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muscularity among male bodybuilding supplement users**

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The relationship between psychosocial variables and drive for muscularity among male bodybuilding supplement users

Abstract

Objective: Given that a high drive for muscularity (DM) has been found to be associated with negative mental health outcomes for men, this research examined pathways involving social influence which may explain why some men are more susceptible to a DM than others.

Method: Building on previous qualitative research, this study examined psychosocial factors (self-esteem, perception of body by others, and body satisfaction during youth) and social influences (peer pressure and social media) associated with DM among young Australian men who lift weights and take bodybuilding supplements daily (N= 250) – both precursors for developing risky body enhancement strategies. This investigation extends the conceptualisation of social influence factors to include social identity (ingroup identification with a muscularity centred subculture). *Results:* Path analysis found social media and peer pressure were directly associated with DM. Self-esteem and perception of body by others had a direct association with DM and an indirect association mediated by peer pressure and social media. Ingroup identification with a muscularity-centred subculture was associated with perception of body by others, peer pressure, and social media. *Conclusions:* These findings highlight the mediating role of social influences on DM in young men, reinforcing the role of peers especially via online mediums.

Keywords: Drive for muscularity, male body image, social media, peer pressure

Key Points

What is already known about this topic

Social influences on drive for muscularity in men

- Men are increasingly reporting body dissatisfaction, often associated with an increased drive for muscularity.
- Research indicates a drive for muscularity is associated with psychosocial factors (e.g., self-esteem) and increasingly social influences (e.g., social media).
- Questions remain as to why some men are more susceptible than others to perform muscularity enhancing behaviour.

What this topic adds

- An online survey of 250 young men who weight-train and take supplements found social media and peer pressure had strong direct associations with DM.
- Psychosocial factors had direct and indirect associations with DM, mediated by the social influences of peer pressure and social media.
- Ingroup identification with a muscularity-centred subculture did not have a direct association with DM but was linked via other social influence constructs.

Introduction

The salience of muscularity in men's body image ideal has become a symbol of the Western stereotype of traditional masculinity (Martin & Govender, 2011). Men's focus on a body ideal that is muscular is in stark contrast to women's primary focus on a thin ideal

(McCreary et al., 2007). It has been argued that the drive for muscularity (DM) is more evident in males (almost exclusively) because it reflects a mesomorphic body ideal, high in muscle and low in bodyfat (Tod & Edwards, 2015), the core features of which typically do not apply to the feminine ideal. Those who perceive themselves as not muscular enough may engage in excessive weight lifting and disordered eating in the pursuit of muscularity (Karazsia & Crowther, 2010; Pope et al., 2000). McCreary and Sasse (2000) were the first to conceptualise this phenomenon as a ‘drive for muscularity’ and develop a scale to quantify it. DM has been used extensively over the past 20 years in research related to men’s body image (McCreary et al., 2004, 2005, 2009; Tod & Edwards, 2015).

Evidence for the DM comes from a variety of sources. Many males have been found to use a range of body change strategies to modify and improve their body image and appearance (McCabe & Ricciardelli, 2004). While the main body change strategies used by males include increasing exercise and modifying dietary patterns (Anonymous et al., 2020, 2021a; Eisenberg et al., 2012), some resort to using a range of substances referred to as performance and image enhancing drugs (PIEDs) (Anonymous et al., 2021b; Dunn et al., 2015). Some of these behaviours do not occur exclusively in adult men as researchers have also shown that many boys and young men within normal weight limits are altering their diet in order to gain weight (Cafri et al., 2006; McCreary & Saucier, 2009). Young men who perform these behaviours can be at risk of body image disorders, for which the DM has been identified as a strong underlying contributor (Mangweth et al., 2001; Pope et al., 2000). Indeed, higher levels of DM have been associated with lower levels of self-esteem and life satisfaction, and higher levels of depression in men (Cafri et al., 2005; McCreary & Sasse, 2000; Olivardia et al., 2004). Men often internalise a muscular ideal as something they personally value and wish to strive for (Tiggemann, 2011). Young males are likely to learn from their social environment that a mesomorphic physique is valued and desirable (Tod &

Edwards, 2015) and compare their levels of muscle mass to this body ideal (Melki et al., 2015). In this way, further consideration should be given to the impact of different sources of social influence and how these factors contribute to DM in young men.

Body image models incorporating social influence components

There is a number of well validated models that have been developed to understand body image factors that refer to the importance of broader social influences. For example, Cash (2002, 2012) proposed a theoretical cognitive behavioural model of body image, which proposes differentiated historical factors (cultural socialisation, interpersonal experiences, physical characteristics and changes, and personality aspects) and proximal factors (present life events which comprise precipitating and maintaining influences on body image experiences) shape the development of body image attitudes. Historical factors incorporating a social influence component include cultural socialisation which alludes to the influence of media and interpersonal experiences with family peers. Proximal factors with a social component refer to specific events or situational cues such as social scrutiny which may activate schema-driven processing of information around self-evaluations of an individual's appearance.

A number of models also have been developed from female body image research that have been shown to be effective in research on male body image such as objectification theory (Daniel & Bridges, 2010; Tiggemann & Kuring, 2004) which assumes that men are subjected to the same overarching cultural system and ideals perpetuated by the media (Parent & Moradi, 2011). The increase in the sexual objectification of men through media images has been documented (Rholinger, 2002) and found to be related to increased body dissatisfaction among men (Arbour & Ginis, 2006). Parent and Moradi (2011) contend that, as body shame and dissatisfaction had no direct link to DM in their study, there were likely cultural internalisations and social influences at play for which the model did not account for.

