ONCE FAT, ALWAYS FAT? INVESTIGATING THE
EXISTENCE OF RESIDUAL OBESITY STIGMA

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Abstract

Recent research suggests that obesity-related stigma is so pervasive, that despite an obese individual losing weight and attaining a seemingly “healthy-weight”, the individual continues to be stigmatised. Previous studies claim that merely being informed a person was formerly obese results in negative reactions and a continuation of the same stigma the individual faced when they were obese. This phenomenon, labelled “residual stigma”, is surprising, as one would expect obesity stigma to dissipate once an individual can no longer be identified as obese. Residual obesity stigma is a relatively new concept, and previous research on the topic has largely relied on undergraduate female participants and only examined such a bias against female targets. The current study is a high powered conceptual replication of the original work (N > 600) with a more diverse online sample examining this potential bias against both male and female targets. Participants were randomly assigned to read a vignette and view an image of the target individual described as either currently lean, overweight or obese, and as having either consistently maintained that weight (weight stable) or as having lost weight from a higher weight (residual). Participants completed a series of measures to determine their stigma against the target individuals, and their attitudes in general towards obese individuals following their evaluation of the target individual. Two main moderating variables of pathogen avoidance and meritocratic beliefs were also examined as potential explanations for why residual obesity stigma exists. Contrary to our expectations, the results revealed no significant differences in participants’ ratings of the target individuals regardless of whether they were in a residual or a weight stable condition, and they show no evidence of residual stigma against both male and female targets. There was also a lack of moderation with both pathogen avoidance and meritocratic beliefs. The results call into question the existence of residual obesity stigma and indicate the need for further studies investigating this phenomenon.
Introduction

Obesity Stigma

The prevalence of obesity (defined as having a Body Mass Index [BMI] measure above 30) is rising globally and is often referred to as an obesity “epidemic” (James, 2009), with the World Health Organization (WHO) estimating 39% of adults worldwide are overweight and 13% are obese (WHO, 2016). Obesity has more than doubled since 1980, and in America, which has the highest rates of obesity in the OECD (Organisation for Economic Co-operation and Development), 32.7% of US adults are overweight, and a further 37.9% are obese (Centers for Disease Control and Prevention [CDC], 2016). New Zealand (NZ), which has the third highest rates of obesity in the OECD only behind USA and Mexico, has similar statistics: 34% of NZ adults are overweight, and a further 32% of adults are obese (Ministry of Health, 2017).

Simultaneously, anti-fat attitudes and obesity stigma have also risen, especially in nations with greater prevalence of obesity (Marini et al., 2013). This stigma has been deemed comparable to racial discrimination (Puhl, Andreyeva, & Brownell, 2008), and research suggests that in the past decade weight discrimination has increased as much as 66% (Fruh et al., 2016). Obesity stigma is linked to many negative stereotypes, attributes, and qualities, including laziness, sloppiness, a lack of self-control and willpower, poor personal hygiene, and incompetence (Puhl & Brownell, 2001). Obesity stigma clearly fits within Goffman’s (1963) description of socially stigmatized individuals as having a “tainted identity” and is referred to as the last socially acceptable form of discrimination (Puhl & Brownell, 2001).

It is largely thought that attribution theory explains a great deal of obesity stigma, in that people generally attribute obesity to an individual failure to adhere to a healthy diet and lifestyle (Khan, Tarrant, Weston, Shah, & Farrow, 2018), which therefore fuels the
commonly held (yet not always accurate) belief that individuals are responsible for their weight, and that weight is something that can be volitionally controlled (Crandall, 1994). Even though obesity can be caused by a range of factors such as genetics, medical causes, environmental causes, psychological causes, and social factors (Ogden et al, 2001), still people generally tend to attribute obesity to the behavioural factors of diet and exercise (Sikorski et al, 2011), which are seen as highly controllable factors that individuals are responsible for.

The idea that one is, and should be, responsible for their own outcomes in life, including their weight, stems from widespread meritocratic beliefs, belief in a just world, and the Protestant work ethic (Crandall, 1994). These ideologies emphasize hard work and the idea that people get what they deserve in life (Puhl & Brownell, 2003). Therefore, people that subscribe to these beliefs tend to believe obese individuals are obese because they have not worked hard enough to remain in the “normal” weight range, and studies have found that greater obesity stigma is associated with greater just world beliefs (Ebneter, Latner, O’Brien, 2011).

Obese individuals tend to internalise (at least to some extent) these responsibility attributions, and therefore view their obese group membership as temporary because they believe weight is, and should be, controllable (Crandall, 1994). Despite the fact the statistics indicate that overweight or obese individuals form the majority of these populations, belonging to a stigmatised group that is seen as devalued by society results in overweight individuals showing no ingroup bias or preference, and being negatively impacted by the stigma against people like themselves (Crandall, Nierman, & Hebl, 2009). This makes it difficult for overweight individuals to feel a strong sense of identity with their group when they believe it is possible to leave the group, and thus believe their group membership is temporary (Tucci, Boyland, Halford, & Harrold, 2013).
The ability for most overweight individuals to leave the group is often futile, however, with most studies reporting diets have a 95% failure rate (Buchanan, Sheffield, & Tan, 2017), although there are alternative weight loss techniques available outside of dieting, such as weight loss surgery which do have greater success rates. Unfortunately, for individuals who are initially successful in their weight loss attempts, many regain the weight (Kerrigan, Clark, Convertino, Forman, & Butryn, 2018).

Obesity stigma infiltrates every domain of life for obese individuals, including employment, relationships, healthcare (Crandall et al, 2009), and even in justice settings. Obese individuals face prejudice and discrimination in the work place through every stage of the employment cycle, from being less likely to be recruited initially compared to lean individuals, through to being less likely to be promoted (Puhl, Suh, & Li, 2016; Roehling, Pichler, & Bruce, 2013; O’Brien et al, 2008; Rudolph, Wells, Weller, & Baltes, 2009). In relationships, overweight and obese individuals have been found to have fewer friends than their leaner counterparts (Davison & Birch, 2004). They also date less often, and begin dating later than their leaner counterparts (Cossrow, Jeffrey, & McGuire, 2001). Within the healthcare sector, obesity bias and stigma has been found amongst a range of health professionals, including physicians (Alberga et al, 2016). Studies have found many health professionals stigmatize obese patients and at times withhold appropriate advice or treatment (Phelan et al., 2014). This leads to overweight patients being less likely to seek out treatment from their healthcare professional. On the flip side, patients are less likely to trust overweight doctors or follow advice from physicians who are not themselves lean (Puhl, Luedicke, & DePierre, 2013). Obesity stigma is so strong that studies investigating whether a defendant’s body weight influences perceptions of guilt has found that, for female defendants, overweight individuals are seen as significantly more guilty, and more likely to reoffend, than lean defendants (Schvey, Puhl, Levandoski, & Brownell, 2013).
For overweight and obese individuals, experiencing this weight stigma is associated with compromised psychosocial wellbeing: depressed mood, anxiety, social isolation, lower self-esteem and poor psychological adjustment. There is a common view that weight stigma acts as a catalyst for obese individuals to lose weight, and some studies have asserted that this weight stigma is a necessary evil (Callahan, 2013; Vogel, 2011). However, recent research has found that it has the opposite effect on weight loss, and instead weight stigma negatively interferes with weight-related health behaviours. A study by Major, Hunger, Bunyan, and Miller (2013) found that women who read stigmatising media messages about obesity engaged in increased consumption of high-calorie food and had reduced feelings of self-efficacy surrounding their ability to control their diet, resulting in increased weight gain. O’Brien et al (2016) found that weight stigma has very real health consequences for overweight individuals. They found that overweight people experiencing weight stigma internalise weight bias, experience greater psychological distress, and engage in disordered eating behaviours such as uncontrolled eating and loss-of-control eating. Other studies have found daily stigmatising experiences lead to a decreased motivation to diet (Vartanian & Porter, 2016), and greater engagement in maladaptive coping strategies, which are associated with poor psychological wellbeing (Hayward, Vartanian & Pinkus, 2018). In light of these findings, it is essential for researchers and public policy makers to find ways to reduce obesity stigma.

Residual Stigma

While many interventions have attempted to reduce obesity bias and stigma, they have been met with limited success, with most failing to produce long-term change in anti-fat attitudes (Alberga et al., 2016). One conclusion from such work has been that for obese individuals to shed the stigma, they need to lose weight (Mattingly, Stambush, & Hill, 2009). However, recent research shows that obesity stigma is so pervasive, that despite an obese
individual losing weight and attaining a BMI in the “normal-weight” range, the stigma the individual experiences still remains (Latner, Ebneter, & O’Brien, 2012). Studies have shown that merely being informed a person was formerly obese results in negative reactions including attributions of negative qualities associated with obesity, or believing the individual is less healthy than a consistently normal-weight individual (Mattingly et al., 2009). This is surprising as one would expect obesity stigma to dissipate once an individual can no longer be identified as obese.

The idea that obesity stigma continues to exist even after an individual loses weight is also cause for concern because of the research illustrating the impact of stigma on weight-related behaviours. One could theorise that if individuals continue to feel stigmatised upon losing weight, they may re-engage in disordered eating such as binge eating, uncontrolled eating, or emotional eating, and be less likely to physically exercise, which in turn would lead to regaining the weight lost. Given the large number of people who are unable to maintain weight loss even after they have lost it, and who often regain more weight than they initially lost, it is entirely plausible that continued stigma could be a potential contributing factor in why individuals who have lost weight often regain it again. A study by Levy and Pilver (2012) also found that formerly overweight people who are now lean suffer far worse psychological health than consistently lean individuals, and similar psychological health to consistently overweight individuals (Levy & Pilver, 2012), such as significantly higher rates of anxiety and depression. The study also found formerly overweight people had significantly greater rates of suicide attempts than any other weight group. The authors have suggested that these outcomes may be due to a residual stigma that formerly overweight individuals feel they carry.

Residual obesity stigma is a relatively new concept, and while there is a large body of literature devoted to obesity bias and stigma, there are comparatively few studies on residual
obesity stigma. Residual stigma in general, or stigma directed towards people who formerly “deviated” from the status quo or the norm in some way or another, has been looked at in various other contexts, such as stigma directed towards individuals who were formerly criminals (Winnick & Bodkin, 2008), formerly mentally ill (Wright, Gronfein, & Owens, 2000), or formerly alcohol or drug addicted (Romo, Dinsmore, & Watterson, 2016). These are all cases of behavioural deviance from the norm or what is perceived as immoral behaviour, and in many cases the stigma attached to these conditions continues beyond cessation of the deviant behaviour (Winnick & Bodkkin, 2008; Wright et al, 2000).

Just like criminal behaviour and addiction, obesity is a condition which can relapse, therefore despite individuals returning to the “norm” by giving up deviant behaviour such as overeating, drinking, drug-taking, or criminal activity, these are all behaviours that a person can “reoffend” in. Therefore, the idea of expected recidivism may partially explain why residual stigma exists for these behaviours, as one may be viewing the current abstinence from the deviant behaviour as only temporary. Simply losing weight may not be enough to fully eliminate others’ perceptions of a formerly obese individual as embodying negative qualities (such as laziness) or as being morally corrupt.

