# The Making of "Fat Girls" and "Skinny Boys": How Social Similarity Influences Weight-Related Perceptions and Behaviors

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**ABSTRACT**

Research on the obesity crisis in the United States has focused on the influence of those to whom we are tied, but has overlooked the impact of the people who surround us without being tied directly to us. We predict that influence flows not only from the people who comprise our social networks, but also from those unconnected people who constitute the social environments that we regularly experience, such as the broader workplace or neighborhood. These people who we see but do not know function as additional vectors of influence by supporting and enforcing, or opposing and subverting, norms about body weight, exercise and eating. More specifically, we look to and take weight-related cues from those who best match us along multiple dimensions of demographic characteristics, including race, gender, age, and SES. We predict that the weight-related behaviors and weight perceptions of those who resemble us, but with whom we do not necessarily have a relationship, will influence our own behaviors and perceptions. Using data from the Add Health, we combine this ecological perspective with social network analysis to examine the roles of direct alters and demographically similar others (DSOs) on individual weight perceptions and behaviors.

## INTRODUCTION

How are health behaviors affected by others? Studies on smoking (Alexander et al. 2001; Kobus 2003), risky sex (Buhi and Goodson 2007; Miranda-Diaz and Corcoran 2012) and obesity (Helfert and Warschburger 2011; Hutchinson and Rapee 2007; Christakis and Fowler 2007; Paxton et al. 1999) find that unhealthy behaviors among friends predict behavior at the individual level. The influence individuals exert on one another is often captured using social network methods. These methods track influence by relying on ties as the primary conduit through which influence flows. Many social scientists who do not use network analytic methods similarly recognize the role of influence, instead focusing on the role of the social environment in shaping individual health patterns. We aim to bridge these perspectives, proposing a model that integrates influence from direct ties as well as demographically similar, yet unconnected, others to predict individual-level weight behaviors and perceptions.

Social influence has previously been measured through ties because these connections are thought to be the "pipes" through which influence flows. Friends, kin and other strong ties can influence individual behavior by way of the norms they propagate about appropriate behavior. Norms may describe the actions of others or create expectations of individual behavior through the encouragement or proscription of certain behaviors (Cialdini, Reno, & Kallgren 1990). When individuals alter their behavior to adhere to established norms, behaviors within a given network converge. Individuals may adopt norms counter to their own beliefs, such as drinking more than they believe is acceptable because of their perception that others celebrate heavy drinking (Prentice and Miller 1993). Such convergence has also been observed around obesity, such that obese status has been shown to diffuse through the network over time (Christakis and Fowler 2007, see also Cohen-Cole and Fletcher 2008a, 2008b). Further, ties may also form the prism through the individual views the world. The behavior of network members not only shapes individuals' outward behaviors, but also their perceptions about which behaviors are acceptable.

Reference group theory plays on the individual's desire to know where he stands in relation to the group, including whether his own presentation is acceptable. However, unlike studies of direct ties, the reference group is not defined or bound by ties to the ego. While direct alters can serve as references, the tie is neither a necessary feature in determining which people comprise the individual's reference group nor in understanding how the influence flows from them to the individual. Reference groups influence the individual by way of perception. Individuals search constantly for a means of self-evaluation and, when traits are difficult to evaluate objectively, they look to reference groups for measurement of subjective attributes (e.g. intelligence, beauty) (Shibutani 1955; Hyman and Singer 1968; Festinger 1974). By comparing herself to others in the group or envisioning how others in the group would judge her, it is possible for the individual to acquire a ranking of how she compares to others. This ranking process may alter the individual's self-perception and she may change her behavior to better align with the standards of the group.

However, even though the reference group influence mechanism may be cleanly theorized, it is difficult to measure empirically with existing methods. Prior studies of reference groups have defined members of references groups radically differently,

ranging from same-age peers to celebrities of the same gender (###). This conceptual vagueness surrounding who constitutes an individual's reference group renders comparison across studies difficult given the wide range of others who could feasibly fit into a given reference group. At the same time, network methods have more clearly identified significant alters, but have been criticized for attributing this broad influence to the select few ties they are able to measure (Cohen-Cole and Fletcher 2008a, 2008b; Van den Bulte and Lilien 2011). While reference groups may cast too wide a net to capture the alters with whom the individual actually interacts, networks fail to account for the fleeting (but persistent) influences of those persons with whom the ego has occasional contact without necessarily having a relationship. Together, these strong ties and casual contacts constitute the social environment from which the ego takes cues. In this paper, we offer a way of measuring the nonrelational influence that stems from reference groups that is separate and complementary to the influence of ties.

In light of the myriad social movements, media foci, and public health campaigns addressing what constitutes a "healthy weight," we utilize body weight perceptions and weight-related behaviors as our case study. We propose that an important reference group to measure consists of those people who resemble the individual along a vector of demographic characteristics, including race, gender and SES. Relying on the homophily principle (Lazarsfeld and Merton 1954; McPherson, Smith-Lovin and Cook 2001) and Blau space (McPherson 1983, 2004; McPherson and Ranger-Moore 1991), we develop a method for measuring the influence that flows between the ego and demographically similar others (DSOs). Our concept, which we term the Blau similarly analysis, captures influence from this type of reference group by modeling the relationship between the actions of these DSOs and the individual. We provide a way through which demographic attributes may be utilized as dimensions in the creation of a multidimensional social space. Within this space, close neighbors in the space can be thought of as more similar to one another than those individuals who are located farther from one another in the space. Neighbors in the space then serve as a type of reference group for the individual. Just as homophily dictates that more similar others will associate with one another, we argue that more similar others will be more likely to influence one another, even without the existence of a direct tie. This method represents an innovation on existing Blau space methods, which have previously been unable to account for critical categorical attributes, such as race and gender.

The controversy over appropriate body weight provides an important site for the investigation of social influence patterns. As the United States faces what has been deemed an "obesity epidemic," it has also witnessed an increase in eating disorders and other unhealthy weight-related behaviors. Though seemingly medical, defining what constitutes a "healthy weight" has become a political, social, and cultural issue (Willett et al. 1999; Spurgas 2005; Van Gaal et al. 2006; Yancey et al. 2006; Swami and Viren 2009; Ornstein 2010; Flegal et al. 2013). While much of public health and medical research contends that unhealthy weights (both over- and underweight) are related to a magazine of health problems (Rome and Ammerman 2003; Van Gaal et al. 2006), popular culture celebrates ultrathin celebritites while reactionary social movements have rebranded "big" as beautiful. In short, messages from the media, social movements and medical establishment have provided myriad scripts for the public to adjudicate.

