Investigating the link between television viewing and men's preferences for female body size and shape in rural Nicaragua.

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Abstract

The different levels of media access in otherwise very similar villages in rural Nicaragua provided a natural laboratory to explore the effect of television (TV) access on men's preferences for female body size and shape. In study 1 we compared the female body ideals of men from three discrete villages who experienced different levels of TV but otherwise inhabited a similar ecological and sociocultural environment. 3D modelling software enabled participants to create their ideal female body with more precision than simply choosing a figure from a limited range of 2D images. In study 2 we further explored local men's perceptions of female physical attractiveness and attitudes towards television using focus group discussions. Results from study 1 showed that men in the high TV villages preferred significantly slimmer bodies compared to those in the low TV village. Regression analyses showed TV access to be a significant predictor of ideal body size and upper body shape, but not of ideal lower body shape. The central theme to emerge from study 2 was the importance of the relationship between lower body shape, movement and sex, in the men's judgments of female attractiveness: the curvaceous body was perceived by the men to be a reliable cue to potential sexual promise, rather than valued simply for its visual aesthetic. Overall, findings suggest that TV access is linked to rural Nicaraguan men's perceptions of ideal female body weight and breast size, but preferences for a curvaceous lower body shape may be driven primarily by judgments of female sexual promise.

Keywords: cross-cultural, media influence, attractiveness, female body size, female body shape, Nicaragua.

It has been suggested that certain physical features can honestly signal an individual's health and reproductive potential (Buss, 1994; Symons, 1995). The ability to recognise and evaluate these features would allow the assessment of the health and fertility of a possible partner. Specific values of these features could signal optimal health and fertility and therefore these values would be regarded as highly attractive. However, not all environments contain the same environmental pressures: Differences in pressures across environments means that optimal values may vary, resulting in differences in attractiveness preferences (Anderson, Crawford, Nadeau, & Lindberg, 1992; Brown & Konner, 1987). These preferences should be malleable. As the environment changes or people move from one environment to another, it would be adaptive for them to alter their attractiveness preferences to those that reflect optimal health and fertility for their new environmental conditions (Tovée et al., 2006; Boothroyd et al., 2016; Jucker et al., 2017).

In women, it has been suggested that two important physical features used in attractiveness judgements are body size (usually indexed as the body mass index or BMI in kilograms per meters squared), and body shape, usually indexed by the ratio of the circumference of the waist divided by the circumference of the hips (the waist-to-hip ratio or WHR). BMI forms a potential signal for mate selection because it could act as a cue to female health (Manson et al., 1995; Willet et al., 1995) and reproductive potential (Frisch, 1988; Lake, Power, & Cole, 1997; Reid & van Vugt, 1987; Wang, Davies, & Norman, 2000). Consistent with these findings, BMI does seem to be a strong predictor of attractiveness judgements in Western observers (Fan, Liu, Wu, & Dai, 2004; Puhl & Boland, 2001; Thornhill & Grammar, 1999; Tovée, Hancock, Mahmoodi, Singleton, & Cornelissen, 2002; Tovée, Maisey, Emery, & Cornelissen, 1999; Tovée, Reinhardt, Emery, & Cornelissen, 1998; Crossley et al., 2012; Holiday et al., 2012; Tovée, Taylor & Cornelissen, 2017). For women in Western Europe and the USA, the balance between the optimal BMI for health and fertility is approximately 20 kg/m^2, which is also the preferred BMI for attractiveness (Fan, Liu, Wu, & Dai, 2004; Puhl & Boland, 2001; Thornhill & Grammar, 1999; Tovée, Hancock, Mahmoodi, Singleton, & Cornelissen, 2002; Tovée, Maisey, Emery, & Cornelissen, 1999; Tovée, Reinhardt, Emery, & Cornelissen, 1998).

For women's shape, a low WHR of 0.7 (i.e. a curvaceous body) is suggested to correspond to the optimal fat distribution for high fertility for women in Western Europe and the USA (Wass, Waldenstrom, Rossner, & Hellberg, 1997; Zaadstra et al., 1995). Therefore, this shape should be highly attractive within these cultures, and several studies have suggested that this may be the case (Furnham, Tan, & McManus, 1997; Henss, 2000; Singh, Dixson, Jessop, Morgan & Dixson, 2010; Singh & Randall, 2007).

This optimal body size and shape should vary depending on the environmental context. For attractiveness preferences to be adaptive they must be able to adjust to any long term environmental difference. For example, in rural South Africa where access to food supplies may be limited, a much heavier body mass is optimal for health and reproduction: men and women in rural South Africa showed a preference for a significantly heavier BMI (approximately 26 kg/m^2) than observers in Western countries (Tovée et al., 2006). Furthermore, and unlike samples from Western populations, there was not a sharp reduction in the attractiveness and health ratings of bodies with higher than ideal BMI values, although low BMI values were still rated as very unattractive. This suggests a significant difference in attractiveness preferences for body size in rural South Africa as compared to a slimmer Western ideal. However, the body size preferences of men and women who had moved from rural South Africa to the UK in 18 months previously were intermediate between those of

Western and South African observers (Tovée et al., 2006), implying that representations of attractiveness are indeed malleable, updated and changed over time as environmental conditions change.

