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## Body image and body change strategies among Tongan adolescents in Tonga and New Zealand

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### Abstract

**Aim** The aim of this study was to evaluate the body image and body change strategies of adolescents from Tonga, and Tongans who are resident New Zealand.

**Method** In total, 598 Tongans from Tonga and 388 Tongans from New Zealand completed measures of body image, body change strategies and messages about their body.

**Results** Tongans in Tonga were more likely to receive positive messages about a larger body from adults at school, church and the media, and losing weight from the media. They were also more likely to adopt strategies to lose weight, increase weight and increase muscles.

**Conclusion** The large body ideal appears to be still valued in Tonga, whereas Tongans also want to lose weight because of media messages to achieve a healthy body weight.

Being slim is highly valued within contemporary Western Society, particularly among females, for whom thinness is often associated with such attributes as attractiveness, self-control and economic success.<sup>1,2</sup> Western culture also values a muscular mesomorphic body shape for males, emphasising muscle mass and physical bulk.<sup>3,4,5</sup>

Although the above findings have been obtained for males and females in Western societies, it is not clear if these body ideals are universal. In particular, it is not clear if these ideals are now prevalent in countries where a large body ideal has previously been valued. The current study examined this issue among Tongan adolescents, who have traditionally valued a large body size for both males and females.<sup>6</sup> This was traditionally a symbol of a high level of family care, and a large body led to increased power and prestige within Tongan society.<sup>7</sup> These ideals applied to both males and females.

More recently, a large body has been shown to be also valuable for boys in the sporting arena.<sup>8</sup> Previous research had demonstrated that adolescent Tongan boys place a high value on muscularity.<sup>9</sup> This research has indicated that the focus was primarily driven by factors related to strength, sporting ability, and the capacity to engage in physical work. Research by McCabe et al<sup>10</sup> also found that there was a high level of sociocultural pressures from parents, friends and the media on Tongan adolescent boys regarding their body size.

In the last two decades, Tongans have experienced greater exposure to Western influences through the media.<sup>10</sup> For Tongans living in Tonga, this is also supplemented by messages from the large number of relatives who live outside Tonga, but maintain contact with their family living in Tonga.<sup>6</sup> This contact has led to a shift towards body ideals for both males and females being thinner than traditional ideal bodies both among Tongans and other Pacific Islanders.<sup>11,7,12</sup> Tongans have migrated to Western countries, in particular, New

Zealand. In fact, there were 50,468 Tongans in New Zealand in 2006, a 24% increase since the 2001 census.<sup>13</sup> Fifty-six percent of these Tongans were born in New Zealand, with the remainder primarily being born in Tonga<sup>13</sup>. One would expect that Tongans living in New Zealand would be more likely than Tongans in Tonga to adopt body image ideals closer to those valued by Western societies, due to their greater exposure to images of these bodies.<sup>6</sup>

No studies were located that have examined the differences in the body image, body change strategies, or sociocultural influences on Tongans in Tonga and those who have migrated to countries where adolescents are more likely to experience Western influences in relation to ideal body size. However, Metcalf, Scragg, Willoughby, Finau, and Tipene-Leach<sup>14</sup> found that Pacific Island people in general who were living in New Zealand were more likely to be overweight and obese than European New Zealanders, and perceived that a larger body size was acceptable. Likewise, Brewis et al<sup>11</sup> found that Samoans in both Samoa and New Zealand displayed a high level of obesity, but did not perceive themselves to be obese, and were no more likely to be attempting to lose weight compared to their slimmer peers.

Many Tongan males and females have been classified as overweight or obese.<sup>15,16,17</sup> While thin females and muscular males are ascribed positive qualities or traits in Western society, overweight individuals are often stigmatised and discriminated against in many facets of their lives, including education, employment, health care and social settings.<sup>18</sup> What is not clear is the extent to which Tongan adolescents have internalized Western attitudes to obesity, and modified their behaviours to reduce their weight.

The current study was designed to investigate the nature of the messages that Tongans received from influential sociocultural agents about their weight (adults at home, adults at church, media). It also examined levels of body dissatisfaction, as well as the adoption of strategies to lose weight, increase weight and increase muscles.