We examine whether misperceptions of weight and unhealthy weight behaviors (i.e. attempts to alter weight to a level described as unhealthy by CDC guidelines). among demographically similar others predict misperception and unhealthy behaviors at the individual level. Using data from the National Longitudinal Study on Adolescent Health (Add Health), we combine measures of network alters' weight perceptions and behaviors with those perceptions and behaviors of unconnected demographically similar others (DSOs) to predict individual perceptions and behaviors. We find that the DSO's perceptions and behaviors exhibit a strong, positive relationship to individual behaviors and perceptions. However, the influence of DSOs (as well as the influence of the network) is not consistent across males and females. Males' weight-related behaviors are more sensitive to the behaviors of others in the network and bubble while females' behaviors are relatively inelastic. We provide potential theories for this gendered difference as well as a discussion of the ramifications of these findings.

**THEORY**

Sociologists have frequently used network analytic methods to capture the conduits of social influence. These ties facilitate the flow of influence between connected parties by providing a channel through which influence may flow ("pipes") and by the way that the behaviors of others create local norms (prisms) (Podolny 2001). One way networks serve to propagate social influence in the prisms perspective is though the transmission of proscriptive and descriptive norms (Latkin et al. 2003; Sheeran, Abraham and Orbell 1999; Cialdini, Reno and Kallgren 1990). Proscriptive norms refer to sentiments about what the individual should do, and have social rewards or sanctions associated with adherence to the norm. In contrast, descriptive norms describe what others are doing and are not directly associated with judgment by the group (2003). However, the members of such normative groups are debated. Studies employing social network analysis have relied on direct ties, such as friends, significant others and kin, to identify influence that flows from others to the individual.

Weight-related behaviors, such as dieting, are susceptible to social influence from direct network alters. Children who perceive themselves to be overweight or whose parents perceived them to be overweight are likely to attempt weight loss even when they are at medically healthy weights (Swaminathan et al. 2013). Female adolescents' weight concerns and weight control behaviors can be predicted by their perceptions of peer weight concerns (Mackey and La Greca 2008) and by their friends' scores of these same behaviors (Hutchinson and Rapee 2007; Paxton et al. 1999). In the same vein, Christakis and Fowler (2007) demonstrate that obesity is contagious, such that egos connected to obese alters are more likely to be obese themselves (see also Cohen-Cole and Fletcher 2008a, 2008b). Bahr and colleagues (2009) contend that the "dieting with friends" strategy of weight loss has generally failed not because of network irrelevance, but rather because the intervention extends only to first-degree alters. Using network simulations, they propose extension to the second-degree alters of dieters would increase efficacy of dieting with friends by way of shifting cluster boundaries. These boundaries are salient because of the weight status homophily observed among friends (2009). Logistically speaking, Pachuki, Jacques and Christakis (2011) find that certain eating patterns, such as high intake of alcohol and snacks, are transmissible across different types of social relationships, including spousal, kin and friendship ties.

Alternatively, theories of reference groups are less constrained in identifying specific conduits of influence, positing that direct ties are not a prerequisite for social influence. Theories of reference groups conceptualize social influence as traveling more freely from the social environment to the individual (Shibutani 1955). Reference groups are sets of people that the individual assumes to be his peers, hopes to join, and/or against whom the he evaluates his own position (Shibutani 1955). Shibutani (1955) explains, "...a reference group becomes any collectivity, real or imagined, envied or despised, whose perspective is assumed by the actor" (p. 563). From this theoretical perspective, the individual has an inherent drive for accurate self-perception and employs the reference group as tool to gauge his own performance (Festinger 1954). The positional model of reference groups contends that the individual imagines himself in the role of alters who he perceives to be in his reference group in order to generate evaluations about his own behavior (Burt 1982; Gattrell 1987). Such positional role taking is salient for the influence of behaviors between unconnected others in reference groups.

Reference group influence is tied to behavioral convergence when such self-evaluations lead the individual to alter his behaviors to align with those of his perceived reference group. The mechanism is psychological, such that impetus to change behavior stems from the individual's perspective taking ("I think they think I'm fat") rather than direct evaluation ("Paul said that I'm fat ") (Turner 1956). As a result, attitudes and behaviors can shift from the perceived, rather than direct, influence of others. For example, in studies of adolescent smoking behavior, researchers find the individual's propensity to smoke is in part determined by his belief about how smoking is viewed by his peers at large (Alexander et al. 2001; Kobus 2003). Accordingly, they find the individual is more likely to smoke if he believes he will be socially rewarded by (or gain membership in) his reference group.[1]

Social comparisons to the reference group are most likely to be made when the attribute being evaluated, such as intelligence or beauty, lacks an objective measurement scale. Upward comparisons are made when the individual compares himself to an elite or superior group. Analogously, downwards comparisons are made when the individual compares himself to a group below him, usually to highlight the ways in which he is different from this group. Psychologically, these comparisons can be problematic because they have the potential to leave individuals feeling dissatisfied or inferior. Strahan and colleagues (2004) find that women are more likely to make upwards comparisons regarding their body (ex: models) and are more dissatisfied with their bodies as a result. Additionally, social comparisons can warp individual's own perceptions about themselves, as in the case of women who report higher rates of negative appearance comparison and body dissatisfaction after watching commercials featuring actors with idealized body types (Hargreaves and Tiggerman 2004).[2]

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[1] This type of perspective taking may lead to pluralistic ignorance if individuals rely too heavily on what they believe to be the perceptions of others rather than actual perceptions of others.

[2] Despite the extensive research on the effects of social influence on weight behaviors, the directionality of this category of study is contested. Whether individuals befriend others with similar behaviors or whether those behaviors influence the individual is inconsistent across studies. Fletcher, Bonell and Sorhaindo (2011) do not claim

Because reference groups are broadly defined, social comparisons may be made upwards and downwards to figures as removed as celebrities or as a close as peers. Accordingly, it becomes difficult to discuss a general effect of reference groups on individual behavior because the group may be far removed from the daily reality of the individual (e.g. celebrities) and the comparative process yielding the self-evaluation may be vertical (upward or downward). In contrast, diffusional studies of behavior among friends, such as delinquency or smoking (Kreger and Haynie 2011; Haynie et al. 2005; Kobus 2003; Alexander et al. 2001; Haynie 2001) may involve horizontal comparisons to friends considered equals. Although both approaches argue that perceptions and behaviors shift in response to others, it is contested whether a tie is necessary for the mechanism behind such change. However, these theories are complementary rather than antithetical. Network ties are bred from homophily (McPherson, Smith-Lovin and Cook 2001), in the sense that individuals are more likely to befriend others who resemble them on a set of key dimensions, such as race, gender or SES. Moreover, McAdam and Rucht (1993) find that the behaviors are most likely to be adopted by those people who resemble the transmitter, suggesting that influence is most likely to occur in horizontal, rather than upwards or downwards, comparisons. Most often we are likely to identify reference groups as those people who most closely resemble us, including our position in the network (Festiginer 1954; Burt 1982; Friedkin 1993; McPherson, Smith-Lovin and Cook 2001). Combined, these theories suggest that individuals are most likely to be persuaded by and to befriend those who resemble them. Hence, a reference group of critical interest is one compromised of others with whom the individual has much in common. However, whether ties between these demographically similar others (DSOs) and the individual are necessary is contested. We propose that an unmeasured source of influence in the social networks literature is that stemming from DSOs to whom the individual is not directly connected.