While there is certainly less research investigating residual obesity stigma compared to obesity stigma in general, there have been a few notable studies on the topic that have informed the current study. The idea that losing weight does not shed the stigma of obesity was initially discussed in a few preliminary studies, such as an early study by Blaine, DiBlasi, and Connor, (2002) which investigated whether weight loss altered perceptions of weight controllability and if it influenced prejudice towards overweight people. Participants (n = 64; 36 female, 23 male, 3 sex unknown) who were university students, viewed a female target individual who was described as either “thin” or “heavy” and having either “recently lost weight” or “not recently lost weight”. The authors found participants displayed significantly
more “dislike” towards females who had lost weight compared to normal-weight or overweight counterparts. The authors theorised that this is due to depictions of weight loss threatening the stereotype of obese individuals as lazy, unmotivated and weak-willed, because the target individual must have had to overcome those negative qualities to lose weight; and because it illustrates the controllability of weight which fuels further dislike of individuals who do not lose weight. The authors also investigated whether participant gender altered the findings; however they found no main effect for participant gender.

Similarly, Fee and Nusbaumer (2012) set out to investigate whether these negative attitudes towards a formerly obese individual would also inform participants’ willingness to engage in a romantic relationship with a formerly obese target individual. Their participants were also undergraduate university students ($n = 363$) who were mostly female (64%), white (86%), of the traditional college age of less than 22 years (85%) and with a BMI in the normal weight range (73%). They found that participants’ own weight status played a role, whereby participants who were obese (10% of participants) were more willing to engage in a romantic relationship with a formerly obese person, but participants who were underweight or normal weight were more likely to hesitate about engaging in a relationship. In contrast to Blaine et al’s (2002) findings, a gender effect was found in this study, in which men were more likely to hesitate in their willingness to date a formerly obese individual than women were. Their results also showed that greater social distance from formerly obese individuals was desired when participants believed that weight loss was a temporary result, not a permanent one, and that participants who believed weight was personally controllable were more hesitant to engage in a romantic relationship with a formerly obese person. The authors concluded that for formerly obese individuals, the stigma of obesity lingers.

And finally, Mattingly, Stambush, and Hill (2009) had similar findings for weight loss surgery targets. They compared participants’ ($n = 207$, undergraduate students)
evaluations of a female target who had lost weight through diet/exercise, to a target who had lost weight through surgery, and a control target who was always thin. They found that the most negative evaluations were made towards the target who had lost weight through surgery, and that this target was viewed as being less healthy, less attractive, and less responsible for the weight they had lost. They also found that there was a residual stigma despite the method used, and that diet/exercise targets were still rated as less healthy than the control target. This was especially true for female participants, who rated both weight loss targets as more responsible for their weight than the control target.

While these earlier studies discussed the stigmatisation of formerly obese individuals, the first study to discuss this type of stigma under the term “residual obesity stigma” was not until a study by Latner, Ebneter, and O’Brien in 2012. As this study directly addresses the concept of residual obesity stigma, it heavily informed the current research. The authors conducted a study to investigate stigma directed at formerly obese individuals who had lost weight, and also to compare the amount of stigma people directed at obese individuals following exposure to descriptions of individuals who had lost weight versus individuals who had remained the same weight. Participants were \( n = 273 \) undergraduate psychology students at the University of Hawaii in Manoa, and as such the sample was largely representative of that particular student population: mostly female (68.5%), with a mean age of 20.7 years, a mean BMI of 23.22, which is in the healthy weight category, and participants’ ethnicities were self-identified as Asian-American (41.4%), White/European (20.9%), Pacific Islander (1.5%), Hispanic (1.1%), African-American (0.7%), and mixed ethnicity (33.3%).

Participants were assigned to one of five experimental conditions, where they read a vignette describing a 31 year old female target individual who was (i) weight stable obese (i.e., BMI of 35.44), (ii) weight stable lean (i.e., BMI of 23.24), (iii) had lost weight through diet/exercise, and a control target who was always thin. The target who had lost weight through surgery, and that this target was viewed as being less healthy, less attractive, and less responsible for the weight they had lost. They also found that there was a residual stigma despite the method used, and that diet/exercise targets were still rated as less healthy than the control target. This was especially true for female participants, who rated both weight loss targets as more responsible for their weight than the control target.
surgery and become lean (i.e. prior BMI of 35.44, current BMI of 23.24), (iv) had lost weight through behavioural methods (e.g. diet and exercise) and become lean (i.e. prior BMI of 35.44, current BMI of 23.24), (v) had lost weight from a higher weight through an unspecified method, but remained obese (i.e., prior BMI of 47.63, current BMI of 35.44). There were no images of the target individual, and all non-weight related details were matched across the five conditions. These conditions consisted of two main dimensions: weight stability (whether the target individual was described as having lost weight or having maintained their weight), and current weight (whether the target individual was described as currently obese or currently lean), as well as a third dimension of weight-loss method.

Two main measures were used to determine whether residual obesity stigma occurred. The first was the Universal Measure of Bias – Stigma ([UMB] Latner, O’Brien, Durso, Brinkman & MacDonald, 2008) which was used to measure stigma towards each target individual, and the second was the Anti-fat Attitudes questionnaire ([AFA] Crandall, 1994) to determine participants’ general anti-fat attitudes following their exposure to descriptions of weight loss versus weight maintained. The results showed that while there was no main effect for weight stability, they were trending towards greater stigma directed towards targets that had lost weight. A significant interaction did emerge, however, for the UMB-Attraction subscale between current weight and weight stability, showing that currently lean targets with a history of obesity were judged as less attractive than weight stable lean targets. Latner and colleagues (2012) concluded that target individuals who were described as having ever been obese were subject to residual stigma.

Latner, et al (2012) also theorised that a potential reason for a significant result in the attraction subscale could be to do with evolutionary tendency of pathogen avoidance such that participants may be envisioning the target individual who has lost weight in their former obese state, and obesity has been found to evoke pathogen avoidance responses in previous
studies (Park, Schaller, & Crandall, 2007). Because the attraction subscale is linked to concepts such as romantic relationships, participants may perceive the target individuals previous obese weight as indicative of a genetic flaw, and despite their weight loss pathogen avoidance may persist even when physical expression of the pathogen-indicating trait has disappeared.

The results of the Anti-fat Attitudes (AFA) Questionnaire revealed that for the dislike subscale, there was a main effect for weight stability, with participants showing greater dislike towards obesity and increased anti-fat attitudes after reading about targets who had lost weight. The authors link this to controllability theory (Blaine et al., 2002), which asserts that depictions of weight loss illustrates that weight is malleable and controllable, and therefore increases blame and bias towards individuals who continue to “deviate” by remaining overweight. Furthermore, the study found that participants with higher BMIs displayed marginally lower anti-fat attitudes in the dislike subscale than participants with lower BMIs, but these higher BMI participants also showed a stronger belief that weight is controllable. This finding is consistent with previous research that found the higher an individual’s BMI is, the stronger the belief that weight is controllable (Geier, Schwartz, & Brownell, 2003). However, the study also found that the formerly extremely obese target who had lost weight to become moderately obese was stigmatised as much as the weight stable moderately obese target, and this finding is inconsistent with controllability theory. While the effect of participants’ own BMIs on residual stigma was discussed, no main effects of gender were presented in their results.

The third dimension in the study of weight loss method revealed no significant differences between the groups. Participants did not rate the target individual more negatively if they had lost weight by surgery, behavioural methods, or an unspecified method. The authors concluded that the method one uses to lose weight is not the cause of residual stigma.
All other subscales of both the UMB and the AFA revealed non-significant results, so it appeared residual obesity stigma seemed to only exist in some contexts, despite the authors’ assertion that, “The current results demonstrate significant residual obesity stigma directed at individuals who have lost weight. Furthermore, obesity stigma significantly increases following even brief descriptions of weight loss.” (Latner et al, 2012, p. 2037).

Latner et al.’s (2012) work was followed by a few recent studies that sought to understand residual obesity stigma. Given the discrepancy across studies as to whether male or female participants are more stigmatising of formerly obese individuals, Tucci et al (2013) conducted a study to first determine whether residual obesity stigma is gender-specific, and secondly identify whether participants’ own BMIs influence their evaluation of a formerly obese individual. The participants \((n = 202)\), who were also university students, were fairly evenly male (106) and female (96), were mostly 20 years old, and 75-76% of participants had a BMI in the normal BMI weight range. Participants viewed a picture of a normal-weight young female target individual and read a vignette describing the target as either always having retained the same weight, or stating that she was previously obese, before rating the target individual using the Fat Phobia Scale ([FPS] Robinson, Bacon, & O’Reilly, 1993). The results showed that female participants displayed higher levels of fat phobia towards the formerly obese target individual compared to the target individual who had retained their weight. Female participants also associated the formerly obese target with attributes such as being lazy, having a lack of control, and being less hard-working. Male participants, however, showed no significant effect. In one subscale of the FPS (Stupid/Uncreative), males even rated the formerly overweight target less negatively than the consistently normal weight target. In terms of participants’ own BMIs and their evaluation of the target, the results showed that for men, the higher their BMI, the more negative attributes they gave to the consistently normal weight target. However, there was no relationship between BMI and total
FPS ratings for female participants. The authors concluded that male participants used the actual photo, rather than the description, to make their evaluation of the target individual, and that they potentially viewed her weight loss as a positive feat. A limitation of the study was that it only investigated male and female attitudes towards a female target individual, and there was no male target individual to compare results with.

Despite many studies illustrating the existence of residual obesity stigma, not all studies were able to find results supporting the concept. Fardouly and Vartanian (2012) conducted a study with \( n = 73 \) first year psychology students to determine whether participants evaluated a female target individual differently after learning she had lost weight, and whether the weight-loss method described influenced those evaluations. They found that overall, the previously-obese target was rated as positively as the target individual who had always been thin, and even rated as being more physically active than the consistently-thin target. This is in contrast to previous studies which found weight-loss targets were rated more negatively than consistently-thin targets (i.e., Latner et al, 2012).

Additionally, the study found that specific weight loss method did appear to influence evaluations of target individuals who had lost weight. They found that targets who were described as having lost weight through surgery were rated as lazy as a target who was still obese, which they theorise is because surgery is perceived as a low-effort weight loss option that does not require willpower, self-control, and discipline in the same way that weight loss via diet and exercise is perceived to do so. Surgery is in fact the most effective method for obese individuals to lose weight, and it also requires a great deal of effort, money, and lifestyle change on the part of the obese individual (Hansen & Huey Dye, 2016). Despite this, when participants were asked which method they thought a target with an unspecified weight loss method had used to lose weight, they assumed it was through diet and exercise. This shows that there may be a type of anti-surgery bias occurring, or pro-effort bias, rather than
residual obesity stigma. Other studies have also investigated the effects of weight-loss method on residual stigma (Bullock, Mattingly & Stambush, 2011; Black, Sokol, & Vartanian, 2014; Stambush, Mattingly, & Hill-Mercer, 2016); however, residual obesity stigma has been shown to occur regardless of weight loss method, and is a different concept to stigma attached to various methods of weight loss, such as weight-loss surgery stigma.

Fardouly and Vartanian’s (2012) study was not the only study to find little evidence of residual obesity stigma. A study by Asbury, Kratzer, & Brinthaupt (2017), which also used undergraduate psychology students ($n = 81$) who were mostly female, white, and had a mean age of 20.74 years, found that compared to other stigmatising conditions, participants were more willing to date someone who was formerly obese than someone who was formerly an alcoholic, homeless, a drug addict, or formerly suffered from a clinical psychological disorder, alongside various other commonly stigmatised conditions. However, they did find that participants believed obese individuals were more personally responsible for their condition compared to the other stigmatised conditions they investigated. The results of this study cannot conclusively say that residual obesity stigma does not exist, rather they can assert that residual obesity stigma, if it does exist, does not appear to be as strong a stigma as the stigma attached to being formerly alcoholic, drug-addicted, homeless, or suffering from a psychological disorder.

