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**Relationships among Muscle Dysmorphia Characteristics, Body Image-Quality of Life,  
and Coping in Males**

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1

2 **Relationships among Muscle Dysmorphia Characteristics, Body Image-Quality of Life,**

3

**and Coping in Males**

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1 **Abstract**

2 *Objectives:* The purpose of this study was to examine relationships among bodybuilding  
3 dependence, muscle satisfaction, body image-related quality of life and body image-related  
4 coping strategies, and test the hypothesis that muscle dysmorphia characteristics may predict  
5 quality of life via coping strategies.

6 *Design:* Participants (294 males,  $M_{age} = 20.5$  years,  $SD = 3.1$ ) participated in a cross-sectional  
7 survey.

8 *Methods:* Participants completed questionnaires assessing muscle satisfaction, bodybuilding  
9 dependence, body image-related quality of life and body image-related coping.

10 *Results:* Quality of life was correlated positively with muscle satisfaction and bodybuilding  
11 dependence but negatively with body image coping ( $p < .05$ ). Body image coping was  
12 correlated positively with bodybuilding dependence and negatively with muscle satisfaction  
13 ( $p < .05$ ). Mediation analysis found that bodybuilding dependence and muscle satisfaction  
14 predicted quality of life both directly and indirectly via body image coping strategies (as  
15 evidenced by the bias corrected and accelerated bootstrapped confidence intervals).

16 *Conclusions:* These results provide preliminary evidence regarding the ways that muscularity  
17 concerns might influence body image-related quality of life.

18

19 *Keywords:* Body image, Size perception, Weight training, Resistance training, Self-  
20 Assessment, Appearance

21

## 1 *i. Introduction*

2           Researchers recognize that muscularity is typically a concern among males  
3 dissatisfied with their bodies.<sup>1</sup> Muscle dysmorphia has been proposed as an extreme  
4 expression and involves individuals' preoccupations that they are insufficiently large and  
5 muscular.<sup>2</sup> Associated with such preoccupations are behaviours aimed at increasing size and  
6 definition, including excessive weightlifting, restrictive diet manipulation and illicit  
7 appearance and performance-related drug use.<sup>2</sup> Researchers have studied both individuals  
8 diagnosed with the condition and people not diagnosed with the disorder, but who may  
9 display characteristics to varying levels.<sup>3,4</sup> Both foci have value. Understanding, for example,  
10 how symptoms interact with other variables in non-clinical populations may help identify at-  
11 risk individuals. Although existing studies have focused on relationships between variables,  
12 researchers have not typically examined mediation issues or investigated the possibility that  
13 muscle dysmorphia characteristics may be related to other variables via multiple pathways.  
14 The novel aspects of the current study involved (a) exploring how the relationship muscle  
15 dysmorphia characteristics have with body image-related quality of life might consist of both  
16 direct and indirect pathways and (b) the involvement of body image-related coping strategies  
17 as mediators of the indirect pathway. Body image-related quality of life refers to the extent  
18 that a person's cognitive representation of their body influences their quality of life (e.g., men  
19 who believe they are insufficiently muscular may avoid social situations, so others do not see  
20 their perceived inadequacy, thereby missing out on social interaction and social support).

21           To date, one study has measured muscle dysmorphia and quality of life and yielded  
22 significant and non-significant results.<sup>5</sup> Pope et al.<sup>5</sup> employed one general quality of life  
23 measure (the Quality of Life Enjoyment Satisfaction Questionnaire, QLESQ) and three Short  
24 Form-36 Health Survey subscales (relating to the mental health, emotional, and social  
25 functioning domains). Results indicated significant differences between male body

1   dysmorphic disorder patients with and without muscle dysmorphia on the QLESQ and SF-36  
2   mental health subscale (men with muscle dysmorphia had lower scores), but not with the  
3   other assessments. One way to explore Pope et al.'s<sup>5</sup> findings and possibly strengthen  
4   understanding of the relationship may be to use a measure that assesses quality of life  
5   domains known to be influenced by body image disturbances such as muscle dysmorphia.  
6   One such measure is the Body Image Quality of Life Inventory<sup>6</sup> which assesses the extent  
7   body image is perceived to influence quality of life. Also, muscle dysmorphia is a  
8   multifaceted condition and greater detail might emerge if researchers examine the  
9   relationships individual characteristics have with quality of life as opposed to the global  
10   measure Pope et al.<sup>5</sup> employed.

