Published in final edited form as:
Int J Eat Disord. 2014 November ; 47(7): 727–737. doi:10.1002/eat.22349.

Globalization and eating disorder risk: Peer influence, perceived social norms, and adolescent disordered eating in Fiji

Margaret E. Gerbasi, Ph.D.[1,*], **Lauren K. Richards, M.A**[2,*], **Jennifer J. Thomas, Ph.D.**[3,4], **Jessica C. Agnew-Blais, Sc.D.**[6], **Heather Thompson-Brenner, Ph.D.**[2], **Stephen E. Gilman, Sc.D.**[5,6,7], and **Anne E. Becker, M.D., Ph.D., S.M.**[1,3,4,7]

[1]Department of Global Health and Social Medicine, Harvard Medical School

[2]Department of Psychology, Boston University

[3]Eating Disorders Clinical and Research Program, Massachusetts General Hospital

[4]Department of Psychiatry, Harvard Medical School

[5]Department of Social and Behavioral Sciences, Harvard School of Public Health

[6]Department of Epidemiology, Harvard School of Public Health

[7]Department of Psychiatry, Massachusetts General Hospital

Abstract

Objective—The increasing global health burden imposed by eating disorders warrants close examination of social exposures associated with globalization that potentially elevate risk during the critical developmental period of adolescence in low- and middle-income countries (LMICs). The study aim was to investigate the association of peer influence and perceived social norms with adolescent eating pathology in Fiji, a LMIC undergoing rapid social change.

Method—We measured peer influence on eating concerns (with the Inventory of Peer Influence on Eating Concerns; IPIEC), perceived peer norms associated with disordered eating and body concerns, perceived community cultural norms, and individual cultural orientations in a representative sample of school-going ethnic Fijian adolescent girls (n=523). We then developed a multivariable linear regression model to examine their relation to eating pathology (measured by the Eating Disorder Examination-Questionnaire; EDE-Q).

Results—We found independent and statistically significant associations between both IPIEC scores and our proxy for perceived social norms specific to disordered eating (both p <.001) and EDE-Q global scores in a fully adjusted linear regression model.

Discussion—Study findings support the possibility that peer influence as well as perceived social norms relevant to disordered eating may elevate risk for disordered eating in Fiji, during the critical developmental period of adolescence. Replication and extension of these research findings in other populations undergoing rapid social transition—and where globalization is also influencing local social norms—may enrich etiologic models and inform strategies to mitigate risk.

[*]Each of these authors contributed equally to this study

Evidence supports an increasingly broad distribution of eating disorders around the world. Global Burden of Disease Study data, moreover, demonstrate that the health burden associated with eating disorders (measured in all ages disability-adjusted life years) has increased by 65.7% over the last two decades, between 1990 and 2010.[1] This substantial percent increase exceeds those reported for any other mental disorder during the same timeframe except for opioid use disorders. Given that prevalence estimates for eating disorders appear stable for high-income populations[2,3] their increasing global health burden suggests the possibility that eating disorders have become more prevalent in populations residing in low and middle-income countries and, in turn, raises questions about which social exposures may be driving an increased risk over the past 20 years. Advancing an understanding of the impact of shifting social norms in low resource regions undergoing rapid social change in the context of globalizing commerce and communications platforms may enrich etiologic models for the pathogenesis of eating disorders while also informing strategies to mitigate such risks. However, a robust literature examining the health effects of acculturation supports that the impacts of Western cultural exposures on eating disorder risk are quite heterogeneous across diverse populations.[4] Therefore, discernment of generalizable or common pathways through which the local socio-cultural environment contributes to risk is desirable. Broadly speaking, putative sociocultural factors contributing to risk relate to a high valuation of slenderness; both the mass media and peer interactions have been implicated as vectors for this impact.[5,6,7,8] Given that adolescence is a time when peer influences become more salient to the adoption of risk behaviors,[9] it is a developmental phase of critical importance to understanding how the impact of globalization on eating disorder risk might be mediated through peer interactions and shifting social norms.

Study findings in North American and other traditionally Western societies such as the UK, Europe, Australia and New Zealand have supported potential contributions of peer influence to risk for body dissatisfaction and disordered eating. These include a recent prospective study of female adolescents in the United States, which demonstrated that friends' self-reported dieting behavior predicted engagement in disordered eating behavior 5 years later, controlling for baseline symptoms.[10] Outside of the United States, direct associations between peer influence on eating and body image concerns and both body dissatisfaction and disordered eating have been reported in Tanzanian,[11] Chinese,[12,13,14,15] Japanese,[16] and Chilean[17] female adolescent and young adult samples. A number of studies have sought to identify the mechanisms underlying the association between peer norms and disordered eating by testing hypotheses that either peer selection or socialization are key drivers.[18,19,20,21,22]

Though multiple sources of data suggest that peers influence risk for an eating disorder among adolescents, the mechanisms of this influence—and how it may mediate social exposures associated with globalization—are incompletely understood. Research on sociocultural influences on eating disorders has focused on the mediating power of individuals' personal beliefs, such as internalization of a thin body ideal.[23] In contrast, other research on shifting social norms suggests that changes in the social norms for behavior have a direct influence on others, even while beliefs may remain stable. For example, following interventions targeting issues as diverse as school-based harassment in the U.S. and reconciliation after ethnic violence in Rwanda, social interactions such as group

discussion resulted in redefined social norms and changes in behavior such as increased reporting of harassment, and increased cooperation and negotiation about shared resources, while personal beliefs and attitudes remained stable.[24,25] Furthermore, the most important influence on the individual may be his or her perception of the social norm and other individuals' behavior, as opposed to their actual behavior. For example, recent data suggest that informing individuals about their neighbors' reduced energy consumption has a direct influence on their own energy consumption regardless of beliefs about the importance of energy conservation.[26] Likewise, other research supports that *perceived* peer normative behavior may be more closely related to adolescent behavior than is actual peer behavior.[9]

