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The Relationship of Work-Family Conflict and Socio-Cognitive Variables to Healthy Eating in Malaysia

Madihah Shukri

School of Social and Economic Development, Universiti Malaysia Terengganu, 21030 Terengganu, Malaysia.

ABSTRACT

Understanding psychosocial determinants of healthy eating is believed to be crucial because they are influences that are potentially modifiable through health intervention. The current study was designed to investigate the effects of work-family conflict and socio-cognitive variables on healthy eating (i.e., low fat consumption, and fruit and vegetable consumption) among Malaysian employees. Participants (N = 325) completed questionnaires based on the Theory of Planned Behaviour (TPB) constructs and the work-family conflict scale. Results based on multiple regressions highlighted the efficacy of TPB in explaining 42% and 44% of the variances for eating low fat and eating fruit and vegetables, respectively. In addition to intention, descriptive norm and anticipated regret were found to be statistically significant predictors of both the healthful eating behaviours. Self-efficacy was a significant predictor of low fat consumption, while affective attitude was a significant determinant of fruit and vegetable intake. Family interference with work (FIW) was found to moderate the effect of intention on low fat consumption, suggesting that intention was predictive of low fat consumption only among people who experienced less FIW and not among those with greater conflict. Intervention could usefully target the socio-cognitive variables and work-family challenges in promoting healthful eating in Malaysia.

Keywords: Healthy eating, socio-cognitive variables, Theory of Planned Behaviour, work-family conflict.

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E-mail address:
madihah@umt.edu.my (Shukri, M.)

INTRODUCTION

The importance of healthy eating in contributing to an overall sense of wellbeing and in reducing the rate of diseases, including chronic disease, has been well established (Hall *et al*., 2009; Bogers *et al*., 2004). Yet

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in Malaysia, results based on the World Health Survey (Hall *et al*., 2009) showed that low fruit and vegetable consumption was prevalent among men (85%) and women (85.5%). Moreover, statistics from the last few decades suggested that as the Malaysian population achieved affluence, their intake of energy, fats, and sugars increased (Ismail *et al*., 2002). Urbanisation and industrialisation have brought about a shift towards a 'westernised' dietary pattern and food consumption in Malaysia (Tee, 1999). Furthermore, in recent decades, the Malaysian national surveys have highlighted a rapid rise in obesity rates (Khor, 2012). Such circumstances make healthy eating an important issue for health promotion and disease prevention. While little is known about dietary habits of the Malaysians, previous studies on healthy eating in Malaysia have focused their attention on consumption patterns (Mirnalini *et al*., 2008; Nurul Izzah *et al*., 2012) and socio-demographic determinants (Yen, Tan, & Nayga, 2011; Yen & Tan, 2012). While demographic factors may account for a significant portion of the variance in these eating behaviours, these variables are not directly amenable to change (Christian *et al*., 2007). In this context, the psychosocial determinants of healthy eating are crucial because they are influences that are potentially modifiable through health intervention. Therefore, it is important to understand them to develop an effective programme for the promotion of healthy eating (Povey *et al*., 2000). Thus, the current study aimed to investigate this issue.

Work-Family Conflict and Eating Behaviour

Striking changes in the nature of family and work life, such as more dual-career couples and the rising numbers of working mothers with young children, have increased the likelihood of employees of both genders experiencing work-family conflict, in an attempt to occupy work and family roles simultaneously. In Malaysia for instance, previous studies (Ahmad, 1997; Mahpul & Abdullah, 2011) suggested the prevalence of work-family conflict among working mothers. Work-family conflict occurs when efforts to cater to work role demands interfere with one's ability to fulfil family demands and vice versa (Greenhaus & Beutell, 1985). Such a conflict occurs in either one or both directions, where one could experience work interference with family (WIF) and/or a family interference with work (FIW). Stress and time availability perspectives (Allen & Armstrong, 2006) provide a conceptual basis to suggest the fact that conflicts between work and family life are likely to constitute barriers for healthy food habits (Roos *et al*., 2007). In a qualitative study examining the influence of conflict between work and family obligations on employed parents' own dietary choices, Devine *et al*. (2006) observed that less healthful food was selected not only because it was fast and easy to obtain or prepare, but also because it was viewed as a reward to make up for a difficult day. In addition, there is evidence that consuming healthy foods such as fruits, vegetables, and fiber may be thought of as inconvenient (Allen & Armstrong, 2006).