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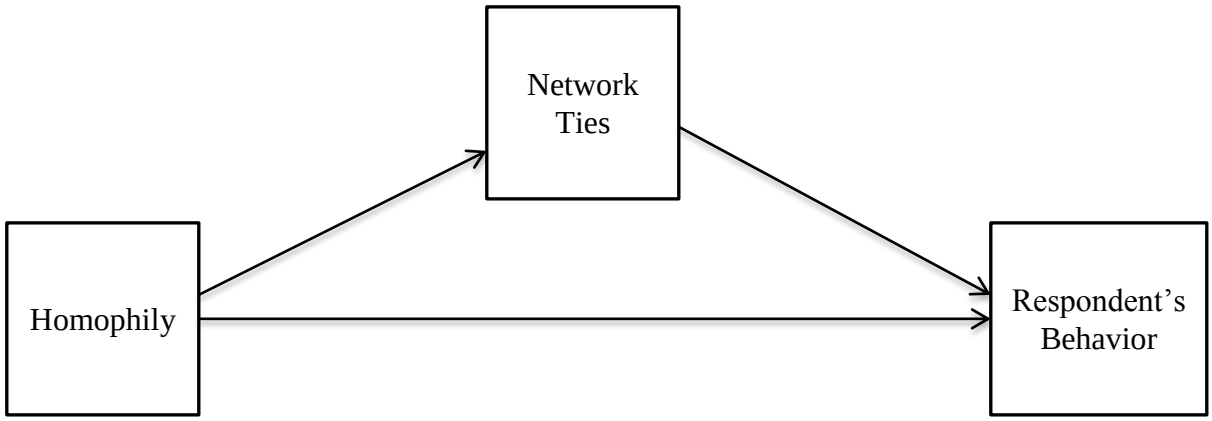
directionality in their finding that overweight adolescents cluster together in friendship networks, while Rayner and colleagues (2013) contend that homophily among body dissatisfied and bulimic girls is the result of selection, rather than influence.

**Figure 1**: In this paper, we conceptualize how influence travels without the conduit of ties.




We integrate theories of nonrelationial diffusion and Blau space to explain how weight-related perceptual and behavioral influence travels from unconnected individuals in the Add Health high schools. Strang and Meyer (1993) list two types of diffusion channels along which innovations flow: direct (or relational ties) and indirect (or cultural linkage) channels. Direct channels describe actual interpersonal networks, while indirect channels refer to people's common identities. The authors note that, in terms of cultural linkage, unconnected individuals display homogeneous behaviors when they "belong to a common social category." The behaviors of the reference group, to which they do not necessarily have direct ties, shape the perceptions of the individual himself. McAdam and Rucht (1993) refer to a similar process as "non-relational channels of diffusion" which they define as "an innovation is adopted by actors in the absence of direct, network ties. They argue that that diffusion should occur the fastest among adopters who identify most strongly with, or most closely resemble, the transmitters. In other words, "The higher the level of identification with a shared social or cultural category, the more extensive the transmission of an innovation" (p. #).

Social networks treat norms as diffusing through a network, regardless of whether these norms are descriptive or proscriptive. Reference group theory states that when attributes or expectations are subjective, the individual will turn to a predicted judgment by the reference group as means of self-evaluation. Thus, when norms regarding behavior are subjective, the individual may turn to the reference group (comprised of others to whom the individual may or may not be tied) to decide whether he is actually adhering to the norm. When adherence to the norm is obvious, such as when smoking or vandalism are socially rewarded, the individual-level reference group evaluation may be unnecessary because it is clear to the individual which behaviors are appropriate. However, when the norm is more nebulous, such as pressure to look attractive or to be fit,

the individual may turn to the reference group to determine whether his status would be considered appropriate (e.g. "They think I'm fit"). When considered in tandem, these theories yield better understanding of how the actions of others affect the individual. In this paper, we provide a new way to quantitatively model DSO reference group influence on weight perceptions and behaviors.

## DATA

Given the increasing focus on childhood obesity and the plummeting ages of eating disordered patients, adolescents constitute a critical population to study the effects of social influence on body weight perceptions and behaviors. We use data from Wave I of the National Longitudinal Study on Adolescent Health to investigate these relationships. To examine the role of influence on weight-related perceptions and behaviors, we use data from Wave I of the National Longitudinal Study of Adolescent Health. These data were gathered from adolescents across the United States (Harris 2009), and include information about peer networks, respondent health status and behaviors.[3] In Wave I, collected in 1994-1995, students in grades 7-12 were surveyed via an in-school questionnaire given to all students in school on the day of administration. Afterward, a subset of 20,000 students were selected for a substantially more detailed in-home interview, which asked respondents about peer networks, sexual behavior and health status (among other topics). To rule out interviewer and parental effects, adolescents were asked sensitive health and risk behavior questions using audio computer-assisted self-interview (A/CASI) techniques (Turner et al. 1998). Although specific minority groups were oversampled in the in-home survey, sample weights are provided to render the data nationally representative. Data regarding friends in the network were collected during the In Home interview at the same time that measurements of height and weight were also collected. In this study, we primarily utilize data from the in-home interviews. In a subset of schools (referred to as "saturation schools"), the In Home interview was administered to all students (rather than a random sample) so that a global network of the school could be constructed. In this study, we use a combination of In School and In Home data from fifteen of the saturation schools. We restrict our analyses to this subset of schools because the network data are comparatively richer and allows us to distinguish the effects of nonrelational Blau space influence from tie-based influence.

## METHODS

This study proposes a new methodological approach in examining how others who have similar socio-demographic characteristics to oneself influence one's attitudes and behaviors, namely "Blau similarity analysis." In past studies, dyadic-level data has investigated the effect of socio-demographic similarity on each others' attitudes and behaviors, as well as tie formation between them. Our new method, on the other hand,

[3] As collected, the data are nationally representative of high schools and can be weighted at the individual-level to be representative of adolescents.

translates dyadic-level influence into a single individual-level measure and incorporates this variable to individual-level survey data.

Blau similarity analysis is an extended methodological approach of Blau space analysis developed by McPherson (1983; McPherson and Ranger-Moore 1991). Blau space is a multi-dimensional space in which individuals close to one another in the space are more similar to one another, and therefore more likely to influence one another than those farther apart. The dimensions of Blau space are defined by the demographic parameters most salient for association. Individuals' positions within Blau space are then determined based on their unique combinations of characteristics along the chosen dimensions. For example, a thirty year-old, college educated, middle income person would be closer to a forty year-old, college-educated, middle income person in Blau Space than they would be to a twenty year-old, low income high school graduate.

