A Project entitled

# The Mediating Effect of Cognitive Interference on the Relation between University Social Environment and Academic Procrastination

Submitted by

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**Declaration**

I, Chin Cheuk Yee, declare that this research report represents my own work under the supervision of Mr. Lam, Hiu Ming John, and that it has not been submitted previously for examination to any tertiary institution for a degree, diploma or other qualifications.

*Signed* _____

Chin Cheuk Yee

15 April, 2019

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**Abstract**

The high prevalence of procrastination in the academic setting has led to a large body of research focusing on the contribution of dispositional factors such as personality to academic procrastination. Nevertheless, considerably less attention has been given to social environmental factors that may elicit such behaviour. Therefore, the current study aims to examine the mediating effect of cognitive interference that arose from school-leisure conflict on the relation between social environment and academic procrastination. The sample of this study was 55 Hong Kong undergraduate students, and a simple regression approach was adopted to examine the mediating effect. Among the three social environmental factors investigated, namely peer procrastination, peer influence and exposure at university, peer influence is found to play a major role in predicting academic procrastination and school-leisure conflict. The results also suggest that the relation between peer influence and academic procrastination is mediated by the cognitive interference that arose from school-leisure conflict. In order to help students reduce or overcome academic procrastination, it is suggested that schools can promote a positive attitude towards learning and help students reduce school-leisure conflict through increasing students' self-determined motivation, as well as teaching self-regulation and time management skills.

Keywords: academic procrastination, cognitive interference, mediating effect, social environment, school-leisure conflict

# The Mediating Effect of Cognitive Interference on the Relation between University Social Environment and Academic Procrastination

"Have you ever found yourself postponing an important task until the last minute before deadline?" This phenomenon, which is known as procrastination, is a problem commonly faced by most people in the world. Over the years, procrastination has received growing attention from researchers to explain this behaviour and to understand the factors influencing procrastination (Burka & Yuen, 1982; Steel, 2007). In particular, most research studies have focused on academic procrastination due to its high prevalence in the academic context (Solomon & Rothblum, 1984; Steel, 2007). Since academic procrastination is prone to lowering academic performance and increasing students' stress and anxiety (Sirois, 2014; Steel, 2007; Stöber & Joormann, 2001), it is important to explore the reasons behind students' procrastination in order to help students reduce or overcome procrastination and eventually, fostering a positive learning habit.

It is noticed that there are adequate researches examining the contribution of dispositional and internal factors such as personality (Johnson & Bloom, 1995; Ozer & Benet-Martinez, 2006; Schouwenburg & Lay, 1995), motivation (Lee, 2005; Vij & Lomash, 2014) and self-efficacy (Haycock, McCarthy & Skay, 1998; Klassen, Krawchuk & Rajani, 2008) to academic procrastination. Nevertheless, considerably less attention has been given to contextual and social environmental factors like peer and environment (Klingsieck, Grund, Schmid & Fries, 2013; Nordby, Klingsieck & Svartdal, 2017), task aversiveness (Blunt & Pychyl, 2000), as well as classroom climate (Corkin, Shirley, Wolters & Wiesner, 2014) that may elicit the problem of academic procrastination. There are also limited researches (Corkin et al., 2014; Ferrari & Pychyl, 2012) that explore the relation between social environment and

academic procrastination through a mediator variable. Since the reciprocal determinism model proposed by Bandura (1986) suggested that an individual behaviour is influenced by both the environment and cognition, it is plausible that the relation between social environment and academic procrastination could be mediated by a cognitive factor.

**Academic procrastination**

Procrastination refers to the act of postponing a task (Schouwenburg, 1995). Specifically, Solomon and Rothblum (1984) defines procrastination as the act of needlessly delaying a task that needs to be accomplished, and is associated with subjective discomfort (Solomon & Rothblum, 1984). Among the six domains of procrastination identified by Klingsieck (2013), namely "academic and work, everyday routines and obligations, health, leisure, family and partnership, and social contacts" (p.177), academic procrastination is seen as the most prevalent aspect. Estimates have found that 70-95% of the university students exhibited procrastination behaviour (Solomon & Rothblum, 1984) and 50% of them considered their procrastination behaviour to be problematic (Day, Mensink & O'Sullivan, 2000). Such high prevalence rate has led to a large body of research focusing on academic procrastination.

According to Schraw, Wadkins and Olafson (2007), academic procrastination is defined as the delay of academic-related tasks that ought to be completed. Rothblum, Solomon and Murakami (1986) also define academic procrastination as the act of needlessly putting off academic tasks, in which the experience would cause discomfort to an individual. These definitions share similarities with that of general procrastination except the focus is on academic aspect.

Regarding the construct of academic procrastination, most researches have identified fear of failure, task aversiveness and laziness as the three factors of academic procrastination (Blunt & Pychyl, 2000; Wolters, 2003). It is seen that the two most commonly used scales (Yockey, 2016), The Procrastination Assessment Scale-Students (PASS: Solomon & Rothblum, 1984) and The Tuckman Procrastination Scale (TPS: Tuckman, 1991), are intended to measure fear of failure and task aversiveness, and task avoidance respectively. Recently, McCloskey (2011) have also identified 6 facets of procrastination, including psychological beliefs regarding own abilities, distractions, social factors, time management skill, personal initiative and laziness to develop The Academic Procrastination Scale (APS: McCloskey, 2011). Since the facets such as fear of failure, task avoidance and laziness are believed to decrease students' incentive to start work, and result in unnecessary delay, these three scales are seen to be related to the concept of needlessly putting off academic task in the definition of academic procrastination. Among the three scales, the APS is seen to have a high internal reliability based on the high Cronbach's alpha of .94, and has a number of advantages over the commonly used scales (McCloskey, 2011). According to McCloskey (2011), not only does it have an adequate domain coverage of academic procrastination and consistent result across ethnic groups and gender, it also shows a significant correlation with the PASS and TPS, highly relates to conscientiousness negatively, and predict academic performance beyond conscientiousness and other commonly used scales. These suggest the APS to be a more valid measure of the construct of academic procrastination. Therefore, the operational definition of academic procrastination in this study is the score that an individual obtained from the APS.

**Dispositional factors and academic procrastination**

Most researchers have placed their focus on the contribution of dispositional factors on academic procrastination. For instance, researches have investigated the relation between personality and academic procrastination, and found that neuroticism and consciousness are positively and negatively related to academic procrastination respectively (Johnson & Bloom, 1995; Ozer & Benet-Martinez, 2006; Schouwenburg & Lay, 1995; Steel, 2007). This result could be associated with the facet of impulsiveness in neuroticism and self-discipline in consciousness, where they are found to be the strongest predictor towards academic procrastination (Johnson & Bloom, 1995; Ozer & Benet-Martinez, 2006; Schouwenburg & Lay, 1995; Steel, 2007). In addition, researches have demonstrated the contribution of low self-efficacy, self-regulation and intrinsic motivation to academic procrastination (Senecal, Koestner, & Vallerand, 1995; Haycock et al., 1998; Lee, 2005; Klassen et al., 2008). Other researches have recognized that a high level of anxiety (Rothblum, Solomon & Murakami, 1986) and perfectionism (Çapan, 2010) are contributed to a high level of academic procrastination, which causes problems to university students in paper writing and examination preparation (Alexander & Onwuegbuzie, 2007).

**Social environmental contribution to academic procrastination**

It is noticed that many studies have focused on dispositional and internal aspects of academic procrastination. Nevertheless, considerably less attention has been given to social environmental factors, which are believed to play a crucial role in students' procrastination by acting as the antecedent. This is because students are considered as social endeavours (Nordby et al., 2017), who are in constant interaction with the social environment that they are situated in, and that social environment is

seen to influence people's behaviour, as suggested in the social cognitive theory (Bandura, 1986).