Arguably, the influence of social norms may be particularly salient during adolescence, when the importance of social success and social conformity within a defined community has developmental implications. A better understanding of how local perceived social norms impact risk for eating pathology during adolescence may illuminate the drivers of the increasing global health burden of eating disorders and aid in the development of culturally informed and effective interventions for at-risk adolescents. The pressing need for mental health research relevant to children and adolescents in low- and middle-income countries—where approximately 90% of the world's children and adolescents live—has been identified as a global mental health priority at the highest levels as has research identifying modifiable social risk factors across the life course.[27,28,29] Youth in indigenous populations, moreover, are particularly exposed to social adversities—including those associated with social change—that can undermine mental health.[30]

In this paper, we examine the relation of Western cultural orientation, peer influence, and perceived social norms to eating pathology among adolescent girls residing in Fiji. Fiji, an archipelago located in the Western Pacific, has undergone rapid economic development over the past several decades, resulting in increasing exposure to Western values and products. Evidence for shifting norms for body size ideals in Fiji offers perspective on the impact of social exposures relating to globalization on eating and weight concerns. Previous research findings from Fiji that support a rise in disordered eating over time[31,32,33,34] are consistent with the potential impact of changing social norms on risk. For example, Western cultural orientation has been found to be associated with increased risk—and ethnic Fijian traditional cultural orientation with decreased risk—for eating pathology as measured by higher Eating Disorder Examination-Questionnaire (EDE-Q) global scores among ethnic Fijian adolescent girls.[33] Further evidence that secondhand exposure to media through peers is associated with eating pathology in Fijian adolescents[33] also suggests a means by which peers may influence uptake of culturally novel attitudes and behaviors introduced by Western-based media content. A study investigating the impact of Western television (including programming from North America, Australia, and New Zealand) on disordered eating among indigenous Fijian females found that participants endorsed ways in which television overwrote traditional values favoring large body size. Importantly, this study suggested a peer role in the transmission of Western cultural values related to television exposure, finding that participants felt affected by peer opinion of what was admirable in television characters.[35]

Therefore, the central aim of this study was to evaluate the association of peer influences and perceived social norms with disordered eating in Fiji, in order to explore a potential explanatory mechanism for the impact of globalization more broadly on eating disorder risk in adolescents residing in low- and middle-income countries. We hypothesized that three exposures would be associated with greater eating pathology: (1) relatively greater peer influence; (2) perceived peer norms for prevalent disordered eating behaviors; and (3) perceived community Western cultural norms. Finally, we also examined a post-hoc hypothesis that peer influence and perceived social norms may partially mediate the relation between Western cultural orientation and eating pathology.

METHODS

Study data were collected in 2007 as part of a school-based study examining the impact of rapid social transition on eating pathology and other health risk behaviors among ethnic Fijian adolescent girls. A cross-sectional design was used. A detailed description of the study methods has been previously published.[36]

Study Sample

The study population consisted of all available ethnic Fijian adolescent girls, ages 15–20, enrolled in Forms 3–6 (grades 9–12) in all 12 secondary schools identified by Fiji's Ministry of Education as located within a single administrative region. The final study sample comprised 523 girls who met eligibility criteria, agreed to participate, and provided written informed assent and parental informed consent (71% response rate). Psychometric evaluation of assessments and assessment of risk correlates of eating pathology was a component of a study protocol that was approved by the Fiji National Research Ethical Review Committee, the Partners Human Research Committee, and the Harvard Medical School Committee on Human Studies.

Translation of study assessments into the local vernacular

The study assessments described below were translated from English into the local Fijian language by a bilingual speaker. After pilot testing, assessments were backtranslated into English by a second bilingual speaker. Original and backtranslated versions were compared; when necessary, adjustments in the Fijian version were made by the study team, in consultation with a scholar of Fijian languages, to enhance alignment with the original version as well as clarity in the Fijian version. The translation procedure is described in greater detail elsewhere.[4]

Study Procedures

After parental informed consent and assent were obtained, study participants responded to self-report assessments during a proctored single session at their school (Time 1). They chose to complete either an English or Fijian language version of the assessment battery and were encouraged to request clarification of the items as needed. To evaluate test-retest reliability, we recruited n=81 participants from three schools representing geographical diversity within the region, who had completed the battery and were present in school when the research team returned within approximately one week (Time 2) to complete the same

assessment a second time. After respondents returned the survey, study staff inspected assessments for missing and double entries on site; when these were identified, respondents were given an opportunity to respond or clarify their intended answers.

Assessments

Eating Disorder Examination-Questionnaire (EDE-Q): The EDE-Q [37] is a 28-item self-report questionnaire that assesses current frequency of bingeing and purging behaviors and attitudinal symptoms over the past 28 days. A global score can be calculated from the mean values for 22 Likert-style items assessing the latter, in the following domains: restraint, eating, weight concerns, and shape concerns for a dimensional measure of eating pathology. For this study we used the EDE-Q global score as a dimensional measure of eating pathology. We have previously shown that the EDE-Q, as adapted for this Fijian study population, demonstrated adequate internal consistency, test-retest reliability, and good construct validity, supporting use of the EDE-Q global score in evaluating eating disorder pathology for this study population.[36]

Individual Cultural Orientation: We assessed self-reported individual orientation to both traditional ethnic Fijian and Western cultures with discrete composite measures of selected contemporary ethnic Fijian cultural traditions and Western values and practices, respectively. These were based on constructs developed and evaluated in a related study in the same study population; a detailed description of measure development and psychometric properties is reported elsewhere.[4] We have also previously established that the relationship between attitudes and behaviors comprising an ethnic Fijian cultural orientation and those comprising a Western/global cultural orientation are neither unidimensional nor orthogonal. Cultural identity in this population has been conceptualized as heterogeneous with multiple complex relationships among dimensions of Western/global and ethnic Fijian orientations.[4] In other words, study participants who endorse a high degree of engagement in ethnic Fijian cultural traditions may also endorse engagement with and participation in Western/global practices and values, and these dimensions are not necessarily mutually exclusive with each other. We have previously published study data relating composite cultural orientation measures to EDE-Q scores in a linear regression model in this study population.[33]