It was expected that Tongans in Tonga compared to Tongans in New Zealand would receive fewer messages to lose weight, but more messages to increase weight and increase muscles from all of the sociocultural agents. It was also expected that Tongans in Tonga compared to Tongans in New Zealand would have lower levels of body dissatisfaction and strategies to lose weight, but higher strategies to increase weight and increase muscles.

Adolescents with a higher body mass index (BMI) in both groups were expected to receive more messages to lose weight, evidence higher levels of body dissatisfaction, and adopt more strategies to lose weight.

## Method

**Participants**—In total, 598 Tongans living in Nuku'alofa, Tonga (301 males, 297 females), and 388 Tongans living in South Auckland, New Zealand (143 males, 245 females) participated in the study. The weight status and age groups of the participants is summarized in Table 1. All participants were drawn from lower middle class socioeconomic groups.

**Table 1. Number of participants by cultural group, sex, BMI status and age**

Cultural group	N	Females	Mean BMI (SD)	Males	Mean BMI (SD)	Healthy weight	Overweight/obese	<13yrs	14–15yr	>16yrs	Mean age (SD)
Tonga	598	297	25.78 (4.24)	301	22.75 (4.00)	306	292	146	239	213	15.0 (1.84)
New Zealand	388	245	28.20 (5.90)	143	27.75 (5.86)	88	300	86	110	192	15.4 (2.21)

**Table 2. Means and standard deviations for Tongans from Tonga and New Zealand**

Cultural group	Strategies to lose weight				Strategies to increase weight				Strategies to increase muscles			
	Male		Female		Male		Female		Male		Female	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Tonga	10.46	3.87	9.09	3.75	10.92	3.9	9.93	4.11	11.53	3.41	9.69	3.94
New Zealand	8.41	3.19	8.09	2.92	8.41	3.37	7.3	3.18	9.17	3.3	6.62	2.95

**Table 3. Means and standard deviations for messages from adults for Tongans from Tonga and New Zealand**

Cultural group	Male		Female		HW		OW/OB			Male		Female		HW		OW/OB	
	M	SD	M	SD	M	SD	M	SD		M	SD	M	SD	M	SD	M	SD
<i>Adults at school/weight and shape</i>									<i>Adults at school/muscles</i>								
Tonga	6.6	1.22	6.33	1.27	6.63	1.28	6.3	1.21		6.96	1.28	5.64	1.26	6.84	1.35	5.72	1.2
NZ	6.03	1.08	5.79	1.06	5.52	.98	5.91	1.09		5.85	1.12	4.71	.93	4.89	.94	5.16	1.03
<i>Adults at church/weight and shape</i>									<i>Adults at church/muscles</i>								
Tonga	6.48	1.25	5.79	1.24	6.2	1.26	6.0	1.27		6.3	1.29	4.49	1.23	6.36	1.32	5.4	1.18
NZ	5.52	1.04	5.49	1.03	5.22	.96	5.55	1.04		5.25	1.06	4.68	.96	4.5	.87	4.95	1.01

NZ=New Zealand; OW=overweight; OB=obese; HW=healthy weight.

**Table 4. Means and standard deviations for body dissatisfaction for Tongans from Tonga and New Zealand**

	Male		Female		Healthy weight		Overweight/obese		Male		Female		Healthy weight		Overweight/obese		Male		Female		Healthy weight		Overweight/obese	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
	<i>Dissatisfaction with lower body</i>								<i>Dissatisfaction with middle body</i>								<i>Dissatisfaction with upper body</i>							
Tonga	2.43	1.19	2.69	1.43	2.44	1.28	2.69	1.36	2.41	1.26	2.84	1.45	2.47	1.32	2.79	1.42	2.38	1.31	2.5	1.39	2.4	1.35	2.47	1.35
New Zealand	2.57	1.14	2.74	1.27	2.67	1.18	2.66	1.23	2.59	1.15	2.8	1.31	2.57	1.18	2.79	1.28	2.45	1.19	2.47	1.19	2.34	1.13	2.54	1.22
	<i>Dissatisfaction with weight and shape</i>								<i>Dissatisfaction with muscles</i>															
Tonga	2.19	1.3	2.7	1.45	2.05	1.23	2.85	1.45	2.31	1.14	2.78	1.33	2.36	1.22	2.74	1.28								
New Zealand	2.52	1.2	2.49	1.24	2.29	1.17	2.62	1.23	2.61	1.04	2.61	1.13	2.44	1.04	2.7	1.12								

**Materials**—The Body Change Strategies scales were comprised of Body Change Strategies to Lose Weight (4 items), Body Change Strategies to Increase Weight (4 items), and Body Change Strategies to Increase Muscles (4 items). These scales were based on the Body Change Strategies Scales developed by Ricciardelli and McCabe,<sup>19</sup> which have been validated in 1732 Australian adolescents.