Previous Western studies suggest that work-family conflicts are important stressors, contributing to poor eating habits (Allen & Armstrong, 2006; Lallukka *et al*., 2010; Roos *et al*., 2007). The concept of WIF and FIW may have different effects on eating. Studies have revealed that the direction of the work-family conflict (i.e., WIF and FIW) influences the nature of eating behaviour (Allen & Armstrong, 2006; Roos *et al*., 2007). For instance, Allen and Armstrong (2006) found that FIW was associated with eating more fatty foods, while WIF was associated with eating fewer healthy foods. They suggested that individuals experiencing WIF might not make the effort to include more healthy food including fruits and vegetables in their diet based on the belief that it would be another drain on their time and energy. On the other hand, FIW may elicit more of a stress-induced response to food choices that prompts individuals to use fatty foods as a comfort mechanism. Yet, no previous studies have examined the association between work-conflict and healthy eating in a non-Western country. Hence, it seems prudent to examine whether work-family conflict and its direction have any influence on healthy eating in a Malaysian sample (i.e. representing a non-Western population). This, in turn, would help develop appropriate worksite policies and practices, and nutrition promotion intervention, to assist the dietary behaviour of individuals.

Theory of Planned Behaviour (TPB)

Several social cognition models were developed as frameworks to understand health related behaviours (for details, see Conner & Sparks, 2005), however, the present study focuses on TPB model. TPB (Ajzen, 1991) is one of the most widely applied socio-cognitive frameworks within the health behaviour sector. The model has been used to explain a range of health behaviours (Armitage & Conner, 2001; McEachan *et al*., 2011), with a view to improving behaviour through interventions (Payne, Jones, & Harris, 2005). According to TPB, the proximal determinant of behaviour is a person's intention to perform the behaviour itself (Ajzen, 1991). Intention represents a person's motivation to perform the behaviour, such that, the more one intends to engage in a particular behaviour, the more likely it is to occur. In turn, intention is theorised to be predicted by three socio-cognitive concepts, namely, attitude [i.e., the individual's evaluation of the behaviour (positive or negative)], subjective norms (i.e., the perceived social pressure to behave, stemming from the beliefs about whether a behaviour will receive social approval), and perceived behavioural control (PBC; i.e., the individual's perception of the extent to which performing the behaviour is easy or difficult). As a construct, attitude has been conceptualised as having both affective and cognitive components (Conner & Armitage, 1998). The affective component of attitude refers to emotions and feelings associated with behaviours (e.g., the enjoyment of eating healthy food), while the cognitive

component is related to the knowledge, ideas, or beliefs related to the behaviour (e.g., the benefit of eating healthy food). Subjective norm, on the other hand, has been distinguished as injunctive norm (i.e., that which the significant others think the person ought to do) and descriptive norm (i.e., what significant others do themselves) because these are separate sources of motivation (Rivis & Sheeran, 2003). According to Ajzen (2002), PBC is also used as a two-dimensional construct comprising self-efficacy (i.e., the extent to which performance of the behaviour is perceived as easy or difficult for the individual) and perceived control (i.e., the extent to which the individuals perceive the performance of the behaviours to be within his or her control). Acknowledging the fact that the sources of attitudes (i.e., affective and cognitive), subjective norms (i.e., subjective and descriptive) and PBC (i.e., self-efficacy and perceived control) are important in behavioural interventions, the present study sought to test if these variables had independent effects on healthy eating.