11         Similarly, muscle dysmorphia has been correlated with behaviours, including exercise,  
12   steroid use, muscle checking and appearance control,<sup>3,7,8</sup> that may represent broader  
13   approaches to coping, some of which might be adaptive and some maladaptive. Cash, Santos  
14   and Williams,<sup>9</sup> for example, identified three body image coping categories. Avoidance  
15   coping refers to attempts to leave or evade stressful body image situations, such as males who  
16   do not shower at a gym after working out so they do not reveal their bodies to others.  
17   Appearance fixing coping involves altering appearance to disguise perceived defects, such as  
18   males who wear oversized clothing to hide their body shapes. Positive rational acceptance  
19   coping includes strategies encouraging acceptance of the defect, self-care or rational self-talk,  
20   such as males who refute negative thoughts by telling themselves they are healthy despite not  
21   being the shape they prefer. Avoidance and appearance fixing coping might be interpreted as  
22   maladaptive strategies, because they do not address individuals' beliefs. Positive rationale  
23   acceptance, however, is an adaptive strategy because the focus is on individuals confronting  
24   or changing their perceptions regarding inadequacy. To date, these coping strategy categories  
25   have not been examined as mediators through which muscle dysmorphia characteristics

1 might predict other outcomes, including quality of life, but doing so may advance knowledge  
2 and identify ways to help people with muscularity concerns, such as helping them to use  
3 adaptive rather than maladaptive strategies.<sup>9</sup> We hypothesized that coping strategies would  
4 mediate the relationship between muscle dysmorphia characteristics and quality of life. First,  
5 coping strategies represent ways people try to deal with their perceptions regarding  
6 muscularity inadequacy, and second, the influence those coping strategies have on their daily  
7 functioning and interactions may alter their perceived quality of life. This involvement of  
8 coping strategies is in addition to direct relationships between muscle dysmorphia and quality  
9 of life.

10 In summary, the purposes of the current study were to (a) explore relationships  
11 muscle dysmorphia characteristics have with body image-related quality of life and coping  
12 strategies, and (b) examine if muscle dysmorphia symptoms predict quality of life via direct  
13 and indirect pathways (see Figure 1). In Figure 1,  $c$  represents the direct pathway between  
14 muscle dysmorphia and quality of life, whereas  $a \times b$  represents an indirect pathway and  
15 according to Hayes,<sup>10,11</sup> a significant indirect pathway would be interpreted as muscle  
16 dysmorphia predicting quality of life via a coping strategy. We hypothesized that muscle  
17 dysmorphia characteristics would be correlated with body image-related quality of life and  
18 coping strategies. We also hypothesized that there would be significant indirect pathways  
19 from muscle dysmorphia characteristics to body image-related quality of life via body image-  
20 related coping strategies. Given Pope et al.'s<sup>5</sup> significant and non-significant results, and  
21 because we were separating indirect and direct pathways, we made the hypotheses 2-tailed.

## 22 *ii. Methods*

23 Before starting the study, we obtained institutional human research ethics committee  
24 approval. Prior to participating, volunteers received a written explanation of the study's  
25 purpose, risks, safeguards and benefits before signing informed consent documents.

