

The influence of body-related-beliefs on sportsmen's body image and muscle dysmorphia: The role of body malleability

Greg Décamps

University of Bordeaux

Sophie Berjot

University of Reims

Romain Simon

Military Medical Centre of

Pau-Bayonne-Tarbes

Martin Hagger

Curtin University

Recent studies on body image have focused on male body dissatisfaction (Baghurst, Hollander, Nardella, & Haff, 2006; Blond, 2008; McCabe & Ricciardelli, 2004; Mosley, 2009). In this area, Pope, Phillips, and Olivardia (2009) suggested muscle

dysmorphia as a specific kind of dysmorphophobia centered on body shape, including ideas that the body is not shaped or thin enough, with excessive involvement in physical activity and preoccupations with dieting. This trouble, sometimes described in terms of bigorexia (Mosley, 2009) has been reported in more than 10% of bodybuilders (Pope et al., 2000), and is explained by the high prevalence of unrealistic male body images (Baghurst et al., 2006; Blond, 2008; Jonason, Krcmar, & Sohn, 2009). This result also led Pope et al. (2000) to propose the concept of the 'Adonis complex'. Contrary to women, whose body dissatisfaction is generally related with weight concerns (especially weight loss), the specificity of muscle dysmorphia described in the Adonis complex in men relies more on the desire to improve body shape and to increase muscle size rather than to lose fat (McCabe & Ricciardelli, 2004; Olivardia, Pope, Borowiecki, & Cohane, 2004). Thus, involvement in sport should be considered as both a consequence and a predictor of body dissatisfaction.

However, the links between sport and body dissatisfaction remains unclear, which some research suggesting it is associated with greater body satisfaction (Hausenblas & Fallon, 2002; Weaver & Byers, 2006) whereas others showed that it might be

linked with negative perceptions of the body (Davies, Kennedy, Ravelski, & Dionne 1994; Olivardia et al., 2004). Such inconsistencies might be explained by social or motivational factors (Baghurst et al., 2006), while the body weight literature also suggests that body-related-beliefs, and especially implicit theories, should be taken into account. (Schunk, 1995). Burnette (2010) reports that individuals can form entity (fixed) or incremental (fluid) beliefs about their weight and their body. According to Burnette (2010) people with entity beliefs are less likely to be involved in attempts to diet in order to lose weight. Conversely, people who view their bodies as malleable can be involved in excessive physical activity and experience muscle dysmorphia, even while holding negative body perceptions. Then, this study aims at testing the relationship between body image, body malleability and muscle dysmorphia amongst sportsmen.

Methods

Participants were 137 male sportsmen (mean age = 27.4, SD = 1.8) involved in 26 different sport disciplines and recruited from two regional sports training centers located in the south-west of France. Sampling was based on previous agreement of the heads the training centers before presenting the objectives of the study to the sportsmen during annual systematic medical examination. No randomization was used in the sampling procedure, but sportsmen had to be eighteen years old or older to be involved in the study. Athletes who decided to participate signed a consent form and the researchers ensured that the anonymity regarding

Table 1

Descriptive statistics and correlation coefficients for Body Image, Body Malleability and Muscle Dysmorphia

	Descriptive statistics				Correlation coefficients (p.value)		
	Mean	Stand. Dev	Min	Max	BI	BM	MD
Body Image BI	70.8	8.62	43	90	1.00		
Body Malleability BM	35.45	7.11	17	48	.211 (.013)	1.00	
Muscle Dysmorphia MD	44.96	15.18	6	95	-.085 (.325)	.271 (.001)	1.00

the collected data was fully respected. Then, participants were presented with a questionnaire containing standardized measures of body image, body malleability beliefs and muscle dysmorphia and completed the measures during medical examination. According to the French legal system, ethical approval is not required in studies using non-invasive methods, such as self-report surveys.

The body image questionnaire from Koleck, Bruchon-Schweitzer, Cousson-Gélie, Gilliard, and Quintard, (2002) was used to measure general body perceptions. Participants responded to the 19 items¹ on a 5-point Likert-type scale proposing two opposite body descriptors. High scores correspond to positive perceptions of the body. The alpha reliability for this scale was satisfactory ($\alpha = 0.87$).

Implicit theories about the body related to the concept of malleability were assessed with Burnette's questionnaire (2010) adapted from Dweck's, Chui's and Hong's measure for intelligence implicit theories (1995). The 8 items² of the questionnaire are scored on a 6-point Likert-type scale ranging from 1 (really not agree) to 6 (totally agree), high scores corresponding to incremental beliefs (body malleability). This scale exhibited high internal consistency ($\alpha = 0.94$).

The Male Body Dissatisfaction Scale (Ochner, Gray, & Brickner, 2009) was used to measure

¹ Items such as : "Physically attractive vs Physically unattractive" or "Bad health vs Healthy"

² Items such as : "Your body weight is something about you that you can't change very much" or "No matter who you are, you can significantly change your body weight"

³ Items such as : "I worry about being more muscular" or "I am hesitant to take my shirt off in public because people will look at my body"

participants' scores of muscle dysmorphia. The Cronbach alpha calculated across the 25 items³ (5-point-Likert-scales) was satisfactory ($\alpha = 0.90$).

Results

Descriptive statistics and correlation coefficients for Body Image, Body Malleability and Muscle Dysmorphia (MD) are provided in Table 1. Moderated hierarchical regression analysis was used to test the influence of body image on muscle dysmorphia and the moderation of that relationship by body malleability. Prior to analysis, independent variables were standardized in accordance with the recommendations of Aiken and West (1991) to avoid the multicollinearity associated with using interaction terms in regression equations. With muscle dysmorphia as the dependent variable, the scores of body image and body malleability were entered as predictors in the first step of the analysis. In the second step, an interaction term representing the multiplicative composite of body image and body malleability was included as a predictor.

