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Beyond peer contagion: Unique and interactive effects of multiple peer influences on Internet addiction among Chinese adolescents

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ABSTRACT

This study examined the roles of different aspects of peer context in the peer contagion of Internet addiction among 956 Chinese adolescents (11–19 years, 473 boys and 419 girls). Framed by peer socialization perspectives, the present study examined the unique effects of close peers' social acceptance and normativeness of Internet addiction on adolescents' Internet addiction beyond the putative effects of close peers' Internet addiction. The interactive effects of close peers' social status and friendship quality with close peers' Internet addiction on adolescents' Internet addiction as well as gender differences also were examined. Results showed that male adolescents who were affiliated with peers having lower levels of social acceptance were more likely to develop heightened levels of Internet addiction. Adolescents who were situated in a class with higher levels of Internet addiction also tended to have higher levels of Internet addiction. In addition, male adolescents who perceived their peers possessing higher social status were more vulnerable to peer contagion of Internet addiction. In general, findings suggest the importance of considering multiple facets of peer influences beyond the peer contagion of Internet addiction. Implications for prevention and intervention efforts are discussed.

1. Introduction

With the development and spread of Internet, adolescents' Internet use has become a big concern in China. The latest National Internet Development Report from China Internet Network Information Center (CNNIC, 2015) showed that the number of 10–19 years old Internet users was about 147.97 million by the end of 2014, which constituted 22.8% of all Internet users in China. Previous research reported that approximately 10% of Chinese adolescents were addicted to Internet (Lam, Peng, Mai, & Jing, 2009; Wang et al., 2013).

Internet addiction, characterized by compulsive Internet use, withdrawal and tolerance symptoms, and interpersonal, health-related, and time management problems (Chen, Weng, Su, Wu, & Yang, 2003), could be detrimental to adolescent development (Greenfield & Yan, 2006). Adolescence is a critical period and the current development of values and behavioral patterns may affect their whole life (Erikson, 1985). A substantial body of research has demonstrated that Internet addicted adolescents display problems in their physical and mental health (Cao, Sun, Wan, Hao, & Tao, 2011), personality development (Cho, Kim, Kim, Lee, & Kim, 2008), school performance (Young, 1998), and family relationships (Liu, Fang, Deng, & Zhang, 2012). Research has showed that adolescents are vulnerable to Internet addiction due to their increasing risk-taking behavior, heighted levels of novelty seeking and exploration, and extensive social interactions, especially with peers (Lee, Han, Kim, & Renshaw, 2013).

Despite a large body of research on Internet addiction, our understanding of why some adolescents become addicted to Internet is quite limited (Willoughby, 2008). Peer has been a salient socialization agent in the development of various problem behaviors during adolescence (Rose & Rudolph, 2006). Consistent with the emphasis on deviant peer influences on other problem behaviors (Shi & Xie, 2012; Simons-Morton & Farhat, 2010), research on Internet addiction is limited to address the direct association between adolescents' and their close peers' Internet addiction (Kraut et al., 1998; Liu & Kuo, 2007). However, peer influences are multi-dimensional and we may not get a complete picture of peer contagion effects without considering other peer factors (Brechwald & Prinstein, 2011). In fact, some adolescents may be more likely to become Internet addicted than others when affiliated with addicted peers, suggesting different susceptibilities

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to peer contagion of Internet addiction. As such, beyond the simple fact that involving with deviant peers could contribute to adolescents' development of problem behavior, the present study examined other critical peer influences on Internet addiction as well as under what circumstances effects of peer contagion may exacerbate, which may contribute to targeted prevention and intervention practices.

1.1. Peer and adolescent Internet addiction

Peer factors have been demonstrated among the most salient, robust correlates of adolescents' deviant behavior, including substance use (Hussong, 2002), alcohol use (Trucco, Colder, & Wieczorek, 2011), and smoking (Kobus, 2003). Although dyadic friendship, small-group relationships (clique), and the broader group system (crowd) constitute the complex peer social system (Brown & Klute, 2003), adolescents' adjustment is more likely to be influenced by peer relationships that are more socially proximal than socially distal to the adolescents (Larson, Whitton, Hauser, & Allen, 2007). In support of this idea, Hussong differentiated among best friendships, peer cliques, and social crowds and found that adolescents who were more highly embedded in substance-using close peer contexts showed greater risk for substance use. In addition, this study also found a reduced risk for substance use for adolescents with substance-using best friends if they had other close friends who were less involved with substances. Thus, it is necessary to consider adolescents' all close friends when examining peer contagion effects (Simons-Morton & Farhat, 2010).