Furthermore, a meta-analysis of TPB (Sandberg & Conner, 2008) provides support for the inclusion of anticipated regret in the TPB. Anticipated regret refers to a negative, cognitive based emotion that is experienced when we realised or imagined that the present situation could have been better if we had acted differently (Conner & Sparks, 2005). With the exception of physical activity (Abraham & Sheeran, 2004), studies have examined if regr*et al*ters expectations about health-risk behaviours and screening behaviours (Sandberg & Conner, 2008). Such studies suggest that anticipated regret is a salient predictor of such behaviour, since engaging in such behaviours is generally understood to have detrimental effect on individuals' health. Thus, individuals are likely to experience unpleasant or negative emotions, including regret, when they indulge in health-risk behaviours or screening behaviours (Sandberg & Conner, 2008). However, to our knowledge, until now, the possibility that anticipates regret may influence healthful eating has not been examined. This study attempts to fill this void.

Theoretically, the integration of research on work-family conflict with the TPB framework will benefit stress research by specifying some important cognitive mechanisms through which stress may affect eating behaviour. The knowledge about the link between work-family conflict, cognition, and healthy eating is particularly useful when developing health interventions, particularly targeting those who face stressful conditions, as individuals' behaviour-specific cognitions are modifiable antecedents of behaviour. Louis *et al*. (2009) studied the effects of life stress (i.e., normal range of stress) on the intention to eat a healthy and unhealthy diet, in relation to the TPB, in a sample of 154 university students. Other research (e.g., Payne *et al*., 2005; Payne *et al*., 2010) has integrated work stress into the study of the TPB model in the exercise and healthy eating domains. Payne *et al*. (2002), for instance, found that the presence of stressor

(i.e., job demands) appeared to impede people's ability to carry out their intentions to perform exercise. In further research, Payne *et al*. (2010) also showed that job demands appeared to disrupt people's ability to carry out their daily exercise intentions. Owing to the importance given to intention as the key determinant of behaviour (Payne *et al*., 2010), this study incorporates the TPB variable of intention, by investigating the extent to which the WIF and FIW affect the relationship between intentions and healthy eating.

RESEARCH OBJECTIVES

The current study was designed to investigate the effects of work-family conflict and socio-cognitive predictors on healthy eating. In the present study, work-family conflict was divided into distinct, but related constructs, namely, 'WIF' and 'FIW'. Of interest, the present study focused on two aspects of eating behaviour (namely, fruit and vegetables intakes and a low fat diet intake) considered as healthy eating in previous studies (Conner *et al*., 2002; Povey *et al*., 2000). Moreover, such dietary behaviour was thought to be vulnerable to deleterious changes in response to stress in the literature (O'Connor & Conner, 2011). The specific aims of this study were as follows:

1. To investigate the possible effects of work-family conflict constructs (i.e., WIF and FIW) on eating behaviour. Based on the previous literature, it was hypothesised that WIF and FIW would predict less healthy eating (i.e., reduction in fruit and vegetable intake and reduction in the consumption of a low fat diet).
2. To examine the role of the TPB in predicting healthy eating among a sample of employees in Malaysia. Of particular interest in the study was the detailed analysis of the different sources of attitudes, subjective norms, and PBC in relation to healthy eating. It was hypothesised that the TPB variables would account for the largest proportion of the explained variance in healthy eating.
3. To examine whether WIF and FIW moderate the relationship between intention and healthy eating behaviours. It was hypothesised that WIF and FIW would moderate the impact of intention on healthy eating, such that experiencing a high WIF and FIW might disrupt the intention to eat more healthy food.

MATERIALS AND METHODS

Participants and Procedures

Participants were a convenience sample of employees from the local government administration in Terengganu. The potential respondents were recruited at their workplaces after informative meetings with representative of the management. In all, 333 respondents completed the questionnaire. However, only 325 (97.5%) returned the completed questionnaires. The respondents included 154 males (47.4%) and 171 females (52.6%). The age of the

respondents ranged from 20 to 61 years [mean ± standard deviation (SD) = 34 ± 8.5]. In terms of ethnicity, 73.2% of the participants were Malays, 20.3% were Chinese, 4.9% were Indians, and 1.5% belonged to other backgrounds. About 57% of the participants lived in households with children, ranging from one to a maximum of six children. A majority of the participants (69.8%) worked in the professional field, while the remaining (27.4%) worked in other fields. Ethics Committee of the Institute of Psychological Sciences, University of Leeds, provided ethical approval for this study.