A number of researchers have drawn upon sociocultural theory to understand men's body concerns, in particular the Tripartite model of social influence which was originally developed for female body dissatisfaction (Thompson et al., 1999). This model is composed of three primary sources of influence (peers, parents, media) hypothesised to exert their effect on body image and eating disturbance via two primary mechanisms—appearance comparison and internalisation of the thin-ideal. Tripartite model variables have been supported in linking DM behaviours in boys (Smolak & Stein, 2006) and men (Karazsia & Crowther, 2009; Tylka, 2011). Tylka's findings highlight those men who perceive pressure from the media to be mesomorphic were only dissatisfied with their muscularity and engaged in muscle building behaviours to the extent they valued the muscular ideal.

The aforementioned models clearly indicate a role of social influence factors in body image and DM. However, none of the models explicitly elucidate why the impact of social factors is more powerful for some men. This question aligns with Tiggemann's (2011) call for more research examining why muscularity may be more important to some men and not others. The current research aims to explore this issue for social influence factors specifically by examining ways in which young men may integrate muscularity as a part of their social identity amidst the role of other salient sources of influence via social media and peer pressure, and how these influence sources link to DM.

Social identity theory

Social identity theory may offer a mechanism by which social influences on DM among men can be better understood. The mere existence of socially prescribed body image ideals is not the only factor leading to DM. The degree to which an individual values these societal ideals is considered to be one of the most prominent risk factors for body image problems (Cafri et al., 2005). Research has shown that individuals who display a high level of athletic-ideal often display increased muscularity-oriented behaviours (Hoffmann & Warschburger,

2019). In a similar way, valuing a socially desirable muscular body ideals may nurture concordant behaviours (e.g., lifting weights) to achieve them. The integration of muscular idols or muscularity-focused subculture norms with an individual's identity may contribute to a DM and be related to its other psychological and social antecedents. Identifying with a muscularity-centred subculture likely means engaging in common group behaviours such as exercise and dieting but may also include more risky behaviours.

Previous research acknowledges that a collective peer group identity can serve to prescribe how one should think and behave as a prototypical group member (Abrams & Hogg, 1988; Hogg & Turner, 1987). In the Australian context, as in other countries, the desire for a hyper muscular physique is a key marker for groups of young men in specific subcultures (Olivardia et al., 2004; Pope et al., 2000, 2005). In the contemporary gym scene in Australia, the term 'Bruss' has emerged as a commonly used term in the media/social media to describe a person who devotes a lot of time to weight training (Anonymised et al., 2021; Mitchell, 2014; Seven Network, 2013). The term has also come to be associated with negative behaviours such as extreme weight training and dieting, as well as use of PIEDs to attain a very muscular appearance (Anonymised et al., 2021; Seven Network, 2013).

The Authors posit that men value the mesomorphic ideal to different degrees and, in some cases, it is expressed as a part of their identity. In recent qualitative work (Anonymous et al., 2020), psychosocial factors such as self-esteem, body satisfaction during youth, and other people's perceptions of one's body were linked to identification and engagement with bodybuilding subcultures and peer pressure to take part in risky body change strategies. These emergent themes align with key constructs in the models above and warrant further exploration.

Peer pressure and, more recently, the impact of social media have emerged in the literature as important social influences of body image. A meta-analysis of studies on the

experience of weight-related teasing about being overweight showed that males had associations in levels of body dissatisfaction (Menzel et al., 2010). More specifically, men participate in negative body talk, the frequency of which is closely related to scores on DM (Engeln et al., 2013; Sladek et al., 2014). In a scale developed to measure body talk especially for men, researchers found that scores on the muscle talk scale correlated closely with scores in DM (Sladek et al., 2014). In a meta-analysis of the effects of exposing men to popular media body ideals and how this impacted their levels of body dissatisfaction thereafter, it was found the largest effects were on “body part dissatisfaction” ($d = .66$) (Blond, 2008). For social media, research has shown negative feedback via social media is damaging to men’s body esteem (Griffiths et al., 2018; Modica, 2020) including recent work within the Australian context (Anonymous et al., 2021a).

The current study

The aim of the current study was to examine potential pathways involving social influence which may explain why some young men are more susceptible than others to a DM. The research examined the association between a number of psychosocial and social influence factors and DM in a group of young Australian men engaging in health-enhancing behaviours of regular weight lifting and bodybuilding supplement use. This sample was chosen due to the clear link between exercise behaviours, bodybuilding supplement use, and the propensity of these cohorts to go on to use PIEDs (Anonymous et al., 2020, 2021b; Dunn & White, 2011; Pope et al., 2005). Living a particular type of lifestyle is an important factor among muscularity-centred subcultures (Anonymous et al., 2020, 2021b; Underwood 2017). In most parts of Australia due to the year-round moderate climate, there is ample opportunity to wear minimal clothing in the interest of showcasing an aesthetic physique. The present study examined social influences (e.g., peer pressure and social media) with direct influence on DM. The current research explores how social influence factors including peer pressure

link established psychosocial constructs such as self-esteem with DM and, in particular, extends this consideration of sources of social influence to examine the potential mediating role of ingroup identification with a muscularity-centred subculture.

