Psychiatry Research 275 (2019) 1–9

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

Testing a new interpersonal model of disordered eating between Australian and East-Asian women: The relationships between theory of mind, maladaptive schemas, and appearance-based rejection sensitivity

Hayley Kimball[a], Matthew Fuller-Tyszkiewicz[b,c], Tara De Paoli[a], Audrey McKinlay[a], Isabel Krug[a,*]

[a] Melbourne School of Psychological Sciences, The University of Melbourne, Melbourne, VIC, Australia
[b] Centre for Social and Early Emotional Development, School of Psychology, Deakin University, Melbourne, VIC, Australia
[c] School of Psychology, Deakin University, Geelong, VIC, Australia

ARTICLE INFO

Keywords:
Interpersonal model
Disordered eating
Theory of mind
Appearance-based rejection sensitivity
Cultural

ABSTRACT

The current study tested a new interpersonal model of disordered eating behaviours, whereby maladaptive schemas and theory of mind decoding (ToM-decoding) were related with disordered eating attitudes (body dissatisfaction) and behaviours (binging/purging and food restriction) through the mediating variable appearance-based rejection-sensitivity. A secondary aim was to test whether this model differed between two cultural groups: Caucasian Australian women (N = 197, ages ranging 17–43, M = 19.25, SD = 3.10), and Asian women living in East-Asia (N = 195, ages ranging 18–40, M = 28.60, SD = 5.15). Participants completed an online survey assessing the variables of interest. While the model showed acceptable fit for both groups, invariance testing demonstrated that the model worked differently in each group. Appearance-based rejection-sensitivity mediated the effect of maladaptive schemas on body dissatisfaction and disordered eating in both groups, but only mediated the effect of ToM-decoding on body dissatisfaction in the East-Asian group. Overall, the significant indirect pathways were greater in strength and number for the Caucasian-Australian group. These findings indicate that while the relationships between maladaptive schemas, appearance-based rejection-sensitivity, and disordered eating attitudes and behaviours are present in both cultures, ToM-decoding may only play a role for East-Asian participants.

1. Introduction

Contrary to prior popular belief, disordered eating is an illness that affects individuals from all ethnicities and cultures. For example, rates of disordered eating are as prevalent in East Asian countries as they are in Western countries (Jennings et al., 2006; Mond et al., 2010). While research has shown many interpersonal factors are important in the development of disordered eating, said research has been conducted almost entirely in Western populations, which is problematic given the global spread of disordered eating. This gap in the literature is especially poignant given interpersonal factors are likely to vary significantly across ethnicities and cultures. It is therefore crucial that research into the role of interpersonal factors in disordered eating among different cultures is carried out, to improve clinical understanding and outcomes for all individuals suffering with disordered eating.

Individuals with eating disorders have shown higher scores than non-clinical participants on the appearance-based rejection-sensitivity measure (De Paoli et al., 2017). Moreover, in community-based samples, appearance-based rejection-sensitivity predicts eating disorder symptomology and thoughts (Park, 2007) and body image concerns (Calogero et al., 2010), even after controlling for factors such as self-esteem, self-rated attractiveness, and self-worth (Park, 2007). Appearance-based rejection sensitivity has also been investigated as a mechanism to explain the co-occurrence of social anxiety and disordered eating in a community sample (Linardon et al., 2017). To date there are no studies that have shown how appearance-based rejection sensitivity differs across eating disorder subtypes. The reason for the association between appearance-based rejection sensitivity and disordered eating remains unclear, as does its generalizability across cultures. Considering that as a part of appearance-based rejection-sensitivity, individuals process *ambiguous stimuli* with a *negative cognitive bias*, it is

* Corresponding author: School of Psychological Sciences; The University of Melbourne, Redmond Barry, Room 1207, Vic 3010, Melbourne, Australia.
E-mail address: Isabel.krug@unimelb.edu.au (I. Krug).

https://doi.org/10.1016/j.psychres.2019.02.065
Received 27 June 2018; Received in revised form 2 February 2019; Accepted 25 February 2019
Available online 28 February 2019
0165-1781/

possible that Theory of Mind (ToM; the ability to attribute mental statest to another person; which relates to the ambiguous stimuli) and maladaptive schemas (relating to the negative cognitive bias) are at play. The evidence for these factors (ToM and maladaptive schemas) are discussed in turn.

Deficits in ToM are common among individuals who engage in disordered eating behaviours (Bora and Kose, 2016). A recent meta-analysis of 15 clinical studies revealed that both anorexia nervosa (AN) and bulimia nervosa (BN) were associated with deficits in ToM relative to healthy controls, with more substantial effects for AN individuals (Bora and Kose, 2016). Bora and Kose (2016) found that this deficit was particularly pronounced for a specific type of ToM: ToM-decoding. ToM-decoding refers to the understanding of affective stimuli, most notably facial expressions, and is commonly measured by the Reading the Mind in the Eyes task (Baron-Cohen et al., 2001).

ToM-decoding is particularly relevant to appearance-based rejection-sensitivity, as an individual who has trouble interpreting facial expressions may be more likely to misinterpret expressions as rejection – a key element of rejection sensitivity (Downey and Feldman, 1996). While ToM-decoding may explain a mechanism by which individuals high in appearance-based rejection-sensitivity are presented with ambiguous social stimuli, maladaptive schemas may explain how those ambiguous stimuli get misinterpreted as rejecting.

Maladaptive schemas, often referred to as core beliefs, are inflexible patterns of thought or belief systems some individuals adopt when young and apply throughout their lifetime (Young et al., 2003).The most common measure of maladaptive schemas identifies 16 different schemas, which range from *abandonment* to *entitlement* (Young, 1994). Among participants with diagnosed eating disorders, most of these 16 maladaptive schema have been found to be implicated in the disorder (e.g. Cooper et al., 2006; Dingemans et al., 2006; Leung and Price, 2007; Turner et al., 2005; Waller et al., 2000).

