

Relationship of Internet Addiction Severity with Depression, Anxiety, and Alexithymia, Temperament and Character in University Students

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Abstract

The aim of the study was to investigate the relationship of Internet addiction (IA) severity with alexithymia, temperament, and character dimensions of personality in university students while controlling for the effect of depression and anxiety. A total of 319 university students from two conservative universities in Ankara volunteered for the study. Students were investigated using the Toronto Alexithymia Scale-20, the Temperament and Character Inventory, the Internet Addiction Scale, the Beck Anxiety Inventory, and the Beck Depression Inventory. Of the university students enrolled in the study, 12.2 percent ($n=39$) were categorized into the moderate/high IA group (IA 7.2 percent, high risk 5.0 percent), 25.7 percent ($n=82$) were categorized into the mild IA group, and 62.1 percent ($n=198$) were categorized into the group without IA. Results revealed that the rate of moderate/high IA group membership was higher in men (20.0 percent) than women (9.4 percent). Alexithymia, depression, anxiety, and novelty seeking (NS) scores were higher; whereas self-directedness (SD) and cooperativeness (C) scores were lower in the moderate/high IA group. The severity of IA was positively correlated with alexithymia, whereas it was negatively correlated with SD. The "difficulty in identifying feelings" and "difficulty in describing feelings" factors of alexithymia, the low C and high NS dimensions of personality were associated with the severity of IA. The direction of this relationship between alexithymia and IA, and the factors that may mediate this relationship are unclear. Nevertheless, university students exhibiting high alexithymia and NS scores, along with low character scores (SD and C) should be closely monitored for IA.

Introduction

THE INTERNET HAS become one of the most important academic and recreational tools for adolescents and young adults in the last decade. Against its usefulness, a loss of control over the Internet use may have negative impacts on daily life function, family relationships, and emotional stability.¹ This phenomenon has been termed "Internet addiction (IA)," "pathological Internet use," and "problematic Internet use." Although a standardized definition has not been uniformly agreed on, IA is generally recognized as an individual's inability to control his or her use of the Internet, having negative consequences (e.g., failing in school and having decreased productivity), and resulting in marked distress and/or functional impairment.^{2,3} Although different types of

Internet activities may be the cause of IA, surfing, which can be described as visiting Web sites on the Internet for noncommunication purposes, seems to be strongly associated with IA.⁴⁻⁶ Nevertheless, IA is typically considered a behavioral addiction.⁷

The Internet Addiction Scale (IAS) was developed to measure pathological Internet use.⁸ Two groups of authors studied the reliability and validity of the Turkish version of the IAS; one study was conducted on adolescents⁹ ($n=300$, 27 items, cut-off of 81), and the other was conducted on university students ($n=253$, 30 items, cut-off of 90).¹⁰ Canan et al.⁹ reported that 11.6 percent of adolescents aged 14-19 years were classified as Internet addicts based on the cut-off point of the IAS.⁹ In the study conducted with university students, this rate was 12.26 percent.¹⁰

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Cloninger developed a dimensional model of personality that accounts for both normal and abnormal variations in two major components of personality: temperament and character. The Temperament and Character Inventory (TCI) is a self-administered dimensional questionnaire that was constructed to assess the seven basic dimensions of personality.¹¹ Individual differences in personality structure and development have a strong influence on the risk of psychopathology, including substance abuse in particular.¹² Temperament and character may differ according to the substance abused¹³; for example, the novelty seeking (NS) score was higher, but the reward dependency (RD), self-directedness (SD), and cooperativeness (C) scores were lower in drug-dependent patients than in alcohol-dependent patients, and NS discriminated drug dependency from alcohol dependency.¹⁴ This result is important, because while society attempts to control drug abuse by illegalizing drugs, alcohol is not typically perceived by society as being entirely negative,¹⁵ and its use is only controlled based on age limits. However, problematic alcohol use has been associated with IA.¹⁶ This may suggest that the personality characteristics associated with IA, which is considered a behavioral addiction that is not controlled by law, may be different from other addiction types. Temperament and character personality profiles are important for predicting and preventing different types of addictions and for the administration of adequate treatments.^{17,18} The treatment approach for individuals with different levels of IA severity may differ according to the associated personality characteristics.