Inventory of Peer Influence on Eating Concerns (IPIEC): The IPIEC is a 30-item Likert-style self-report measure comprising five subscales that assesses the impact of different aspects of peer influence on children's eating and body concerns.[38] For example, items include statements such as "Girls say that I should go on a diet," "I talk with girls about what types of food make people fat," and "I think that girls think I am fat." Response options and their corresponding numeric values are 1("Never"), 2("Almost Never"), 3 ("Not Very Often"), 4 ("Sometimes"), and 5 ("A lot"). The majority of studies using the IPIEC have found significant associations between peer influence and either body image dissatisfaction[39,40] or eating pathology,[41] which supports the construct validity of the IPIEC as a measure of peer influence on disordered eating behaviors and attitudes in children and adolescents. We identified two studies that used the IPIEC or one or more of its subscales in slightly older study samples in the United States, which reported similar validity and reliability data among males and females in 10th grade.[42,43] The IPIEC displayed good

variability in the current sample (see Table 2 for mean and standard deviation), and is comparable to the range observed in the original validation sample.[38] Measures of internal consistency reliability (Cronbach's α) and test-retest reliability (ICC) demonstrated its acceptable reliability in this study population (see Table 2).

Perceived Peer Norms for Disordered Eating (PPNDE): We assessed perceived peer norms for disordered eating attitudes and behaviors with a 10-item measure developed for use in the present study. The PPNDE assesses respondents' perception of how common dieting and disordered eating behaviors are among same sex friends and school peers. In contrast to IPIEC content, which asks the respondent to evaluate or comment on their interactions with peers concerning diet, appearance, weight, and body shape, the PPNDE asks respondents to describe the prevalence of peer engagement in various disordered eating behaviors, and is thus a proxy for perceived peer norms relevant to disordered eating. Study participants responded to each item on a 4-point Likert scale ranging from 1 (none of them) to 4 (all of them). We created a second version of this covariate (PPNDE-SCHOOL) to mitigate the possible influence of friend selection in relating perceived peer norms to eating pathology. This "same sex school peers only" version of the covariate includes only the five items evaluating perceptions of same sex school peers and omits items assessing perceived behaviors among the respondent's "closest friends." Table 2 shows means, standard deviations, internal consistency reliability and test-retest reliability for each of the two versions of this measure. Both versions demonstrated acceptable internal consistency reliability, but the PPNDE showed acceptable test-retest reliability (ICC=.62) whereas the PPNDE-SCHOOL version demonstrated poor reliability (ICC=.53). We thus selected the PPNDE version of the covariate for our final analyses.

Perceived Community Cultural Norms (Western and Traditional Fijian): We assessed perceived community (operationalizing community as comprising school, family, and village domains) cultural norms with six items developed for this study, with three items assessing Westernized and traditional (ethnic Fijian) cultural orientations, respectively (e.g., "How Westernized are girls from your school compared with girls from other schools?"). Study participants responded to each item on a 11-point Likert scale; anchor values were 0 ("Not at all Westernized/traditional") and 10 ("Extremely Westernized/traditional"). Responses to both measures show good variability. Table 2 displays their sample means, standard deviations, and reliability statistics, which indicate that our covariate measuring perceived community Western cultural norms demonstrated acceptable reliability, whereas the covariate relevant to Ethnic Fijian cultural norms did not.

Body Mass Index (BMI): Study staff measured each participant's height and weight using a portable stadiometer to the nearest millimeter and a portable electronic scale to the nearest 0.2 kg. Each participant was weighed in light clothing without shoes. BMI was calculated by dividing each subject's height in m^2 by her weight in kg, after subtracting 0.5 kg from each weight measurement to correct for estimated weight of clothing and rounding measured height values to the nearest centimeter.

Statistical Analyses—The analysis sample for this study excluded observations with incomplete data as follows. For measures of perceived community Western and traditional Fijian cultural norms, age, BMI, and school attended, only participants who responded completely were included in analysis. For the EDE-Q, we followed recommendations for imputing missing data.[33, 36, 37] For the measures of individual cultural orientation, we followed the scale authors' recommendations and computed scale scores if 75% of the items were complete.[33] For the IPIEC and the PPNDE, we calculated a total score only for those participants who responded to at least 90% of the items (518 and 512, respectively). This procedure resulted in an analysis sample of n=507, and n=76 for the retest sample. We assessed reliability by examining internal consistency reliability for all measures with multiple test items with the entire analytic sample as well as test-retest reliability in the analytic retest subsample. Internal consistency reliability was estimated by calculating Cronbach's alphas for EDE-Q global scores, individual Western and Traditional ethnic Fijian cultural orientations, IPIEC, PPNDE, and perceived community cultural norms (Western and traditional ethnic Fijian). Test-retest reliability was estimated by calculating interclass correlation coefficients (ICCs). We assessed the construct validity of selected measures by examining correlations between them.

Multivariable regression models assessing the relation of peer influence on eating and body concern, perceived social norms regarding disordered eating behaviors, and perceived community cultural norms with individual eating pathology: We examined the bivariate relationships between eating pathology, as assessed by the EDE-Q global score, and several theoretically important and/or known confounders and predictors (age, BMI, school—implemented via 11 dummy-coded variables, and individual cultural orientations), as well as IPIEC, PPNDE, and perceived community Western and Fijian cultural norms by individually including each covariate in a separate linear regression model. We retained covariates with $p < .10$ associations with EDE-Q in multivariable regressions. Next, we tested the hypothesis that each type of normative influence independently contributed to eating pathology by comparing (1) a multivariable linear regression model with only age, BMI, school, and individual cultural orientations to (2) a model with all covariates associated with EDE-Q scores in the bivariate analyses. Comparison of the total variance accounted for in the models allows us to assess the independent predictive contribution of these peer influences and perceived social norms.