Importantly, the analysis addresses the gap identified by Tiggemann (2011) by examining potential pathways involving social influence which may explain why some young men are more susceptible than others to a DM. The initial path model developed for this investigation (see Figure 1) explored how DM (outcome factor) was associated with:

- i) the first level of factors, termed psychosocial factors, self-esteem, perception of body by others, and body satisfaction during youth and,
- ii) the second level of factors, termed social influence factors: ingroup identification with a muscularity-centred subculture, peer pressure, and social media pressures.

These conceptual pathways to the DM were tested in a sample of young Australian men who engaged in regular weightlifting and supplement use. These selection criteria were chosen as they demonstrate an investment in body enhancement, with evidence these behaviours can lead to riskier body enhancement strategies (Anonymous et al., 2020; Dunn & White, 2011). The path analysis initially allowed for direct associations of first level factors (psychosocial) with DM, as well as indirect associations (mediation) via second level factors (social influences) on DM.

Insert Figure 1 here

Method

Participants

The sample consisted of 250 participants ($M=22.25$ years, $SD=3.75$). This sample size is consistent with similar investigations in this area (Karaszia & Crowther 2009; 2010, Tyłka 2011, Stratton et al., 2015). Inclusion criteria for the study were to identify as male, between 18 and 30 years old, be residing within Australia, lifting weights >3 times per week, and daily use of bodybuilding supplements which have been used as part of inclusion criteria in previous investigations in similar groups (Anonymous et al., 2020, 2021a, 2021b). This age group has the highest levels of muscular-building behaviours (Boyda & Shevlin, 2011; Martin & Govender, 2011) and these training and supplement criteria have been used in similar types of studies examining relationships between AAS and body image (Dunn et al., 2014; Martin & Govender, 2011; McFarland & Kaminski, 2009).

The majority (83.2%; $n=208$) were currently working, and 41.6% ($n=104$) were full time students. Almost half (41.9%; $n=105$) had completed senior schooling; 16.5% ($n=41$) had completed a certificate or diploma, 13.7% ($n=34$) an apprenticeship or trade, and 22.8% ($n=57$) had an undergraduate degree or higher. Participants were largely single (55.3%; $n=138$), 20.2% ($n=51$) were in a committed relationship, 10.5% ($n=26$) married/de-facto, and 12.3% ($n=31$) were dating. Most ($n=175$) of the men had Facebook pages, while 17.3% ($n=43$) favoured Instagram, and 9.2% ($n=23$) used Snapchat. During the last seven days, men in this sample predominantly lifted weights on four (21.5%; $n=54$) or five (21.5%; $n=54$) days. In contrast, participants primarily reported one day of cardiovascular activity (36.5%; $n=91$). Among this cohort 20.4% ($n=51$) of the young men had used any type of AAS ever. Of these, 88.2% ($n=45$) had used injectable AAS, while 66.7% ($n=34$) had used oral AAS. For other PIEDs, 5.2% ($n=13$) of this cohort had ever used human growth hormone (HGH), while 3.6% ($n=9$) had ever used insulin-like growth factor 1 (IGF-1). PIED use such as AAS was not correlated with any other study variables.

Procedure

This study was approved by the QUT Human Research Ethics Committee (approval number 1600000330). Participants were recruited from a range of sources, including flyers, emails, and online free and paid advertising. In all recruitment materials, a link was provided for participants to access the online questionnaire. Prior to commencing the questionnaire, participants were required to read an information sheet and provide informed consent (via a tickbox). Participants who completed the survey were invited to enter the draw to win 1 of 2 \$AUD250 vouchers.

Measures

The online study employed a cross-sectional design administered via the Qualtrics platform. Demographic questions such as age, education level, working status and relationship status preceded the main survey measures. This investigation used a mixture of established scales (self-esteem and DM,) and those created by the researchers (body satisfaction during youth, body perceptions by others, peer pressure, ingroup identification, and social media) based on formative research whereby representatives of the target sample identified issues with the length and wording of existing scales (Anonymised., 2020, 2021a). See Supplementary Table 1 for a description of the measures employed.

In the piloting phase, many of the established scales were deemed unsuitable due to length, relevance, or clarity and, hence, scales more relevant to the population were constructed for perception of body by others, body satisfaction during youth, peer pressure, ingroup identification with a muscularity-centred subculture, and social media based on the piloting feedback and formative qualitative research (Anonymised, 2020, 2021a). The scale development process involved a reduction of the original scale sizes through an iterative process involving analysis of factor loadings and dimensions as well as visual analysis of scree plots. For body satisfaction during youth, a 7-item questionnaire was reduced to 4

items. Peer pressure, originally a 5-item questionnaire, was decreased to 4 items. Ingroup identification with a muscularity-centred subculture was originally comprised of 7 questions and reduced to 4. Lastly, the social media questionnaire was reduced from 10 items to 5.

Data Analysis

A post hoc analysis for model power was performed for sample size estimation using web-based software (Preacher & Coffman, 2006). With an alpha = .05 and power = 0.8, the projected sample size needed for testing this type of path model is approximately $N = 164$, indicating the adequacy of current sample for the analyses undertaken.

Statistical analysis was performed using SPSS Statistics Version 25. Missing data analysis showed less than 5% of data which were missing at random. Missing data on scales which had responses on 60% or more of the items were replaced by scale means.