Research on the relationship between adolescent Internet addiction and peer context mainly has focused on the reciprocal associations between Internet addiction and peer relationships, including general attachment, peer acceptance, and/or friendship quality. On one hand, the desire for communication motives adolescents to use Internet, where adolescents could satisfy their psychological needs that may not be fulfilled in the real world (Kraut et al., 1998). In support of this idea, poor peer relationship was found as an important predictor of Internet addiction among adolescents (Milani, Osualdella, & Di Blasio, 2009). On the other hand, excessive use of Internet and preoccupation with the virtual reality may drive adolescents away from the real world and thus youth might engage in less communications with peers (Kraut et al.). For example, Internet addicted adolescents are more likely to display many communication problems with peers (Liu & Kuo, 2007) and tend to have poor friendship quality (Harman, Hansen, Cochran, & Lindsey, 2005). An important gap in the literature is that limited studies have integrated several dimensions of peer influences and examined their additive and/or synergetic effects on adolescent Internet addiction. As such, the present study examined how close peers' social acceptance, normativeness of Internet addiction, close peers' social status, and friendship quality with close peers are implicated in the peer contagion of Internet addiction.

1.2. Theoretical foundation and hypotheses

The theoretical grounding for this examination of multiple peer influences on adolescents' Internet addiction is based in peer socialization perspectives, including a social context model of peer influence (Chang, 2004), a social impact perspective (Latané, 1981), and a differential-association perspective (Agnew, 1991). These theoretical models were utilized to examine the independent and interactive effects of various peer factors in the peer contagion of Internet addiction.

First, a social context model of peer influences (Chang, 2004) asserts that peer group norm has profound influences on adolescents' behavior and peers' norm is the major source of constraint forces during adolescence (Blanton & Burkley, 2008). Although best friends exert the greatest influences in the peer context, it is essential to address the impact of other aspects of peer context to better understand the underlying mechanism of peer contagion of Internet addiction (Simons-Morton & Farhat, 2010). Given that Chinese adolescents (i.e., junior and high school students) spend most of their time in class (Fuligni & Stevenson, 1995), the classroom may be a typical context where peer influences take place (Chang, 2004). Peer acceptance and normativeness of behavior are two critical components of peer norm in the classroom. The level of social acceptance of adolescents' peers in the classroom may indicate the extent to which adolescents' social behavior (Internet addiction in this case) conforms to the normative behavior among classmates. In addition, the average level of Internet addiction in the classroom represents the social context in which adolescents manifest their excessive Internet use behavior and communicate with classmates (Chang, 2004). Thus, we hypothesized that peers' social acceptance and the normativeness of Internet addiction are associated with adolescents' Internet addiction, when controlling for close peers' Internet addiction.

Second, a social impact perspective indicates that a social group varies in its strength of social impact on its members depending on its various levels of social status (Latané, 1981; Shi & Xie, 2012). LaFontana and Cillessen (2010) found that adolescents prioritized social status over friendship, personal achievement, following rules, prosocial behavior, and romantic interests. Adolescents strive for attention and belongings to a specific group and more importantly, for high social status or impact in their peer groups (Ojanen, Grönroos, & Salmivalli, 2005). Thus, these adolescents may be more likely to conform to the behavioral patterns of high social status peers. Thus, we hypothesized that the positive association between close peers' and adolescents' Internet addiction is stronger for adolescents affiliating with peers having higher social status than those affiliating with peers having lower social status.

Finally, a differential-association perspective of delinquent behavior posits that deviant friends are assumed to have more influence provided that relationships with these friends are more close and positive (Agnew, 1991). Consistent with this proposition, social bonding theory states that observational learning from friends is enhanced when having more positive relationships with friends (Berndt, 2002). The magnifying effects of peer relationships on peer contagion have been supported by research on depressive symptoms (Prinstein, 2007), substance use (Urberg, Luo, Pilgrim, & Degirmencioglu, 2003), and antisocial behavior (Piehler & Dishion, 2007). Thus, the present study examined the magnifying effect of adolescents' friendship quality on peer contagion of Internet addiction.