According to Barnett and Casper (2001), social environment refers to the "immediate physical environment, social relationship and setting in which people function and interact with" (p. 465). Similarly, the social environment of the university encompasses of and will be affected by the school environment and people including teachers and peers. Since students spend most of their time interacting with peers at universities (Nordby et al., 2017), and peers are found to have a strong influence on an individual's behaviour and performance including academic performance (Chen, Shi & Wang, 2016; Kindermann, 2016), the contribution of peer and environment to academic procrastination will be examined specifically.

**Peer and environmental factors**

Peers and the environment are deemed to play an important role in determining academic procrastination, as students are in constant interaction with their peers and environment in both academic setting and in their spare time (Nordby et al., 2017). Therefore, peer influence and social distraction are particularly common. Klingsieck et al. (2013) have identified several social antecedents related to procrastination. First, they found that procrastination seems to be lower when working with others (Klingsieck et al., 2013). Second, they reported that students' procrastination will be influenced by the extent of attitude of significant others towards procrastination (Klingsieck et al., 2013). Third, they realized that students tend to be influenced by their role models, in which when their role models procrastinate, they may also exhibit a similar behaviour (Klingsieck et al., 2013). The findings above are in line with the existing social theory. For instance, the social cognitive theory proposed by Bandura (1986) suggested that behaviour could be

learnt through observation and imitation. The theory advocated that behaviour, environment and cognition are closely related to each other. This explains why students' procrastination is affected by their peers and role models, and it explains why students tend to increase their tendencies of procrastination when their peers and role models procrastinate, and vice versa. The social comparison theory proposed by Festinger (1964) also stated that people tend to compare themselves with others through an upward or downward social comparison for self-enhancement or to increase self-regard respectively. Therefore, when students look to their peers who do not procrastinate, students may feel the need to improve and work harder. Contrastingly, when they look to their peers who exhibit a more serious procrastination behaviour, they may lack the incentive to reduce their procrastination. This comparison behaviour may reinforce or decrease students' procrastination. Recognizing the effect of peer influence on procrastination, if students are surrounded with peers who exhibit procrastination behaviour and are prone to peer influence, students' tendencies to procrastinate are expected to increase due to the existing procrastination culture (Nordby et al., 2017) formed as a result of complex learned human behaviour and perception (Linton, 1945).

In addition to peer influence, environment is also a crucial determinant of students' procrastination, as students mentioned that social distraction in the environment often resulted in procrastination (Klingsieck et al., 2013). Since students' lives, especially university students, are filled with ubiquitous opportunities to interact with people and to engage in different activities inside school such as joining clubs and organizations, students will have multiple goals and will find themselves in constant social temptation (Fries, Dietz & Schmid, 2008). If students have a higher social exposure at the university, their likelihood of being exposed to social

environmental factors such as peer influence and social distraction will increase (Nordby et al., 2017). This may further enhance students' tendency to procrastinate.

In fact, the study conducted by Nordby et al. (2017) has reported a *r*-squared value of .11, .14 and .12 between academic procrastination and the following three factors respectively: peer influence, peer culture of procrastination and students' exposure at the university. The significant value of these three *r*-squared shows a correlation between social environment and academic procrastination, and reflect the critical role of social environment in university students' act of procrastination.

The above review has suggested that the construct of peer and environment encompasses of three main factors, including peer influence, peer culture of procrastination and students' exposure at university. With reference to the study of Nordby et al (2017), three subscales were developed accordingly to measure the relation between these three factors with academic procrastination. These scales are found to have an acceptable reliability based on the Cronbach's alpha and a good measurement model fit to the construct based on the comparative fit index (CFI), root mean square error of approximation (RMSEA) and standardised root mean square residual (SRMR) (Nordby et al., 2017). Therefore, the operational definition of peer and environment in this study is the degree of peer influence, peer procrastination and students' exposure at the university, and will be measured in the 3 scales developed by Nordby et al. (2017).

**The mediating effect of cognitive interference on academic procrastination**

It is seen that social environmental factors play a crucial role in facilitating or hindering academic procrastination as the antecedent. Nevertheless, it is also noted that social environmental factors influence people's behaviour in a complex way with dispositional and internal factors (Klingsieck et al., 2013). For instance, Corkin et al.

(2014) have examined the mediating effect of internal factors on social environment and academic procrastination, which it identified the mediating effect of motivational belief on the relation between classroom climate and academic procrastination.

In a research conducted by Grund, Brassler & Fries (2014), it is found that students are often interfered by leisure activity and experience school-leisure conflict. In this circumstance, students have to make a decision between choosing academic work or leisure activity. If students place a higher value on leisure activity, they may choose leisure activity over academic work, and their learning will be postponed (Ratelle, Senècal, Vallerand & Provencher, 2005). This will bring a negative impact on academic performance (Ratelle et al., 2005) and increase students' tendency to procrastinate (Vij & Lomash, 2014). In fact, social environment is seen to affect one's value on leisure activity. For instance, Shin and You (2013) found that an individual's decision on leisure activity participation could be affected by the opportunities that the environment and context offered. Payne (2002) also recognised that peers could influence a person's decision on leisure activity, as peers serve as both "the source of behavioural standard" (Arnon, Shamai & Ilatov, 2008, p.374) and an effective socializing agent that may encourage activity participation (Arnon et al., 2008). Since the reciprocal determinism model proposed by Bandura (1986) suggested that three factors, including environment, cognition and behaviour, are influenced by each other and are all responsible in explaining an individual's behaviour, it is plausible that the negative peer influence of procrastination and distraction that existed in the social environment could give rise to the conflicts between academic work and leisure activity, and result in cognitive interference, which is defined as an unwanted or disturbing thought that interferes with task-related activity and affects the quality of

performance (Sarason, Pierce & Sarason, 2014). And the existence of cognitive interference will in turn leads to academic procrastination.

It is noticed that several studies have recognised the effect of social group on cognitive dissonance (Festinger, 1962; Stone & Copper, 2001), which is a mental discomfort that arises when an individual experiences conflicting thoughts or beliefs (Festinger, 1962). For instance, McKimmie (2015) found that social group affects the arousal and reduction of cognitive dissonance through the attitude-behaviour consistency between an individual and the social group. In order to resolve the dissonance and reduce discomfort, an individual is very likely to change their conflicting cognition, or adjust their behaviour accordingly to follow the social group (Norton, Monin, Cooper, & Hogg, 2003). Since social group is part of the social environment, and conflicting thought, which can be regarded as cognitive interference, is experienced in cognitive dissonance, this suggests a suspected linkage between social environment and cognitive interference. Additionally, the study conducted by Senécal, Julien & Guay (2003) reported a *r*-squared value of .09 between role conflict, which is an disturbing thought resulted from the conflict between interpersonal relationship and academic activity (Senécal et al., 2003), and academic procrastination. Since a disturbing thought is considered as cognitive interference, this shows a correlation between cognitive interference and academic procrastination. Hence, the relationship between these suggests the possible role of cognitive interference as a mediator between the relation of social environment and academic procrastination. This mediator is expected to decompose the antecedent effect of social environment to academic procrastination.

With reference to the study conducted by Ratelle et al. (2005), a scale was specifically developed to measure school-leisure conflict. This scale consists of one

factor. It is seen to have a good internal reliability based on the Cronbach's alpha and a fair measurement model fit to the construct based on the CFI, RMSEA and non-normed fit index (NNFI) (Ratelle et al., 2005). Hence, the operational definition of school-leisure conflict is the extent to which social leisure activities interfere with academic work, and this is reflected from the scores obtained in the School-Leisure Conflict Scale developed by Ratelle et al. (2005).

