

Recategorization Threat, Fear of Fat, and Antifat Prejudice

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PREFACE

*“Of course it is happening inside your head, Harry,
but why on earth should that mean that it is not
real?” – Albus Dumbledore*

ABSTRACT

Learning one is similar to a stigmatized group can threaten one's identity and cause disassociation from that group. However, how would learning of an immutable similarity with a stigmatized outgroup, implying possible recategorization into that group, affect prejudice towards that group? In the current investigation, we explored how receiving feedback that one has a high genetic predisposition to become obese in the future affected implicitly- and explicitly-assessed antifat attitudes. Participants ($N = 216$) were provided feedback indicating they either did or did not have a high genetic predisposition for obesity, or given no feedback (control condition). We found for those told they have a high probability of becoming fat in the future, initial fear of fatness was associated with *greater* antifat prejudice on both implicit and explicit measures. Contrary to predictions, we did not find any differences due to beliefs about the biological-basis of body size. This work adds to intergroup literature specifying when and how perceived similarity with outgroups affects prejudice.

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CHAPTER 1

INTRODUCTION AND LITERATURE REVIEW

Antifat prejudice refers to negative evaluations of overweight and obese individuals due to their weight or body size. Research has found that antifat prejudice is stronger than prejudice towards other stigmatized groups such as Muslims (Latner, O'Brien, Durso, Brinkman, & MacDonald, 2008), gay and lesbian individuals (Latner et al., 2008), individuals with a physical handicap (Sigelman, Miller, & Whitworth, 1986) and is more pervasive than racism, sexism, and other forms of bias (Bronchu & Esses, 2011).

In the current investigation, we explore the impact that learning of an immutable similarity implying membership in a stigmatized outgroup has on implicit and explicit antifat prejudice. Specifically, we investigate how perceiving that one will be obese in the future affects participants prejudices and antifat attitudes. We predict that those given feedback indicating they have a high likelihood of becoming fat in the future will show reduced implicit antifat prejudice and this will be moderated by their beliefs about the biological-basis of fatness.

Psychological Essentialism and Antifat Prejudice

Much of the literature on obesity and antifat prejudice refers to the implicit theory perspective which distinguishes between lay theories about the changeable verses fixed nature of social categories and human attributes (Dweck, 1999). Entity theories refer to beliefs that traits, such as body size, are fixed and uncontrollable (i.e., biologically based), while incremental theories refer to beliefs that traits are malleable and thus controllable. In the psychological literature, entity theories align well with psychological essentialist beliefs, which are beliefs

asserting social grouping are natural, basic, non-arbitrary, and therefore, indicative of some kind of essence, as opposed to socially constructed (Medin, 1989). Haslam and colleagues (2000) assert that psychological essentialism facilitates the process by which members of social groups come to be viewed as linked through fundamental properties, as well as assigned a kind of fixity and uniformity; group labels then facilitate inferences about virtually all members of a social group. One perspective suggests that there are four types of essentialist beliefs described in the literature: naturalness, discreteness, informativeness, and homogeneity (Arseneau, Grzanka, Miles, & Fassinger, 2013). Naturalness refers to the immutability, fixedness, and biological-basis of social categories. Discreteness refers to beliefs that social categories are distinct and non-overlapping. Homogeneity beliefs refer to the notion that group members are similar to one another. Informativeness refers to beliefs that group membership reveals fundamental things about the group members.

While some research has found a positive relationship between essentialist beliefs and prejudice (e.g., Haslam et al., 2006; Haslam, Rothschild, & Ernst, 2002; Rydell, Hugenberg, Ray, & Mackie, 2007), other research has found a negative relationship (Grzanka, Zeiders, & Miles, 2016). For example, beliefs in the naturalness (i.e. biological basis) of sexual orientation is associated with less homonegativity, while beliefs in discreteness, homogeneity, and informativeness are associated with more homonegativity (Grzanka et al., 2016). Regarding body size, some research has found framing weight as biological is associated with less antifat prejudice (Crandall, 1994; Nutter et al., 2018; Puhl et al., 2005; Study 3), while other research finds that this same frame is associated with increased prejudice (Burnette, Hoyt, Dweck, & Auster-Gussman, 2017, Hoyt, Burnette, Auster-Gussman, & Major, 2016).

Only a handful of studies investigated the effect of biogenetic explanations of obesity on

implicit prejudice (i.e. prejudice activated automatically that operate without individual's full control or awareness; Greenwald & Banaji, 1995). Some of these studies found no differences in implicit prejudice in response to biogenetic explanations (Ata, 2015; Teachman, Gapinski, Brownell, Rawlins, and Jeyaram, 2003; Study 1), while others found that such explanations resulted in reduced implicit antifat prejudice (O'Brien, Puhl, Latner, Mir, & Hunter, 2010), similar to explicit prejudice.

Controllability Attributions, Psychological Essentialism, and Antifat Prejudice

The stigma asymmetry model (Hoyt et al., 2016) seeks to explain how the conceptualization of obesity as biological (i.e. as genetic) has the power to both increase and decrease prejudice by combining attribution theory with the implicit theory perspective. Attribution theory posits that individuals search for causal explanations for events, particularly when those events are negative and/or unexpected (Clary & Tesser, 1983). When individuals' undergo a negative event seen as controllable, they experience more blame compared to when the event is seen as uncontrollable (Weiner, 1995). Similarly, when individuals possess negative characteristics, such as obesity, which tends to be perceived as controllable (e.g., due to a lack of willpower), they experience more blame, negativity, and stigmatization, than when the attributes are seen as uncontrollable (Weiner, 1995). In fact, stronger beliefs about internal control (Crandall & Reser, 2005; Himmelstein & Tomiyama, 2015; Musher-Eizenman, Holub, Miller, Goldstein, & Edwards-Leeper, 2004), personal responsibility (Crandall et al., 2001; Crandall & Reser, 2005) and blame (Crandall & Reser, 2005; Nutter et al., 2018) are associated with greater antifat prejudice. On the flip side, labeling a stigmatizing attribute as genetic, and therefore uncontrollable, can reduce prejudice by reducing blame (Weiner, 1995). Thus, messages that

weight is biological, fixed, and thus uncontrollable, have the power to reduce prejudice by implying reduced control by obese and overweight, and subsequently reducing blame (Crandall & Reser, 2005).

From the implicit theory perspective, entity theories (i.e. the belief that human categories are fixed) have been associated with both essentialist beliefs as well as stronger prejudice (Haslam et al., 2006; Haslam, Rothchild, & Ernst, 2002). When characteristics are seen as fixed and immutable but are also negative and unwanted, such as obesity, biogenetic explanations can exacerbate stigma by imbuing the individual with a fundamental differentness, implying an intrinsic dissimilarity between the essence of that individual and outgroup others (Hoyt et al., 2016). In other words, essentializing individuals and/or groups can *increase* prejudice through the assertion of a fundamental difference in the essence ascribed to those individuals. Overall, this model asserts that biogenetic explanations have the possibility of decreasing prejudice by implying reduced control by the individual over their group membership, which in turn reduces blame, but such explanations may also increase stigma by instilling the stigmatized group with a different essence, which can exacerbate antifat prejudice.

Applied to group memberships, beliefs about the naturalness (i.e. biological basis) of social categories implies reduced control by the individual over their group membership, which in turn is associated with less blame and more tolerance of those groups (Kvaale, Gottdiener, & Haslam, 2013), while beliefs in the discreteness, homogeneity, and informativeness of social categories, on the other hand, suggests fundamental differences between groups and is associated with more prejudice (Grzanka, Zeiders, & Miles, 2016). For example, while genetic explanations have been found to reduce blame for individuals with mental illness, such beliefs are also associated with increases in perceptions of dangerousness and social distancing from these same

individuals (Kvaale et al., 2013). A series of studies by Hoyt et al. (2016) framing obesity as either a disease (i.e. biological and uncontrollable) or as controllable found that framing the etiology of obesity as biological both decreased blame, which in turn decreased explicit antifat prejudice, while also increasing beliefs in the unchangeable nature of weight, which increased antifat prejudice. In other words, framing obesity as biological decreased blame but increased the essentializing of obese individuals, both of which affected prejudice but in opposing ways. Thus, different types of essentialist beliefs imply different attributions for one's group memberships but also different implications for prejudice.