**Self-Stigma**

While there appears to be inconsistencies in the literature about public stigmatisation of individuals who have lost weight, some studies have also investigated whether individuals who have lost weight feel stigmatised themselves, or carry a self-stigma about their own weight-loss. Qualitative studies (Granberg, 2011; Hindle & Carpenter, 2011) consisting of in-depth interviews with individuals who had lost weight found that participants often suffered from a felt stigma, and despite losing weight still had a stigmatised identity. However, some
participants were able to successfully “exit” the stigma after maintaining weight loss for a period of time (Granberg, 2011). Some participants felt people close to them would (perhaps unintentionally) sabotage their weight loss or weight maintenance efforts, or at times question their new eating and exercising behaviours (Hindle & Carpenter, 2011).

A longitudinal study by Mustillo, Hendrix and Schafer (2012) investigated whether obese female youth who lost weight and became a lean weight had changes in their self-esteem and body image following weight loss. They found that self-esteem and body image discrepancy (the belief that one’s body is discrepant from the “ideal” body) paralleled self-esteem and body image discrepancy in chronically obese female youth. Neither their self-esteem nor their self-image improved following weight loss, suggesting that despite losing weight the stigma remained, and the participants still suffered the effects of stigma. In line with Mustillo et al.’s (2012) work, Levy and Pilver (2012) conducted a large scale study using a nationally representative sample (n = 33,604), to determine psychological outcomes for formerly overweight individuals. Splitting the data into four weight groups: formerly overweight, consistently normal weight, consistently overweight, and subsequently overweight, they found that formerly overweight individuals were significantly more likely to attempt suicide than all the other groups, and they had significantly greater likelihood of anxiety and depressive disorders than the consistently normal-weight group, and not significantly different likelihood from the consistently overweight group. These results are alarming, as it suggests that people who have lost weight may experience similar or even worse negative outcomes than consistently overweight individuals.

In contrast to these earlier studies, more recent qualitative studies (Romo, 2016) have found that formerly obese individuals do not feel stigmatised following weight loss, and perceive many benefits from disclosing their former weight status, such as overwhelmingly
supportive and encouraging responses. As such, Romo (2017) suggests that the concept of residual obesity stigma has been overblown.

The Current Study

As evidenced in the literature review above, there are mixed findings in the literature on residual obesity stigma. While some literature finds evidence for the existence of residual obesity stigma, it appears to be under limited conditions, such as only in areas of attraction and romantic relationships; only occurring in female participants; or only occurring in participants with a BMI in the normal weight range. Alternatively, some of the literature was not able to find any existence of residual stigma, and have suggested that as a concept it may have been “overblown” (Romo, 2017). Due to the level of variability in the findings of earlier studies, the current study seeks to do a conceptual replication of previous work to determine to what extent residual obesity exists using a larger community sample. Given the increased emphasis on replication in psychological science (Nosèk et al., 2015; Pashler & Wagenmakers, 2012), it is even more important to examine the existence of such a residual obesity stigma as described by Latner and colleagues (2012).

Additionally, the current work examines whether such a residual obesity stigma may impact male targets in a similar fashion as it sometimes appears toward female targets. Previous research (Latner et al., 2012; Mattingly et al., 2009) has only examined residual obesity stigma towards female targets leaving it unclear whether such a stigma applies to men who have lost weight as well. I predict that while a similar bias will carry over to men, the overall stigma should be weaker toward men relative to women as women tend to face greater backlash over their weight than men (Crandall et al, 2009).

And finally, previous work has often been limited to two “current weight” conditions: obese and lean. The current work seeks to explore whether the effects of residual obesity
stigma extends to overweight individuals – that is individuals who are classified as overweight (BMI of 25-29.9) but are not obese (BMI > 30). It is hypothesised that the effect will not be as strong for overweight individuals, both for a residual condition (an overweight target individual who has lost weight from a higher, obese, weight) or a weight stable condition (an overweight target described as having always been overweight), compared to obese target individuals, or residual lean target individuals (individuals described as having previously been obese but have lost weight to become lean).

Almost all previously conducted research on residual obesity stigma has used undergraduate university students, mainly studying psychology, to complete their studies. These samples have often consisted of mostly young (mean age of 20), female (most studies around 70%) individuals, who predominantly have a BMI in the healthy weight range (BMI 18.5-24.9). This is a potentially problematic platform to research residual obesity stigma from, as research has found there can be weight, age, and gender effects when it comes to both obesity stigma and residual obesity stigma. Crandall (1994) found that university-aged females are the most stigmatizing towards obesity compared to any other group, and therefore it is important for research to observe the existence of residual obesity stigma in a more diverse community sample with greater variability in age, ethnicities, body weights, as well as a more even gender split. Because it is important to research residual obesity stigma outside of the college population, the current study seeks to achieve a more diverse sample by recruiting a large sample of online US participants.

Furthermore, the current study includes a photo of the target individual at their current weight. In previous work there has been variations in whether a photo was included, with some studies opting for solely a vignette (i.e., Latner et al, 2012), and other studies using various versions of a vignette with both “before” and “after” weight loss images used, or just an “after” photo (Tucci et al, 2013). The rationale behind the current study using an “after”
(or “current weight”) image stems from the fact that in real-life interactions, and even in many virtual interactions, weight is a visible feature. When assessing residual obesity stigma, it is appropriate to present participants with an image of the individual as they currently are, as this is the condition under which evaluations of the target would be made in real life, with visual cues.

**Moderators**

Two moderator variables that may influence the effects of residual obesity stigma are examined in the current study. Following Latner et al’s (2012) theorizing on the cause of residual obesity stigma in the domain of attraction, the perspective of the evolutionary position (Park, Schaller & Crandall, 2007) is examined, which argues that obesity triggers pathogen avoidance mechanisms, and that disease-connoting perceptions are implicitly associated with obesity. Following this framework, it may be that people high on pathogen avoidance tendencies may be particularly likely to react negatively toward formerly obese individuals as such individuals are especially attuned toward such concerns. By contrast, people low on pathogen avoidance may be less reactive to reminders of someone’s former obesity. Such tendencies may be particularly evident against female targets as gender has been found to play a role in the relationship between pathogen disgust sensitivity and weight stigma, with multiple studies finding that disgust is only related to anti-fat attitudes for women, not for men (Lieberman, Tybur, & Latner, 2012; O’Brien et al, 2013).

A second perspective may emerge from a more social psychological perspective, which argues that individuals who endorse anti-fat attitudes also endorse meritocratic beliefs (Crandall, 1994). Specifically, participants who score high on meritocratic beliefs may view individuals who have lost weight more positively due to the high-effort they assume was exerted by the target individual to lose weight. Therefore, residual obesity stigma should be greater for participants who score low on meritocratic beliefs. This is based on previous
research which has found evidence for a pro-effort bias towards target individuals who have lost weight (Stambush, Mattingly, & Hill-Mercer, 2016; Bullock, Mattingly, & Stambush, 2011; Black, Sokol, & Vartanian, 2014). Some studies have found a relationship between both disgust and effort in weight stigma (Beames, Black, & Vartanian, 2016). Both perspectives have been heavily discussed in general obesity stigma literature (Vartanian, 2010), and as such are worth investigating as potential moderators in the expression of residual obesity stigma.

**Aims of Current Research**

The main hypotheses of the current study are:

i) Residual obesity stigma will exist, and this will be shown by a main effect of weight change (residual or weight stable) on stigma (UMB) towards the target individuals. This effect will be particularly evident in the attraction subscale of the UMB, as previous research has presented significant findings in this domain. Specifically, participants will rate residual target individuals as less attractive than weight stable target individuals, in all current weight conditions (lean, overweight, or obese), but particularly in the lean current weight condition.

ii) Residual obesity stigma will show gender effects, in that the stigma will be directed at both the male target and the female target; however the stigma will be greater for the female target compared to the male target, based on previous work that shows obesity stigma is greater towards women (Crandall et al, 2009). There will also be an effect of participant gender on stigma with female participants rating the residual targets more harshly than male participants.

iii) There will be an interaction between target weight (currently lean, overweight or obese) and weight change (residual or weight stigma) which will show that residual obesity
stigma will occur for the residual overweight target individuals (an overweight target who has lost weight from a higher, obese, weight), but the effect will be weak in comparison to the residual lean targets (a lean target who has lost weight from being previously obese).

iv) Participants who view a target described as having lost weight (residual) will display greater anti-fat attitudes towards obese individuals in general compared to participants who view a target individual described as having maintained their weight (weight stable). This prediction is also based on previous research that found greater anti-fat attitudes in the dislike subscale of the AFA for participants who viewed a target that had lost weight.

v) I expect that pathogen avoidance will interact with the manipulation to predict increased weight bias such that people high in pathogen avoidance will show more residual obesity stigma compared to those low on pathogen avoidance who may not show any residual obesity stigma. Similarly, I expect that meritocracy beliefs will interact with the manipulation such that participants high on meritocracy beliefs may show no residual stigma (or even a reverse residual stigma) compared to those low on meritocracy beliefs, who may show greater residual obesity stigma.
Method

Participants

Seven hundred and thirty nine participants (345 male, 46.6%; 393 female, 53.1%; 1 other, 0.1%) were recruited from Crowdflower (Peer, Samat, Brandimarte & Acquisti, 2017), an online participant source platform in the USA similar to Amazon’s Mechanical Turk. The participants ranged in age from 16 to 79 years, with a mean (SD) age of 35.9 (12.40) years, and a mean BMI of 27.72 (9.43) which is categorised as overweight, but not obese. Participants self-identified as white (74.1%), African-American (7.2%), Hispanic/Latino American (8.2%), Asian American (6.6%), Native Hawaiian or Native (Indigenous) American (1.2%), Arab American (0.5%), Pacific Islander (0.1%), multiracial (1.2%) or other (0.7%). Participants disclosed their sexual orientation which included heterosexual/straight (90.3%), lesbian (1.6%), gay (1.5%), bisexual (4.9%), and other (1.6%). A small monetary reward (USD$2) was credited to each participant for completing the 10-15 minute online study. Participants were only included in analysis if they passed at least one of two manipulation check questions about each target. This resulted in a final sample of six hundred and forty participants.

Design

A 3 x 2 between-subjects design was implemented, in which the independent variables were the target individual’s current weight status (obese, overweight, or lean), and the target individual’s weight history (residual [i.e., experienced weight loss] or weight stable). Target gender was manipulated within-subjects, meaning each participant saw both a male target individual and a female target individual.

Manipulation

Participants were randomly assigned to one of six experimental conditions. For each condition participants saw both a male target and a female target fitting that condition
description (the order of which was counterbalanced): (1) residual lean target, in which the
target individual was described as having previously been obese, but had lost weight to
become lean; (2) weight stable lean target, in which the target individual was described as
having always been lean; (3) residual overweight target, in which the target individual was
described as having previously been obese, but had lost weight to become overweight, but no
longer obese; (4) weight stable overweight target, in which the target individual was
described as having always been overweight; (5) residual obese target, in which the target
individual was described as having previously been morbidly obese, but had lost weight to
become obese, but no longer morbidly obese; (6) weight stable obese target, in which the
target individual was described as having always been obese.

Each condition included a vignette describing the target individual, and an image of
the target individual at their current weight (see Appendix D for all images and vignettes).
There were three different images of the female target individual, and three different images
of the male target individual, with each image portraying the target individual at a different
current weight: obese, overweight, or lean. The images were obtained from weight loss
websites as per previous studies (Fardouly & Vartanian, 2012), and the faces of the target
individuals were blurred out, in order to avoid confounding results due to facial
attractiveness. In keeping with previous studies (i.e., Latner et al, 2012) all non-weight
related details about the target were kept constant across all conditions including age,
occupation, and interests. All female targets were presented as a 31 year old teacher who
enjoys spending time with her friends and cat, and listening to music. All male targets were
described as a 31 year old IT consultant who enjoys walking his dog, going to the cinema,
and spending time with friends.