Reliability of the existing measures was tested using Cronbach's alpha with all measures being above a cut-off of .7 (Christmann & Van Aelst, 2005). As the perception of body by others scale was assessed with only two items, its reliability was tested using correlation which was above the acceptable cut-off (Aiken, 1985).

Following a preliminary assessment of correlations (see *Table 1*), an exploratory factor analysis (EFA) was performed on each of the measures created by the Authors (excluding perception of body by others as it is a 2-item measure). A Kaiser-Meyer-Olkin (KMO) value over .7, indicated suitability of the data for EFA. Horn's Parallel Analysis is commonly used for principal component and factor analysis (Dinno, 2009), and revealed the items were indicators of a single construct. As demonstrated in *Table 3*, model fits were good for all measures ($CFI > .95$), with the exception of ingroup identification which showed a moderate fit ($CFI = .85$). Although ingroup identification achieved less than ideal fit indices,

it was retained due to its pivotal role in the investigation and path analysis. Supplementary Table 2 provides more information detailing factor loadings and variance for each scale.

Insert Table 1 here

Results

Path Model

Path analysis was performed using AMOS 22 statistical software and tested the conceptual model presented in Figure 1 with maximum likelihood estimation using the covariance matrix (Arbuckle, 2011). As an exploratory model, the initial analysis tested for all direct and indirect pathways to DM. Model fit was evaluated with chi-square (χ^2) goodness of fit index statistic, comparative fit index (CFI), root mean squared error of approximation (RMSEA), Akaike information criteria (AIC), and standardised root mean square residual (SRMR) – see Table 2. The initial model displayed a lack of fit, χ^2 (113.12), $p < .000$, normed $\chi^2 = 12.57$, CFI = .719, RMSEA = .216, SRMR = .121.

Inset Table 2 here

As this current research was exploratory in nature, modification indices were used to respecify the model to evidence the significant pathways between these variables and to achieve the best fit of the data. An iterative approach was used to develop the best fitting model whereby additional paths were freed sequentially (i.e., a direct path is added between two variables). Additional paths were freed between self-esteem and ingroup identification, body satisfaction during youth and ingroup identification and DM, and ingroup identification and DM. Paths were constrained between ingroup identification and peer pressure, as well as social media. Error terms were allowed to correlate between self-esteem, perceptions of body

by others, body satisfaction during youth, and between peer pressure and social media. The final model showed a good fit to the data, χ^2 (6.094), $p=.191$, normed $\chi^2 = 1.524$, CFI = .994, RMSEA = .046, SRMR = .0322. Figure 2 presents the final model.

Insert Figure 2 here

The final model indicated that peer pressure, social media, self-esteem, and perception of body by others had a direct association with DM. Additionally, the psychosocial factors of self-esteem and body satisfaction during youth were negatively associated with social media and peer-pressure, and perception of body by others positively associated with the social influence factors. Ingroup identification with a muscularity-centred subculture was positively associated with perception of body by others and peer pressure and social media. The model explained 51% of the variance in the factors associated with DM in young men.

Significant indirect effects were demonstrated by a confidence interval that did not include zero. There was a significant indirect effect from perceptions of body by others to DM via peer pressure and social media (standardised indirect effect = .20, 95% CI = .13; .30). There was a significant indirect effect from body perceptions in youth to DM via peer pressure and social media (standardised indirect effect = -.11, 95% CI = -.19; -.05). There was also a significant indirect effect from self-esteem to drive for muscularity via peer pressure and social media (standardised indirect effect = -.16, 95% CI = -.22; -.09). In addition, there was a significant indirect effect from ingroup identification with a muscularity-centred subculture to drive for muscularity via peer pressure and social media (standardised indirect effect = .19, 95% CI = .13; .25).

Discussion

The current study examined the potential pathways involving social influence which may explain why some young men are more susceptible to a drive for muscularity than others among a group of 250 young male bodybuilding supplement users. This cohort reported higher mean levels of DM than college students (Bergeron & Tylka, 2007), adolescent boys (Smolak & Stein, 2006), and cohorts of men who recreationally weight-trained (Robert et al., 2009), more closely reflecting scores from experienced powerlifters (Hale et al., 2010). The path analysis tested in this study expanded upon previous research by examining the association between socially determined factors such as ingroup identification with a muscularity-centred subculture and DM, in addition to more established psychosocial factors (e.g., self-esteem). In this way, the path analysis helped to address the research question raised by Tiggemann (2011) identifying potential pathways explaining why some young men are more susceptible than others to a DM. Results demonstrated both psychosocial and social influence factors had direct associations with DM; however, the social influence factors partially mediated the direct association of the psychosocial factors. Ingroup identification with a muscularity-centred subculture was not significantly directly associated with DM but there were significant pathways between psychosocial factors and ingroup identification. Ingroup identification with a muscularity-centred subculture was also significantly associated with the social influence factors of peer pressure and social media which, in turn, were significantly associated with DM.