Our research seeks to add to this literature by comparing how implicit prejudice is affected when one is provided feedback that *they* possess genes associated with obesity compared to receiving feedback that they do not have a genetic predisposition for obesity. Both conditions make salient the message that obesity is genetic and therefore fixed and uncontrollable, but one relates the message to the self (i.e. 'this attribute is immutable' combined with 'I possess it') while the other does not. In the next sections we explain why we believe the self is a crucial factor in the way individuals react to and interpret such messages.

The Special Self

It is well established that the self is special. People show heightened sensitivity to self-relevant stimuli (Cherry, 1953; Nuttin 1985), self-congruent stimuli are more efficiently processed (Markus 1977), self-relevant stimuli show enhanced recall and recognition (Markus, 1980), and the self serves as an initial base for evaluations and information about novel groups (Gramzow & Gaertner, 2005; Gramzow, Gaertner, & Sedikides, 2001).

Similarly, individuals are particularly sensitive to threats related to the self. Individuals avoid seeking information that would threaten their sense of self (Sedikides, 1993) and engage in avoidance more when the threat pertains to their personal-self compared to their relational or social selves (Gaertner et al., 2012; Exp 2). Self-threat can cause deterioration of self-regulatory effectiveness (Baumeister, Heatherton, & Tice, 1993) and can cause increases in negative emotions such as dejection, depression, agitation, anxiety (Higgins, Klein, & Strauman, 1985; 1987). When individuals feel threatened, they use variety of strategies to avoid or negate those threats (Campbell, 1986; Sherwood, 1981). Individuals may engage in biased processing by selectively remembering and revising memories (Greenwald, 1980), reducing their self-awareness (Hull, 1981; Hull, Levenson, Young, & Sher, 1983; Hull & Young 1983), engaging in self-handicapping (Berglas & Jones 1978; Jones & Berglas 1978), generating situational attributions for negative outcomes, and failing to accept responsibility for negative outcomes (Campbell & Sedikides, 1999; Alicke & Sedikides, 2009) in order to protect themselves from threatening information. Individuals may also bolster the self in another domain (Steele & Lui, 1983) or engage in selective social comparison (Wills, 1981; Wood, Taylor, & Lichtman 1985). Thus, it is apparent that individuals are motivated to protect against self-threats and have an arsenal of strategies available to help them do so. But what if the threat is fixed and unchangeable? How would individuals deal with those threats?

Social Identity and Recategorization Threat

Social Identity Theory (Tajfel & Turner, 1979) states that people define themselves and derive a sense of worth from the groups with which they affiliate (Turner, 1999). People's evaluations of groups they belong to are associated with their self-evaluations (Gramzow &

Gaertner, 2005; Greenwald, Banaji, Rudman, Farnham, Nosek, & Mellott, 2002) and when the group possesses positive characteristics, belonging to a group fosters camaraderie and can enhance self-esteem (Cialdini, Borden, Thorne, Walker, Freeman, & Sloan, 1976). Thus, because one's group-evaluations are closely tied with one's self-evaluations, people are motivated to associate with groups that possess positive characteristics.

Conversely, possible membership in a disliked group is threatening and can cause disassociation from (Cialdini et al., 1976; Novak & Lerner, 1968; Schimel, Pyszczynski, Greenberg, O'Mahen, & Arndt, 2000), and increased prejudice and discrimination towards that group (Adams, Wright, & Lohr, 1996; Gibbons, 1985; Zarate, Garcia, Garza, & Hitlan, 2004). For example, when induced to think of how they were similar to (as opposed to different from) them, Zarate et al. (2004) found participants showed greater explicit prejudice toward immigrants. In short, perceiving oneself as similar to a negatively-stereotyped group is a threat to one's social identity.

Unlike most previous research on outgroup similarity, the focus of the current investigation is not a group-relevant trait, but rather a group-defining trait. We are interested in how perceiving membership in a previous outgroup affects individuals' prejudice towards that group. Categorization threat, one of four types of social identity threats outlined by Branscombe, Ellemers, Spears, and Doosje (1999), is defined as the threat of being categorized against one's will. Recategorization threat is the threat of being potentially *recategorized* into a devalued social identity group. Specifically, the threat investigated in this study arises when an individual is given information that implies a new group identity.

In previous sections, we presented research on the effects of messages about the different causes of obesity. But what would happen if these messages are presented in such a way that

implies a recategorization threat to the self? That is, what would happen if one was given information that not only made salient the biological-basis of obesity, but also implied the individual might have the biology to be obese in the future? Might this elicit a different attitudinal response? We believe the answer is yes.

Biologically-Based Recategorization Threat and Prejudice

The focus of the current investigation is the effect that feedback implying one might be obese in the future has on implicit and explicit antifat prejudice. A handful of studies have investigated effects of personalized feedback about genetic susceptibility to obesity on health behaviors (Ahn & Lebowitz, 2018; Bloss, Schork, & Topol, 2011), perceptions (Harvey-Berino, Gold, West, & Shuldiner, 2001; Meisel, Walker, & Wardle, 2012), and attitudes toward diet and exercise (Ahn & Lebowitz, 2018), but none have investigated how this would affect evaluations towards overweight individuals.

Relevant to the current investigation is recent research by Fritzlen and colleagues (2019), who investigated how believing one is part of a negatively stigmatized group affects one's prejudice towards that group. They found evidence that perceived group membership in a previous outgroup led to decreases in implicit prejudice towards that outgroup but no change in explicit prejudice. Specifically, White participants who believed they had above average genetic overlap with African-Americans, implying the presence of a Black ancestor, showed reduced implicitly-assessed prejudice toward Black people. Similarly, they found that straight participants who were led to believe they exhibited similarity in their pupil dilation patterns to the average homosexual individual showed reduced implicitly-assessed prejudice towards gay

men and lesbian women, to the extent that they believed sexual orientation was immutable and biologically based (Fritzlen et al., 2019; Study 2).

Similar to the findings of Fritzlen et al. (2019; Study 2), beliefs that group membership is immutable and fixed are essential to the current investigation. If people believe that group membership is immutable, they are unlikely to believe they can change the newly-formed association between the self and outgroup. Alternately, if individuals do not believe group membership is fixed and unchangeable, then they may perceive any feedback they receive as reflective of a current state as opposed to an enduring, biological trait. It is the belief that group membership is immutable and fixed (and hence that they are in some sense “stuck” with the group) that motivates individuals to resolve this attitudinal inconsistency.

Balance theory asserts that people are motivated to have consistency in their attitudes (Heider, 1958; Greenwald, Banaji, Rudman, Farnham, Nosek, & Mellott, 2002). Specifically, people are motivated to maintain balance between their attitudes, identities, and self-esteem, both explicitly and implicitly (Greenwald et al., 2002). Imbalance between their evaluations of these entities causes strain and motivates individuals to restore balance. Generally, people resist forming associations with concepts or valences that oppose associations they currently possess (Greenwald et al., 2002) but, if they believe that the new association is fixed and immutable, then individuals would be motivated to restore attitudinal balance through another route.

When such a situation occurs, such as when individuals are forced into an identity they do not want but cannot change, we believe their interest in maintaining a positive self-view will motivate them to change their attitude toward the group. Specifically, since individuals are motivated to perceive themselves positively, if they perceive an immutable link with a negative outgroup, in order to maintain a positive view of the self, they may change their attitude toward

the new ingroup. Thus, it may be that perceiving the stigmatized outgroup as more positive at the implicit level may have allowed our participants to maintain such a balance between their group- and self-attitudes.

The decrease in implicit prejudice may also result from an increase in implicit self-identification with the new ingroup. That is, recategorization may create an association between the self and the former outgroup, resulting in a positive association with that group (Cadinu & Rothbart, 1996). Research looking at the effects of conditioning targeting self-outgroup associations has found evidence of reduced implicit prejudice towards that group (Gulker & Monteith, 2013, Phills, Kawakami, Krusemark, & Nguyen, 2019, Woodcock & Monteith, 2012). In one study, Phills et al. (2019; Study 3) tested the effect of interventions either targeting self-associations or racial evaluations on racial attitudes and self-Black associations. They had White participants either complete an evaluative conditioning intervention associating positive concepts with Black people or self-conditioning intervention in which they associated the self with Black people. They found that while both self-conditioning and evaluative conditioning resulted in reduced implicit racial prejudice, only the self-conditioning directly increased self-Black associations. In other words, associating the self with Blacks both reduced participants' implicit racial prejudice and increased their implicit outgroup identification.