1.3. Gender differences

Although we could not locate any study that has examined gender differences of how peer factors are implicated in peer contagion of Internet addiction, there is evidence for gendered patterns of adolescent Internet use and addiction. Studies consistently found that males are more likely to become Internet addicted than females (Chou & Hsiao, 2000). In addition, males are more likely to be interested in online activities involving violence, power, and/or control whereas females tend to use Internet for communications (Young, 1998). Chou, Condron, and Belland (2005) reviewed studies related to Internet addiction and concluded that "men are more likely subject to Internet addiction" (p. 371), which justifies the need for a better understanding of the gendered patterns of peer influence processes of Internet addiction among adolescents.

Gender has long been demonstrated to be an importance factor in considering adolescents' susceptibility to peer influence in other addictive or problem behaviors. Boys tend to have denser peer

networking than girls and thus are more likely to be surrounded by deviant peers (Steinberg & Monahan, 2007). Boys were found to be more susceptible or less resistant than girls to peer influences in terms of aggressive behavior (Steinberg & Monahan). However, Rose and Rudolph (2006) reviewed studies on gender differences of emotional and behavioral development and found that girls may be more influenced within peer context. In addition, Allen, Chango, Szwedo, Schad, and Marston (2012) found no significant gender differences of substance use in susceptibility to peer influence. Overall, the results regarding the gender differences of adolescents' susceptibility to peer influence are equivocal. The present study extended the previous literature by examining gender differences of the proposed close peers' influence models for adolescents' Internet addiction. Given that Internet use and addiction are more prevalent among male adolescents and thus boys are more likely to be affiliated with Internet addicted close peers, we expect that the peer influences are more salient among boys than girls.

1.4. The present study

The present study examined the independent and interactive effects of multiple peer factors on Internet addiction among Chinese adolescents. We examined five primary research questions: (a) How are close peers' social acceptance associated with adolescents' Internet addiction after controlling for close peers' Internet addiction?; (b) How are normativeness of Internet addiction associated with adolescents' Internet addiction after controlling for close peers' Internet addiction?; (c) How does the association between perceived close peers' and adolescents' Internet addiction vary by close peers' social status?; (d) How does the association between perceived close peers' and adolescents' Internet addiction vary by friendship quality?; and (e) Do these peer influences differ across boys and girls?.

2. Methods

2.1. Procedures

The study has been approved by the ethical committee of School of Psychology, Beijing Normal University. Students in 7th, 8th, 10th, and 11th grades from two middle schools in a southeastern county of China, were given take-home recruitment letters and consent forms. We followed Fletcher and Hunter's (2003) suggestions to acquire adequate parental consent for children's participation. The return rate of parental consent for children's participation was over 95%. Children who returned signed consent forms were asked to complete an in-school survey (20–30 min). 1006 middle school students were included in the study on adolescent Internet use. All questionnaires were distributed to participants in classroom settings during the self-study time. During the in-school survey, youth completed a questionnaire including demographic questions (family structure, income, parents' education, and occupation) and questions regarding their friends' and own Internet use behaviors as well as their peer relationships. Questionnaires were anonymous and self-administered. The researcher stayed at the classroom to answer any possible questions and the teachers left the classrooms during the period to avoid any possible information bias. Adolescents received compensation after completing questionnaires (equivalent to approximate $2 per student). 50 participants failed to participate due to either conflict of time, resulting in 956 valid questionnaires.

2.2. Participants

473 boys and 419 girls (63 missing on gender) were from various socio-economic backgrounds, with ages ranging between 11 and 19 years old (M = 15.51, SD = 2.05). Of all participants, 218, 219, 277, and 242 came from 7th, 8th, 10th, and 11th grades respectively. Students' parental educational attainment, occupation, and family income were collected to evaluate the socio-economic status (SES). 5.6% of mothers and 2.9% of fathers having at least some college education. 9.8% and 15.5% of the adolescents were from low-income and high-income families (one deviation away from local average monthly family income), respectively. Parental occupation ranged from nonemployment to managers. Most adolescents came from two-parent families (838, 87.7%) and the rest was living with single parents or step-parents. The demographic distributions of the sample were representative of the local population (China statistical yearbook., 2010).