A previous study, which evaluated the relationship between personality dimensions and IA, found that high NS and high harm avoidance (HA), whereas low RD were significant predictors of IA in adolescents.¹⁹ Similarly, college students with IA had higher NS and lower RD scores.²⁰ A study that evaluated the relationship between both temperament and character and IA reported that high HA, low SD, low C, and high self-transcendence (ST) were correlated with IA severity.²¹ In another study, risky Internet users were found to have lower scores in the RD, SD, and C dimensions than did normal Internet users.²² Finally, Montag et al.²³ found that SD was a better predictor of problematic Internet use than neuroticism.

Alexithymia is a multifaceted personality construct that is defined as the inability to distinguish one's feelings from the accompanying bodily sensations, the inability to communicate feelings to others, and externally orientated cognitive features reflecting an absence of inner thoughts and fantasies.²⁴ Studies that have evaluated the relationship of alexithymia with temperament and character found that high HA, low SD, low RD, and high ST were associated with alexithymia in psychiatric inpatients and outpatients,²⁵ a sample group of healthy college students,²⁶ and alcohol-dependent inpatients.²⁷ Thus, alexithymia was related to both the temperament and the character dimensions of personality,²⁵⁻²⁷ indicating that both genetic and environmental factors may contribute to alexithymia development. Finally, state-dependent mood and anxiety may mediate the relationship between alexithymia and personality.²⁸

Alexithymia has been associated with deficits in the regulation of emotion.²⁴ Alexithymia has been considered as not only impairment in the identification and expression of one's feelings, but also a global impairment in emotional proces-

sing.²⁹ In their review, Ko et al.¹ suggested that problematic Internet use may lead to emotional stability. Consistent with this view, studies that evaluated the relationship between alexithymia and IA in a nonclinical sample of undergraduate students found that alexithymia was related to IA.^{30,31} Alexithymia was also found to be a mediator in the relationship between childhood maltreatment and IA in college students.³²

The development of effective methods for the prevention and treatment of severe IA first requires the establishment of a clear understanding of the mechanisms underlying the condition.²⁰ Two recent reviews that have evaluated the coexisting of IA and psychopathology reported significant associations of IA with depression and with anxiety disorders,^{1,33} which suggests that psychological symptoms such as anxiety and depression could be relevant to detect IA patients in university students.^{21,34} There is also a concept termed "Internet anxiety," which is the fear or apprehension that individuals experience when using the Internet.³⁵

Since alexithymic personality features are only partly captured by Cloninger's psychobiological model,^{25,27} it is important to evaluate the contribution of alexithymia, in combination with TCI, to psychopathology in different populations,³⁶ such as IA. Recent findings suggest that anxiety and depression may mediate the relationship between alexithymia and TCI.²⁸ In addition, since depression and anxiety may be related with both alexithymia³⁷ and TCI,³⁸ they should be considered when evaluating the effect of alexithymia and TCI on psychopathology. Our hypothesis is that severity of IA would be positively related with alexithymic features and some temperament dimensions such as NS and HA, whereas it would be negatively related with some character dimensions such as SD and C, even when controlling the effect of anxiety and depression. Thus, the aim of this study was to investigate the relationship of temperament, character dimensions, and alexithymia with IA in university students while controlling for the effects of depression and anxiety.

Methods

Participants

The study was conducted on student volunteers from two conservative universities (as explained in the discussion) in Ankara between December 2011 and May 2012. The Fatih University Faculty of Medicine Ethics Committee approved the study. Written informed consent was obtained from the students after the study protocol had been thoroughly explained.

Five hundred university students were considered candidates for the study. Sixty-four of the students refused to participate in the study. Eighty-two students who had volunteered to participate in the study withdrew, because they considered the forms to be overly long. Thirty-five students were excluded, because their forms were incomplete or not returned. Thus, a total of 319 university students participated in the study.