Similarly, research investigating conditioning the self with a single outgroup member (Gulker & Monteith, 2013), as well as conditioning the self with a minimally created ingroup consisting of mostly outgroup members (Woodcock & Monteith, 2012) has also found evidence of reduced implicit prejudice towards the outgroup. Overall, the conclusions of these studies are that when individuals associate an outgroup with the self, they show reductions in implicit prejudice towards that group. Applied to the current investigation, it may be that receiving

feedback implying identity recategorization into a negatively stigmatized outgroup creates a similar association between self and that group, increasing implicit identification which in turn reduces implicit prejudice towards the group.

Caveat: Implicit-Explicit Measure Discrepancies

Similar to other prejudices, antifat prejudice often shows discrepancies between implicit and explicit measures. Research has found evidence of both implicit and explicit antifat prejudice but no relation between the measures (Bessendorf & Sherman, 2000; Brochu & Morrison, 2007), implicit antifat bias with no evidence of explicit bias (Teachman et al., 2003; Study 1), and implicit antifat bias with evidence of weaker explicit bias (Roddy, Stewart & Barnes-Holmes, 2009). Such implicit-explicit dissociations are not surprising (Greenwald, Poehlman, Uhlmann, & Banaji, 2009), and dual-process theories provide explanations for when and how such dissociations occur, as well as how they relate to explicit judgments and behavior. There is evidence that social norms affect overt attitude expression of attitudes, particularly when those attitudes are socially undesirable (Zitek & Hebl, 2007). Previous research has found that individuals are likely to show differences on implicit and explicit measures when they have motivation to respond in a socially appropriate way (Fazio & Olson, 2014). For example, contemporary American norms against overt expressions of racial prejudice are stronger than norms against the expression of prejudice against gay men (Crandall, Eshleman, & O'Brien, 2002; Zitek & Hebl, 2007). Thus, to the extent that categorization threat prompts explicit distancing, social norms may have, to some extent, dampened its overt expression.

Compared to racial or sexual orientation prejudice, expression of body size or “fat prejudice” may be a more socially acceptable prejudice. In line with this, previous research has

found that antifat prejudice is perceived as less negative than racism (Crandall, 1994), is greater than prejudice towards other common target groups for mistreatment (i.e. Muslims and gay and lesbian individuals; Latner et al., 2008), as well as evidence that obese individuals are the most openly stigmatized individuals in society (Bronchu & Esses, 2011). Crandall (1994) found that antifat prejudice, while manifesting itself similar to other types of prejudice, such as symbolic racism, possesses less of the negative social desirability of racism.

Since previous research finds evidence that fat prejudice is less affected by social desirability concerns than other forms of prejudice, we may observe changes in explicit antifat prejudice as a function of the identity-threatening feedback. Alternately, since previous work on recategorization threat did not find explicit prejudicial changes in line with implicit changes, we should predict no changes in explicit prejudice in response to a similar recategorization threat. Finally, seeing as previous research has found that the framing of obesity as biological both increases and decreases prejudice simultaneously, resulting in no apparent overall change, we should predict no change in explicit prejudice. Therefore, we withhold any predictions about explicit prejudice.

Overview of Current Work

The goal of the present research is to explore how learning of an immutable similarity with a negatively-characterized outgroup that implies membership in that group affects implicit and explicit prejudice. Specifically, we investigate the effect of learning that one has a genetic predisposition to become obese in the future on individuals' implicit and explicit fat prejudice. We predict that providing individuals with feedback implying they possessed a genetic predisposition to obesity will result in reduced implicit antifat prejudice, but only for those who

believe that body size (i.e. fatness) is biological and uncontrollable. Additionally, we measure implicit outgroup identification as a potential mediator of this effect.

CHAPTER 2

METHODS AND MATERIALS

Participants and Design

Undergraduate students ($n = 216$) were recruited via a web-based sign-up system at a large Southeastern university and participated in exchange for course credit. The duration of participation was approximately 90 minutes for the experiment. Participants were randomly assigned to one of three conditions: Fat gene feedback condition ($n = 72$), no fat gene feedback condition ($n = 72$), or no feedback condition ($n = 72$).

Procedure

Pretest

At the beginning of the semester, participants completed an online prescreening survey in which they provided demographic information, completed some questionnaires, and indicated whether they had previously completed a genetic test (e.g., 23andMe or AncestryDNA).

The questionnaires included the Goldfarb Fear of Fat Scale (Goldfarb, Dykens, and Gerrard, 1985) and an adapted version of the Sexual Orientation Beliefs Scale (SOBS; Arseneau, Grzanka, Miles, & Fassinger, 2013). The Goldfarb Fear of Fat scale is a 10-item scale, which measures the degree of fear participants experience with the thought of becoming fat (Goldfarb et al., 1985). These items were measured using a 7-point Likert scale from Strongly Disagree (-3) to Strongly Agree (+3). An example item was “I fear even a little weight gain”. The original SOBS measures four types of essentialist beliefs about sexual orientation.

In the modified version, the Weight Belief Scale (WBS), the words referring to sexual orientation were replaced with words relating to weight to assess essentialist beliefs about body size. The naturalness subscale, the focus for the present investigation, consisted of 11 items that assessed one's belief that body size is innate, biologically-based and immutable (e.g., "Biology is the main basis of an individual's body size"). Participants rated each of the statements on a 7-point Likert scale ranging from -3 (strongly disagree) to +3 (strongly agree; note: the original published scale employed 5-point response options). The mean scores for both scales were computed such that higher scores indicated higher belief support. These scores were treated as continuous variables in all analyses.

Lab Session

Upon arriving to the lab for the session, participants were informed by the experimenter that the experiment is about group membership and that, in order to accurately assess their group membership, they would each be submitting a cheek swab sample. Participants were told they would not be told exactly what the researchers were assessing but that they would be given more information when they received the results of their lab work. The experimenter then assisted each participant in obtaining his or her sample and storing it in a biohazard bag (in reality, this "sample" was disposed of immediately following the session). To bolster the cover story and for sanitary purposes, the experimenter wore a white lab coat and latex exam gloves, had participants wash their hands prior to collecting their sample, used sterile medical swabs to take the sample, and stored the samples in individual bags emblazoned with medical biohazard text and symbols.

While waiting on the results of their cheek swab sample, participants completed a series of questionnaires. Included in these were questions about their height and weight in order to calculate their Body Mass Index (BMI) as well as an adapted Level of Contact scale (Holmes, Corrigan, Williams, Canar, & Kubiak, 1999) which assessed participants' level of contact with fat people. Within this scale was an item asking participants to rate whether they perceived themselves as fat, which we used as an exploratory variable for exclusion in our analyses. After participants finished the scales and 15 minutes had elapsed, researchers went to retrieve the participants' results.

When the researcher returned, participants in the fat gene and no fat gene feedback conditions were told that, in order to classify their group membership, their genetic profile had been analyzed, looking at particular biological markers of health. They were told one of the main indicators of health is weight so researchers were specifically interested in their genetic profile relating to obesity. Participants were then given a sealed envelope containing their results.

The first page of their results includes a chart of the different genetic markers that were analyzed, which phenotypes they are linked to, the gene locus, and the abnormality of the sample. The next second page will contain the experimenter's write-up of the participant's group membership based on the average healthy genetic profile. Specifically, participants were given the following feedback (note: the numbers outside the parentheses were provided for those in the fat feedback condition and those in parentheses refer to the no fat gene feedback condition) "This sample identifies 15 genetic markers associated with obesity. On average, most individuals who do not develop obesity show 15%-25% overlap in these markers compared to those who do eventually develop obesity. The assessment of nucleotide markers for this batch indicates that there is an 83% [17%] overlap in the markers between those in this sample and the markers in

the average person who develops obesity. This indicates that the individual from whom this sample was taken has a 78% [$<10\%$] chance of developing obesity within the next 20 years.” See Appendix A for the genetic feedback table and statement of results.