2.3. Measures

2.3.1. Adolescents' Internet addiction and normativeness of Internet addiction

The Chinese Internet Addiction Scale-Revision (CIAS-R) was used to measure the severity of adolescent *Internet addiction* (Chen et al., 2003). The CIAS-R is a self-rated Likert scale with good reliability and validity. The 26 questions asked about the core symptoms and the related problems of Internet addiction. Tolerance (4 questions), compulsive use (5 questions), and withdrawal (5 questions) constitute the core symptoms subscale; negative impact on their social activities, time management (5 questions), and interpersonal relationships and physical conditions (7 questions) constitute the related problems subscale. The total score of these five subscales ranges from 26 to 84, with higher score indicating higher levels of Internet addiction. Ko, Yen, Chen, Chen, and Yen (2005) demonstrated that the diagnostic cut-off value of 64 for CIAS-R had a high sensitivity rate (86.6%) and an excellent diagnostic accuracy rate (87.6%). Thus, it has been used as a reliable diagnostic tool in an epidemiological survey as it can provide the estimated prevalence rate and identify the target case group (Mak et al., 2014). The internal consistency of the scale (Cronbach's alpha) in this study was .95. The classroom normativeness of Internet addiction was obtained by computing the geometric mean of Internet addiction within 17 classes.

2.3.2. Close peers' Internet addiction

Adolescents' close peers were nominated by adolescents and names of these close friends were written down (the confidentiality of their nomination has been stated in the consent form). Participants were allowed to nominate no more than 10 close peers (Ennett, Bauman, & Koch, 1994), and then reported the sex, closeness, whether in the same school or class, frequency of Internet use, attitude toward Internet use, and severity of Internet addiction for each peer they identified. The item for severity of Internet addiction is a 4 point item from 0 = never use Internet to 3 = addicted to Internet. Because of our focus on the close peers' influence instead of a single close friend, the scores of all the *close peers' severity of Internet addiction* were averaged for each adolescent.

2.3.3. Close peers' social acceptance and social status

Adolescents were presented with a class roster and asked to circle the names of up to three classmates who fit the following descriptions: (a) someone who you like least (i.e., negative nominations), and (b) someone who you like most (i.e., positive nominations). Because research showed average ratings are among the most reliable of the measures used to estimate peer acceptance across members of a peer group (Ladd, 2005), the positive and negative nominations were averaged and standardized within classrooms. The total number of nominations for "like most" and "like least" were standardized to obtain two separate z scores,

which were subsequently subtracted to compose a social preference score (z "like most" – z "like least" = peer acceptance) and added together to compose a social impact score (Coie, Dodge, & Coppotelli, 1982). Lower scores of social acceptance scores represented less likeability whereas higher scores represented greater likeability. This is a widely used technique for assessing social acceptance within the classroom (Ladd). Social status was measured by the number of times a child was nominated by peers into a social group, which represented a strong power of social status (Shi & Xie, 2012). *Close peers' social acceptance and social status* were computed by averaging the peer acceptance and social status scores of all nominated close friends for a given adolescent.

2.3.4. Friendship quality

Adolescents' perceptions of *friendship quality* were assessed with Chinese version of the Network of Relationships Inventory (NRI; Furman & Buhrmester, 1985). This adapted 16-item questionnaire measured four features of relational closeness (help and support, conflict, companionship, and intimate disclosure). One intimate disclosure item is "How often do you share your privacy with your friend?" One conflict item is "How often do you and your friend argue with each other?" Adolescents responded on a five-point Likert scale from 1 (Never or hardly at all) to 5 (Always or extremely much). For the current study, reliability coefficients for each subscale were .77, .56, .72, .77, respectively. The conflict subscale was dropped from the analyses because of the low reliability in this sample. A composite score of the other three positive dimensions was obtained by averaging across the three subscales.

2.3.5. Covariates

Information regarding adolescent *gender* (0 = female; 1 = male), adolescent *age* in years, *parental educational attainment, occupation, family income,* and *grade* (1 = 7th grade, 2 = 8th grade, 3 = 10th grade, 4 = 11th grade) was collected in the questionnaire. Students' parental educational attainment, occupation, and family income were collected to evaluate the *socio-economic status* (SES). Parental educational attainment was coded using the larger number of years of education received between parents; occupation was coded following standards by Ganzeboom and Treiman (1996); family income was coded into low-, medium-, and high-income families. The SES score for each family was calculated using the composite factor scores of components out of factor analysis: $SES = (\beta_1 * Z_{education} + \beta_2 * Z_{occupation} + \beta_3 * Z_{income})/\varepsilon_f$, where β_1, β_2, and β_3 are factor loadings and ε_f was the first eigenvalue. The SES for all participants ranges from −1.97 to 4.51, and those above one standard deviation were assigned into high SES group (12.5%); those below one standard deviation were assigned into low SES group (15.9%); and the rest were assigned into medium SES status group (71.6%). SES status and family type were included in all models to control for potential selection into different levels of severity of Internet addictive.

