The mediating role of social support in the relationship between psychological well-being and health-risk behaviors among Chinese university students

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Abstract

While literature has displayed a link between psychological well-being (i.e. depression, hopelessness, and life satisfaction) and health-risk behaviors (i.e. smoking, drinking, suicide, and physical inactivity), the mechanisms underlying this relationship have received little empirical attention. This study examines the mediation effects of social support (from family, friends, and significant others) that accounted for the link. Participants were 2023 university students (47.7% male). Structural equation modeling showed partial mediation effect of social support between psychological well-being and health-risk behaviors. In particular, social support from family and friends jointly mediated about 80 percent of the effect of life satisfaction and hopelessness on drinking. These results offered novel evidence that helps improve theorizing the mechanisms of the relationship between psychological well-being and health-risk behaviors. They also highlighted the potential benefits of social support for university students to help them stay healthy. The implications of these results are discussed.

Keywords

health behavior, mediation effect, social support, structural equation modeling, well-being, young adult

Introduction

There is an increasing trend in the prevalence of mental disorders (Hunt and Eisenberg, 2010) and severe psychological problems among university students. About 21 percent of freshmen (Wong et al., 2006) experience some degree of depression, and 38 percent of university students report feeling hopeless (American College Health Association, 2006). The potential negative outcomes of psychological problems among university students have been well documented (e.g. Hefner and Eisenberg, 2009). For example, depressed individuals are at least 20 times more likely to commit suicide than the general population (Lépine and Briley, 2011). Negative psychological well-being is a global public concern (American Foundation for Suicide Prevention, 2010; Capron and Schmidt, 2012), and, hence, research has been called for greater understanding of their correlates (e.g. Cranford et al., 2009; Kessler et al., 2005).

Psychological well-being and health-risk behaviors

An extensive body of literature demonstrates that mental health problems in early adulthood are associated with substance use, suicide, and physical inactivity. For instance, life satisfaction is widely evidenced to be negatively linked with smoking, drinking, suicide, and physical inactivity among university students in different cultures (e.g. Grant et al., 2009). Other psychological factors (i.e. depression and hopelessness) are also positively associated with

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health-risk behaviors, including alcohol consumption (Geisner et al., 2012; Gonzalez and Hewell, 2012), suicidal thoughts (Hawton et al., 2013), and physical inactivity (Taliaferro et al., 2009; Tyson et al., 2010). Although the research literature is clear that psychological well-being is associated with health-risk behaviors, not much research has been done to fill the gap in the mechanisms how psychological correlates are associated with unhealthy behaviors.

Social support, psychological well-being and health-risk behaviors

Social support is a likely candidate to explain the association between psychological well-being and health-risk behaviors. Good mental health, such as low rates of hopelessness (Merkaš and Brajša-Žganec, 2011), depression (Lakey and Orehek, 2011), and high life satisfaction (Proctor et al., 2009), has been linked to social support. Social support has also been studied as a protective factor against health-risk behaviors, such as smoking and drinking (e.g. Piko and Kovács, 2010; Walsh et al., 2010). Recently, there is a growing interest in studying the mediating role of social support (e.g. Eather et al., 2013; Zhao et al., 2014). For example, Babiss and Gangwisch (2009) found that the relationship between depression and sports participation was mediated by social support. They concluded that depressive symptoms could possibly function to decrease social support from peers and family members, which, in turn, lowers an individual's motivation to participate in physical activity. Hence, it is possible that psychological well-being influences health-risk behaviors through its effect on social support.

When examining the impact of social support, it is important to take diverse social agents into account (Rueger et al., 2010). Family as the primary and first source of support is not only associated with greater life satisfaction (Nickerson and Nagle, 2004), lower depression (Rueger et al., 2010), and hopelessness (Kerr et al., 2006) but also linked with a lower level of health-risk behaviors, for instance, tobacco and alcohol use (Allahverdipour et al., 2015; Kristjánsson et al., 2010), suicidal ideation (Kerr et al., 2006), and physical inactivity (Kim and Cardinal, 2010).