To ensure participants were reading the study and engaged in answering the
questions, participants were required to complete two multi-choice answer manipulation
checks, one asking what the target individual’s profession was, and the other asking the target individual’s current weight. There were four possible answers for participants to choose from in both multi-choice questions, and the correct answers to these were obvious in the prime.

Measures

Pre-measures

**Demographic Measures.** All participants first completed a series of pre-measures including demographics such as age, gender, ethnicity, sexual orientation, nationality, qualifications, and to disclose their weight (in pounds) and height (in feet and inches) so that their BMI could be measured. This was to determine whether there was any connection between participants’ own BMI and the outcome variables, such as stigma. The imperial system of pounds, feet, and inches was used because participants were residing in the United States where that is the system of measurement (see Appendix G for all pre-measures).

**Pathogen Avoidance (Tybur et al, 2009).** A seven-item pathogen avoidance subscale derived from the Three-Domain Disgust Scale (Tybur et al, 2009) was used to investigate pathogen avoidance as a potential moderator for residual stigma. The questionnaire asked participants to rate how disgusting they found each of the seven concepts described on a scale from 1 to 6, and included items such as “Standing close to a person who has body odour”. The pathogen avoidance subscale has good internal consistency, Cronbach’s alpha was .81 in the current study.

**Meritocracy Beliefs (Lalonde et al, 2000).** Participants answered a short four-item questionnaire assessing meritocracy beliefs, which was investigated as a second moderating variable. The questionnaire included items such as “Everybody in this country has equal opportunities”. Cronbach’s alpha was .73, indicating acceptable internal consistency of the meritocracy beliefs questionnaire in the current study.
Evaluating the Target Individual

**Stigma.** Participants began their evaluation of the target individual by responding to the 20-item Universal Measure of Bias (UMB; see Appendix E for all scale items). For all items 1 = strongly agree, 7 = strongly disagree). The UMB includes four subscales: Attractiveness (“I find people like Laura to be sexy”), which has good internal consistency for the female target (Cronbach’s α = .85) and the male target (Cronbach’s α = .82); Negative Judgments (“People like Laura tend toward bad behaviour”), which shows excellent internal consistency for both the female target (Cronbach’s α = .96) and the male target (Cronbach’s α = .96); Distance (“I would be comfortable having a person like Laura in my group of friends”), has good internal consistency for both the female target (Cronbach’s α = .89) and male target (Cronbach’s α = .85); and Equal Rights (“Special effort should be taken to make sure that people like Laura have the same housing opportunities as other people”) which revealed excellent internal consistency for both the female target (Cronbach’s α = .94) and male target (Cronbach’s α = .95).

Post Target Evaluation Measure

**Anti-fat Attitudes ([AFA] Crandall, 1994).** Participants were asked to complete the 13-item scale (each item 0 = strongly disagree, to 9 = strongly agree) to determine their anti-fat attitudes in general (see Appendix F for all scale items). The total scale exhibited good internal consistency, Cronbach’s α = .89. The scale can be broken down into three subscales, Dislike (“I don’t really like fat people much”), which has excellent internal consistency (Cronbach’s α = .94); Fear of fat (“I feel disgusted with myself when I gain weight”), which has good internal consistency (Cronbach’s α = .86); and Willpower (“Some people are fat because they have no willpower”) which also has good internal consistency (Cronbach’s α = .82).
Procedure

Participants selected the study entitled “Impression Formation”. Before beginning the study, participants read an information page informing them about the purpose of the study and the tasks involved in it (see Appendix A for the full information sheet participants read). Deception was used to deter participants from learning the real purpose of the study in order to avoid socially desirable responding. This was also done similar to previous residual obesity stigma work (e.g., Mattingly et al, 2009). They were then asked to read a consent form and “agree” to the terms of the study (see Appendix B for the full consent form).

After completing the demographic measures and individual difference measures outlined above, participants were told they would be undertaking two impression formation tasks where they would be required to read about two individuals and provide feedback on these individuals. Participants were then presented with the manipulation. Qualtrics, the online survey tool used for the study, randomised the order in which participants saw the male or female targets. To provide an example, the conditions are described below with the female target presented first, and only the residual lean condition is described to illustrate the procedure (see Appendix D for all vignettes and images for each condition).

Participants in the residual lean condition were presented with a picture of the first target individual (in this example, a female target individual), and asked to read the vignette about the woman pictured, before evaluating the target individual:

Laura is 29 years old and works as a teacher full-time. Outside of work she enjoys going out with her friends, spending time with her cat, and listening to music. Previously, Laura was not at a healthy weight for her height. She is 5 foot 4 inches tall, an average height for women, and she used to weigh 200 pounds. Her doctor had told her she was obese. Laura managed to lose 66 pounds and is now at a healthy weight, weighing 134 pounds. Below is a picture of Laura. Her face is blurred to protect her privacy.
Participants then evaluated the target by completing the target evaluation questionnaires such as the UMB. Following this, participants were then asked to read about the second target individual, Peter.

Peter is 31 years old and works as an IT consultant full-time. Outside of work he enjoys playing with his dog, going to the cinema, and hanging out with his friends. Previously, Peter was not at a healthy weight for his height. He is 5 foot 10 inches tall, an average height for men, and he used to weigh 240 pounds. His doctor had told him he was obese. Peter managed to lose 80 pounds and is now at a healthy weight, weighing 160 pounds. Below is a picture of Peter. His face is blurred to protect his privacy.

Participants then evaluated the second target individual by completing the same evaluation questionnaires. After evaluating both the male and female target individuals, participants were asked to complete the post target evaluation measures of Anti-fat Attitudes.
Once participants had completed the study, they were presented with a debrief page which revealed the true nature of the study (see Appendix C for the full debrief sheet). Participants were provided with helpline phone numbers in case any questions had been distressing for them, and finally they were given a Crowdflower code to receive their USD$2 reward for completing the study. For all conditions the process was identical to the above described procedure, with only the target individual differing between the six conditions.
Results

Descriptive statistics were analysed to examine skew, kurtosis, and normality of key variables presented, and none were outside of the acceptable range, with all variables <1.

Stigma: Universal Measure of Bias

To examine the main and interaction effects of weight change (residual or weight stable), target weight (currently lean, overweight, obese), and target gender on stigma, a 3 x 2 x 2 mixed model ANOVA was done for each of the four UMB subscales. Table 1 provides all UMB means, in which higher numbers represent greater bias toward the target. Analysis also included controlling for participant BMI and age, however these revealed no significant differences in evaluations of the target individual, and therefore these factors are not discussed further.

Table 1.

Means (M) and Standard Deviations (SD) of Universal Measure of Bias (UMB) subscales for female target and male target.

<table>
<thead>
<tr>
<th></th>
<th>Weight Stable</th>
<th></th>
<th></th>
<th>Residual</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lean M (SD)</td>
<td>Overweight M (SD)</td>
<td>Obese M (SD)</td>
<td>Lean M (SD)</td>
<td>Overweight M (SD)</td>
<td>Obese M (SD)</td>
</tr>
<tr>
<td>Female Target</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attraction</td>
<td>3.55 (1.54)</td>
<td>4.16 (1.24)</td>
<td>3.99 (1.21)</td>
<td>3.66 (1.47)</td>
<td>3.80 (1.40)</td>
<td>3.99 (1.22)</td>
</tr>
<tr>
<td>Negative Judgment</td>
<td>3.38 (1.85)</td>
<td>3.80 (2.03)</td>
<td>3.09 (1.62)</td>
<td>3.15 (1.87)</td>
<td>3.63 (2.27)</td>
<td>3.14 (1.88)</td>
</tr>
<tr>
<td>Distance</td>
<td>3.53 (1.54)</td>
<td>3.86 (1.76)</td>
<td>3.35 (1.50)</td>
<td>3.41 (1.57)</td>
<td>3.64 (1.87)</td>
<td>3.06 (1.62)</td>
</tr>
<tr>
<td>Equal Rights</td>
<td>3.55 (1.64)</td>
<td>3.83 (1.83)</td>
<td>3.49 (1.62)</td>
<td>3.62 (1.66)</td>
<td>3.74 (1.82)</td>
<td>3.07 (1.66)</td>
</tr>
<tr>
<td>Male Target</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attraction</td>
<td>3.85 (1.33)</td>
<td>4.16 (1.34)</td>
<td>4.07 (1.36)</td>
<td>3.76 (1.34)</td>
<td>3.93 (1.26)</td>
<td>4.35 (1.21)</td>
</tr>
<tr>
<td>Negative Judgment</td>
<td>3.54 (1.75)</td>
<td>3.61 (2.15)</td>
<td>3.17 (1.55)</td>
<td>3.49 (1.95)</td>
<td>3.61 (2.15)</td>
<td>3.30 (1.86)</td>
</tr>
<tr>
<td>Distance</td>
<td>3.76 (1.34)</td>
<td>3.68 (1.65)</td>
<td>3.54 (1.32)</td>
<td>3.63 (1.45)</td>
<td>3.67 (1.74)</td>
<td>3.32 (1.56)</td>
</tr>
<tr>
<td>Equal Rights</td>
<td>3.59 (1.55)</td>
<td>3.67 (1.76)</td>
<td>3.64 (1.59)</td>
<td>3.79 (1.62)</td>
<td>3.83 (1.85)</td>
<td>3.30 (1.73)</td>
</tr>
</tbody>
</table>
UMB Attraction

There was no significant main effect of weight change (weight stable vs residual) on attractiveness rating towards the target individuals $F(1,640) = .292, p = .589, \eta^2_p < .001$, showing that participants showed no difference in their ratings of attractiveness of the target individuals who had lost weight (residual) or remained weight stable. There was no significant interaction between weight change (residual vs weight stable) and target gender on attractiveness ratings, $F(1, 640) = .419, p = .518, \eta^2_p = .001$, and no interaction between target gender, weight change, and target weight (lean, overweight, obese), on attractiveness ratings $F(2, 640) = 1.76, p = .173, \eta^2_p = .005$, showing that there was no significant gender effect in attractiveness ratings towards the male target or the female target individual. There was also no interaction between weight change (weight stable vs residual) and target weight (lean, overweight, or obese), on attractiveness ratings, $F(2, 640) = 2.050, p = .130, \eta^2_p = .006$.

The only significant result for the UMB Attraction subscale was target weight $F(2, 640) = 6.612, p = .001, \eta^2_p = .020$, showing that currently obese target individuals were viewed as less attractive than the overweight or lean target individuals, which is in keeping with the obesity stigma literature, but does not imply any presence of residual obesity stigma. Overall, participants did not rate residual target individuals as less attractive than weight stable target individuals, in any current weight condition (lean, overweight, or obese).

UMB Negative Judgment

There was no main effect of weight change (residual stigma) on negative judgments $F(1,640) = .129, p = .719, \eta^2_p < .001$, and no interaction between weight change and target weight on negative judgments for either the male or female target $F(2,640) = 2.46, p = .782, \eta^2_p = .001$. There was also no three-way interaction between target gender, target weight, and
weight change on negative judgments towards the target individuals, \( F(2,640) = .064, p = .938, \eta^2_p < .001 \). Therefore, participants did not hold greater negative judgments towards target individuals who were in the residual conditions, and they did not hold significantly different negative judgments towards the female target individual compared to the male target individual. As with the attraction subscale, the only significant effect for the UMB subscale on negative judgments was target weight, \( F(2,640) = 4.173, p = .016, \eta^2_p = .013, \) however for negative judgments overweight targets were viewed significantly more negatively than either the obese targets or the lean targets. Overall, there was no evidence of residual obesity stigma occurring in the negative judgments subscale, as participants did not judge residual targets more negatively than weight stable targets.