Only a small amount of studies, has assessed schema according to diagnostic classifications, with some studies (e.g. Dingemans et al., 2006; Legenbauer et al., 2018; Leung et al., 1999; Unoka et al., 2007; Waller et al., 2000), observing differences between eating disorder subtypes on certain maladaptive core beliefs. For example, Waller et al. (2000), found that AN- Binge Purging (AN-BP), BN and Binge Eating Disorder (BED) could be differentiated by three core beliefs, namely *defectiveness/shame, insufficient self-control*, and *failure-to-achieve*, while Leung et al. (1999) found that AN-Restrictive (AN-R), AN-BP, and BN patients only differed on the *entitlement* schema, with those diagnosed with BN patients endorsing more entitled beliefs than AN-R.

Research has shown that in particular, both clinically diagnosed eating disorder participants and participants who score highly on disordered eating measures tend to score higher than healthy control participants on five maladaptive schemas: *defectiveness/ shame* (Cooper et al., 2006; Leung and Price, 2007; Turner et al., 2005), *unrelenting standards* (Deas et al., 2011), *abandonment* (Cooper et al., 2006), *mistrust/abuse* (Cooper et al., 2006; Leung and Price, 2007), and *social isolation* (Leung and Price, 2007). Abandonment, mistrust/abuse, and social isolation all address fears of absent or negative interpersonal relationships, while defectiveness/shame and unrelenting standards both revolve around failing to meet society's standards (Young et al., 2003). Should an individual hold such schemas, it is plausible that they may construe ambiguous social stimuli to mean rejection.

Cultural differences have been observed for rejection sensitivity, maladaptive schemas, and ToM. Garris et al. (2011) showed that exposure to the same degree of social rejection was associated with stronger feelings of social rejection, and more negative self-reports of emotional affect, belonging, meaningful existence, and self-esteem for Japanese participants relative to American participants. Baranoff et al. (2006) compared maladaptive schemas among East-Asian (Korean) and Caucasian (Australian) participants and found that Korean participants scored significantly higher than the Australian participants on seven out of the 13 schemas measured; defectiveness/shame and abandonment being two of them. The Australian participants, in contrast, only scored higher than the Korean participants on emotional deprivation and self-sacrifice schemas (Baranoff et al., 2006). Finally, Koelkebeck et al. (2015) found that, when presented with ambiguous facial expressions, Japanese participants were more likely to assign a negative expression than Caucasian German participants. This suggests that if a facial expression seems ambiguous (as is the effect of poor ToM-decoding), East-Asian individuals may experience a negativity bias in interpreting that expression. Based on these findings in Japanese and Korean samples, it is possible that negative biasing of social stimuli may be more common in East-Asian populations than Western-Caucasian populations.

1.1. The current study

There is currently a paucity of culturally-focused research addressing the relationships between disordered eating behaviour, maladaptive schemas, and ToM-decoding. Furthermore, no study to date has addressed appearance-based rejection-sensitivity, let alone the relationship between appearance-based rejection-sensitivity and disordered eating behaviour, from a cultural perspective. To address these gaps in the literature, and contribute to clinical knowledge of disordered eating, the present study tested a new interpersonal model of eating pathology. The model proposes that appearance-based rejection-sensitivity acts as a mediator in the relationships ToM-decoding and

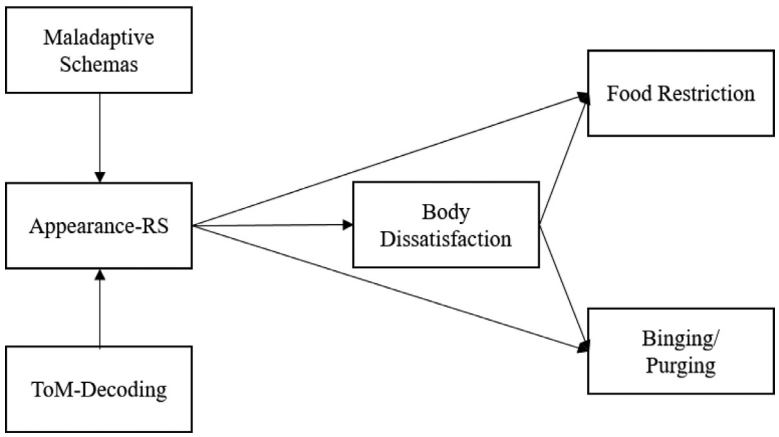

Fig. 1. The proposed interpersonal model of disordered eating behaviour.
Note: The correlations between the maladaptive schemas, and the direct effects of ToM-decoding and the schemas to body dissatisfaction, food restriction, and binging/purging, are not presented here, for ease of interpretation.

maladaptive schemas have with disordered eating attitudes (body dissatisfaction) and behaviours (binging/purging and food restriction) (see Fig. 1). Given body dissatisfaction has been recognised as one of the most predictive factors for disordered eating behaviours (Stice, 2002; Stice and Desjardins, 2018), it has been placed as a mediating variable before binging/ purging and food restriction. Additionally, the five maladaptive schemas found most relevant to disordered eating (e.g. Cooper et al., 2006; Deas et al., 2011; Leung and Price, 2007) were combined into a latent variable, to represent an underlying disturbance in perception of interpersonal relationships.

In addition to testing this new interpersonal model of disordered eating, the present study aimed to evaluate the cultural generalisability of the model, by testing the plausibility of a single model for two cultural groups; Caucasian women living in Australia, and Asian women living in East Asia. Based on prior research (e.g. Baranoff et al., 2006; Garris et al., 2011; Koelkebeck et al., 2015), it was anticipated that compared to the Caucasian-Australian sample, the East-Asian group would have higher levels of maladaptive schemas, a higher negativity bias in interpreting facial expressions, higher levels of rejection sensitivity and, in turn, be more vulnerable to disordered eating pathology.