Those in the no feedback condition were told: “I’m sorry to inform you that the machine analyzing your cheek swab experienced an error and researchers are not able to get it to work properly so you won’t be able to get the feedback from your cheek swab. Instead, we’re going to have you complete a different study so you can still get your research credit.” In actuality, all of the feedback was completely fake but participants were not made aware of this until they completed the experiment.

Dependent Measures

Next to assess implicit attitudes, participants completed an evaluative and a self-associative IAT. The order of the two was counterbalanced across participants. For the evaluative IAT, the 4 categories of objects were pleasant words, unpleasant words, and words relating to fat or thin body size. For the evaluative IAT, we used personalized five-block IAT with 30 trials per practice block and 60 trials per critical block (Olson & Fazio, 2004). The third and fifth blocks contained critical trials in which participants used the same response keys to categorize both words referring to fat or thin individuals and the valence of adjectives. For the self-associative IAT, the 4 categories of objects in the critical blocks were words referring to stereotypical fat traits verses stereotypical thin traits, and words referring to either the self or others. Trait words were drawn from those used by Bessenoff and Sherman (2000).

The order of exposure to critical blocks was counterbalanced across subjects and reaction times for responses on the critical blocks were recorded using DirectRT (Jarvis, 2014). We

computed IAT d-scores according to recommendations by Greenwald, Nosek, and Banaji (2003), such that for the evaluative IAT, higher numbers indicated a pro-thin attitude and for the self-associative IAT, higher numbers indicated a more pro-thin self-identity. However, error trials were removed from analyses in lieu of an error penalty, along with any trial with raw latencies shorter than 300 milliseconds (ms) or longer than 2500 ms, as in Olson and Fazio (2004).

Next participants completed the Antifat Attitudes Questionnaire (AFA; Crandall, 1994), Antifat Attitudes Scale (AFAS; Morrison & O'Connor, 1999), and feelings thermometer to assess explicit fat prejudice, as well as the Goldfarb Fear of Fat Scale (Goldfarb et al., 1985; the same scale as completed in the prescreen) to assess pre-post changes in fat-based fear. The order of these scales was counterbalanced between participants.

The Antifat Attitudes questionnaire (Crandall, 1994) is a 13-item questionnaire designed to measure 3 different types of negative attitudes toward fat people: Dislike (prejudice against fat people), Willpower (the belief in the controllability of fatness), and Fear (concern of becoming fat). The items were scored on a 7-point Likert Scale from Strongly disagree (-3) to Strongly Agree (+3). Examples items included "Fat people tend to be fat pretty much through their own fault" and "I really don't like fat people much." The Anti-Fat Attitudes Scale is a 5-item questionnaire, which also measures explicit prejudice against fat people (Morrison & O'Connor, 1999). The scale is scored on a 7-point Likert scale from Strongly Disagree (-3) to Strongly Agree (+3). Example items included "Fat people are less sexually attractive than thin people." and "A person's weight is a genetic issue, so fat people are not to blame for their weight (reverse scored)."

Both the Dislike subscale of the AFA and the AFAS assess evaluative attitudes towards fat individuals but they both contain a mix of evaluatively-based items as well as stereotypically

based items. For example, the Dislike subscale of the AFA contains both of the following statements: “I really don't like fat people much” and “I tend to think that people who are overweight are a little untrustworthy”. While one is purely evaluative the other appears to tap into more stereotypical associations. Similarly, the AFAS contains statements such as “On average, fat people are lazier than thin people” and “It is disgusting when a fat person wears a bathing suit at the beach”. Since neither offers a truly “pure” measure of one’s explicit evaluations of fat individuals, we include both scales.

For the feelings thermometer, participants rated how positively or negatively they felt towards a variety of social groups from 0 (very cold) to 100 (very warm). Social groups were presented in random order and include fat people, and filler social groups (e.g., Republicans, Hispanics). We computed a standardized feeling thermometer index of explicit prejudice towards fat people for each participant by subtracting the mean rating of all the other social groups from the ratings of fat people, then dividing the difference by the standard deviation of the ratings of all social groups. More positive numbers indicated more positive attitudes of fat people relative to other social groups.

We administered the Fear of Fat scale (Goldfarb et al., 1985) both as a pretest and posttest measure in order to assess the moderating and mediating effects of these beliefs. Fear is elicited from perceptions of threat and thus, this is the only measure that assesses one’s beliefs that membership in this group constitutes a legitimate threat to the self. The extent to which one sees potential membership in this group as threatening may moderate the effect that receiving “fat gene” feedback may have on prejudice such that, if group membership is not seen as threatening, individuals may not be motivated to change their attitudes towards overweight and obese individuals as a group.

The mediational potential of this measure is similar to that of essentialist beliefs regarding the biological-basis of weight. If individuals both receive feedback that they have the biological predisposition to become obese and simultaneously endorse a biological view of weight, they may change their fear of fatness in order to reconcile their potential recategorization into a fat identity. If individuals reduce their fear related to fatness, they may better cope with the threat of potentially becoming fat in the future. Thus, it is possible that we see a change in endorsement of such beliefs to combat the threat of recategorization.

To assess changes in essentialist beliefs about body size, participants also completed the Weight Beliefs Scale (also completed in the prescreening survey) as well as the Implicit Theories of Weight scale (ITW; Burnette, 2010). The ITW scale is a 6-item scale that assesses entity and incremental theories of weight, with three entity-worded items and three incremental-worded items. Items were scored on a 7-point Likert Scale from Strongly disagree (-3) to Strongly Agree (+3). Examples items included “You have a certain body weight, and you can’t really do much to change it” (entity-worded item) and “You can always substantially change your body weight.” (incremental worded item). The order of these scales was counterbalanced between participants. Participants were then asked some final open-ended questions about the experiment (where none expressed any suspicion or doubt about the feedback manipulation), were fully debriefed, offered an opportunity to revoke their consent (none refused) thanked, and dismissed.

CHAPTER 3

RESULTS

Preliminary Analyses

Results from a one-sample t-test showed an overall anti-fat prejudice effect on the evaluative IAT, $M = .50$, $SD = .50$, $t(191) = 13.10$, $p < .001$. Similarly for the self-associative IAT, results from a one-sample t-test showed an overall self-thin association effect, $M = .24$, $SD = .42$, $t(193) = 7.875$, $p < .001$. For standardized feeling thermometer scores, results from one-sample t-tests showed an overall prejudice effect on the feelings thermometer ratings for fat individuals, $M = -.15$, $SD = .80$, $t(200) = -2.742$, $p = .007$.

Fear of fatness and beliefs in the controllability versus genetic basis of weight were assessed prior to the experiment at time 1 as well as at the end of the experimental session (time 2) using Fear of Fat (FoF; Goldfarb et al., 1985) and the Weight Beliefs Scale (WBS). Overall, time 1 FoF scores did not significantly vary by condition, $F(2,175) = 1.366$, $p = .258$. Similarly, time 1 WBS scores did not significantly vary by condition, $F(2,175) = 1.995$, $p = .139$.

Table 1. Bivariate Correlations between Dependent Measures

<i>Parameter</i>		1	2	3	4	5
1	Evaluative IAT	1.0				
2	Self-Associative IAT	.458**	1.0			
3	Feeling Thermometer	-.181**	-.223**	1.0		
4	AFA	.113	-.006	-.404**	1.0	
5	AFAS	.085	.141*	-.382**	.481**	1.0
6	Fear of Fat (T2)	.013	-.182*	-.203**	.625**	.103

Note: * indicates significant at the .05 level (2-tailed); ** indicates significant at the .01 level (2-tailed)

Table 2. Bivariate Correlations between Belief Measures

	<i>Parameter</i>	1	2	3	4	5
1	WBS (T1)	1.0				
2	WBS (T2)	.478**	1.0			
3	ITW	.292**	.528**	1.0		
4	Fear of Fat (T1)	.116	.071	.163	1.0	
5	Fear of Fat (T2)	-.038	.138*	.108	.610**	1.0

Note: ** indicates significant at the .01 level (2-tailed); * indicates significant at the .05 level (2-tailed).

Impact of Naturalness Beliefs (WBS) and Feedback Condition on Prejudice.