Path analyses indicated that the social influence factors of peer pressure and social media partially mediated the association between the psychosocial factors of perception of body by others and self-esteem. The first pathway (self-esteem) supports evidence linking low self-esteem to higher levels of DM (Jones & Crawford, 2005; Smolak & Stein, 2006). Although we did not examine body dissatisfaction, which is commonly thought to mediate the relationship between the two (Jones & Crawford, 2005; Bergeron & Tylka, 2007), Nowell

and Ricciardelli (2008) make a case for pressures from significant others, such as peers, being a factor in moderating the effects of body dissatisfaction on DM. The second pathway (perception of body by others) is partially supported by Karazsia and Crowther's (2010) findings that social body comparisons were a mediating factor in body change behaviours. Stratton et al. (2015) also found that there was a direct link between body comparisons, as well as peers' encouragement of a muscular ideal, and DM behaviours. The present data suggest both body perceptions by others and peer pressure have direct associations with DM. Body perceptions were associated with peer pressure, suggesting there may be an indirect relationship between body perceptions on DM via this association with peer pressure.

Ingroup identification with a muscularity-centred subculture had significant associations with peer pressure, social media, and perception of body by others. The increased emphasis of how others perceive one's body could be related to an increase in an individual's susceptibility to internalising group norms. Internalisation may be expressed as an increased vulnerability to peer pressures and social media on an individual's body ideal, thus associated with an increased DM. This escalation could be related to men internalising gender-typed dimensions through ingroup identification with a muscular subculture. For example, Grogan and Richards (2002) have suggested that men who diet run the risk of being perceived as feminine and, as dieting is perceived as a feminine-type of behaviour, they are shunned from the male group. As muscularity and masculinity are linked, being part of a muscular group of men would be associated with the social pressure to conform to gender-role expectations. Although there is some qualitative evidence in support of this pathway (Anonymous et al., 2020), more research is required to assist in understanding how psychosocial variables and ingroup identification and pressures link to individual choices for muscle-building behaviours. Future investigations may consider including social

identification and group norms as mediating factors nested within established body image frameworks.

The men in this study reported levels of self-esteem in the normal range. Previous studies looking at DM in middle school boys (Smolak & Stein, 2006) and men (Grieve & Helmick, 2008) have reported similar results among their cohorts. Perception of one's body by others was significantly associated with all three social influence factors and DM. Men perceive their bodies are subject to scrutiny by significant others in their lives (Ricciardelli et al., 2000; Schaefer & Salafia, 2014) and place value in appearance-related attitudes and commentary from a range of sources in their lives (Anonymous et al., 2020), which can contribute to men's body dissatisfaction (Nowell & Ricciardelli, 2008). In the case of perception of body by others, it is possible men who are invested in how others perceive them will be particularly susceptible to messages about muscularity, and thus value endorsement of ideals that emphasize masculinity.

Adolescence is a particularly important time where boys make an increased investment in masculinity (Gattario et al., 2015) and, therefore, this developmental stage may be a phase where the investment is more commonly expressed through attempting to increase muscularity. Body perceptions in youth can be affected by peer feedback, which can increase body concerns and DM (Jones, 2001; Nowell & Ricciardelli, 2008). Research focusing on adolescent boys suggests significant correlations between DM and self-reported teasing experiences at the hand of parents, siblings, and peers (Schaefer & Salafia, 2014). In a sample of male bodybuilders, a relationship was found between childhood victimisation, such as peer critiquing, and muscle dysmorphia (Boyda & Shevlin, 2011). Such findings support the present data, showing the association between body satisfaction during youth on DM is amplified by peer pressure.

The association between ingroup identification with a muscularity-centred subculture and DM exerted indirect associations via peer pressure and social media. The findings support previous research which shows self-presentation using social media plays a large role in young men's lives in relation to their body image identity (Anonymous et al., 2021a), suggesting the expression of this ingroup identity on social media may increase their DM to live up to the culturally accepted norms of this muscularity-centred subculture. Formative qualitative research (Anonymous et al., 2020) found peers appeared to support risky behaviours linked with increased muscularity such as excessive exercise and PIED use. A similar interplay of factors appears to be operating in the present study. Ingroup identification with a muscularity-centred subculture is positively associated with peer pressure to engage in body change strategies (DM behaviours) as a key social norm of this subculture. Further, peer pressure was directly and positively related to DM among participants, consistent with previous research (e.g., McCabe & Ricciardelli, 2004), indicating a strong association between male peers and DM (Karazsia & Crowther, 2009).

The male body ideal depicted in most media formats is muscular (McCabe & Ricciardelli, 2004) and there is evidence muscular body shapes are socially and culturally valued (Swami, 2015). The current findings provide evidence of the importance of social media in shaping DM. This finding seems reasonable for this population given the extensive use of social media by young adults (Duggan & Smith, 2013) and the heightened use of social media by this subculture (Anonymised et al., 2020; Anonymised et al., 2021a).

The present research underscores the importance of the psychosocial factors established in the research but, importantly, the potential social influences that may amplify associations between these factors, such as social media. A strength of this research is the examination of established social influences (e.g., peer pressure) for DM with the addition of a consideration of the role of identification with a muscularity-centred subculture. In addition,

measures were piloted within the target population. Limitations include the cross-sectional nature of the research and the Australian sample, which prevents statement of causality and potentially limits generalisability to other countries with different body ideal norms. One particular limitation includes the wording of the ingroup identification scale which, through inclusion of the specific term *Bruss*, limits generalisability further and requires some knowledge around the norms within certain Australian subcultures (e.g., Anonymised 2020, 2021; Underwood, 2017).