In this paper, the meaning of leisure is confined to social leisure, which is the activity that takes place in social setting, involves social interaction such as social gatherings and extra-curricular activities, and is done by choice (Klumb & Maier, 2007). This is because the cognitive interference that arose from school-leisure conflicts is the result of influence from the surrounding social environment.

Based on the above review, it is seen that social environmental factors, and the cognitive interference that arose from school-leisure conflict, play an important role in students' procrastination. Inspired by the study that examined the contribution of peer influence and culture difference across academic majors on academic procrastination (Nordby et al., 2017), this study would like to investigate how peer and general environment at university influence academic procrastination by acting as the antecedent. Realizing the fact that social environmental factors tend to influence people's behaviour in a complex way, and that little research has been conducted to investigate the indirect effects of social environment with other internal factors, this study would like to further examine whether the relation between social environment and academic procrastination is mediated by the cognitive interference that arose from school-leisure conflict. Therefore, the current study aims to investigate the mediating effect of cognitive interference on the relation between university social environment and academic procrastination (see Fig. 1). It is hoped that this study could provide a

more comprehensive and holistic picture on academic procrastination, and to offer possible suggestions to promote a more productive learning environment.

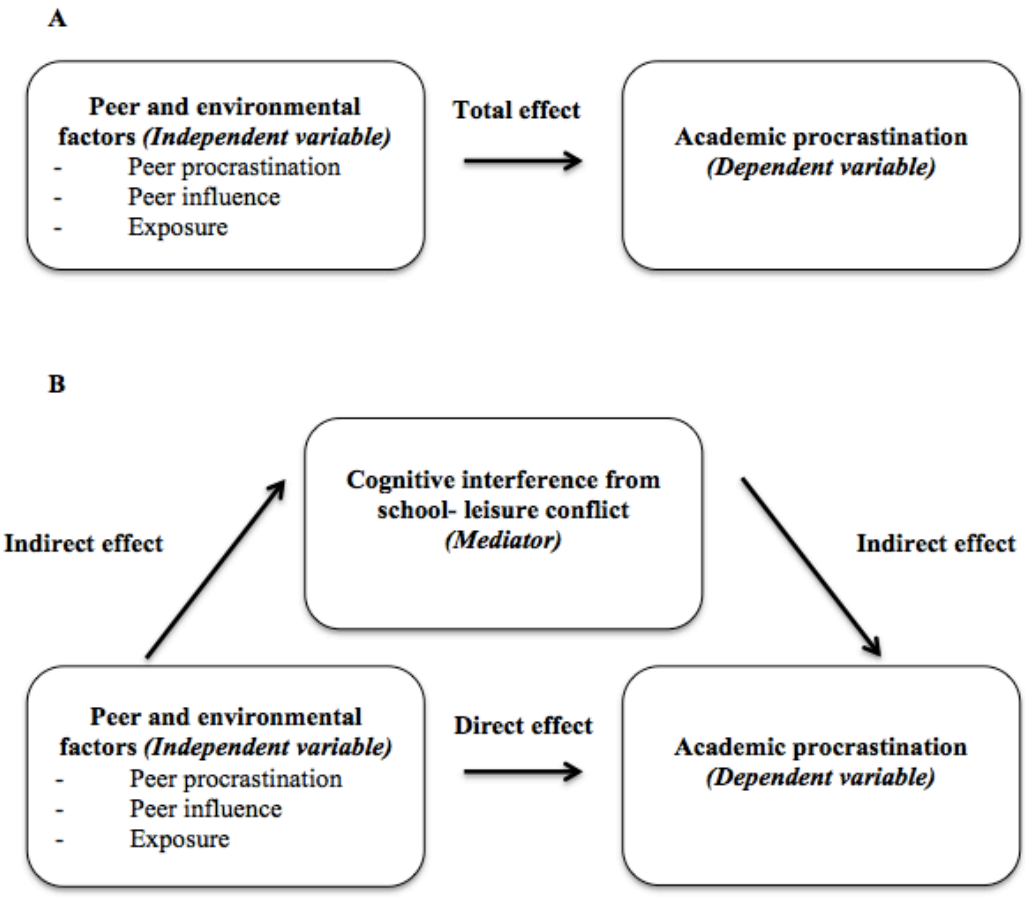


*Figure. 1*. A diagram illustrating the total relation between peer and environment and academic procrastination (A), as well as the indirect relation between peer and environment and academic procrastination with cognitive interference that arose from school-leisure conflict as a mediator (B).

The major research questions are as follow:

1. How do peer and environment at university predict academic procrastination?
2. How do peer and environment at university predict cognitive interference that arose from school-leisure conflict?

3. How does cognitive interference that arose from school-leisure conflict predict academic procrastination in the presence of peer and environment?
4. How does cognitive interference that arose from school-leisure conflict mediate the relation between peer and environment and academic procrastination?

Firstly, it is hypothesized that peer and environment, including a high presence of negative peer influence, peer procrastination, and students' exposure at the university, are expected to increase academic procrastination. Secondly, peer and environment is expected to predict cognitive interference that arose from school-leisure conflict, in which a high presence of negative peer influence, peer procrastination, and students' exposure at the university will result in a greater interference of leisure activities on academic works. Thirdly, cognitive interference that arose from school-leisure conflict is expected to predict academic procrastination, in which a high interference of leisure activities on top of academic work will lead to higher academic procrastination, partialling the effect of peer and environment on academic procrastination. Lastly, peer and environment, including a high presence of negative peer influence, peer procrastination, and students' exposure at the university, will lead to higher interference of leisure activities on academic works, which in turn leads to the increase of academic procrastination. It is expected that the direct effect of peer and environment on academic procrastination will decrease due to the mediating effect of school-leisure conflict.

## Methodology

### Participants and procedures

In this study, convenience sampling was used to collect data from participants who are easy to access. They were approached and invited through social media

platforms such as Facebook and WhatsApp. The sample size of the study was 55 and it was determined by the use of G* power analysis with a medium effect size of Cohen's $f^2$ of .15, a power of .8 and an alpha level equal to .05 that is needed for conducting a linear regression test with two predictors. The 55 participants were full-time undergraduate students in Hong Kong, ranging from first to final year of their undergraduate study. An information sheet that describes necessary information such as the aim, purpose, potential risk and benefits of the study, as well as participants' right were first provided to the participants for basic understanding of the study. Then, a consent form was given to the participants to choose whether they would like to participate in the study. After that, the participants completed an online questionnaire. The questionnaire consists of the following scales.

**Measures**

**Academic procrastination.** The Academic Procrastination Scale (APS: McCloskey, 2011) was employed to measure academic procrastination (see Appendix A). The APS consists of 25 items, with 5 reverse-scored items that focuses on general academic procrastination and assesses individual's habits and routines as a student. For each item in the scale, participants were asked to rate the degree to which they agree the statement on a 5-point Likert scale, with 1 indicating strongly disagree and 5 indicating strongly agree. The mean score was calculated by adding up the score obtained from each item and then divided by the total number of items in the scale. A higher score indicates a higher tendency to procrastinate. The APS is seen to show promising psychometric properties (Yockey, 2016). Regarding reliability, it has satisfactory internal consistency reliability with a Cronbach's Alpha of .94 (McCloskey, 2011), despite the fact that a slight redundancy of items is seen in the high Cronbach's Alpha (Tavakol & Dennick, 2011). Regarding validity, it has good

content validity in which the items show adequate coverage of the six facets of academic procrastination, including psychological beliefs regarding own abilities, distractions, social factors, time management skill, personal initiative and laziness (McCloskey, 2011). It also has good convergent validity, in which a significant correlation with other common procrastination scales like The Tuckman Procrastination Scale ($r$ = .70) (McCloskey, 2011) and The Procrastination Assessment Scale-Students ($r$ = .53) is seen (McCloskey, 2011).