Several changes were made to these scales to increase their cultural validity. These changes were based on interviews with Pacific Island adolescents that suggested that they would have difficulty in responding to some of the items. In particular, the two items in each of the original scales that related to cognitions (as opposed to behaviours) about changing body size were deleted. Cronbach's Alpha for these scales ranged from 0.75 to 0.84.

The Body Dissatisfaction Scale was comprised of five items and was developed from modifying the Body Dissatisfaction Scale developed by Ricciardelli and McCabe.<sup>20</sup> These items were changed based on the results of interviews with Pacific Island adolescents that indicated that these two aspects of body size were a focus for Pacific Island adolescents.<sup>18</sup>

The final Body Dissatisfaction Scale was comprised of five items and respondents indicated their level of satisfaction with their weight/shape, muscles, and specific body parts (lower, middle, upper) using a 5-point Likert scale that ranged from 1–very happy to 5–very unhappy. Cronbach's Alpha for this scale ranged between .75 and .81. In the current study, analyses were completed using the separate items of the scale, in order to better understand dissatisfaction with different parts of the body.

Sociocultural Influences Scales were designed to assess the influence of family, church and the media on body image and body change strategies. These scales were based on the Perceived Sociocultural Influences on Body Image and Body Changes Questionnaire.<sup>22</sup> Perceived influences from adults at school and adults at church as potential sources of messages regarding body size were included. These changes resulted from the interviews that demonstrated the importance of these two groups in shaping the body image and body change strategies of Pacific Island adolescent.<sup>23</sup>

The final three scales in the current study were comprised of nine items that assessed the levels of messages from adults at school, adults at church and the media to lose weight (three items), gain weight (three items) and increase muscles (three items)(nine items in total). Separate scales were completed for each of these three sociocultural influences. Respondents rated their answer on a 5-point Likert scale that ranged from 1–never to 5–always. Cronbach's Alpha for these scales ranged from .70 to .73.

**Procedure**—Ethics approval to conduct the study was obtained from Deakin University Ethics Committee, Victorian Department of Education and the Ministry of Education in Tongan and New Zealand.

In Tonga, principals from local schools were approached to provide permission for the students from their school to participate in the study. All schools that were approached agreed to participate. In New Zealand, data were collected from the Churches rather than through the schools (since Tongans only comprise a small percentage of students at school). Since the majority of Tongan adolescents attend church, it was not expected that this would result in a biased sample. Community leaders from three churches agreed to be involved in the study.

For all potential participants, information sheets and consent forms were sent home for parents to provide consent for their adolescent children to complete the questionnaire. In total, nearly all parents in both Tonga and New Zealand provided consent. In both Tonga and New Zealand, students completed the anonymous questionnaire in small well-spaced groups. The surveys took about 30 minutes to complete. All participants' height and weight was measured individually in a private location.

**Analytic strategy**—Group differences in body image and body change strategies were calculated using MANOVA. Regression analyses were utilized to determine predictors of body dissatisfaction and body change strategies for each of the groups (Tongan males, Tongan females), living in either Tonga or New Zealand. The statistical package used to analyse the results was SPSS (Version 15).<sup>24</sup>

## Results

More than 60% of Tongan adolescent living in New Zealand were classified as overweight or obese compared to 49% of the Tongan adolescents in Tonga,  $\chi^2=79.61$ ,  $p<.001$ . More than two-thirds of Tongan females (living in Tonga and New Zealand) were classified as overweight or obese compared to about half of Tongan males,  $\chi^2=46.48$ ,  $p<.001$ .

Tongan females living in New Zealand were more likely to be classified as overweight or obese than Tongan females living in Tonga,  $\chi^2=13.11$ ,  $p<.001$ . This finding also applied for Tongan males living in New Zealand compared to Tongan males living in Tonga,  $\chi^2=69.06$ ,  $p<.001$ . Interestingly, sex was not related to BMI status among Tongans living in New Zealand, but among Tongans living in Tonga, females were more likely to be overweight or obese than males,  $\chi^2=48.28$ ,  $p<.001$ . There were no significant differences in the responses of adolescents from different schools in Tonga, or from different church groups in New Zealand, so the data were pooled across school and church group for the analyses described below.