The homophily principle functions as the bedrock of Blau space analysis. Homophily refers to the tendency of individuals to develop intimate relationships with those who are similar to themselves (Lazarsfeld and Merton 1954; McPherson, Smith-Lovin, and Cook 2001). In Blau space, individuals who are near to one another are more likely to contact with another and associate across many types of relations than those who are far away due to the prevalence of homophily. Thus, Blau space analysis enables us to model a social space focusing on multidimensional propinquity using individual-level variables as axes of the space.

McPherson has applied Blau space primarily to study the influence of collective entities, such as voluntary associations on individuals' membership. Because organizations recruit their members primarily from the associates of existing members, they tend to be composed of relatively homogeneous members. Thus, groups are localized to particular areas or niches in Blau space from which they recruit their members. Moreover, organizations are under competitive pressure from other organizations, and organizations respond to the ecology of other organizations by shrinking/expanding in size of niche and by their adaptations to recruit different types of members when competition for members of an existing niche becomes intense. Mark (1998) extends this organizational argument to the example of musical tastes, arguing that musical genres must compete for fans in the same way organizations do because of the time and energy required to be a fan.

In our new method, we employ the idea of social space from Blau space analysis. At the same time, however, we depart from the dynamics of organizational recruitment in Blau space and shift our focus to interpersonal influence in terms of proximity in Blau space. Specifically, this method aims at developing an individual-level index that captures the influence of demographically similar others (DSOs). This index, which we term the Blau similarity index, reveals how individuals, are likely to be influenced by others who are proximate to themselves in socio-demographic space, regardless of actual interpersonal friendship,. The basic idea of this interpersonal influence is illustrated in Figure 2.

**Figure 2**: Hypothetical Sphere in a Three Dimensional Blau Space

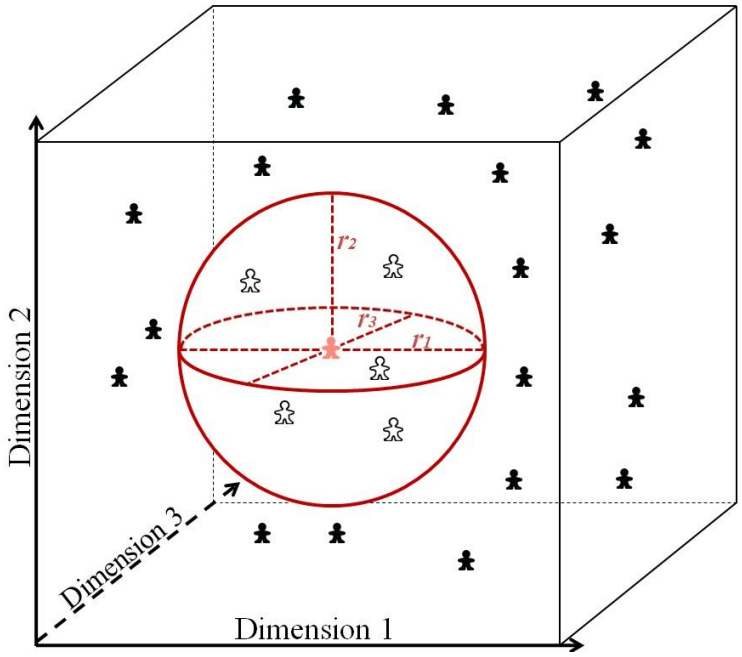



Figure 2 depicts a three-dimensional Blau space where individuals are positioned in terms of their unique combinations of characteristics along the three dimensions. Although we use three continuous variables as dimensions to visualize the social space, the number of dimensions can exceed three and include both binary and continuous variables. In the Blau space above, we measure Blau similarity index for every individuals. For each individual, others who are proximate to oneself are identified using a hypothetical sphere, and then, the average attitudes or behaviors of those DSOs are calculated to capture the interpersonal influence.

In Blau similarity analysis, a two-stage method is applied: First, we identify similar others who are positioned within the hypothetical sphere of the respondent using Euclidean distance. Second, we measure the effect from similar others by calculating the mean value of the dependent variable among those who have similar characteristics with the respondent.

To identify individuals who are similar to the respondent *i*, we calculate the Euclidean distance from *i* to all other individuals, denoted as *j*, in the Blau space as follows:

$$D_{ij} = \sqrt{\sum \frac{\Sigma_{p=1}^{k}(X_{pi} - X_{pj})^2}{\Sigma_{p=1}^{k}(X_{p(\max)} - X_{p(\min)})^2}}$$

$$D_{ij} = \sqrt{\frac{\Sigma_{p=1}^{k}\left(X_{pi} - X_{pj}\right)^2}{\Sigma_{p=1}^{k}\left(X_{p(\max)} - X_{p(\min)}\right)^2}}$$

where *X* is the individual values for each dimensions and *k* is the number of dimensions in Blau space. All dimensions, including continuous and binary variables, are standardized to span from zero to one. In this equation, a score of zero in D means perfect similarity, one means perfect dissimilarity, and .5 denotes an even mixture of similarity and dissimilarity between individuals *i* and *j*.[4]

Next, the mean value of the dependent variable among those who are positioned within a certain size of a hypothetical sphere is computed to capture the interpersonal influence from similar others. Blau similarity index (BSI) is calculated as follows:

$$BSI_i = \left( \frac{\sum_{j=1}^{n} Y_j}{n} \;\middle|\; D_{ij} \leq r \right)$$

where *r* is radius of a hypothetical sphere, *Y* is the dependent variable, and *n* is the number of individuals who are within the radius of the individual *i*. The radius is used as a threshold to sort out those who are distant from the individual *i* in the Blau space. If the radius is set to 0, only those whose characteristics completely match with the individual should be classified as DSOs; if the radius is set as 1, all individuals should be captured. In a Blau space where individuals are positioned evenly across the space, a radius of .5 should capture half of the population whose characteristics are approximately half similar and half dissimilar to the individual. As a reasonable threshold of similar others, we propose an arbitrary value of 1/3. The value of 1/3 indicates that, for someone to be identified as similar others, at least two-thirds of the characteristics should be identical with the respondent.

Blau similarity analysis can be utilized in numerous settings for various purposes. While dyadic-level data is necessitated for conventional network studies to capture interpersonal influence and organizational information is needed to apply Blau space analysis, this new method can be used in all sorts of individual-level survey data to explain the effect of similar others on various kinds of individual attitudes and behaviors. In other words, Blau similarity index can be incorporated into individual-level data within a regression framework in order to investigate whether similar others' behaviors have independent effects on individuals' behaviors, even after controlling the actual interpersonal networks of the respondent.

