	0.80*
Using the Internet is a way to forget about the things I must do but don't really want to do.	3.05	1.72	0.79*
		$\alpha = 0.81$	
		Total $\alpha = 0.94$	

*$p < 0.01$.

REFERENCES

1. Schulman, A. (2001). The extent of systematic monitoring of employee e-mail and Internet use. [Online]. Available: www.privacyfoundation.org/workplace/technology/extent.asp
2. Young, K.S. (1999). Internet addiction: symptoms, evaluation and treatment. In: VandeCreek, L., & Jackson, T. eds. *Innovations in clinical practice: a source book. Vol. 17.* pp. 19–31.
3. Beard, K.W., & Wolf, E.M. (2001). Modification in the proposed diagnosis criteria for Internet addiction. *CyberPsychology & Behavior* 4:377–383.
4. Grohol, J. (1999). Too much time online: Internet addiction or healthy social interactions? *CyberPsychology & Behavior* 2:395–401.
5. Morahan-Martin, J., & Schumacher, P. (2000). Incidence and correlates of pathological Internet use among college students. *Computers in Human Behavior* 16:13–29.
6. Davis, R.A. (2001). A cognitive-behavioral model of pathological Internet use (PIU). *Computers in Human Behavior* 17:187–195.
7. Anderson, K. (1998). Internet dependency among college students: should we be concerned? Presented at the Meeting of the American College Personnel Association, St. Louis, MO.
8. Scherer, K. (1997). College life on-line: healthy and unhealthy Internet use. *The Journal of College Student Development* 38:655–664.
9. Davis, R.A., Flett, G.L., & Besser, A. (2002). Do people use the Internet to cope with stress? Presented at the 110th Annual Convention of the American Psychological Association, Chicago.
10. McMillan, L.H., O'Driscoll, M.P., Marsh, N.V., et al. (2001). Understanding workaholism: data synthesis, theoretical critique, and future design strategies. *International Journal of Stress Management* 8:69–91.
11. Oates, W.E. (1968). On being a "workaholic" (a serious jest). *Pastoral Psychology* 19:16–20.
12. Oates, W.E. (1971). *Confessions of a workaholic: the facts about work addiction.* New York: World Publishing Company.
13. Goldberg, I. (1995). Internet addiction disorder [Online]. Available: www.cybernothing.org/jdfalk/media-coverage/archive/msg01305.html.
14. Young, K.S. (1996). Psychology of computer use. XL. Addictive use of the Internet: a case that breaks the stereotype. *Psychological Reports* 79:899–902.
15. Clark, L.A., & Watson, D. (1995). Constructing validity: basic issues in objective scales development. *Psychological Assessment* 7:309–319.
16. Young, K.S. (1998). *Caught in the Net.* New York: Wiley.
17. Shapira, N.A., Goldsmith, T.D., Keck, P.E., et al. (2000). Psychiatric features of individuals with problematic Internet use. *Journal of Affective Disorders* 57:267–272.
18. Kraut, R., Patterson, M., Lundmark, V., et al. (1998). Internet paradox: a social technology that reduces social involvement and psychological well-being? *American Psychologist* 53:1017–1031.
19. Armstrong, L., Phillips, J. G., & Saling, L. L. (2000). Potential determinants of heavier Internet usage. *International Journal of Human-Computer Studies* 53: 537–550.
20. Young, K.S., & Rogers, R.C. (1998). The relationship between depression and Internet addiction. *CyberPsychology & Behavior* 1:25–28.
21. King, S.A., & Poulos, S.T. (1998). Using the Internet to treat generalized social phobia and avoidant personality disorder. *CyberPsychology & Behavior* 1: 29–36.
22. Chou, C., & Hsiao, M.-C. (2000). Internet addiction, usage, gratification, and pleasure experience: The Taiwan college students' case. *Computers and Education* 35:65–80.
23. Wastlund, B.A., Norlander, T., Archer, T., et al. (2001). Internet blues revisited: replication and extension of an Internet paradox study. *CyberPsychology & Behavior* 4:385–391.