After evaluating this model, we proceeded to seek support for our post-hoc hypothesis that the influence of Western culture on disordered eating might operate through direct peer influences and perceived social norms. To do this, we first examined mediation of individual Western cultural orientation by the three proxies for peer and normative influence (IPIEC, PPNDE, and perceived community Western cultural norms) by comparing the change in coefficients for individual cultural orientation between models 1 and 2. We then also performed a mediation analysis by conducting a test of indirect effects per Hayes.[44] Though mediation analyses assume temporality between exposure (cultural orientation), mediator (peer influence and perceived social norms), and outcome (EDE-Q), which cannot be established using a cross-sectional design, the extent to which associations between cultural orientation and EDE-Q scores are reduced after accounting for peer influences can arguably

provide an upper bound of the indirect effects of peer influences, and thus provide preliminary evidence regarding mechanisms.

RESULTS

Descriptive Data

Table 1 displays demographic and anthropomorphic characteristics of the analysis sample (n=507), as well as mean individual cultural orientation scores and mean EDE-Q scores. By study design, the age ranged from 15 to 20 years old; the mean age was nearly 17 years old, mean BMI was 23.9 kg/m^2, and approximately half of the respondents attended school in a peri-urban area with the remainder attending a rurally located school. In Fiji, the age of majority is 21 and thus, the developmental range of this school-going study sample was narrow, spanning mid to late adolescence. The mean EDE-Q global score was 1.69, with a range of 0 to 5.20. This mean global score is comparable to mean scores reported in other community-based study populations such as Australian women aged 18–22 (mean=1.59, SD=1.32),[45] as well as to mean scores for U.S. women in college-based populations, a population similarly subject to potentially heightened levels of perceived peer influence and social norms around compensatory weight control (mean=1.74, SD=1.30).[18,46] Descriptive data for peer influence, perceived peer norms for disordered eating, and perceived community cultural norms variables are shown in Table 2. Notably, data support that both community Western and traditional Fijian cultural orientations are endorsed as perceived norms, with values ranging from 0 to 10 on both measures.

Relations among Age and Peer and Normative Influences

Table 2 reports bivariate relationships between age and eating pathology (EDE-Q global score), peer influence (IPIEC score), perceived peer norms (PPNDE), and perceived community Western and traditional Fijian cultural norms. As previously shown in this study sample, and consistent with known peak age of onset for eating disorders, older age was significantly correlated with eating pathology (r= .10, p=.02). In addition, older age was significantly, though weakly related to greater peer influence (r=.09, p=.048), while neither perceived peer norms nor perceived community cultural norms showed a significant relation to age.

Relations among Peer Influence and Perceived Social Norms

Table 2 summarizes tests of reliability for the five constructs measuring peer influence (IPIEC), perceived peer norms for disordered eating (PPDNE), perceived school-peer only norms for disordered eating (PPNDE-SCHOOL), and perceived community Western and traditional Fijian cultural norms and displays results from bivariate correlations among them. As Table 2 shows, IPIEC and PPNDE, the measures of peer influence and perceived peer norms around eating concerns and behaviors, respectively, were only moderately but significantly positively correlated (r=.27, p<.001). Likewise, the IPIEC score and perceived community Western cultural norms were also moderately and significantly positively correlated (r=.20, p<.001). These results support our premise that the key peer constructs used for this study are conceptually related, but not entirely overlapping. As expected, perceived community traditional Fijian cultural norms were unrelated to either of the peer

constructs or to perceived community Western cultural norms (Table 2). Findings also support that perceived school peer norms for disordered eating and perceived community Western cultural norms were distinct constructs (r=.05, p=.25).

Relations among Peer Influence, Perceived Social Norms, and Eating Pathology

Table 3 displays the results of bivariate relations between our covariates of interest and eating pathology as well as two multiple linear regression models that test our hypothesis that peer influence and perceived social norms are independently associated with eating pathology. As seen in Model 1 (Table 3, middle column), previously noted correlates of eating pathology (BMI, individual Western cultural orientation, individual Ethnic Fijian traditional cultural orientation) along with school attended share approximately 28% of their total variance with eating pathology. In this model—and consistent with previously published findings with a similar analytic sample[33]—BMI and individual Western cultural orientation were each independently associated with higher EDE-Q scores, and individual Ethnic Fijian tradition cultural orientation was significantly associated with lower EDE-Q scores. Age was no longer associated with eating pathology independent of BMI, school, and individual cultural orientation.

Next, the addition of self-reported peer influence (IPIEC), perceived peer norms for disordered eating (PPDNE), and perceived community Western cultural norms in Model 2 (Table 3, third column) increases the variance shared between the model covariates and eating pathology by 14%. In particular, both proxies for peer influence on disordered eating (reported peer influence and perceived peer norms relevant to disordered eating) independently predict higher EDE-Q scores. Further, the magnitude of their respective regression coefficients can be interpreted as follows: a one point greater IPIEC score corresponds to a .4 point higher EDE-Q global score. Similarly, a one point greater PPNDE score (or one category difference toward perceived greater prevalence of peer behaviors) corresponds to an EDE-Q global score which is .42 point higher.

Perceived community Western cultural norms remained associated with greater eating pathology, but this relation was only marginally significant in Model 2. Moreover, attenuation of the magnitude and significance of the regression coefficients for individual Western cultural orientation between Model 1 and Model 2 (from .19 to .11) supports that its relation to greater eating pathology is at least partially explained by variation in peer influence, perceived peer norms for disordered eating, and perceived community cultural norms that go along with Western cultural orientation.