**UMB Distance**

There was no main effect of weight change (residual stigma) on distance from the target individual \( F(1,640) = 1.920, p = .166, \eta^2_p = .003 \), and no interaction between weight change and target weight on distance, \( F(2,640) = .133, p = .875, \eta^2_p < .001 \). There was also no significant interaction of target gender, target weight, and weight change on distance \( F(2,640) = .492, p = .612, \eta^2_p = .002 \), showing that there was no evidence of residual stigma expressed by a desire to have greater social distance from a target individual, and no significant differences in distance between the male and female targets in either residual conditions or weight stable conditions. There was a significant interaction between target weight and target gender \( F(2,640) = 4.893, p = .008, \eta^2_p = .015 \), and a significant effect of target weight on distance \( F(2,640) = 3.768, p = .024, \eta^2_p = .012 \). This showed that participants desired greater social distance from the overweight female target individual compared to the obese or lean target individuals. Overall, no evidence of residual stigma was found for UMB distance.
UMB Equal Rights

This final subscale of the UMB questionnaire was not included in previous studies (Latner et al., 2012), however the current study included it to determine if there were any differences between residual and weight stable conditions on attitudes towards equal rights directed at the target individuals, as previous research has found that attitudes relating to equal rights have been biased against obese individuals, especially in areas such as career opportunities (Crandall et al., 2009). There was no main effect of weight change (residual vs weight stable) on equal rights across target individuals, $F(1,640) = .324$, $p = .569$, $\eta^2_p = .001$. There was also no significant interactions between target gender, weight change, and target weight on equal rights, $F(2,640) = .214$, $p = .807$, $\eta^2_p = .001$. Participants did not rate either the male or female target as more deserving of equal rights, and the interaction between the target individual’s current weight and weight change (residual or weight stable) was not significant, $F(2, 640) = 1.522$, $p = .219$, $\eta^2_p = .005$. Similar to the Negative Judgments subscale and the Distance subscale, there was a significant effect of target weight on equal rights, $F(2, 640) = 3.440$, $p = .033$, $\eta^2_p = .011$ which also showed that overweight targets were viewed significantly more negatively than obese targets, however in this subscale the results are not significantly different from lean targets. Participants had the most positive attitudes regarding equal rights for obese targets compared to lean or overweight targets, and the most negative attitudes about equal rights for overweight targets. Overall, however, the equal rights subscale showed no evidence for residual obesity stigma.

Anti-fat Attitudes

To examine the main and interaction effects of weight change (residual or weight stable) and target weight (currently lean, overweight, obese) on anti-fat attitudes, a $3 \times 2$ between subjects ANOVA was done for each of the three Anti-fat Attitudes (AFA) subscales,
and for the total AFA Questionnaire. Table 2 provides all AFA means, in which higher numbers represent greater anti-fat attitudes.

Table 2.

**Means (M) and Standard Deviations (SD) of Anti-fat Attitudes (AFA) questionnaire subscales and total score.**

<table>
<thead>
<tr>
<th></th>
<th>Weight Stable</th>
<th></th>
<th>Residual</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lean</td>
<td>Overweight</td>
<td>Obese</td>
<td>Lean</td>
</tr>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>Dislike</td>
<td>3.48 (2.07)</td>
<td>3.11 (1.81)</td>
<td>3.93 (2.25)</td>
<td>3.45 (2.21)</td>
</tr>
<tr>
<td>Fear of Fat</td>
<td>5.26 (2.49)</td>
<td>5.37 (2.55)</td>
<td>5.18 (2.29)</td>
<td>5.26 (2.67)</td>
</tr>
<tr>
<td>Willpower</td>
<td>5.47 (2.30)</td>
<td>5.75 (2.22)</td>
<td>5.94 (1.93)</td>
<td>6.00 (2.27)</td>
</tr>
<tr>
<td>AFA Total</td>
<td>4.35 (1.75)</td>
<td>4.24 (1.57)</td>
<td>4.68 (1.74)</td>
<td>4.46 (1.77)</td>
</tr>
</tbody>
</table>

**AFA Dislike**

There was a significant main effect of weight change on anti-fat attitudes in the dislike subscale $F(1,643) = 11.473, p = .001, \eta^2_p = .018$, and a significant interaction between target weight and weight change $F(2,643) = 4.902, p = .008, \eta^2_p = .015$. When analysed further by target weight (lean, overweight, or obese), it was revealed that the significant effect was only for participants who saw an obese target individual. A 3x2 ANOVA of the obese targets only revealed that there is significantly greater anti-fat attitudes in the dislike subscale towards obese individuals for participants in the weight stable obese condition compared to the residual obese condition, $F(1,187) = 17.694, p < .001$. Despite the target individual from both conditions described as currently presenting at the same weight, participants expressed greater dislike after viewing the weight stable obese target.
AFA Fear of Fat

There was no significant main effect of weight change on participants fear of fat \( F(1,643) = .074, \ p = .786, \eta^2_p < .001 \), and no interaction between target weight change (residual or weight stable) or target weight (lean, overweight or obese) on fear of fat \( F(2,643) = .022, \ p = .978, \eta^2_p < .001 \). This shows that participants’ anti-fat attitudes surrounding fear of fat were not significantly different after viewing a weight stable target individual or a target individual who had lost weight.

AFA Willpower

There was no significant main effect of weight change on participants anti-fat attitudes in their beliefs about willpower \( F(1,643) = .093, \ p = .761, \eta^2_p < .001 \), and no interaction between target weight change (residual or weight stable) or target weight (lean, overweight or obese) on willpower \( F(2,643) = 1.912, \ p = .149, \eta^2_p = .006 \). This indicates that there is no residual stigma occurring in this subscale. However, further analysis of each target weight revealed that for participants who saw a lean target individual there is a trend towards residual stigma in the willpower subscale of the AFA, although it is not significant \( F(1,208) = 2.827, \ p = .094 \). Participants have slightly higher anti-fat attitudes (willpower) after viewing a target who had lost weight (residual) and was now lean, compared to a target who had always been lean (weight stable), although this was not a significant result, and this scale is reflecting anti-fat attitudes in general, not attitudes towards the target individual.

AFA Total

A significant main effect was found for weight change on total anti-fat attitudes \( F(1,643) = 4.767, \ p = .029, \eta^2_p = .007 \), and a significant interaction between weight change and target weight \( F(2,643) = 3.331, \ p = .036, \eta^2_p = .010 \). Further analysis revealed that these effects only occurred in the obese target weight conditions. Participants assigned to an obese
condition showed significantly greater anti-fat attitudes (total) in general after viewing the weight-stable obese target compared to the obese target who had lost weight from being morbidly obese, $F(1,187) = 9.805, p = .002$. This is the opposite of residual stigma, which would show that participants have greater anti-fat attitudes after viewing a target individual who had lost weight.

**Participant Gender**

As no evidence of residual obesity stigma was found analysing the participants all together, further analysis was conducted by looking specifically at participant gender to determine if there were any effects for just female participants or male participants, given participant gender has shown significance in previous studies (Tucci et al., 2012).

**Female Participants.** Previous research has often used a heavily female participant sample, largely due to using undergraduate psychology students. I hypothesised that this may have explained the finding of residual obesity stigma in previous work (i.e., Latner et al, 2012); therefore I expected to find some evidence of residual stigma with female-only participants in the UMB subscales. However, no subscales of the UMB revealed any significant main effects for female participants directed at either the male target individual or the female target individual, suggesting that there was no evidence of residual obesity stigma. Female participants did rate the obese female target more positively than the overweight and lean female targets on the Negative Judgments and Distance subscales, however there was no interaction with weight change (residual vs weight stable). See Table 3 for all UMB means for female participants only.
Table 3.

Female participants: Means (M) and Standard Deviations (SD) of Universal Measure of Bias (UMB) subscales for female target and male target.

<table>
<thead>
<tr>
<th></th>
<th>Weight Stable</th>
<th></th>
<th>Obese</th>
<th></th>
<th>Residual</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lean (M SD)</td>
<td>Overweight (M SD)</td>
<td></td>
<td>Overweight (M SD)</td>
<td>Obese (M SD)</td>
<td></td>
</tr>
<tr>
<td>Attraction Female Target</td>
<td>3.55 (1.45)</td>
<td>3.92 (1.18)</td>
<td>3.95 (1.28)</td>
<td>3.82 (1.40)</td>
<td>3.91 (1.28)</td>
<td>3.88 (1.24)</td>
</tr>
<tr>
<td>Negative Judgment</td>
<td>3.50 (1.92)</td>
<td>3.74 (2.13)</td>
<td>2.88 (1.68)</td>
<td>3.16 (2.09)</td>
<td>3.67 (2.43)</td>
<td>2.99 (1.93)</td>
</tr>
<tr>
<td>Distance</td>
<td>3.57 (1.54)</td>
<td>3.79 (1.96)</td>
<td>2.84 (1.61)</td>
<td>3.36 (1.69)</td>
<td>3.60 (2.01)</td>
<td>2.87 (1.73)</td>
</tr>
<tr>
<td>Equal Rights</td>
<td>3.51 (1.61)</td>
<td>3.87 (1.74)</td>
<td>3.16 (1.56)</td>
<td>3.56 (1.65)</td>
<td>3.49 (1.86)</td>
<td>2.81 (1.67)</td>
</tr>
<tr>
<td></td>
<td>Male Target</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lean (M SD)</td>
<td>Overweight (M SD)</td>
<td></td>
<td>Overweight (M SD)</td>
<td>Obese (M SD)</td>
<td></td>
</tr>
<tr>
<td>Attraction</td>
<td>3.86 (1.31)</td>
<td>3.87 (1.33)</td>
<td>3.91 (1.57)</td>
<td>3.78 (1.26)</td>
<td>3.89 (1.26)</td>
<td>4.44 (1.06)</td>
</tr>
<tr>
<td>Negative Judgment</td>
<td>3.45 (1.76)</td>
<td>3.43 (2.05)</td>
<td>3.02 (1.71)</td>
<td>3.36 (2.16)</td>
<td>3.76 (2.25)</td>
<td>3.14 (1.92)</td>
</tr>
<tr>
<td>Distance</td>
<td>3.71 (1.50)</td>
<td>3.55 (1.86)</td>
<td>3.23 (1.50)</td>
<td>3.44 (1.52)</td>
<td>3.68 (1.83)</td>
<td>3.06 (1.64)</td>
</tr>
<tr>
<td>Equal Rights</td>
<td>3.73 (1.52)</td>
<td>3.58 (1.72)</td>
<td>3.58 (1.65)</td>
<td>3.71 (1.52)</td>
<td>3.59 (1.84)</td>
<td>3.01 (1.68)</td>
</tr>
</tbody>
</table>

Following analysis of the UMB with female-only participants, the AFA was also analysed with female-only participants. See Table 4 for all AFA means for female participants. In line with the results from all participants, female participants showed significantly higher anti-fat attitudes in the dislike subscale, \( F(1,355) = 4.064, p = .045, \eta^2_p = .011 \), after viewing an obese target who had always been obese (weight stable) versus those who viewed an obese target who was described as having previously been morbidly obese, but having lost weight to become just obese (residual), which again is the opposite to residual stigma. No other subscales for female-only participants revealed any significant results.
Table 4.
Female participants: Means (M) and Standard Deviations (SD) of Anti-fat Attitudes (AFA) questionnaire subscales and total score.