**Peer and environmental factors.** To measure peer and environmental factors, three instruments from the study of Nordby et al (2017) on a 5-point Likert scale (1-strongly disagree, 5-strongly agree) were utilized (see Appendix B). The first one was peer influence, which consists of 6 items that describe participants' comparison to others. These items measure how one regulates and changes behaviour according to that of their peers. The score of individual items were summed up and then divided by the total number of items in the scale to compile the mean score. The higher the score obtained, the higher the peer influence. The Cronbach's alpha of this construct is .65 and is acceptably reliable, as Hair, Tatham, Anderson and Black (1998) indicated that a Cronbach's alpha greater than 0.6 is considered to be acceptable. This scale also shows acceptable goodness of fit, with a CFI, RMSEA and SRMR of .961, .074 and .047 respectively in the confirmatory factor analysis (CFA) (Nordby et al., 2017). The second one was peer procrastination, which contains 4 items relating to peer culture of procrastination. Two items are reverse-scored. The mean score was calculated by adding up the individual score of each item and then divided by the total number of items in the scale. A higher score indicates a higher level of peer procrastination. This construct has a Cronbach's alpha of .68, and has great goodness of fit, with CFI, RMSEA and SRMR equal to .994, .043 and .023 in the CFA (Nordby et al., 2017).

The last one was students' exposure. It consists of 3 items measuring the degree that participants spend their time and engage in social integration with their peers at university. To compile the mean score, the score of each item was summed up and then divided by the total number of items in the scale. A higher score indicates a higher exposure. This construct has a fair Cronbach's alpha of .69. The goodness of fit is excellent, which the CFI, RMSEA and SRMR are 1.000, .000 and .000 respectively in CFA (Nordby et al., 2017).

**School-leisure conflict.** To measure the cognitive interference that arose from the conflict between academic work and leisure activities, the School-Leisure Conflict Scale developed by Ratelle et al. (2005) was employed (see Appendix C). This scale consists of 6 items measuring the degree to which leisure activities interfere with academic works. On a 7-point Likert scale ranging from 1-strongly disagree to 7-strongly agree, participants were asked to indicate how much do they agree to the statement. To calculate the mean scale score, the score of each individual item were summed up and then divided by the total number of items in the scale. The higher the score obtained, the greater the extent that leisure activities interfere with academic works. This scale has a Cronbach's alpha of .74, and shows acceptable goodness of fit with CFI, RMSEA and NNFI equal to .94, .05 and .93 respectively in CFA (Ratelle et al., 2005). In order to fit the current study, the meaning of leisure activities is specified as social leisure activities in the instruction part.

**Reliability Analysis**

Reliability analysis was conducted on the above scales after data collection. This is to ensure the scale is reflecting the construct it is measuring and thus the factor score obtained is reliable (Santons, 1999). Academic Procrastination scale, Peer Influence scale and School-Leisure Conflict scale were found to have a Cronbach's

alpha well above .7, while the two scales that measure peer procrastination and exposure at university had a relatively low Cronbach's alpha of .541 and .524 (see Table 1). Since these two scales only contain 3-4 items, it is not advisable to raise the value of Cronbach's alpha by deleting the scale item, for the reason that removing an item from the two scales may lower the content validity of the measure (Cho & Kim, 2015). Alternatively, the standard deviation of participants in peer procrastination and exposure at university were calculated to check if there is a large variance in participant's rating to each question within the same factor. A high standard deviation in both peer procrastination and exposure at university were observed in four participants. This reflects participants' inconsistency in answering questions and hence they are not representative for the population. Therefore, these four participants were removed according to the descending order of the value of standard deviation one by one to calculate the Cronbach's alpha. It was found that the Cronbach's alpha of Academic Procrastination scale, Peer Influence scale and School-Leisure Conflict scale remains well above .7, while that of peer procrastination and exposure at university both increased to .612 (see Table 2). This Cronbach's alpha is found to be acceptable, as Hair et al. (1998) stated that a Cronbach's alpha greater than 0.6 is considered to be acceptable, especially when the factor has only few items.

Table 1.
*Reliability Analysis of Scales*

| Construct | No. of items | Cronbach's Alpha |
|---|---|---|
| Academic procrastination | 25 | .950 |
| Peer procrastination | 6 | .541 |
| Peer influence | 4 | .707 |
| Exposure at university | 3 | .524 |
| School-leisure conflict | 6 | .846 |

Table 2.
*Reliability Analysis of Scales after the Removal of Four Participants*

| Construct | No. of items | Cronbach's Alpha |
|---|---|---|
| Academic procrastination | 25 | .953 |
| Peer procrastination | 6 | .612 |
| Peer influence | 4 | .734 |
| Exposure at university | 3 | .612 |
| School-leisure conflict | 6 | .852 |

**Data analysis**

Regarding the analysis method, a descriptive analysis was first used to summarize the data collected by calculating the mean and standard deviation of peer and environmental factors, school-leisure conflict and academic procrastination. Then, a scatterplot was utilized to visually assess the relationship between peer and environmental factors and academic procrastination, peer and environmental factors and school-leisure conflict, as well as school-leisure conflict and academic procrastination respectively. Following after, Pearson correlation was conducted to further examine the above relations and quantify the strength of their linear relationships. With reference to the mediation model suggested by Baron and Kenny (1986), the peer and environmental factors are the independent variable whereas the school-leisure conflict and academic procrastination are the mediator and dependent variable in this study respectively. In order to examine the mediating effect of school-leisure conflict, a regression analysis was conducted to measure the extent of linear relationship between peer and environmental factors and academic procrastination, peer and environmental factors and school-leisure conflict, as well as school-leisure conflict and academic procrastination in the presence of peer and environmental factors respectively. A Sobel test was also conducted to test the significance of the mediation effect of school-leisure conflict.

## Result

### Descriptive analysis and Pearson correlation

The mean and standard deviation of academic procrastination, peer and environmental factors and school-leisure conflict are shown in Table 3. Base on the scatter plots (see Fig. 2 – Fig. 8), the preliminary result shows that peer influence was the only peer and environmental factor that has a positive linear relation with academic procrastination and school-leisure conflict respectively, as the slope of the line of best fit is steep. No obvious linear relation was found between the other two peer and environmental factors, namely peer procrastination and exposure at university, with academic procrastination and school- leisure conflict. It is also observed that there was a positive linear relation between school-leisure conflict and academic procrastination. To further examine the above relations, Pearson correlation was conducted (see Table 4). As expected, peer influence correlated significantly with academic procrastination, $r = .429$, $p = .002$, whereas peer procrastination and exposure at university correlate weakly with academic procrastination respectively, $r = .168$, $p = .239$ and $r = .123$, $p = .389$. A strong significant correlation was also found between peer influence and school-leisure conflict, $r = .586$, $p < .001$. However, nearly no correlation was found for peer procrastination and exposure at university with school-leisure conflict, $r = .074$, $p = .604$ and $r = .013$, $p = .929$. For academic procrastination and school-leisure conflict, a strong significant correlation was observed, $r = .744$, $p < .001$. Since peer influence was the only factor that correlated significantly with academic procrastination (dependent variable) and school-leisure conflict (mediator) among the three peer and environmental factors investigated, only peer influence was used in conducting simple regression analysis to examine the mediating effect of school-leisure conflict.