However, what is the basis of this change? There is evidence that physiological state can have a significant effect on attractiveness preferences. For example, observers prefer a relatively heavier female body when they are hungry (Swami & Tovée, 2006, 2012), but these are relatively small preference changes compared to those seen in the Zulu migrant population discussed above (Tovée et al., 2006). Another potential factor is visual diet; for example, if an observer is presented with a large number of thin bodies this may shift their perception of a normal body size in the same direction (e.g. Winkler & Rhodes, 2005; Cornelissen et al., 2015). However, the size and shape of bodies in the general population in rural South Africa is not significantly different from that in the U.K (Swami & Tovée, 2006). Instead, in this case what seems important is the value placed on a particular body size (visual valency) (Boothroyd et al., 2012). In the UK, a premium is placed on a very slim body whereas in rural South Africa a heavier body is more indicative of health and social status (Clark et al., 1999; Mvo et al., 1999). In Westernized populations, societal standards of appearance, including the 'thin ideal' female body, are predominantly created and perpetuated by the media.

While evidence strongly suggests that media exposure drives the preference for a slim female body (see Grabe, Ward & Hyde, 2008), the ubiquitous nature of the media via TV, print and electronic devices in Western countries means that experiments manipulating media exposure often face the problem of ceiling effects (i.e. individuals already have so much media exposure, that additional exposure has little or no effect on their body perception). However, in parts of Nicaragua there still exists considerable variation in TV access: some villages have no mains electricity and thus very limited potential for TV access, while other villages are connected to the national grid and therefore have relatively high media access. This situation allowed us to make a cross-sectional comparison of the relative impact of TV on men's preferences for ideal female body size and shape, by sampling from high media access and low media access populations.

We employed a mixed methods study design, which enabled a deeper investigation of both the 'context' and the 'facts' of the research topic (Evered & Reis, 1981). In Study 1 we utilized a methodology that enabled us to capture in '3D' the ideal female body size and shape of a sample of men in rural Nicaragua. To specifically assess the effect of TV, while controlling for other possible influencing factors such as socio-economic status (SES) and acculturation, we compared ideals of men from three villages who experienced very different levels of TV access but otherwise inhabited a similar sociocultural and economic environment. In Study 2, using focus group discussions, we explored Nicaraguan men's perceptions of female attractiveness in greater depth and further investigated their attitudes towards TV.

Study 1

Method

Participants

A total of 66 participants were recruited from three villages in the Pearl Lagoon Basin region in Eastern Nicaragua (see Table 1 for details). Village 1 and village 3 are Garifuna communities and Village 2 is a Miskitu community. Village 1 and 2 have relatively high

levels of media exposure and Village 3 has relatively low levels of media exposure. At the time of this study, there were no magazines and most people had very limited access to the internet, so media exposure was measured specifically by television viewing (see Boothroyd et al (2016) for more ethnographic context).

Table 1. Descriptive statistics for demographic and predictor variables by location group

	Village 1	Village 2	Village 3	
Valid N	23	21	22	
% Miskitu	0	71	0	
% Garifuna	87	0	68	
% Creole	13	0	0	
% Mixed	0	29	23	
% Mestizo	0	0	9	
Age (years)	27.0 (10.64)	20.7 (8.0)	25.7 (9.51)	
BMI	22.4 (2.36)	21.9 (2.31)	22.6 (2.00)	
Acculturation score	1.9 (0.17)	1.7 (0.26)	1.8 (0.68)	
Education (years)	8.8 (2.33)	8.5 (2.65)	6.2 (3.39)	*
Income ($ U.S per year)	1616 (1303.4)	238 (661.7)	511 (414.4)	**
Hunger score	5.4 (0.72)	4.8 (0.81)	4.4 (0.84)	**
Hours since last meal	2.2 (1.28)	3.6 (2.59)	4.6 (5.59)	
TVE	10.5 (8.59)	11.1 (6.70)	4.1 (5.80)	**
USTV	2.8 (1.11)	2.9 (1.36)	1.4 (1.22)	**
SPTV	3.4 (0.84)	3.3 (1.32)	2.0 (1.36)	**
USFM	2.6 (0.94)	2.4 (1.33)	2.0 (1.31)	
SPFM	2.5 (1.04)	1.9 (1.45)	1.2 (0.87)	**
TV access	3.7 (0.54)	3.9 (0.36)	1.1 (0.64)	**

* $p < .05$; ** $p < .01$. TVE = Hours television viewing per week. Frequency of viewing content types: USTV =U.S originating / English language TV shows; SPTV = Latin American originating /Spanish language TV shows; USFM = U.S / English language films; SPFM = Latin American / Spanish language films.