MANOVA demonstrated that there were main effects on body change strategies for group,  $F(3, 982)=60.12$ ,  $p<.001$ , and sex  $F(3, 982)=31.02$ ,  $p<.001$ . Univariate analyses demonstrated that Tongans in Tonga were more likely than Tongans in New Zealand to engage in strategies to lose weight,  $F(1, 1063)=53.03$ ,  $p<.001$ , increase weight,  $F(1, 984)=112.61$ ,  $p<.001$ , and increase muscles,  $F(1, 984)=144.63$ ,  $p<.001$  (see Table 2). Univariate analyses in relation to sex effects demonstrated that males were more likely than females to engage in strategies to lose weight,  $F(1, 984)=16.50$ ,  $p<.001$ , increase weight,  $F(1, 984)=15.17$ ,  $p<.01$ , and increase muscles,  $F(1, 984)=92.90$ ,  $p<.001$  (see Table 2).

MANOVA demonstrated that there was a significant main effect in terms of messages about their bodies and body dissatisfaction for group,  $F(9, 975)=3.01$ ,  $p<.01$ , sex,  $F(9, 975)=3.40$ ,  $p<.001$ , and BMI,  $F(9, 975)=3.87$ ,  $p<.001$ . Univariate analyses demonstrated that Tongans in Tonga received more messages than Tongans in New Zealand from adults at school about the desirability of having a larger weight/shape,  $F(1, 983)=6.78$ ,  $p<.01$ , and having larger muscles,  $F(1, 983)=19.60$ ,  $p<.001$ . They also received more messages from adults at church about the desirability of having a larger weight/shape  $F(1, 983)=9.87$ ,  $p<.01$ , and about having larger muscles,  $F(1, 983)=16.03$ ,  $p<.001$  (see Table 3).

In terms of gender effects, univariate analyses demonstrated that males received more messages from adults at church to obtain larger muscles,  $F(1, 983)=10.15$ ,  $p<.001$ , whereas females were more dissatisfied with their muscles,  $F(1, 959)=6.39$ ,  $p<.05$ , and with their middle body,  $F(1, 983)=10.62$ ,  $p<.001$  (see Table 3 and 4). In terms of BMI, univariate analyses demonstrated that overweight participants compared to normal weight participants were more dissatisfied with their weight/shape,  $F(1, 983)=27.67$ ,  $p<.001$ , muscles,  $F(1, 983)=10.11$ ,  $p<.01$ , and their middle body,  $F(1, 983)=7.50$ ,  $p<.001$  (see Table 4).

In terms of media messages, there was a significant group effect,  $F(3, 982)=32.68$ ,  $p<.001$ , and sex effect,  $F(3, 982)=17.58$ ,  $p<.001$ . Univariate analyses demonstrated that Tongan adolescents in Tonga reported receiving more messages to lose weight ( $M=8.39$ ,  $SD=3.37$ ) than Tongans in New Zealand ( $M=7.7$ ,  $SD=3.23$ ),  $F(1, 982)=13.35$ ,  $p<.001$ ; increase weight ( $M=7.18$ ,  $SD=3.31$ ) compared to ( $M=5.42$ ,  $SD=2.51$ ),  $F(1, 982)=86.05$ ,  $p<.001$ ; and increase muscles ( $M=8.28$ ,  $SD=3.52$ ) compared to ( $M=6.71$ ,  $SD=2.94$ ),  $F(1, 984)=53.13$ ,  $p<.001$ .

Gender effects indicated that females ( $M=8.27$ ,  $SD=3.53$ ) received more messages from the media than males ( $M=7.85$ ,  $SD=3.05$ ) to lose weight,  $F(1, 984)=5.69$ ,  $p<.05$ ; in contrast, males ( $M=6.94$ ,  $SD=3.11$ ), reported more messages than females ( $M=5.93$ ,

$SD=3.04$ ) to gain weight,  $F(1, 984)=19.10, p<.001$ ; and to increase muscles: males ( $M=8.19, SD=3.43$ ) versus females ( $M=7.06, SD=3.23$ ),  $F(1, 984)=24.42, p<.001$ .