In addition, this method makes a significant contribution in the usage of Blau space by incorporating critical socio-demographic binary variables, including race and gender, as the dimensions of Blau space. Current Blau space methods have failed to model categorical variables as dimensions, because individuals are positioned at the each extreme of zero and one in this dimension and organizational niches, i.e., the average characteristics of preexisting members, are in the middle of zero and one and,

[4] The distance is computed as a value of .5 when two individuals have the same values for half of the dimensions and totally different values for other half of the dimensions. However, this is not necessary, and a half-similarity between two individuals in all dimensions may also lead to a value of .5. Moreover, different weights may be given to each dimension so as to capture a stronger effect of one dimension over other dimensions.

subsequently, are unable to capture meaningful number of individuals. In our method, on the other hand, the focus is not on organizational dynamics but on interpersonal influence, and Euclidean distance can be used to compute the distance between two individuals.

In this study, we integrate theories from social psychology and explore the possibility that the people who are proximally close to one another in Blau space, i.e., demographically similar others, can serve as reference groups for individuals as they constitute the individual's social environment. More specifically, we propose that this interpersonal influence from similar others may influence weight-related attitudes and behaviors among individuals. To define the Blau space, we use six demographic parameters: gender, grade, parents' income, IQ, race, and language spoken at home. Distance in Blau Space is calculated between all students enrolled in the same school.

To parse out the effects of Blau space from network effects and other social factors, we use a multinomial logistic regression model to predict the likelihood whether a respondent will fall into two separate categories of unhealthy behaviors or perceptions versus a healthy control group. We use multinomial logistic regression models because we cannot assert that the values of the dependent variables are equally spaced and because influence may affect different unhealthy weight perceptions (or behaviors) disproportionately. By predicting how a set of covariates affects different levels of the dependent variable, we shed greater light on how influence may be more effective at triggering some unhealthy states over others. For models of weight perception, we predict the likelihood of overestimating or underestimating weight status in comparison to correctly identifying their weight. Similarly, for models of weight action, we predict that the respondent will exhibit unnecessary weight control behaviors, including gaining or losing weight when they medically do not need to. In these models, the control group represents respondents who are taking the "correct" action for their weight status: maintaining weight if BMI is normal, gaining weight if BMI is low and losing weight if BMI is high. Coefficients can be interpreted as the likelihood of being in one value of the dependent variable compared to being in the reference category.

## KEY VARIABLES

To construct measures of weight perception, we draw on a question in Add Health that asks respondents, "How do you think of yourself in terms of weight?" Respondents may then choose from five options, ranging from very underweight to very overweight. We collapse this variable to three values, underweight, about the right weight, and overweight, such that very underweight and underweight were combined as well as very overweight and overweight. To calculate whether the respondent's perception is correct, we compare these perceptions against the respondent's actual BMI, using body mass index (BMI) cutoffs established by the CDC (2011) to judge whether the respondent's perception is accurate. A trifurcate dependent variable is then constructed to measure underestimation, over estimation and correct estimation of weight status.

This process is repeated for the weight behavior dependent variable, based off the question, "Are you trying to lose weight, gain weight, or stay the same weight?" Respondents are also given the option of "not trying to do anything about weight," which we collapse with "stay the same weight." Using the CDC cutoffs for BMI categories, we

construct a dependent variable with values for CDC recommended weight action, unnecessary weight loss/maintenance of underweight status, and unnecessary weight gain/maintenance of overweight status. We establish recommended weight action as taking action to bring one's weight to a healthy level: weight gain for underweight respondents, weight maintenance for normal weight respondents, and weight loss for overweight respondents. Unnecessary weight loss/maintenance is recorded for those underweight and normal weight respondents reporting they are trying to lose weight and for underweight respondents who report trying to stay at the same weight, while unnecessary weight gain/maintenance is recorded for those normal weight and overweight respondents who report trying to gain weight and for overweight respondents who report maintaining weight.[5]

These values are established for all respondents and further used in measures of network and Blau similarity analysis. To examine the effect of direct ties on the respondent, we construct a measure averaging the aforementioned correct/incorrect perceptions (or behaviors) variable for all members of ego's first degree alters. During the In Home survey, respondents are asked to nominate up to five male and female friends (ten total). If students report friends who attend the same school, the friend is selected from a roster of students within the school so that the data may be compiled into a global network for the saturation school. Respondents may also nominate friends outside of school, but because they are not also surveyed, we cannot account for their behaviors and perceptions. Hence, the network measures we employ aggregate the behaviors and perceptions of respondents' in school friends. We repeat the same averaging process for the respondent's DSOs who fall within the aforementioned .33 radius in Blau similarity analysis calculations.

We utilize misperceptions and unhealthy weight behaviors because we are interested in how others skew the individual's perceptions and behaviors. Theoretically, there is a difference between a medically healthy weight and a medically overweight individual perceiving themselves as being overweight. We highlight choose to investigate the disjuncture between objective weight status and individual behaviors and perceptions to better understand how DSOs and network members influence our perceptions of reality (like a prism) in this area. Further, from a public health standpoint, we may be better able to curb unhealthy weight behaviors if we understand that they are correlated with the perceptions and behaviors of our contacts.

**RESULTS**

Incorrect weight perceptions and behaviors are common throughout the Add Health saturation schools. There is systematic weight misperception by gender: females are more likely to overestimate their weight (30%) while males are more likely to underestimate their weight (25%). When we examine weight actions, we find that incorrect weight

[5] Henceforth, when weight action is described as "recommended" or "unhealthy," we refer to the respondent's weight action in comparison to the CDC recommendations for his BMI status, not to normative judgments about specific weights.

action is similarly gendered: 41% of females are taking action to lose weight unnecessarily or maintain their underweight status, while 39% of males are taking action to gain weight unnecessarily or maintain their overweight status. These numbers are staggering as roughly one third of our sample misperceives their weight and nearly half exhibit weight behaviors problematic for their objective BMIs.