Measures

Ideal female body. Most previous studies have relied on visual scales containing a limited range of silhouettes (Patt, Lane, Finney, Yanek, & Becker, 2002), figural drawings (Gardner, Jappe, & Gardner, 2009) or photographs (Boothroyd et al., 2016; Swami, Salem, Furnham, & Tovée, 2008) to ascertain participants' preferred body size and shape. However, it cannot be assumed that they represent the full range of ideal body sizes and shapes, particularly in non-Western populations. In the current study, the use of a 3D figure-modelling software package (Daz Studio 4.6 from Daz3d.com) allowed participants to be presented with a 3-dimensional, photo-realistic figure whose adiposity and shape could be adjusted to create a 'personalised' ideal female body. The model used was Stephanie 6 from the Genesis 2 model series. Relative to previous studies in the UK (e.g. Crossley et al., 2012; Tovée et al. 2012), the model was given a darker skin tone and hair colour that did not represent a specific racial or ethnic group but minimized the 'European-ness' associated with most visual scales (Gardner & Brown, 2010). The programme contains more than 90 sliders for altering different parts of

the body, but the number available for use in this study was limited to a total of 16, 6 'full body' options (e.g., 'emaciated', 'heavy', 'pear-shaped') and 10 sliders for specific areas (e.g., breasts, waist, hips, buttocks) for several reasons: Firstly, many of the sliders relate to body parts that were not relevant to this study (e.g., fingers, hands, feet); secondly, even fully 'computer competent' participants tend to use only about a third of the total available sliders (Crossley et al., 2012); and lastly, to prevent the task from being too long and arduous for participants.

Acculturation. Twelve items adapted from the Suinn-Lew Self-Identity Acculturation Scale (Suinn et al., 1992) and the original Hispanic version (Cuellar, Harris & Jasso 1980) measured the frequency with which participants spoke, thought, and socialized in Spanish and / or English language versus in indigenous languages (Creole and Miskitu) on a five-point scale (1 - only Miskitu / Creole; 3 – Miskitu / Creole, and Spanish and / or English equally; 5 – only Spanish and / or English).

Education and income. Participants reported their highest level of education, total number of years spent in education, and any income they had received in the last year in Nicaraguan Cordobas or U.S dollars (see Table 1).

Televisual exposure. Participants reported how many hours of televisual content (including DVDs) they had watched in the previous seven days (TVE). The frequency of viewing U.S originating or English language televisual content (USTV) and films (USFM), and Latin American originating or Spanish language televisual content (SPTV) and films (SPFM) was measured on a five-point scale from 0 for 'never' to 4 for 'every day or nearly every day'. Participants were also asked to name the type of content or specific shows they enjoyed watching most. TV access was also measured using a scale of 1-4: 1 - no TV in the village; 2 - TV in a neighbour's but doesn't watch; 3 - watches TV at a neighbour's; 4 - has a TV in the home.

Hunger Status. Participants were asked to indicate how hungry they felt on a scale of 1 (starving) to 10 (bursting), and the time in hours since they had last eaten. No participant reported hunger levels outside of 3-6 range.

Protocol

Participants were tested individually in a quiet room with a desk by a male researcher (JLJ, a white male postdoctoral researcher) and a locally trained assistant. The participants were told that their participation was voluntary and that they could stop at any time during the task if they did not want to continue. Participants were assured that we were interested in their personal opinion and that there were no 'right' or 'wrong' answers to any of the questions. Because of considerable variation in participants' levels of literacy, agreement of consent and all demographic and media information were gathered orally during each session with the researcher entering responses directly into a laptop. Anthropometric measurements were then obtained using a digital weighing scale and tape measure. The height and weight of each participant was measured to allow the calculation of their BMI. The participants' chest, waist and hip circumferences were also measured. Participants were weighed and measured without footwear and heavy clothing and given the opportunity to take their own measurements with guidance if they preferred.

Before beginning the ideal female body task, the researcher opened a 'trial' body in the Daz programme to familiarise participants with how the software works, and to demonstrate the full range of body alteration available with each slider. To keep test conditions uniform across the sample, as familiarity with computer use varies considerably among this

population, the researcher operated the sliders following the participant's instructions until he was happy with the body. As in previous studies (Crossley et al., 2012), to eliminate possible anchor effects participants created their ideal body twice, once from an underweight 'starter' body and once from an obese 'starter' body. The order of presentation of the two starter bodies was counterbalanced across participants. The starting BMI for the overweight and underweight 3D models was the same for all participants. The underweight body had a BMI of 12.0 kg/m^2 and the overweight body had a BMI of 35.0 kg/m^2

The whole session took about an hour and participants were paid the equivalent of $4 in local currency for their time.

Data handling

Upon completion of all data collection, the participant-created bodies were re-opened in the Daz programme. The height of the model was standardized to 163 cm, and bust, under-bust, waist, hips and thigh circumferences were measured in centimetres using the 'Measuremetrics' function in the programme. To estimate the BMI of the bodies we used the Health Survey for England (HSE 2003 & 2008) datasets to create calibration curves between waist and hip circumferences and height derived from ~5000 females in the UK, aged between 18 and 45. Because our CGI models exist in an appropriately scaled 3D world, having set the height of our models (1.6m) we can therefore measure their waist and hip circumferences, and compare these with our HSE calibration curves in order to compute their BMI (Cornelissen, Tovée, & Bateson, 2009; Cornelissen et al., 2015).

Ideal female lower and upper body shape were measured by calculating the Waist to Hip ratio (WHR - waist circumference divided by hip circumference), and the Waist to Bust ratio (WBR - waist circumference divided by bust circumference) respectively. As participants created two bodies, ideals were calculated by averaging both sets of measurements.