2. Method

2.1. Participants

In total, 392 women aged 17 to 43 (M = 19.25, SD = 3.10) participated in the study. Of these, 197 were Caucasian, living in Australia, and 195 were East-Asian, living in Asia. Australian participants were undergraduate students at a university in Melbourne and completed the survey for course credit. East-Asian participants were members of "Clickworker", an online recruitment service, and were reimbursed their local currency equivalent of four euros for their participation. To capture data that were more generalizable across East-Asia, rather than being specific to one country, participants were sampled from a range of countries in East-Asia. The East-Asian participants were from the Philippines (N = 130), Malaysia (N = 43), South Korea (N = 10), Thailand (N = 4), China (N = 3), Hong Kong (N = 2), Singapore (N = 2), and Taiwan (N = 2). The decision to only include women in this analysis was two-fold. First, disordered eating attitudes and behaviours are commonly cited as higher in females (Allen et al., 2013), hence there is greater urgency to address these issues for women. Second, there is a lack of research including males on the factors included in this analysis, meaning that the viability of proposed pathways in the current model may be inappropriate for men. Inclusion criteria for participants was thus gender (must be female), currently living in a focal country, and English proficiency. The research was approved by the ethics committee of an Australian institution.

2.2. Measures

Participants completed six measures, plus demographic questions. All measures were selected based on common use in the literature, being well-validated, and having good psychometric properties.

2.2.1. Ethnicity and demographics

Ethnicity was assessed in the Australian sample with one multiple-choice question, "What is your ethnic background?". In the East-Asian sample, participants were asked two multiple-choice response questions, "In which country do you currently reside", and "What is your ethnic background?", to ensure only participants who met inclusion criteria of Asian ethnicity and living in East-Asia were included. Participants also reported their age, weight and height [used to calculate body mass index (BMI)], their highest education, current employment status, marital status, sexual orientation, and whether they had ever been formally diagnosed with an eating disorder.

2.2.2. Appearance-based rejection sensitivity

Appearance-based rejection-sensitivity was measured using the Appearance-Based Rejection-Sensitivity Scale (Park, 2007), in which participants rated on a 6-point Likert scale how anxious they felt towards 15 social situations, as well as how likely they believed rejection would be in those situations (30 questions in total). Higher scores reflect greater appearance-based rejection-sensitivity. Internal reliability was excellent (East-Asians, α = 0.96; Caucasian-Australians, α = 0.96).

2.2.3. Theory of mind

ToM-decoding was measured using the Reading the Mind in the Eyes task (RME; Baron-Cohen et al., 2001) for the Australian participants. In this task, participants were shown 36 photographs of the eye region of a person showing different expressions (for example, angry, pensive, and fantasising). Participants were presented four emotion labels, and asked to identify which of those four emotions the person pictured was feeling. The East-Asian participants completed an East-Asian adaptation of the RME task, featuring photographs of Japanese faces with culturally matched expressions (Adams et al., 2010). This measure was developed to match the original RME task in difficulty and validity (Adams et al., 2010). As the adapted RME task translated the response options only into Japanese, for this study the East-Asian version of the task used the same emotion label options, in English, for each question. Each emotion label was accompanied by synonyms or an explanation to assist with language difficulties. Scores were calculated as a percentage of correct responses, meaning a higher score represented greater ToM-decoding.

2.2.4. Maladaptive schema

Five maladaptive schemas were measured using subscales of the Young Schema Questionnaire – Short Form (YSQ-SF; Young et al., 2003; Oei and Baranoff, 2007): *abandonment* (East-Asians, α = 0.88; Caucasian-Australians, α = 0.91), *mistrust/abuse* (East-Asians, α = 0.90; Caucasian-Australians, α = 0.88), *social isolation* (East-Asians, α = 0.92; Caucasian-Australians, α = 0.95), *defectiveness/shame* (East-Asians, α = 0.92; Caucasian-Australians, α = 0.95), and *unrelenting standards* (East-Asians, α = 0.89; Caucasian-Australians, α = 0.90). Participants completed 25 questions in total (five per subscale) and were asked to rate on a 6-point Likert scale how true different statements representing maladaptive schemas were of them, for example, "I need other people so much that I worry about losing them" (abandonment), "I feel that people will take advantage of me" (mistrust/abuse), "I don't fit in" (social isolation), "I feel that I'm not loveable" (defectiveness/shame), and "I must meet all my responsibilities" (unrelenting standards).

2.2.5. Disordered eating behaviour

Body dissatisfaction and binging/purging were measured using subscales of the Eating Disorder Inventory 3 (EDI-3; Garner, 2004). The body dissatisfaction subscale includes nine questions (East-Asians, α = 0.71; Caucasian-Australians, α = 0.79), and the binging/purging subscale includes seven questions (East-Asians, α = 0.87; Caucasian-Australians, α = 0.90). For each, participants indicated on a 6-point scale how often they have certain thoughts around their body shape and size.

Restrictive eating behaviour was measured using the restrictive subscale of the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn and Beglin, 1994). The subscale consists of five questions, where participants reported on a 7-point scale how frequently over the past four weeks they had engaged in restrictive eating behaviours (East-Asians, α = 0.79; Caucasian-Australians, α = 0.84).

2.3. Procedure

2.3.1. Data collection

Participants accessed the survey on their own device via a link to

the Qualtrics™ website, where they gave consent and then completed demographic questions and the questionnaires. Once completed, they were debriefed and reimbursed.

2.3.2. Data analytic strategy

All descriptive and group-difference analyses were conducted using IBM SPSS 23.0, and path analysis was undertaken using Mplus version 7.1 (Muthén, 2012). Group differences on the demographic variables were assessed using chi-square tests and t-tests. As age and BMI have been identified as correlates of disordered eating (Stice et al., 2017), ANCOVAs with age and BMI as covariates were used to assess whether the cultural groups varied on the measures of ToM-decoding, the five maladaptive schemas, appearance-based rejection-sensitivity, body dissatisfaction, food restriction, and binging/purging. Other demographic variables were also included as covariates, if shown in the t-tests mentioned above to significantly differ across groups. Subsequent to these ANCOVAs, a latent variable approach was used for the five maladaptive schemas, rather than modelling them separately, as they are thought to be indicative of an underlying disturbance in perception of interpersonal relationships.

