

# Social network media exposure and adolescent eating pathology in Fiji

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## Background

Mass media exposure has been associated with an increased risk of eating pathology. It is unknown whether indirect media exposure – such as the proliferation of media exposure in an individual's social network – is also associated with eating disorders.

## Aims

To test hypotheses that both individual (direct) and social network (indirect) mass media exposures were associated with eating pathology in Fiji.

## Method

We assessed several kinds of mass media exposure, media influence, cultural orientation and eating pathology by self-report among adolescent female ethnic Fijians ( $n=523$ ). We fitted a series of multiple regression models of eating pathology, assessed by the Eating Disorder Examination Questionnaire (EDE-Q), in which mass media exposures, sociodemographic characteristics and body mass index were entered as predictors.

## Results

Both direct and indirect mass media exposures were associated with eating pathology in unadjusted analyses, whereas in adjusted analyses only social network media exposure was associated with eating pathology. This result was similar when eating pathology was operationalised as either a continuous or a categorical dependent variable (e.g. odds ratio OR = 1.60, 95% CI 1.15–2.23 relating social network media exposure to upper-quartile EDE-Q scores). Subsequent analyses pointed to individual media influence as an important explanatory variable in this association.

## Conclusions

Social network media exposure was associated with eating pathology in this Fijian study sample, independent of direct media exposure and other cultural exposures. Findings warrant further investigation of its health impact in other populations.

## Declaration of interest

None.

Eating disorders are associated with substantial morbidity and mortality;<sup>1</sup> the World Health Organization (WHO) has designated them a global priority area within adolescent mental health.<sup>2</sup> Evidence that migration, urbanisation, acculturation and modernisation elevate risk for eating disorders<sup>3,4</sup> raises concern about their contribution to the burden of disease in low-resource populations. Ecological, historical and cross-national comparative population data cumulatively support an association between modern and/or Western social contexts and eating pathology,<sup>5,6</sup> and suggest mechanisms by which cultural exposures increase risk. Major theoretical models propose a central role for social norms – established, in part, through the mass media – promoting 'thin ideals' and appearance-based social comparison as aetiological and maintaining mechanisms.<sup>6–8</sup>

There is strong empirical support for the adverse impact of visual mass media on several adolescent behavioural health outcomes.<sup>9</sup> In addition, both correlational and experimental data, in aggregate, support the association of mass media exposure with body dissatisfaction and eating pathology. Although experimental data have demonstrated a small to moderate effect of mass media exposure on body image disturbance and disordered eating,<sup>10–12</sup> these findings reflect only the measured immediate impact of direct media exposure. Because cumulative and collateral effects that characterise naturalistic media consumption have not been measured, laboratory-based findings very likely underestimate the true effects of media on eating pathology. Similarly, correlational studies relating media consumption to body image and disordered eating do not measure indirect media exposures. Given consensus that media consumption affects body image and eating pathology at least partly by internalisation of a 'thin ideal',<sup>6,7,13</sup> social network media exposure conceivably influences adolescent behaviour independently of direct exposure, through

imitation and social learning.<sup>8,14</sup> Indeed, peer conversations may be critical to the uptake of media-based values.<sup>15,16</sup> However, little is known about the dynamics of media influence within social networks and the potential indirect impact of media exposure on eating pathology remains relatively unexplored.<sup>12</sup>

Given the global access to visual mass media, there are compelling reasons for understanding the scope of, and mechanisms for, its effects on health behaviours. Naturalistic studies of media consumption are desirable but may be limited in demonstrating measureable impact when there is relative saturation of media exposure within a study population.<sup>17</sup> Indeed, there are few opportunities to examine media impact in populations that vary in their media access. In Fiji's indigenous population, however, broadcast television only became available in the mid-1990s and household ownership of television varies substantially among communities. Previous research in Fiji has supported the impact of mass media exposure on disordered eating there. Narrative data also identified the potential influence of indirect exposure to media, through social interaction with television-exposed peers.<sup>18,19</sup> The primary objective of this study was to test hypotheses that both direct and indirect television exposure would be associated with eating pathology in a Fijian study population with comparatively short-term and heterogeneous exposure to visual mass media.