**Table 1: Weight Perception by BMI category and gender.** Correct weight perceptions are bolded.

| | **Female** | | | | **Male** | | | |
|---|---|---|---|---|---|---|---|---|
| | *Perceives* Self as Underweight | *Perceives* Self as Normal Weight | *Perceives* Self as Overweight | *Total* | *Perceives* Self as Underweight | *Perceives* Self as Normal Weight | *Perceives* Self as Overweight | *Total* |
| Underweight BMI | **69** | 79 | 5 | *153* | **66** | 46 | 1 | *113* |
| Normal Weight BMI | 62 | **474** | 305 | *841* | 222 | **580** | 86 | *888* |
| Overweight BMI | 8 | 26 | **251** | *285* | 7 | 111 | **251** | *369* |
| *Total* | *139* | *579* | *561* | *1,279* | *295* | *737* | *338* | *1,370* |

**Table 2: Weight Action by BMI category and gender.** Correct weight actions bolded.

| | **Female** | | | | **Male** | | | |
|---|---|---|---|---|---|---|---|---|
| | Trying to Lose Weight | Stay Same Weight | Trying to Weight Gain | *Total* | Trying to Lose Weight | Stay Same Weight | Trying to Gain Weight | *Total* |
| Underweight BMI | 11 | 105 | **37** | *153* | 3 | 47 | **63** | *113* |
| Normal Weight BMI | 409 | **394** | 38 | *841* | 101 | **424** | 363 | *888* |
| Overweight BMI | **247** | 37 | 1 | *285* | **199** | 136 | 35 | *369* |
| *Total* | *667* | *536* | *76* | *1,279* | *393* | *607* | *460* | *1,370* |

Does nonrelational influence from Blau space lead respondents to misperceive their weight statuses? Yes, but only sometimes. As more Blau DSO's (identified in Blau similarity analysis) overestimate their weight, the respondent too is more likely to overestimate their weight. As the average weight perception in the model shifts from correct estimation (a score of zero) to overestimation (a score of +1), the risk of the

respondent overestimating his own weight increases by a factor of 3.98 when all other variables are held constant. The multinomial logistical regressions (Tables 3 & 4) support the gendered findings of the cross tabulations, showing females are significantly more likely to overestimate their weight than males. Similarly, black students are more likely to misestimate their weights than students of other races. Being on a sports team as well as engaging in active activities after school are also significant predictors of weight overestimation. In contrast, as weight status increases, heavier respondents are less likely to overestimate their weight.

With regard to weight perceptions, the effect of Blau DSO's is not symmetric, as underestimates of weigh status among Blau DSO's are not significant predictors of respondent weight underestimation. Better predictors of weight underestimation are weight status, gender, race and activity levels. Thinner respondents are more likely to underestimate their weights than normal weight and overweight respondents. Holding all else constant, a point increase in respondent BMI predicts increased risk of underestimating his weight by a factor of 1.75. Black respondents are also more likely to underestimate their weight than respondents of other races. This finding in conjunction with their higher likelihood of overestimating suggests that they may have less accurate perceptions of their weight in general. On the other hand, females are significantly less likely than males to underestimate their weight, as are students who engage in physically active activities. Active students are also significantly less likely to overestimate their weight, suggesting that these students are most likely to correctly estimate their weights. Interestingly, like higher rates of physical activity, higher rates of TV and video watching also share a significant, negative relationship with weight underestimation. Because higher rates of TV and video watching are negatively associated with weight underestimation but have a null relationship with weight overestimation, the data suggest that increasing amounts of TV watching are related to increased likelihood of correct estimation or overestimation of weight. It is important to note that the effects of the network are not significant in either model.

Turning to weight behaviors, the behaviors of Blau DSO's are significant in predicting individual weight behavior when DSO's try to gain weight unnecessarily. In other words, as more DSO's exhibit unnecessary weight gain behaviors, so too does the respondent. The network has a similar significant effect, albeit smaller than the effect of Blau proximity analysis, demonstrating that unnecessary weight gain behaviors among friends are analogously exhibited by the respondent. Whereas higher rates of unhealthy weight gain/maintenance in the network predict increased individual risk of unhealthy weight gain/maintenance by a factor 1.75, the same shift in attitudes among Blau DSOs predicts an increase in risk by a factor of 9.92. Put differently, the predicted relationship of the bubble to individual risk of unhealthy weight gain/maintenance is roughly four times larger in magnitude than that of the network. Higher BMI weight status is also correlated with higher likelihood of gaining weight unnecessarily; however, this may be by virtue of the fact that it is impossible to lose weight unnecessarily if the individual is already overweight. Likewise, being black is also associated with unnecessary weight gain..

Like Table 3, Blau DSO's and network are only significant predictors of one type of unhealthy weight behavior. Neither the behavior of DSO's nor network alters significantly predicts whether respondents will try to lose weight unnecessarily. Echoing

the original cross tabulations in Table 2, females are significantly more likely than males to try to lose weight when they medically should not. The risk of unhealthy weight loss/maintenance of underweight status increases by a factor of 6.10 relative to males, ceteris paribus. Higher amounts of TV and video watching are slightly more likely to to lose weight unnecessarily or maintain underweight status. For each additional hour of TV and video watching, the respondent's risk of losing weight unnecessarily or maintaining underweight status increases by a factor of 1.01 when all other variables are held constant.

Throughout these models, it is important to note the significance of the Blau DSO's in relation to the network effects. The correlation between DSO's and individual behavior is significant in more models, and with larger coefficients, than the network variables.[6] Although the respondent's direct ties may also be present counted as Blau DSO's, by controlling for the network separately, the Blau DSO coefficient describes the influence of the DSO's on individual weight perceptions/behaviors *net* of the influence from the respondent's first-degree alters. Consequently, the bubble coefficient is a very conservative test of the nonrelational influence effect, as it looks at only that influence which is not already captured by close friends. Although Blau DSO's may include friends who are not nominated by individuals or who are greater than two steps from the ego, it is possible to treat these effects as separate from those of the network. Firstly, not all students nominate up to five alters. Compared to the 2,442 (2,482) students in the sample who nominate one male (female) best friend, only 863 (661) nominate up to five male (female) students as friends. The fact that not all nominations are utilized suggests that respondents are either able to account for their friends who they deem closest. Further, of those students who utilize all friendship nominations, the bubble then captures their weaker ties in addition to those with whom they have casual contact.

To test for robustness, we also calculated models (not reported) with additional controls for gendered interactions, respondent attractiveness, and using Wave 2 dependent variables. The patterns of significance and magnitude among the coefficients of key variables did not differ across models, so we present the trimmed Wave I models for reading ease. Although we include gender and race as dimensions in creating the Blau bubbles, we also include them as control variables in our final models to control for additional influence they may have on weight perceptions and outcomes. When including them as Blau dimensions, they speak mainly to their roles in creating a reference groups for the individual. As Blau dimensions, they are salient in predicting homophilious association among respondents, an association we extend to the creation of reference groups comprised of DSOs. As control variables, they measure direct influence on the dependent variable that is not accounted for in the reference group patterns established in the Blau bubble, such as the predict effect on being female on weight misperceptions net of the effect being female has for determining the individual's reference group.

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[6] These variables are on the same scale and can thus be directly compared to one another.