2.4. Strategy of analyses

Data were analyzed using multilevel modeling (SAS, v. 9.4) to deal with the dependency of variables within classes. Individual characteristics (i.e., level 1) were nested within classes (i.e., level 2). Restricted maximum likelihood (REML) was chosen as the estimation method because REML generates more accurate variance estimation. In addition to close peers' Internet addiction (i.e., peer contagion effects), other peer factors and their interactions with child sex were included to test their independent effects on adolescents' Internet addiction as well as their gender differences. Moreover, interactions between other peer factors and close peers' Internet addiction (i.e., two-way interactions) as well as their interactions with child sex (i.e., three-way interactions) were included to test syngeneic effects of multiple peer factors on adolescents' Internet addiction as well as their gender differences. The variance accounted for by each model was reported as the indicator of effect size.

Single imputation was conducted to impute missing data because traditional approaches, including listwise or case deletion, pairwise deletion, mean substitution, and indicator/dummy variable adjustment can result in "serious biases in a positive or a negative direction, increases in Type II errors, and underestimating correlations and b weights" (Acock, 2005, pp. 1017–1018). The percentage of missing data ranged from 0% (i.e., complete data on grade and family type) to 7.95% (i.e., close peers' social status). Single imputation is good to document the small amount of missing data (Schafer & Graham, 2002).

3. Results

The prevalence of Internet addiction among Chinese adolescents and the differences across demographic variables were showed in Table 1. The Internet addiction rate was 8.9% in this sample. The significant differences of severity of Internet addiction have been found in gender, grade, and SES status. Boys reported significantly higher levels of severity of Internet addiction than girls. The level of severity of Internet addiction of adolescents in Grade 8, 10, and 11 each were significantly higher than that of adolescents in Grade 7 (MD = 5.43, $p < .001$; MD = 5.80, $p < .001$; MD = 7.45, $p < .001$). As for SES status, adolescents from high SES families reported significantly lower levels of Internet addiction than those from medium or low SES families. However, there is only gender differences in Internet addiction rate with boys higher than girls (see Table 2).

Before examining peer influences on adolescents' Internet addiction, an unconditional model without any predictors was modeled. The average level of adolescents' Internet addiction between classes (i.e., the intercept) was 43.68 (SE = .94, $p < .001$). A decomposition of the total variance in adolescents' Internet addiction scores indicated that 5.68% of the variance was between classes ($\tau_{00} = 11.47$, $Z = 1.62$, $p < .05$) and 94.32% of the variance was within classes ($\sigma^2 = 190.46$, $Z = 10.05$, $p < .001$). The significant variance across classes justified the need to employ multi-level modeling to deal with the clustering of adolescents' Internet addiction between classes and that there was sufficient variability in Internet addiction between and within classes for subsequent analyses.

Our first research question focused on the association between close peers' social acceptance and adolescents' Internet addiction after controlling for close peers' Internet addiction as well as the potential gender differences. In addition, to provide a more complete picture of peer influences, we also examined the moderating effects of close peers' social acceptance. Controlling SES status and family type (see Table 3, Column 1), close peers' social acceptance is associated negatively with adolescents' Internet addiction. This association between close peers' social acceptance and adolescents' Internet addiction was moderated by child sex. Follow-up analyses indicated that the association between close peers' social acceptance and adolescents' Internet addiction was significant in adolescent male group ($b = -3.40$, $p < .001$) but not significant in the adolescent female group ($b = .30$, $p > .05$). Close peers' social acceptance did not interact with close peers' Internet addiction and child sex in the prediction of adolescents' Internet addiction. The model accounted for 14.81% of the variance of adolescents' Internet addiction within classes. Thus, our hypothesis of a negative association between close peers' social acceptance and adolescents' Internet addiction was supported in the male adolescents.

Table 1
Mean levels and standard deviations of Internet addiction among adolescents: Differences across genders, grades, SES, and family types.