Next, we conducted mediation analyses to quantify the extent to which self-reported peer influence (IPIEC), perceived peer norms for disordered eating (PPNDE), and perceived community Western cultural norms contribute to the association between individual Western cultural orientation and eating pathology following procedures suggested by Hayes.[44] Of the overall association between individual Western cultural orientation and eating pathology (B=.19), 42% (B=.08, CI=.03 to .13) is explained by the combined influences of IPIEC, PPNDE, and perceived community Western cultural norms; of these three covariates, self-reported peer influence (IPIEC) demonstrated the strongest indirect effect (indirect effect estimate=.04, CI=.01 to .07; compared with indirect effect estimates of .02; CI=.01 to .05

and .02; CI=.001 to .04 for PPNDE and perceived community Western cultural norms, respectively).

Finally, we performed similar analyses as described above after substituting the "same sex school peers only" version of the PPNDE covariate, given previous research examining the relative impact of peer selection versus socialization on peer influence over disordered eating. Results did not substantially change after removing items specific to the respondent's closest friends; for example, the regression coefficient for the PPNDE-SCHOOL covariate was B= .32 (CI=.16 to .49) in the same multivariable linear regression model.

DISCUSSION

Evidence of the rapid and substantial increase in the global health burden associated with eating disorders raises pressing questions about whether this change may result from increasing pathogenic social exposures, notably those associated with globalizing commerce and communications platforms. Broad empirical support for the influence of peers and mass media on disordered eating, moreover, suggests potential vectors for rapid distribution and uptake of newly introduced risk attitudes and behaviors in the context of economic and social change. Previous research in Fiji, our study site, has supported increasingly prevalent disordered eating there, concomitant with the rapid social and economic development over the past several decades and has established its association with mass media exposure.[31, 32, 33, 34, 35] In this study, we report findings that extend this body of work in understanding the social pathogenesis of disordered eating in this small scale indigenous society, by focusing on the salience of peer influence, perceived peer norms for disordered eating, and perceived community cultural norms.

First, we found a significant and positive association of *peer influence about eating and body concerns* with disordered eating in an ethnic Fijian population. This finding extends the published research on peer influence using the IPIEC (e.g., Sinton & Birch;[39] Vander Wal & Thelen[40]) on disordered eating to the novel cultural setting of a small-scale indigenous society. Our findings are also consistent with previous data from study populations in Latin America, China and Japan suggesting peer influence on eating and body image concerns is associated with disordered eating.[17, 14, 16] Therefore, replication of this finding in a new cultural setting provides additional support for the generalizability of peer influence on disordered eating across diverse social and cultural contexts.

Second, we found an independent and significant positive association of *perceived peer norms* relevant to disordered eating behaviors with greater levels of individual eating pathology. Though understanding of the effects of perceived peer norms on eating pathology is incomplete, existing research suggests that perceived peer norms can have a robust effect on disordered eating. Research conducted across 31 middle and high schools in the U.S. exploring both school-wide dieting norms and perceived dieting norms among friends suggests that unhealthy weight-control behaviors increase as both perceived dieting increases among friends and as school-wide dieting increases for normal and overweight girls.[47] Broader measurement of perceived norms, including perceived family and peer weight norms, combines in a parsimonious model to predict 80% of variance unhealthy

weight-control behaviors in girls and 70% in boys.[48] Perceived weight control-behavior of peers, particularly same-sex friends, predicts the individuals most and least likely to exhibit weight control behavior for males and females, even to a greater extent than BMI.[49] Parsing the effects of prescriptive and descriptive norms may be important, particularly in relation to particular local contexts. In indigenous populations undergoing rapid economic development and social change, the perception of whether attitudes and behaviors are normative may be especially influential when they are locally unprecedented among the parents' generation compared to contexts where social norms are well-established and temporally stable.

Third, although we found a positive association of perceived community Western cultural norms with higher levels of eating pathology, this association was only of marginal significance, suggesting that perceived social norms specific to disordered eating may be more influential than are general Western cultural norms. Further, our findings are consistent with the interpretation that both kinds of disordered eating-specific peer influences may partially mediate the association between individual Western cultural orientation and eating pathology.

Study Limitations

Our results should be interpreted in the context of the following limitations. First, there may be culturally unique dimensions of peer influence that were not captured by the IPIEC scale items, since it was developed in the United States. Second, the cross-sectional nature of the study limits causal inference regarding the directionality of the association between peer influences and perceived social norms and disordered eating. For example, following a plausible interpretation based on selection theory, the hypothesis that girls with disordered eating sought friends with similar symptoms, presents a viable alternative explanation for the direction of influence. In the United States and Australia, research has suggested that girls select friends with whom they share similarities in body attitudes and eating behaviors.[50,51] We also cannot exclude the possibility that respondents were biased by their own eating attitudes and behaviors in reporting how they perceived social norms; notably, previous research has demonstrated that body dissatisfaction predicted perceived peer influence in early adolescent girls.[52] Further research examining peer influence prospectively is therefore necessary to establish a causal relation with eating pathology in this study population. Next, our findings are not necessarily generalizable to culturally distinct populations in other settings. Importantly, the relationships identified among peer influence, perceived peer norms, and perceived community cultural norms may be unique to this study population. In fact, peers may be particularly influential in populations undergoing rapid cultural and social change and concomitant adjustment to fluctuating social norms.[53] Finally, although our analysis is consistent with an explanatory framework positing that peer influence and perceived social norms may partially mediate the impact of Western cultural exposures on eating pathology, our cross-sectional study design does not permit inference about direction of effect.