Assessments

All patients were assessed using a semi-structured, socio-demographic form and a series of scales. Alexithymia was

assessed with the Turkish version of the 20-item Toronto Alexithymia Scale (TAS-20).³⁹⁻⁴¹ The first factor (difficulty in identifying feelings [DIF]) in the three-factor model for the TAS-20 consists of seven items that assess the ability to identify feelings and to distinguish them from the somatic sensations which accompany emotional arousal. Factor 2 (difficulty in describing feelings [DDF]) consists of five items that assess the ability to describe feelings to other people. Factor 3 (externally oriented thinking [EOT]) consists of eight items that assess EOT. The approved form of TAS-20 was previously validated in a Turkish population study.⁴¹ The Cronbach's alpha for the total TAS-20 scale was 0.78, and for the three subscales (factors DIF, DDF, and EOT); 0.80, 0.57, and 0.63, respectively.

To evaluate temperament and character traits, the Turkish version of Cloninger et al.'s TCI was used. This measure is a 240-item, forced-choice, self-report scale.^{42,43} The dimensions of temperament are (a) HA, (b) NS, (c) RD, and (d) persistence (P). The dimensions of character are (a) SD, (b) C, and (c) ST. The reliability and validity of the Turkish version of the TCI were supported by its psychometric properties and construct validity.⁴³ The Cronbach's alpha ranged between 0.60 and 0.85 for temperament dimensions and ranged between 0.82 and 0.83 for character dimensions.

The IAS, which was developed by Nichols and Nichi⁸ and tested on a group of 233 college students, measures the level of IA. The Cronbach's alpha of the IAS was 0.95, and the explained variance was 46.50 percent. The IAS is scored by summing the Likert responses across the 31 items. The authors suggested a cut-off score of 93 (3×31 items) as indicative of possible IA. In a reliability and validity study of the Turkish version of the IAS,¹⁰ the Cronbach's alpha value was 0.93 in 253 university students. In this study,¹⁰ item 4 was deleted from the scale, because the item-total correlation was 0.146. In the present study, which was conducted on 319 university students, the item-total correlation for item 4 was 0.337; whereas the lowest item-total correlation was 0.208 for item 29. Item 29 also had the lowest correlation (0.332) after deleting item 4 in the adaptation study of the Turkish version.¹⁰ In the present study, item-total correlations ranged between 0.208 and 0.712, and Cronbach's alpha (0.94) did not differ when any of the items were deleted. Thus, Kayri and Gunuc's¹⁰ original 31-item Turkish version of the scale was used in the present study. This Turkish version was selected, because it was validated on university students, and only one item was deleted (in the Turkish version developed by Canan et al.,⁹ which was conducted on adolescents, 4 items were deleted).

Kayri and Gunuc¹⁰ suggested the classification of scores into 5 groups: 30–60, 61–70, 71–80, 81–89, and >90. They also suggested that those who score 90 or higher should be considered as addicted to the Internet and that those who score between 81 and 89 should be considered as at a high risk of IA. According to this grouping, the score distributions in Kayri and Gunuc's study and the present study are shown in Table 1.

The symptoms and severity of depression were evaluated using the validated Turkish version of Beck Depression Inventory (BDI).^{44,45} The symptoms and severity of anxiety were evaluated using the validated Turkish version of Beck Anxiety Inventory (BAI).^{46,47} In the present study, the Cronbach's alphas were 0.89 for the BDI and 0.90 for the BAI.

TABLE 1. DISTRIBUTION OF INTERNET ADDICTION GROUPS ACCORDING TO THE SUGGESTION OF KAYRI AND GUNUC¹⁰ IN THE ADAPTATION AND PRESENT STUDIES AND GENDER DIFFERENCES ACCORDING TO THE INTERNET ADDICTION GROUPS

Scores	Adaptation study ^a		Present study		Males n (%)	Females n (%)
	n=253	%	n=319	%		
30–60	104	41.1	198	62.1	51 (60.0)	147 (62.8)
61–80	86	34.0	82	25.7	17 (20.0)	65 (27.8)
81–highest	63	24.90	39	12.2	17 (20.0)	22 (9.4)

^aKayri and Gunuc¹⁰ statistics for gender difference: $\chi^2=7.28$, df:2, $p=0.026$.

Data analysis

The statistical package SPSS 17.0 for Windows was used for all analyses. Categorical variables were compared by means of the chi-square test. One-way analysis of variance was employed to compare continuous variables between groups. Correlation analyses (Pearson and bivariate analyses) between the IAS, the depression, anxiety, alexithymia, and personality dimensions were performed. With IA severity as the dependent variable, a hierarchical linear regression model was performed. For all statistical analyses, differences were considered significant at $p<0.05$.