1 Participants included 294 males ( $M_{age} = 20.5$  years,  $SD = 3.1$ ) who weight trained 2.5 ( $SD =$   
2 1.7) times a week, who had weight trained regularly for 2.47 ( $SD = 2.40$ ) years and of whom  
3 69% were consuming nutritional supplements. In an open ended question regarding ethnicity  
4 91% described themselves as White British, 6.5% were grouped together as other, and 2.5%  
5 did not respond. These males weight trained for various reasons, ranging from recreational  
6 lifters to competitive athletes and bodybuilders. Participants were approached in small  
7 groups or individually in various locations as we came into contact with them during data  
8 collection via several channels (e.g., our networks and recommendations, although we did not  
9 approach close friends with whom there may have been a conflict of interest). As such they  
10 represent a sample of convenience, rather than a group randomly selected from a specified  
11 population, although all participants were regular weight trainers (at least once a week) from  
12 a midlands town in the United Kingdom. Individuals received a packet containing the  
13 information sheet, written informed consent form, and paper versions of the questionnaires  
14 presented in a counterbalanced fashion to avoid order effects. Participants completed the  
15 questionnaires anonymously in approximately 10 minutes.

16 Participants completed the bodybuilding dependence and muscle satisfaction  
17 subscales of the Muscle Appearance Satisfaction Scale (MASS), the Body Image Quality of  
18 Life Inventory (BIQLI), the Body Image Coping Strategies Inventory (BICSI) and a  
19 demographic questionnaire. The demographic questionnaire recorded age, self-described  
20 ethnicity, number of years weight training experience, weight training frequency, reasons for  
21 weight training, and consumption of nutritional supplements to help describe the sample.

22 The bodybuilding dependence subscale has 5 items<sup>12</sup> and the muscle satisfaction  
23 subscale has 3 items and they are rated on a 5-point Likert scale, from 1 (definitely disagree)  
24 to 5 (definitely agree). An example bodybuilding dependence item is “I often feel like I am  
25 addicted to working out with weights.” An example muscle satisfaction item is “I am



1 satisfied with the size of my muscles.” High scores indicate greater bodybuilding dependence  
2 and muscle satisfaction. Evidence exists for the subscales’ internal consistency and test-  
3 retest reliability, along with construct, divergent and convergent validity.<sup>12</sup> In the current  
4 study, Cronbach’s alpha for bodybuilding dependence was .88 (95% Confidence Intervals [CI]  
5 = .86-.90) and .80 (95% CI = .76-.84) for muscle satisfaction.

6 The BIQLI lists 19 life domains (e.g., relationships, emotions, grooming activities).  
7 Participants rate the influence of their body image on each domain using a 7-point bipolar  
8 scale from -3 (very negative effect) to +3 (very positive effect) allowing for a negative,  
9 positive or neutral influence. The BIQLI yields a total overall score and high scores reflect a  
10 greater positive influence of body image on quality of life. Evidence exists for the BIQLI’s  
11 reliability and validity.<sup>6,13,14</sup> The Cronbach’s alpha in the current study was .93 (95% CI  
12 = .92-.94).

13 The BICSI has 29 items assessing avoidance, appearance fixing and positive rational  
14 acceptance.<sup>9</sup> Participants respond on a 4-point Likert-type scale from 1 (definitely not like me)  
15 to 4 (definitely like me). Higher scores indicate greater engagement in these strategies.  
16 Appearance fixing has 10 items and one example is “I spend extra time trying to fix what I  
17 don’t like about my looks.” Avoidance has 8 items and one example is “I withdraw and  
18 interact less with others.” Positive rationale acceptance has 11 items and an example is “I tell  
19 myself that I probably look better than I feel that I do.” Evidence exists for the reliability and  
20 validity of the BICSI.<sup>9,14</sup> The current Cronbach’s alpha for appearance fixing was .89 (95%  
21 CI = .87-.91), avoidance was .70 (95% CI = .64-.75) and rational acceptance was .80 (95% CI  
22 = .76-.83).