## Method

### Study site

Fiji was selected as a study site for its unique combination of geopolitical and sociocultural attributes conducive to a naturalistic study of the relation of mass media and other

Western/global cultural exposures to eating pathology. Notwithstanding Fiji's lengthy duration of European contact, initiated in the 17th century and later followed by British colonisation, cession, independence and membership of the Commonwealth, large sectors of Fiji's indigenous population have retained their core political, social and cultural traditions. Approximately half of Fiji's population is ethnic Fijian, who recognise Melanesian and Polynesian cultural heritage. Notably, robust shape and large body size were the cultural ideal for men and women through at least the 1980s.<sup>20</sup> Moreover, although ethnographic and clinical data suggest that eating disorders were either rare or non-existent in this indigenous population prior to rural electrification and the introduction of broadcast television, recent reports suggest that disordered eating and weight management behaviours may have subsequently become more prevalent among ethnic Fijian girls and women.<sup>18,19,21</sup> Located in the tropical Western Pacific, Fiji's largest industry is tourism. Although the communications and transportation infrastructure has developed rapidly in coastal Fiji over the past decade, remote areas in the region of the study site still lacked electricity, cell phone reception, television, and/or internet access when data were collected in 2007. Many interior areas also lack paved roads. Thus the region's population, although unified by their shared linguistic and cultural heritage, varies widely in exposure to television, internet and print media.

### Study participants

The study population comprised school-going ethnic Fijian adolescent girls, ages 15–20, enrolled in forms 3–6 of all the 12 secondary schools registered and identified within a single administrative region by the Fiji Ministry of Education. The study sample ( $n = 523$ , a 71% response rate) was recruited and assessed in 2007.

### Study procedures

Participants completed a battery of self-report questionnaires in the language of their choice – either English, the language of formal instruction, or the local vernacular Fijian – during proctored sessions at their respective schools. Study staff measured their height and weight on the same day. Following the initial data collection, a subsample of participants ( $n = 81$ ) completed the same self-report questionnaires within approximately 1 week for assessment of test–retest reliability. An independently selected subsample responded to structured interviews to assess clinical impairment attributable to eating pathology ( $n = 215$ ). Further details of study procedures and of these assessments are reported elsewhere.<sup>22</sup> Parental or guardian written informed consent and participant written assent were obtained from each participant and the study protocol was approved by the Fiji National Research Ethical Review Committee (FN-RERC), the Partners Human Research Committee and the Harvard Medical School Committee on Human Studies.

### Study measures

Self-report measures were translated into the local vernacular Fijian language by a bilingual native speaker, edited for syntax, and back-translated into English by a bilingual scholar of Fijian languages. The back-translated and original versions were compared and then edited to achieve consistency, clarity and idiomatic accuracy across the two versions. Primary ethnic identity was assessed by self-report.

### Eating pathology

Eating pathology was assessed with a version of the Eating Disorder Examination Questionnaire (EDE–Q) adapted for this study population. The EDE–Q global score, a dimensional summary score of current eating pathology based on 28 items comprising 4 subscales,<sup>23</sup> demonstrated adequate reliability and validity in both English and Fijian language versions for ethnic Fijian adolescent girls.<sup>24</sup> In our primary analyses, eating pathology was measured as a continuous variable (range: 0–6), with a higher score indicative of more severe eating pathology. We also analysed eating pathology as a dichotomous variable. Because no cut-off point for clinical relevance of the EDE–Q has been established in this study population, we defined a high EDE–Q global score as being in the upper quartile of the sample (global score  $\geq 2.41$ ) for this analysis. The validity of this *a priori* cut-off point was established through comparison of mean scores between the two groups on the Clinical Impairment Assessment (CIA),<sup>25</sup> a measure of impairment due to eating pathology that has acceptable validity adapted as a structured interview in this study population.<sup>22</sup> Mean CIA scores for each group were based upon scores from the subsample of respondents who completed this structured interview as described above.

### Mass media influence

We measured media influence on individuals with the Sociocultural Attitudes Towards Appearance Questionnaire (SATAQ–3).<sup>13</sup> The SATAQ–3 is a 30-item measure of media influence upon endorsement of social appearance norms that includes subscales reflecting internalisation, pressures and information from media sources. For the purpose of the current study, a composite score was created from the mean of 23 items that showed adequate internal consistency ( $\alpha = 0.90$ ) and test–retest reliability in the study sample (intraclass correlation coefficient, ICC = 0.80).

### Mass media exposures

We developed four measures of mass media exposure for this study: two assessed direct, or individual, exposure and the remaining two measured indirect, or social network, exposure. Direct mass media exposure was operationalised as weekly frequency of personal television or video viewing (personal television viewing frequency) and level of personal access to mass media through household ownership of electronic media goods (household electronic media access index). Indirect mass media exposure was operationalised as weekly frequency of parental television viewing (parental television viewing frequency) and perceived social network density of household television, video deck or DVD ownership (social network media exposure).