However, friends and significant others play a more influential role during young adulthood than during adolescence (Fatoba and Bzdzikot, 2015; Pugliese and Okun, 2014). Young adults spend more time with their peers and depend less on family emotionally and financially (Arnett, 2000). They start exploring extra-familial influences during college years (Windle, 2000). Therefore, it is advocated to examine the influence of support from different social agents for a better understanding of the support processes in the development of health-risk behaviors among young adults.

The influence of social support from friends has been shown in different domains, including psychological well-being (Sheets and Mohr, 2009), physical activity (Pugliese and Okun, 2014), and health-risk behaviors (Kristjánsson et al., 2010). However, literature displays mixed results of friends' support. Some studies demonstrated that peer support was positively related to involvement in health-risk behaviors and negative mental well-being (e.g. Walsh et al., 2010). On the other hand, some studies exhibited that higher support from friends was associated with positive psychological well-being (Sheets and Mohr, 2009) and better psychological adaptation when facing stressful life events (Fatoba and Bzdzikot, 2015).

One possible explanation for these mixed results comes from the measurement strategy for assessing social support from friends. Some studies examined social support from peers (friends) without distinguishing significant others (e.g. close/best friends or romantic partners) from general friends (peers) (Pugliese and Okun, 2014); whereas, other studies distinguished significant others from friends (Malinauskas, 2010), romantic partners from friends (Ratelle et al., 2013), or close friends from classmates (Fatoba and Bzdzikot, 2015). In particular, Rueger et al. (2010) found that support from general peers, but not close friend support, had negative associations with depression. Perhaps, differentiating significant others from friends provides a clearer understanding of the impact from different social agents. Thus, research assessing the distinctive contributions of support from friends and significant others is warranted.

This study

This study aimed to understand more the mechanisms underlying the relationship between psychological well-being and health-risk behaviors by (1) assessing the mediating role of social support from family, friends, and significant others in the relationship between psychological well-being (i.e. depression, hopelessness, and life satisfaction) and unhealthy behaviors (i.e. smoking, drinking, suicidal thoughts, and physical inactivity) and (2) comparing the relative influences of the three types of social agents as mediators. Based on the relevant literature, two hypotheses were proposed:

Hypothesis 1. Social support from the three agents would mediate the relationship between psychological well-being and health-risk behaviors.

Hypothesis 2. The effects of social support would vary with different social agents.

Methods

Participants and procedures

Prior to data collection, ethical approval was obtained from the University Review Board. Formal consent was obtained

from the participants or the parents of the participants below age 18. Their participations were not compensated. Participants were recruited from a local university in 2014 (*N* = 2023; male: *n* = 965, 47.7%; female: *n* = 1057, 52.3%). The participants were mainly Chinese (*n* = 1896, 94%) and freshmen (*n* = 1952, 96.7%), with mean age = 18.7 years, standard deviation = 1.29 years. Demographic information of the participants is presented in Supplementary Table 1. A questionnaire, including relevant measures, was distributed to and completed by each participant within 15 minutes.

Measures

Life satisfaction. Life satisfaction was measured using the 5-item Satisfaction With Life Scale (SWLS; Diener et al., 1985). The Chinese version has good validity and reliability (e.g. Ma and Shek, 2013). The response options ranged from 0 = not present to 5 = constantly present over the past month. In this study, the total scores ranged from 0 to 25, and the mean scores of the five items ranged from 0 to 5.

Hopelessness. Hopelessness was measured by the Chinese version of 5-item Hopelessness Scale (Shek, 1993), which has been used in many studies in Chinese contexts (e.g. Shek and Li, 2016). A 6-point scale, where 0 = not present to 5 = constantly present over the past month, was used to yield a total scale score ranging from 0 to 25 and a mean score ranging from 0 to 5.