<table>
<thead>
<tr>
<th></th>
<th>Weight Stable</th>
<th></th>
<th>Residual</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lean</td>
<td>Over-weight</td>
<td>Obese</td>
<td>Lean</td>
</tr>
<tr>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>Dislike</td>
<td>2.70 (1.66)</td>
<td>2.58 (1.49)</td>
<td>3.27 (2.13)</td>
<td>2.70 (1.84)</td>
</tr>
<tr>
<td>Fear of Fat</td>
<td>5.61 (2.51)</td>
<td>6.03 (2.63)</td>
<td>5.00 (2.44)</td>
<td>5.52 (2.83)</td>
</tr>
<tr>
<td>Willpower</td>
<td>5.28 (2.40)</td>
<td>5.63 (2.14)</td>
<td>5.51 (1.97)</td>
<td>5.75 (2.36)</td>
</tr>
<tr>
<td>AFA Total</td>
<td>3.97 (1.46)</td>
<td>4.08 (1.40)</td>
<td>4.19 (1.62)</td>
<td>4.05 (1.65)</td>
</tr>
</tbody>
</table>

**Male Participants.** Following the female participant analyses, the UMB was re-examined with male participants only. As was found with female participants, no subscales of the UMB revealed any significant main effects for male participants directed at either the male target individual or the female target individual, and no evidence of residual obesity stigma was present. See table 5 for all UMB means for male participants only, in which higher numbers represent greater bias.

Male participants showed no significant differences on any subscales of the UMB between the residual conditions and the weight stable conditions, so therefore no evidence of residual obesity stigma was present for male participants.
Table 5.

Male participants: means (M) and standard deviations (SD) of Universal Measure of Bias (UMB) subscales for female target and male target.

<table>
<thead>
<tr>
<th></th>
<th>Weight Stable</th>
<th></th>
<th></th>
<th>Residual</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lean</td>
<td>Overweight</td>
<td>Obese</td>
<td>Lean</td>
<td>Overweight</td>
<td>Obese</td>
</tr>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>Attraction</td>
<td>3.55 (1.64)</td>
<td>4.41 (1.26)</td>
<td>4.02 (1.15)</td>
<td>3.44 (1.57)</td>
<td>3.60 (1.57)</td>
<td>4.19 (1.87)</td>
</tr>
<tr>
<td>Negative Judgment</td>
<td>3.28 (1.80)</td>
<td>3.84 (1.94)</td>
<td>3.26 (1.57)</td>
<td>3.13 (1.54)</td>
<td>3.48 (1.97)</td>
<td>3.42 (1.78)</td>
</tr>
<tr>
<td>Distance</td>
<td>3.49 (1.55)</td>
<td>3.93 (1.55)</td>
<td>3.78 (1.25)</td>
<td>3.48 (1.42)</td>
<td>3.64 (1.64)</td>
<td>3.43 (1.34)</td>
</tr>
<tr>
<td>Equal Rights</td>
<td>3.58 (1.68)</td>
<td>3.79 (1.95)</td>
<td>3.77 (1.64)</td>
<td>3.70 (1.71)</td>
<td>4.09 (1.71)</td>
<td>3.56 (1.56)</td>
</tr>
</tbody>
</table>

Male Target

<table>
<thead>
<tr>
<th></th>
<th>Attraction</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>Attraction</td>
<td>3.84 (1.36)</td>
<td>4.45 (1.29)</td>
<td>4.20 (1.14)</td>
<td>3.72 (1.44)</td>
<td>3.99 (1.29)</td>
<td>4.18 (1.45)</td>
</tr>
<tr>
<td>Negative Judgment</td>
<td>3.62 (1.75)</td>
<td>3.87 (1.85)</td>
<td>3.30 (1.41)</td>
<td>3.65 (1.64)</td>
<td>3.31 (1.99)</td>
<td>3.61 (1.74)</td>
</tr>
<tr>
<td>Distance</td>
<td>3.80 (1.18)</td>
<td>3.77 (1.39)</td>
<td>3.80 (1.10)</td>
<td>3.88 (1.34)</td>
<td>3.63 (1.60)</td>
<td>3.82 (1.27)</td>
</tr>
<tr>
<td>Equal Rights</td>
<td>3.47 (1.59)</td>
<td>3.75 (1.82)</td>
<td>3.69 (1.56)</td>
<td>3.90 (1.75)</td>
<td>4.17 (1.83)</td>
<td>3.86 (1.71)</td>
</tr>
</tbody>
</table>

The AFA was also analysed with male only participants. See table 6 for all AFA means for male participants, in which higher numbers represent greater anti-fat attitudes. There were no significant interactions for any subscale of the AFA for male participants, however, in keeping with the results of all participants and female participants, there was a trend in the dislike subscale for an interaction between weight change (residual vs weight stable) and target weight (lean, overweight, obese) towards greater dislike after male participants viewed the weight stable obese target compared to after they viewed the residual
obese target $F(2,285) = 1.909, p = .150, \eta^2_p = .013$. This was not a significant result, however, and not as strong an effect as female participants showed.

Table 6.

*Male participants: Means (M) and Standard Deviations (SD) of Anti-fat Attitudes (AFA) questionnaire subscales and total score.*

<table>
<thead>
<tr>
<th></th>
<th>Weight Stable</th>
<th>Residual</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lean</td>
<td>Overweight</td>
</tr>
<tr>
<td></td>
<td>M (SD)</td>
<td>M (SD)</td>
</tr>
<tr>
<td>Dislike</td>
<td>4.21 (2.17)</td>
<td>3.63 (1.95)</td>
</tr>
<tr>
<td>Fear of Fat</td>
<td>4.94 (2.44)</td>
<td>4.64 (2.29)</td>
</tr>
<tr>
<td>Willpower</td>
<td>5.65 (2.20)</td>
<td>5.88 (2.33)</td>
</tr>
<tr>
<td>AFA Total</td>
<td>4.71 (1.93)</td>
<td>4.38 (1.74)</td>
</tr>
</tbody>
</table>

**Moderators**

Despite there being no main effects of residual obesity stigma, I investigated whether the moderating variables revealed any significant findings or evidence of residual obesity stigma.

**Pathogen Avoidance.** I analysed whether participants (both male and female) high in pathogen avoidance displayed greater stigma towards targets in the residual conditions compared to the weight stable conditions relative to those low in pathogen avoidance. To do so, a series of multiple regression analyses were conducted, but no significant interactions between pathogen avoidance and the manipulations were found (for UMB on female targets, all $ps > .25$, $R^2 < .006$; for UMB on male targets, all $ps > .29$, $R^2 < .005$; for anti-fat attitudes, all $ps > .24$, $R^2 < .004$).
**Meritocracy Beliefs.** Similarly, I conducted a series of multiple regression analyses to examine whether individual differences in participants’ meritocracy beliefs moderated the impact of the manipulations on bias toward the targets and anti-fat attitudes. Here too there were no significant interactions between meritocracy beliefs and the manipulations on all the dependent measures (for UMB on female targets, all $p > .17$, $R^2 < .006$; for UMB on male targets, all $p > .10$, $R^2 < .007$; for anti-fat attitudes, all $p > .05$, $R^2 < .01$).
**Discussion**

Previous research has provided evidence for the existence of residual obesity stigma (i.e., Latner et al, 2012), suggesting that merely being informed a person was previously obese leads individuals to stigmatise that person in the same way they stigmatise a currently obese person. In other words, if an individual has ever been obese before, they cannot escape the stigma of obesity, even by losing weight and becoming lean. However, there are relatively few studies investigating residual obesity stigma, and not all have found evidence for its existence (Fardouly & Vartanian, 2012; Romo, 2017). The inconsistency in the findings across studies makes it difficult to conclude whether residual obesity stigma is a real phenomenon, and if so, under which conditions it occurs.

**Summary of Findings**

The aim of the current study was to examine the existence of residual obesity stigma, and to determine under which conditions it was present. Because previous work in the area did not include a male target individual, it was necessary to examine whether the same phenomena found in previous work was present towards a male target, and if a more diverse sample population would elicit similar findings. An overweight target individual was also included to determine if the findings from previous studies would generalise to an individual who lost weight and went from obese to overweight rather than obese to lean (as tested in previous work). A secondary aim of the current study was to understand whether individual differences in perceivers’ pathogen avoidance and meritocracy beliefs moderated the impact of the manipulations on residual obesity stigma.

Contrary to my expectations, I found no evidence of residual obesity stigma. The current study failed to replicate the findings of earlier work that provided evidence for residual obesity stigma (i.e., Latner et al, 2012). Based on the evidence provided by previous studies, it was predicted that residual obesity stigma would be particularly present in the
attraction subscale of the Universal Measure of Bias (UMB). However, the only significant result for the UMB Attraction subscale was target weight (lean, overweight, obese), which revealed currently obese target individuals were viewed as less attractive than the overweight or lean target individuals, which parallels the general obesity stigma literature, but does not provide any evidence for residual obesity stigma. In direct contrast to earlier work, I found no significant results in any subscale of the UMB indicative of residual obesity stigma. Participants showed no significant differences in their ratings of the target individual regardless of whether they were in a weight loss (residual) condition or a weight stable condition.

Whilst obese targets were viewed as least attractive compared to overweight or lean targets, interestingly, analyses revealed that for the negative judgments, distance, and equal rights subscales of the UMB, overweight target individuals were viewed the most negatively. It is somewhat surprising that participants held greater negative judgements towards the overweight targets compared to obese targets, and that they expressed a desire for greater social distance from the overweight targets (particularly the overweight female targets) compared to obese targets. In the equal rights subscale, participants had the most positive attitudes regarding equal rights for obese targets compared to lean or overweight targets, and the most negative attitudes about equal rights for overweight targets. While it is not possible to determine exactly why the currently-overweight targets were subject to greater bias on all three subscales compared to obese targets, a potential explanation is that it could be a case of social desirability in which participants do not want to appear to judge the obese target too negatively.

Secondly, I had hypothesized that I would find evidence of residual obesity stigma directed at both the male target and the female target, but that the stigma would be greater for the female target compared to the male target, based on the assumption from previous work
that found obesity stigma is greater towards women (Crandall et al, 2009). Just as I was unable to find evidence of residual stigma at all, I was also unable to find evidence for residual obesity stigma directed at just the female target, or just the male target. There were no significant differences in participants’ ratings of the male target compared to the female target individual, regardless of weight change condition (residual or weight stable), or target weight (lean, overweight, obese). In this study, target gender was not a factor in the existence of residual obesity stigma.

Third, I predicted that residual obesity stigma would occur for the residual overweight target (described as currently overweight but having lost weight from a higher, obese weight), but that the effect would be weak in comparison to the residual lean target (described as currently lean but having lost weight from being obese). Again, just as I found no evidence for residual obesity stigma, the results showed no significant findings for the overweight target individuals. Therefore, the extent of the obesity (e.g. overweight or obese) does not appear to play a role in the existence of residual obesity stigma.

Fourth, I predicted that participants who viewed a target described as having lost weight (residual) would display greater anti-fat attitudes compared to participants who viewed a target individual who was described as having maintained their weight (weight stable). This prediction was also based on previous research that found greater anti-fat attitudes in the dislike subscale of the Antifat Attitudes Questionnaire (AFA) for participants who viewed a target that had lost weight. This finding was explained as evidence for controllability theory (Latner et al, 2012), in that reading about a person who has lost weight emphasizes the idea that weight is controllable. However, the current study found that rather than residual stigma, participants displayed significantly greater anti-fat attitudes in the dislike subscale of the AFA after viewing the weight stable obese target compared to the weight loss (residual) obese target. Despite the target individual from both conditions
described as currently presenting at the same weight, participants expressed greater dislike after viewing the weight stable obese target. This is in direct contrast to Latner et al’s (2012) finding that AFA Dislike was greater for participants in the residual condition.