**Table 3:** Multinomial Logistic Regression of Model of Respondent's Weight Image as Predicted by Weight Image within R's Bubble and Weight Image within R's Network, Reported as Relative Risk Ratios

| | Model 1: R Underestimates Weight | Model 2: R Overestimates Weight |
|---|---|---|
| Wt Image Blau DSO's | .82 | **3.98*** |
| Wt Image Network | .65 | .94* |
| Female | **.42*** | **2.56*** |
| Average BMI of Bubble | 1.14 | 1.08 |
| Average BMI of Network | **1.05*** | .98 |
| R's BMI Status | **1.73*** | **.17*** |
| Pregnant | .93 | 1.14 |
| Sports Team | 1.09 | **1.43*** |
| Black | **2.01*** | **1.89*** |
| Hrs TV and Video | **.99*** | .97 |
| Physically Active | **.91*** | **.92*** |
| Constant | .006 | .12 |

N= 2648

**Table 4:** Multinomial Logistic Regression of Model of Respondent's Weight Action as Predicted by Weight Action within R's Bubble and Weight Action within R's Network, Reported as Relative Risk Ratios

| | Model 3: Lose Weight When Not Overweight | Model 4: Gain Weight When Not Underweight |
|---|---|---|
| Wt Action Blau DSO's | 1.21 | **9.92*** |
| Wt Action Network | .97 | **1.76*** |
| Female | **6.10*** | **.36*** |
| Average BMI of Bubble | 1.06 | .92 |
| Average BMI of Network | .98 | 1.00 |
| R's BMI Status | **.11*** | **2.06*** |
| Pregnant | 1.87 | **4.31*** |
| Sports Team | .89 | 1.01 |

| | | |
|---|---|---|
| Black | .97 | **1.56*** |
| Hrs TV and Video | **1.01*** | **.98*** |
| Physically Active | 1.03 | 1.03 |
| Constant | 3.29 | **.001** |

N= 2650

## DISCUSSION

In our results, we provide ample support for the effect of the Blau DSOs on predicting weight perceptions and actions. Blau similarity analysis predicts that weight perceptions and behaviors among DSOs are more often and strongly correlated with individual behavior than network measures aggregated from five friend nominations. This result supports other empirical findings from social comparison theory that nonrelated others affect individual-level attitudes and behaviors. Further, these findings suggest that the Blau similarity analysis is a useful quantitative method for measuring the effects of reference groups on individual-level outcomes. Finally, the validity of the Blau DSO's as a reliable predictor of these outcomes allows us to reconceptualize "environmental" influence that is a separate but important counterpart to network influence.

The large predicted effects of the Blau DSO's (in models where they are significant) often trump the friendship network in predicting weight behaviors and weight actions. Frequently, these effects work in tandem to predict outcomes, but the Blau DSO's are consistently stronger in magnitude and significance. This result may stem from the way that we determine Blau DSO's, such that there may be far more DSO's than there outgoing friendship nominations (capped at five nominations). Even if each DSO does not have as great an influence on the individual as a close friend, the sum influence of the DSO's may be greater simply because it picks up influence from more alters, each of whom have a non-zero influence on the ego because of their resemblance to him. Relatedly, the strength of the Blau DSO's may be a function of the time we spend in the presence of indirect others versus our actual ties. Although we may prefer to spend time with our close ties, much of our day is dominated by people with whom we do not have close ties, such as coworkers, peers and fellow commuters. Given that the data surveys high school students, much of respondents' time is spent in classrooms or in extracurricular activities where they may be separated from the friends they nominate in the network module. Consequently, while friends and Blau DSO's may influence the individual alike, individuals may be more influenced by Blau DSO's simply because of the proportionally greater time they spend in their presence. Alternatively, Blau similarity analysis may measure an influence that better resembles an environmental force than the aggregate sum of influences from DSO's. As a broader measure of environment, the Blau similarity analysis adjusts for the more general norms that apply to people who resemble the ego, such as weight expectations for middle-SES, English-speaking, white females or low-SES, Spanish-speaking, black males. The comparison between the Blau DSO and network coefficients would then becomes a comparison of culture versus networks rather than of direct versus indirect influence. However, this final interpretation is unlikely given the significance of Blau DSO's and network net of the control variables.

Neither the network nor the Blau DSO's affects each model similarly. In fact, in both Tables 3 and 4, the network and DSO effects are stronger for one model than the other. However, given the marginal significance of the DSO and network coefficients in Table 1, it could be argued that these measures are better predictors of individual perception than behavior. This difference may stem from the relatively "low cost" of influencing perceptions. Whereas communal talk about weight may lead the individual to adopt those attitudes, it is of greater cost to the individual to adopt the according behaviors. For example, it may cost us little to overestimate our weight but it takes planning, sacrifice and energy to follow through to losing weight. This applies to both males and females who systematically differ in weight action intentions. Nichter (2001) finds that despite adolescent females' rampant discussion of weight insecurities, a phenomenon she dubs "fat talk," girls show little follow through in actually pursuing weight loss. Rather, fat talk serves as a communal glue or a signal of solidarity to other friends. Conversely, though adolescent males may complain about being scrawny, muscle gain requires physical exercise and dietary changes that the individual may be unwilling (or unable) to implement. However, not all weight gain may require such effort (if the goal is simply more pounds) and the significant effects of the Blau DSO's and the network in Model 4 may reflect the relative ease with which weight gain is acquired. Additionally, if the ultimate goal is "bulk up," prevailing masculine fashions that are loose may more easily disguise added pounds as added muscle for men.

The inconsistent significance of the Blau DSO's and network across models illuminates the contextual importance of influence, especially regarding gender. Across models, gender is consistently a very strong predictor incorrect weight perceptions and actions. Women are significantly more likely to overestimate their weight and to lose weight unnecessarily. These effects are so strong that influence becomes a minor player in predicting how such misperceptions and actions take place. Because gender plays such a decisive role in predicting inaccurate weight perceptions and unhealthy behaviors, other variables, such as network or race, lose some of their explanatory power. However, this finding does not jeopardize the theoretical or empirical implications of Blau similarity analysis. Rather, it suggests that female respondents should be surveyed at younger ages if we wish to understand how malleable perceptions are shaped among young women.

We find that women are likely to overestimate their weight and lose weight unnecessarily. While influence is significant in predicting weight overestimation, it is not significant in predicting unhealthy weight loss. We suspect that this difference stems from cultural pressure demanding that women always be thinner, even when thinness comes at the cost of health. In this model, influence from DSO's and the network may be a poor predictor of unhealthy weight loss because of women's constant pursuit to lose weight, regardless of whether such weight loss would provide a physical health advantage. We believe that influence is not a significant factor in this decision because female adolescents in this study have already internalized norms of ideal body size by the time they reach the point of data collection. Put differently, if one of these young women were set on a deserted island where she had no friends or others to observe, she may still feel that she should lose five pounds. Influence is functional to the extent that it sways the individuals from Action A to Action B (or Perception A to Perception B). However, if there is no initial flexibility in either of these states, the push and pull of influence hits a theoretical wall. We do not propose that females are not influenced in their weight

actions, but rather that cultural scripts in this area so strong and consistent, both in the moment and over time, that interpersonal influence is essentially irrelevant. By the time data is collected at ages fourteen and above, weight action attitudes among females may have cemented and become resilient to the ebb and flow of influence from the network and Blau DSO's. Accordingly, when we address the problem of influence on individual-level adolescent behavior, we should be more concerned about the influence of like others among adolescent boys, as their attitudes and behaviors appear to be more pliant in their teenage years.