To assess the effects of naturalness beliefs (as assessed by WBS) and feedback condition on implicit and explicit prejudice, in the following analyses we conducted an ANOVA with time 1 WBS as a covariate with a model specified to include an interaction term between condition assignment and the covariate (time 1 WBS). This analysis was performed separately for the following measures: the evaluative IAT, self-associative IAT, feeling thermometer z-scores, AntiFat Attitudes Questionnaire (AFA), AntiFat Attitudes Scale (AFAS), and time 2 Fear of Fat scores on feedback condition and time 1 WBS.

Implicit Measures

For evaluative IAT scores, there was neither a main effect of feedback condition, $F(2,163) = .061, p = .941$, nor a main effect of time 1 WBS, $F(1,163) = .006, p = .939$. The predicted time 1 WBS x feedback condition interaction was also not significant, $F(2,163) = .041, p = .960$. For self-associative IAT scores, there was not a main effect of feedback condition, $F(2,165) = 1.018, p = .364$, time 1 WBS, $F(1,165) = 2.278, p = .133$, or a time 1 WBS x feedback condition interaction, $F(2,165) = .954, p = .387$.

Explicit Measures

For feelings thermometer ratings of fat people, there was not a main effect of condition, $F(2,170) = .661, p = .518$, but there was a main effect of time 1 WBS such that participants with higher beliefs in the genetic basis of weight expressed warmer attitudes towards fat individuals, $F(1, 170) = 5.693, p = .018$. There was not an interaction between time 1 WBS and condition, $F(2,170) = 1.006, p = .368$.

For the AFAS, there was not a significant main effect of feedback condition, $F(2,172) = 1.506, p = .225$ but there was a significant effect of time 1 WBS on participants' attitudes towards fat individuals, $F(1,172) = 6.496, p = .012$, such that participants with higher beliefs in the genetic basis of weight expressed less prejudiced attitudes towards fat individuals. There was not a significant interaction between feedback condition and time 1 WBS on participants' anti-fat attitudes, $F(2,172) = 1.556, p = .214$.

For the AFA, there was not a significant main effect of feedback condition, $F(2,172) = .378, p = .686$, or time 1 WBS on participants' anti-fat prejudice, $F(1, 172) = 3.066, p = .082$. There also was not a significant feedback condition x time 1 WBS interaction, $F(2,172) = .321, p = .726$.

For time 2 FoF, there was not an effect of feedback condition, $F(2,172) = 1.166, p = .314$, or an effect of time 1 WBS, $F(1,172) = .378, p = .539$, on participants fear of being fat. Similarly, there was not a significant interaction between feedback condition and time 1 WBS on fear, $F(2,172) = .860, p = .425$.

We examined whether there was an interaction between time 1 WBS and condition on time 2 WBS to investigate whether participants' attitudes towards their beliefs in the malleability of the social category changed as way to resolve their recategorization threat. Cognitive dissonance theory states that when individuals experience inconsistency, they are motivated to reduce it and they may do that by changing their attitudes. In this case, these changed attitudes may be attitudes toward the new ingroup or may be attitudes towards the malleability of the social category. Specifically, increasing beliefs in the malleability of the social category might serve to reduce this attitudinal inconsistency and allow psychological exit from the group. As expected, time 1 WBS predicted time 2 WBS, $F(1,172) = 48.364, p < .001$, but we did not find a

main effect of condition on time 2 WBS, $F(2,172) = .957, p = .386$, or an interaction between condition and time 1 WBS on time 2 WBS, $F(2,172) = 1.256, p = .288$.

Impact of Time 1 Fear of Fat and Feedback Condition on Prejudice

To assess the effects of time 1 Fear of Fat (FoF) beliefs and feedback condition on implicit and explicit prejudice, we conducted univariate ANOVA with condition assignment and fear of fat as a continuous covariate, and included their interaction term.

Implicit Measures

For evaluative IAT scores, there was not a main effect for time 1 FoF, $F(1,168) = .001, p = .975$, but there was a significant effect of feedback condition, $F(2,168) = 3.345, p = .038$. This was subsumed by a significant time 1 FoF X feedback condition interaction, $F(2,168) = 3.517, p = .032$. Further analyses by condition revealed that in the fat feedback condition, higher time 1 fear of fat was associated with more prejudice on the IAT, $b = .103, SE = .048, t(56) = 2.136, p = .037$. There was not a relationship between time 1 FoF and evaluative IAT scores in either the no fat feedback condition, $b = -.013, SE = .059, t(55) = -.225, p = .822$, or the control condition, $b = -.093, SE = .053, t(52) = -1.747, p = .087$. There were no significant effects for self-associative IAT scores (all F 's < 1.238 , all p 's $> .267$). This suggests that participants in the fat feedback condition engaged in implicit distancing as a way to deal with recategorization threat.

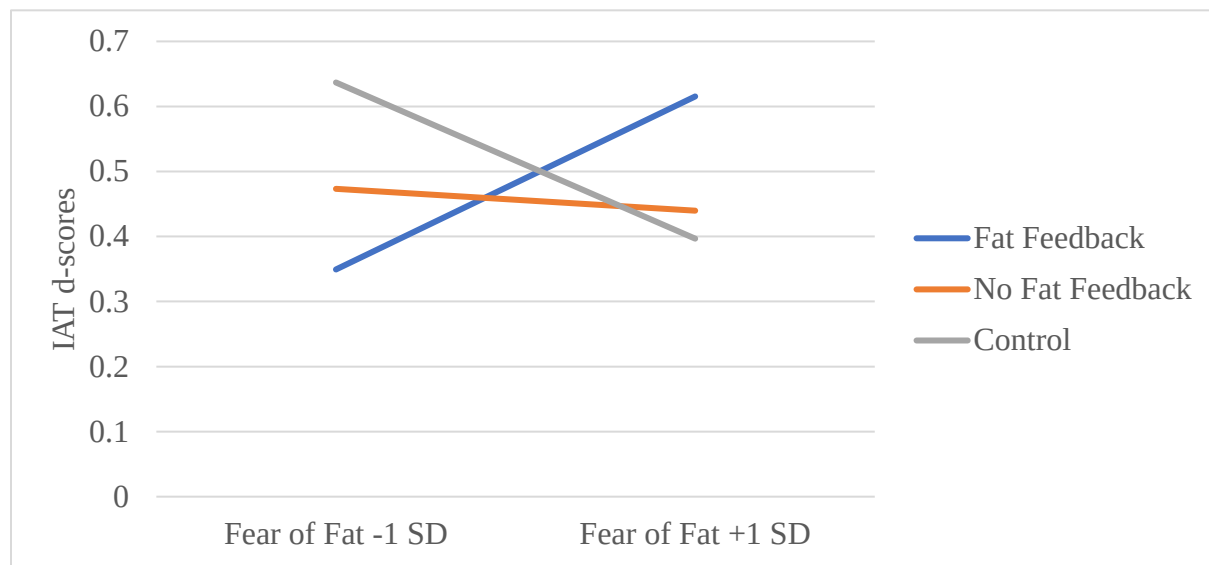


Figure 1. Time 1 Fear of Fat x Condition on Evaluative IAT d-scores

* Note: Higher IAT d-scores indicate greater anti-fat attitudes

Explicit Measures

For feelings thermometer ratings, there was a significant effect of condition, $F(2,175) = 3.462, p = .034$, but not a main effect of time 1 FoF, $F(1,175) = .646, p = .423$. However, there was a significant interaction between time 1 FoF and condition, $F(2,175) = 4.144, p = .017$. Further analyses revealed that in the fat feedback condition, higher time 1 fear of fat was associated with more negative attitudes towards fat individuals, $b = -.215, SE = .067, t(57) = -3.230, p = .002$. There was no relationship between time 1 FoF and feeling thermometer scores in either the no fat feedback condition, $b = -.005, SE = .096, t(56) = -.054, p = .957$, or the control condition, $b = .105, SE = .085, t(57) = 1.227, p = .225$. Similar to implicit measures, these findings provide evidence that participants in the fat feedback condition engaged in explicit distancing as a way to deal with recategorization threat.