In fact, these results suggest the exact opposite of residual stigma, as participants are showing significantly less dislike towards obesity in general after viewing a target individual who has lost weight, even if they remain obese, than they are after viewing a target individual who was described as having maintained their obese weight, but not having previously been morbidly obese. It may be that seeing obese or morbidly obese individuals lose weight makes people view obese individuals more positively as they are reminded of obese targets working hard to lose weight, asserting effort, and achieving weight loss. This was particularly evident amongst female participants assigned to the obese conditions. When male and female participants were analysed separately, female participants showed significantly higher anti-fat attitudes in the dislike subscale for the weight stable obese targets compared to the residual obese targets. For male participants there was a trend in the dislike subscale towards greater anti-fat attitudes after viewing the weight stable obese targets compared to the residual obese targets.

Similar results were also found for total anti-fat attitudes for all three subscales of the AFA combined (dislike, fear of fat, and willpower), which revealed that participants assigned to an obese condition showed significantly greater anti-fat attitudes in general after viewing the weight-stable obese target compared to the obese target who had lost weight from being morbidly obese. Again, this is the opposite of residual stigma, which would show that participants have greater anti-fat attitudes after viewing a target individual who had lost weight.
Lastly, I had hypothesized that moderator variables of pathogen avoidance and meritocracy beliefs may provide an explanation for the existence of residual obesity stigma. Both moderating variables also failed to present any significant interactions.

**Implications of Current Study**

The inability of the current study to find any significant evidence for the presence of residual obesity stigma does raise the question as to its existence. The data was analysed in a number of different ways, and under no circumstances was residual obesity stigma found. In many ways, this is a positive finding, as it suggests people who lose weight do appear to lose the stigma. While I cannot conclusively proclaim that residual obesity does not exist at all, I can say that the current study found no evidence to support its existence, and theorise as to why that may be.

Despite the pervasiveness of obesity stigma in general, residual obesity stigma is surprising as a concept. This is because there is a wealth of evidence supporting the many benefits that are experienced by individuals who successfully lose weight. These benefits range from physical rewards such as minimising health risks or overcoming weight-related illnesses, to psychological outcomes such as increased self-esteem, a reduction in depressive symptoms, improved body image, and greater health related quality of life (Lasikiewicz, Myrissa, Hoyland, & Lawton, 2014), and, as the current study suggests, there are also social benefits to losing weight such as losing the stigma associated with obesity. However, there is obviously variability in the literature regarding the psychological benefits of weight loss too, as previous work has found evidence of self-stigmatisation in formerly obese individuals, and associated poor mental health outcomes (Levy & Pilver, 2012). This suggests that further research is needed in this area to ascertain whether residual obesity stigma exists under very specific conditions and if so, what those conditions may be. In the sections that follow, some
of the strengths and limitations of the present work are outlined, before summarizing potential directions for future work.

**Strengths and Limitations**

A possible explanation for the current non-significant findings is that my sample was very different from previous research. Because I used an online sample and a larger, more diverse group of participants, it is possible that this yielded different results from previous work conducted in a laboratory, with participant samples consisting of undergraduate students, which were usually relatively small in size, with $n < 300$. Because of the specific population undergraduate students often consist of, these studies provide a relatively invariable sample with often the majority of the participants identifying as female, with a mean age of <22 years, and a BMI in the healthy weight range, considered lean. The lack of diversity throughout participant samples used in residual obesity stigma studies presented a gap in the literature that the current study sought to fill by recruiting this larger and more diverse range of participants online to determine whether this is a phenomenon that exists across a range of individuals. Participant age and gender were controlled for; however there are other variables involved in a university sample and lab study which could have contributed to the significant findings in previous research, such as the education level of participants, or the environment in which they participated in the study, and how focused and motivated they were to participate in the study.

In contrast to some studies with significant findings of residual obesity stigma (Latner et al, 2012), the current study used both a photo and a vignette in its manipulations. Participants viewed both the male and female target individual at their described current weight, and only their weight history was manipulated in the vignette (the target was described as weight stable or as having lost weight from a higher weight). The decision to use both an image and vignette was based on the fact that obesity stigma is a visual stigma, and in
real life interactions participants would see the target individual at their current weight, they would not normally just be reading about it. While I would argue that this is strength of the current study, it may be that such a difference contributed to the observed non-significant findings. Perhaps the significant findings in previous work have to do with imagined-pictures of how the target individual looks, and being presented with a visual image ameliorates the influence of such imaginary thought processes.

Additionally, much of the previous work on residual obesity stigma has been conducted only with a female target individual. Manipulating the target gender and the inclusion of a male target is a gap in the current literature which had been discussed as a necessary element to examine in future studies. Because there are gender differences in obesity stigma in general (Crandall & Biernat, 1990), it was important to analyse whether these effects extended to residual obesity stigma, and therefore the current study included both a male target individual and a female target individual. However, a potential limitation emerges from the use of both male and female targets, in that description of both targets, one right after the other, may have caused participants to become suspicious and potentially could have influenced them to monitor their responses.

Another limitation of the current study is that both the male and female target individuals were white, young adults. Because ethnicity and age have been shown to effect obesity stigma in general (Puhl, Luedicke, & Heuer, 2013; Hebl & Heatherton, 1998; Hebl, King, & Perkins, 2009), future research should include diverse target individuals from different ethnic backgrounds, and of different age groups.

Due to the inconsistencies in the literature regarding the importance of weight loss method in residual obesity stigma, the current study did not include this element in its investigation, and instead simply asked participants what method they assumed the target
individual had used to lose weight. As shown, there is a growing body of literature on anti-surgery bias and pro-effort bias determined by weight-loss method. However, other studies have found no significant difference between weight loss methods (Latner et al, 2012), and in most studies, they found that the stigma still remained even for diet and exercise targets, if to a smaller degree (Latner et al, 2012; Mattingly et al, 2009). It is important to analyse whether residual obesity stigma continues to exist when weight loss method is not mentioned, as in real life interactions when formerly obese individuals disclose their weight loss, or when external individuals discover that someone they know was formerly obese, the weight loss method will not always be known or be disclosed.

**Future Directions**

Given the importance of replication in psychology research, it would be important to continue research into the investigation of the existence of residual obesity stigma. Because there are inconsistencies in the findings across studies, residual obesity stigma would benefit from a pre-registered replication of earlier work, such as Latner et al’s 2012 study. As there is a growing body of literature emerging on residual obesity stigma, this is an area that could also benefit from a meta-analysis. There is also potential that residual stigma may exist in other, unexplored domains (such as being a former smoker, or formerly having an infectious disease), and future research should continue to explore the concept across other stigmatised groups.

While the current study found no evidence to support the existence of residual obesity stigma, future research should continue to investigate whether it exists, and if so under what circumstances. Despite the many positive short term benefits to weight loss, there is evidence to suggest that formerly obese individuals do suffer from worse mental health outcomes in the long term (Levy & Pilver, 2012), and therefore it is important to determine whether external residual obesity exists, or whether there is perhaps a continuing residual obesity self-
stigma that is causing formerly obese individuals to suffer these outcomes. Romo (2017) has suggested that instead of there being a residual obesity stigma, there is new, lean stigma emerging referring to how now-lean people feel they are stigmatised for their weight maintenance health habits. Future research should explore whether formerly obese individuals are suffering from a residual obesity stigma, or a new, weight-maintenance stigma.

Due to the obesity “crisis” many countries are facing, and the associated health and economic effects of obesity, the diet industry also continues to boom as many individuals attempt to lose weight and shake off its associated stigma; therefore, it is important to understand any factors contributing to weight loss maintenance and weight loss attitudes. Additionally, building an understanding of why this particular stigma exists and under which circumstances will assist future research in interventions designed to reduce residual stigma.
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You are invited to participate in a research study conducted by University of Canterbury researchers. Please read the information below which outlines what is involved in this research. If you would like to complete this study, which will take approximately 15-20 minutes, you can give your consent by ticking the consent box below. This project has been reviewed and approved by the University of Canterbury Human Ethics Committee, Private Bag 4800, Christchurch, New Zealand. Any inquiries or complaints can be addressed to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch, New Zealand 8140.

PURPOSE OF THE STUDY
This is a study examining how people make first impressions regarding other people and their various bodily cues in an online, virtual setting.

PROCEDURE
By volunteering in this study, you will be asked to provide information about yourself and your body image.

POTENTIAL RISKS AND DISCOMFORTS
There are no major foreseeable risks associated with this study. However, you will be asked about your own body weight, and certain terminology throughout the questionnaires may cause offence. If you feel uncomfortable with the research at any time, please note that you may withdraw from the research and you may request that all the information provided by you be discarded. Participation in this study is voluntary and your responses will be entirely confidential. If you feel emotionally distressed at any time during or after taking part in this study, please phone a free crisis helpline such as Hopeline: 1-800-784-2433, or Suicide Prevention Lifeline: 1-800-273-8255.

POTENTIAL BENEFITS TO PARTICIPANTS AND ORGANIZATIONS
The results of the study will be used to better understand the way people make first impressions of other people online, and how these impressions are formed.

CONFIDENTIALITY
The researchers are very mindful of the need to protect participants’ interests. Any information that you provide will be treated as confidential. Only the principal researcher and named co-investigators, who have signed a formal confidentiality agreement, will have access to the raw data, which will be destroyed after five years. Under no circumstances will any data you supply be disclosed to a third party in any way that could reveal who the source was. The study data will be stored on password-protected computers in secured locations in the Psychology Department.

The results of the project may be published, and as this research involves confidential questionnaires you can be assured that your name will not be revealed in any reports or publications generated by this study, without your prior consent.

PARTICIPATION AND WITHDRAWAL
Participation is entirely voluntary, and you may withdraw at any time. If you wish to withdraw, simply close the survey window browser and no data will be recorded; responses are only collected at the end of the survey once participants have clicked submit.

The project is being carried out as a requirement for a Master’s thesis by Liz Chivers under the supervision of Dr Kumar Yogeeswaran. If you have any questions or concerns about this research, please contact Liz Chivers (liz.chivers@pg.canterbury.ac.nz). If you agree to participate in the study, you are asked to read the consent form and tick the consent box at the bottom of the page to proceed.
Appendix B: Consent Form

PARTICIPANT CONSENT FORM

I have been given a full explanation of this project and have had the opportunity to ask questions.

I understand what is required of me if I agree to take part in the research.

I understand that participation is voluntary and I can withdraw from the study at any time without penalty, and the data I provided will be deleted.

I understand that any information or opinions I provide will be kept confidential to the researcher and that the results may be published, with the understanding that my anonymity will be preserved. I understand that a thesis is a public document and will be available through the UC Library.

I understand that all data collected for the study will be kept in locked and secure facilities and in password protected electronic form and will be destroyed after five years.

I understand the risks associated with taking part and how they will be managed.

I understand that I can contact the researcher Liz Chivers (liz.chivers@pg.canterbury.ac.nz) for further information. If I have any complaints, I can contact the Chair of the University of Canterbury Human Ethics Committee, Private Bag 4800, Christchurch 8140.

☐ Please click here if you agree with the terms above and wish to participate in this study.
Appendix C: Debrief Sheet

Thank you for participating in the study. We originally informed you our study was investigating impression formation and various bodily cues. In reality, the real purpose of the study was to investigate the underlying mechanisms of stigma directed at individuals who were formerly obese and have lost weight. If you do not feel comfortable about your participation in this study and wish to have your responses deleted or removed from our study, then simply close the browser now before clicking the “submit” button, and your data will not be used. If you feel emotionally distressed after taking part in this study, please phone a free crisis helpline such as Hopeline: 1-800-784-2433, or Suicide Prevention Lifeline: 1-800-273-8255.