Online Data Access The data for this study is available online at: https://osf.io/7grxk/

Data analyses

All data analyses were run in SPSS 22. Using location (i.e. Village 1, 2 or 3) as the grouping variable, a series of ANOVAs were used to identify differences in the means of outcome and predictor variables. All assumptions were met unless otherwise stated. Where data were non-normal, Welch's robust tests were interpreted. Tukey Post hoc follow up tests were used to investigate where group differences lay. Games Howell tests were used where Welch's test had been interpreted. Pearson's correlations were used to identify which predictor variables were associated with body ideal variables. Regression analyses were then carried out to determine the extent of media's influence in predicting the men's body ideals.

Group comparisons of predictor variables

A series of ANOVAs were carried out to look for group differences in predictor variables. Means and standard deviations for all predictor variables by location are shown in Table 1. There were no significant differences in age, $F(2, 63) = 2.5$, $p = .09$, or acculturation scores, $F(2, 63) = 1.90$, $p = .158$. Men in Village 1 were significantly more educated than men in Village 3, Welch's $F(2, 40.097) = 3.75$, $p = .032$, post hoc $p = .026$. Men in Village 2 were intermediate but did not differ significantly from either of the other two groups (ps > .05). Village 1 men also had a higher income than men in the other two groups, Welch's $F(2, 36.98) = 9.87$, $p < .0005$, post hoc ps < .01, who did not differ from each other. There were significant differences in men's hunger status. Men in Village 1 felt less hungry at time of

interview than men in the other two locations, $F(2, 63) = 9.47$, $p < .0005$, post hoc ps < .05, who did not differ from each other, $p = .165$. Data for time since last meal was strongly skewed, so the data was transformed with a log10. Levene's was still significant ($p = .025$), so Welch's F was used to interpret the data. There was no significant difference in means for time since last meal, $F(2, 37.22) = .665$, $p = .520$.

Men in Village 3 watched significantly less hours of television (TVE) than men in Village 2 and Village 1, $F(2, 63) = 6.38$, $p = .003$, post hoc ps < .05, who did not differ from each other (ps > .05). Men in Villages 1 and 2 and watched both USTV, $F(2, 63) = 11.29$, $p < .0005$, and SPTV, $F(2, 63) = 9.34$, $p < .0005$, more frequently than men in Village 3 (all post hoc ps < .01), but did not differ from each other (ps > .05). The difference in group means for SPFM was significant, Welch's $F(2, 40.02) = 10.21$, $p < .0005$, with Village 1 watching more frequently than Village 3, Games Howell $p < .0005$. Village 2 means were intermediate but not significantly different from either group (ps > .05). There was no significant difference between groups for USFM, $F(2, 63) = 1.52$, $p = .227$. Across all groups men reported watching mainly action or 'fighting' movies, sports, and news. Men in Village 2 also mentioned watching cartoons, *telenovelas* and music video content. The majority of men in Village 1 reported watching music channels or music video content regularly.

There were significant differences in TV access, F(2, 63) = 185.912, p < .0005, with Village 3 having lower media access than the other two villages (Tukey post hoc ps < .0005) who did not differ ($p = .741$).

Table 2. Means and standard deviations of ideal body size and shape variables by location group

	Orinoco	Kahkabila	Square Point	
	23	21	22	
BMI	25.6 (3.81)	29.68 (3.26)	33.7 (4.40)	**
WHR	0.72 (0.05)	0.67 (0.04)	0.70 (0.05)	**
BUR	1.16 (0.05)	1.20 (0.03)	1.15 (0.03)	**
WBR	0.85 (0.05)	0.81 (0.05)	0.89 (0.05)	**
BHR	0.85 (0.03)	0.84 (0.04)	0.79 (0.04)	**

** $p < 0.01$. BMI = Body mass index; WHR = Waist to Hip Ratio; BUR = Bust to Under-bust Ratio; WBR = Waist to Bust Ratio; BHR = Bust to Hip Ratio.

Ideal female body size and shape

All data for ideal body size and shape variables were normally distributed and met assumptions of homogeneity of variances as measured by Levene's test. Across the whole sample mean ideal female BMI was 29.6 kg/m^2 (*S.D* 5.08), ideal WHR was 0.70 (*S.D* .049), and ideal WBR was 0.85 (*S.D* .062). To further investigate breast preferences, a 'cup size' was calculated using a Bust to Under-Bust Ratio (BUR –bust circumference divided by under-bust circumference). Mean BUR was 1.17 (*S.D* 0.04).

Previous research using the same methodology as the current study found that for a U.K sample of men, the ideal female body had a larger bust than hips (Crossley et al., 2012). To ascertain if Nicaraguan men's preferences were moving in a similar direction where media exposure levels were higher, a Bust-to-Hip ratio (BHR – bust circumference divided by hip circumference) was calculated to measure the direction and degree of body fullness: a BHR of 1 would indicate a perfectly symmetrical 'hourglass' figure while a BHR above 1 would denote a proportionately fuller upper body than lower body. Mean ideal BHR was 0.83 (*S.D*

0.05). Means and standard deviations for ideal female body size and shape variables by location group are shown in Table 2.