To test the proposed model, multi-group path analysis using maximum likelihood was undertaken. Conceptually, this invariance testing evaluates whether the path model is comparable across groups and does so through two key steps. Initially, an unconstrained model was constructed in which the parameters of the proposed model were allowed to vary across the groups (Caucasian-Australians and East-Asians). Model fit was assessed using standard goodness-of-fit indices and cut-offs: non-significant chi-square, Comparative Fit Index (CFI) >0.95, Root Mean Square Error of Approximation (RMSEA) <0.06, and Standardized Root Mean Square Residual (SRMR) <0.08 (Byrne, 2016). Provided this unconstrained model provided adequate fit, subsequent modelling in which the parameters were constrained to be equal across both cultural groups was undertaken (constrained model). The plausibility of a single model for both groups was evaluated by comparing the chi square and CFI values for the unconstrained and constrained models. A significant difference in chi square across the two models indicates significant worsening of the model when equality constraints are applied, whereas a difference of 0.01 or greater in CFI indicates difference in model fit from a practical perspective (Byrne, 2016).

Once the appropriate model – whether a single model for both groups, or separate model for each group – was identified, parameter estimates (including indirect effects) were evaluated using bias-corrected bootstrapping with 5000 re-samples.

3. Results

3.1. Sociodemographics

Presented in Table 1 are the sociodemographic results from the t-tests and chi-square tests. Significant group differences were observed for age, such that East-Asians were older than Caucasian-Australians ($p < .001$); and BMI, such that East-Asians had a higher BMI than Caucasian-Australians ($p = .033$). Significant group differences were also found for all other demographic factors, except for eating disorder diagnosis.

3.2. Cultural differences on the main variables

As detailed in Table 2, ANCOVAs revealed significant main effects of cultural context on ToM-decoding and three of the maladaptive schemas (abandonment, mistrust/abuse, and social isolation). There were no significant differences detected for the maladaptive schemas defectiveness/shame or unrelenting standards, appearance-based rejection-sensitivity, food restriction, binging/purging, or body dissatisfaction. The East-Asian group scored significantly higher than Caucasian Australian participants on abandonment, mistrust/abuse, and social isolation dimensions of maladaptive schemas, but significantly lower on ToM-decoding.

Table 1
Percentage of each ethnicity group that identified as each response on factors education, employment, marital status, sexual orientation, and eating disorder diagnosis.

Variable	Means (*SD*s) for cultural groups		t-tests	
	EA ($N = 195$)	CA ($N = 197$)	*t*	*p*
Mean (SD)				
Age	28.59 (5.15)	19.25 (3.10)	21.69	< 0.001
BMI	22.96 (4.37)	22.17 (3.34)	2.02	.045
Count			Chi square statistics	
Highest education:			154.51	< 0.001
Primary	1	3		
Secondary	118	14		
Undergraduate	75	102		
Postgraduate	3	76		
Employment status:			159.84	< 0.001
Working Full-time	80	4		
Working part-time	56	69		
Unemployed	33	2		
Student	26	122		
Marital Status:			78.30	< 0.001
Single	96	134		
In a relationship	31	61		
Married	64	2		
Else	4	0		
Sexual Orientation:			10.53	.015
Heterosexual	166	183		
Homosexual	10	6		
Bisexual	17	4		
Other	2	4		
Eating Disorder Diagnosis:			1.01	.314
Yes	10	15		
No	185	182		

Note: EA = East-Asian, CA = Caucasian-Australian.

Table 2
Group Differences for Modelled Variables.

Variable	Unadjusted Means (*SD*s) for cultural groups		ANCOVA statistics	
	EA ($N = 195$)	CA ($N = 197$)	F (1, 385)	*p*
Appearance-based rejection-sensitivity	17.21 (8.62)	14.66 (7.58)	1.00	.317
ToM-decoding	70.56 (11.01)	76.89 (9.93)	35.75	<0.001
Schemas				
Abandonment	1.22 (1.64)	0.61 (1.21)	22.64	<0.001
Mistrust/Abuse	1.39 (1.80)	0.51 (1.06)	30.12	<0.001
Social Isolation	1.30 (1.82)	0.68 (1.37)	8.53	.004
Defectiveness/Shame	0.62 (1.34)	0.42 (1.16)	3.78	.052
Unrelenting Standards	2.06 (1.85)	1.99 (1.92)	0.51	.476
Binging/purging	7.93 (6.95)	6.60 (7.05)	0.73	.394
Food restriction	1.50 (1.39)	1.47 (1.39)	0.07	.798
Body Dissatisfaction	16.91 (7.02)	16.61 (7.52)	0.00	.962

Note: EA = East-Asian, CA = Caucasian-Australian.
Tests control for age, BMI, relationship status, work status, and educational attainment.