		Internet addiction *M* (SD)	*t*/*F*	*p*	Internet addiction rate *N* (%)	χ^2	*P*
Total		44.28 (14.28)			84 (8.9)		
Gender			7.553***	<.001		17.368***	<.001
	Boys	47.47 (14.81)			60 (12.7)		
	Girls	40.47 (12.62)			19 (4.7)		
Grade			11.53***	<.001		5.182	.159
	Grade 7	39.42 (14.33)			11 (5.3)		
	Grade 8	44.84 (13.09)			18 (8.4)		
	Grade 10	45.22 (13.96)			29 (10.5)		
	Grade 11	46.86 (14.70)			26 (10.7)		
SES status			5.347**	.005		5.108	.078
	Low	44.74 (15.00)			9 (8.3)		
	Medium	44.47 (14.12)			59 (9.5)		
	High	40.33 (11.45)			5 (3.6)		
Family type			−1.368	.172		.001	.973
	Two biological parents	44.04 (14.10)			74 (8.9)		
	Others	46.00 (15.48)			10 (9.7)		

** $p < .01$.
*** $p < .001$.

Table 2
Correlation matrix for major variables used in this study.

	1	2	3	4	5	6
1. Adolescents' Internet addiction	1					
2. Close peers' Internet addiction	.28***	1				
3. Close peers' social acceptance	−.11**	−.16***	1			
4. Normativeness of Internet addiction	.27***	.23***	.07*	1		
5. Friendship quality	.06	.10*	.02	.03	1	
6. Close peers' social status	.03	.10*	.11**	−.04	−.13***	1
M	43.49	1.04	.31	43.50	2.96	.38
SD	14.22	.48	.87	3.85	0.69	.93

* $p < .05$.
** $p < .01$.
*** $p < .001$.

Our second research question centered on the normativeness of Internet addiction in relation to adolescents' Internet addiction in the context of peer contagion effects as well as gendered patterns of these additive effects. Controlling for SES status and family type (see Table 3, Column 2), the normativeness of Internet addiction was associated positively and significantly with adolescents' Internet addiction. The normativeness of Internet addiction did not interact with close peers' Internet addiction and/or child sex in the prediction of adolescents' Internet addiction. The model accounted for 27% of the variance of adolescents' Internet addiction across classes and 14.81% of the variance of adolescents' Internet addiction within classes. Thus, our hypothesis of a positive association between the normativeness of Internet addiction in the class and adolescents' Internet addiction was supported across both male and female adolescents.

The third research question concentrated on the moderating effects of close peers' social status in the peer contagion of adolescents' Internet addiction as well as potential gender differences. Controlling for SES status and family type (see Table 3, Column 3), close peers' social status interacted with close peers' Internet addiction and child sex in the prediction of adolescents' Internet addiction. The follow-up analyses indicated that the significant interactive effects between close peers' social status and close peers' Internet addiction was significant in the male group ($b = -3.56$, $p < .01$) but not significant in the female group ($b = .86$, $p > .05$). Fig. 1 showed that male adolescents who perceived their peers earning higher social status were more likely to become Internet addicted as their close peers' Internet addiction became serious than those who perceived their peers possessing lower social status. The model accounted for 14.82% of the variance of adolescents' Internet addiction within classes. Thus, our hypothesis that peer contagion effects of Internet addiction were stronger for adolescents with higher social status peers was supported.

The last research question spoke to the moderating effect of adolescents' friendship quality in the peer contagion of Internet addiction as well as potential gender difference. Controlling for SES status and family type (see Table 3, Column 4), friendship quality did not interact with close peers' Internet addiction and/or sex in the prediction of adolescents' Internet addiction. As such, our hypothesis of a magnifying effect of adolescents' higher levels of friendship quality in the peer contagion process of Internet addiction was not supported.

4. Discussion

The present study contributed to the literature by examining the unique and interactive effects of multiple peer factors on Internet addiction among Chinese adolescents beyond the simple, direct peer contagion effect of Internet addiction (Brechwald & Prinstein, 2011). Specifically, the present study was guided by peer socialization theories to examine the independent effects of close peers' social acceptance and normativeness of Internet addiction as well as the moderating effects of close peers' social status and friendship quality in the peer contagion of Internet addiction. In addition, this study also extended the previous literature by examining potential gendered patterns of these peer influences.

