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Adolescents’ Perceived Decisional Balance, Task Specific Efficacy and Stages of Change in Early Computer Gaming Behavior

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Adolescents’ perceptions of decisional balance, task specific efficacy and stages of changes related to their gaming behavior in an Asian context were examined. A total of 414 adolescents (girls, n = 171, 41.3%) participated in the study, with their age ranged between 12 and 17 (M = 13.8, SD = 1.37) years old. The participants reported their particulars and rated three scales, i.e., decisional balance, task specific and stages of changes. Nearly all subscales had good international consistency. The precontemplation subscale was significantly related to the DB-pro subscale, r(409)=.29, p<.01. Significant correlations were observed between the DB-con subscale with the contemplation r(409)=.35, p<.01, action r(409)=.32, p<.01, and maintenance r(409)=.34, p<.01 subscales. The action subscale was positively correlated to the task specific efficacy - school situation subscale, r(408)=.20, p<.01. Significantly correlations were reported between the frequency of gaming and the DB-pro r(412)=.28, p<.01, the ARC Action subscale r(409)=.13, p<.01, and the TSSE school subscale r(410)=.14, p<.01.

The transtheoretical model (TTM) of behavior change, a synthesis of various best practices of psychotherapy attempts to explain and predict how and when individuals end high risk or problem behavior or to adopt adaptive or healthy behavior (Prochaska, Diclemente, & Norcross, 1992). The model construes behavioral change as a process that unfolds over time and that involves a series of stages: pre-contemplation, contemplation, preparation, action and maintenance (Prochaska, Diclemente, 1982, 1983; Prochaska et al., 1992). It posits that when modifying behavior in different stages, individuals differ predictably on their attitudes, decision making, self-efficacy (DiClemente, Prochaska, Fairhurst, Velicer, Velasquez, & Rossi, 1991). Evidently, the TTM can be an effective model to facilitate change in addictive behavior (e.g., smoking, gambling and substance abuse). The addictive behavior we examined was computer gaming. Recent statistics indicated that two thirds (69%) of the American heads of household play computer or video games; and one third (31%) of them are.

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under 18 years of age (Entertainment Software Association, 2006). In Singapore, the number of gamers was speculated to be at over a million (The Strait Times Interactive, 2006). Our study examined adolescents’ perceptions of their readiness to change the computer gaming behavior, confidence in regulating relationship, school work, help seeking, and symptom management, as well as making decision in continuing or ceasing the addictive behavior.

Stages of Change
The TTM posits five stages of change of a maladaptive behavior (i.e., precontemplation, contemplation, preparation, action and maintenance) (Prochaska & DiClemente, 1984).

Precontemplation: This is the stage where individuals have no or little awareness of their problem and there is no intention in the near future to change their problematic behavior. The individuals might be compelled to seek treatment by their families, friends or employers. They will reverse to their old behaviors once there is no external pressure to continue the intervention. Individuals in the precontemplation stage are resistant to recognizing and/or changing their problematic behavior.

Contemplation: Individuals in this stage have the intention to change within the next six months. They recognize the benefits of changing their behaviors but at the same time are aware of the detriments involved. As such, they experience an internal struggle and can remain in this stage for a prolonged period of time.

Preparation: In this stage, individuals intend to take action within the immediate future. They have certain concrete plans to carry out. They might have taken small steps towards changing their behaviors.

Action: The action stage presents with the observable behaviors changes. Individuals have made specific modifications to their problematic behaviors the past six months. The behavioral alternations must fulfill certain requirements as set forth by professionals in the area.

Maintenance: In the fifth stage, individuals are involved in taking steps to prevent a relapse on their previous problematic behaviors; they would be maintaining their newly acquired behavior over time. A stabilized change in the maladaptive behavior is the most significant indicator of the maintenance stage.

Intermediate/Outcome Measures
Two constructs that predict and mediate progress of change, self-efficacy and decisional balance, are discussed (Prochaska et al., 1992; Velicer, Prochaska, Fava, Norman, & Redding, 1998).

Self-efficacy: Adapted from Bandura’s (1994) social cognitive theory, self-efficacy refers to belief that determines how people think, feel, motivate and behave. The higher efficacy an individual demonstrates for performing a specific task, the greater the likelihood s/he chooses to participate, put forth effort and complete that task (Chou, 2003). Self-perceived self-efficacy is an important variable in monitoring and predicting stage movements and actual behavioral change (Marcus, Selby, Ni aura, & Rossi, 1992; Marlatt & Gordon, 1985). In a study, DiClemente (1991) assessed the level of self-efficacy of twenty-nine cigarette smokers who quit smoking on their own. The study reported that the level of self-efficacy increased from the precontem-
Singapore, the Interactive, is to change the look work, help continue or cease.