Depression. Depressive symptoms were measured by Patient Health Questionnaire-9 (PHQ-9; Spitzer et al., 1999). The scale has been validated in the Chinese population (Yu et al., 2012). The response options ranged from 0 = not at all to 3 = nearly every day. In this study, the total scores ranged from 0 to 27, and the mean scores of the nine items ranged from 0 to 3.

Perceived social support. Perceived social support was assessed using the Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1988). This scale consists of 12 items that measure perceived social support from three sources: family (e.g. "My family really tries to help me"), friends (e.g. "I can count on my friends when things go wrong"), and significant others (e.g. "I have a special person who is a real source of comfort to me"). The MSPSS has good psychometric properties (Chou, 2012; Zimet et al., 1988). A 4-point scale, where 1 = strongly disagree and 4 = strongly agree, was used with a higher score reflecting a greater level of perceived social support (range of scores is presented in Table 1).

Smoking and drinking. Smoking and drinking behaviors were measured by two separate questions that were used in prior studies (e.g. Shek and Yu, 2012). The participants were invited to indicate the frequency of using different types of substances (i.e. tobacco and alcohol) in the last 3 months. The response options ranged from 0 = never in my lifetime to 6 = more than five times per week and yielded a score ranging from 0 to 6.

Suicidal thoughts. Having suicidal thoughts was measured by one question. The participants were invited to indicate the frequency of having suicidal thoughts in the last 3 months to assess whether the participants had seriously considered committing suicide. This question was adopted from the Suicidal Behavior Scale, which was demonstrated to be valid and reliable (Law and Shek, 2013). The response options were the same as in the question about smoking and yielded a score ranging from 0 to 5.

Physical inactivity level. Physical activity level was measured via one question. This question assessed participants' frequency of participation in moderate to vigorous physical activities, such as swimming and cycling, in the previous week. The response options ranged from 0 = never to 7 = over seven times per week (one time equaled to at least 30 minutes) and yielded a score ranging from 0 to 7.

Demographic information (covariates). Participants were invited to indicate their gender, their place of birth, their year of birth, and the academic year they are in. These characteristics were included as previous studies showed that these demographic characteristics were associated with psychological well-being and health-risk behaviors among university students (e.g. Husky et al., 2008; Johnston et al., 2007; Kristjánsson et al., 2010).

Statistical analyses

The measurement model was tested by confirmatory factor analysis (CFA) to assess the extent to which each of the latent variables was represented by its indicators. The measurement model with acceptable fit was considered as the final model of each latent variable. According to each final measurement model, three indicators with the highest loadings were used to represent each latent variable in the later analyses. Path analyses within structural equation modeling (SEM) were specified to test the proposed hypotheses. Overall model fit was evaluated based on the values of the chi-square goodness-of-fit statistic (χ^2), the comparative fit index (CFI), the Tucker–Lewis Fit Index (TLI), the root mean square error of approximation (RMSEA), and the standardized root mean square residuals (SRMR), which were considered acceptable fit if CFI and TLI ⩾ .90 (Bentler, 1990; Kline, 1998); RMSEA < .08 (Hooper et al., 2008); and SRMR < .08 (Hu and Bentler, 1999). All CFA and SEM analyses were performed with Mplus, version 7.31 (Muthén and Muthén, 2016 [1998]).

Results

Descriptive analyses

Table 1 presents descriptive statistics and the interrelationships of the variables. Cronbach's α values were above .70, indicating good internal consistency of all scales tested (Nunnally and Bernstein, 1994). Values of kurtosis and skewness (i.e. kurtosis $\leqslant$ 7 and skewness $\leqslant$ 2; West et al., 1995) suggested that the data of all variables were normally distributed, except for smoking and suicidal thoughts. The levels of depression and hopelessness were low, with the mean score of 1.02 and 1.15, respectively. The mean score of life satisfaction was 3.10.