- (a) Personal television viewing frequency: television exposure was assessed with a single Likert-style item asking the respondent to indicate the number of evenings per week, on average, mostly spent viewing television or videos (response range from 0 to 7). One-week test–retest reliability was adequate as indicated by an ICC = 0.69.
- (b) Household electronic media access index: household access to electronic mass media was assessed by self-reported affirmation that selected electronic devices were present in the current residence: (i) television and/or video; (ii) CD player or MP3 player; (iii) internet access; and (iv) mobile phone. From these responses, we developed an index of household access to electronic mass media goods with values ranging from 0 to 4, with higher scores indicating access to

a greater number of modalities of media exposure. One-week test–retest reliability was adequate as measured by an ICC = 0.78.

- (c) Parental television viewing frequency: this was assessed with a single Likert-style item asking the respondent to indicate the number of evenings per week, on average, the participant's parents spent mostly viewing television; response range from 0 to 7. One-week test–retest reliability was adequate as indicated by an ICC = 0.75.
- (d) Social network media exposure: we assessed social network exposure to visual mass media by calculating the mean of two Likert-style items (with values ranging from '1: none of them' to '4: all of them') asking respondents how many of their closest friends and how many of the girls at their respective schools have home access to a television, video deck or DVD player. Higher scores indicate a greater degree of household media viewing access within a respondent's social network and, by extension, higher potential for indirect media exposure. This measure had adequate internal consistency ( $\alpha = 0.67$ ) and test–retest reliability (ICC = 0.60).

Pearson correlation coefficients among the four measures of mass media exposure ranged from  $r = 0.12$  to  $r = 0.39$  ( $P$ -values all  $< 0.01$ ), indicating that these constructs are related, but not isomorphic.

#### Cultural exposures and cultural orientation

As television exposure in Fiji over the decade preceding the study was concurrent with rapid economic and social changes in the context of globalising communications and trade, we evaluated several additional kinds of cultural exposures and characteristics as potential confounders. For this study, we used composite measures to assess two key dimensions of cultural orientation and engagement: 'Western/global' (here, encompassing ideas, values, practices and products associated with a global, transnational culture with largely Western historical roots); and 'ethnic Fijian' (encompassing contemporary indigenous cultural traditions and norms). Development and psychometric evaluation of these composite measures is discussed elsewhere.<sup>4</sup> We also assessed three proxies for Western/global cultural exposures in addition to mass media, including lifetime personal overseas travel, family overseas travel to earn income over the past 12 months, and peri-urban school location. Finally, because cultural dissonance is a purported risk factor for eating pathology in migrant populations,<sup>26</sup> we measured respondents' perceived conflict with their parents due to a Westernised lifestyle with a Likert-style question (anchored with 1: no difficulty at all and 10: extreme difficulty; ICC = 0.24).

#### Anthropomorphic measurements

We measured height with a portable stadiometer to the nearest millimetre and weighed each study participant in light clothing without shoes on a portable electronic scale to the nearest 0.2 kg. We calculated body mass index (BMI; as weight in kg/height in  $m^2$ ) after subtracting 0.5 kg from each weight measurement to correct for estimated weight of clothing and rounding measured height values to the nearest centimetre.

#### Data analyses

Missing data were handled as follows. For the EDE–Q and CIA we followed the authors' recommendations for evaluating scoreability and imputation of missing data.<sup>23,25</sup> For other scales that are computed as the mean of multiple items, we computed scale

scores as long as at least 75% of the items were complete. For forced choice assessments about key cultural exposures (e.g. overseas travel and household presence of electronic media devices), we coded affirmative responses as exposed, or present, and negative, uncertain, and missing responses as unexposed or absent. This procedure resulted in a complete sample of 503 participants, which served as the analytic sample for the current study.

#### Analyses of mass media exposures and eating pathology

We conducted regression analyses of eating pathology using both linear regression for the continuous EDE–Q scores and logistic regression for the dichotomy between the upper quartile versus the remaining quartiles of the EDE–Q. First, we fitted a linear regression model including the four covariates representing mass media exposures, other covariates that were associated with eating pathology in preliminary bivariate analyses ( $P < 0.10$ ), and theoretically important potential confounders (age, BMI and urban proximity of school location). This model allowed us to identify mass media exposures that were independently related to eating pathology, while controlling for important confounders. Next, we investigated whether mass media influence (as measured by the modified SATAQ–3) explains the association between mass media exposure and eating pathology. We tested this hypothesis by examining whether media exposures significantly predicted SATAQ–3 scores, and then by adding SATAQ–3 scores to the models for eating pathology and examining whether the coefficients for media exposures were attenuated. We used the same analytic strategy in logistic regression analyses of the dichotomous EDE–Q score. Analyses were performed with SAS 9.1 using Windows XP.