• post-contemplation, precontemplation, action, and maintenance stage. The level of temptation fell from the precontemplation to contemplation, further to action and maintenance stage.

The self-efficacy stabilized approximately 18 months after quitting smoking. The temptation levels subsided approximately three years after quitting smoking (DiClemente, 1991).

**Decisional balance:** In adopting a new behavior, a person tends to weigh the perceived benefits (pros) against the cost (cons) (Janis & Mann, 1977). If a person expects a favorable effect of a particular behavior (e.g., weighs more pros than cons on having unprotected sex), s/he is likely to continue performing the previous behavior (smoking) rather than forming a new behavior (quit smoking). A study was conducted to examine if the decision of 960 current or previous smokers if they took action to change (Velicer, DiClemente, Prochaska, & Brandenberg, 1985). The participants completed the decisional balance measure as part of the larger, longitudinal study. The decisional balance paradigm was operationalized and validated through a between group comparison of five groups representing different stages of change; and a longitudinal study to determine if the instrument could predict change in actual behavior. Principal component analysis identified two orthogonal components; one involving all the positive aspects and the other involving all the negative aspects, the pros and cons of the current behavior. Discriminant function analysis informed us that in precontemplation stage, the pros of smoking outweighed the cons of smoking. In contemplation stage, there was greater overall balance between the pros and cons. When the pros for change and the cons for maintaining the current status increases, this will tip the overall balance in favor of the change (Velicer et. al., 1985). In the early stages of change, an individual’s decisional balance is an important marker of any behavioral change.

**Computer Gaming Behavior as Problem Behavior**

To define computer gaming as a problem behavior, the present study referred to the following indicators.

**Time commitment:** The devotion of time to playing these games can vary with age and with the nature of the individual. In the extreme situation, the frequency of playing computer games may signify that a person has become dependent or addicted to computer games.

**Psychological effects:** Children who exposed themselves to greater amounts of video games violence were more hostile, reported getting into arguments with teachers more frequently, and were more likely to be involved in physical fights (Gentile, Lynch, Linder, & Walsh, 2004; Lynch, Gentle, Olson, & van Brederode, 2001). Correlations were observed between the time spent playing computer games and the level of social anxiety and the quality of interpersonal relationships (Lo, Wang, Fang, 2005). The results from 174 college-aged students indicated that the heavy users (spending an average of 4.70 hours per day, 7 days per week) of online games had less fulfilling interpersonal relationships compared to light users (spending 2.45 hours per day, 1 to 3 days per week) and non-users. Light users had less fulfilling interpersonal relationships compared to non-users. The results showed that social anxiety increased with greater usage of online games.
Academic performance: There is a negative association between academic performance and the amount of time playing video game for students (Anderson & Dill, 2000; Gentile et al., 2004; Lynch et al., 2001; Walsh, 2000). High-school students who reported spending more time playing computer games or who reported spending more money on computer games had poorer grades in English classes (Harris & Williams, 1985). The “displacement hypothesis” suggests that electronic media such as computer games could influence learning and social behavior by taking over the place of activities such as reading, family interaction, and social play with peers (Huston et al., 1992).

Addiction: The dependency on computer game was seen as particularly harmful where it occurred among children. Their constant use of computer games engendered introversion and social withdrawal (Levy, 1984; Waddilove, 1984). Severe computer game dependency among young players could drive them to take extreme measure to feed their habit. There were cases of youngster admitted truanting in order to play computer games and stealing money to buy new games cartridges (Griffiths & Hunt, 1995; Keepers, 1990).

METHOD

Participants
The participants were 414 students of which 171 (41.3%) girls and 240 (58.0%) boys; three did not indicate his/her gender. The age of the participants ranged from 12 to 17 and the mean age was 13.8 (SD = 1.37). Of the total sample, there were 373 (90.1%) Chinese, 23 (5.6%) Malays, 2 (0.5%) Indians, and 13 (3.1%) other ethnicities. One participant did not report his/her ethnicity.

Measures
Frequency of gaming: Participants responded to the question, “How often do you play cyber/computer/video games?” on a 6-point Likert scale, with 0=Never, 1=Not regular (less than 3 times a month), 2=1-2 days/week, 3=3-4 days a week, 4=5-6 days/week, and 5=Everyday. All the 414 student participants played cyber, computer or video games at least 1-2 days a week. 115 (27.8%) participants played everyday, 57 (13.8%) played 5-6 days a week, 130 (31.4%) played 3-4 days a week, and 112 (27.1%) played 1-2 days a week.