The prevalence of health-risk behaviors was low (see Supplementary Table 2(a)). Over 96 percent of the respondents indicated that they had never smoked, and more than 95 percent indicated that they had never had suicidal thoughts. Of the respondents, 64.8 percent reported that they had never drunk alcohol in their life or in the past 3 months. However, while only 8.6 percent of the respondents met the national guidelines for physical activity (American College Health Association, 2012), 19.9 percent of the participants indicated that they had not participated in any moderate or vigorous physical activities that last more than 30 minutes, in the past 7 days (see Supplementary Table 2(b)). There were no demographic differences in having suicidal thoughts ($p > .05$) as detected by Chi-square test. Smoking, drinking, and meeting the national guidelines for exercise were more common among males ($p < .001$). Smoking was less prevalent among students who, aged 18 years or below, were local or in their first year of university studies ($p < .001$). It was more common that students who were non-Chinese or aged above 18 years had drunk alcohol in the last 3 months ($p < .001$).

Measurement model (CFA)

All measurement models were estimated by maximum likelihood (ML). All error variances were initially set to be uncorrelated. Given the unfavorable fit of the initial models for life satisfaction, depression, and hopelessness, item content and modification index (MI) were examined. Error covariances were sequentially set for a model re-run. The final models for each variable revealed a better fit, including bigger CFI, TLI and smaller RMSEA, SRMR. Two models (one-factor and three-factor) were run for perceived social support. The three-factor model was retained as the final model due to the design of this study and better model fit. Supplementary Table 3 presents all CFA models' fit indexes.

Structural equation model (path analysis)

All structural equation models were performed with maximum likelihood estimation robust (MLR) to non-normality due to deviation from normal distribution (Finney and

Table 1. Descriptive statistics, internal consistencies, and correlations of variables.

Variable	M (SD)	Range	Skew	Kurt	α	1	2	3	4	5	6	7	8	9	10
1. Smoking	.08 (.56)	0–6	8.12	72.70	–	–									
2. Drinking	1.05 (1.34)	0–6	.89	–.45	–	.27**	–								
3. Suicidal thoughts	.09 (.46)	0–5	6.64	48.70	–	.17**	.08**	–							
4. Physical inactivity level	4.95 (1.65)	0–7	–.73	.13	.86	–.08**	–.09**	.02	–						
5. Life satisfaction	3.10 (.91)	0–5	–.32	.18	.89	.01	–.03	–.11**	–.21**	–					
6. Depression	1.02 (.60)	0–3	–.08	–.58	.89	.06*	.06**	.15**	.10**	–.34**	–				
7. Hopelessness	1.15 (.97)	0–5	.80	.24	.83	.06**	.05*	.20**	.02	–.37**	.51**	–			
8. Social support (family)	3.14 (.64)	1–4	–.55	.09	.90	–.04	–.09**	–.15**	–.10**	.37**	–.29**	–.32**	–		
9. Social support (friends)	3.26 (.59)	1–4	–.45	.16	.90	.01	.01	–.11**	–.11**	.38**	–.32**	–.34**	.55**	–	
10. Social support (others)	3.24 (.63)	1–4	–.53	–.03	.90	.02	–.02	–.13**	–.07**	.41**	–.30**	–.33**	.62**	.74**	–
11. Social support (total)	3.21 (.54)	1–4	–.30	–.15	.93	.00	–.04	–.15**	–.11**	.45**	–.35**	–.38**	.84**	.87**	.91**