## Results

### Participant characteristics

Characteristics of the sample are presented in Table 1. The mean BMI was  $23.9 \text{ kg/m}^2$ , with a range from  $15.9$  to  $38.8 \text{ kg/m}^2$ . With respect to eating pathology, the mean EDE–Q global score was 1.69 (seventy-fifth percentile 2.41). The median value for the EDE–Q global score was 1.58; the lowest-quartile scores ranged from 0 to 0.81; the second quartile from 0.81 to 1.58; the third quartile from 1.58 to 2.41; and the highest (upper) quartile from 2.41 to 5.20. High EDE–Q scores (i.e. scores in the upper quartile) were associated with greater clinical impairment than scores in the lower three quartiles. The unadjusted mean CIA score among participants in the upper quartile of EDE–Q was 16.35, compared with a mean CIA score of 8.97 among participants in the lower three EDE–Q quartiles ( $P < 0.001$ ).

The analytic sample reflects a broad distribution of Western/global cultural exposures (Table 1). For example, approximately half of the participants attended school in an urban or peri-urban location and half in a rural location. Although only 11% of respondents had personally travelled overseas (outside of Fiji), 40% reported that a parent or sibling had travelled overseas within the past year to earn money. With respect to household access to media, 3% of respondents lived in a household with all four of the electronic items assessed, whereas 12.5% had none of these four items. Television ownership among respondents' households ranged from 7.7% in a rurally located school to a high of 85.5% in a peri-urban school location. The majority of respondents (71.8%) reported that 'most' or 'all' of the girls at their school live in a home with a TV, video deck, and/or DVD player, whereas 4.6% reported that 'none' of them did. On average, respondents spent three evenings a week viewing TV, and the mean frequency

**Table 1** Characteristics of the sample (n = 503)

Characteristic	
Demographic and anthropomorphic characteristics	
Age, years: mean (s.d.)	16.70 (1.10)
Urban school location, n (%)	256 (50.89)
Body mass index, kg/m <sup>2</sup> : mean (s.d.)	23.93 (3.32)
Media exposures, mean (s.d.)	
Personal television viewing frequency, evenings/week	3.05 (2.17)
Household electronic media access index score	2.12 (1.09)
Parental television viewing frequency, evenings/week	2.66 (2.32)
Social network exposure to media	2.84 (0.76)
Cultural exposures, n (%)	
Family member overseas travel	202 (40.16)
Personal overseas travel	57 (11.33)
Media influence, mean (s.d.)	
SATAQ-3 (modified 23-item composite) score	3.00 (0.62)
Eating pathology, mean (s.d.)	
EDE-Q global score	1.69 (1.06)
SATAQ-3, Sociocultural Attitudes Towards Appearance Questionnaire; EDE-Q, Eating Disorder Examination Questionnaire.	

of personal television viewing was higher than for parental viewing. Most respondents reported at least one evening of television viewing per week (88.3%) on average, but 11.7% of respondents reported watching TV zero evenings per week.

**Identifying predictors of eating pathology**

Bivariate associations between each of the four types of mass media exposure measured and greater eating pathology were uniformly positive (shown in Tables 2 and 3, first columns respectively). With the exception of personal viewing frequency in the logistic regression model for the upper quartile of EDE-Q, these associations were statistically significant at the  $P < 0.10$  level. Body mass index, Western/global cultural

orientation and family member overseas travel each met our criterion for retention in both multivariable regression models. In contrast, ethnic Fijian cultural orientation was associated only with lower eating pathology measured as a continuous outcome, and personal overseas travel was associated only with greater eating pathology operationalised as a dichotomous, upper-quartile outcome. Neither urban location nor reported conflict with parents relating to Westernisation was significantly related to eating pathology in these two analyses.