URICA-Adapted for Computer Gaming (URICA-Gaming): The URICA-Gaming adapted from the University of Rhode Island Change Assessment (URICA; McConnaughy, Prochaska, & Velicer, 1983) comprised 32-items. The items were modified to suit the context of computer gaming behavior and written to determine how individuals perceive, contemplate, and respond to their “gaming behavior” and for those seeking help. Sample items reflecting the four stages of change were: “As far as I’m concerned, I don’t have any gaming behavior that needs changing” (pre-contemplation); “I have a problem with gaming behavior and I really think I should work on it” (contemplation); “Even though I’m not always successful in changing, at least I’m working on my gaming behavior” (action); and “I’ve been successful in controlling my gaming behavior, but I’m not sure I can keep up the effort on my own” (maintenance). Each item was rated on a 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree). The Cronbach’s alphas of the URICA-Gam-
academic per-derson & Dill, school students reported spending media such taking over the play with peers especially harmful ess engendered were computer ime measure to order to play thiffs & Hunt, (58.0%) boys; ged from 12 to there were 373 other ethnicities.

How often do you (Never, 1=Not a week, 4=5-6 yper, computer everyday, 1week, and 12

RICA-Gaming en (URICA; the items were n to determine havior" and inge: "As changing" (pre-think I should in changing, at uccessful in e effort on my ranging from 1 URICA-Gam-

Results

Means, Standard Deviation, Skewness and Kurtosis
The means, standard deviations, skewness, and kurtosis of the measures were computed (Table 1). The skewness and kurtosis scores indicate whether scores in a specific set of data take on normal distributional shape. For a normal distribution, the stati-
Statistics of skewness and kurtosis are zero. Kline (1998) states that departures from normality may become a concern when the absolute value of the univariate skew index is greater than 3.0, and when the absolute value of the univariate kurtosis index is greater than 10.0. The data of this study indicated that there was no severe departure from normality, and thus all items were subjected to further analyses.

Table 1
The Mean, Standard Deviation, Skewness and Kurtosis in the Scales

<table>
<thead>
<tr>
<th>Subscale</th>
<th>N</th>
<th>M</th>
<th>SD</th>
<th>Skewness</th>
<th>Kurtosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>URICA-gaming (Precontemplation)</td>
<td>411</td>
<td>3.19</td>
<td>.70</td>
<td>.01</td>
<td>.73</td>
</tr>
<tr>
<td>URICA-gaming (Contemplation)</td>
<td>411</td>
<td>3.13</td>
<td>.73</td>
<td>-.10</td>
<td>.43</td>
</tr>
<tr>
<td>URICA-gaming (Action)</td>
<td>411</td>
<td>3.14</td>
<td>.76</td>
<td>-.10</td>
<td>.76</td>
</tr>
<tr>
<td>URICA-gaming (Maintenance)</td>
<td>411</td>
<td>3.03</td>
<td>.70</td>
<td>-.15</td>
<td>.95</td>
</tr>
<tr>
<td>TSSE-gaming (Symptom Mgt)</td>
<td>412</td>
<td>3.86</td>
<td>1.16</td>
<td>-.20</td>
<td>-.15</td>
</tr>
<tr>
<td>TSSE-gaming (Social Skills)</td>
<td>412</td>
<td>3.84</td>
<td>1.18</td>
<td>-.22</td>
<td>-.10</td>
</tr>
<tr>
<td>TSSE-gaming (School)</td>
<td>412</td>
<td>4.22</td>
<td>1.13</td>
<td>-.46</td>
<td>.01</td>
</tr>
<tr>
<td>TSSE-gaming (Help)</td>
<td>412</td>
<td>3.27</td>
<td>1.45</td>
<td>.11</td>
<td>-.81</td>
</tr>
<tr>
<td>DB-gaming (Pros)</td>
<td>414</td>
<td>2.87</td>
<td>.82</td>
<td>.22</td>
<td>-.31</td>
</tr>
<tr>
<td>DB-gaming (Cons)</td>
<td>414</td>
<td>2.46</td>
<td>.78</td>
<td>.30</td>
<td>-.26</td>
</tr>
</tbody>
</table>

Correlations among the Adolescents’ Readiness for Change, Task Specific Self-efficacy, Decisional Balance, and Frequency of Gaming

The coefficients for the correlations among the subscales for URICA-adapted for computer gaming, Task Specific Self-efficacy (TSSE), Decisional Balance (DB), and Frequency of Gaming are reported in Table 2. Given that the large number of correlational analyses, and the large sample size may lead to Type I error, the significance level of the correlational analyses was set to alpha = .01 rather than .05. With regards to effect size, Cohen, Cohen, West and Aiken (2003) recommended that correlation coefficients of r = .10, .30, and .50 represent small, medium and large effect sizes, respectively.