23 There was less than 2% missing data and Little’s test indicated they could be  
24 considered missing completely at random. The hot deck approach was the imputation  
25 method used in the current study.<sup>15</sup> Pearson’s correlation coefficients, corrected for scale

1 unreliability, were calculated (correction involves adjusting the correlation values based on  
2 the Cronbach's alpha values<sup>16</sup>). Hayes'<sup>10,11</sup> regression-based mediation analysis guidelines  
3 and PROCESS macro for SPSS (<http://afhayes.com/>) were implemented to test the direct and  
4 indirect pathways. Hayes'<sup>10,11</sup> procedures are accepted as suitable for answering questions  
5 such as those posed in the current study. The procedures involve estimating a series of  
6 multiple regression equations from which the independent direct and indirect effects are  
7 calculated. The effects represent regression coefficients obtained from the multiple  
8 regression equations. Full details of these procedures are described by Hayes.<sup>10,11</sup> In keeping  
9 with Hayes'<sup>10,11</sup> guidelines, 95% bias corrected and accelerated bootstrapped confidence  
10 intervals were used to determine if the effects were statistically different from zero.  
11 Bootstrapped confidence intervals do not require the assumptions of homoscedasticity or  
12 residual normality to be satisfied and are considered more suitable and powerful indicators  
13 than traditional inferential tests.<sup>10,11,17</sup>

14 Prior to the main analysis, regression diagnostics were computed to assess the  
15 presence of bias in the results and to assess the satisfaction of regression assumptions. There  
16 was no evidence of predictor multicollinearity, because tolerance values were well above 0.2  
17 and variance inflation factor values were close to 1.<sup>17</sup> Cook's and Mahalanobis distances  
18 were inside cut-off values indicating no influential cases and these values, along with residual  
19 plots, indicated no obvious outliers.<sup>17</sup> The Durbin-Watson tests were non-significant  
20 indicating that residuals were independent.

### 21 *iii. Results*

22 Table 1 presents the means, standard deviations and correlations among the variables.  
23 Greater body image influenced quality of life was associated with greater bodybuilding  
24 dependence, higher muscle satisfaction, but less engagement in body image-related coping  
25 (i.e., appearance fixing, avoidance and rational acceptance). Greater engagement in any one

1 of the body image coping strategies was associated with more use of the other two methods.  
2 Greater engagement with any of the coping strategies was associated with more bodybuilding  
3 dependence but with lower muscle satisfaction.

4 Table 2 presents the results from the main mediation analysis. After accounting for  
5 each coping strategy, bodybuilding dependence and muscle satisfaction were significant  
6 direct predictors of body image-related quality of life ( $P < 0.005$ ). Bodybuilding dependence  
7 also predicted (negatively) quality of life via each of the 3 indirect pathways containing one  
8 of the coping strategies, as indicated by the bootstrapped 95% confidence intervals not  
9 including zero. Muscle satisfaction also predicted quality of life via the indirect pathway that  
10 contained avoidance coping.

#### 11 *iv. Discussion*

12 Results indicated that bodybuilding dependence and muscle satisfaction predicted  
13 body image quality of life directly and indirectly via body image coping. After accounting  
14 for the direct pathway, all three coping strategies provided a negative indirect pathway  
15 between bodybuilding dependence and quality of life. The one indirect pathway between  
16 muscle satisfaction and quality of life involved avoidance coping.

17 These results advance current knowledge by revealing that the relationship muscle  
18 dysmorphia characteristics have with quality of life may be complex and they conform to  
19 mediation theory postulates.<sup>10,11</sup> First, variables (e.g., muscle dysmorphia characteristics)  
20 may predict other variables (quality of life) via multiple pathways. Further, these different  
21 pathways may be in opposite directions,<sup>10,11</sup> as in the current study. For example,  
22 bodybuilding dependence was associated directly and positively with increased body image-  
23 influenced quality of life, perhaps because participants believed they were actively improving  
24 their physiques and were attaining, or expected to attain, benefits associated with an ideal  
25 physique (e.g., securing sexual partners).<sup>1</sup> At the same time, however, if bodybuilding

1 dependence elicits increased maladaptive body image coping (e.g., avoidance behaviours)  
2 then its indirect pathways to quality of life may be negative. For example, greater levels of  
3 bodybuilding dependence were associated with greater engagement in avoidant behaviour or  
4 appearance fixing and participants may have perceived that their need to engage in these  
5 strategies had a negative influence on their quality of life (e.g., feeling unhappy about  
6 removing one's shirt in hot weather because of anxiety associated with other people viewing  
7 one's upper body).