Conclusion

Study findings support the possibility that peer influence on eating concerns plays an important role in the severity of disordered eating in this small-scale indigenous Pacific society. This peer influence, moreover, may in part be exerted through mediation of Western cultural mores and ideas--possibly by setting and reinforcing novel social norms that value, render culturally permissible, or otherwise promote these recently emerging disordered eating attitudes and behaviors. Despite the unique cultural attributes of the study population, our findings may also inform prevention efforts in populations beyond Fiji and have relevance to interventions aimed at reducing other health risk behaviors. For example, previous research has established cultural orientation as well as peer group influence on other youth risk behaviors.[14,54] Based on this study's findings, reshaping perceptions of socially normative risk behaviors might be explored as a potential strategy for reducing health risk behaviors in other regions as well. In populations such as these, where the emergence of plural ethnic identities in the context of rapid modernization continue to be negotiated,[4] it may be fruitful to explore whether reinforcement of cultural traditions and values and/or building youth capacity to interrogate and critique perceived newly emerging social norms can mitigate their potentially adverse impacts. These study findings also contribute much needed empirical data that address youth mental health in low- and middle-income countries. Indeed, adolescence and early adulthood may be a particularly critical—and opportune—developmental stage for interventions that mitigate the adverse impacts of peer influence on disordered eating and other health risk behaviors.[9,55] Furthermore, in the context of a robust empirical literature identifying peer networks and mass media as social factors associated with elevated risk, these findings hold promise for building a generalizing explanatory model relating the exposures and impacts of globalization to the increased health burden associated with eating disorders.

Acknowledgments

This study was supported by K23 MH068575 (AEB) and a Harvard University Research Enabling Grant (AEB). We gratefully acknowledge the assistance of Dr. Lepani Waqatakirewa, CEO - Fiji Ministry of Health and his team; the Fiji Ministry of Education; the late Joana Rokomatu, *Tui Sigatoka*; Dr. Jan Pryor, Chair of the FN-RERC; Dr. Tevita Qorimasi; Nisha Khan; Asenaca Bainiliku; the late Kesaia Navara; and members of the Senior Advisory Group for the HEALTHY Fiji Study (Health-risk and Eating attitudes and behaviors in Adolescents Living through Transition for Healthy Youth in Fiji Study), including Bill Aalbersberg, Alumita Taganesia, Livinai Masei, Pushpa Wati Khan, and Fulori Sarai. Finally, we thank all the Fiji-based principals and teachers who facilitated the data collection for this study. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health or other consultants. This manuscript development was additionally supported by K23 MH071641 (HTB) and R36MH095395 (LR)

References

1. Murray CJL, Vos T, Lozano R, Naghavi M, Flaxman AD, Michaud C, et al. Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. Lancet. 2010; 380:2197–2223. [PubMed: 23245608]
2. Hoek HW. Incidence, prevalence and mortality of anorexia nervosa and other eating disorders. Curr Opin Psychiatr. 2006; 19:389–394.
3. Smink FRE, van Hoeken D, Hoek HW. Epidemiology of eating disorders: Incidence, prevalence and mortality rates. Curr Psychiatry Rep. 2012; 14:406–414. [PubMed: 22644309]

4. Becker AE, Fay K, Agnew-Blais J, Guarnaccia PM, Striegel-Moore RH, Gilman SE. Development of a measure of 'acculturation' for ethnic Fijians: Methodologic and conceptual considerations for application to eating disorders research. Transcult Psychiatry. 2010; 47:454–488.
5. Grabe S, Ward LM, Hyde JS. The role of the media in body image concerns among women: a meta-analysis of experimental and correlational studies. Psychol Bull. 2008; 134:460–76. [PubMed: 18444705]
6. Groesz L, Levine MP, Murnen SK. The effect of experimental presentation of thin media images on body satisfaction: a meta-analytic review. Int J Eat Disord. 2002; 31:1–16. [PubMed: 11835293]
7. Levine MP, Murnen SK. "Everybody knows that mass media are/are not [pick one] a cause of eating disorders": a critical review of evidence for a causal link between media, negative body image, and disordered eating in females. J Soc Clin Psychol. 2009; 28:9–42.
8. Stice E. Risk and maintenance factors for eating pathology: A meta-analytic review. Psychol Bull. 2002; 128:825–848. [PubMed: 12206196]
9. Brechwald WA, Prinstein MJ. Beyond homophily: A decade of advances in understanding peer influence processes. J Res Adolsc;. 2011; 21:166–79.
10. Eisenberg ME, Neumark-Sztainer D. Friends' dieting and disordered eating behaviors among adolescents five years later: Findings from Project EAT. J Adolescent Health. 2010; 47:67–73. 2010.
11. Hennessey, M.; Thompson-Brenner, H. Unpublished Manuscript. 2008.
12. Jackson T, Chen H. Risk factors for disordered eating during early and middle adolescence: Prospective evidence from mainland Chinese boys and girls. J Abnorm Psychol. 2011; 120:454–464. [PubMed: 21319924]
13. Xu X, Mellor D, Kiehne M, Ricciardelli LA, McCabe MP, Xu Y. Body dissatisfaction, engagement in body change behaviors and sociocultural influences on body image among Chinese adolescents. Body Image. 2010; 7:156–164. [PubMed: 20089467]
14. Lam TH, Lee SW, Fung S, Ho SY, Lee PWH, Stewart SM. Sociocultural influences on body dissatisfaction and dieting in Hong Kong girls. European Eat Disord Rev. 2009; 17:152–160. [PubMed: 18792894]
15. Jackson T, Chen H. Predicting changes in eating disorder symptoms among Chinese adolescents: A 9-month prospective study. J Psychosom Res. 2008; 64:87–95. [PubMed: 18158004]
16. Yamamiya Y, Shroff H, Thompson KJ. The tripartite influence model of body image and eating disturbance: A replication with a Japanese sample. Int J Eat Disord. 2008; 41:88–91. [PubMed: 17968899]
17. Caqueo-Urizar A, Ferrer-Garcia M, Toro J, Gutierrez-Maldonado J, Penaloza C, Cuadros-Sosa Y, Galvez-Madrid MJ. Associations between sociocultural pressures to be thin, body distress, and eating disorder symptomatology among Chilean adolescent girls. Body Image. 2011; 8:78–81. [PubMed: 21147054]
18. Crandall CS. Social contagion of binge eating. J Pers Soc Psychol. 1988; 55:5888–5898.
19. Myer C, Waller G. Social convergence of disturbed eating attitudes in young adult women. J Nerv Ment Dis. 2001; 189:114–119. [PubMed: 11225684]
20. Gilbert N, Meyer C. Similarity in young women's eating attitudes: Self-selected versus artificially constructed groups. Int J Eat Disord. 2004; 36:213–219. [PubMed: 15282691]
21. Zalta AK, Keel P K. Peer influence on bulimic symptoms in college students. J Abnorm Psychol. 2006; 115:185–189. [PubMed: 16492110]
22. Rayner KE, Schniering CA, Rapee RM, Taylor A, Hutchinson D M. Adolescent girls' friendship networks, body dissatisfaction, and disordered eating: Examining selection and socialization processes. J Abnorm Psychol. 2012; 122:93–104. [PubMed: 22867115]
23. Striegel-Moore RH, Bulik CM. Risk factors for eating disorders. American Psychologist. 2007; 62:181–98. [PubMed: 17469897]
24. Paluck EL. Reducing intergroup prejudice and conflict using the media: A field experiment in Rwanda. J Pers Soc Psychol. 2009; 96:574–587. [PubMed: 19254104]
25. Paluck EL, Shepard H. The salience of social referents: A field experiment on collective norms and harassment behavior in a school social network. J Pers Soc Psychol. 2012; 103:899–915. [PubMed: 22984831]