The results showed that with regards to the URICA-gaming scale, the precontemplation subscale was significantly related to the DB-pro subscale ($r(409) = .29, p < .01$) but not the DB-con subscale ($r(409) = .00, ns$). This association suggests that in making the decision on whether or not to play computer games, adolescents who scored high on the precontemplation stage were more likely to consider the pros of gaming rather than the cons of gaming. With regards to the URICA-gaming scale,
The precontemplation skew index is not severe due to skew index in turtosis index in I severe departure.

**Table 2**

<table>
<thead>
<tr>
<th></th>
<th>Pre</th>
<th>Con</th>
<th>Act</th>
<th>Main</th>
<th>SESM</th>
<th>SESS</th>
<th>SESC</th>
<th>SEHS</th>
<th>DBP</th>
<th>DBC</th>
<th>FG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre</td>
<td>.22**</td>
<td>.25**</td>
<td>.39**</td>
<td>.25**</td>
<td>.22**</td>
<td>.11*</td>
<td>.11*</td>
<td>.29**</td>
<td>.00</td>
<td>.00</td>
<td>.07</td>
</tr>
<tr>
<td>Con</td>
<td>.82**</td>
<td>.78**</td>
<td>.16**</td>
<td>.20**</td>
<td>.13*</td>
<td>.17**</td>
<td>.12*</td>
<td>.35**</td>
<td>-.06</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Act</td>
<td>.78**</td>
<td>.22**</td>
<td>.26**</td>
<td>.20**</td>
<td>.19**</td>
<td>.05</td>
<td>.32**</td>
<td>-.13**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Main</td>
<td>.15**</td>
<td>.17**</td>
<td>.09</td>
<td>.15**</td>
<td>.21**</td>
<td>.34**</td>
<td>-.03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SESM</td>
<td>.65**</td>
<td>.59**</td>
<td>.45**</td>
<td>.18**</td>
<td>.13**</td>
<td>.01</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>SESS</td>
<td>.67**</td>
<td>.49**</td>
<td>.10</td>
<td>.12*</td>
<td>-.11*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SESC</td>
<td>.41**</td>
<td>.00</td>
<td>.08</td>
<td>.14**</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SEHS</td>
<td>.02</td>
<td>.12*</td>
<td>-.10*</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>DBP</td>
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<td></td>
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<td></td>
<td>.21**</td>
<td>.28**</td>
<td></td>
</tr>
<tr>
<td>DBC</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.01</td>
</tr>
</tbody>
</table>

Note: **p<.01 (2-tailed), *p<.05 (2-tailed), Pre: Precontemplation stage, Con: Contemplation stage, Act: Action stage, Main: Maintenance Stage, SESM: Self-efficacy symptom management, SESS: Self-efficacy social skills, SESC: Self-efficacy for school situations, SEHS: Self-efficacy for help-seeking skills, DBP: Decisional balance (Pros), DBC: Decisional balance (Cons), FG: Frequency of gaming.

Regression Analyses examining Adolescents’ Readiness for Change, Task Specific Self-efficacy, and Decisional Balance as Predictors of the Frequency of Gaming

As the results of bivariate correlations are susceptible to spurious relationships, multiple regression analyses were run to gain a better understanding of the importance of adolescents’ readiness for change, task specific self-efficacy, and decisional balance in predicting the frequency of gaming. Variables that were correlated significantly at
the p<.05 level to frequency of gaming were chosen as predictors in the regression analyses; the subscales chosen were the TSSE social skills, TSSE school situation, TSSE help-seeking, DB pro, and the URICA-gaming action subscale. The regression analyses in Table 3 indicate that the significant predictors of the frequency of gaming were the DB pro and the URICA- action subscale. The effect size of the predictors were such that a 1 SD increase in DB-pro was associated with a .29 SD increase in the frequency of gaming, and a 1 SD increase in the URICA- action subscale was associated with a .11 SD decrease in the frequency of gaming. These five predictors explained 11% of the variance in the frequency of gaming. The results suggest that after controlling for the effects of the other predictors, adolescents who tend to consider the pros of gaming are more likely to play computer games, and adolescents who are high in the action phase of change are less likely to play computer games.