In the absence of established, brief scales measuring some of the study's constructs that the target population thought were relevant and comprehensible, items were constructed by the researchers to reflect the variables of interest. Further, the 2-item scale of perception of body by others is a noted limitation and is likely to have low reliability. An additional limitation is acknowledged in the overlap between some items that appear in the newly created Social Media scale and the Drive for Muscularity Scale. The distinction that the DMS describes what individuals are doing while the Social Media Scale gives an indicator of the underlying motivations may partially explain the strength of the correlation between these constructs. Testing of the newly developed scales through EFA comprises evidence the scales provided a valid and reliable measure of the constructs however more research is needed to consolidate support for these measures. Ingroup identification was tied to a specific muscularity-centred subculture but identification more generally with peers and friends or other relevant groups (gym friends/sports team members) should also be investigated. While the data from the current research indicate that social identity theory and sociocultural frameworks were useful in exploring pathways leading to DM in young men, other approaches may also contribute further to our understanding (e.g., Cash, 2002, 2012). Cash's general cognitive social learning model of body image disturbance (2002) discusses the relationships between historical factors and the development of body image attitudes which,

in turn, provoke emotions and behaviours that are then maintained through negative reinforcement. It is likely that Cash's model may provide insight in the context of further research around negative reinforcement of risky behaviours (e.g., supplement use or PIED use).

The current data underscore the direct association of both social media and peer pressure directly on driving muscularity enhancing behaviours. Future strategies could aim to lessen the influence that social media has among young male cohorts by discouraging excessive screen time looking at images of muscular bodies and bolstering self-esteem via other means than body perceptions. From a public health perspective, DM within normal ranges may promote exercise and might have protective effects against negative psychological outcomes. Allied health professions should be aware, however, of the propensity of sociocultural pressures to interact with DM particularly among younger cohorts. It is through these mechanisms sociocultural pressures accumulate to a point where exercise stops being about health, and particularly with the introduction of illicit substances, muscularity becomes more important than their health. Public health campaigns targeted at young men should focus on the performance-related benefits of exercise while emphasising equally general wellbeing.

Research suggests there is an increase in the use of PIEDs among men (Sagoe et al., 2014), with those high in DM likely at greater risk of using (Pope et al., 2017). This pattern was not supported by the present data, likely due to a large proportion of the sample not using PIEDs. This cohort were not required to be using PIEDs, but had strict weight lifting and supplement use inclusion criteria. Therefore, it is possible that, at least among this cohort, DM is linked to less risky body enhancement strategies such as bodybuilding supplement use. By examining precursor behaviours such as weight lifting and supplement use, however, we posit that this is a group at-risk of developing more risky body enhancement behaviours

such as PIED use, consistent with extant work (Anonymous et al., 2020; Dunn & White 2011).

The current study examined potential pathways involving social influence which may explain why some young men are more susceptible to a DM than others. The largest contribution of this study to extant literature lies in elucidating a possible mechanism responsible for the varied importance placed on muscularity by men. The current research demonstrates that psychosocial constructs such as self-esteem and body satisfaction during youth are linked to DM but that much of this relationship works through their association with social influence factors such as social media and peers. In addition, this research builds on existing work by highlighting the role of ingroup identification muscularity-centred subculture in underpinning the association of peer pressure and social media with DM. This study adds to the body of knowledge surrounding DM among young men by providing evidence for the relationships between psychosocial factors and ingroup identification as precursors of striving for muscular ideals. Continued efforts to establish the factors leading to the often-unhealthy behaviours associated with a DM should examine specifically those young men with an affiliation to muscularity-centred subcultures where peer and social media influences may exert greater strength.

Declaration of competing interests

The Authors declare that there is no conflict of interest.

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Social influences on drive for muscularity in men

Table 1. Descriptive statistics and correlations (N=250).

	M	SD	1	2	3	4	5	6	7	α (or <i>r</i>)
1. Self-esteem	3.80	0.62	-	.161***	.288***	-.025**	-.340***	-.230***	-.254***	0.92
2. Perception of body by others	5.65	1.36		-	.019**	.178***	.178***	.324***	.376***	0.58 (<i>r</i>)
3. Body satisfaction during youth	3.25	1.69			-	-.098**	-.157***	-.245***	-.274***	0.96
4. Ingroup identification	2.52	1.44				-	.340***	.355***	.298***	0.84
5. Peer pressure	3.25	1.72					-	.340***	.428***	0.87
6. Social media	3.90	1.50						-	.673***	0.74
7. Drive for muscularity	3.77	1.15							-	0.92

Note: All significance tests were two-tailed

* $p < .05$

** $p < .01$

*** $p < .001$

Social influences on drive for muscularity in men

Table 2. Model fits for created scales

Scale	χ^2	<i>df</i>	CFI	AIC	SRMR
Feelings towards body during youth	32.60	2	.974	48.60	.018
Ingroup identification	66.69	2	.855	82.67	.079
Peer pressure	20.65	2	.963	36.65	.037
Social media	8.23	2	.971	24.23	.035