Results

Of the 319 university students, 12.2 percent ($n=39$) were in the Internet addicted or high risk for addiction group. The rate of membership in these two groups was higher in men (20.0 percent, $n=17$) than women (9.4 percent, $n=22$) ($\chi^2=7.28$, df:2, $p=0.026$) (Table 1).

According to IAS score in the present study, participants were divided into three different groups; moderate/high IA (IA or high risk group; IAS score cut off 81), mild IA (IAS score 61–80), and group without IA (IAS score 30–60). Of the university students enrolled in this study, 12.2 percent ($n=39$) were categorized into the moderate and high IA group (IA 7.2 percent, high risk 5.0 percent), 25.7 percent ($n=82$) were categorized into the mild IA group, and 62.1 percent ($n=198$) were categorized into the group without IA (Table 1).

Alexithymia, depression, anxiety, and NS scores were higher; whereas SD and C scores were lower in the group with moderate/high IA (Table 2). The severity of IA was positively correlated with DIF ($r=0.38$, $p<0.001$), DDF ($r=0.37$, $p<0.001$), and alexithymia ($r=0.41$, $p<0.001$); whereas it was negatively correlated with SD ($r=-0.28$, $p<0.001$). Other than these, IAS showed no significant correlation (Not shown).

In the hierarchical linear regression model, the seven temperament and character dimensions were entered as independent variables in the first step. In the second step, DIF, DDF, and EOT factors of TAS-20 were added to the model; whereas in the third step, depression and anxiety scores were entered as independent variables. The results identified the DIF and DDF factors of alexithymia and low C and high NS dimensions of personality as the determinants of IAS score in the final model (Table 3).

TABLE 2. ONE-WAY ANALYSIS OF VARIANCE WAS EMPLOYED TO COMPARE CONTINUOUS VARIABLES BETWEEN GROUPS AND CORRELATION ANALYSES (PEARSON AND BIVARIATE ANALYSES) BETWEEN THE INTERNET ADDICTION SCALE AND ALEXITHYMIA, PERSONALITY DIMENSIONS, ANXIETY, AND DEPRESSION WERE PERFORMED

Scale scores	No IA (n=198)		Mild IA (n=82)		Moderate/high IA (n =39)		F	p
	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation		
DIF ^a	13.80	4.40	15.31	4.86	18.82	5.37	19.62	<0.001*
DDF ^a	11.85	3.66	13.05	3.51	15.95	4.04	20.97	<0.001*
EOT ^b	20.46	3.77	21.23	3.37	22.21	2.88	4.45	0.012*
TAS-20 ^a	46.11	8.48	49.59	8.84	56.97	10.28	25.92	<0.001*
NS ^a	18.74	4.82	19.99	4.97	20.77	4.65	3.94	0.020*
Harm avoidance	16.98	5.54	17.83	4.88	18.13	5.68	1.20	0.304
Reward Dependency	13.71	3.22	13.44	3.27	13.03	2.89	0.81	0.444
Persistence	4.59	1.88	4.51	1.95	4.15	2.31	0.80	0.452
SD ^c	28.20	6.58	26.06	5.92	23.80	6.74	9.08	<0.001*
C ^c	28.76	5.99	25.88	6.87	25.41	5.51	9.16	<0.001*
Self-transcendence	19.84	5.60	19.49	5.05	20.31	4.54	0.32	0.726
BAI ^b	10.54	9.07	13.07	9.48	14.80	10.60	4.52	0.012*
BDI ^d	9.18	8.48	9.66	7.16	16.46	11.62	11.85	<0.001*

^aModerate/high > mild > no.

^bModerate/high > no.

^cModerate/high, mild < no.

^dModerate/high > mild, no.

*Statistically significant.

C, cooperativeness; IA, Internet addiction; NS, novelty seeking; SD, self-directedness; DIF, difficulty in identifying feelings; DDF, difficulty in describing feelings; EOT, externally oriented thinking.