Measures

Participants completed baseline questionnaire on work-family conflict and the TPB measures. One month later, they received a follow-up measure of healthy eating. The original questionnaire in the English version was translated into the Malay language before it was administered to the participants. Back translation of the questionnaire was conducted by two proficient linguists in both languages and having in-depth experiences in culture, jargon, idiomatic expressions and emotional terms of the original language and translated language. As part of content validation procedure, consultation with experts was done to determine the representativeness, specificity and clarity of the questionnaire (see Haynes *et al*., 1995). Measures included:

Demographic background. Age, gender, marital status, number of children, and job characteristics were compiled for each participant.

Healthy eating.To examine the participants' habits related to eating fruits and vegetables, the following item was used: 'In the past four weeks, I have eaten five fruits and vegetables a day'. For the purpose of this study, participants were informed that eating fruits and vegetables refers to eating at least five portions of fruit and/or vegetables daily. For assessing their habits related to eating a low fat diet, the following item was used: 'In the past four weeks, I have eaten a low fat diet'. The participants were informed that eating low fat diet refers to limiting intake of fatty food and trying to pick low fat-options where possible. Examples of low fat diet were also given. Responses to these items ranged from '1 = never' to '7 = always'.

Work-family conflict. An eight-item scale developed by Gutek *et al*. (1991) was used to measure the two types of work-family conflict. The participants responded on a five-point scale ranging from strongly disagree (rated as 1) to strongly agree (rated as 5). WIF was measured using a four-item scale, with items such as, 'My family dislikes how often I am preoccupied with work while I am at home'. Similarly, FIW was assessed with a scale comprising four items. Higher scores indicated higher WIF and FIW. The corresponding Cronbach's alpha coefficient was 0.723 for the complete scale.

Socio-cognitive variables. The items related to socio-cognitive variables were based on TPB (Conner & Sparks, 2005). The intention to engage in each behaviour was assessed using one item: I intend to eat five fruits and vegetables a day; '1 = strongly

disagree' to '7 = strongly agree'. Cognitive attitude was assessed with one item: Eating five fruits and vegetables a day, over the next four weeks, would be 'worthless-valuable' and 'beneficial-harmful'. For affective attitude, the responses 'not enjoyable-enjoyable' and 'unpleasant-pleasant' were used. Injunctive norm was assessed with the statement: Most people important to me think that I, '1 = should not' and '7 = should', eat five fruits and vegetables a day, over the next four weeks. Descriptive norm was measured using one item: I think that most people who are important to me will eat five fruits and vegetables a day. Responses to this item were rated on a seven-point scale, '1 = strongly disagree' to '7 = strongly agree'. Self-efficacy was measured by a single item: If it were entirely up to me, I am confident that I could eat five fruits and vegetables a day. The item to assess perceived control was: I have control over whether or not I eat five fruit and vegetables a day. Again, responses to these items ranged from '1 = strongly disagree' to '7 = strongly agree'. Anticipated regret was measured by one item: I will feel regret if I do not eat five fruits and vegetables a day, with responses ranging from '1 = definitely no' to '7 = definitely yes'.