Figure 1: The average ideal female Daz body for the men in Village 1 (A), Village 2 (B) and Village 3 (C). As can be seen, the Village 3 ideal is significantly heavier and has more fat deposited on the thighs and buttocks.

There were significant differences between all three location groups for ideal female BMI, $F(2, 63) = 24.72$, $p < .0005$ (all post hoc ps < .01), with Village 1 men having the slimmest ideal body size and men in Village 3 having the heaviest. There was a significant difference in group means for ideal WHR, $F(2, 63) = 6.15$, $p = .004$. Post hoc tests showed that Village 2 men created a significantly curvier lower body than men in Village 1 ($p = .002$). Means for Village 3 were intermediate but did not differ significantly from either of the other two samples (ps > .05). Differences in group means for ideal WBR were also statistically significant, $F(2, 63) = 12.09$, $p < .005$, with Village 3 making a less curvy upper body shape than men in the other two locations (ps < .05) who did not differ from each other ($p > .05$). There was significant difference in means for BUR, $F(2, 63) = 8.25$, $p = .001$, with men in Village 2 creating a fuller breast than men in both Village 1 and Village 3 (ps < .01) who did not differ from each other (ps > .05). There was a significant difference in means for ideal BHR, $F(2, 63) = 13.89$, $p < .0005$, with Village 3 men preferring a proportionately fuller lower body than men in both Village 2 and Village 1 (ps < .01) , who did not differ from each other ($p = .485$).

Ideal BMI was significantly associated with income, hunger status, USTV, and SPTV and TV access.

Table 2. Pearson's correlations of ideal body size and shape variables with predictor variables

	USTV	SPTV	TV access	Income	Hunger status
BMI	-.244*	-.275*	-.489**	-.365**	-.260*
WHR	-.100	.028	-.042	.194	.179
WBR	-.317**	-.181	-.402**	.037	-.131
BHR	.286*	.267*	.434**	.135	.360**

* $P < .05$; ** $p < .01$.

To explore the importance of the potential predictors across the whole population sampled for the BMI of the ideal bodies we ran a stepwise regression, with TV access, SPTV, USTV, hunger status and income entered (Criteria of F to enter < .05, Probability of F to remove, > .01). Only TV access and income were significant predictors in the final model which accounted 32% of variance in ideal BMI ($F(2, 63) = 14.73$, $p < .0005$, $R^2 = .319$. TV access alone accounted for 24%.

To determine the predictors for BHR, we ran a stepwise regression with hunger status, SPTV, USTV, and TV access entered. The final model was significant with only TV access remaining as a significant predictor ($F(1, 64) = 14.871$, $p < .0005$, $R^2 = .189$). We then ran a further stepwise regression to determine the significant predictors for WBR. Again, only TV access was a significant predictor in the final model ($F(1, 64) = 12.304$, $p = .001$, $R^2 = .161$). Ideal WHR was significantly associated with and predicted by the age of the participant alone ($F(1, 64) = 10.50$, $p = .002$, $R^2 = .136$), suggesting that younger men preferred a curvier lower body shape.

Anthropometric Differences in Women's Bodies

Several studies have suggested that there are differences in the pattern of fat deposition in different racial groups (Wells et al., 2008, 2012). Thus, it is possible that in villages with different ethnic populations (as in the present study), the shape of women in those populations may differ, thus creating differences in visual diet. To discount this possibility, we measured and compared the anthropometric measurements of women in the villages (see Table 4). As there was a significant difference in the mean age of the samples analyses were carried out using ANCOVA. There were no significant differences in the sample means for any of the anthropometric measurements (all *p*s >.05).

Table 4. Pearson's correlations of ideal body size and shape variables with predictor variables

	USTV	SPTV	Income	Hunger status	Hrs last meal
BMI	-.244*	-.275*	-.365**	-.260*	.289*
WHR	-.100	.028	.194	.179	-.166
WBR	-.317**	-.181	.037	-.131	.122
BHR	.286*	.267*	.135	.360**	-.339**

* $P < .05$; ** $p < .01$.

Results summary

There were significant differences in body ideals between groups – Village 1 men had the slimmest ideal body size, Village 3 the heaviest, and Village 2 was intermediate. Men in Village 2 preferred a body shape that was curvier, especially in the upper body. Men in Village 3 preferred a much fuller lower body shape than the other two groups. In our analysis, media access predicted ideal BMI, BHR, and WBR. WHR however, was not predicted by

media access. That ideal body size and upper body shape elements in particular were predicted by media exposure, supports findings from previous research (e.g. Boothroyd et al. 2016, Jucker et al., 2017). Income also played a significant part in predicting men's body ideals. Relative wealth tended to predict more Western preferences (i.e. slimmer body size and curvier upper body), which is consistent with previous findings (ref Swami 2015). Only ideal lower body shape was not predicted by media exposure.