Social influences on drive for muscularity in men

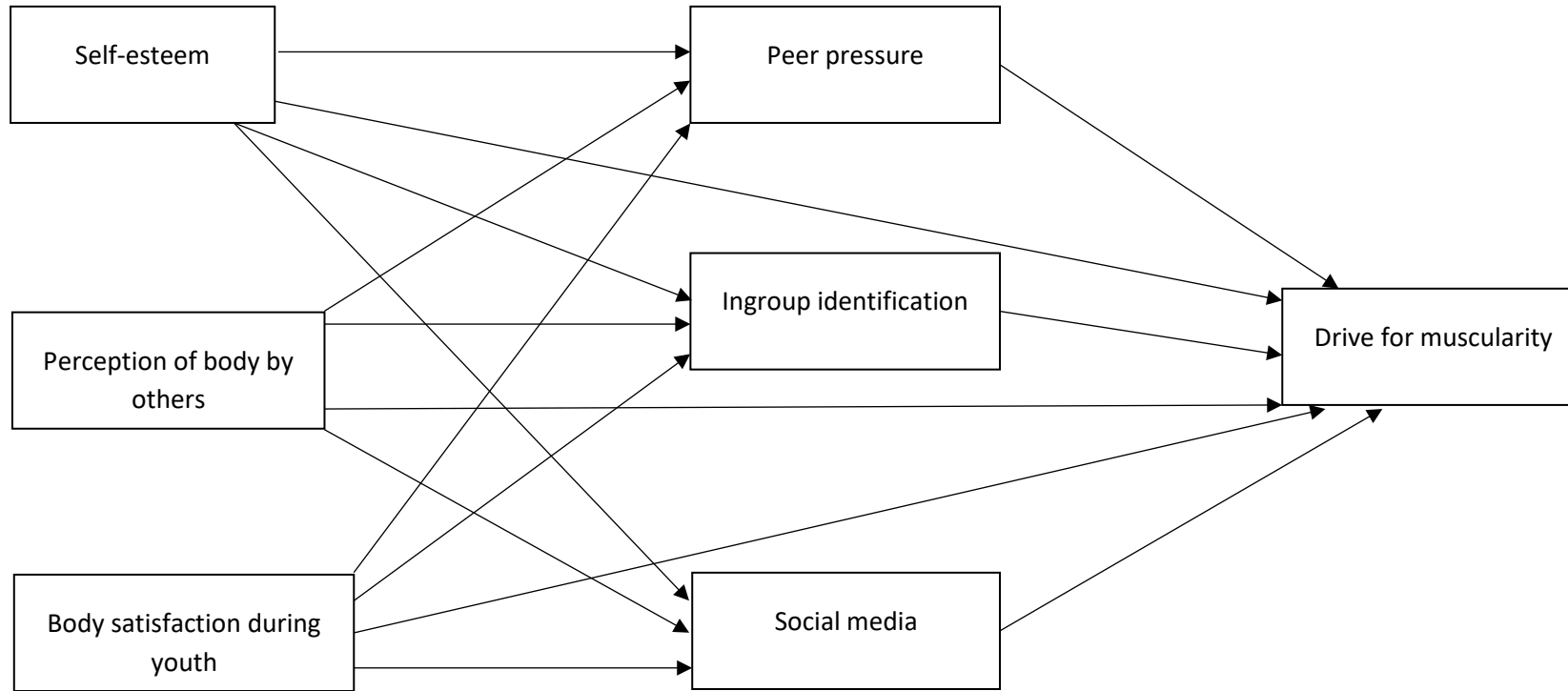


Figure 1. An initial path model testing the psychosocial and social influence effects on the outcome variable of drive for muscularity.