Skew: skewness; Kurt: kurtosis; Others: significant others; M: mean; SD: standard deviation.
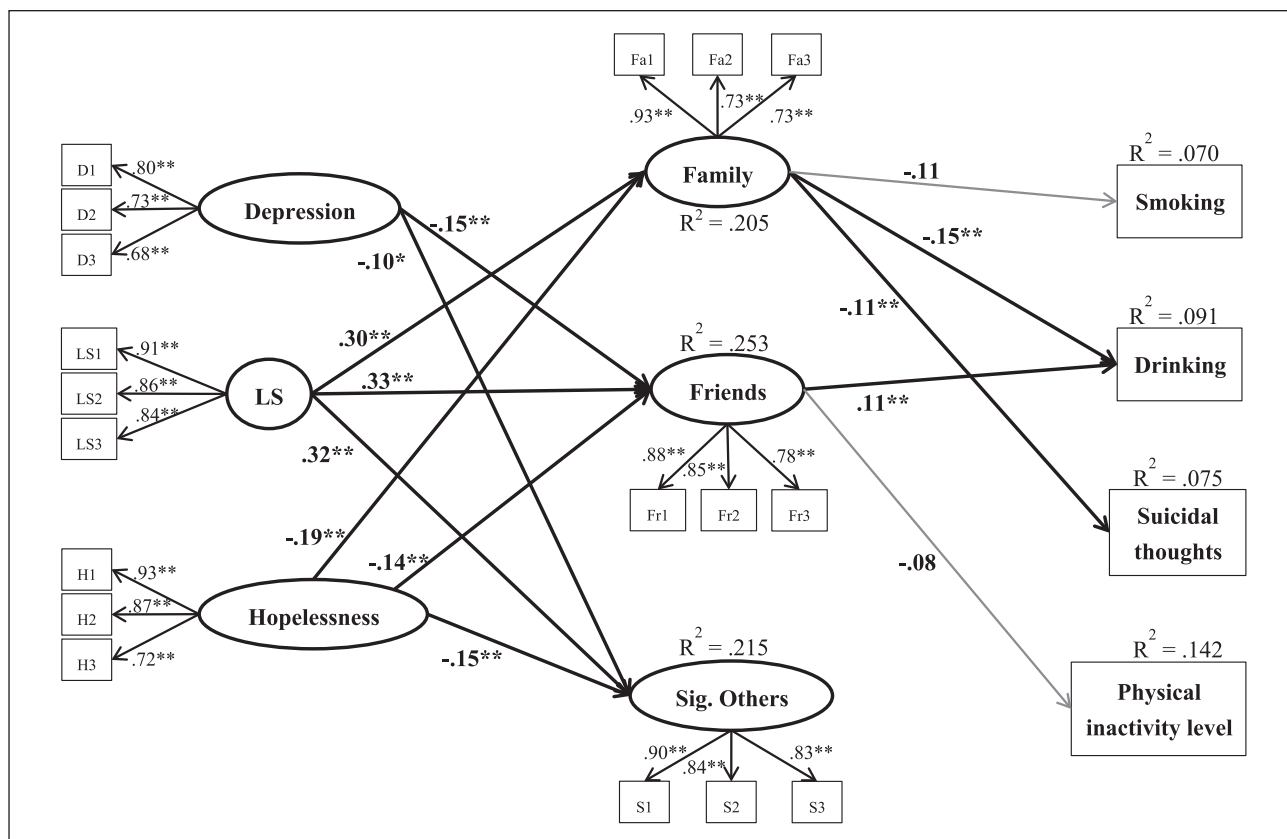*p < .05 and **p < .01.

Figure 1. A structural equation model to examine the relationships between psychological well-being and health-risk behaviors with perceived social support from family, friends, and significant others as the mediators.

LS: life satisfaction; Family: perceived social support from family; Friends: perceived social support from friends; Sig. Others: perceived social support from significant others.

Only significant and marginally non-significant indirect paths are depicted. All are standardized estimates.

$*p < .05; **p < .01$.

DiStefano, 2006). Demographic variables: age, gender, place of birth, and academic year were included as covariates.

Mediation by perceived social support

Path analysis was performed to examine the mediating roles of perceived social support in the relationships between psychological well-being and health-risk behaviors (Figure 1). Perceived social support (three factors) was included as mediators, and variables related to psychological well-being were included as predictors of health-risk behaviors. An error covariance was set between two constructs (i.e. social support from friends and significant others) in the final model due to the unfavorable fit of the initial model. The final model had a better model fit (S-Bχ^2 (242) = 1488.683, RMSEA = .05 (90% confidence interval (CI) = .048−.053), CFI = .93, TLI = .91, SRMR = .08).