Study 2

Method

A total of 24 men participated in four focus group discussions; one in Village 1, two in Village 2 and one in Village 3. The sessions were moderated by the first author (TT, a white female doctoral student) and the second author (JLJ, a white male postdoctoral researcher). Each focus group was attended by six men and ran for about an hour. The sessions were video recorded with the verbal consent of all the participants, with camera being placed behind participants and at an unobtrusive distance, so that only the researchers' face was fully visible. This amount of visual information aided significantly in accurate transcription of the conversation without focusing on the participants' identities, and captured additional non-verbal information conveyed by the participants, such as head nods and hand gestures. Participants were not paid for these sessions, but the researchers provided soft drinks and snacks.

English and Creole English were used throughout. In one focus group, a Miskitu participant spoke mostly in Spanish, however TT speaks and understands Spanish to a similar level as the Miskitu man (also not his native language). TT and JLJ were both present in two of the groups, TT alone ran the other two groups.

The mean age of men in the focus group in Village 1 was 23.2 years old (*SD* 3.7, range 17 to 28 years old). In Village 2, mean age of the men in group 1 was 28.3 years old (*SD* 8.6, range 17 to 40 years old), and in group 2 it was 33.3 years old (*SD* 11.4, range 19 to 45 years old). The mean age of the group in Village 3 was 24.4 years old (SD 3.0, range 20 to 28 years old).

A small introduction was given to the participants in each focus group, explaining that we were interested in finding out their opinions about female attractiveness and television. The participants were informed that they could leave at any time and they were not obligated to answer any questions they did not want to. While initiated using key questions, discussion was allowed to flow in whatever direction the participants took it until the conversation naturally subsided at which point the researcher would either redirect the focus back to the key questions or continue to discuss any relevant new topics that arose. At the end of the session, participants could ask any questions they had about our study.

Data analysis

The transcripts were transcribed verbatim by the first author, who then organized and coded the data using NVivo software. To protect participant anonymity, each participant was given a unique code that included information about their location and ethnicity. To maintain context, sentences or small paragraphs were coded systematically, initially building categories based on participants' responses to key questions. Where a sentence or phrase related to more than one category, it was placed in both. Categories were grouped to create 'themes', as wider patterns or relationships emerged. Coding and organizing of the data were discussed at several points with two other authors to reach a consensus regarding the themes. Thematic analysis was used to interpret and organise findings from the data into themes

(Braun & Clarke, 2006). The key themes that emerged relating to female attractiveness were: 'Non-physical attributes that make a woman attractive'; 'Physical attributes that make a woman attractive'; 'Curvaceous body shape, movement and sex'; 'Racial and ethnic preferences'; ''Pastime' versus life partner'. The key themes identified in relation to television viewing were: 'Use of television'; 'Favourite televisual content'; 'Attractive women on television'; 'Influence of television; 'Television reflecting reality'. Here, only those themes which relate directly to our research questions are summarized and discussed. A full description of all themes with quotations can be found in the supplementary material.

Summary of findings

Physical attributes that make a woman attractive

Across all focus groups men often used the word 'normal' to describe the most attractive body size or weight for a woman, sometimes naming women in their communities to illustrate what is a 'normal' and thus attractive female body size. None of the men stated a particular preference for a large female body, however in Village 3 (low TVE) several men acknowledged that all sizes of women could potentially be attractive to men. Men in Villages 1 and 2 (high TVE) employed the term 'slim' to refer to the ideal waist and several others expressed preferences for a 'flat' or 'smooth' stomach. Together with the waist, the buttocks and thighs were frequently mentioned as the most attractive parts of the female body: 'See a nice shaped girl, small waist, good backside, maybe you look on that, that girl look nice… She got a good waist or a good ass…And big legs'. Overall, the men tended to define an attractive female body in terms of shape rather than weight. Men in Villages 1 and 2 (high TVE) described the ideal female body as having a 'Coca-Cola shape' or a 'Barbie shape', both iconic references to Western culture. Men in these focus groups also referred to female celebrities of Western media, such as Nicki Minaj, Rihanna and Halle Berry, when discussing their ideal female body. To describe a similar preference for a body shape with a slim waist, large buttocks and thighs, men in Village 3 (low TVE) employed the term 'guitar body', an expression that is rooted in Latino culture (Beltran, 2002; Viladrich, Yeh, Bruning, & Weiss, 2009).

Body shape, movement and sex

A particularly salient theme that emerged from the discussions was the relationship between lower body shape, movement and sex. The curvaceous body shape, with its slim waist, full buttocks and big thighs, was central to the men's judgments of female physical attractiveness because it exaggerates the action of the hips when a woman is walking or dancing. How a woman moves her hips is understood as a visual cue to her potential prowess in the bedroom. The curvaceous lower body shape amplifies movements originating from the hips, making it easier to 'judge' her value as a sexual partner. As one participant put it, 'when you look on that woman's ass, the way it wining (gyrating the hips in isolation), the way it moving, it's like oh fok! …she could be nice in bed you know'.