The first two research questions were guided by the contextual model of peer influence and focused on how group norms in the classroom are related to adolescents' Internet addiction beyond peer contagion. The results indicated that close peers' social acceptance by the classmates and the normativeness of Internet addiction were associated with adolescents' Internet addiction, respectively, above and beyond the effects of close peers' Internet addiction. Internet addictive peers are more likely to be rejected by classmates based on the fact that lower social acceptance was a significant correlate of the development of various addictive and problem behaviors among adolescents (Liu & Kuo, 2007). It could be difficult for close deviant peers to earn higher social acceptance because their norm may be different from the norm of the classmates, which may place male adolescents in a vulnerable position to develop heightened levels of Internet addiction. In addition, we

Table 3
Independent and interactive effects of multiple peer factors in the prediction of adolescents' Internet addiction.

	Close peers' social acceptance predictor	Normativeness of Internet addiction predictor	Close peers' social status predictor	Friendship quality predictor
Intercept	53.82***	52.05***	54.23***	51.56***
Close peers' Internet addiction (peer contagion effects)	2.79***	2.26***	3.26***	2.91***
Other peer influences				
Peer predictor	−6.35**	3.80*	−.56	−2.43
Child sex	−4.81***	−4.96***	−5.11***	−4.55***
Peer predictor * child sex	3.15*	−.08	.57	2.00
Peer predictor * close peers' Internet addiction	1.41	−2.14	−7.30***	−1.79
Control variables				
SES	−1.83	−.87	−1.68	−.70
Family type	.07	−.08	−.14	−.58

* $p < .05$.
** $p < .01$.
*** $p < .001$.

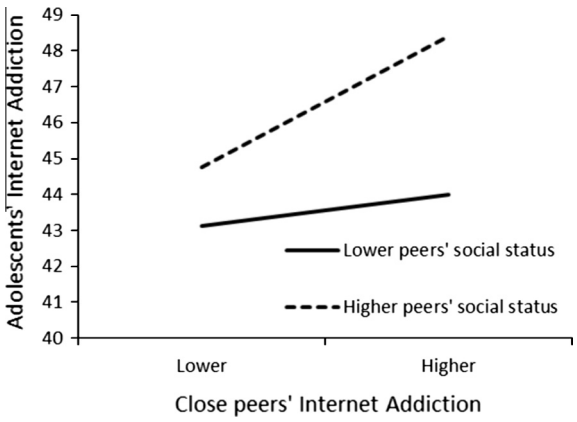

Fig. 1. Close peers' social status interacted with close peers' Internet addiction in predication of male adolescents' Internet addiction.

found that close peers' social acceptance was associated negatively and significantly only with male but not female adolescents' Internet addiction. The gender effects may be due to the intense involvement with deviant behavior among male adolescents (Steinberg & Monahan, 2007). Moreover, the average level of Internet addiction in the classroom was associated significantly with adolescents' Internet addiction, above and beyond the effects of close peers' Internet addiction. According to the contextual model of peer influences, the normativeness of Internet addiction serves as a social context in which adolescents model peers' behavior and communicate their values (Chang, 2004). Higher level of Internet addiction among classmates may enhance dialogs associated with Internet use and also may implicitly create group pressure, which may urge adolescents to initiate additive Internet use or may result in increased addictive symptoms, such as excessive use and withdrawal behavior.

The significant main effects of close peers' social acceptance and normativeness of Internet addiction emphasize the importance of considering multi-layered peer contextual influences on adolescents development of Internet addiction (Simons-Morton & Farhat, 2010), especially in China where classroom and school could be more salient socialization contexts than western countries (Chang, 2004). Moreover, different levels of peer norms (e.g., best friend, friends in the neighborhoods) might be different from the norm in the class, which may interact with each other and exert influences on adolescents' Internet addiction. For example, Hussong (2002) suggested that different levels of peer influences interacted with each other to predict adolescents' behavior such that adolescents' risk for substance use due to having a substance-using best friend was exacerbated if they also belonged to a clique that used substances more than the best friend. Future studies could incorporate norms across dyadic friends, clique, and crowds to uncover the complicated peer influence processes of Internet addiction.