8         These findings may help explain Pope et al.'s<sup>5</sup> significant and non-significant results.  
9 Pope et al.'s<sup>5</sup> findings may have been due, at least partly, to not assessing the various  
10 pathways between the constructs. Depending on the sample or situation, different pathways  
11 may be more salient than others. In addition, Pope et al.<sup>5</sup> used a global assessment of muscle  
12 dysmorphia. Muscle dysmorphia, however, represents a cluster of characteristics and each  
13 may relate to quality of life in different ways. Regarding future research, investigators could  
14 use qualitative or thought listing designs to examine the perceptions and cognitions  
15 associated with the muscle dysmorphia characteristics and quality of life relationships. Also,  
16 measures that examine multiple characteristics of the condition may advance understanding.

17         In contrast, muscle satisfaction had a positive direct relationship with quality of life  
18 and also a positive indirect relationship via avoidance coping. There is evidence to help  
19 interpret these findings. Similar with bodybuilding dependence discussed above, greater  
20 muscle satisfaction may be viewed by males as contributing to their quality of life. They may  
21 feel they are more likely to attain the desired benefits because they have, or are developing, a  
22 body closer to the ideal physique than they did previously or compared to other males with  
23 whom they are competing.<sup>1</sup> Regarding the positive indirect relationship via avoidance coping,  
24 previous research has found that some males who weight train may be selective in who they  
25 reveal their bodies to, because they fear being assigned negative labels (e.g., "freak") or

1 accused of using steroids when they are not consuming such substances.<sup>18,19</sup> Such inaccurate  
2 accusations regarding steroid use arise from misperceptions among uninformed people in the  
3 general population regarding steroid use. It is conceivable that individuals, who might  
4 otherwise be satisfied with their physiques (representing the positive direct relationship  
5 observed above), may engage in avoidance behaviour in certain circumstances to avoid  
6 negative labels, and perceive that the adjustments they have to make contribute to their  
7 quality of life because they avoid negative consequences. Again, the multiple pathways  
8 between muscle satisfaction and quality of life are plausible within mediation theory,<sup>10,11</sup> and  
9 further reinforce that the relationship between muscle dysmorphia characteristics and quality  
10 of life is multifaceted.

11 The current sample consisted of regular weight trainers and the study is similar to  
12 muscle dysmorphia research in which people not diagnosed with the condition have been  
13 participants. The value of such studies is the possibility of developing knowledge that helps  
14 identify individuals at-risk of developing the condition. Based on the current study, for  
15 example, males unhappy with the quality of their lives, because of muscularity concerns, may  
16 be at-risk of developing muscle dysmorphia.

17 The current findings provide suggestions for future research on muscle dysmorphia  
18 beyond body image-related quality of life and coping. Relationships muscle dysmorphia  
19 characteristics have with other variables may also be represented by multiple pathways.  
20 Researchers could examine alternative pathways by which variables related with muscle  
21 dysmorphia mediate and moderate each other. Such investigations will add depth to current  
22 understanding by assessing the degree to which relationships between muscle dysmorphia  
23 and other variables consist of multiple and conflicting pathways.

24 Causality cannot be inferred from the results due to a descriptive design. This is a  
25 common limitation across the muscle dysmorphia literature and one not easily avoided, often

1 for sound reasons. It would be unethical for researchers to encourage muscularity concerns  
2 in participants to observe the detrimental consequences, when effects include drug abuse and  
3 social dysfunction. Given experimental research is unethical, descriptive research represents  
4 the best evidence available to guide theory development. Although research will continue to  
5 be mostly descriptive, employing various types of descriptive studies (e.g., longitudinal,  
6 qualitative) will help address limitations inherent in each design.

#### 7 *v. Conclusions*

8         Investigators have developed an impressive body of knowledge about the perceptions  
9 males have regarding their muscularity. The current study has found the relationship muscle  
10 dysmorphia characteristics have with quality of life is multifaceted. Muscle dysmorphia  
11 characteristics may influence people's lives in multiple ways, and people exhibiting these  
12 characteristics may interpret these influences positively or negatively. Such findings have  
13 applied value for mental health care professionals. Assistance or prevention strategies based  
14 on simple relationships between variables may not be effective when muscularity-focused  
15 issues may be related to quality of life and other consequences (e.g., drug use) via multiple  
16 and conflicting pathways. The best help will consider the various ways by which muscularity  
17 concerns influence people's lives.