3.3. Model analysis

3.3.1. Invariance testing

The unconstrained model provided adequate fit for the data; $\chi^2_{(df=60)} = 118.65$, $p < 0.001$, CFI = 0.926, SRMR = 0.056, RMSEA = 0.071. Forcing cross-cultural equality constraints on model parameters resulted in statistically and practically significant decline in

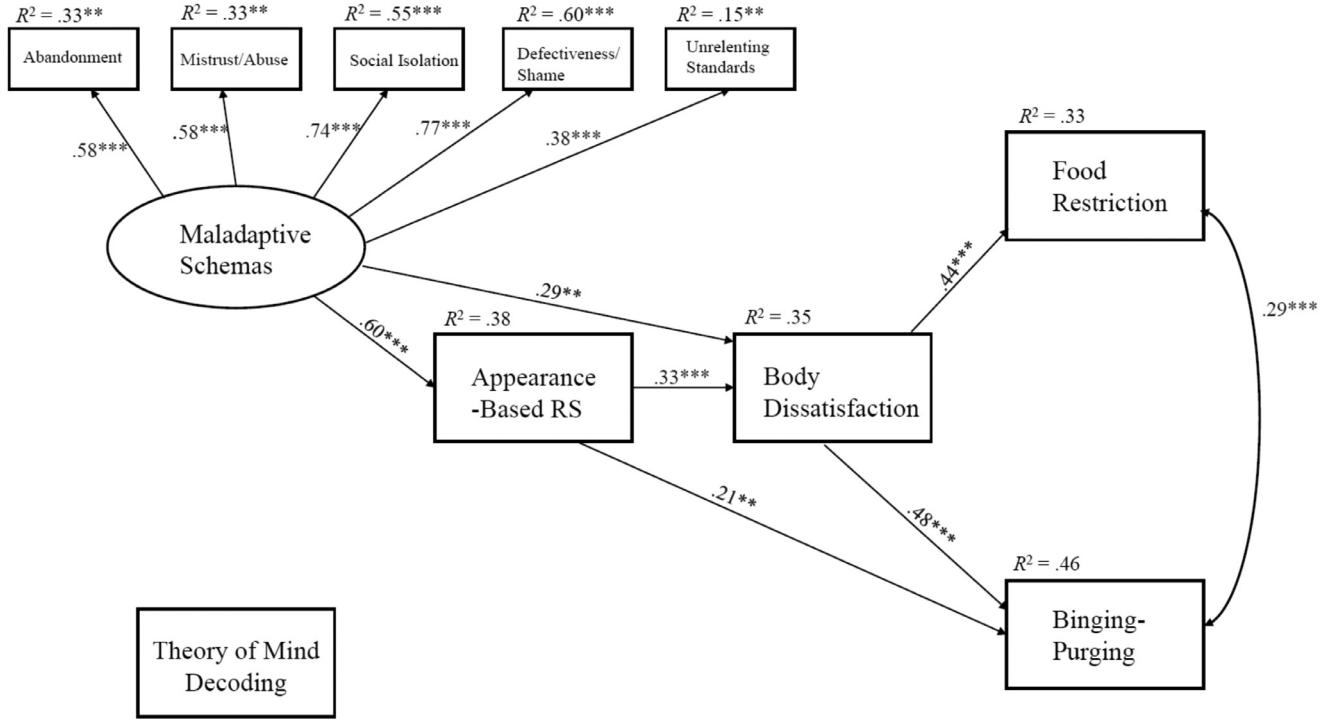

Fig. 2. Model results for the Caucasian-Australian group.
Note: Age, BMI, relationship status, educational attainment and work status are included as covariates for all DVs in the model (but omitted from figure for simplicity). The model also only outlines significant pathways for simplicity reasons.

model fit; $\Delta\chi^2_{(df=13)} = 45.22$, $p < 0.001$, $\Delta CFI = 0.041$.

Subsequent analyses at the level of individual groups revealed that the proposed model provided acceptable fit for both groups: $\chi^2_{(df=51)} = 83.939$, $p = .003$, CFI = 0.936, SRMR = 0.053, RMSEA = 0.057 for the Caucasian-Australian group; and $\chi^2_{(df=51)} = 63.389$, $p = .114$, CFI = 0.967, SRMR = 0.046, RMSEA = 0.035 for the East-Asian group. However, forcing equality constraints led to worsening fit when attempting a single model for Caucasian-Asian and East-Asian groups ($\Delta\chi^2_{(df=34)} = 69.086$, $p < 0.001$, $\Delta CFI = 0.039$). Inspection of modification indices suggested the bases for failed invariance were diffuse, and hence analyses were terminated at this step instead of attempting partial invariance. Model parameters are therefore reported separately for each group below.

3.3.2. Model pathways

The final group models, with standardised regression weights and squared multiple correlations notated, are presented in Figs. 2 (Caucasian), and 3 (East-Asian) below, along with indirect effects in Table 3.

3.3.2.1. Caucasian-Australian group. For the Caucasian-Australian group, the proposed model accounted for 38% variance in appearance-based rejection-sensitivity, 35% in body dissatisfaction ($p < .001$), 46% in binge/purge symptoms ($p < .001$), and 33% in food restriction ($p < .001$). Appearance-based rejection-sensitivity was significantly predicted by maladaptive schemas ($b = 0.60$, $p < 0.001$). Body dissatisfaction was predicted by maladaptive schemas ($b = 0.29$, $p = .005$) and appearance-based rejection-sensitivity ($b = 0.33$, $p < .001$). Binge/purge symptoms were predicted by body dissatisfaction ($b = 0.48$, $p < .001$) and appearance-based rejection-sensitivity ($b = 0.21$, $p = .005$). Food restriction was predicted by body dissatisfaction ($b = 0.44$, $p < .001$). Binge/purge and food restriction were also significantly related ($b = 0.29$, $p < .001$).

The following mediating effects were found: (1) the effects of maladaptive schemas on body dissatisfaction and binge/purge symptoms were mediated by appearance-based rejection-sensitivity; (2) body dissatisfaction mediated the appearance-based rejection-sensitivity → binge/purge, the maladaptive schemas → binge/purge, appearance-based rejection-sensitivity → food restriction, and maladaptive schemas → food restriction relationships; and (3) complex indirect pathways from maladaptive schemas to binge/purge and food restriction via appearance-based rejection-sensitivity and then body dissatisfaction.