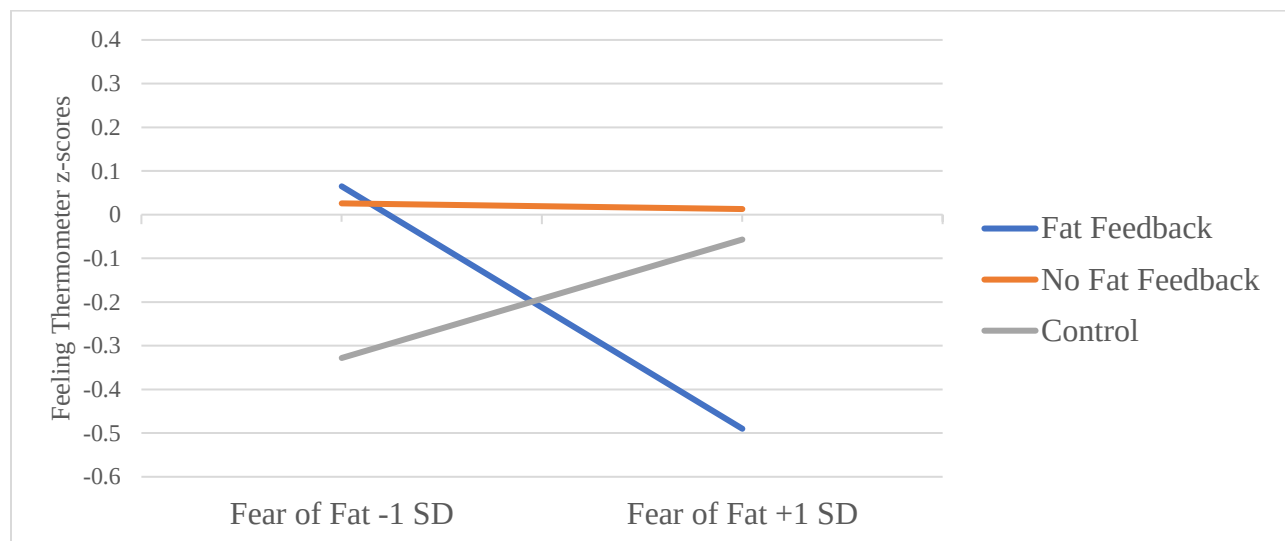


Figure 2. Time 1 Fear of Fat x Condition on Feeling Thermometer z-scores

* Note: Lower thermometer scores indicate greater anti-fat attitudes

There were no significant main effects or interactions for AFAS scores (all F 's < 1.367 , all p 's $> .258$). For AFA there was a significant main effect of time 1 FoF, $F(1,177) = 14.140$, $p < .001$, such that as participants' fear increased, their anti-fat prejudice also increased. This is unsurprising given that the AFA contains a 3-item fear subscale that assesses similar fat-related fear beliefs. There was not a significant condition main effect or condition x time 1 FoF interaction (all F 's < 2.034 , all p 's $> .134$).

Finally, neither time 1 FoF, nor condition, or their interaction had an effect on either time 2 WBS or implicit theories of weight (all F 's < 2.358 , all p 's $> .127$).

We also investigated whether participants fear changed as a function of the condition they were assigned. Unsurprisingly, time 1 FoF predicted time 2 FoF scores, $F(1,177) = 110.908$, $p < .001$. We also found a condition x time 1 FoF interaction on time 2 FoF, $F(2, 177) = 4.535$, $p = .012$. Tests of within-subjects contrasts revealed that there was a significant difference between time 1 and time 2 FoF in the fat feedback condition, $F(1, 59) = 5.265$, $p = .025$, but not in either the no fat feedback condition, $F(1,58) = 2.868$, $p = .096$, or the control condition, $F(1, 58) = .152$, $p = .698$. Specifically, while fear increased in the fat feedback condition, it decreased or stayed relatively the same in the other conditions (see Figure 3).

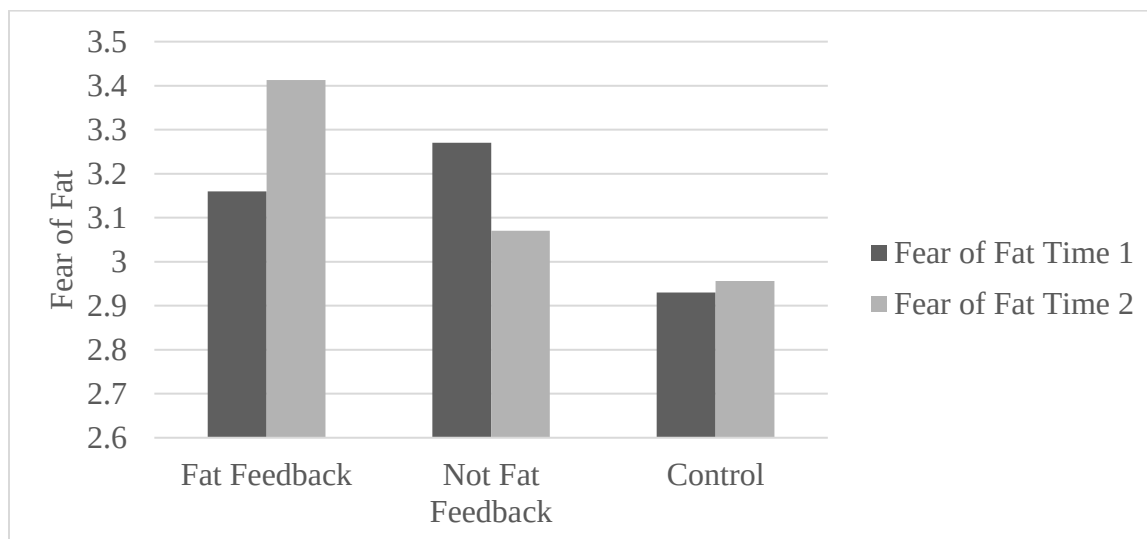


Figure 3. Fear of Fat Time 1 and 2 by Condition

Exploratory Analyses

Sex

We included sex as an exploratory variable to see if it interacted with condition or time 1 FoF to influence fat attitudes. We found a main effect of sex for feeling thermometer scores such that men ($M = -.34$, $SD = .78$) showed cooler feelings towards fat individuals than women ($M = -.07$, $SD = .80$), $F(1, 197) = 5.031$, $p = .026$. Similarly on the AFAS, men ($M = 4.57$, $SD = .95$) show greater prejudice towards fat people than women ($M = 3.54$, $SD = 1.12$), $F(1, 199) = 41.866$, $p < .001$. For time 2 FoF, we found that Females ($M = 3.39$, $SD = 1.42$) also show significantly higher time 2 fear of fat compared to males ($M = 2.66$, $SD = 1.42$), $F(1, 199) = 9.662$, $p = .002$. None of the Condition x Sex interactions were significant for any of the measures (all F 's < 2.32 , all p 's $> .10$). Similarly, we looked at whether sex interacted with time 1 FoF to affect attitudes and found that for none of our measures was this interaction significant (all F 's < 1.7 , all p 's $> .19$).

To determine whether these effects were driven by both males and females or just one sex, we split the file by sex and ran all of the main findings again. Specifically, we re-ran the condition x time 1 FoF interaction on evaluative IAT d-scores and feeling thermometer z-scores. For evaluative IAT d-scores, we found that the interaction was significant for females, $F(2, 120) = 3.838$, $p = .024$, but not for males, $F(2, 47) = .897$, $p = .416$. Similarly, for feeling thermometer scores, we found that the interaction was significant for females, $F(2, 122) = 5.062$, $p = .008$, but not for males, $F(2, 52) = .189$, $p = .829$.

We looked at the effect of each condition for females and found that for evaluate IAT scores, the only significant relationship between time 1 FoF and d-scores was in the fat feedback condition, $b = .127$, $SE = .057$, $t(41) = 2.207$, $p = .033$. The relationship was nonsignificant for

the no fat feedback and control conditions (all t 's $< |1.38|$, all p 's $> .17$). For males, this relationship was nonsignificant for all conditions (all t 's $< |.98|$, all p 's $> .34$).

For feeling thermometer z-scores, the same patterns emerged with females only, compared to when all participants were included. Specifically, only for the fat feedback condition did time 1 FoF significantly predict feeling thermometer z-scores, $b = -.258$, $SE = .082$, $t(40) = -3.150$, $p = .003$. For both the no fat feedback and control conditions, time 1 FoF did not significantly predict feeling thermometer z-scores (all t 's < 1.71 , all p 's $> .09$). For males, this relationship was nonsignificant for all conditions (all t 's $< |1.2|$, all p 's $> .24$). Although we do not have enough power to detect interaction effect in males, it appears that these findings are driven by females.