Statistical Analysis

Data were analysed using the Statistical Package for the Social Sciences (SPSS). To test the hypotheses, correlation, and hierarchical regression analyses were performed. A series of hierarchical multiple regression analyses were conducted to determine the predictors of low fat consumption, and fruits and vegetables consumption tendencies of the sample. The independent variables were entered in two steps: (i) All the TPB variables (i.e., intention, self-efficacy, perceived control, cognitive attitude, affective attitude, injunctive norm, and descriptive norm), (ii) anticipated regret, WIF, FIW, and gender. By using this procedure, it was possible to assess the predictive utility of the TPB constructs and the additional predictive utility of all the variables under consideration (Norman & Conner, 2006). Besides gender, demographic variables including age, marital status (married vs. single), and children (no children vs. with children, i.e. having at least one child or more) were included in the initial regressions, but were subsequently excluded as they were not significant predictors. Regression analyses were also performed to examine the moderating role of WIF and FIW on the intention-behaviour relationship. Interaction terms (i.e., intention × WIF, and intention × FIW) were constructed based on the recommendations by Baron and Kenny (1986). The nature of the significant interaction was then probed by examining beta weights for the different levels of moderators. For the WIF (median = 12) and the FIW (median = 8) measures, the participants were divided into a low group and a high group, by way of median split. To facilitate the interpretation of the analyses, only two interaction terms were created. The regression analysis was run separately in the two groups to decompose the interaction.

RESULTS

The means and Pearson's correlations for low fat diet consumption, and fruits and vegetable consumption are shown in Table 1 and Table 2, respectively. All correlations between eating behaviours and the TPB components were statistically significant. FIW was significantly related to eating a low fat diet, suggesting that a higher FIW was related to an increased intake of a low fat diet.

Predicting Low Fat Consumption

In the first step, the impact of the TPB variables was analysed (see Table 3). The results indicated that the TPB variables accounted for a statistically significant proportion of the variance in eating a low fat diet [$\Delta R^2 = .42$; F change (7, 293) = 30.58, $p < .001$]. Examination of beta weights indicated that intention, self-efficacy and descriptive norm had significant positive beta weights, while cognitive attitude had a negative beta weight. In Step 2, the analysis of the impact of anticipated regret, WIF, FIW, and gender did not result in a statistically significant increment in the explained variance in eating a low fat diet [$\Delta R^2 = .01$; F change (4, 289) = 2.17, n. s]. Examination of beta weights indicated that intention, self-efficacy, cognitive attitude (negative beta weight), descriptive norm, and anticipated regret were significant predictors. In Step 3, while intention, self-efficacy, and descriptive norm remained significant, a significant negative interaction was observed in FIW × intention ($\beta = -.86$, $p < .001$). This interaction led to a significant improvement in the model [$\Delta R^2 = 0.03$, F change (2, 287) = 8.15, $p < .001$]. Decomposition of the interaction showed that the intention to consume a low fat diet was predictive of those in the low FIW group ($\beta = -.32$, $p < .001$). For those in the high FIW group, the effect was non-significant ($\beta = -.04$, n. s).

Predicting Fruit and Vegetable Consumption

Hierarchical regression was also performed to predict the effects of the predictors on the consumption of fruits and vegetables. In Step 1 (see Table 3) intention, cognitive and affective attitude and descriptive norm were found to significantly predict fruit and vegetable consumptions. Taken together, these variables explained a significant, 44.4% of the variance in fruit and vegetable consumption [F change (7,292) = 33.31, $p < .001$]. The addition of anticipated regret, WIF, FIW, and gender in Step 2 failed to explain a significant additional proportion of the variance in fruit and vegetable intake [F change (4,288) = .789, n. s]. In this step, fruit and vegetable consumption was significantly predicted by intention, affective and cognitive attitudes (negative beta weight), descriptive norm, and anticipated regret. Interaction terms were entered in Step 3, descriptive norm and cognitive attitude were significant but no significant interaction was found [F change (2, 286) = .51, n. s].