We examined the intercorrelations between measures of mass media exposures and both BMI and cultural composite measures to ensure that we avoided including covariates in the regression analyses that were redundant with one another. Correlations of measures of media exposures with composite variables measuring Western/global and ethnic Fijian cultural orientation were in the expected direction but small, ranging from  $r = 0.05$  to  $r = 0.10$  and  $r = -0.04$  to  $r = -0.19$ , respectively. Correlations between measures of media exposures and BMI were also small, ranging from  $r = 0.04$  ( $P = 0.35$ ) to  $r = 0.09$  ( $P = 0.04$ ).

**Is media exposure an independent predictor of eating pathology?**

Social network media exposure was independently associated with greater eating pathology in both linear and logistic regression models ( $B = 0.15$ , 95% CI 0.04–0.27 and odds ratio (OR) = 1.60, 95% CI 1.15–2.23, respectively, shown in the second column of Tables 2 and 3). Indeed, it was the sole cultural exposure covariate that predicted eating pathology in both models. The magnitude of the linear regression coefficient (0.15), approximately one-fifth of a standard deviation of the social network media exposure measure coefficient, is modest but probably not inconsequential. In contrast, other measures of media exposure did not independently contribute to eating pathology in either of these fully adjusted models.

In addition to BMI, which was an independent predictor of eating pathology in each of these models, other cultural exposures

**Table 2** Linear regressions of Eating Disorder Examination Questionnaire (EDE-Q) global scores

	Bivariate associations between each covariate and EDE-Q scores <sup>a</sup>		Multiple linear regression model for EDE-Q <sup>b</sup>		Multiple linear regression model for EDE-Q testing mediation of SATAQ-3 <sup>b</sup>	
	Coefficient	95% CI	Coefficient	95% CI	Coefficient	95% CI
Demographic and anthropomorphic characteristics						
Age	0.10*	0.01 to 0.18	0.01	-0.07 to 0.08	0.00	-0.07 to 0.08
Body mass index	0.15***	0.12 to 0.17	0.14***	0.11 to 0.16	0.13***	0.11 to 0.16
Urban school location	0.08	-0.11 to 0.26	-0.12	-0.30 to 0.05	-0.12	-0.29 to 0.04
Media exposures						
Personal television viewing frequency	0.04(*)	-0.00 to 0.08	-0.01	-0.05 to 0.03	-0.02	-0.06 to 0.02
Household electronic media access index	0.10*	0.01 to 0.18	-0.00	-0.09 to 0.08	-0.01	-0.09 to 0.07
Parental television viewing frequency	0.05*	0.01 to 0.09	0.03	-0.01 to 0.07	0.02	-0.02 to 0.06
Social network media exposure	0.23***	0.10 to 0.35	0.15*	0.04 to 0.27	0.10(*)	-0.01 to 0.21
Cultural orientation and exposures						
Western/global cultural orientation composite	0.28***	0.18 to 0.38	0.20***	0.11 to 0.30	0.13**	0.03 to 0.22
Ethnic Fijian traditional cultural orientation composite	-0.08*	-0.15 to -0.02	-0.08*	-0.14 to -0.02	-0.05	-0.11 to 0.01
Family member overseas travel	0.22*	0.03 to 0.41	0.13	-0.04 to 0.31	0.14(*)	-0.02 to 0.31
Personal overseas travel	0.23	-0.06 to 0.52				
Parent-respondent perceived conflict relating to Westernisation	0.01	-0.01 to 0.04				
Media influence						
SATAQ-3 (modified 23-item)					0.41***	0.27 to 0.55
SATAQ-3, Sociocultural Attitudes Towards Appearance Questionnaire.						
a. Linear regression coefficients, along with 95% confidence intervals, obtained from separate models for each covariate.						
b. Linear regression coefficients obtained from a single linear regression model.						
(*) $P < 0.10$ , * $P < 0.05$ , ** $P < 0.01$ , *** $P < 0.001$ .						