24. Wallace, P. (1999). *The psychology of the Internet*. Cambridge: Cambridge University Press.
25. Roberts, L.D., Smith, L.M., & Pollock, C.M. (2000). "U r a lot bolder on the net": shyness and Internet use. In: Crozier, R.W., ed. *Shyness: development, consolidation and change*. New York: Routledge, pp. 121–138.
26. Turkle, S. (1995). *Life on the screen: identity in the age of the Internet*. New York: Simon and Schuster.
27. Lavoie, J.A., & Pychyl, T.A. (2001). Cyberslacking and the procrastination highway: a web-based survey of on-line procrastination, attitudes, and emotion. *Social Science Computer Review* 19:431–444.
28. Ho, S.M., & Lee, T.M. (2001). Computer usage and its relationship with adolescent lifestyle in Hong Kong. *Journal of Adolescent Health* 29:258–266.
29. Greenfield, D.N. (1999). *Virtual addiction: help for netheads, cyberfreaks, and those who love them*. Oakland, CA: New Harbinger Publications.
30. Davis, R.A., Besser, A., & Flett, G.L. (2002). Click . . . the boss is coming! Managing employee Internet abuse. Presented at the 110th Annual Convention of the American Psychological Association, Chicago.
31. Lay, C.H. (1986). At last, my research article on procrastination. *Journal of Research in Personality* 20: 474–495.
32. Burka, J.B., & Yuen, L.M. (1990). Procrastination: causes and consequences. *New Realities* May/June:42–45.
33. Ferrari, J.R., Johnson, J.L., & McCown, W.G. (1995). *Procrastination and task avoidance: theory, research and treatment*. New York: Plenum.
34. Flett, G.L., Blankstein, K.R., & Martin, T.R. (1995). Procrastination, negative self-evaluation, and stress in depression and anxiety: a review and preliminary model. In: Ferrari, J.R., & Johnson, L., eds. *Procrastination and task avoidance: theory, research, and treatment*. New York: Plenum, pp. 137–167.
35. Ones, D.S., Viswesvaran, C., & Schmidt, F.L. (1995). Integrity tests: overlooked facts, resolved issues, and remaining questions. *American Psychologist* 50: 456–457.
36. Patton, J.H., Stanford, M.S., & Barratt, E.S. (1995). Factor structure of the Barratt Impulsiveness Scale. *Journal of Clinical Psychology* 51:768–774.
37. Corchoran, K., & Fischer, J. (2000). *Measures for clinical practice: a sourcebook*. New York: Free Press.
38. Radloff, L.S. (1977). The CES-D Scale: a self-report depression scale for research in the general population. *Applied Psychological Measurement* 1:385–401.
39. Russell, D., Peplau, L.A., & Cutrona, E.C. (1980). The revised UCLA Loneliness scale: concurrent and discriminant validity evidence. *Journal of Personality and Social Psychology* 39:472–280.
40. Stainton, M., Lay, C.H., & Flett, G.L. (2000). Trait procrastinators and behavior/trait-specific cognitions. *Journal of Social Behavior and Personality* 15:297–312.
41. Downey, G., & Feldman, S.I. (1996). Implications of rejection sensitivity for intimate relationships. *Journal of Personality and Social Psychology* 70: 1327–1343.
42. Anderson, J.C., & Gerbing, D.W. (1988). Structural equation modeling in practice: a review and recommended two-step approach. *Psychological Bulletin* 103:411–423.
43. Aurbuckle, J.L. (1999). *AMOS: a structural equation modeling program*. Chicago: Small Waters.
44. Kelloway, E.K. (1998). *Using LISREL for structural equation modeling: a researcher's guide*. Thousand Oaks, CA: Sage.
45. Bentler, P.M., & Bonett, D.G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin* 88:588–606.
46. Bentler, P.M. (1990). Comparative fit indexes in structure models. *Psychological Bulletin* 107:238–246.
47. Jöreskog, K.G., & Sörbom, D. (1985). *LISREL VI: analysis of linear structural relationships by the method of maximum likelihood*. Mooresville, IN: Scientific Software.
48. Browne, M.W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In: Bollen, K.A., & Long, J.S., eds. *Testing structural equation models*. Newbury Park, CA: Sage, pp. 136–162.
49. McCoul, M., & Haslam, N. (2001). Predicting high-risk sexual behavior in heterosexual and homosexual men: the roles of impulsivity and sensation seeking. *Personality and Individual Differences* 31: 1303–1310
50. Cramer, K.M., & Barry, J.E. (1999). Conceptualizations and measures of loneliness: a comparison of subscales. *Personality and Individual Differences* 27:491–502.
51. Endler, N.S., & Parker, J. (1994). Assessment of multidimensional coping: task, emotion, and avoidance strategies. *Psychological Assessment* 6:50–60.
52. Watson, D. C. (2001). Procrastination and the five-factor model: a facet-level analysis. *Personality and Individual Differences* 30:149–158.
53. Witt, L.A, Burke, L.A., Barrick, M.A., et al. (2002). The interactive effects of conscientiousness and agreeableness on job performance. *Journal of Applied Psychology* 87:164–169.
54. Stanton, J.M., & Weiss, E.M. (2000). Electronic monitoring in their own words: an exploratory study of employees' experiences with new types of surveillance. *Computers in Human Behavior* 16:423–440.
55. Flynn, N. (2000). *The e-policy handbook: designing and implementing effective e-mail, Internet, and software policies*. New York: Amacom.
56. Scheuermann, L.E., & Langford, L. (1997). Perceptions of Internet abuse, liability, and fair use. *Perceptual and Motor Skills* 85:847–850.
57. Neuman, G., & Baydoun, R. (2001). An empirical examination of overt and covert integrity tests. *Journal of Business and Psychology* 13:65–79.
58. Sackett, P.R., & Wanek, J.E. (1977). Integrity testing: an overview. *Security Journal* 8:11–18.

59. Angus Reid Group, Inc. (2000). New study shows Canadians with work Internet access will rack up 800 million hours of personal surfing time at work. *Canadian Interactive Reid Report* July:2000.
60. Ferrari, J.R. (1992). Procrastination in the workplace: attributions for failure among individuals with similar behavioral tendencies. *Personality and Individual Differences* 13:315–319.

Address reprint requests to:
Richard A. Davis
Department of Psychology
York University
Toronto, Ontario, Canada, M3J-1P3

E-mail: davisr@yorku.ca