TABLE 1
Means, Standard Deviations, Pearson Correlations for low fat consumption variables

variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Behaviour	-											
2. Intention	.58**	-										
3. CAttitude	.20**	.34**	-									
4. AAttitude	.42**	.55**	.58**	-								
5. INorm	.39**	.46**	.43**	.41**	-							
6. DNorm	.49**	.53**	.28**	.55**	.46**	-						
7. PC	.28**	.42**	.28**	.47**	.37**	.39**	-					
8. SEfficacy	.56**	.62**	.39**	.52**	.46**	.46**	.38**	-				
9. Regret	.47**	.58**	.31**	.45**	.47**	.48**	.31**	.46**	-			
10. WIF	.01	-.03	-.04	-.15**	.03	-.09	-.12*	.01	-.04	-		
11. FIW	.13*	.06	.10	.01	-.06	.12*	-.10	.10	.10	.36**	-	
12. Gender	.05	.04	.08	.05	.01	-.00	.03	-.07	.08	-.02	.00	-
M	4.29	4.89	5.72	5.14	5.20	4.83	5.53	5.20	4.87	12.07	9.38	-
SD	1.51	1.50	1.36	1.51	1.43	1.56	1.33	1.47	1.70	3.30	2.77	-

Note: Male=0, Female=1; CAttitude=cognitive attitude, AAttitude=affective attitude, INorm= injunctive norm, DNorm= descriptive norm, SEfficacy= self-efficacy, WIF= work to family conflict, FIW = family to work conflict, * p <. 05, ** p < .001.

TABLE 2
Means, Standard Deviations, Pearson Correlations for Fruits and Vegetables variables

variables	1	2	3	4	5	6	7	8	9	10	11	12
1. Behaviour	-											
2. Intention	.67**	-										
3. CAttitude	.12**	.27**	-									
4. AAttitude	.36**	.43**	.70**	-								
5. INorm	.32**	.42**	.55**	.54**	-							
6. DNorm	.51**	.57**	.30**	.45**	.50**	-						
7. PC	.18**	.31**	.20**	.22**	.23**	.25**	-					
8. SEfficacy	.46**	.59**	.35**	.51**	.48**	.53**	.27**	-				
9. Regret	.43**	.48**	.33**	.41**	.43**	.46**	.21**	.52**	-			
10. WIF	-.05	-.04	.14**	.02	.03	-.01	.01	.01	-.02	-		
11. FIW	.08	.04	-.13*	-.04	-.12*	.10	-.00	-.00	.03	.36**	-	
12. Gender	.03	.08	.00	.04	.05	.08	.02	.02	.11*	-.02	.00	-
M	3.60	4.25	5.73	5.33	4.98	4.57	5.33	5.20	4.87	12.07	9.38	-
SD	1.77	1.74	1.40	1.40	1.59	1.57	1.44	1.47	1.70	3.30	2.77	-

Note: Male=0, Female=1; CAttitude=cognitive attitude, AAttitude=affective attitude, INorm= injunctive norm, DNorm= descriptive norm, SEfficacy= self-efficacy, WIF= work to family conflict, FIW = family to work conflict, *p < .05, **p < .001.

TABLE 3
Hierarchical Regression Analysis Predicting Low Fat Consumption and Fruit and Vegetable Consumption from TPB Measures, WIF, FIW, Gender and Interaction terms.

		Low fat consumption			Fruit and vegetables consumption		
Step 1	Predictors	Step 1 β	Step 2 β	Step 3 β	Step 1 β	Step 2 β	Step 3 β
	Intention	.17**	.16**	.62***	.48***	.45***	.29
	PC	-.05	-.04	.00	-.04	-.04	-.02
	Self-efficacy	.34***	.33***	.35***	.04	.01	.05
	Cognitive attitude	-.14*	-.14*	-.14*	-.23***	-.23***	-.26***
	Affective attitude	.07	.09	.03	.19**	.18**	.12
	Injunctive norm	.07	.05	.06	.03	.03	.03
	Descriptive norm	.20**	.19**	.19**	.15**	.13*	.17**
Step 2	Regret		.14*	.13*		.10*	.07
	WIF		.04	.06		-.01	-.11
	FIW		.02	.02		.03	-.02
	Gender		.03	.02		-.12	-.03
Step 3	Intention x WIF			.01			.10
	Intention x FIW			-.86***			.15