You may be interested in our hypotheses. Recent research (Mattingly et al., 2009; Latner et al., 2012) has demonstrated that formerly obese individuals who have lost weight experience strong negative attitudes from others and struggle from worse mental health outcomes including anxiety, depression, and suicidal ideation than normal weight and even currently obese individuals (Levy & Pilver, 2012). Yet, no research has examined why such stigma exists. This study seeks to fill this gap in the literature by examining the role of both evolutionary factors (pathogen-avoidance) and socio-cultural factors (perceived threat to status, jealousy, and reduced self-efficacy) in why residual obesity stigma persists.

In this study, we first asked you several demographic questions, including your height and weight and your own weight-loss and body image history. We required this information so we could calculate your own Body Mass Index (BMI), a measure used to determine weight status, and understand how an individual’s own BMI and weight loss history affects their opinion of others’ weight. We also asked your gender so we can determine the role gender plays in attitudes towards weight. Previous research has had conflicting findings on whether males or females are more biased towards individuals who were formerly obese. We also asked you various questions about your personality, work ethic, and political attitudes. These questions were there to test whether these factors influence your attitudes towards the person in the image you were shown.

Finally, the last questions of the study were assessing anti-fat attitudes (AFA, Crandall, 1994) as well as a policy measure to determine how supportive people are towards programmes supporting people who were formerly obese.

In order to avoid influencing your personal responses, we did not tell you the true purpose of the study. We can assure you that none of the information that you provided will be linked back to you in any way as your data was only saved with no personal information about you. Again, if you do not feel comfortable about your participation in this study and wish to withdraw your responses from our study, then simply close the browser now and your data will not be used.

We are extremely grateful for your participation in this study. We hope that the information provided by you will help us understand why residual obesity stigma exists, and provide us with information to learn how to reduce this particular stigma, and improve the lives of those who receive this stigma.

Any inquiries or complaints can be addressed to The Chair, Human Ethics Committee, University of Canterbury, Private Bag 4800, Christchurch, (human-ethics@canterbury.ac.nz) or (03 364 2987). If you are interested in learning more about the study, or if you have any concerns regarding any aspect of this study, please feel free to contact Liz ChIVERS (liz.chivers@pg.canterbury.ac.nz) or Dr Kumar Yoggleswaran (kumar.yoggleswaran@canterbury.ac.nz).

Please proceed to the next page to receive your Crowdflower code.
Appendix D: Experimental Manipulation (Vignettes and Photos)

Condition 1: Residual Lean: Female

Laura is 29 years old and works as a teacher full-time. Outside of work she enjoys going out with her friends, spending time with her cat, and listening to music. Previously, Laura was not at a healthy weight for her height. She is 5 foot 4 inches tall, an average height for women, and she used to weigh 200 pounds. Her doctor had told her she was obese. Laura managed to lose 66 pounds and is now at a healthy weight, weighing 134 pounds. Below is a picture of Laura. Her face is blurred to protect her privacy.

Condition 1: Residual Lean: Male

Peter is 31 years old and works as an IT consultant full-time. Outside of work he enjoys playing with his dog, going to the cinema, and hanging out with his friends. Previously, Peter was not at a healthy weight for his height. He is 5 foot 10 inches tall, an average height for men, and he used to weigh 240 pounds. His doctor had told him he was obese. Peter managed to lose 80 pounds and is now at a healthy weight, weighing 160 pounds. Below is a picture of Peter. His face is blurred to protect his privacy.
Condition 2: Weight Stable Lean: Female

Laura is 29 years old and works as a teacher full-time. Outside of work she enjoys going out with her friends, spending time with her cat, and listening to music. Laura is 5 foot 4 inches tall, an average height for women. She is a healthy weight for her height, weighing 134 pounds, and has never been overweight. Below is a picture of Laura. Her face is blurred to protect her privacy.

Condition 2: Weight Stable Lean: Male

Peter is 31 years old and works as an IT consultant full-time. Outside of work he enjoys playing with his dog, going to the cinema, and hanging out with his friends. Peter is 5 foot 10 inches tall, an average height for men. He is a healthy weight for his height, weighing 160 pounds, and has never been overweight. Below is a picture of Peter. His face is blurred to protect his privacy.
Condition 3: Residual Overweight: Female

Laura is 29 years old and works as a teacher full-time. Outside of work she enjoys going out with her friends, spending time with her cat, and listening to music. Previously, Laura was not a healthy weight for her height and her doctor told her she was obese. Laura is 5 foot 4 inches tall, an average height for women, and she previously weighed 200 pounds. Laura has managed to lose 41 pounds and is no longer obese, but she is still overweight for her height, now weighing 159 pounds. Below is a picture of Laura. Her face is blurred to protect her privacy.

Condition 3: Residual Overweight: Male

Peter is 31 years old and works as an IT consultant full-time. Outside of work he enjoys playing with his dog, going to the cinema, and hanging out with his friends. Previously, Peter was not a healthy weight for his height and his doctor told him he was obese. Peter is 5 foot 10 inches tall, an average height for men, and he previously weighed 240 pounds. Peter has managed to lose 50 pounds and is no longer obese, but he is still overweight for his height, now weighing 190 pounds. Below is a picture of Peter. His face is blurred to protect his privacy.
Condition 4: Weight Stable Overweight: Female

Laura is 29 years old and works as a teacher full-time. Outside of work she enjoys going out with her friends, spending time with her cat, and listening to music. Laura weighs 159 pounds and is 5 foot 4 inches tall, an average height for women. She is not at a healthy weight for her height, and her doctor has told her she is overweight. Laura has been overweight all her life and has never managed to lose weight. Below is a picture of Laura. Her face is blurred to protect her privacy.

Condition 4: Weight Stable Overweight: Male

Peter is 31 years old and works as an IT consultant full-time. Outside of work he enjoys playing with his dog, going to the cinema, and hanging out with his friends. Peter weighs 190 pounds and is 5 foot 10 inches tall, an average height for men. He is not at a healthy weight for his height, and his doctor has told him he is overweight. Peter has been overweight all his life and has never managed to lose weight. Below is a picture of Peter. His face is blurred to protect his privacy.
Condition 5: Residual Obese Female

Laura is 29 years old and works as a teacher full-time. Outside of work she enjoys going out with her friends, spending time with her cat, and listening to music. Previously, Laura was not a healthy weight for her height and her doctor told her she was morbidly obese. Laura is 5 foot 4 inches tall, an average height for women, and she previously weighed 233 pounds. Laura has managed to lose 33 pounds and is no longer morbidly obese, but she is still obese for her height, now weighing 200 pounds. Below is a picture of Laura. Her face is blurred to protect her privacy.

Condition 5: Residual Obese Male

Peter is 31 years old and works as an IT consultant full-time. Outside of work he enjoys playing with his dog, going to the cinema, and hanging out with his friends. Previously, Peter was not a healthy weight for his height and his doctor told him he was morbidly obese. Peter is 5 foot 10 inches tall, an average height for men, and he previously weighed 280 pounds. Peter has managed to lose 40 pounds and is no longer morbidly obese, but he is still obese for his height, now weighing 240 pounds. Below is a picture of Peter. His face is blurred to protect his privacy.
Condition 6: Weight Stable Obese: Female

Laura is 29 years old and works as a teacher full-time. Outside of work she enjoys going out with her friends, spending time with her cat, and listening to music. Laura weighs 200 pounds and is 5 foot 4 inches tall, an average height for women. She is not at a healthy weight for her height, and her doctor has told her she is obese. Laura has been overweight all her life and has never managed to lose weight. Below is a picture of Laura. Her face is blurred to protect her privacy.

Condition 6: Weight Stable Obese: Male

Peter is 31 years old and works as an IT consultant full-time. Outside of work he enjoys playing with his dog, going to the cinema, and hanging out with his friends. Peter weighs 240 pounds and is 5 foot 10 inches tall, an average height for men. He is not at a healthy weight for his height, and his doctor has told him he is obese. Peter has been overweight all his life and has never managed to lose weight. Below is a picture of Peter. His face is blurred to protect his privacy.
Appendix E: Universal Measure of Bias (UMB) scale items

Universal Measure of Bias (Latner, O’Brien, Durso, Brinkman & MacDonald, 2008)

Using a 7-point scale (1=strongly agree; 7=strongly disagree), to what extent do you agree or disagree with the statements about the person you read about earlier (i.e., Laura or Peter):

Negative Judgment

1) People like Laura/Peter tend toward bad behavior.
2) People like Laura/Peter are sloppy.
3) Sometimes I think that people like Laura/Peter are dishonest.
4) People like Laura/Peter have bad hygiene.
5) In general, people like Laura/Peter don’t think about the needs of other people.

Distance

6) I would not want to have a person like Laura/Peter as a roommate.
7) I like people like Laura/Peter.
8) I don’t enjoy having a conversation with a person like Laura/Peter.
9) I would be comfortable having a person like Laura/Peter in my group of friends.
10) I would like having a person like Laura/Peter at my place of worship or community center.

Attraction

11) I find people like Laura/Peter attractive.
12) People like Laura/Peter make good romantic partners.
13) I find people like Laura/Peter to be sexy.
14) People like Laura/Peter are a turn-off
15) I find people like Laura/Peter pleasant to look at.

Equal Rights

16) Special effort should be taken to make sure that people like Laura/Peter have the same rights and privileges as other people.
17) Special effort should be taken to make sure that people like Laura/Peter have the same salaries as other people.
18) Special effort should be taken to make sure that people like Laura/Peter have the same educational opportunities as other people.
19) Special effort should be taken to make sure that people like Laura/Peter have the same housing opportunities as other people.
20) I try to understand the perspective of people like Laura/Peter.
Appendix F: Anti-fat Attitudes (AFA) Questionnaire

Anti-fat Attitudes (Crandall, 1994)

Use the following scale from 0 (strongly disagree) to 9 (strongly agree) to indicate your response to the following:

**Dislike**

1) I don’t really like fat people much.
2) I don’t have many friends that are fat.
3) I tend to think that people who are overweight are a little untrustworthy.
4) Although some fat people are surely smart, in general, I think they tend not to be quite as bright as normal weight people.
5) I have a hard time taking fat people too seriously.
6) Fat people make me feel somewhat uncomfortable.
7) If I were an employer looking to hire, I might avoid hiring a fat person.

**Fear of Fat**

8) I feel disgusted with myself when I gain weight.
9) One of the worst things that could happen to me would be if I gained 25 pounds.
10) I worry about becoming fat

**Willpower**

11) People who weigh too much could lose at least some part of their weight through a little exercise.
12) Some people are fat because they have no willpower.
13) Fat people tend to be fat pretty much through their own fault.
Appendix G: Demographic Measures

Gender:   M    F    Other

Age:    ________

Ethnicity: Black/African American; White/European/Caucasian American; Hispanic/Latino American; Asian American; Native Hawaiian or Native (Indigenous) American; Arab American; Pacific Islander; Multiracial; Other, Please Specify ________

Sexual Orientation: Lesbian; gay; bisexual; heterosexual/straight; other (please specify)

Nationality / Country of Citizenship: ________

Highest educational qualification: High School or GED; Associates Degree; Bachelor’s Degree; Master’s Degree; Doctoral Degree (i.e., PhD/MD/JD)

How much do you weigh (pounds)? ________

How tall are you (feet; inches)? ________