**Table 3** Logistic regressions of Eating Disorder Examination Questionnaire (EDE-Q) highest-quartile scores

	Bivariate associations between each covariate and upper-quartile EDE-Q scores <sup>a</sup>		Multiple logistic regression model for upper-quartile EDE-Q scores <sup>b</sup>		Multiple logistic regression model for upper-quartile EDE-Q testing mediation of SATAQ-3 <sup>b</sup>	
	OR	95% CI	OR	95% CI	OR	95% CI
Demographic and anthropomorphic characteristics						
Age	1.15	0.96 to 1.38	1.05	0.85 to 1.30	1.05	0.84 to 1.30
Body mass index	1.30***	1.21 to 1.40	1.29***	1.20 to 1.39	1.28***	1.19 to 1.38
Urban school location	1.23	0.82 to 1.84	0.77	0.47 to 1.24	0.77	0.47 to 1.25
Media exposures						
Personal television viewing frequency	1.06	0.96 to 1.16	0.98	0.88 to 1.09	0.96	0.86 to 1.08
Household electronic media access index	1.21(*)	1.00 to 1.47	0.99	0.77 to 1.26	0.97	0.76 to 1.24
Parental television viewing frequency	1.09(*)	1.00 to 1.18	1.07	0.96 to 1.19	1.06	0.95 to 1.18
Social network media exposure	1.70***	1.28 to 2.26	1.60**	1.15 to 2.23	1.47*	1.05 to 2.05
Cultural orientation and exposures						
Western/global cultural orientation composite	1.48**	1.16 to 1.89	1.23	0.95 to 1.61	1.11	0.84 to 1.46
Ethnic Fijian traditional cultural orientation composite	0.89	0.77 to 1.03				
Family member overseas travel	1.57*	1.05 to 2.36	1.38	0.86 to 2.21	1.43	0.88 to 2.32
Personal overseas travel	2.07*	1.16 to 3.68	2.05*	1.05 to 4.00	2.09*	1.05 to 4.16
Parent-respondent perceived conflict relating to Westernisation	1.04	0.99 to 1.11				
Media influence						
SATAQ-3 (modified 23-item)					2.04***	1.35 to 3.08

SATAQ-3, Sociocultural Attitudes Towards Appearance Questionnaire.  
a. Odds ratios (ORs), along with 95% confidence intervals, obtained from separate models for each covariate.  
b. Odds ratios, along with 95% confidence intervals, obtained from a single logistic regression model.  
(\*)  $P < 0.10$ , \* $P < 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$ .

were significantly associated with greater eating pathology while controlling for other sociodemographic characteristics. Western/global cultural orientation was associated with greater eating pathology ( $B = 0.2$ , 95% CI 0.11–0.30) and ethnic Fijian traditional cultural orientation with less eating pathology ( $B = -0.08$ , 95% CI  $-0.14$  to  $-0.02$ ) in the fully adjusted regression model with eating pathology measured as a continuous outcome. In contrast, neither of these was associated with eating pathology in our model with a dichotomous (upper-quartile) outcome, whereas personal travel overseas was significantly associated with greater eating pathology in this latter model (OR = 2.05, 95% CI 1.05–4.00).

### The role of individual media influence

Correlations between measures of media exposures and individual media influence measured by the modified SATAQ-3 ranged between  $r = 0.14$  to  $r = 0.23$  (all  $P < 0.01$ ), consistent with the hypothesised relation between media exposure and individual media influence. Table 4 presents the results of a linear regression model in which the modified SATAQ-3 score was the dependent variable, and measures of media exposures and cultural orientation were entered as predictors. In this model, social network exposure to mass media was independently associated with media influence ( $B = 0.13$ , 95% CI 0.06–0.20), as was greater Western/global cultural orientation ( $B = 0.19$ , 95% CI 0.13–0.25). In contrast, greater ethnic Fijian cultural orientation was associated with significantly lower media influence ( $B = -0.07$ , 95% CI  $-0.11$  to  $-0.04$ ).

The final step in these analyses involved adding modified SATAQ-3 scores to the adjusted linear and logistic regression models. Results of these analyses are shown in the third columns of Tables 2 and 3, respectively. In these models, modified SATAQ-3 scores were associated with both significantly greater mean EDE-Q scores ( $B = 0.41$ , 95% CI 0.27–0.55) and higher odds of being in the upper EDE-Q quartile (OR = 2.04, 95% CI 1.35–3.08). Moreover, the magnitude of the association between

social network media exposure and eating pathology was attenuated after adjusting for media influence in each of these models. In the model predicting eating pathology with EDE-Q global scores as a continuous measure, this relation was no longer statistically significant. In the model with upper-quartile EDE-Q scores as the dependent variable, the odds ratio and 95% confidence interval support an association that remained statistically significant, albeit reduced (OR = 1.47, 95% CI 1.05–2.05). This attenuation is consistent with our hypothesis that individual media influence explains part of the association between social network media exposure and individual eating pathology.