Results indicated that body malleability ($\beta = 0.302, p < .001$) was a significant predictor of muscle dysmorphia in the first step of the analysis. In the second step of the analysis, a significant negative interaction between body image and body malleability on muscle dysmorphia ($\beta = -0.167, p < .05$) was found. These results, including β values, t test statistics, p. values and adjusted R squared are presented in Table 2.

Simple slopes analyses (Aiken & West, 1991) were

Table 2
Results of the moderated hierarchical regression analysis

Step	β	t	p-value	Adjusted R ² for model
1 Body Image BI	-.149	-1.766	.080	.081
Body Malleability BM	.302	3.595	.000	
2 Interaction BI x BM	-.167	-2.011	.046	.101

used to decompose the nature of these interactions and are presented in Table 3. We computed slopes for the regression of body image on muscle dysmorphia at three levels of body malleability: the mean and one standard deviation above and below the mean. Then considering the moderation of the body image-muscle dysmorphia relationship by body malleability, unstandardized regression coefficients for muscle dysmorphia were significantly different from zero for high levels of body malleability alone ($\beta = -0.286, p < .01$), but not low and medium levels. The slopes illustrating this result are presented in Figure 1. For people with high body malleability beliefs, a negative perception of the body predicts muscle dysmorphia, whereas this is not the case for low and medium levels of body malleability.

Discussion

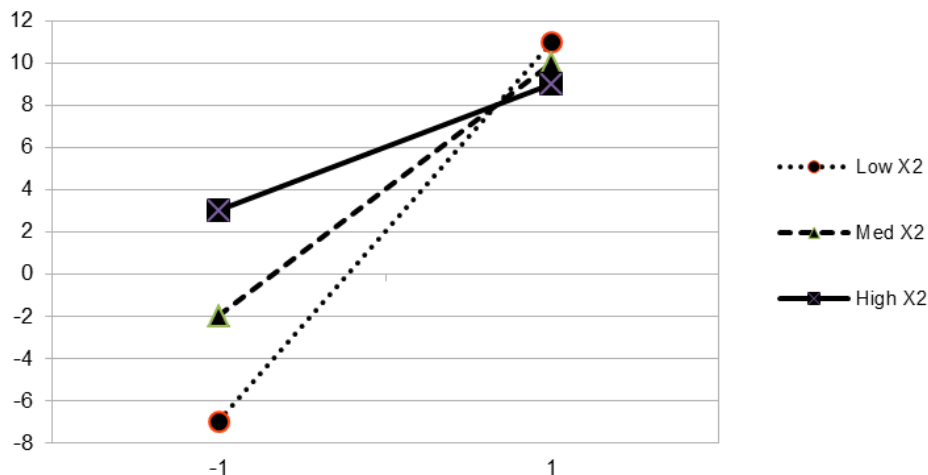
These results suggest that body malleability should not be considered as a systematic protective factor against health issues (Dweck et al., 1995): if its positive influence has been demonstrated in the context of weight loss (Burnette, 2010), our findings

show that body malleability might also be considered as a vulnerability factor when considering the risks for body image disorders such as muscle dysmorphia. However, our findings support Burnette's results (2010) concerning the influence of specific beliefs on diet intentions, and can be extended to other activities such as excessive physical activity. Nevertheless, this association merits further investigation. One possible avenue would be to examine the relations between body image, body malleability and several measures referring to the principal consequences related to muscle dysmorphia such as addiction to sport practice (Hausenblas & Down, 2001), self-esteem and depression (Olivardia et al., 2004) or specific eating disorders (Davis, Kennedy, Ravelski, & Dionne, 1994). Moreover, if our findings are helpful when considering the predictive factors of muscle dysmorphia, further research remains necessary in order to determine if other psychological variables can explain the relationship. Integrative models including psychological, medical and social factors would provide a more comprehensive picture. The results suggest that specific interventions should be offered to sportsmen with high levels of body

Table 3
Results of the Simple slopes analysis for the regression of body image (X1) on muscle dysmorphia (Y) at three levels of body malleability (X2)

X2 Label	X2 value	Slope between X1 and Y at this value	Slope standard error	t statistic	df	p-value
Low	-1	9	1,612	5,581	96	2,21E-007
Medium	0	6	1,414	4,242	96	5,09E-005
High	1	3	1,483	2,022	96	0,045

Figure 1. Illustration of the Simple Slopes Analysis for the three levels of Body Malleability (X2): Low, Medium, High



malleability who are unsatisfied with their own body. Such a treatment should focus on cognitive and/or behavioral interventions in order to change negative body perceptions to positive and minimize the risks of muscle dysmorphia. The positive benefits of such interventions would merit further examination in longitudinal studies based on different specific sports. The results of this study contribute to a better understanding of male body image disorders including beliefs and self-perceptions.

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Greg Décamps

Department of Psychology,
University of Bordeaux, France
greg.decamps@u-bordeaux.fr



Sophie Berjot

Department of Psychology,
University of Reims, France
sophie.berjot@univ-reims.fr



Romain Simon

Health Service of the Army,
Military Medical Centre of Pau-
Bayonne-Tarbes, France
simon.romain.psy@live.fr



Martin Hagger

School of Psychology and Speech
Pathology, Curtin University,
Australia
Martin.Hagger@curtin.edu.au