Note: * p < .05, ** p < .01, *** p < .001. β = standardized coefficient. For low fat consumption model, [Δ R^2 =.42, F (7, 293) = 30.58, p<.001] for Step 1; [Δ R^2 =.01, F (4, 289) = 2.17, n.s.] for Step 2, [Δ R^2 =.03, F (2, 287) = 8.15, p<.001] for Step 3. For fruit and vegetable model, [Δ R^2 =.44, F (7, 292) = 33.31, p < .001] for Step 1; [Δ $R2$ =.00, F (4, 288) = .78, n.s]. for Step 2; [Δ R^2 =.00, F (2, 286) = .51, n.s.] for Step 3.

DISCUSSION

The current study was novel as it examined the effects of work-family conflict on healthy eating using a non-Western sample. In the present study, the correlation coefficient observed between FIW and a low fat intake was small (r = .13, p < .05), but statistically significant, suggested that individuals who perceived more FIW had a higher tendency to consume a low fat diet. The result was unexpected since a previous research (Roos *et al*., 2007) had suggested that women and men with strong family-work conflicts (i.e. FIW) were less likely to report recommended food habits. On the contrary to Hypothesis 1, however, the result of the regression analyses showed that after the TPB variables were controlled, FIW failed to predict healthy eating. This suggests that FIW may be a distal predictor as TPB mediated its effect on the eating behaviours (Conner & Abraham, 2001). Further research is needed to confirm the weak association between work-family conflict and healthy eating using different samples, and to examine such a mediation effect. Some previous Western studies (Roos *et al*., 2007; Allen & Armstrong, 2006; Lallukka *et al*., 2010) have shown a significant association between work-family conflict and unhealthy eating behaviour. The low predictive power

of work-family conflict in the present study may be due to several factors. Firstly, the level of work-family conflict experienced by the Malaysian sample may not be very disturbing or harmful enough to alter the behaviours under study. Secondly, the presence of various important moderating effects (e.g., coping, personality, and social support) that were not addressed in the present study might have influenced the relationship between work-family conflict and healthy eating. Future research could further examine these possible moderators and replicate the study on a broader range of eating behaviours (e.g., meals and snacks intake, unhealthy food intake, skipping meals).

Consistent with Hypothesis 2, this study found that the TPB model tested on each of the healthy eating behaviours was significant. In addition, the percentage of variance it predicted suggested sizeable effects (explaining variances of 42% and 44% for eating low fat food, and eating fruits and vegetables, respectively). This study also corroborated the findings of previous studies (e.g., Armitage & Conner, 2001; McEachan *et al*., 2011), showing that intention was the strongest predictor of healthy eating. A noteworthy finding in the present study was that, after intention, descriptive norm was a statistically significant predictor of healthy eating among the theoretical determinants, although it was lower in magnitude than that of PBC (i.e., self-efficacy). In addition, while self-efficacy may predict only a low fat diet (β =.35, $p < 0.00$), descriptive norm emerged as a significant predictor of both low fat diet and fruit and vegetable consumption (β =.19, $p < 0.00$ and β =.17, $p < 0.00$, respectively). These finding contradict to the results of studies conducted on Western samples (Povey *et al*., 2000), where the effect of PBC predominated the prediction of healthy eating, as compared to normative influences. Such results, as those revealed in the present study, also strengthen previous research (Lee *et al*., 2006; Hagger *et al*., 2007), suggesting the effect of social consideration (i.e., descriptive norm) on the behaviour of those from a non-Western background.