Table 3.
*Means and Standard Deviations of Academic Procrastination, Peer and Environmental Factors and School-Leisure Conflict.*

| | M | SD |
|---|---|---|
| Academic procrastination | 2.94 | .70 |
| **Peer and environmental factors** | | |
| Peer procrastination | 3.27 | .59 |
| Peer influence | 3.60 | .59 |
| Exposure at university | 3.22 | .67 |
| School-leisure conflict | 4.12 | 1.12 |

*Note.* $N = 51$.

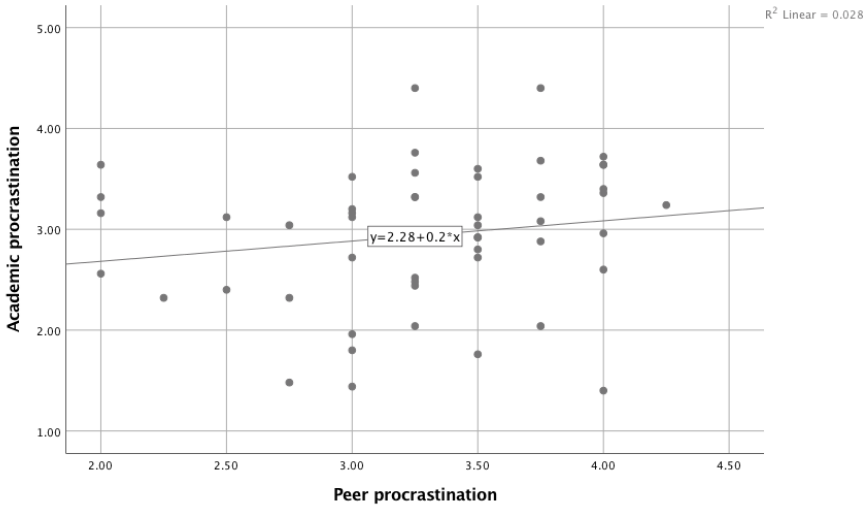


*Figure 2.* Relation between academic procrastination and peer procrastination.

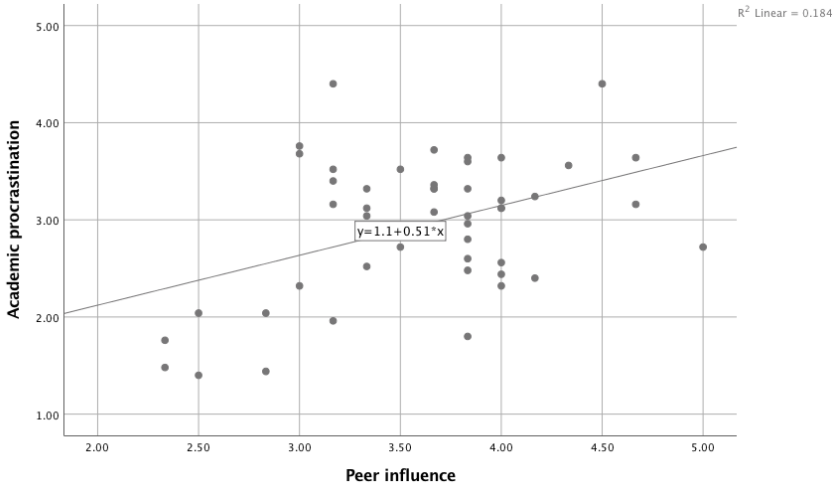


*Figure 3.* Relation between academic procrastination and peer influence.

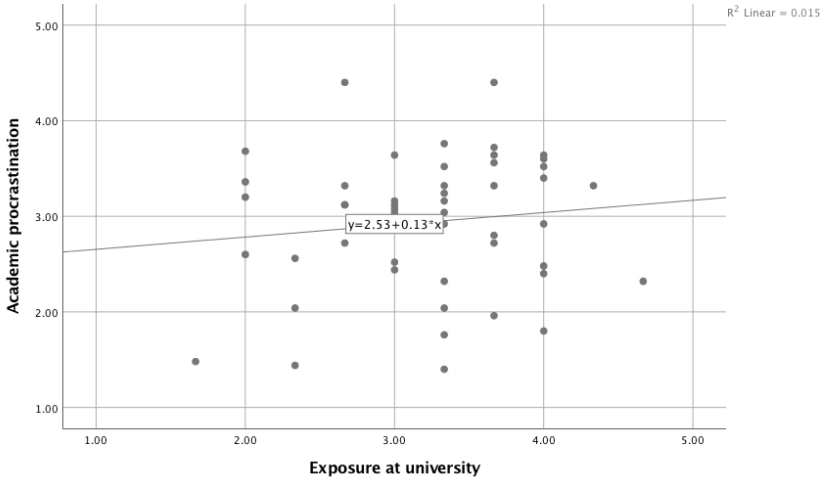


*Figure 4.* Relation between academic procrastination and exposure at university.

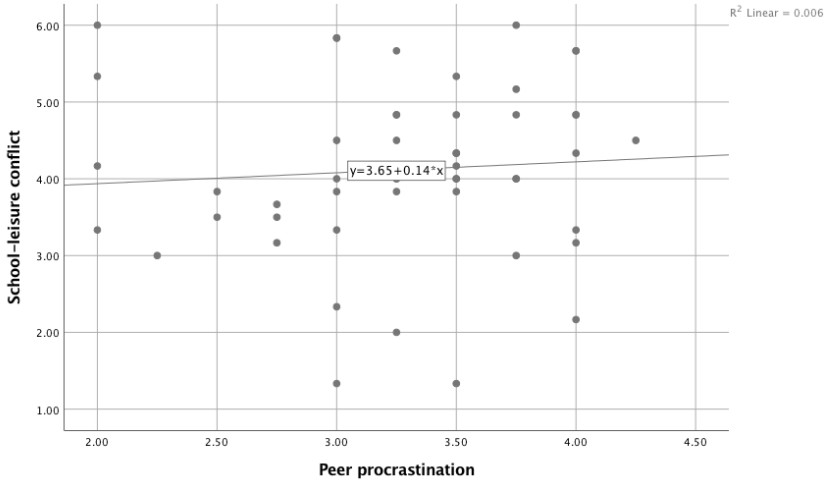


*Figure 5.* Relation between school-leisure conflict and peer procrastination.

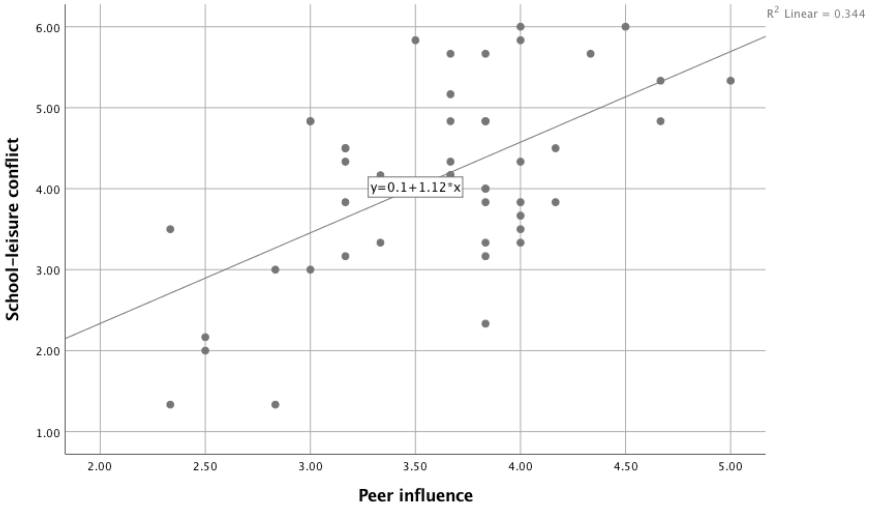


*Figure 6.* Relation between school-leisure conflict and peer influence.