26. Allcott H. Social norms and energy consumption. Journal of Public Economics,. 2011; 95:1082–1095.
27. Kieling C, Baker-Henningham H, Belfer M, Conti G, Ertem I, Omigbodun O, Rohde LA, Srinath S, Ulkuer N, Rahman A. Child and adolescent mental health worldwide: Evidence for action. Lancet. 2011; 378:1515–25. [PubMed: 22008427]
28. Collins PY, Insel TR, Chockalingham A, Daar A, Maddox YT. Grand Challenges in Global Mental Health: Integration in Research, Policy, & Practice. PloS. 2013; 10:1–6.
29. Collins PY, Patel V, Joestl SS. Grand challenges in global mental health. Nature. 2011; 475:27–30. [PubMed: 21734685]
30. Cunningham, M. State of the World's Indigenous Peoples. New York: United Nations; 2009. Health; p. 156-187.
31. Becker, AE. Body, self, and society: The view from Fiji. Philadelphia: University of Pennsylvania Press; 1995.
32. Becker AE, Burwell RA, Gilman SE, Herzog DB, Hamburg P. Eating behaviours and attitudes following prolonged exposure to television among ethnic Fijian adolescent girls. British J Psychiat. 2002; 180:509–14.
33. Becker AE, Fay K, Agnew-Blais J, Khan AN, Striegel-Moore RH, Gilman SE. Social network media exposure and adolescent eating pathology in Fiji. British J Psychiat. 2011; 198:43–50.
34. Thomas JJ, Crosby RD, Wonderlich SA, Striegel-Moore RH, Becker AE. A latent profile analysis of the typology of bulimic symptoms in an indigenous Pacific population: Evidence of cross-cultural variation in phenomenology. Psychol Med. 2011; 41:195–206. [PubMed: 20346191]
35. Becker AE. Television, disordered eating, and young women in Fiji: Negotiating body image and identity during rapid social change. Cult Med Psychiat. 2004; 28:533–59.
36. Becker AE, Thomas JJ, Bainivualiku A, Richards L, Navara K, Roberts A, Gilman SE, Striegel-Moore R. Validity and Reliability of a Fijian Translation and Adaptation of the Eating Disorder Examination Questionnaire. Int J Eat Disord. 2010; 43:171–178. [PubMed: 19308995]
37. Fairburn CG, Beglin SJ. The assessment of eating disorders: interview or self-report questionnaire? Int J Eat Disord. 1994; 16:363–370. [PubMed: 7866415]
38. Oliver KK, Thelen MH. Children's perceptions of peer influence on eating concerns. Behav Ther. 1996; 27:25–39.
39. Sinton MM, Birch LL. Individual and sociocultural influences on pre-adolescent girls' appearance schemas and body dissatisfaction. J Youth Adolescence. 2006; 35:165–175.
40. Vander Wal JS, Thelen MH. Predictors of body image dissatisfaction in elementary-age school girls. Eat Behav. 2000; 1:105–122. [PubMed: 15001054]
41. Phares V, Steinberg AR, Thompson JK. Gender differences in peer and parental influences: Body image disturbance, self-worth, and psychological functioning in preadolescent children. J Youth Adolescence. 2004; 33:421–429.
42. Jones DC, Crawford JK. The peer appearance culture during adolescence: Gender and body mass variations. J Youth Adolescence. 2006; 2:257–269.
43. Jones DC. Body image among adolescent girls and boys: A longitudinal study. Dev Psychol. 2004; 40:823–835. [PubMed: 15355169]
44. Hayes, AF. Introduction to mediation, moderation, and conditional process analysis. New York: Guilford Press; 2013.
45. Mond JM, Hay PJ, Rodgers B, Owen C. Eating disorder examination questionnaire (EDE-Q): Norms for young adult women. Behav Res Ther. 2006; 44:53–62. [PubMed: 16301014]
46. Luce KH, Crowther JH, Pole M. Eating disorders examination questionnaire (EDE-Q): Norms for undergraduate women. Int J Eat Disord. 2008; 41:273–276. [PubMed: 18213686]
47. Eisenberg ME, Neumark-Sztainer D, Story M, Perry C. The role of social norms and friends' influences on unhealthy weight-control behaviors among adolescent girls. Soc Sci Med. 2005; 60:1165–1173. [PubMed: 15626514]
48. Neumark-Sztainer D, Wall MM, Story M, Perry CL. Correlates of unhealthy weight-control behavior among adolescents: Implications for prevention programs. Health Psychol. 2003; 22:88–98. [PubMed: 12558206]