Social influences on drive for muscularity in men

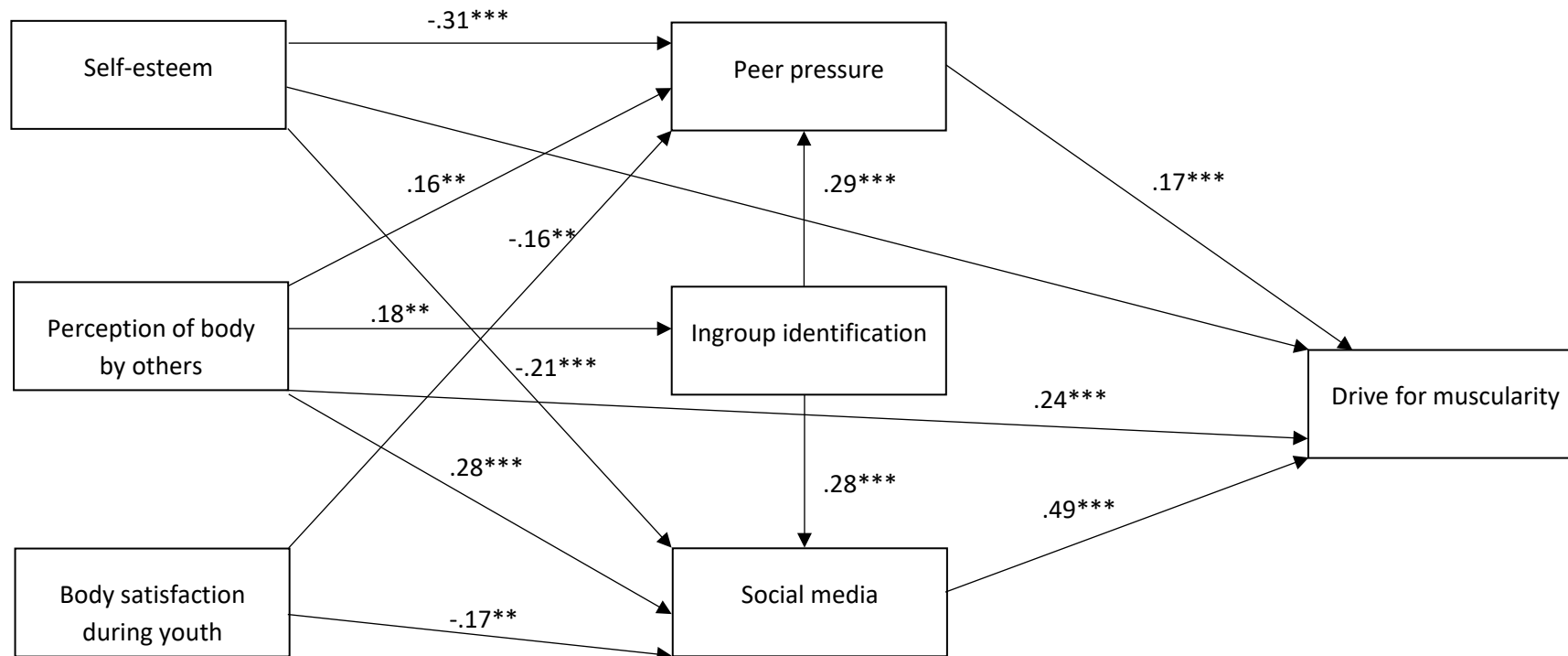


Figure 2. Final path model for predicting young Australian men's drive for muscularity ($N=250$). Note the figure does not show bi-directional paths. * $p < .05$, ** $p < .01$, *** $p < .001$.

Social influences on drive for muscularity in men

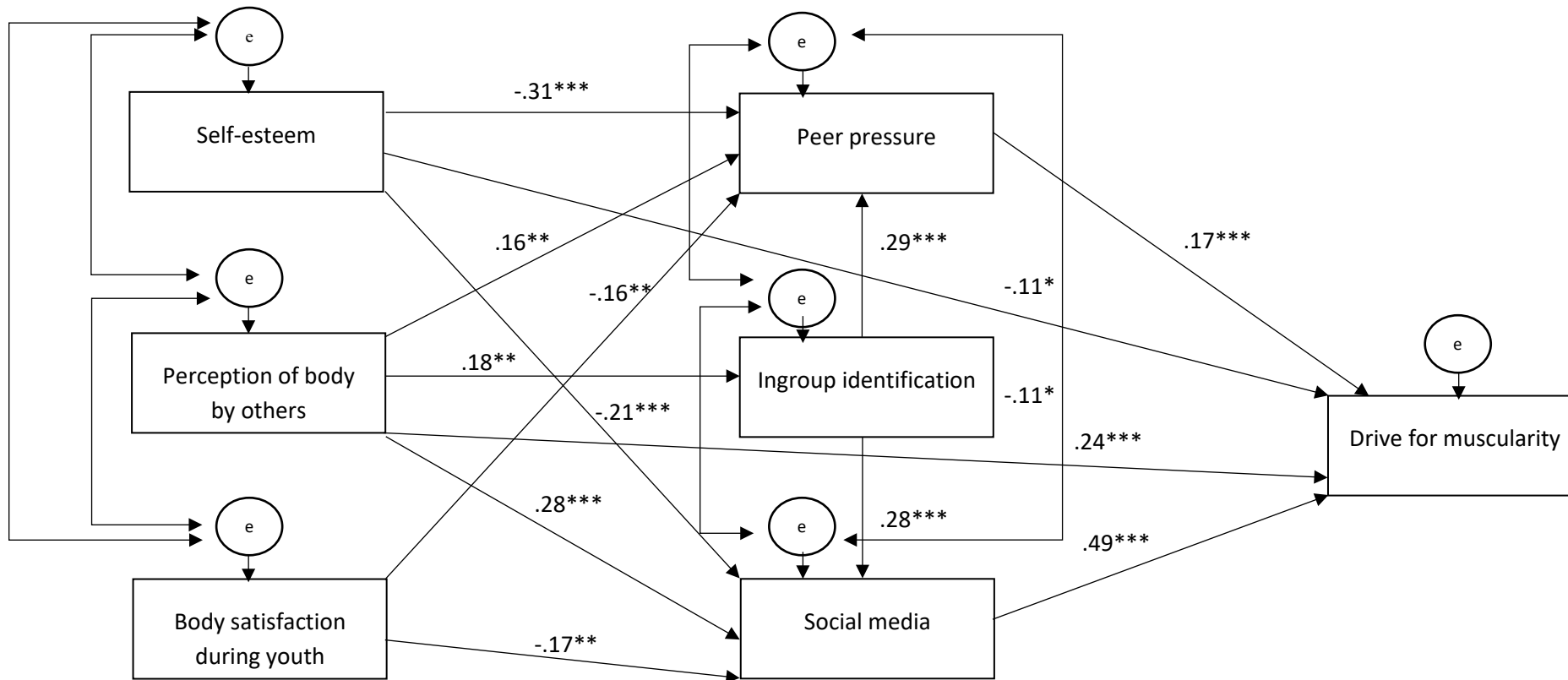


Figure 2. Final path model for predicting young Australian men's drive for muscularity ($N=250$). Note the figure does not show bi-directional paths. $*p < .05$, $**p < .01$, $***p < .001$.