Table 3
Multiple Regression Analysis with Frequency of Gaming as the Dependent Variable

<table>
<thead>
<tr>
<th>Predictors</th>
<th>B</th>
<th>t</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>TSSE - social skills</td>
<td>-.04</td>
<td>-56</td>
<td>.57</td>
</tr>
<tr>
<td>TSSE - school situation</td>
<td>-.07</td>
<td>-1.13</td>
<td>.26</td>
</tr>
<tr>
<td>TSSE - help-seeking</td>
<td>-.03</td>
<td>-.57</td>
<td>.57</td>
</tr>
<tr>
<td>DB - pro gaming</td>
<td>.29</td>
<td>6.11</td>
<td>&lt;.00**</td>
</tr>
<tr>
<td>URICA - Gaming action</td>
<td>-.11</td>
<td>-2.34</td>
<td>.02*</td>
</tr>
</tbody>
</table>

Note: **p<.01, *p<.05. TSSE: Task specific self-efficacy, DB: Decisional Balance, URICA: Adolescents’ readiness for change.

DISCUSSION

The purpose of this study was to investigate how the adolescents cope with their computer gaming behaviors. The present study provided a preliminary examination of the association of self-efficacy and decisional balance at the various stages of change. The internal consistencies of the scales were examined. The reliability estimates based on the Cronbach’s alpha coefficient for the URICA-Gaming subscales ranged from .76 to .86; the TSSE-Gaming subscales ranged from .83 to .89; and the DB-Gaming ranged from .82 to .85. The internal consistencies for all subscales were above the conventional .70 level for acceptable reliability (Nunnally, 1978) indicated that they measured related but distinct aspects of the self-efficacy, decisional balance and stages of change. On the whole, the findings suggested that self-efficacy and decisional balance constructs significantly predicted scores of the stages of change but varied at depending on the different subscales of the stages of change. Generally, the positive results suggest that it is useful to adapt the transtheoretical model to the domain of videogaming. The good reliabilities support such an adaptation.

General: We learn that the adolescents of our study scored the highest in the contemplation stage (M = 3.19, SD = .70) followed by other stages of change action (M = 3.14, SD = .76), contemplation (M = 3.13, SD = .73) and maintenance (M = 3.03, SD = .70). Their pro-gaming decision mean (M = 2.87, SD = .82) was higher than that of con-gaming decision (M = 2.46, SD = .78). The mean for task specific
The regression analysis indicated that the predictors of the predictors did not increase in the scale was associated with the predictors. Its suggest that the adolescents tend to consider computer games.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balance</td>
<td>.57</td>
</tr>
<tr>
<td>.26</td>
<td></td>
</tr>
<tr>
<td>.57</td>
<td></td>
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<tr>
<td>.00**</td>
<td></td>
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<tr>
<td>.02*</td>
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</tr>
</tbody>
</table>

The findings suggested that the adolescents of our study as expected were yet to experience the precontemplation stage, and hence, they were likely at the precontemplation stage, and did not have sufficient awareness to quit computer gaming (lower cons than pros). The adolescents of our study showed high confidence in school related tasks, but were less confident in other domains which might be beneficial for change in behavior (e.g., help seeking, symptom management).

From the zero-order correlation coefficients we learn that stages of change were positively related to each other and to all subscales of task specific efficacy, except between maintenance and school situation. More distinct, precontemplation, action, and maintenance related positively to pro-gaming decision, whereas, all stages except precontemplation related positively to con-gaming decision. As expected, students in the precontemplation stage were not likely to think about the costs of quitting gaming (hence cons). The frequency of playing computer games provided some worthy indication. It related negatively with action, task specific efficacies (social skills, school situation, help seeking) and pro-gaming decision (Table 2). The finding suggest that frequency of playing computer games would reduces when the adolescents would be in the action stage, and would have high task specific efficacies in social relation, school work and seeking professional help. The multiple regression analysis with frequency of gaming as the dependent variable and decisional balance and task specific efficacy as independent variable support this claim (Table 3).

The findings of the present study will provide baseline data for designing stage-matched intervention. Research has shown that stage-matched intervention can have a far greater impact than action-oriented, one-size-fits-all programs by increasing the likelihood of the individuals taking action and increasing participation. For example, stage-matched interventions for smokers more than double the smoking cessation rates of the traditional interventions available (Prochaska, DiClemente, Velicer, & Rossi, 1993). Stage-matched interventions have outperformed one-size-fits-all interventions for mammography screening (Rakowski et al., 1998) and dietary behavior (Campbell et al., 1994). These findings suggest that intervention should be individualized, matched to the individual’s readiness to change. Stage-matched intervention can reduce resistance, reduce stress, and reduce the time to implement the change by accelerating movement toward the action stage. It allows all individuals to participate in the change process, even if they are not prepared to take action.

REFERENCES


Key words: Adolescent, Computer gaming, Decisional balance, Stage of change, Task-specific efficacy