Figure 1 shows the significant standardized path coefficients and R-square statistics. Support from family was significantly related to life satisfaction, hopelessness, drinking, and suicidal thoughts. Support from friends was significantly

associated with life satisfaction, depression, hopelessness, and drinking. Support from significant others had significant associations with life satisfaction, depression, and hopelessness. Smoking and physical inactivity had a marginally non-significant association with support from family ($\beta = −.11$, $p = .051$) and friends ($\beta = −.08$, $p = .053$), respectively.

Asymmetric CIs based on bootstrap methods (MacKinnon, 2008) with a bootstrap draw of 10,000 samples were employed for testing the significance of the mediation of perceived social support. Mediating effect with the 95 percent bootstrap CI excluding zero was considered as significant. The magnitude of the mediation was estimated with the proportion of the mediating effect in the sum of all direct and mediating effects' absolute values.

Table 2 displays the total mediating effects, specific mediating effects, and the corresponding 95 percent CIs. Examination of the specific indirect effects revealed that support from family significantly mediated the effects of life satisfaction and hopelessness on smoking, drinking, and suicidal thoughts individually. The six indirect effects had an estimate ranging from −.05 to .03 and magnitude ranging from 10.4 to 52.7 percent (see Table 3). Support

Table 2. Standardized total mediating effects, specific mediating effects, and 95% bias-corrected bootstrap confidence intervals.

Model pathways via	Family			Friends			Significant others			Total		
	Estimate	(95% CI)		Estimate	(95% CI)		Estimate	(95% CI)		Estimate	(95% CI)	
		Lower	Upper		Lower	Upper		Lower	Upper		Lower	Upper
Life satisfaction→Smoking	**−.03**[a]	−.07	−.00	.01	−.01	.03	.02	−.01	.05	−.01	−.02	.01
Hopelessness→Smoking	**.02**[a]	.00	.05	−.00	−.02	.00	−.01	−.02	.00	.01	−.00	.02
Depression→Smoking	.01	−.00	.03	−.00	−.02	.00	−.01	−.02	.00	−.00	−.01	.01
Life satisfaction→Drinking	**−.05**[b]	−.07	−.03	**.04**[a]	.01	.07	.00	−.03	.03	−.01	−.03	.01
Hopelessness→Drinking	**.03**[b]	.02	.05	**−.02**[b]	−.04	−.00	−.00	−.02	.01	.01	−.00	.03
Depression→Drinking	.01	−.00	.03	**−.02**[b]	−.04	−.00	−.00	−.01	.01	−.01	−.02	.00
Life satisfaction→Suicidal thoughts	**−.03**[b]	−.06	−.01	.01	−.02	.05	−.01	−.05	.03	**−.03**[b]	−.05	−.01
Hopelessness→Suicidal thoughts	**.02**[b]	.01	.04	−.01	−.02	.01	.00	−.02	.02	**.02**[b]	.01	.03
Depression→Suicidal thoughts	.01	−.00	.02	−.01	−.02	.01	.00	−.01	.02	.00	−.01	.02
Life satisfaction→Physical inactivity	−.00	−.02	.02	**−.03**[a]	−.06	−.00	.00	−.02	.03	**−.03**[a]	−.05	−.01
Hopelessness→Physical inactivity	.00	−.01	.02	**.01**[a]	.00	.03	−.00	−.02	.01	**.01**[a]	.00	.03
Depression→Physical inactivity	.00	−.00	.01	**.01**[a]	.00	.03	−.00	−.01	.01	**.01**[a]	.00	.03

CI: confidence interval.

Physical inactivity: physical inactivity level; Family: perceived social support from family; Friends: perceived social support from friends; Significant others: perceived social support from significant others.