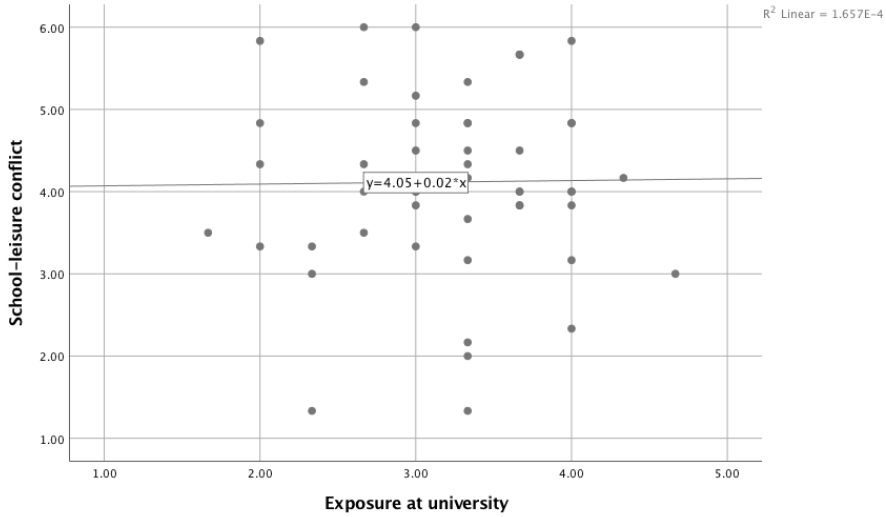


*Figure 7.* Relation between school-leisure conflict and exposure at university.

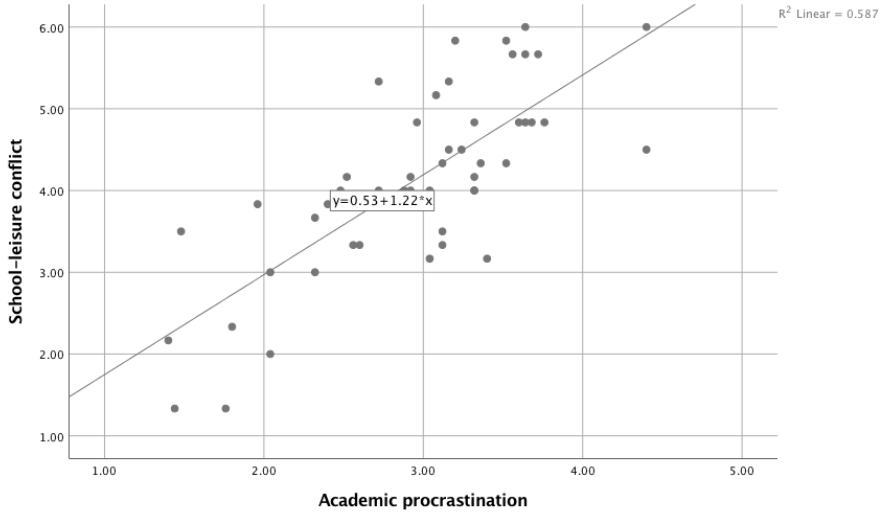


*Figure 8.* Relation between school-leisure conflict and academic procrastination.

Table 4.

*Correlation between Academic Procrastination, Peer and Environmental Factors, and School-Leisure Conflict.*

| Variables | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| 1. Academic procrastination | - | | | | |
| 2. Peer procrastination | .168 | - | | | |
| 3. Peer influence | .429** | -.070 | - | | |
| 4. Exposure at university | .123 | -.107 | .090 | - | |
| 5. School-leisure conflict | .766** | .074 | .586** | .013 | - |

*Notes.* $N = 51$. $^{**}p < .01$, two-tailed.

**Regression analysis and Sobel test**

Three simple regression analyses were first conducted to examine the significance of three predictive effects, including peer influence on academic procrastination and school-leisure conflict, as well as school-leisure conflict on academic procrastination in the presence of peer influence. It was verified that peer influence significantly predicted academic procrastination, $b = .513$, $t(49) = 3.32$, $p = .002$, and school-leisure conflict, $b = 1.119$, $t(49)= 5.07$, $p < .001$. School-leisure conflict also emerged to be a significant predictor of academic procrastination in the presence of peer influence, $b = .491$, $t(49) = 6.85$, $p < .001$. Following that, peer influence, academic procrastination and school-leisure conflict were put into the regression model to examine the mediating effect of school-leisure conflict on the relation between peer influence and academic procrastination. The model was found to be significant, $F(2, 48) = 34.16$, $p < .001$, $R^2 = .587$. In the presence of school-leisure conflict as a mediator, the direct effect of peer influence on academic procrastination decreased and became insignificant $b = -.037$, $t(49) = -.268$, $p = .790$. And the indirect effect between peer influence and academic procrastination with school-leisure conflict as a mediator was 1.119 x .491 =.55. The results are presented in Figure 9.

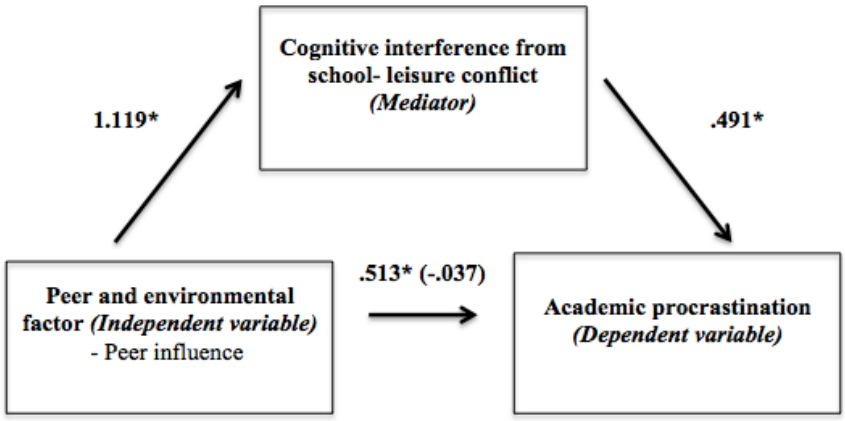


*Figure. 9.* Unstandardized regression coefficients for the relation between peer influence and academic procrastination with school-leisure conflict as a mediator. The unstandardized regression coefficients between peer influence and academic procrastination, controlling for school-leisure conflict, is in parentheses. *$p < .05$.

Furthermore, the Sobel test conducted demonstrated that the mediation effect of school-leisure conflict was significant, $z = 4.07$, $p < .001$.

## Discussion

The current study aimed at examining the relationship between peer and environment and academic procrastination and the mediating role of school-leisure conflict on this relationship. It is expected that the three peer and environmental factors investigated, namely peer procrastination, peer influence and exposure at university, would predict academic procrastination, similar to the previous study conducted by Nordby et al. (2017). However, in this study, out of the three factors mentioned above, only peer influence has the most significant correlation with academic procrastination. This result shows that peer influence is the major determinant of academic procrastination in the social environment. That is to say, an individual's tendency to procrastinate depends on whether one is easily influenced by his or her peers, but not exactly on the peer culture of procrastination or one's

exposure at the university. In fact, this finding echoes with the previous studies on the effect of peer influence on academic procrastination (Klingsieck et al., 2013; Nordby et al., 2017) and could be supported by the social cognitive theory (Bandura,1986) and social comparison theory (Festinger, 1964) mentioned previously.