TABLE 3. DETERMINANTS OF INTERNET ADDICTION SEVERITY IN A HIERARCHICAL LINEAR REGRESSION MODEL

	Unstandardized coefficients		Standardized coefficients Beta	T	p
	B	Standard error			
Step 1 (constant)	75.168	6.517		11.534	<0.001
SD	-0.585	0.163	-0.214	-3.581	<0.001
NS	0.498	0.198	0.135	2.514	0.012
C	-0.338	0.170	-0.119	-1.991	0.047
Step 2 (constant)	40.379	8.000		5.047	<0.001
SD	-0.160	0.66	-0.059	-0.963	0.336
NS	0.543	0.86	0.147	2.913	0.004
C	-0.361	0.159	-0.127	-2.267	0.024
DDF	0.965	0.304	0.208	3.178	0.002
DIF	0.731	0.247	0.199	2.955	0.003
Step 3 (constant)	38.486	8.249		4.665	<0.001
SD	-0.126	0.172	-0.046	-0.733	0.464
NS	0.567	0.189	0.153	3.005	0.003
C	-0.355	0.160	-0.124	-2.217	0.027
DDF	0.949	0.306	0.205	3.099	0.002
DIF	0.680	0.262	0.185	2.594	0.010
Anxiety	0.099	0.113	0.052	0.873	0.383
Depression	0.010	0.133	0.005	0.076	0.939

Variables entered in the first step: subscales of TCI, $F=12.84$, $df=3$, 315, $p<0.001$, adjusted $R^2=0.10$. Variables entered in the second step: subscales of TAS-20, $F=17.84$, $df=5$, 313, $p<0.001$, adjusted $R^2=0.21$. Variables entered in the third step: Beck Anxiety Inventory and Beck Depression Inventory $F=12.83$, $df=7$, 311, $p<0.001$, adjusted $R^2=0.21$.

TCI, Temperament and Character Inventory.

Discussion

The percentage of students who were categorized into the IA group according to the IAS cut-off point of 90 was 7.2 percent, which was low compared with previous studies conducted on Turkish adolescents (11.6 percent)⁹ and university students (12.26 percent).¹⁰ The reason for this lower rate may be that the students included in the study were conservative; that is, none of the participants tried any drugs, only 30 students reported ever smoking cigarettes, and 13 students reported that they had tried alcohol at least once. Furthermore, while the rate of IA is typically higher in men, there was a greater number of female than male participants in the study. Female students may have participated in the survey more willingly and completed the questionnaires more carefully, as was suggested in previous studies.⁴⁸

When those at a high risk of IA (cut-off point between 81 and 89) were included (5.0 percent), the percentage of students with moderate/high IA was 12.2 percent. Alexithymia, depression, anxiety, and NS were higher; whereas SD and C were lower in the group with moderate/high IA. These findings are consistent with the hypothesis of our study; the only exception was that we did not find HA higher in the group with moderate/high IA. The main findings of the study suggested that higher DIF, DDF, and NS scores and lower C scores are associated with greater severity of IA in university students. Since the study was cross-sectional, the causal relationship between alexithymia and IA and the factors that may mediate this relationship could not be determined. In addition, there may be a bi-directional interaction between IA and alexithymia. Finally, alexithymia may affect how a person perceives her-/himself. In the present study, all of the scales were self-rated, which may be considered a limitation.

Alexithymia is both considered as a stable personality trait constituting a vulnerability factor in mental disorders and as a defensive mechanism that is secondary to the occurrence of psychological distress.⁴⁹ The results of a study conducted in the general population support the assumption that alexithymia generally represents a stable personality trait and may increase vulnerability to depressive symptoms.⁵⁰ In contrast, some researchers suggest that alexithymia is a state-dependent phenomenon in depressed people⁵¹ and partly a state-dependent phenomenon in patients with substance use disorder.⁵² Strong associations were also found between alexithymia and immature or maladaptive defense styles in students⁵³ and alcohol-dependent inpatients.⁵⁴ Students with negative emotions, such as anxiety or depression, may use the Internet to relieve these emotions externally^{55,56} and may have alexithymia as a defense mechanism internally.^{53,54}

Both moderate/high IA and alexithymia may be utilized to cope with or relieve anxiety and depressive symptoms. Maladaptive and excessive Internet use may also result in or further amplify alexithymia,¹ anxiety, and depressive symptoms³⁴; moreover, anxiety and depression may serve to mediate the relationship between IA and alexithymia. Nevertheless, DIF and DDF predicted the severity of IA independent of anxiety and depression. Spending time on the Internet could be an escape from feelings that would otherwise be emotionally painful. This could represent self-induced alexithymia, which is consistent with the study by Ko et al.,¹ who suggested that a loss of control over Internet use may lead to emotional stability. Thus, although the cross-sectional design of the study does not allow for the analysis of the stability of alexithymia or the causal relationship between alexithymia and moderate/high IA, alexithymia is associated with IA in university students.