Regression analyses were conducted to determine the extent to which messages from adults at school, the church, media and BMI predicted strategies to lose weight, increase weight and increase muscles. Separate regressions were calculated for Tongan males in Tonga, Tongan females in Tonga, Tongan males in New Zealand, and Tongan females in New Zealand. For Tongan males in Tonga,  $F(4, 296)=2.25, p<.001, R^2=.17$ . Unique variance was explained by messages from adults to lose weight,  $t=3.39, p<.01, \beta=.24$ . For Tongan females in Tonga,  $F(4, 292)=7.97, p<.001, R^2=.20$ . Unique variance was explained by messages from adults to lose weight,  $t=3.39, p<.01, \beta=.27$ . For Tongan males in New Zealand,  $F(4, 138)=2.25, p<.001, R^2=.17$ . Unique variance was explained by messages from the church,  $t=2.21, p<.01, \beta=.17$ , and the media  $t=2.2, p<.05, \beta=.17$ , to lose weight. For Tongan females in New Zealand  $F(4, 240)=8.27, p<.001, R^2=.16$ . Unique variance was explained by messages from adults,  $t=3.8, p<.001, \beta=.35$ , and the church  $t=2.18, p<.05, \beta=.15$ , to lose weight.

Similar results were obtained for strategies to increase weight. For Tongan males in Tonga,  $F(4, 296)=18.63, p<.001, R^2=.24$ . Unique variance was explained by messages from adults at school,  $t=4.52, p<.001, \beta=.31$ , and the media,  $t=.20, p<.05, \beta=.11$ , to increase weight. For Tongan females in Tonga,  $F(4, 292)=6.0, p<.001, R^2=.09$ . There were no significant unique predictors. For Tongan males in New Zealand,  $F(4, 138)=13.34, p<.001, R^2=.29$ . Unique variance was explained by messages from adults,  $t=2.01, p<.05, \beta=.18$ , and church  $t=2.08, p<.05, \beta=.16$ , to increase weight. For Tongan females in New Zealand,  $F(4, 240)=15.29, p<.001, R^2=.26$ . Unique variance was explained by messages from adults at school,  $t=2.87, p<.01, \beta=.23$ , and the media,  $t=3.77, p<.001, \beta=.25$ , to increase weight.

Similar results were obtained for strategies to increase muscles. For Tongan males in Tonga,  $F(4, 296)=10.45, p<.001, R^2=.15$ . Unique variance was explained by messages from adults at school to increase muscle,  $t=4.88, p<.001, \beta=.35$ . For Tongan females in Tonga,  $F(4, 292)=10.42, p<.001, R^2=.15$ . Unique variance was explained by messages from adults at school,  $t=2.5, p<.05, \beta=.18$ , and the church,  $t=2.12, p<.05, \beta=.13$ , to increase muscles. For Tongan males in New Zealand,  $F(4, 138)=13.71, p<.001, R^2=.29$ . Unique variance was explained by messages from the church to increase muscles,  $t=4.48, p<.001, \beta=.34$ . For Tongan females in New Zealand,  $F(4, 240)=21.79, p<.001, R^2=.33$ . Unique variance was explained by messages from adults at school,  $t=3.46, p<.01, \beta=.23$ , and the church,  $t=4.81, p<.001, \beta=.29$ , to increase muscles.

## Discussion

Consistent with previous research<sup>6</sup>, Tongans received messages to obtain a large body; adolescents in Tonga were more likely to receive these messages than Tongan adolescents in New Zealand. This may be due to Tongan adults and adolescents in New Zealand being more exposed to Western media, and so not as strongly adopting the traditional cultural ideal of valuing a larger body.<sup>14</sup> Once people migrate to Western societies from traditional societies they are more likely to be influenced by Western values.<sup>6</sup> It may also be due to the fact that Tongans in New Zealand were more likely to be overweight than Tongans in Tonga (77% as opposed to 49%).