**Table 4** Multiple linear regression analysis of personal media influence measured by the modified Sociocultural Attitudes Towards Appearance Questionnaire (SATAQ-3)<sup>a</sup>

	Coefficient	95% CI
Demographic and anthropomorphic characteristics		
Age	0.01	-0.04 to 0.06
Body mass index	0.01	-0.00 to 0.03
Urban school location	0.00	-0.11 to 0.11
Media exposures		
Personal television viewing frequency	0.02	-0.01 to 0.04
Household electronic media access index	0.02	-0.03 to 0.07
Parental television viewing frequency	0.02	-0.01 to 0.04
Social network media exposure	0.13***	0.06 to 0.20
Cultural orientation and exposures		
Western/global cultural orientation composite	0.19***	0.13 to 0.25
Ethnic Fijian cultural orientation composite	-0.07***	-0.11 to -0.04

a. Multiple linear regression model of the modified 23-item SATAQ, with media exposures and measures of cultural orientation entered as predictors.  
\*\*\* $P < 0.001$ .

## Discussion

We observed a significant association between social network mass media exposure and eating pathology in ethnic Fijian school-going adolescent girls. This finding appears robust, as supported by the association of social network media exposure with eating pathology when operationalised as either a continuous or dichotomous measure, and after adjusting for age, BMI, urban location, cultural orientation and overseas travel. Although both direct and indirect mass media exposures were associated with elevated eating pathology in unadjusted analyses, only social network media exposure was associated with a higher level of eating pathology in our fully adjusted models. Our results augment existing empirical support for the impact of mass media exposure on increased risk for eating pathology.<sup>10–12</sup> Although consistent with the prevailing sociocultural model for the relation between media exposure and disordered eating, mediated in part by individual media influence,<sup>6</sup> our finding, that indirect exposure to media content may be even more influential than direct exposure in this particular social context, is novel.

Previous research has examined the impact of direct exposure as well as of specific media content, but has not investigated whether the context of mass media exposure – that is, whether it is direct versus indirect – is differentially related to health outcomes. This gap may result from methodological challenges inherent to the diffuse exposure to media characterising many populations, so that a design strategy reliant on between-individual variation is inadequate to relate an exposure to outcome by comparing risk across individuals.<sup>27</sup> This ethnic Fijian study population, however, provides a unique naturalistic setting with heterogeneous media exposure that enables observation of the relation of between-individual differences in social network media exposure to eating pathology.

### Study limitations

Our cross-sectional design precludes causal inference, a limitation that is particularly germane for studies relating media exposure to risk behaviour, since it has been argued that weight and shape concerns characteristic of eating pathology measured in this study may drive mass media consumption.<sup>8</sup> However, this argument may be a less likely explanation for the association of indirect exposure to eating pathology than it is for individual viewing behaviour. That is, girls plausibly exert some control over direct exposure (i.e. their own viewing behaviour), but they have comparatively little, if any, control over their indirect exposure (i.e. their parents', friends' and school peers' mass media consumption). Although it is conceivable that girls with greater eating pathology might gravitate to media-savvy friends who validate their weight and shape concerns,<sup>28</sup> it is unlikely that they substantively influence the household media access of their school peers.

Second, our measure of indirect media exposure assesses perceived – rather than actual – degree of household television access among same-gender peers. Although this perception of peer behaviour is subjective, we suggest that it is an informative and relevant measure of indirect media exposure. In support of its construct validity, we found that perceived social network television household access was moderately correlated ( $r=0.36$ ,  $P<0.001$ ) with the calculated prevalence of households with a television within each school. Our measures of media exposure also did not allow examination at a more granular level regarding what elements of media content (e.g. ideas, specific images, marketing) are relevant to eating pathology, although the scope

of media influence is unlikely to be fully appreciated by consumers.<sup>9,16</sup>

Next, the local clinical relevance of our categorical measure of eating pathology, based upon sample upper-quartile global EDE–Q scores, is not fully established for Fijian youth. However, the EDE–Q is a widely accepted and gold-standard measure of disordered eating and has demonstrated construct validity as a dimensional measure of eating pathology in this study sample. Moreover, the mean EDE–Q score falling into the upper quartile was associated with significantly greater clinical impairment in our study sample; the mean CIA score in this quartile also exceeded the value of the best cut-off point for determining eating disorder case status described elsewhere.<sup>25</sup>