3.3.2.2. East-Asian group. Finally, in the East-Asian group, appearance-based rejection-sensitivity was significantly predicted by maladaptive schemas ($b = 0.45$, $p < .001$) and ToM-decoding ($b = -0.16$, $p = .008$). Body dissatisfaction was significantly predicted by appearance-based rejection-sensitivity ($b = 0.47$, $p < .001$). Binge/purge symptoms were significantly predicted by maladaptive schemas ($b = 0.27$, $p = .005$), body dissatisfaction ($b = 0.20$, $p = .007$), and ToM-decoding ($b = -0.21$, $p = .001$). Food restriction was predicted by body dissatisfaction ($b = 0.19$, $p = .011$). In total, 25% variance was explained in appearance-based rejection-sensitivity ($p < .001$), 28% in body dissatisfaction ($p < .001$), 30% in binge/purge symptoms ($p < .001$), and 12% in food restriction ($p = .002$).

Several mediating effects were found: (1) appearance-based rejection-sensitivity mediated the maladaptive schemas → body dissatisfaction and ToM-decoding → body dissatisfaction relationships; (2) body dissatisfaction mediated the appearance-based rejection-sensitivity → binge/purge and appearance-based rejection-sensitivity → food restriction relationships; and (3) complex indirect pathways from maladaptive schemas to binge/purge and food restriction via appearance-based rejection-sensitivity and then body dissatisfaction.

4. Discussion

This study sought to examine new dimensions of the disordered eating literature. First, a new interpersonal model of disordered eating was proposed, whereby appearance-based rejection-sensitivity mediated the relationships that maladaptive schemas and ToM-decoding

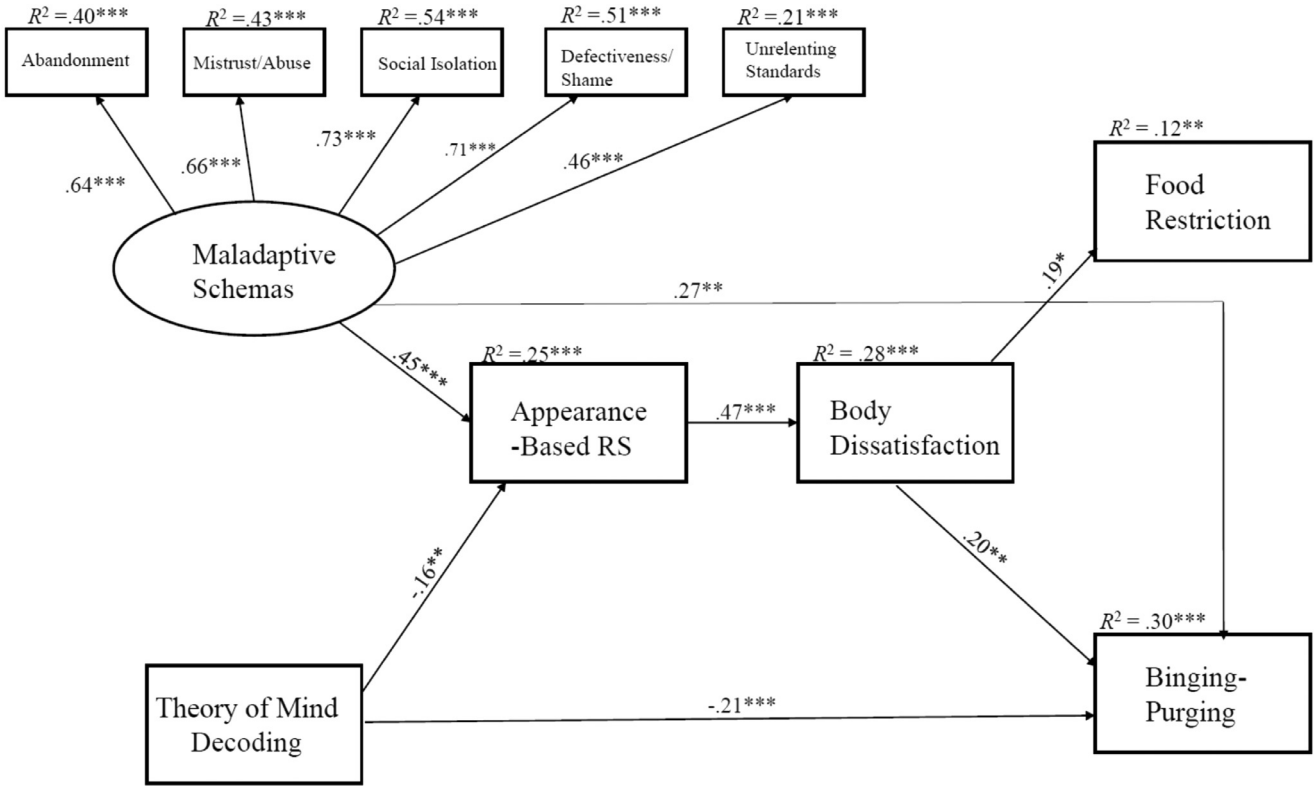

Fig. 3. Model results for the East-Asian group.
Note: Age, BMI, relationship status, educational attainment and work status are included as covariates for all DVs in the model (but omitted from figure for simplicity). The model also only outlines significant pathways for simplicity reasons.

Table 3
Indirect Pathways of the Maladaptive Schemas through Appearance-based rejection-sensitivity to Body Dissatisfaction, Binging/Purging, and Food Restriction.