In some of the previous studies, high NS predicted IA,^{19,20} whereas in other studies, NS was not related to IA.²¹⁻²³ In the present study, NS was related to severity of IA. The loss of control of Internet use may be related to a risk-taking personality. Individuals who have greater tendencies for NS tend to be quick tempered, excitable, exploratory, curious, enthusiastic, ardent, easily bored, impulsive, and disorderly.⁴² NS reflects activity in appetitive motivational systems, greater attention to reward cues, and increased emotional reactivity to reward.⁵⁷ Risk taking and NS indicate the potential to seek new experiences, higher levels of rewarding stimulation, and persistent engagement in risky behaviors without considering future outcomes or consequences.⁵⁸ Studies suggest that NS represents a vulnerability factor for substance abuse in general.^{18,59} Students with high NS may engage in Internet activities with higher motivation and arousal responses.²⁰ Thus, high NS may predispose an individual to severe IA, similar to its effect on substance use.¹³ These findings suggest that NS temperament, which is directly related to substance dependence, may also be related to the severity of behavioral (Internet) addiction in models with low C and alexithymia predictors. Consistent with this, a recent study found that personality dimensions did not differ between substance-abusing adolescents and adolescents with IA.⁶⁰

The findings considering relationships of other temperament dimensions of HA and RD with IA in the literature are also inconsistent.¹⁹⁻²³ Some studies found higher HA^{19,21} to be related with IA, whereas others did not.^{20,22,23} The same is true for lower RD, which was suggested to be related with IA

by some authors,^{19,20,22} whereas the others did not find any relationship.^{21,23} Both HA and RD were not related with IA in the present study. These differences may be due to cultural differences; most of the previous studies were conducted in far eastern countries, in which IA and factors related with IA may differ from Turkish samples. In addition, methodological differences may explain these differences; such as evaluating the severity of IA in dichotomy or dimensionally; whether the sample was taken from Internet cafes or not, with regard to the definition of IA; and whether the negative affect was controlled or not. A limitation of our sample is that it represents female predominant and conservative university students.

Consistent with previous studies,²¹⁻²³ the character dimension of SD was lower in the moderate/high IA than in the other groups and was negatively correlated with IAS. C was also lower in this group and was predictive of IAS. All categories of personality disorder are distinguished by low SD, regardless of the cluster or category of personality disorder,^{42,61} whereas lower C increases this difference by modulating the predictive value of SD.⁶¹ However, low C predicted IAS along with high NS, which may suggest that dramatic and emotional subjects (Cluster B) are well represented⁶² in those with moderate/high IA. Thus, Internet use may provide additional emotional stability¹ for subjects with Cluster B characteristics who are also highly alexithymic.^{30,31} Alexithymia as a defensive style can be considered as an aspect of personality, defined as an individual's ability to overcome and adapt to stresses caused by illness or other negative life events. Nevertheless, character scores are not stable over time⁴²; therefore, low SD and C could be considered as either preceding or consequent on IA. Thus, it is unknown whether the observed association between character dimensions and moderate/high IA reflects correlates, causal factors, or sequela of pathological Internet use.

Evaluating pathological Internet use and the factors related to IA would help in identifying university students with moderate/high IA. At the minimum, these findings suggest that a moderate/high IA classification may alert clinicians to students with complex psychopathology (higher alexithymia, depression, and anxiety and lower character scores) who may also exhibit additional problems related to these psychopathologies. The results suggest that in university students, DIF and DDF factors of alexithymia and personality, particularly low C and high NS scores, are associated with IA severity. Although the direction of this relationship between alexithymia and IA, and the factors that may mediate this relationship are unclear, university students exhibiting high alexithymia and NS scores, along with low character scores (SD and C) should be closely monitored for IA.

Author Disclosure Statement

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