BMI

We measured participant BMI as a possible moderator of our predicted effect. We might expect the manipulation to be more believable and effective for people who are not either very low or very high in BMI (i.e., closer to the norm). To assess this, we created a BMI deviation score for each participant by taking the absolute value of each participant's BMI subtracted from the sample mean BMI.

We examined the effect of condition on evaluative IAT scores while covarying absolute difference of BMI and found a marginally significant interaction between it and condition on evaluative IAT scores, $F(2,186) = 2.920$, $p = .056$ (Note, the similar F and p -values were obtained using standardized BMI deviation scores). When using actual BMI as the covariate, the condition x BMI interaction on evaluative IAT scores was also significant, $F(2,186) = 3.548$, $p = .031$. Further analyses found that there was a significant relationship between participant BMI and evaluative IAT d-scores for the no fat feedback condition, such that as BMI increased,

implicit anti-fat bias decreased, $b = -.066$, $SE = .01$, $t(65) = -6.378$, $p < .001$. Similarly, there was a significant relationship between participant BMI and evaluative IAT d-scores for the control condition such that, as BMI increased, implicit anti-fat bias decreased, $b = -.039$, $SE = .013$, $t(56) = -2.892$, $p = .005$. This relationship was not significant for the fat feedback condition, $t(60) = -1.118$, $p = .268$.

Exploratory Exclusion Criteria

We conducted analyses excluding participants who had previously taken a genetic test ($N = 5$) and similarly, found that the condition x time 1 FoF interaction on evaluative IAT scores was still significant ($p = .032$) as well as the condition x time 1 FoF interaction on feelings thermometer z-scores ($p = .047$).

One of the filler questionnaires had participants complete a level of contact survey, adapted for fat people. The last item asked participants to respond with yes or no to the item “I am fat”. We looked at the analyses while excluding people who believe they are fat ($N = 18$). We found that when this group was excluded, the condition x time 1 FoF interaction on evaluative IAT scores was marginally significant ($p = .073$), whereas it was still significant for feeling thermometer z-scores ($p = .013$).

CHAPTER 4

GENERAL DISCUSSION

In the current investigation, we explored how learning of an immutable similarity implying membership in a stigmatized outgroup affected implicitly- and explicitly-assessed attitudes toward that group. We gave participants fake feedback about their likelihood of becoming obese in the future and manipulated the type of feedback they received to assess what effect this had on their implicit and explicit antifat attitudes. We predicted (a) those who were given feedback implying a biological similarity indicating outgroup membership would exhibit reduced implicit prejudice, and (b) this effect would be moderated by participants' beliefs about the biological basis and immutability (i.e. naturalness) of group membership. Contrary to our predictions, we did not find any differences in the relationship between naturalness beliefs and prejudice based on condition. Instead, we found for those told they have a high probability of becoming fat in the future, initial fear of fatness was associated with *greater* antifat prejudice on both implicit and explicit measures.

Fear of Fat Beliefs, Distancing, and Antifat Prejudice

While belonging to a group fosters closeness and can enhance self-esteem when the group is positive, belonging to a negative group poses a threat to the self and can cause dissociation and distancing from that group (Branscombe, Ellemers, Spears, & Doosje, 1999). When individuals perceive a similarity with a negatively characterized outgroup or outgroup member, they may distance or disassociate from (Berger & Heath, 2008; Cialdini, Borden, Thorne, Walker, Freeman, & Sloan, 1976; Falomir-Pichastor & Mugny, 2009; Novak & Lerner, 1968; Pyszczynski et al., 1995), or show increased prejudice and discrimination towards that

group (Adams, Wright, & Lohr, 1996; Gibbons, 1985; Talley & Bettencourt, 2008; Zarate, Garcia, Garza, & Hitlan, 2004).

In the current experiment, we found that for those told they had a high likelihood of becoming fat in the future, their initial fear of fatness was associated with greater antifat prejudice on both implicit and explicit measures (i.e. evaluative IAT d-scores and feeling thermometer z-scores, respectively). It may be that for those with initially high fear of fatness, their fear made them more sensitive to the threat of future fatness, which in turn resulted in an increase in prejudice as a way to distance themselves from this threat. In other words, this increase in prejudice may have served a self-protective function for our participants, allowing them to distancing themselves against threats to the self (i.e. the threat of fatness).

There is a substantial amount of research linking perceptions of threat to prejudice (Fein and spencer, 1997; Schaller, Park, & Mueller, 2003; Sherif & Sherif, 1953; Stangor & Crandall, 2000). This threat can come in many forms such as the threat of interpersonal harm (Schaller et al., 2003), conflict of interests (Sherif & Sherif, 1953), threat of recategorization (Fritzlen et al., 2019), or threat to self-esteem (Fein and Spencer, 1997). Research suggests that prejudice may be particularly salient in situations in which individuals feel particularly vulnerable to harm. For example, research by Schaller et al. (2003) investigated how belief in a dangerous world (i.e. level of threat perception), combined with ambient darkness, resulted in higher levels of racial prejudice. They found that for participants who completed the experiment in darkness (compared to normal lighting), those who had higher beliefs in a dangerous world showed increased associations between African and danger-related words. Thus, prejudice can reflect a threat management mechanism, particularly when the individual feels vulnerable to the threat.

The extent to which one sees potential membership in an obese social group as threatening may moderate the effect that receiving “fat gene” feedback may have on prejudice such that, if group membership is seen as threatening, individuals may be motivated to dissociate or distance themselves from the group through changes in their attitudes. If group membership is not seen as threatening, individuals may not be motivated or have reason to change their antifat attitudes. For those who showed high fear of fatness, they may have felt particularly vulnerable to the threat of becoming fat in the future. This may have motivated these individuals to protect themselves through increased negativity towards fat people as a way to distance themselves from this new unwanted group membership.

Essentialist Beliefs and Null Findings

In previous work researchers found that perceiving an immutable similarity with a stigmatized outgroup can reduce prejudice towards that group if individuals believe that group membership is fixed and immutable, yet in the current investigation, we found no such relationship between such beliefs and feedback on prejudice. Fritzlen et al. (2019) also explored how learning of an immutable similarity implying membership in a stigmatized outgroup affected prejudice toward that group. These researchers found that when dominant-group members were informed that they possessed biological similarities with a stigmatized outgroup, they showed *reduced* implicit racial (Study 1) and sexual orientation (Study 2) prejudice. In Study 2, this effect was moderated by naturalness beliefs in that implicit prejudice reduction as a function of categorization threat only occurred among those who subscribed to beliefs about the biological basis of sexual orientation. Unlike Fritzlen et al. (2019) and contrary to predictions, we did not find an interaction between the recategorization threat and naturalness beliefs on

either implicitly-assessed or explicitly-assessed fat prejudice. Why might this be?

Several differences exist between the current investigation and that of Fritzlen et al. (2019) that may explain this discrepancy in findings. First is the type of group. Sexual orientation and race are both groups whose group membership is relatively discrete (i.e. distinct and non-overlapping), whereas body size is a continuous group in which membership exists on a continuum. The second difference is the level of anticipated movement between groups. Whereas most people believe that race, and for the most part, sexual orientation, are fixed groups in which membership is biologically based, body size is largely considered a product of both biology and individual willpower (Crandall & Reser, 2005). Thus, people likely believe individuals have greater ability to change their body size compared to their race or sexual orientation.

These two distinctions have important implications for why we may have not found the predicted change in prejudice moderated by naturalness. Individuals may not feel like they are stuck with any weight-related identity, regardless of the feedback they receive about their genetic probability of becoming obese. Since body size is continuous, individuals' greater beliefs about their ability to change their body size in the future may have made them perceive any feedback about their genetics as less definitive or conclusive about their future social memberships. These results suggest that individuals may hold both of the belief that weight is controllable and the belief weight is genetic simultaneously. There is some evidence that suggests this may be true.