Finally, although our sample was representative of adolescent school-going ethnic Fijian girls in Fiji, findings are not necessarily generalisable to study populations in other cultural settings or at different developmental stages. That is, cognitive and social developmental processes that characterise adolescence<sup>29</sup> may enhance vulnerability to peer mediation of mass media exposures among school-age youth. In addition, the relations among media influence, body size, body satisfaction and weight control behaviours may be uniquely culturally patterned in Fiji.<sup>30</sup> For example, there is considerable culturally based interest and vigilance for appetite and weight changes in Fiji, and forthright comments on body size are both common and socially acceptable there.<sup>20</sup> Cultural traditions, moreover, that value consensus and conformity may amplify the relative impact of social network media exposure in this Fijian study population. Finally, peers may be especially likely to shape the impact of mass media exposure in populations undergoing acculturation, as a strategy for adaptation<sup>31</sup> to rapidly shifting social norms and in the context of economic pressures.<sup>32</sup> Further research will be necessary to replicate these findings, to relate them prospectively to eating pathology and to understand their relevance to populations beyond Fiji.

### Implications

Our study findings are consistent with previous reports that mass media consumption has an adverse impact on eating pathology. These findings are novel, however, in supporting the possibility that indirect media exposure – operationalised in this study as peer social network exposure – may also promote risk for eating pathology. They also complement previous research that has established peer and family-mediated influences as risk factors for eating disorders.<sup>6,33,34</sup> Therefore, they augment other empirical data that suggest that not only cultural context, but also social network, influence risk for eating disorders.

Notwithstanding the unique geopolitical and cultural characteristics of this study population, important commonalities with youth in regions undergoing rapid economic or social transition suggest the relevance of these findings to populations beyond Fiji in understanding vulnerability for eating disorders. Such empirical data on social determinants of mental illness are urgently required to address health risks and inequities associated with globalisation.<sup>35</sup> These data, moreover, have implications for understanding the adverse impact of media exposure on adolescents across diverse cultural contexts. Indeed, our findings are consistent with the central role of both media and peer influence as described in major theoretical models for the pathogenesis and maintenance of eating disorders<sup>7,8</sup> but they also suggest the impact of previously unmeasured indirect media exposure on eating pathology. Notably, our finding that social network media exposure is associated with eating pathology resonates with empirical evidence that health behaviours relating

to obesity may be spread by social ties,<sup>36</sup> with data linking social network and individual eating attitudes and behaviours,<sup>34</sup> and with concerns that the indirect impact of media exposure may be substantial.<sup>12</sup> In addition to suggesting that social network media exposure may be an appropriate target for intervention, there are potential health and social policy implications raised by identification of second-hand health risk.<sup>37</sup> For example, efforts to address the recent degradation of nutritional health in Pacific Island countries might expand to scrutinise the effects not just of culturally Western food products,<sup>38</sup> but also of transnational mass media imports that may promote unhealthful behaviours. Importantly, if second-hand exposure to media content is, indeed, harmful to children, as this study supports, then the recommendation to parents to limit screen time<sup>9</sup> may be inadequate to protect children from the risk imposed by their social milieu. Further research on the health impact of social network media exposure on youth in other populations is warranted to address the optimal scope of intervention.

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Poems  
by  
doctors

## Vincent

Julian Leff

I, Vincent Van Gogh, born in Groot Zundert,  
where men grow pale like roots beneath the ground  
and visions are luxuries,  
brought my visions to Arles,  
where they sucked the light from the sky,  
danced through the orchards like blossom,  
and spun the moon-stars from their orbits  
in the dark-blue nights.  
I stared like some great flower at the sun  
and saw its burning image everywhere,  
torching the cornfields to a flaring gold.  
I felt I had to grasp familiar things,  
my smoke-charred pipe, my yellow chair,  
a pair of boots, the postman's honest face.  
But still the fury rose relentlessly,  
writhed upwards like the twisted cypresses,  
and seized and tore my unprotesting body.  
Then did I see the sadness that lies coiled  
like a grey snake at the root of things.  
The haunted corridors, the avenues of tragic trees.  
I found refuge in the kindly doctor's house,  
but I knew that some day  
in a solitary field of corn  
the black crows would gather in my skull  
and peck out my mind.

Julian Leff graduated in psychiatry at the Maudsley Hospital in 1967. For the next 35 years he worked as a researcher and a psychiatrist, taking consultant responsibility for 12 admission beds. His main interest was in psychosis, both schizophrenia and bipolar disorder. He has a long-standing interest in art, with a particular focus on what is called 'Outsider Art'. He attended adult education classes in experimental sculpture, silk-screen printing and silversmithing. He has acted as a judge in three national art competitions for people with schizophrenia, and is currently chair of the steering committee for a trial of art therapy for schizophrenia.

Chosen by Femi Oyeboode.

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