Interestingly, females were more dissatisfied with their muscles and their middle body than males, although males were more likely than females to receive messages to obtain larger muscles. Previous research has demonstrated that Tongan males are focused on their upper body, but not on their middle and lower body.<sup>34</sup>

The large body ideal appears to apply to both males and females, but males are more satisfied with their bodies than females. This is in contrast to previous research that demonstrates that Western ideals for females are slim and lean,<sup>25</sup> and certainly needs to be explored further in this population to determine the meaning of a large body build for females. However, consistent with past research, the media, which was primarily Western media, was reported to provide more messages to females to lose weight, whereas the messages for males were more likely to be related to gaining weight and increasing muscles.

The results of this study demonstrated that the level of overweight or obesity is extremely high among Tongan adolescents. This is particularly the case for Tongans living in New Zealand. These results are consistent with previous research,<sup>17</sup> but extend this research to examine the prevalence of overweight and obesity among Tongans in both Tonga and New Zealand.

It was interesting to note that although females overall were more likely to be overweight or obese, this effect was primarily due to females in Tonga being twice as likely to be overweight or obese compared to Tongan males. These gender differences were not evident in New Zealand, with over 75 percent of both male and female Tongan adolescents in New Zealand being overweight or obese. Clearly, further research is necessary to determine the causes of these high levels of overweight or obesity, and the reasons for the gender differences in Tonga. It is likely that the findings relate to the types and volumes of food consumed as well as levels of physical activity.

Overweight adolescents were more dissatisfied with their bodies than normal weight adolescents. This is surprising, given the focus in Tongan society on the value of a larger body.<sup>9</sup> However, the extremely high percentage of adolescents who were overweight or obese is likely to contribute to health risks, particularly for Tongan adolescents in New Zealand. Shoko et al.<sup>16</sup> also found that a high percentage of Tongans in Tonga were overweight or obese.

Of concern was the finding by<sup>16</sup> that, although this high BMI for males was not strongly correlated with fat mass, for females there was a strong correlation between fat mass and BMI. Craig et al.<sup>15</sup> suggested that the same cut off scores for obesity should not be used for Tongan and Caucasian populations. They suggested that for adult Tongan men, the cut off for overweight and obesity should be a BMI of 27.5 and 35.8 respectively, whereas the equivalent cut offs for Tongan women should be 28.8 and 35.1. Even if these cut-off scores were changed, a large proportion of adolescents in the current sample would still be overweight or obese. Further research needs to be conducted to determine appropriate cut-off scores for overweight and obesity among Pacific Island adolescents.

Adolescents in both Tonga and New Zealand are increasingly exposed to Western media that places a high value on a slim ideal for females, and a lean muscular ideal for males.<sup>6</sup> There is a focus among Tongans to look like film stars and celebrities.<sup>9</sup> Perhaps this exposure has led to changes in the type of body desired by Tongan adolescents, and so if they are overweight they evidence body dissatisfaction. These findings may also relate to

the high level of publicity that has associated obesity with health problems,<sup>10</sup> and so the desire by participants to lose weight, as well as increase weight and muscles.

Tongans in Tonga were more likely than Tongans in New Zealand to adopt strategies to lose weight, increase weight and increase muscles. It would appear that Tongans in Tonga still want to maintain a large body size that is valued within their society,<sup>10</sup> but also lose weight because of messages from the media about a healthier body size. Although it appears contradictory for adolescents to be adopting all three of these body change strategies, it is possible that they want to build up their muscles, but reduce body fat: these adolescents appear to be striving for a leaner, muscular body, with lower levels of body fat. This is more likely to be the goal of males, since they were more likely than females to engage in the three body change strategies, and so be attempting to both lose weight and increase muscle tone.

The main predictors of all of the body change strategies were messages from adults, and to a lesser extent from the church, for the adolescents to change their bodies. This applied for both males and females, in both countries. Thus it would appear for these adolescents that the family and church, but not the media, were more likely to predict the body change strategies they adopted.

The results from this study need to be explored further in future research to determine the extent to which Tongans in both countries are still influenced by the cultural ideal of a large body, and so how this ideal is shaping the body image and body change strategies of adolescents in both countries. Further sources of information about the sociocultural messages received by Tongans from both countries need to be investigated. For example, the influence of the peer group on messages to lose weight and increase muscles needs to be investigated.

The motivation of Tongans in both countries to adopt the various strategies to change their body size and shape also needs to be explored to determine the extent to which these body change strategies are motivated by health, as opposed to striving for the Western ideal of a slim, toned body.

**Competing interests:** None.

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