Pathway	EA (N = 195) b	CI	CA (N = 197) b	CI
Schemas → A-RS → BD	**.21**	.12, 0.31	**.20**	.10, 0.33
ToM → A-RS → BD	**−0.07**	−0.14, −0.02	.01	−0.03, 0.06
A-RS → BD → B/P	**.09**	.02, 0.18	**.15**	.06, 0.25
Schemas → A-RS → B/P	.05	−0.02, 0.13	**.13**	.05, 0.23
Schemas → BD → B/P	−0.01	−0.05, 0.02	**.14**	.04, 0.25
Schemas → A-RS → BD → B/P	**.04**	.01, 0.09	**.09**	.04, 0.16
ToM → A-RS → B/P	−0.02	−0.06, 0.01	.01	−0.02, 0.04
ToM → BD → B/P	.01	−0.02, 0.03	.02	−0.03, 0.08
ToM → A-RS → BD → B/P	−0.02	−0.04, 0.00	.01	−0.01, 0.03
A-RS → BD → FR	**.09**	.02, 0.18	**.14**	.06, 0.25
Schemas → A-RS → FR	.04	−0.03, 0.13	.06	−0.05, 0.17
Schemas → BD → FR	−0.01	−0.05, 0.02	**.13**	.04, 0.24
Schemas → A-RS → BD → FR	**.04**	.01, 0.08	**.09**	.04, 0.16
ToM → A-RS → FR	−0.02	−0.06, 0.01	.00	−0.01, 0.04
ToM → BD → FR	.00	−0.02, 0.03	.02	−0.03, 0.08
ToM → A-RS → BD → FR	−0.01	−0.04, 0.00	.01	−0.01, 0.03

Note: Schemas = maladaptive schemas, A-RS = appearance-based rejection-sensitivity, BD = body dissatisfaction, B/P = binging/purging, FR = food restrictiion. EA = East-Asian, CA = Caucasian-Australian. Bolded figures are significant ($p < .05$).
Tests control for age, BMI, relationship status, work status, and educational attainment.

have with disordered eating attitudes and behaviours. This model was then tested amongst two culturally distinct groups (Caucasian-Australians and East-Asians), to determine whether the relationships within it are culturally bound. It was shown that the model explained variance in body dissatisfaction, food restriction, and binging/purging behaviours in the Caucasian Australian group, but less so in the East-Asian group. The findings of the current study therefore show that this new interpersonal model of disordered eating is potentially valuable in Western cultures, but that culture is important for these interpersonal factors of disordered eating.

4.1. The interpersonal model of disordered eating

Invariance testing showed that while fit of the proposed model was acceptable for each group separately, the modelled associations differed in magnitude between the cultural groups. This finding corroborates the growing body of literature that indicates cultural context is an important consideration when looking at factors of disordered eating (for review see Holmqvist and Frisen, 2010).

The model explained more variance in the Caucasian-Australian group for both binging/purging behaviours (46% of variance explained), and the food restricting behaviours (29% of variance explained); compared to the East-Asian group for whom only 25% and 9% of variance was explained for binging/purging and food restriction respectively. These findings indicate that the relationships shown between these factors in Western-based research may not replicate in non-western cultures; a concern that has been voiced by many but heeded by few (e.g. Henrich et al., 2010).

Path analysis showed that appearance-based rejection-sensitivity mediated the relationship between maladaptive schemas and body dissatisfaction in both cultural groups; and the path from maladaptive schemas to binging/purging and food restriction via body dissatisfaction in both groups. In the Caucasian-Australian group, appearance-based rejection-sensitivity also mediated the direct relationship between maladaptive schemas and binging/purging behaviours. These findings therefore are in line with the proposed theory that appearance-based rejection-sensitivity may mediate the effect maladaptive schemas have on disordered eating attitudes and behaviours; building upon previous findings that have shown links between social anxiety,

appearance-based rejection-sensitivity and disordered eating (Linardon et al., 2017); and building our understanding of how appearance-based rejection-sensitivity might develop.

Conversely, the only ToM-decoding relationship that was mediated by appearance-based rejection-sensitivity was between ToM-decoding and body dissatisfaction in the East-Asian group. This may help to explain previous findings that East-Asian participants are more susceptible to experiencing rejection after ambiguous social stimuli than their Caucasian-Western counterparts (Koelkebeck et al., 2015).

The direct effects explained comparatively little of the overall significant effect, as only five direct effects were significant; maladaptive schemas to body dissatisfaction in the Caucasian-Australian group; ToM-decoding to binging/purging behaviours in the East-Asian group; and maladaptive schemas to binging/purging in the East-Asian group. In summary, appearance-based rejection-sensitivity mediated a) the relationship between maladaptive schema and eating restriction fully in both groups; b) the relationship between maladaptive schema and binging/purging fully in the Caucasian-Australian group; and c) the relationship between ToM-decoding and eating restriction fully in the East-Asian group.

4.1.1. Underlying cultural differences

Overall, the model proposed seemed to work for the Caucasian-Australian group, but not the East-Asian group. These findings reflect a cultural disjunction, where the tested interpersonal factors are likely to be related to higher scores on disordered eating factors in the Caucasian-Australian group, but not in the East-Asian group. A closer look at the literature reveals that this pattern is not unique to this study. For example, in studies that showed *no* significant difference in disordered eating behaviour between Caucasian-Australian and East-Asian samples, the East-Asian samples often scored higher on the predictive factors being measured in the study, such as interpersonal distrust and social insecurity (Jennings et al., 2006) and fear of losing control over eating and weight gain (Mond et al., 2010). Even research that found East-Asian participants showed *lower* disordered eating symptomology than their Caucasian counterparts found that the East-Asian participants reported higher rates of predictive factors, such as appearance self-schema, body image, and self-esteem (Jung, 2006). These findings appear to indicate a disjunction between predictive factors and actual eating behaviour in East-Asian cultures, and the present study corroborates this pattern.

There are two possible explanations for this cultural disjunction. One explanation is that individuals in East-Asia exhibit important protective factors that shield them from the effects of factors such as the factors assessed in our interpersonal model. Accordingly, some studies have stated that ethnicity, in and of itself, is a protective factor against disordered eating symptoms (Rakhkovskaya and Warren, 2014; Warren et al., 2005). Alternatively, it is possible that the factors we assessed are not as predictive of disordered eating in Asian cultures as they are in Western cultures. Should this be the case, the present findings are evidence that factors which have been found important in disordered eating in the West may not be as relevant to disordered eating in East-Asia. Empirical testing is required to determine which of these options best explains the patterns of findings.