We hypothesize that the differing patterns across models in Tables 1 and 2 appear because women do not need to feel that they are overweight in order to experience the pressure to lose weight. While friends and similar others may shape females' perceptions of whether their body weights are underweight, normal weight or overweight, normal weight females may be just as likely as overweight females to attempt weight loss, regardless of the health incentives. Females in a healthy weight range who report trying to lose weight may do so for different reasons than overweight females (such as health versus appearance). Nonetheless, the saying "You can never be too rich or too thin," speaks absolutely, and so its broader pressure may similarly be felt across weight statuses. However, thinness is not the same as health, a message that is frequently lost or conflated in the sparring discourse between cultural expectations and medical recommendations. Medical guidelines and cultural aspirations do not always align and thusly, we find a propensity for women to lose weight when they medically do not need to in response to cultural approbation of thinness. Rewards to thin women may stem both from the social approval other women, but also from potential mates. The need to attract a mate based on appearances harkens back to Scott's (1965) paper on the emphasis women must place on attributes like beauty and likeability because their SES is not sufficient in itself to attract men in the same way that it is for men to attract women.

A game theoretic approach also suggests why women who do not need to lose weight continue to do so even if it may have marginal gains or threats to their health. Living in a society that privileges thinness among (especially white) women, the definition of thin may be more relative than absolute. Thin is not so much a number than it is a status in comparison to others. As a result of its relative status, competition arises among women to be thinner than others. Although the process of weight loss may be time intensive or unpleasant, by forfeiting weight loss behaviors, one potentially falls behind the efforts of others. Put in a prisoner's dilemma framework, women, as a whole, would gain more if they collectively stopped engaging in unnecessary weight loss behaviors (cooperation). However, because an individual woman may not trust that other women will stop, and thus gain advantage over her in a market that rewards thinness, the individual will not stop herself lest she be the sucker in the prisoners' dilemma. Hence, women as a whole continue to engage in weight loss behaviors (mutual punishment), favoring the energy involved in weight loss (defecting) to the risk of being "betrayed" by others. Because women of high SES are not guaranteed a larger selection of male suitors in the same way high SES males are, competition amongst women for high status mates is harsher because all women compete against all women for desirable mates, rather than high SES men competing against other high SES men for desirable partners. Moreover, because females' status has been posited as more derivative of romantic relationships

than males' (Krain, Cannon, and Bagford 1977), the stakes of finding a high status mate are higher for women than for men.

Ultimately, this study shows that nonrelational influence, as captured through Blau similarity analysis, is a very real and observable phenomenon. Using the example of weight-related perceptions and behaviors, we show that Blau DSO's are a unique and powerful predictor of individual outcomes. Moreover, the data suggest that we should focus efforts at adolescent (and younger) populations about the myriad images of healthy weight. The immense amount of weight misperceptions and inappropriate weight behaviors suggest that society—at the network, Blau DSO's, and broader levels—has a responsibility to educate young adults about accurate weight images and healthy weight behaviors.

## FUTURE APPLICATIONS

The findings of the Blau DSO's in our models offer promise for new ways of capturing influence in the social environment. However, much like Blau space, much work remains in deciding which parameters to utilize in the creation of the space. Currently, the researcher has total discretion in deciding which variables to use as dimensions in the Blau similarity analysis, lacking a sufficient goodness-of-fit test to determine whether the parameters selected are apt choices. Additionally, the parameters used in the determination of Blau DSO's are currently equally weighted. Because different forms of homophily may be stronger than others, additional research may focus on the assignment of weights to different dimensions of the Blau similarity analysis in order to best capture associational practices.

With regard to our case study, although we operationalize weight perceptions and weight-related actions as separate variables, it may be harder as an onlooker in reality to differentiate between the two. For example, it may be difficult to observe a pure weight perception in a way that it entirely separate from a weight behavior. Overhearing conversations in which people discuss their weights may be as clean a perception we can observe, while other visible signals, such as exercising and eating low calorie (or very high calorie) food are behaviors. This dearth of observable perceptions begs the question of whether behaviors are interpreted cognitively separately from perceptions.

Because humans are a complex and reflective species, we may attribute perceptions to others based on their behaviors (Stiller and Dunbar 2007). Consider the example of a person drinking a diet soda. When we observe this person, we may see a behavior (dieting) or a perception tied with a behavior ("They're drinking a diet soda because they think they should lose weight."). Further, we may wrongly attribute perceptions to observed behaviors. If we see a person running, we may assume they are running to lose weight or that they are running to maintain their weight based on the weight of the observed person and our own motives in that scenario. In our models, we are unable to disentangle the causal mechanism linking the perceptions and behaviors of similar others with individual behaviors, so we cannot address whether it is the behaviors or assumed perceptions that couple with those behaviors that influence the individual. Nonetheless, these findings provide important fodder for additional social psychological

work that isolates the mechanisms responsible for the observed influence between the Blau DSO's and the individual.

## CONCLUSION

In this paper, we provide evidence in support of the relationship between the weight-related behavior and perceptions of demographically similar, yet unconnected, others and individual attitudes and behaviors. Through the design of Blau similarity analysis, we identify a central reference group from which individuals take cues regarding personal body weight decisions. Theoretically, we argue that Blau DSO's are an important source of influence because they are the group against which the individual evaluates herself. In accordance with reference group theory, the individual does not need to be tied to the DSO's who comprise her reference group because her perceptions and attitudes function as a reaction to this personal evaluation, rather than from direct pressure. We find that DSO's exhibit the strongest relationship to individual's perceptions when they overestimate weight and when partake in unhealthy weight gain or overweight maintenance behaviors. In fact, the same unhealthy weight gain behaviors among DSO's are predicted to have an effect four times larger than those of network alters, all other factors held constant. We propose that the differential significance of DSO's in predicting individual perceptions and behaviors stems from the relatively cheaper cost of altering perceptions rather than behaviors and from the extraordinary intransitivity females show in their drive for weight loss, regardless of the influence of network alters and DSO's.

Theses results shed important light in the way that influence travels through the social environment. In contrast to traditional social network analyses, which bind the flow of influence through ties, our work suggests that a sizeable and significant source of influence comes from those who resemble but are not tied to the individual. Blau DSO's comprise a persistent social environment that follows the individual in places where his direct ties may not be present, such as the train to work or the lecture hall. When the ego's social sphere is expanded to included DSO's, influence is better thought of as a diffusing through a space which encompasses the individual's local reference group and friends, rather than through just the prescribed channels of relationships. Future sociological and health behavioral research must expand its metrics of influence to include Blau DSO's in order to accurately predict individual health decisions.

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