49. Clemens H, Thombs D, Olds C, Gordon KL. Normative beliefs as risk factors for involvement in unhealthy weight control behavior. J Am Coll Health. 2008; 56:635–641. [PubMed: 18477518]
50. Paxton SJ, Schutz HK, Wertheim EH, Muir SL. Friendship clique and peer influences on body image concerns, dietary restraint, extreme weight-loss behaviors, and binge eating in adolescent girls. J Abnorm Psychol. 1999; 108:255–266. [PubMed: 10369035]
51. Pike KM. Bulimic symptomatology in high school girls. Psychol Women Quart. 1995; 19:373–396.
52. Rayner KA, Schniering CA, Rapee RM, Hutchinson DM. A Longitudinal Investigation of Perceived Friend Influence on Adolescent Girls' Body Dissatisfaction and Disordered Eating. J Clin Child Adolesc. 2013; 42:643–56.
53. Ward C, Rana-Deuba A. Acculturation and adaptation revisited. J Cross Cult Psychol. 1999; 30:422–442.
54. Gazis N, Conner JP, Ho R. Cultural identity and peer influence as predictors of substance use among culturally diverse Australian adolescents. J Early Adolescence. 2010; 30:345–368.
55. Keel PK, Forney KJ, Brown TA, Heatherton TF. Influence of college peers on disordered eating in women and men at 10-year follow-up. J Abnorm Psychol. 2013; 122:105–110. [PubMed: 23025666]

Table 1

Characteristics of the study sample (n=507)[a]

Characteristic	Mean (SD)
Demographic and anthropomorphic characteristics	
Age, years	16.68 (1.10)
Body mass index, kg/m^2	23.9 (3.3)
Eating pathology	
EDE-Q global score	1.69 (1.06)
Cultural Orientation	
Western/global cultural orientation composite	4.42 (.88)
Ethnic Fijian traditional cultural orientation composite	4.83 (1.40)

[a]Related findings with a substantially overlapping analysis sample have been previously reported, see Becker et al.[33] and Becker et al.[36]

Table 2

Characteristics of Scales assessing self-reported peer influence (IPIEC), perceived peer norms for disordered eating (PPDNE), perceived school-peer only norms for disordered eating (PPNDE-SCHOOL), and perceived community Western and traditional Fijian cultural norms (*n*=507, unless otherwise noted)

Measure	Mean (SD)	Cronbach's α (Internal Consistency Reliability)	ICC (Test-Retest Reliability, n=76)	Pearson Correlation (*r*)				
				Age	Self-reported peer influence (IPIEC)	Perceived peer norms for disordered eating (PPNDE)	Perceived school-peer only norms for disordered eating (PPNDE-SCHOOL)	Perceived community Western cultural norms
Self-reported peer influence (IPIEC)	2.28 (.81)	.94 (*n*=488)	.69	.09 *				
Perceived peer norms for disordered eating (PPNDE)	1.57 (.42)	.83 (*n*=503)	.62	−.06	.27 ***			
Perceived school-peer only norms for disordered eating(PPNDE-SCHOOL)	1.59 (.47)	.75 (*n*=505)	.53	−.09 (*)	.24 ***	.91 ***		
Perceived community Western cultural norms	5.21 (2.22)	.60	.64	−.01	.20 ***	.05	.05	
Perceived community traditional Fijian Cultural norms	6.86 (2.04)	.54	.48	.01	−.07	.02	.02	−.04

(*) $p<.10$,

* $p<.05$,

*** $p<.001$

Table 3

Unstandardized Bs and 95% Confidence Intervalsfor Bivariate and Linear Regression Models Predicting Eating Disorder Examination Questionnaire (EDE-Q) global scores (n=507)

	Bivariate association with EDE-Q scores[a]	**Model 1[b]**	**Model 2[c]**
Demographic and anthropomorphic characteristics			
Age	.10 * (.02 to .18)	.00 (−.08 to .07)	.01 (−.06 to .07)
Body mass index	.14 *** (.12 to .17)	.13 *** (.11 to .16)	.09 *** (.07 to .12)
Cultural Orientation			
Western/global cultural orientation composite	.27 *** (.16to .37)	.19 *** (.10 to .28)	.11 * (.02 to .20)
Ethnic Fijian traditional cultural orientation composite	−.08 * (−.14 to −.01)	−.07 * (−.13 to −.01)	−.05 (*) (−.10 to .00)
Peer Influence and Perceived Social Norms			
Self-reported peer influence (IPIEC)	.65 *** (.55 to .75)		.40 *** (.30 to .50)
Perceived peer norms for disordered eating(PPNDE)	.73 *** (.52 to .93)		.42 *** (.24 to .60)
Perceived community Western cultural norms	.09 *** (.05 to .14)		.03 (*) (.00 to .07)
Perceived community traditional Fijian Cultural norms	−.01 (−.05 to .04)		

(*) p<.10,

* p<.05,

** p<.01,

*** p<.001

School was controlled for in Models 1 and 2 via 11 dummy-coded covariates.

[a] Linear regression unstandardized B and 95% confidence intervals (CI) obtained from separate models for each covariate.

[b] Linear regression unstandardized B and95% confidence intervals (CI)obtained from a single regression model.

R^2Model 1 = 0.28 ***, ΔR^2schools = 0.07 ***, ΔR^2demo&cultural = 0.21 ***

[c] Linear regression unstandardized B and 95% confidence intervals (CI) obtained from a single regression model.

R^2Model2 = 0.42 ***, ΔR^2norms = 0.14 ***

NB: Related findings with a substantially overlapping analysis sample have been previously reported for Model 1 and for bivariate relations for predictors in Model 1 with EDE-Q scores, see Becker et al.[33] and Becker et al.[36]