In addition, the result supported the hypothesis that peer and environment predicts school-leisure conflict, though the predictor again, is limited to peer influence. As anticipated, school-leisure conflict has also positively predicted academic procrastination. With the above three conditions being verified, it is further supported that peer influence positively predicts school-leisure conflict, which in turn leads to an increase in academic procrastination. In line with the expectations, a decrease in the direct effect of peer influence on academic procrastination is also observed due to the mediating effect of school-leisure conflict. Taken together, these findings provide a new insight into the understanding on the relation between peer influence and academic procrastination. Rather than seeing peer influence as a direct contributor to academic procrastination, it is realised that the relation between peer influence and academic procrastination is mediated by the cognitive interference arose from school-leisure conflict. Thus, the result of this study is important for several reasons.

Firstly, this is the first study that examined the mediating role of school-leisure conflict on the relation between peer influence and academic procrastination. It is noticed that there are a number of procrastination researches that have taken a mediating variable into account. For instance, Seo (2008) identified the mediating effect of self-efficacy on the relation between perfectionism and academic procrastination. Balkis (2013) also recognised the mediating role of academic life satisfaction on the relation between academic procrastination and achievement.

However, limited study has been conducted to investigate the indirect effects of social environment with other internal factors. Therefore, the current study provides a new mechanism in understanding the indirect effect of social environment with internal factors on academic procrastination, and supports that social environmental factors influence people's behaviour in a complex way with dispositional and internal factors (Klingsieck et al., 2013).

Secondly, this study adds value to previous researches that examine the effect of peer influence on academic procrastination (Klingsieck et al., 2013; Nordby et al., 2017). The result extends what is known about peer influence and its link to academic procrastination. Although studies have indicated that peer influence can influence academic procrastination, no research has addressed a possible factor that might mediate such relationship. The result of this study is particularly interesting because it provides a fuller picture by suggesting that peer influence leads to academic procrastination through the increase of cognitive interference arose from school-leisure conflict. It is also seen to strengthen the findings in existing literatures and researches about the relation between peer and cognitive interference (Festinger, 1962; Stone & Copper, 2001; Mckimmie, 2015), as well as the effect of cognitive interference on academic procrastination (Senécal et al., 2003; Ratelle et al., 2005; Vij & Lomash, 2014).

Thirdly, this study has practical implications for education. The result reveals that high peer influence increases the cognitive interference arose from school-leisure conflict, and leads to a higher tendency to procrastinate. Thus, it raises a point to the schools that they can help students reduce or overcome academic procrastination by promoting a positive attitude towards learning and reducing students' school-leisure conflict. Obviously, it would be ineffective for the school to adopt an indulging style

by reducing the amount of school time or school work to provide more leisure time for students. This is because students tend to slack off and procrastinate when they feel that academic work is less valued or important. When students are situated in an environment where people have a sluggish attitude towards learning, this may further reinforce their procrastination behaviour due to the existence of negative peer influence (Klingsieck et al., 2013). It would also be ineffective for the school to take an authoritarian approach, and exploiting students' leisure time for academic purpose. This is because school-life balance is particularly important for optimal academic functioning and well being (Wentzel & Wigfield, 2009), and school and leisure should not be seen as mutually exclusive. What schools can do is to promote a positive attitude towards learning and help students strike a balance between school and leisure to reduce and solve the conflict. One practical solution is to foster students' self-determined motivation, as it is found to encourage learning (Deci, Vallerand, Pelletier & Ryan, 1991) and play a role in reducing school-leisure conflict (Ratelle et al., 2005). The more the school context is successful in supporting students' psychological needs for autonomy, competence and relatedness, the more students are motivated to learn (Niemiec & Ryan, 2009), and the less conflict students will experience (Ratelle et al., 2005). To do so, teachers can provide adequate information and feedback to students on how to master the task, stress the importance of a learning activity, maximise the freedom of choice in the academic activities that students are engaged in, and to make students feel that they are being valued (Niemiec & Ryan, 2009). When students' self-determined motivation is fostered, students' tendency to procrastinate may decrease due to the positive peer influence and the reduced school-leisure conflict. Apart from that, teaching self-regulation skills and time management skills could also be helpful in increasing students' resistance to

negative peer influence and temptation (Gardner, Dishion & Connell, 2008), and addressing school-leisure conflict (Perels, Gürtler, & Schmitz, 2005; Fries, Dietz & Schmid, 2008). For instance, teachers can help students to set learning goals, organise the priority of each task using the Stephen Covey's Time Management Matrix (see Fig. 10), and create a schedule for their learning and leisure activities. When students plan and organise their activities clearly, students would be able to manage their time more effectively and avoid unnecessary delay (Covey, 1989). In fact, Dietz, Hofer & Fries (2007) have found that establishing a fixed daily routine for learning and leisure activities can help students better handle their impulse and temptation, be more resistant to negative peer influence, and thus reducing school-leisure conflict. Additionally, teachers may adopt the three-tier anti-procrastination model (see Fig. 11) in their classroom to increase students' self-regulation skills and provide scaffolding assistance to them in reducing academic procrastination gradually (Xu, 2016). It is believed that this can help students develop an effective and efficient learning habit, and eventually promote a more productive learning environment in the classroom.

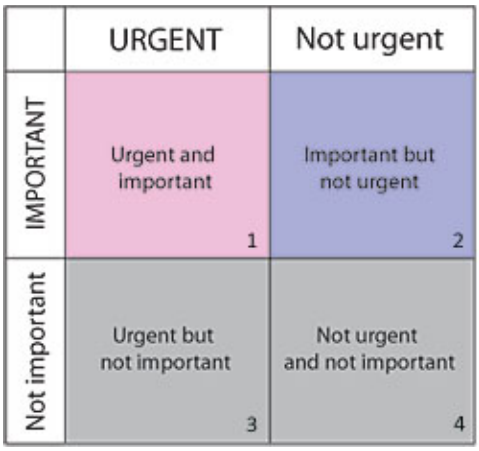


*Figure 10.* The Stephen Covey's Time Management Matrix. Adapted from *The 7 habits of highly effective families*, by S. Covey, 1989, New York, USA: Simon & Schuster. Copyright 1989 by Stephen Covey.

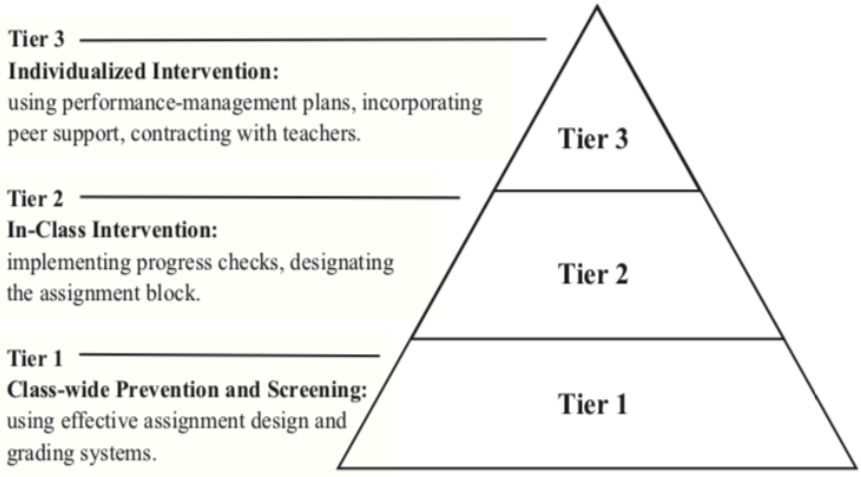


*Figure 11.* The Three-tier anti-procrastination (T-TAP) Model. Adapted from "Just do it! Reducing academic procrastination of secondary students", by Z. Xu, 2016, *Intervention in School and Clinic*, *51*(4), p. 213. Copyright 2016 by Hammill Institute on Disabilities.