Television

Most men in Village 3 reported not watching television at all during their childhood, and very little as adults. The youngest participant in Village 1 reported watching television all his life, while most of the men in Villages 1 and 2 reported first watching television as children or teenagers. Television was generally regarded as positively contributing to the lives of local people, informing, educating, and also simply entertaining them. For some, television was perceived as influencing general cultural change in a positive way, for others it was framed as impacting more negatively on traditional lifestyles. Television was also discussed in relation to how it could change or encourage certain behaviours in people. Particularly commented

upon in Villages 1 and 2 was the perceived negative influence of *telenovelas* (Latin American soaps) on women, particularly those who were 'perhaps already thinking to do it' (e.g., to have an extramarital affair): their thoughts were legitimized by the behaviour witnessed in the *telenovelas* which pushed them to act similarly. Conversely, *telenovelas* were often framed as a positive source of behavioural learning for men, particularly for how to deal with these 'changed' women. Action movies, a clear viewing favourite, were also considered valuable sources of learning for men: 'maybe you could learn from watching the [movie], and take it into your brains, and maybe learn it how to fight'. Local news was also regarded as essential viewing by a majority of participants for its 'action' content (i.e. live news reports from accident or crime scenes). Other favourite TV content included sport, the Discovery Channel, and Animal Planet. Several men in Village 3 mentioned that they most liked to watch 'pron' (pornography in Creole language) but had little opportunity to watch it. When asked in what type of TV content they might see attractive women, men in all groups primarily mentioned *novelas*. Several men in Village 1 additionally mentioned beauty pageants such as Miss Universe and Miss Nicaragua. In Village 3, Jamaican music videos and pornography were also mentioned for the 'guitar body woman' and the 'pretty woman, blue eyes!'

General discussion

The aim of this study was to investigate the potential link between media exposure and men's perceptions of the ideal female body size and shape in rural Nicaragua. In study 1, higher TV access was linked to a preference for a lower ideal female BMI across our male population. Higher TV access also linked to a preference for a more curvaceous upper body shape. This preference produces a more hour glass ideal female figure. Consistent with this result, men in the higher TV access villages in study 2 described a slim and curvaceous body ideal and made references to slim Western media celebrities such as Rihanna and Halle Berry.

The trend in preferences for a curvier and fuller upper body shape among men from the high TV access Villages 1 and 2, together with the finding that Western television viewing predicted those preferences, suggests that their ideals may be moving towards the 'curvaceously thin' ideal female body that appears to be usurping the thin ideal in Western media more recently (Crossley et al., 2012; Harrison, 2003). Although these results do not demonstrate a causal effect of media access on body preferences, the finding that the men in the focus groups in the high TV access villages referred to media icons such as Nicki Minaj and Barbie, whose bodies are extremely curvaceous, adds further support to this possibility.

Our results are consistent with the pervading presence on Nicaraguan television of Western appearance standards, in particular the positive valuation of a slim but curvy female body, having an impact on local body ideals, shifting them towards an ideal that may not the best adaptation to a relatively low resource environment. In many traditional, non-Western settings, body fat may be viewed as an indicator of wealth and prosperity (McGarvey, 1991; Jucker et al., 2017), with obesity as a symbol of economic success, femininity, and sexual capacity (Ghannam, 1997; Nasser, 1988). In less affluent societies, there is often a positive relationship between increased SES and body weight. Only high-status individuals would have been able to put on body weight, which explains why many of the world's cultures had or have ideals of feminine beauty that include a relatively high BMI (Anderson et al., 1992; Brown & Konner, 1987), as it would have been advantageous for women to be able to store excess food as fat in times of food surplus. Our results are consistent with the hypothesis that in Nicaragua, in a comparatively short time period, heavier body preferences may have been at least partially over-written by a media message favouring a slimmer body. They are also

consistent with recent results from Boothroyd et al. (2016) and Jucker et al. (2017) obtained in the same area using different methods.

Previous studies in Villages 2 and 3 found preferences for slightly lower BMIs of approximately 25 and 27 kg/m^2 respectively (Boothroyd et al., 2016), values consistent with those reported in previous studies among rural populations in KwaZulu Natal and Malaysia (Tovée et al., 2006; Swami & Tovée, 2007). In these studies participants rated the attractiveness of the same set of 50 photographs of female bodies (Tovée et al., 1999), meaning participants' choices were limited to a fixed range of body sizes and shapes. Their choices may thus reflect a compromise from amongst the possible options presented to them trading off the size and shape options available and not their absolute ideal. In the present study however, participants were able to independently alter the shape and size of the female body and thus produce a more accurate representation of their ideal configuration of shape and size.

Several studies have suggested that different ethnic or racial groups have differing patterns of fat deposition (e.g. Wells et al., 2008, 2012). As a result, people of different ethnic backgrounds may have different body shapes (e.g. Capers et al., 2016; Cohen et al. 2014). As participants in Villages 1 and 3 are predominantly Garifuna, and those in Village 2 are predominantly Miskitu, the body sizes and shapes of women in Village 1 and 3 may differ from those in Village 2 (i.e. there may be systematic differences in villagers' visual diet) and this may have an impact on body judgements. For example, if someone views a lot of high BMI bodies in their daily environment their internal reference (what they perceive as a normal, representative body size) will be shifted towards a heavier body size (Robinson & Kirkham, 2013; Oldham & Robinson, 2015). To test whether differences existed in the non-media aspect of the men's visual diet of bodies, we compared the anthropometric measurements of local women and found no significant differences based on ethnic group. This suggests that their non-media visual diet is unlikely to play a significant role in the results reported here.