Furthermore, affective attitude was a statistically significant predictor of fruit and vegetable consumption, but not of low fat intake. Given that the direction of cognitive attitude on low fat consumption ($r = .20$, $p < .001$, $\beta = -.14$, $p < .05$) and fruit and vegetable consumption ($r = .12$, $p < .001$, $\beta = -.23$, $p < .001$) was different based correlation and regression analyses, this may suggest that they are merely statistical artefacts. Hence, it is recommended to exercise caution while interpreting these results. Perhaps the most original finding of the present research is that anticipated regret emerged as a reliable predictor of both the healthy eating behaviours, even after the effects of the other TPB constructs had been taken into account. Hence, this finding supports the view that anticipated regret has a motivational significance that can be generalised to the promotion of health protective behaviour, including healthy eating, as well as health risk behaviour (Abraham & Sheeran, 2004). Overall, the

present study has revealed the important role of emotional evaluations (i.e., affective attitude, regret) and social consideration (i.e., descriptive norm) in predicting healthy eating. This indicates that health messages which focus on affective benefits (e.g. I enjoy eating healthy food, I feel regret if I do not eat healthy food), and perception of significant others (e.g., if everyone is eating healthy food, it must be sensible to do so), may serve as useful tools to increase healthful eating in the Malaysian context.

Past research has demonstrated the moderating effects of stress in relation to key TPB variables (Louis *et al*., 2009; Payne *et al*., 2005). Consistent with the third hypothesis and past research, the present study found evidence to support the moderating role of the FIW in the relationship between intention and low fat consumption. It was notable that a high FIW changed the predictive effect of the intention to eat a low fat diet. In particular, the intention to eat a low fat diet was only predictive among those who reported a low level of FIW, while it was not a significant determinant among those who reported a higher FIW. This extends the findings of a previous study by Allen and Armstrong (2006), which reported the link between FIW (but not WIF) and increased fat consumption. Such results could be explained by the fact that the psycho-physiological responses to stress might influence subsequent eating behaviour (Epel *et al*., 2001), including a greater preference for nutrient-dense foods, particularly those that are high in fat and sugar (Torres, 2007).

From a practical point of view, the results of this study provide useful information to guide the promotion of healthy eating in Malaysia. First, given that intention, descriptive norm, anticipated regret, self-efficacy, and affective attitude of the TPB model were found to be significant determinants of healthy eating, increasing the salience of these constructs may be one way to promote a healthful eating pattern. Results also demonstrated that the FIW had altered the intention-behaviour links. This suggests that the conflict derived from an imbalance in the work-family relationship reduced the likelihood of eating a more healthy diet, which could consequently influence both weight and health. Hence, a healthy eating intervention should be tailored to address issues related to the work-family balance.

The limitations revealed in the present study are insightful for future studies. The nature of this study may fail to capture the within-subject fluctuations in stress measures, and its influence on predicting behavioural outcomes. Thus, it is recommended that future studies be conducted to examine the effects of work-family conflict within and between individuals, over a number of days. Secondly, the study used self-report measures. Hence, future studies, particularly in prospective designs, may benefit from measures that are more objective. Another important limitation is that a few items from the TPB measures, including eating measures, were measured as a single item. Despite previous research (e.g.) acknowledging the use of single item

measurement for the TPB constructs, it must be noted that such measures could be affected by measurement error (Levy *et al*., 2008). Thus, future research may benefit from using multiple item measures, which are considered more reliable (Conner & Sparks, 2005). Finally, there might have been a selection bias in the samples due to the convenience sampling. Thus, the lack of randomisation in the selection process of participation affects generalisability of the study findings. It would have been desirable to have employed a larger and more representative sample, suggesting the same for future studies.

CONCLUSION

This study was the first to look at the effects of work-family conflicts and socio-cognitive variables on healthy eating behaviours in a non-Western sample. Findings supported the efficacy of the TPB model, which accounted for the largest proportion of the explained variance in predicting healthy eating in Malaysian samples. This research provides some insight into the fact that after intention, descriptive norm and anticipated regret were statistically significant predictors of healthy eating behaviours. The findings of this study also added novelty to the previous literature regarding the moderating effects of work-family conflict in the intention-behaviour relationship. In more specific, FIW was found to moderate the effect of intention on low fat consumption, such that intention was predictive of low fat consumption only among people who experienced less FIW, but not among those who reported higher conflict. Intervention could usefully target the socio-cognitive variables and the work-family challenges in promoting healthful eating in Malaysia.

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