4.2. Main effect of cultural context on the focal variables

The East-Asian participants scored significantly higher than the Caucasian-Australian group on three of the maladaptive schemas: *abandonment, mistrust/abuse,* and *social isolation*. There were no significant group differences on the *defectiveness/shame* or *unrelenting standards* measures. As previous findings have shown that East-Asian participants score higher than Western-Caucasians on measures of maladaptive schemas (Baranoff et al., 2006), the difference between the East-Asian and Caucasian-Australians in this study was unsurprising. A theory of *relational mobility* has been found to explain cultural differences in sensitivity to social rejection (Sato et al., 2014), which could possibly also be attributable to the five maladaptive schemas commonly found in individuals with eating pathology (e.g. Cooper et al., 2006; Deas et al., 2011; Leung and Price, 2007). Relational mobility is the concept that in East-Asian countries, relationships are stable and exclusive (low relational mobility), making social rejection difficult to recover from; whereas in Western countries rejection is easier to recover from, as individuals have more viable social connections (high relational mobility; Falk et al., 2009).

On the ToM-decoding task, the Caucasian-Australian group scored significantly higher than the East-Asian group. These findings contradict previous analyses which show that ToM-decoding is an inherent adult ability (Koelkebeck et al., 2011), which therefore should not be affected by culture. Such cultural differences theoretically should have been related to higher scores on the disordered eating variables for the East-Asian participants, as they showed both more maladaptive schemas and lower ToM-decoding scores than the Caucasian-Australian group (Bora and Kose, 2016; Mącik and Sas, 2015). However, there were no significant group differences in body dissatisfaction, binging/purging, or food restriction, between any of the groups. While not congruent with the other findings, these non-significant differences seem to corroborate the literature that shows no cultural differences in disordered eating attitudes and behaviours (Jennings et al., 2006; Mond et al., 2010).

Additionally, there were no significant group differences between the cultural groups in appearance-based rejection-sensitivity, indicating that appearance-based rejection-sensitivity may be equal across East-Asian and Caucasian-Australian cultural contexts. As previous findings have shown East-Asian cultures experience greater rejection-sensitivity (Garris et al., 2011; Sato et al., 2014), this finding also validates the need to separate appearance-based rejection-sensitivity from general rejection sensitivity in cultural analyses, as the factors appear to behave differently transculturally.

4.3. Limitations

Several study limitations warrant consideration. Primarily, there were significant demographic differences (age, BMI, education, employment, and marital status) between the East-Asian group and the Australian group, which could have confounded the effects of cultural context on the measured variables. We did however control all our group-comparison analyses for these sociodemographic variables. Additionally, two thirds of the East-Asian participants came from the Philippines, while other East-Asian countries were poorly represented. This imbalance between countries meant the findings could not be generalised to East-Asia, but also that the results cannot be attributed to one country.

Secondly, it is possible that the differences found on the ToM-decoding task were influenced by language barriers. Previous research has shown that group differences on the RME (whereby Asian participants score lower on the Asian-RME than Caucasian participants on the Caucasian-RME) disappear when English proficiency is controlled for (Bjornsdottir and Rule, 2016). The current East-Asian cohort's English language proficiency may have influenced the current findings, despite attempts to prevent this through provision of synonyms for the emotion labels and including English proficiency as an inclusion criterion. Adding to this, as research on the factors included in this study is limited in the East-Asian populations sampled, the validity of these measures was mainly based on studies undertaken with Caucasian samples. Furthermore, the Asian-RME task consists of Japanese face stimuli, while the current participants were largely from the Philippines. While there is currently no other variations of the RME task, making the Japanese version the most appropriate, this could have negatively affected participants performance on the task.

Adding to the complications of the ToM-decoding task, is the fact that no information about participants potential psychiatric disorders,

aside from disordered eating (which was not significantly different between the two groups), was taken. As many psychiatric disorders have been shown to affect ToM performance, such information may have affected the present data, particularly given the different recruitment methods employed for the two populations.

Finally, it should be mentioned that the women in the two groups had different incentives for participating in the study, with the Caucasian-Australian group receiving course credits, whereas the East-Asian women getting paid for their participation. It is possible that the monetary incentive lead to a higher motivation and commitment in the East-Asian sample to accurately respond to the questions, compared to the Caucasian-Australian sample.

4.4. Implications and future research

The present findings have important theoretical and practical implications. Theoretically, the contrasting cultural findings (standard across cultures for some factors and relationships; but non-standard across other factors and relationships) show how critical it is to consider cultural context in eating disorder research. Future models should be tested in different cultural settings before their findings can be generalised. Practically, the current findings may point towards a focus on early detection of maladaptive schemas and appearance-based rejection-sensitivity in preventative efforts of disordered eating, for individuals from both East-Asian and Caucasian-Australian backgrounds. Additionally, a focus on ToM-decoding may be insightful when looking to prevent disordered eating in East-Asian cultures.

This area of research is ripe for future study. A comparison of this new model between a clinical and non-clinical population; or experimental manipulation of appearance-based rejection-sensitivity, would contribute to our understanding of the causality amongst the pathways explored above. As previously mentioned, further investigation into potential protective factors in East-Asian cultures could also inform future preventative strategies.

5. Conclusion

Overall, the interpersonal model of disordered eating tested in this study explained variance in disordered eating attitudes and behaviours for both cultural groups, most powerfully for the Caucasian-Australian group. Appearance-based rejection-sensitivity mediated the relationship between maladaptive schemas and disordered eating attitudes and behaviours in both Australian and East-Asian cultural contexts; but the involvement of ToM-decoding seems to be culturally bound to East-Asia. Combined, the findings demonstrate the importance of cultural context in disordered eating research and practice.

Conflict of interests

The authors named on this article have no conflicts of interest.

Acknowledgements

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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