#### 18 *vi. Practical Implications*

- 19         • Attempts to help males with their muscularity concerns need to be multifaceted
- 20         • Helping males realize that overemphasizing appearance can degrade quality of life  
21             may assist them in reassessing their desires for an ideal muscular physique
- 22         • Muscular dissatisfaction prevention programmes may benefit from educating males  
23             about adaptive coping strategies for dealing with their concerns, such as those  
24             associated with rational acceptance (e.g., cognitive restructuring)

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26

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1 **viii. References**

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1 **ix. Tables**

2

3 Table 1

4 *Means ( $\pm$  SD) and Correlations among the Variables*

	Mean	SD	1	2	3	4	5
1. BIQoL	1.41	0.84					
2. AF	1.28	0.65	-.13 <sup>a</sup>				
3. A	0.80	0.46	-.43 <sup>a</sup>	.48 <sup>a</sup>			
4. RA	1.36	0.49	-.14 <sup>a</sup>	.53 <sup>a</sup>	.63 <sup>a</sup>		
5. BD	2.43	1.03	.14 <sup>a</sup>	.46 <sup>a</sup>	.22 <sup>a</sup>	.26 <sup>a</sup>	
6. MS	2.83	0.88	.24 <sup>a</sup>	-.33 <sup>a</sup>	-.20 <sup>a</sup>	-.11 <sup>a</sup>	.10

5 Note: <sup>a</sup> $P < .05$ ; A = avoidance, AF = appearance fixing, BD = bodybuilding dependence,

6 BIQoL = body image quality of life, MS = muscle satisfaction, RA = rational acceptance

7

1 Table 2  
 2 *Direct and Indirect Effects of Bodybuilding Dependence and Muscle Satisfaction on Body*  
 3 *Image-related Quality of Life*

	Effect (SE)	95% CI
<b>Bodybuilding Dependence</b>		
Appearance Fixing		
Direct BD effect	0.172 <sup>a</sup> (0.053)	0.068-0.276 <sup>b</sup>
Indirect AF effect	-0.068 (0.027)	-0.128--0.020 <sup>b</sup>
Avoidance		
Direct BD effect	0.154 <sup>a</sup> (0.046)	0.062-0.245 <sup>b</sup>
Indirect A effect	-0.047 (0.020)	-0.091--0.010 <sup>b</sup>
Rational Acceptance		
Direct BD effect	0.132 <sup>a</sup> (0.049)	0.034-0.230 <sup>b</sup>
Indirect RA effect	-0.026 (0.015)	-0.050--0.004 <sup>b</sup>
<b>Muscle Satisfaction</b>		
Appearance fixing		
Direct MS effect	0.181 <sup>a</sup> (0.059)	0.064-0.300 <sup>b</sup>
Indirect AF effect	0.018 (0.018)	-0.016-0.057
Avoidance		
Direct MS effect	0.158 <sup>a</sup> (0.055)	0.050-0.261 <sup>b</sup>
Indirect A effect	0.055 (0.021)	0.019-0.101 <sup>b</sup>
Rational acceptance		
Direct MS effect	0.198 <sup>a</sup> (0.057)	0.085-0.310 <sup>b</sup>
Indirect RA effect	0.011 (0.010)	-.002-0.039

4 Note: <sup>a</sup> $P < .005$ , <sup>b</sup>significant pathway based on 95% accelerated and bias corrected  
 5 bootstrapped confidence intervals, A = avoidance, AF = appearance fixing, BD =  
 6 bodybuilding dependence, BIQoL = body image quality of life, MS = muscle satisfaction,  
 7 RA = rational acceptance

8

1 *x. Figure Legends*

2 Figure 1

3 *The Hypothesized Direct and Indirect Relationships Examined in the Current Study*

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Figure(s)