The CIs (.00 or −.00) are not exactly zero. They are ranged from .004 to −.004.

The bold values with (*) or (a) are the significant values with the 95% bootstrap confidence interval excluding zero.

The bold values with (**) or (b) are the significant values with the 99% bootstrap confidence interval excluding zero.

[a] 95 percent confidence interval does not overlap with zero.

[b] 99 percent confidence interval does not overlap with zero.

Table 3. The magnitude of the mediating effects of perceived social support from family and friends.

Model pathways medicated by perceived social support from	Magnitude (%)	
	Family	Friends
Life satisfaction → Smoking	23.7	–
Hopelessness → Smoking	23.3	–
Life satisfaction → Drinking	44.2	34.6
Hopelessness → Drinking	52.7	29.1
Depression → Drinking	–	16.5
Life satisfaction → Suicidal thoughts	30.8	–
Hopelessness → Suicidal thoughts	10.4	–
Life satisfaction → Physical inactivity level	–	3.3
Hopelessness → Physical inactivity level	–	3.3
Depression → Physical inactivity level	–	36.4

from friends was a significant mediator of the effects of life satisfaction, hopelessness, and depression on drinking and physical inactivity separately. The six indirect effects had an estimate ranging from −.03 to .04 and magnitude ranging from 3.3 to 36.4 percent (see Table 3). In particular, support from family and friends jointly mediated the effects of life satisfaction on drinking (magnitude = 78.8%) and the effects of hopelessness on drinking (magnitude = 81.8%). The support from significant others had no significant indirect effect.

Discussion

This study attempted to examine the mediating role of perceived social support in the relationship between psychological well-being and health-risk behaviors. As hypothesized, social support significantly mediated the link between psychological well-being and health-risk behaviors. In addition, the mediating role of social support and its magnitude varied with the sources of support.

Mediation by perceived social support from family

The result indicated that psychological well-being predicted unhealthy behaviors through the mediating effect of perceived family support. In other words, individuals with higher life satisfaction and lower hopelessness had the propensity to perceive more family support, which was, in turn, related to less smoking, drinking, and suicidal thoughts. This is consistent with prior research, which showed the positive roles of family support in university students' alcohol use (Abar and Turrisi, 2008), cigarette smoking (Allahverdipour et al., 2015), and suicidal ideation (Arria et al., 2009). This study provides evidence that life satisfaction and hope do not only affect adolescents' perceived family support (Jiang et al., 2013; Piko and Hamvai, 2010) but also affect young adults' perceived

family support. Unexpectedly, it was found that family support did not contribute significantly to the prediction of physical inactivity. Parental support has been identified as a key correlate of adolescent's participation in physical activity (Trost et al., 2003). However, there is evidence that friends have more influence on university students' frequency of doing exercise than family has (Okun et al., 2002). Therefore, it is plausible that once the other mediators, such as friends support, were controlled, the predicting power of family support diminished. The results revealed that depression did not exert a significant effect on family support. Although this is contrary to the correlation found in previous studies (e.g. Rueger et al., 2010), this is consistent with the findings of Stice et al. (2004), which showed that depression did not predict prospective change in parental support. More research is needed to understand the unclear relationship.

Mediation by perceived social support from friends

Our findings revealed that support from friends played a significant mediating role in the impact of psychological well-being (i.e. depression, hopelessness, and life satisfaction) on drinking and physical inactivity. This is consistent with findings of many studies that individuals with lower life satisfaction, higher hopelessness, and depression generally perceive less social support from friends (e.g. Hagen et al., 2005; Kong et al., 2012; Sheets and Mohr, 2009). The result demonstrated that individuals with more support from friends engaged in higher levels of physical activity and drinking. This indicates that the positive effect of friends support on level of physical activity does not only exhibit in adolescents (Kim and Cardinal, 2010) but also in young adults. Moreover, the mediating effect of support from friends on the positive relation between depression and physical inactivity is consistent with the findings where social support has been found to be a partial mediator of the association among adolescents (Babiss and Gangwisch, 2009). Given that university students perceive alcohol use as a social norm (Borsari and Carey, 2003) and almost half of the participants reported drinking in the past, our findings are in alignment with the research that links social support with drinking (Taylor, 2007); peer support had positive effect on the level of drinking when the young adult had friends who drank. Our findings provide support to Hypothesis 2 that the support from family and friends had unique mediating effects. For example, the results revealed that family support decreased alcohol consumption but friends' support increased it (see Figure 1). Moreover, family support mediated more proportions of the effect (52.7%) than friends' support did (29.1%) in the prediction of drinking by hopelessness (see Table 3).