The next two research questions concerned with the moderating effects of close peers' social status and friendship quality in the peer contagion of Internet addiction. We found a significant magnifying effect of higher levels of close peers' social status in the association between close peers' and adolescents' Internet addiction, but only among male adolescents. Social status, as an indicator of social hierarchy, was found to be a significant moderator such that male adolescents who perceived their peers earning higher social status were more inclined to become Internet addicted. This finding orients us to pay special attention to the strength of social impact in the peer influence process. Adolescents tend to achieve and maintain popularity with health-risk behaviors despite short-term benefits, especially for boys (Schwartz & Gorman, 2011). With limited access to Internet, male adolescents may be more likely to be affiliated with high-status Internet users to acquire popularity and thus proceed to use Internet excessively. This is in line with what Shi and Xie (2012) found in a group of seventh graders that high-status peers rather than low-status peers in a group had a strong influence on individual members' physical and social aggression. In terms of the null findings for girls, the overall level of Internet addiction was significantly lower among female adolescents and thus peer influence may not be salient. This conforms to the gender difference that girls' relationships may be characterized by prosocial behavior to a greater degree than boys. In addition, boys are more likely to have dense social networks and well-defined dominance hierarchies and the gender differences appear to increase across adolescence (Rose & Rudolph, 2006). As such, male adolescents may demonstrate intense involvement with close peers and conform to the norm of excessive Internet use in order to maintain their needs for higher hierarchy.

However, we did not found a significant magnifying effect of adolescents' higher levels of friendship quality in the peer contagion process. Adolescence is characterized by increased autonomy and youth are more likely to disengage from parents and seek comforts and emotional bonding from peers (Rose & Rudolph, 2006). Close deviant peers who are more close to adolescents potentially may exert more influences. This null finding in our sample may be that adolescent perceived friendship quality may be specific to a

given person, who may not represent the overall relationship quality with a number of close peers nominated within the classrooms. Thus, the moderating effects of relationship quality with peers in the peer contagion process merit further scrutiny in research.

The results from this study provide important implications for policy and practices. Peer factors always have been implicated in the development of prevention and/or intervention programs that focus on reducing youth problem behaviors (Dishion & Piehler, 2009; Turrisi et al., 2009). However, practical efforts on decreasing Internet addiction place a central focus on adolescents' individual therapies or family-based programs (e.g., Liu et al., 2015; Shek, Tang, & Lo, 2009). In the present study, the significant peer influences on the development of adolescent Internet addiction provide promising evidence for necessary efforts in integrating critical peer factors in future prevention and/or intervention efforts in reducing the incidence and severity of adolescents' Internet addiction. In addition, the results of this study suggest the need of considering multiple dimensions of peer influences beyond a simply peer contagion effect. For example, identifying adolescents who are involved in rejected peer groups or those surrounded by classmates with high levels of Internet addiction may be a critical step in limiting adolescents' development of Internet addiction. Moreover, the results of the present study also provide important guidance in distinguishing adolescents who are highly susceptible to peer contagion effects of Internet addiction. For instance, those popular adolescents in the class who are Internet addicted could be good starting points to search for potential addicted students. Implementing a classroom nomination may help identify students who are affiliated with high social status and deviant peers and thus provide potential targets for intervention. Finally, the gendered patterns of peer influences inform parents, teachers, and practitioners to pay special attention to male adolescents when trying to reduce their initiation and severity of Internet addiction through peer intervention.

Although this study had several important contributions to Internet addiction literature, there are some limitations that should be considered when interpreting the findings. First, although the participants ranged from 7th to 11th grade and covers early adolescence through late adolescence, peer socialization processes of Internet addiction may change over time (Rose & Rudolph, 2006; Steinberg & Monahan, 2007). As such, future studies may use longitudinal design to examine the dynamic peer influences of Internet addiction. Second, although nearly 1000 adolescents were included to increase the representation of the sample and strengthen the statistical power, only self-report was used to collect data and thus may cause common method bias and involve social desirability issues. Future studies could employ various types of formats, such as daily diary methods and peer and/or teacher reports.

In conclusion, close peers may be salient socialization agents in the development of Internet addiction among Chinese adolescents. Male adolescents who were affiliated with peers having lower levels of social acceptance or youth who were situated in a class with higher levels of Internet addiction were more likely to develop heightened levels of Internet addiction. In addition, male adolescents, who perceived their peers possessing higher social status, were more vulnerable to be Internet addicted when affiliated with addictive peers. The unique and interactive effects of multiple peer factors on adolescents' development of Internet addiction provide important insights for future prevention and intervention efforts.

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