First, at least in the domain of weight, stronger belief in genetic basis of weight is not associated with weaker belief in controllability. At time 1, the correlation between the control and biological items for naturalness scores is positive, $r = .288, p < .001$. For time 2, the correlations between these items is still positive, albeit a bit smaller, $r = .143, p = .043$. One might expect that if these beliefs were two ends of the same dimension that a higher value on one

would inevitably mean a lower value on the other (i.e. a negative correlation), yet we see positive correlations between endorsement of these beliefs. This suggest that these beliefs are not conflicting or antagonistic beliefs but can be held simultaneously.

To investigate whether there were differences in changes in participants beliefs about the etymology of weight, we looked at whether naturalness scores differed between conditions from time 1 to time 2. We separated the items into controllable beliefs and genetic beliefs and calculated a difference score subtracting time 2 minus time 1 scores for each condition for both types of belief. Based on the table below (Table 3), it appears that for those in the no fat feedback condition and the control condition, both genetic and controllability beliefs increased from time 1 to time 2. The only group whose beliefs did not increase from time 1 to time 2 were controllability beliefs for those in the fat feedback condition. This is further evidence that genetic beliefs and controllability beliefs are not antagonistic.

Table 3. Difference in means for controllability and genetic beliefs between time 1 and time 2

Condition	Controllability T2-T1 difference	Genetic T2-T1 difference
Fat Feedback	-.11	+.18
No Fat Feedback	+.09	+.31
Control	+.19	+.18

Another reason we may not have found any effect of naturalness beliefs on prejudice is that individuals appear to hold controllability beliefs more strongly than genetic beliefs. We found that participants showed greater endorsement for controllability beliefs compared to genetic beliefs at both time 1 and time 2. Specifically at time 1, participants were more likely to slightly agree with controllability statements ($M = 4.76$, $SD = .834$), compared to slightly disagree with genetic statements ($M = 3.40$, $SD = .701$). Similarly, at time 2, participants on average slightly agreed with controllability statements ($M = 4.82$, $SD = .779$), compared to slightly disagreed with genetic statements ($M = 3.63$, $SD = .822$). Thus, participants appear to have greater support for beliefs that fatness is controllable than fatness is genetic, both before and after treatment.

Unlike the previous findings of Fritzlen et al. (2019), we found similar patterns across both implicitly and explicitly-assessed prejudice. While some types of prejudice result in discrepancies between implicit and explicit measures, generally this difference is due to motivational and social desirability concerns. Fat prejudice does not have the same social desirability concerns as other prejudices such as racial or sexual prejudice. Research finds that fat people are shamed openly and often in modern society, and fat prejudice is just as strong for fat people as it is for thin people (Crandall, 1994). Research has found that fat prejudice increased 66% from the mid 1990's to mid 2000's (Andreyeva, Puhl, & Brownell, 2008) and that while explicit anti-fat attitudes remain stable across age groups, implicit anti-fat prejudice increases with age (Hauser, 2010). Finally, fatness is rated as more socially undesirable than other stigmatized social groups such as possessing a mental handicap or racial identity (Towler & Schneider, 2005). Thus, the divergence of implicit and explicit measures may be due to a lack of motivation by participants to control their prejudicial responses that stems from lower concerns

about the social desirability of antifat prejudice.

On Sex Differences

Upon further investigation, we discovered that the effect of initial fear of fat and recategorization threat on prejudice occurred for female but not male participants. Specifically, for females who had high fear of fat and experienced threat of recategorization, they showed more implicitly and explicitly-assessed prejudice towards fat people compared to females in the other conditions, whereas there was no difference between conditions for males.

Females may have more fear of fatness than males due to greater social pressure to be thin. Research has found that across numerous settings, women experience more weight-related stigma than men, with fat women faring worse than thin women and worse than men, both fat and thin (Fikkan & Rothblum, 2012). Similarly, attractiveness is a stronger determinant of popularity for women than for men (Feingold, 1990, 1992a). A meta-analysis looking at gender differences in body image found females are more dissatisfied with their bodies and consider themselves to be worse-looking than do males, even when controlling for actual attractiveness (Feingold & Mazzella, 1998). Lieberman, Tybur, and Latner (2011) found that while males report greater negative attitudes toward obese individuals, females reported greater fear at the possibility of becoming obese.

Although we do not have enough power to make definitive conclusions, we see support for these assertions. We find that females show higher fear of fat at both time 1 and time 2 compared to men while males show more explicit antifat prejudice than females. Females ($M = 3.26$, $SD = 1.34$) show significantly higher time 1 fear of fat compared to males ($M = 2.74$, $SD = 1.09$), $t(176) = 6.26$, $p = .013$. Females ($M = 3.39$, $SD = 1.42$) also show significantly higher time

2 fear of fat compared to males ($M = 2.66$, $SD = 1.42$), $F(199) = 11.345$, $p = .001$. For feeling thermometer z-scores, men ($M = -.34$, $SD = .78$) show greater negativity towards fat people than women ($M = -.07$, $SD = .80$), $F(197) = 4.853$, $p = .029$. Similarly on the AFAS, men ($M = 4.57$, $SD = .95$) show greater prejudice towards fat people than women ($M = 3.54$, $SD = 1.12$), $F(199) = 39.340$, $p < .001$. There were no differences in levels of prejudice between males and females on the evaluative IAT or AFA (all F 's $< .99$, all t 's $> .24$). Thus, it appears that females experience more fear of fatness, but less explicit prejudice towards fat people in general than males. Thus, it can be surmised that women experience more pressure to be thin compared to men, and this pressure results in a greater dissatisfaction with their own body and a greater fear of becoming fat. When this fear is combined with a recategorization threat though, we find that women show greater levels of implicit and explicitly-assessed prejudice than men.

Implications

Our findings add to the literature delineating situations in which perceived similarity with outgroups affects prejudice, a key question in intergroup relations research. Our findings suggest that prejudice might be increased when the similarity is thought to be with a continuous group in which membership is fluid. Our work adds to the growing body of literature on intergroup relations and threat and our results suggest that emotions, such as fear, may be relevant and useful for understanding the foundations of antifat prejudice.

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APPENDICES

APPENDIX A

Sample #: 8327B6 Sample source: Cheek Swab Result: Normal			
Location	Phenotype	Gene Locus	Exclusion Status
1p36.11	Obesity, mild, early onset	NR0B2	OK
1p35.2	{Obesity, association with}	SDC3	OK
2p23.3	{Obesity, early-onset, susceptibility to}	POMC	OK
3p25.3	{Obesity, susceptibility to}	GHRL	OK
3p25.2	Obesity, severe	PPARG	OK
4q31.1	{Obesity, susceptibility to}	UCPI	OK
5q13.2	{Obesity, susceptibility to}	CARTPT	OK
5q32	{Obesity, susceptibility to}	ADRB2	OK
5q32	{Obesity, variation in}	PPARGC1B	OK
6q16.3	Obesity, severe	SIMI	OK
6q23.2	{Obesity, susceptibility to}	ENPPI	OK
8p11.23	{Obesity, susceptibility to}	ADRB3	OK
11q13.4	Obesity, severe, and type II diabetes	UCP3	OK
16q22.1	{Obesity, late onset}	AGRP	OK
18q21.32	Obesity, autosomal dominant	MC4R	OK
Laboratory batch number: 82393130C1		See Statement of Results for additional information	

Statement of Results: Fat gene feedback condition (No fat gene feedback condition)

This sample identifies 15 genetic markers associated with obesity. On average, most individuals who do not develop obesity show 15%-25% overlap in these markers compared to those who do eventually develop obesity.

The assessment of nucleotide markers for this batch indicates that there is an **83% (17%)** overlap in the markers between those in this sample and the markers in the average person who develops obesity.

This indicates that the individual from whom this sample was taken has a **78% (<10%)** chance of developing obesity within the next 20 years.

VITA

Katherine Anne Fritzlen was born in St. Louis, MO in 1993. She grew up in San Antonio, TX and graduated from Ronald Reagan High School in 2011. Katherine earned her B.A. in Psychology from Rhodes College in Memphis, TN, graduating in May 2015. Katherine began her graduate work with Dr. Michael Olson in Experimental Psychology at the University of Tennessee in Fall 2015. There, her research focused on implicit attitudes, with a focus on attitude formation through evaluative conditioning and the effect of recategorization threat on prejudice. After completion of her Ph.D., she plans on pursuing a career as a User Experience (UX) Researcher.