Mediation by perceived social support from significant others

Unexpectedly, support from significant others was significantly associated with psychological well-being but did not significantly relate to any unhealthy behavior and had no mediating effect. Hypothesis 1 was partially supported. This is probably because most participants in this study were freshmen, and the data were collected during the first 2 weeks of the first semester. A review of the literature suggested that first-year university students are generally making a transition into new social networks when they enter university (Brissette et al., 2002). Previous studies indicated that the significant others of an adolescent are usually their teachers (Rueger et al., 2010), close friends (Rueger et al., 2010), or romantic partners (Ratelle et al., 2013). However, it is common that individuals get less in touch with their significant others (e.g. best/close friends) of their past social groups after they enter university (Cummings et al., 2006; Oswald and Clark, 2003), especially when they go to different universities or when one of them goes to university but the other one does not. Most participants (first-year university students) of this study might have not yet developed social networks with new significant others in their current social group or context. Hence, future research may explore the mediation using a longitudinal design.

Conclusion

In general, the results showed that perceived social support from family and friends partially accounted for the effects of psychological well-being on health-risk behaviors. In particular, social support from family and friends jointly mediated the effects from life satisfaction to drinking and from hopelessness to drinking, explaining about 80 percent of the effect from life satisfaction and hopelessness to drinking. These findings suggest that there are other potential mediating processes underlying the associations between psychological well-being and health-risk behaviors. These processes could involve factors other than social support or aspects of social support that were not examined in this study. For example, Uchino (2009) proposed that both perceived and received social support are related to healthier behavioral choices (e.g. exercising and less smoking); Babiss and Gangwisch (2009) found that self-esteem and social support both acted as the mediators of the relationship between depression and physical inactivity. Future research is needed to explore possible mediators to fully explain these relationships.

Limitations

Several limitations should be noted. First, data were collected based on self-report measures. Other methods, such as focus group interview, could be useful to help understand the current findings. Second, participants were relatively homogeneous (mostly Hong Kong Chinese). Future study with students from other non-Western countries may help in the generalizability of the present findings. Finally, the cross-sectional design of this study was not able to make any conclusions about the causal relationships between the variables. A longitudinal design may provide further insight.

Implications

Despite the above limitations, our findings have theoretical contributions to the literature and practical implications for health services. Theoretically, this study represents the first attempt to investigate the mediating roles of support from different social agents in order to extend our understanding of the mechanisms between psychological well-being and health-risk behaviors among young adults. We examined the mediating role of social support from a specific agent in relation to support from other agents in the same model. The finding that support from family and friends had unique mediating effects in the associations (i.e. life satisfaction drinking and hopelessness drinking) offered novel evidence to improve the theorizing of the mechanisms of these relations. Practically, the occurrence of multiple health-risk behaviors (Barnett et al., 2014) among university students underscored the importance of providing effective preventive programs and interventions. The present findings indicate that interventions should focus on only the "helpful" intervening factors for an optimal outcome. For instance, it would be worthwhile to set up schemes to promote family support for helping university students stay away from smoking, drinking, and suicidal thoughts; whereas, it would be instrumental to provide more fitness classes and programs that aim to cultivate more social support from friends in order to increase the level of physical activity.

Declaration of conflicting interests

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