**Limitation and suggestions for future studies**

The major limitation of this study is the removal of the two social environmental factors in the mediation model due to their weak correlations with academic procrastination and school-leisure conflict respectively. With the two social environmental factors being removed, this study could not provide a full picture of the total effect that university social environment has on academic procrastination, as the university social environment in this study is now limited to peer influence. Therefore, there is a need to explore other social environmental factors. Besides, the Cronbach's alpha of the scale that measures peer procrastination and exposure at university were found to be low, though acceptable. Given that the previous study conducted by Nordby et al. (2017) has identified a correlation between peer procrastination and exposure at university with academic procrastination, it is suggested that scholars could develop a more reliable measure on these two factors to

further investigate and confirm their relation with academic procrastination, as well as the mediating effect of school-leisure conflict on the relation between these two factors and academic procrastination. Future research could also be developed to assess the effectiveness of teaching self-regulation and time management skills on promoting positive attitude towards learning and reducing school-leisure conflict.

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## Appendix A

### Academic Procrastination Scale (APS: McCloskey, 2011)

The following questions assess your habits and routines as a student.

How much do you, yourself agree to the following statements? (Scored on a 1 to 5 Likert-type scale, with 1= Strongly Disagree and 5= Strongly Agree)

1. I usually allocate time to review and proofread my work.*
2. I put off projects until the last minute.
3. I have found myself waiting until the day before to start a big project.
4. I know I should work on school work, but I just don't do it.
5. When working on schoolwork, I usually get distracted by other things.
6. I waste a lot of time on unimportant things.
7. I get distracted by other, more fun, things when I am supposed to work on schoolwork.
8. I concentrate on school work instead of other distractions. *
9. I can't focus on school work or projects for more than an hour until I get distracted.
10. My attention span for schoolwork is very short.
11. Tests are meant to be studied for just the night before.
12. I feel prepared well in advance for most tests. *
13. "Cramming" and last minute studying is the best way that I study for a big test.
14. I allocate time so I don't have to "cram" at the end of the semester. *
15. I only study the night before exams.
16. If an assignment is due at midnight, I will work on it until 11:59.
17. When given an assignment, I usually put it away and forget about it until it is almost due.
18. Friends usually distract me from schoolwork.
19. I find myself talking to friends or family instead of working on school work.
20. On the weekends, I make plans to do homework and projects, but I get distracted and hang out with friends.
21. I tend to put off things for the next day.
22. I don't spend much time studying school material until the end of the semester.
23. I frequently find myself putting important deadlines off.
24. If I don't understand something, I'll usually wait until the night before a test to figure it out.
25. I read the textbook and look over notes before coming to class and listening to a lecture or teacher. *

* Indicates reverse-scored items

## Appendix B

### Peer and Envrionmental factors (Nordby et al., 2017)

How much do you agree with the following statements? (Scored on a 1 to 5 Likert-type scale, with 1= Strongly Disagree and 5= Strongly Agree)

Peer procrastination

1. There is a culture among my fellow students to delay exams-reading and starting writing assignments.
2. My fellow students rarely delay schoolwork. *
3. Many of my fellow students are relaxed about their schoolwork.
4. There is a culture among my fellow students to get started early and finish early with schoolwork. *

Peer influence

1. When I am late with my schoolwork, I find it reassuring that other students are also behind on their work.
2. When other students around me delay working on their schoolwork, it gets easier for me to delay as well.
3. I work more on my schoolwork when I know my fellow students are working as well.
4. I envy those students who get started early on their exams-reading and written assignments.
5. I work harder when I know I am behind my fellow students on schoolwork.
6. I try to work as much as my fellow students do with their schoolwork.

Exposure in university

1. I spend a lot of time at the university.
2. I work a lot of schoolwork together with my fellow students.
3. I often socialise with my fellow students.

* Indicates reverse-scored items

Appendix C

School- Leisure Conflict (Ratelle et al., 2005)

In the following, the meaning of "leisure" is defined as "social leisure activities". Please rate the following statements on a scale of 1- 7. (1= Strongly Disagree and 7= Strongly Agree)

1. I sometimes have difficulty choosing between my leisure activities and studying.
2. I never hesitate to say "Yes" when someone asks me to do a leisure activity, even if I have an exam to prepare for the next day.
3. I often impinge on my study hours to do leisure activities.
4. I sometimes realize that I should be studying when I'm doing something else.
5. I often think that I dedicated too much time to my leisure and not enough to my studies.
6. I often feel annoyed when I have to choose between studying for an exam and doing leisure activities

Appendix D

Consent Form

**THE EDUCATION UNIVERSITY OF HONG KONG**
**Department of Psychology**

**CONSENT TO PARTICIPATE IN RESEARCH**

**Project title: The Mediating Effect of Cognitive Interference on the Relation between University Social Environment and Academic Procrastination**

I, _____, hereby consent to participate in the captioned project supervised by Mr. Lam Hiu Ming John and conducted by Chin Cheuk Yee, who are staff and student of the Department of Psychology and Department of English Language Education in The Education University of Hong Kong.

I understand that information obtained from this research may be used in future research and may be published. However, my right to privacy will be retained, i.e., my personal details will not be revealed.

The procedure as set out in the **attached** information sheet has been fully explained. I understand the benefits and risks involved. My participation in the project is voluntary.

I acknowledge that I have the right to question any part of the procedure and can withdraw at any time without negative consequences.

Signature: _____

Name of Participant: _____

Date: _____

Appendix E

Information Sheet

**INFORMATION SHEET**

**Project title: The Mediating Effect of Cognitive Interference on the Relation between University Social Environment and Academic Procrastination**

You are invited to participate in a project supervised by Mr. Lam Hiu Ming John and conducted by Chin Cheuk Yee, who are staff and student of the Department of Psychology and Department of English Language Education in The Education University of Hong Kong.

The aim of this research is to investigate the mediating effect of cognitive interference, which arose from school-leisure conflict, on the relation between university social environment and academic procrastination. By understanding how school-leisure conflict mediates the relation between university social environment and academic procrastination, it is hoped that this study could provide a more comprehensive and holistic picture on the issue of academic procrastination, and to offer possible suggestions to promote a more productive learning environment.
In this study, full-time undergraduate students in Hong Kong, ranging from first to final years of their undergraduate study, are selected to be the participants.

In this study, convenience sampling is used to collect data from participants who are easy to access. The sample of this study is 55 full-time undergraduate students in Hong Kong, ranging from first to final year of their undergraduate study. The participants are approached and invited through social media platforms such as Facebook and WhatsApp.
Regarding the procedures of the research, the research will only contain one phase. You will first be provided with this information sheet to have a basic understanding of the study. Then, a consent form will be given to you to choose whether you would like to participate in the study. After you have agreed to participating in this study, you will be asked to complete an online questionnaire about academic procrastination and university social environment. The questionnaire will take approximately 15- 20 minutes to complete.
After participating in this research study, you will gain a better understanding on one's academic procrastination behavior, as well as the contribution of university social environment to academic procrastination.

There will be no potential risk or discomfort caused by the project. Your participation in the project is voluntary. You have every right to withdraw from the study at any time without negative consequences. All information related to you will remain confidential, and will be identifiable by codes known only to the researcher. All the collected data will be disposed and destroyed upon the completion of study.

This is the honors project conducted by students. The results of this research will be presented to The Education University of Hong Kong in the form of oral presentation and thesis.