It is also possible that differences between ethnic groups' body size ideals reflect their physiological differences: variation in body fat distribution and body composition across ethnic groups would ultimately lead to different cut-offs for health outcomes. For example, the BMI cut-off for becoming overweight among people of Chinese descent is lower compared to people of European descent (e.g., Choo, 2002; Deurenberg, Deurenberg-Yap, & Guricci,2002; Shiwaku, Anuurad, Enkhmaa, Kitajima, & Yamane, 2004). If what we perceive to be attractive is what is healthy and fertile (Buss, 2003; Thornhill & Grammer, 1999), then we might expect differences in ideal body size and shape preferences between ethnic groups, even in the same environment. However, several previous studies have found this not to be the case: For example, people of African and European descent have the same ideal body size in the UK, and people of Chinese, Pakistani and Malay descent in Kuala Lumpur have the same preferred body size (Swami & Tovée, 2005; Tovée et al., 2006). This suggests that ethnic group should not be a significant contributor to differences in body size preference, all other factors in the environment being equal.

A potential factor in the choice of ideal body maybe the participants' own body characteristics. Several studies have suggested a positive assortment for BMI between men and women in relationships (Allison et al., 1996; Tambs, 1991; Mascie-Taylor, 1987), with a stronger preference for BMI being exhibited by men as compared to women (Courtiol et al., 2010). However, this reported positive assortment is very weak (with correlations in the order of 0.1), and it did not have a significant effect on preferences in this study.

It is worth noting that ideal WHR was not associated with media exposure, but only with age, such that younger men preferred a curvier waist shape. It has been suggested that a low female WHR maybe a visual cue to youth, fertility and nulliparity (Singh et al., 2010; Wells, Griffin & Treleaven, 2010). It would follow then that younger men might be more attracted to women with a curvier lower body as women with this shape are more likely to be young and nulliparous (Wells et al., 2010).

There is also evidence that for some ethnic groups of Black African descent, a smaller waist relative to thigh girth may be a better predictor of underlying health than BMI (Wells et al., 2008), suggesting that for some ethnic groups, such as those in this study, lower body shape may be more important in attractiveness judgements than simply body weight. Indeed, previous studies have found that African American women (Overstreet, Quinn, & Agocha, 2010), Black South African men (Swami et al., 2009) and Hadza men in Tanzania (Marlowe, Apicella & Reed, 2005) considered full buttocks to be more central to the ideal female body shape than their White Caucasian counterparts. Similarly, for the men in our study a curvaceous body shape was an essential component of female attractiveness: even when men expressed a preference for a slimmer female body size, lower body curvaceousness was not relinquished.

The importance of lower body curvaceousness continued in the focus group discussions in study 2. Men referred to women's bodies not as static displays but in motion, particularly when dancing: larger buttocks and thighs exaggerate the movement of the lower body, reinforcing the visual impact of this motion which the men interpreted as a strong sexual signal. Hip swing is regarded as highly attractive in female dance (McCarty et al., 2017) and may aid in men's judgements about a woman's potential fertility (Fink et al 2012). Furthermore, while lower body shape seems to be a relatively weak cue to attractiveness judgements in static images (Tovée et al., 1999, 2002), Johnson & Tassinary (2007) have argued that body motion emphasizes WHR as a cue to attractiveness. Our findings would be consistent with this hypothesis and help to explain why lower body shape remained key in men's judgments of attractiveness in both studies, regardless of levels of media exposure.

A limitation of our qualitative study is that three of the focus groups were from high TV exposure villages and only one was from a low TV exposure village. Ideally, additional focus groups would have been run in the low TV environment. However, an issue with testing in small villages was the limited availability of participants due to the relatively small pool from which they can be drawn. Future quantitative and qualitative studies should ideally aim to recruit more participants in a low TV exposure environment and recruit from additional sites in both high and low TV exposure environments to confirm that our findings are a general feature of these environments and not specific to these test sites. However, the roll out of electrification across rural Nicaragua makes this increasingly difficult to achieve in practice.

Overall, our results are consistent with the hypothesis that media exposure is a significant factor in determining Nicaraguan men's preferences for ideal female body shape and size. However, this relatively small-scale study had a cross-sectional design, comparing attractiveness preferences in a high media exposure environment compared to a low exposure environment. To confirm this media effect, what is now needed is a larger scale, longitudinal study in which the preferences of a specific cohort of participants is followed as TV is introduced into a village compared to a control cohort. Despite these limitations, the use of a combination of quantitate and qualitative techniques working with a non-WEIRD (Western, Educated, Industrialized, Rich, and Democratic) population provides a unique insight into the malleability of body ideals and the cultural factors which may influence them.

In conclusion, television access was linked to a significant shift towards a preference for a slimmer female body size in this sample of men in rural Nicaragua. It was also linked to a preference for a more curvaceous upper body (i.e. larger bust). However, the preference for a curvaceous lower body shape was not related to, nor diminished by, access to media. This may be because the preferences for a fuller lower body may be driven primarily by judgments of female sexual potential.

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